INDEX OF SHEETS

SEE PLAN SHEET 2

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

DESIGN SPEED- 50 MPH
ADT- 6,981 (2022)
9,828 (2042)

FUNCTIONAL CLASSIFICATION:
RURAL PRINCIPAL ARTERIAL

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	C 111-9-42		1
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

BRAZORIA COUNTY
BS 288B
CSJ 0111-09-042

STATE PROJECT NO. C 111-9-42

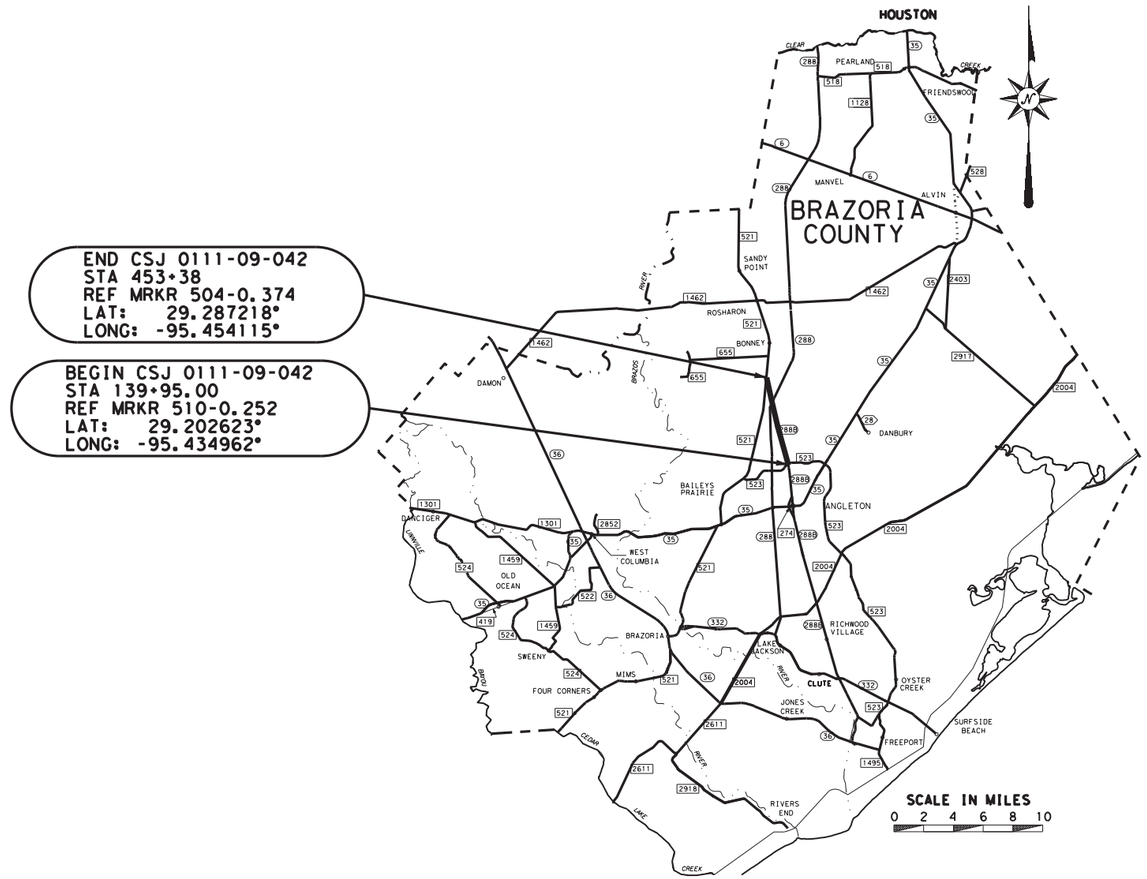
PROJECT LENGTH: 31,343.00 FT = 5.936 MILES

LIMITS: FROM FM 523 TO FM 521

FOR THE CONSTRUCTION OF ASPHALT CONCRETE PAVEMENT OVERLAY CONSISTING OF ADDING SHOULDERS, PAVEMENT REPAIR, ONE COURSE SURFACE TREATMENT, PERMEABLE FRICTION COURSE OVERLAY, SIGNING AND STRIPING.

END CSJ 0111-09-042
STA 453+38
REF MRKR 504-0.374
LAT: 29.287218°
LONG: -95.454115°

BEGIN CSJ 0111-09-042
STA 139+95.00
REF MRKR 510-0.252
LAT: 29.202623°
LONG: -95.434962°



PROJECT VICINITY MAP

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT. REQUIRED SPECIAL LABOR PROVISIONS FOR ALL STATE CONSTRUCTION PROJECTS (SP000---008).

RAILROAD CROSSING: NONE
EXCEPTIONS: NONE
EQUATIONS: ONE

Texas Department of Transportation®

SUBMITTED FOR LETTING: 9/23/2022

DocuSigned by:
María Pilar Aponte, P.E.
C8B39625B1F14DE...
AREA ENGINEER

APPROVED FOR LETTING:

DISTRICT ENGINEER

9/23/2022
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111090042\4 - Design\Plan Set\3. Roadway\TitleSht.dgn

STATE OF TEXAS
JAMIE A. H. JONES
128752
LICENSED PROFESSIONAL ENGINEER

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

Jamie A.H. Jones — 09/29/2022

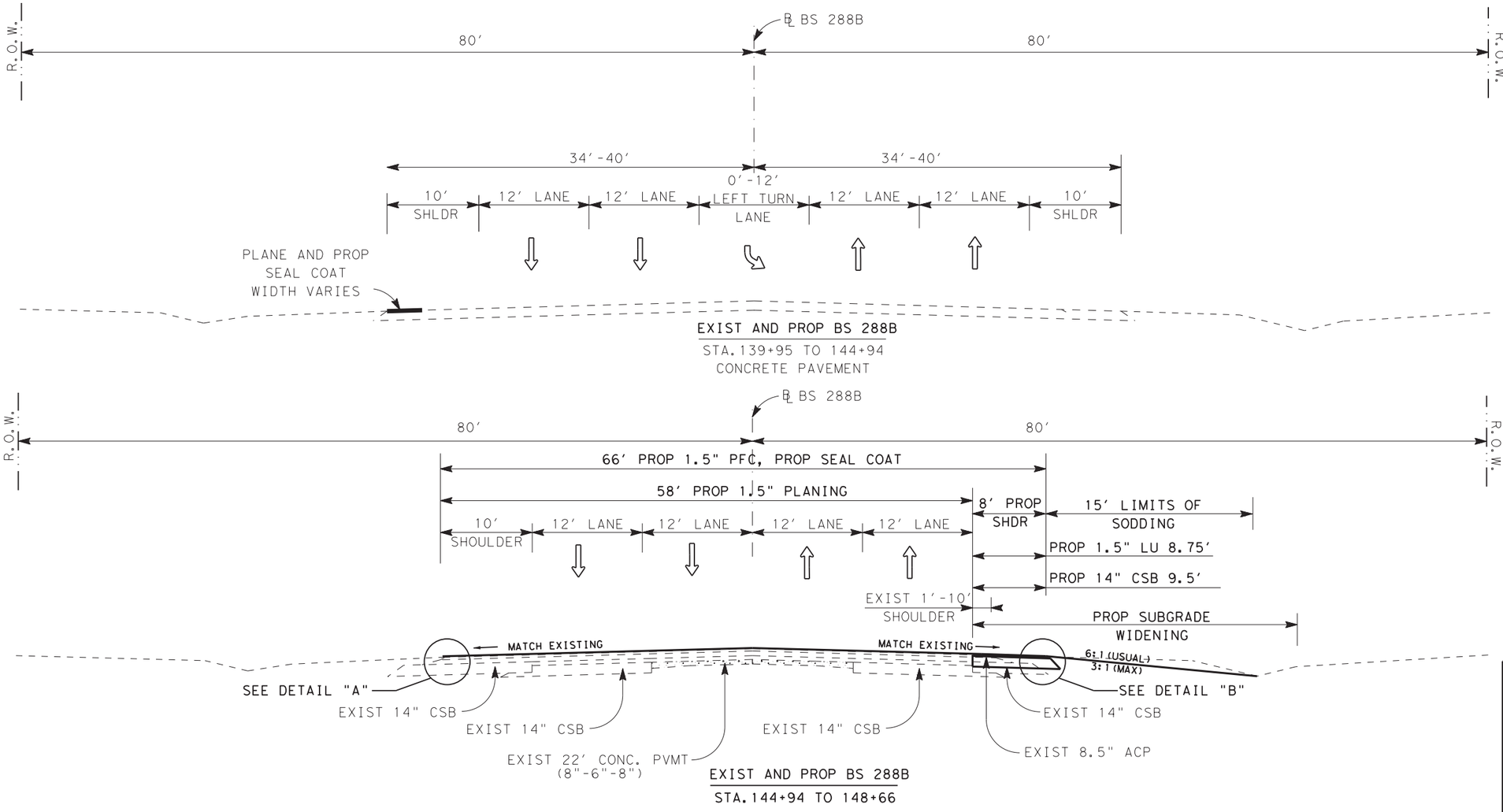
JAMIE A.H. JONES, P.E. — DATE

INDEX OF SHEETS

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		2

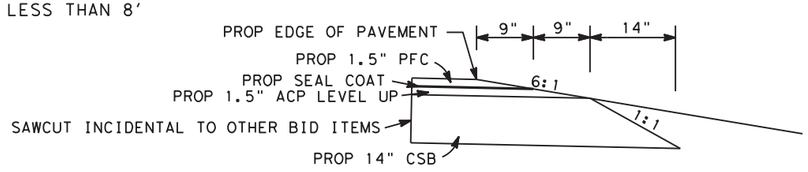
SHEET 1 OF 1



* PROP SHOULDER WIDENING ONLY AT LOCATIONS WHERE EXISTING SHOULDER IS LESS THAN 8'

NOTES:

1. ALL STATIONING BASED ON BS 288B MAINLANE ALIGNMENT.
2. ENGINEER TO DETERMINE PAVEMENT REPAIR AFTER PLANING OPERATIONS. NO REPAIR TO BE MADE PRIOR TO PLANING.
2. WIDENING SHOULDERS WILL MATCH EXISTING SLOPE TO MAINTAIN NORMAL CROWN OF ROADWAY.
3. BLADE OFF EXISTING VEGETATION FROM EDGE AND BACKFILL (ITEM 134 TYP A OR B)PRIOR TO OVERLAY. VEGETATION REMOVAL AND SHOULDERING UP IS SUBSIDIARY TO VARIOUS BID ITEMS.
4. EXISTING PAVEMENT MATERIALS AND DEPTHS MAY VARY.
5. VERTICAL SAWCUTS TO BE VERIFIED BY THE ENGINEER AND IS SUBSIDIARY TO VARIOUS BID ITEMS.



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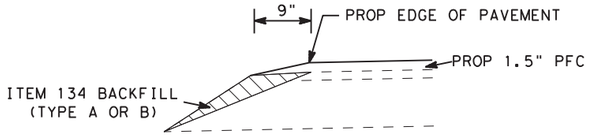


DETAIL "A"
N.T.S.

SCALE N.T.S.
SHEET 1 OF 5

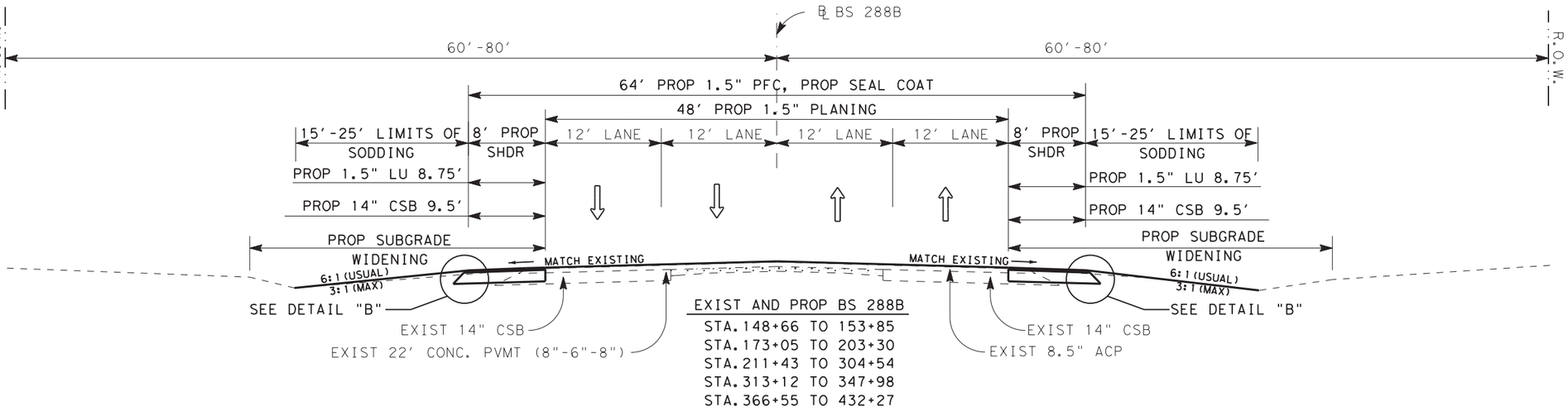
STATE OF TEXAS
JAMIE A. H. JONES
128752
LICENSED PROFESSIONAL ENGINEER

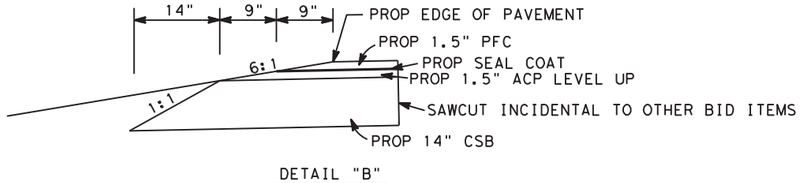
Jamie A.H. Jones, P.E.
09/23/2022

PROPOSED TYPICAL SECTIONS

Texas Department of Transportation

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		3





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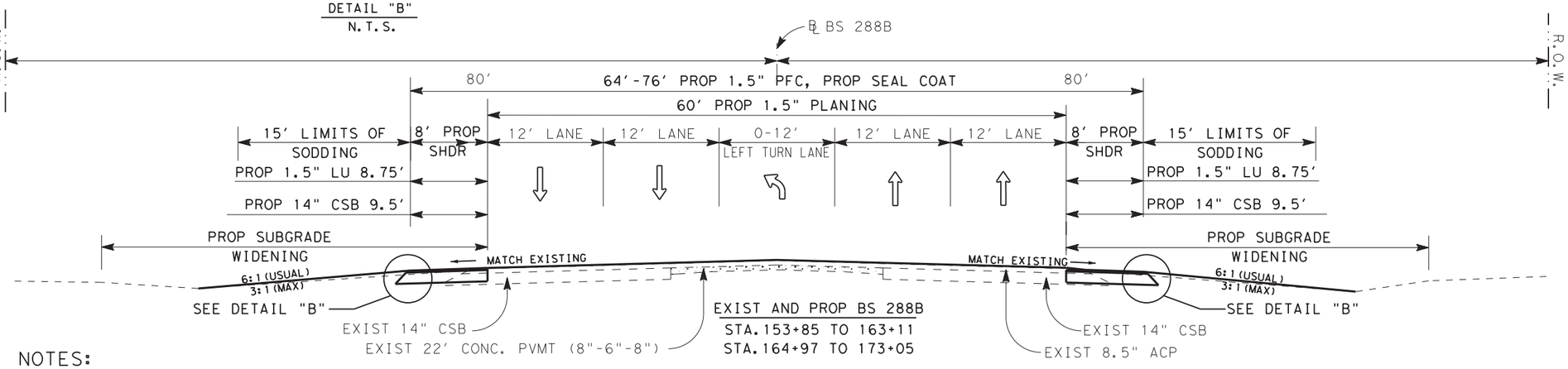

NOTES:

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STATE OF TEXAS
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Jamie A.H. Jones, P.E.
09/23/2022

PROPOSED TYPICAL SECTIONS

Texas Department of Transportation®
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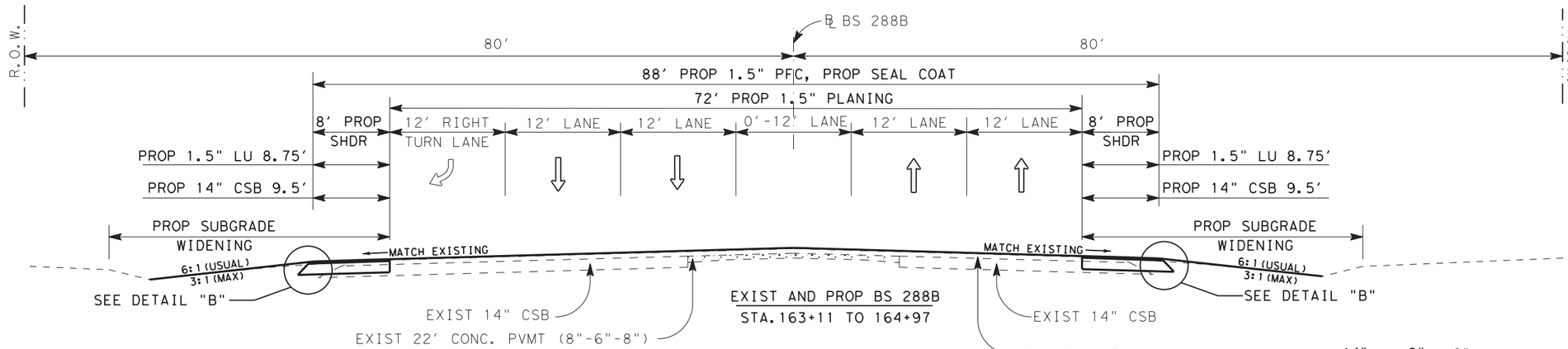
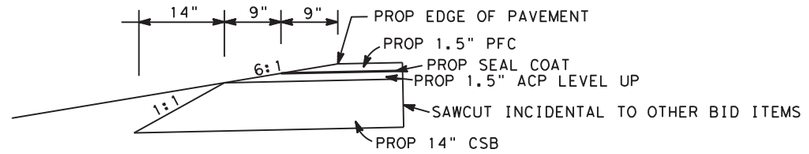
CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		4

SCALE N.T.S.
SHEET 2 OF 5

9/23/2022
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111090042\4 - Design\Plan Set\3. Roadway\Typical Sections.dgn





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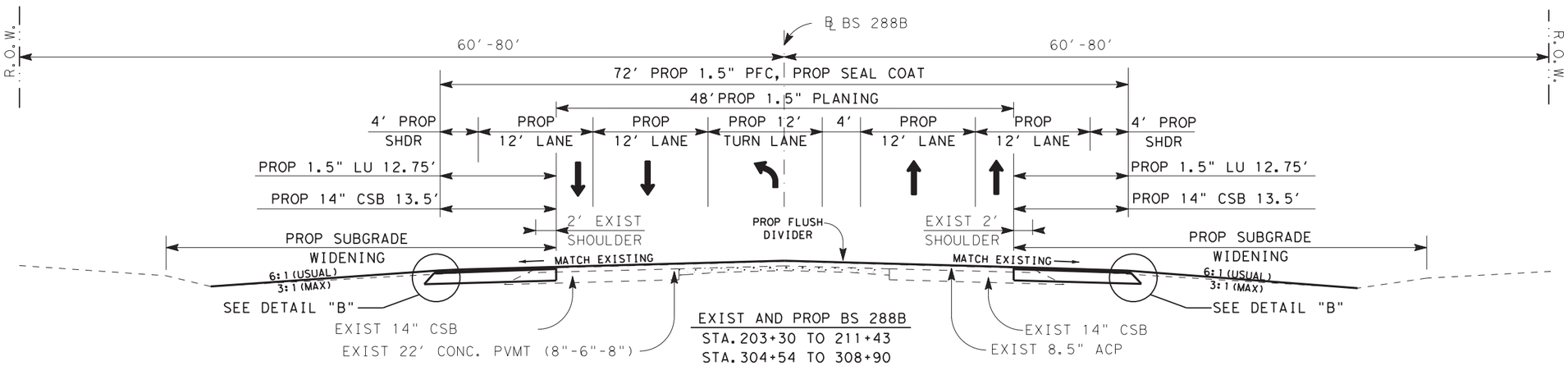

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09/23/2022

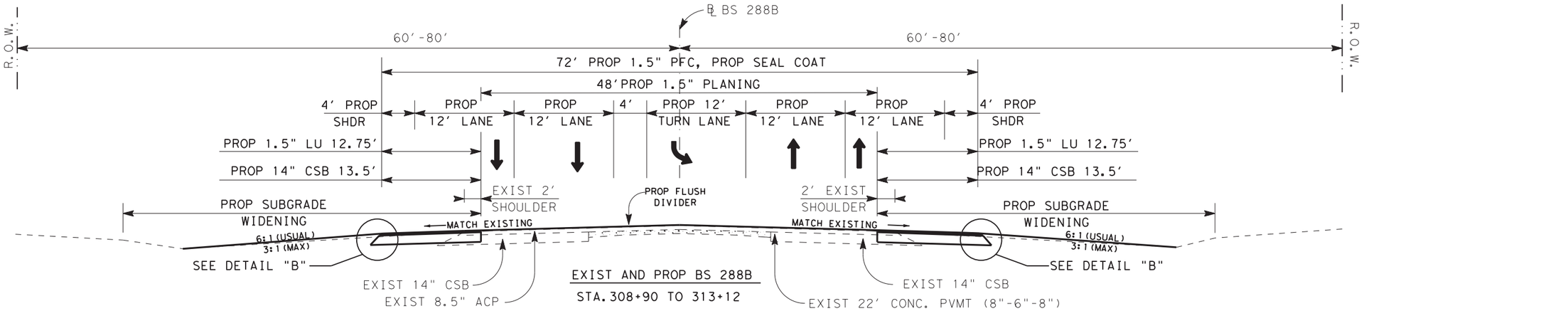
PROPOSED TYPICAL SECTIONS

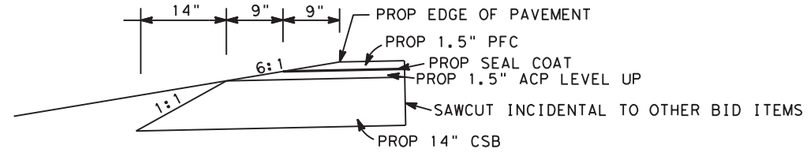
Texas Department of Transportation

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		5

SCALE N.T.S.
SHEET 3 OF 5

9/23/2022
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111090042\4 - Design\Plan Set\3. Roadway\Typical Sections.dgn





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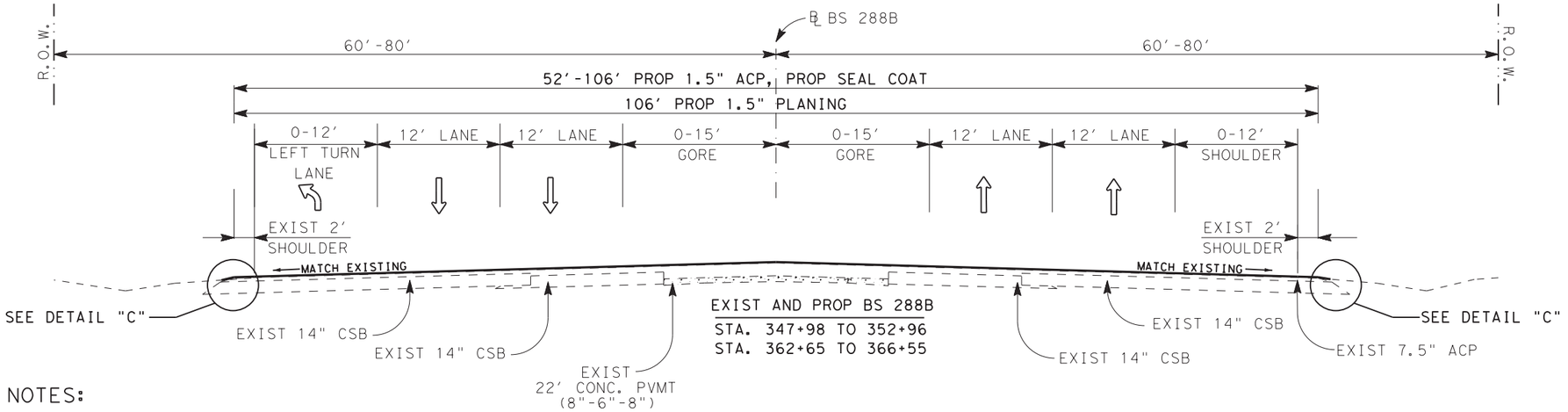

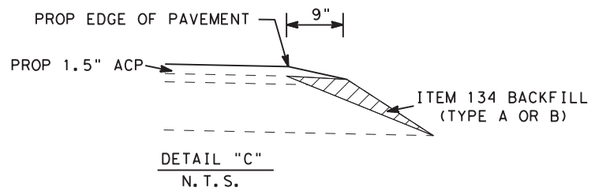

DETAIL "C"
N.T.S.

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SCALE N.T.S.
SHEET 4 OF 5

STATE OF TEXAS
JAMIE A. H. JONES
128752
LICENSED PROFESSIONAL ENGINEER

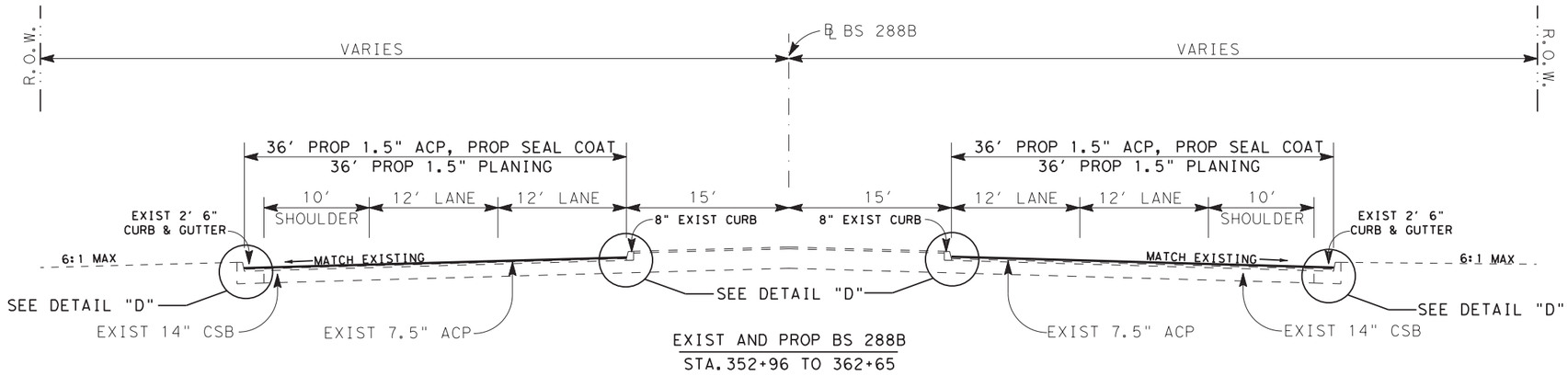
Jamie A.H. Jones, P.E.
09/23/2022

PROPOSED TYPICAL SECTIONS

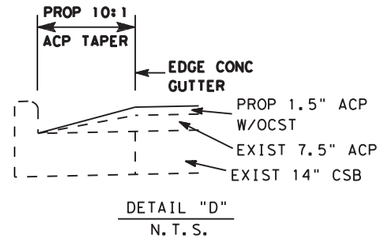
Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		6

9/23/2022
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111090042\4 - Design\Plan Set\3. Roadway\Typical Sections.dgn



EXIST AND PROP BS 288B
STA. 352+96 TO 362+65



DETAIL "D"
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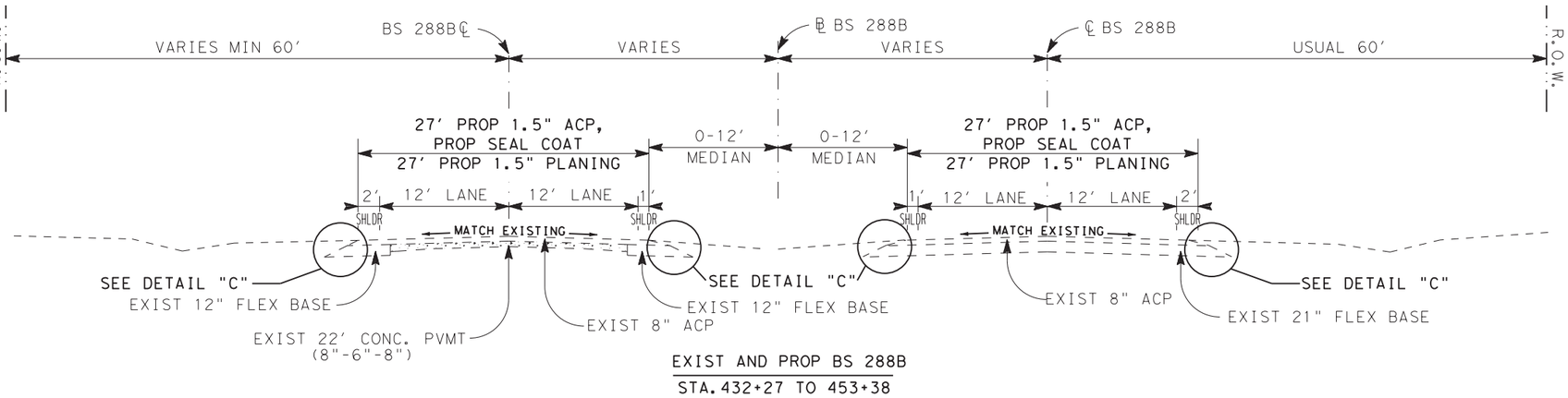
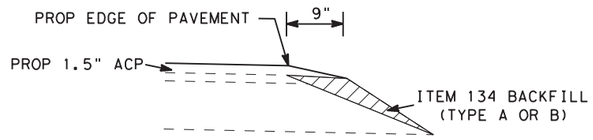


EXIST AND PROP BS 288B
STA. 432+27 TO 453+38



DETAIL "C"
N.T.S.

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09/23/2022

PROPOSED TYPICAL SECTIONS

Texas Department of Transportation
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CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		7

SCALE N.T.S.
SHEET 5 OF 5

FY	MSEC	HIGHWAY	RDBD	REFERENCE MARKERS BEGIN		REFERENCE MARKERS END		LEN	PTYPE	IRI(IN/MI) TEST MM/DD/YYY	LEFT	RIGHT	SI
2022	02	BS0288B	k	0504	+0.130	0504	0.230	0.1	7	10/3/2021	93	120	3.5
2022	02	BS0288B	k	0504	+0.230	0504	0.330	0.1	7	10/3/2021	93	109	3.6
2022	02	BS0288B	k	0504	+0.330	0504	0.430	0.1	7	10/3/2021	99	118	3.5
2022	02	BS0288B	k	0504	+0.430	0504	0.530	0.1	7	10/3/2021	75	109	3.8
2022	02	BS0288B	k	0504	+0.530	0504	0.630	0.1	7	10/3/2021	89	105	3.7
2022	02	BS0288B	k	0504	+0.630	0504	0.730	0.1	7	10/3/2021	72	98	3.9
2022	02	BS0288B	k	0504	+0.730	0504	0.830	0.1	7	10/3/2021	89	98	3.8
2022	02	BS0288B	k	0504	+0.830	0504	0.930	0.1	7	10/3/2021	78	101	3.9
2022	02	BS0288B	k	0504	+0.930	0504	1.030	0.1	7	10/3/2021	76	116	3.7
2022	02	BS0288B	k	0504	+1.030	0504	1.130	0.1	7	10/3/2021	64	86	4.2
2022	02	BS0288B	k	0504	+1.130	0504	1.230	0.1	7	10/3/2021	81	108	3.8
2022	02	BS0288B	k	0504	+1.230	0504	1.330	0.1	7	10/3/2021	108	117	3.4
2022	02	BS0288B	k	0504	+1.330	0504	1.344	0.1	7	10/3/2021	94	107	3.7
2022	02	BS0288B	k	0504	+1.528	0504	1.628	0.1	7	10/3/2021	84	83	4.0
2022	02	BS0288B	k	0504	+1.628	0504	1.728	0.1	7	10/3/2021	108	100	3.6
2022	02	BS0288B	k	0504	+1.728	0504	1.828	0.1	7	10/3/2021	69	92	4.0
2022	02	BS0288B	k	0504	+1.828	0506	0.046	0.1	7	10/3/2021	80	101	3.8
2022	02	BS0288B	k	0506	+0.046	0506	0.146	0.1	7	10/3/2021	82	86	4.0
2022	02	BS0288B	k	0506	+0.146	0506	0.246	0.1	7	10/3/2021	76	89	4.0
2022	02	BS0288B	k	0506	+0.246	0506	0.346	0.1	7	10/3/2021	65	91	4.1
2022	02	BS0288B	k	0506	+0.346	0506	0.446	0.1	7	10/3/2021	72	81	4.1
2022	02	BS0288B	k	0506	+0.446	0506	0.546	0.1	7	10/3/2021	80	80	4.1
2022	02	BS0288B	k	0506	+0.546	0506	0.646	0.1	7	10/3/2021	70	83	4.1
2022	02	BS0288B	k	0506	+0.646	0506	0.746	0.1	7	10/3/2021	74	79	4.1
2022	02	BS0288B	k	0506	+0.746	0506	0.846	0.1	7	10/3/2021	76	84	4.1
2022	02	BS0288B	k	0506	+0.846	0506	0.946	0.1	7	10/3/2021	69	65	4.3
2022	02	BS0288B	k	0506	+0.946	0506	1.046	0.1	7	10/3/2021	89	95	3.8
2022	02	BS0288B	k	0506	+1.046	0506	1.146	0.1	7	10/3/2021	72	98	3.9
2022	02	BS0288B	k	0506	+1.146	0506	1.246	0.1	7	10/3/2021	70	99	4.0
2022	02	BS0288B	k	0506	+1.246	0506	1.346	0.1	7	10/3/2021	61	75	4.3
2022	02	BS0288B	k	0506	+1.346	0506	1.446	0.1	7	10/3/2021	59	92	4.1

** FOR CONTRACTOR'S INFORMATION ONLY

IRI DATA

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		8

F Y	M S E C	HIGHWAY	R D B D	REFERENCE MARKERS BEGIN		END		LEN	P T Y P E	IRI (IN/MI) TEST MM/DD/YYY	LEFT	RIGHT	SI
2022	02	BS0288B	k	0506	+ 1.446	0506	1.546	0.1	7	10/3/2021	78	87	4.0
2022	02	BS0288B	k	0506	+ 1.546	0506	1.646	0.1	7	10/3/2021	69	94	4.0
2022	02	BS0288B	k	0506	+ 1.646	0506	1.746	0.1	7	10/3/2021	83	111	3.7
2022	02	BS0288B	k	0506	+ 1.746	0506	1.846	0.1	7	10/3/2021	64	79	4.2
2022	02	BS0288B	k	0506	+ 1.846	0508	0.011	0.1	7	10/3/2021	71	92	4.0
2022	02	BS0288B	k	0508	+ 0.011	0508	0.111	0.1	7	10/3/2021	81	97	3.9
2022	02	BS0288B	k	0508	+ 0.111	0508	0.211	0.1	7	10/3/2021	97	101	3.7
2022	02	BS0288B	k	0508	+ 0.211	0508	0.311	0.1	7	10/3/2021	73	74	4.2
2022	02	BS0288B	k	0508	+ 0.311	0508	0.411	0.1	7	10/3/2021	65	79	4.2
2022	02	BS0288B	k	0508	+ 0.411	0508	0.511	0.1	7	10/3/2021	87	95	3.8
2022	02	BS0288B	k	0508	+ 0.511	0508	0.611	0.1	7	10/3/2021	61	59	4.5
2022	02	BS0288B	k	0508	+ 0.611	0508	0.711	0.1	7	10/3/2021	65	84	4.2
2022	02	BS0288B	k	0508	+ 0.711	0508	0.811	0.1	7	10/3/2021	70	82	4.1
2022	02	BS0288B	k	0508	+ 0.811	0508	0.911	0.1	7	10/3/2021	68	81	4.2
2022	02	BS0288B	k	0508	+ 0.911	0508	1.011	0.1	7	10/3/2021	67	69	4.3
2022	02	BS0288B	k	0508	+ 1.011	0508	1.111	0.1	7	10/3/2021	75	81	4.1
2022	02	BS0288B	k	0508	+ 1.111	0508	1.211	0.1	7	10/3/2021	80	87	4.0
2022	02	BS0288B	k	0508	+ 1.211	0508	1.311	0.1	7	10/3/2021	77	78	4.1
2022	02	BS0288B	k	0508	+ 1.311	0508	1.411	0.1	7	10/3/2021	79	78	4.1
2022	02	BS0288B	k	0508	+ 1.411	0508	1.500	0.1	7	10/3/2021	103	94	3.7
2022	02	BS0288B	k	0508	+ 1.500	0508	1.600	0.1	7	10/3/2021	99	95	3.7
2022	02	BS0288B	k	0508	+ 1.600	0508	1.700	0.1	7	10/3/2021	159	137	2.9
2022	02	BS0288B	k	0508	+ 1.700	0508	1.800	0.1	7	10/3/2021	120	129	3.2
2022	02	BS0288B	L	0504	+ 0.000	0504	0.030	0.1	7	10/3/2021	64	98	4.0
2022	02	BS0288B	L	0504	+ 1.344	0504	1.431	0.1	7	10/3/2021	85	80	4.0
2022	02	BS0288B	R	0000	+ 0.000	0000	0.100	0.1	7	10/3/2021	132	157	2.9
2022	02	BS0288B	R	0000	+ 0.100	0000	0.111	0.1	7	10/3/2021	105	207	2.8
2022	02	BS0288B	R	0504	+ 0.000	0504	0.100	0.1	7	10/3/2021	101	121	3.5
2022	02	BS0288B	R	0504	+ 0.100	0504	0.130	0.1	7	10/3/2021	87	92	3.9
2022	02	BS0288B	R	0504	+ 1.344	0504	1.444	0.1	7	10/3/2021	100	101	3.7
2022	02	BS0288B	R	0504	+ 1.444	0504	1.531	0.1	7	10/3/2021	113	109	3.5

** FOR CONTRACTOR'S INFORMATION ONLY

IRI DATA

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		9

General Notes:

General:

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

Maria P. Aponte, P.E. Maria.Aponte@txdot.gov
Rajendra Hada, P.E. 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.

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

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

Superelevate the curves to match the existing surface.

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

The following standard detail sheets are modified:

Modified Standards

TCP (7-1) – 13 (MOD)

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

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

Grade street intersections and median openings for surface drainage.

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

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

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

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.

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

General: Roadway Illumination and Electrical

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

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

General: Traffic Signals

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

General: Site Management

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

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

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

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

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

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

General: Traffic Control and Construction

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

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

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

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

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 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.

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.

Item 5: Control of Work

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

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

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

Submit shop drawings electronically for the fabrication of items as documented in Table 1 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 1

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

Spec Item No.'s	Product	Submittal Required	Approval Required (Y/N)	Contractor/ Fabricator P.E. Seal Required	Reviewing Party	Shop or Working Drawing (Note 1)
7.16.1&.2	Construction Load Analyses	Y	Y	Y	B	WD
400	Excavation and Backfill for Structures (cofferdams)	Y	N	Y	A	WD
403	Temporary Special Shoring	Y	N	Y	C	WD
420	Formwork/Falsework	Y	N	Y	A	WD
423	Retaining Walls, (calcs req'd.)	Y	Y	Y	C	SD
425	Optional Design Calculations (Prstrs Bms)	Y	Y	Y	B	SD
425	Prestr Concr Sheet Piling	Y	Y	N	B	SD
425	Prestr Concr Beams	Y	Y	N	B	SD
425	Prestr Concr Bent	Y	Y	N	B	SD
426	Post Tension Details	Y	Y	N	B	SD
434	Elastomeric Bearing Pads (All)	Y	Y	N	B	SD
441	Bridge Protective Assembly	Y	Y	N	B	SD
441	Misc Steel (various steel assemblies)	Y	Y	N	B	SD
441	Steel Pedestals (bridge raising)	Y	Y	N	B	SD
441	Steel Bearings	Y	Y	N	B	SD
441	Steel Bent	Y	Y	N	B	SD
441	Steel Diaphragms	Y	Y	N	B	SD
441	Steel Finger Joint	Y	Y	N	B	SD
441	Steel Plate Girder	Y	Y	N	B	SD
441	Steel Tub-Girders	Y	Y	N	B	SD
441	Erection Plans, including Falsework	Y	N	Y	A	WD
449	Sign Structure Anchor Bolts	Y	Y	N	T	SD
450	Railing	Y	Y	N	A	SD
462	Concrete Box Culvert	Y	Y	N	C	SD
462	Concrete Box Culvert (Alternate Designs Only,calcs reqd.)	Y	Y	Y	B	SD
464	Reinforced Concrete Pipe (Jack and Bore only; ONLY when requested)	Y	Y	Y	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets	Y	Y	N	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets (Alternate Designs Only, calcs req'd.)	Y	Y	Y	B	SD
466	Pre-cast Headwalls and Wingwalls	Y	Y	N	A	SD
467	Pre-cast Safety End Treatments	Y	Y	N	A	SD
495	Raising Existing Structure (calcs reqd.)	Y	Y	Y	B	SD
610	Roadway Illumination Supports (Non-Standard only, calcs reqd.)	Y	Y	Y	BRG	SD
613	High Mast Illumination Poles (Non-standard only, calcs reqd.)	Y	Y	Y	BRG	SD

627	Treated Timber Poles	Y	Y	N	T	SD
644	Special Non-Standard Supports (Bridge Mounts, Barrier Mounts, Etc.)	Y	Y	Y	T	SD
647	Large Roadside Sign Supports	Y	Y	Y	T	SD
650	Cantilever Sign Structure Supports - Alternate Design Calcs.	Y	Y	Y	T	SD
650	Sign Structures	Y	Y	N	T	SD
680	Installation of Highway Traffic Signals	Y	Y	N	T	SD
682	Vehicle and Pedestrian Signal Heads	Y	Y	N	T	SD
684	Traffic Signal Cables	Y	Y	N	T	SD
685	Roadside Flashing Beacon Assemblies	Y	Y	N	T	SD
686	Traffic Signal Pole Assemblies (Steel) (Non-Standard only)	Y	Y	Y	T	SD
687	Pedestal Pole Assemblies	Y	Y	N	T	SD
688	Detectors	Y	Y	N	A	SD
784	Repairing Steel Bridge Members	Y	Y	Y	B	WD
SS	Prestr Concr Crown Span	Y	Y	N	B	SD
SS	Sound Barrier Walls	Y	Y	Y	A	SD
SS	Camera Poles	Y	Y	Y	TMS	SD
SS	Pedestrian Bridge (Calcs req'd.)	Y	Y	Y	B	SD
SS	Screw-In Type Anchor Foundations	Y	Y	N	T	SD
SS	Fiber Optic/Communication Cable	Y	Y	N	TMS	SD
SS	Spread Spectrum Radios for Signals	Y	Y	N	T	SD
SS	VIVDS System for Signals	Y	Y	N	T	SD
SS	CTMS Equipment	Y	Y	N	TMS	SD

Notes:
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.

Area Office	Email Address
Brazoria Area Office	HOU-BRZAShpDrwgs@txdot.gov

B - Houston Bridge Engineer	
Bridge Design (Houston TxDOT)	HOU-BrgShpDrwgs@txdot.gov
BRG - Austin Bridge Division	
Bridge Design (Austin TxDOT)	BRG_ShopPlanReview@txdot.gov
C - Construction Office	
Construction	HOU-ConstrShpDrwgs@txdot.gov
Laboratory	HOU-LabShpDrwgs@txdot.gov
T - Traffic Engineer	
Traffic Operations	HOU-TrfShpDrwgs@txdot.gov
TMS – Traffic Management System	
Computerized Traffic Management Systems (CTMS)	HOU-CTMSShpDrwgs@txdot.gov

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

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

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 6 day workweek in accordance with Section 8.3.1.2.

The maximum number of days the time charges on this contract may be suspended due to contractor mobilization, and material fabrication/accumulation or processing delays is 120 days. The Engineer and the Contractor may mutually agree, in writing, to decrease this maximum number of days.

The Lane Closure Assessment Fee is $ 200.00. This fee applies to the Contractor for closures or obstructions that overlap into restricted hour traffic for each hour or portion thereof, per lane, regardless of the length of lane closure or obstruction. For Restricted Hours subject to Lane Assessment Fee refer to the Item, "Barricades, Signs, and Traffic Handling." The time increment for the Lane Closure Assessment fee for this project is one hour.

Item 104: Removing Concrete

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

Item 105: Removing Treated and Untreated Base and Asphalt Pavement

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

Item 110: Excavation

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

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

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

Item 112: Subgrade Widening

Removing obstructions within the right of way, such as trees, brush, overhanging limbs, fences, foundations and other miscellaneous debris that may interfere with grading (subgrade widening) is subsidiary to the Item, "Subgrade Widening."

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.

Item 134: Backfilling Pavement Edges

Quantity by station includes both sides of the roadway.

Place proposed pavement backfill and prime before the surface overlay is placed. Overlap a 6:1 edge taper of hot mix onto the previously placed backfill.

The Contractor has the option of selecting the type of backfill material consisting of Reclaimable Asphalt Pavement (RAP), Flex Base, or Crushed Concrete provided that it meets the requirements listed below.

For Permeable Friction Courses (PFC), the backfill material chosen must meet the requirements of Department Test Method Tex-246-F.

If using salvaged asphalt concrete pavement, size it so that all the material, passes the 2-in. sieve. Use RAP that does not contain deleterious material such as clay or organic material.

Flex Base must meet the requirements of Item 247, Type A, Grade 1-2. Department Test Method Tex-117-E will not be required.

Crushed concrete must meet the requirements of Item 247, Grade 1-2. Department Test Methods Tex-116-E and Tex-117-E will not be required.

Place emulsified asphalt (SS-1, CSS-1, or CSS-1H) at an application rate of 0.25 gal/sq. yard.

Item 161: Compost
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 276: Cement Treatment (Plant-Mixed)

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

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

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

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

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

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

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

Curing Material	Application
Water	All courses, except final course
PCE	Final course

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

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

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

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

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

If using Recycled Type E cement treatment under proposed flexible pavement, produce it using the existing base salvaged from within this project or from other approved Department projects and salvaged asphalt concrete pavement. Do not use crushed concrete under flexible pavement.

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

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

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

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

Item 3076: Dense-Graded Hot Mix Asphalt

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

Item 316: Seal Coat

Seal coat will be required to be covered up with PFC or ACP overlay prior to opening to traffic. The asphalt application rate shown on the "Basis of Estimate" is an average rate for calculating asphalt quantities. Vary the rate based on the pavement conditions and other factors such as the type and grade of aggregate used, weather, and traffic.

The asphalt application rate shown on the "Basis of Estimate" is an average rate for calculating asphalt quantities. Vary the rate based on the pavement conditions and other factors such as the type and grade of aggregate used, weather, and traffic.

Allowable Asphalt Cements based on Average Daily Traffic (ADT) are shown below:

For ADT greater than 5000
AC-20 XP
AC-20-5TR

Item 351: Flexible Pavement Structure Repair

Use asphalt stabilized base for the base material.

For base repair, place the asphalt stabilized base in compacted lifts of 4 in. maximum, unless otherwise directed.

Item 361: Repair of Concrete Pavement

For full depth repair, remove only the quantity of pavement replaceable during the daily allowable work schedule.

Remove loose sub-base material and replace it with concrete. Use a bondbreaker, such as a polyethylene sheet, at the interface between the replaced sub-base material and the new concrete pavement.

Supply polyethylene fabric on the job site sufficient to cover the area of repair.

Do not place concrete if impending weather may result in rainfall or low temperatures that may impair the quality of the finished work.

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

Ready mix concrete will be permitted if the equipment and construction methods can produce the desired results. Hand finishing will be permitted.

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

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 502: Barricades, Signs, and Traffic Handling

Install delineators and object markers for existing structures immediately after installation of Barricades, Signs, and Traffic Handling. Contractor shall maintain delineators and object markers throughout the duration of the project. Payment for maintaining installed delineators and object markers shall be in accordance with Item 658.

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

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

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

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

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

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.

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

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

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

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

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

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

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

One Lane Closure

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	9:00 am – 3:00 pm	9:00 PM - 5:00 AM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Tuesday	9:00 am – 3:00 pm	9:00 PM - 5:00 AM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Wednesday	9:00 am – 3:00 pm	9:00 PM - 5:00 AM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Thursday	9:00 am – 3:00 pm	9:00 PM - 5:00 AM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Friday	9:00 am – 3:00 pm	9:00 PM - 5:00 AM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Saturday	9:00 am – 3:00 pm	9:00 PM - 5:00 AM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Sunday	Emergency Only	9:00 PM - 5:00 AM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM

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

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

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

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

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

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

A Storm Water Pollution Prevention Plan (SWP3) is required. Since the disturbed area is more than 5 acres, a "Notice of Intent" (NOI) is also required.

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

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

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

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

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

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

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

Item 531: Sidewalks

An air-entraining admixture is not required.

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

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

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

Item 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 and direct connectors, use Surface Test Type B and Pay Adjustment Schedule 2.

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

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

Item 618: Conduit

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

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

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

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

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

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

Item 620: Electrical Conductors

Test each wire of each cable or conductor after installation. Incomplete circuits or damage to the wire or the cable are cause for immediate rejection of the entire cable

being tested. Remove and replace the entire cable at no expense to the Department. Also test the replacement cable after installation.

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

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

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

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

For Roadside Flashing Beacon Assemblies (Item 685) and Pedestal Pole Assemblies (Item 687) within the project, provide single-pole breakaway disconnects as shown on the Construction Division (CST) material producers list. Check the latest link on the Department's website for this list. The category is "Roadway Illumination and Electrical Supplies." The fuse holder is shown on the list under Item 685. For underground (hot) conductors, install a breakaway connector with a dummy fuse (slug). Provide dummy fuse (slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).

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

Item 624: Ground Boxes

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

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

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

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

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

apron in accordance with details shown on the "Ground Box Details Installations" standard.

Item 628: Electrical Services

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

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

Item 636: Signs

Include aluminum route markers, exit only panels, routing signs, and other special panels attached to guide signs in the unit bid price for the parent guide sign material.

Furnish and install signs shown on the traffic signal "Summary of Traffic Signal Materials" sheet. Ensure that the legend on these sign panels is in accordance with the latest "Standard Highway Sign Designs for Texas" manual.

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

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

Item 644: Small Roadside Sign Assemblies

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

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

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 647: Large Roadside Sign Supports and Assemblies

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

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

Assume ownership of the removed existing signs.

Item 662: Work Zone Pavement Markings

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

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

Do not use raised pavement markers as optional work zone pavement markings on final asphalt surfaces.

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

Item 662: Work Zone Pavement Markings
Item 666: Reflectorized Pavement Markings
Item 668: Prefabricated 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.

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 677: Eliminating Existing Pavement Markings and Markers

Remove existing pavement markings on concrete or asphalt surfaces by flail milling or as directed.

Item 678: Pavement Surface Preparation for Markings

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

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

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

Do not clean concrete pavement by grinding.

Item 680: Highway Traffic Signals

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

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

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

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

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

Staking in the field is subject to approval.

Make adjustments in project construction, if needed, due to conflicts with underground utilities.

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

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

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

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

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

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

Furnish signal heads from the same manufacturer.

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

The Contractor may use ready mix concrete.

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

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

Item 682: Vehicle and Pedestrian Signal Heads

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

Furnish black housings for vehicle and pedestrian signals. Furnish black vehicle signal head back plates with 2 in. retroreflective yellow borders.

Item 685: Roadside Flashing Beacon Assemblies

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

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

Item 686: Traffic Signal Pole Assemblies (Steel)

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

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

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

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

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

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

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

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

Item 3076: Dense-Graded Hot Mix Asphalt

Begin ACP Overlay the same day of placing surface treatment. Surface treatment is not allowed for temporary riding surface.

Tie HMACP tapers to a vertical transition joint created by the milling operation at the ending transition, or as directed. Provide a temporary HMACP taper at vertical joints until overlay operations begin.

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

Limit uneven pavement to two days production with the requirement that all longitudinal joints adjacent to a travelway are constructed with a joint maker providing a maximum of one-inch vertical edge (1/2" desirable) with adjacent 6:1 taper.

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.

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

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

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

A total of one (1) shadow vehicle with a TMA/TA is required for the work with the exception of Pavement Marking Operations. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed on the project.

A total of three (3) shadow vehicles with a TMA/TA are required for Pavement Marking Operations. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed on the project.

Item 6306: Video Imaging Vehicle Detection System

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

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

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

Detector zone videotaping for this project will not be required.

Special Specification 6306 Video Imaging Vehicle Detection System Requirements

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

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

VIVDS devices covered under the Department's Purchasing Special Specification T.O.-6291 (http://www.dot.state.tx.us/gsd/purchasing/supps.htm#divspecs) will also be allowed for use.

Basis of Estimate

Item	Description	Limit and Rate	Unit
134	Backfilling Pavement Edges		STA
	• Asphalt Emulsion	0.25 Gal. / Sq. Yd.	
316	Seal Coat		
	• Asphalt	0.32 Gal. / Sq. Yd.	GAL
	• Aggregate (Gr 4)	1/130 Cu. Yd. / Sq. Yd.	CY
	A-R Binder		
	• Asphalt	0.42 Gal. / Sq. Yd.	GAL
	• Aggregate (Gr 4)	1/130 Cu. Yd. / Sq. Yd.	CY
3076	Dense-Graded Hot Mix Asphalt	110 Lb. / Sq. Yd.-In.	TON
	• Asphalt	6 % by weight	
	• Aggregate	94 % by weight	
	Tack Coat		GAL
	• Applied on new HMA	0.06 Gal. / Sq. Yd.	
	• Applied on Existing HMA	0.09 Gal. / Sq. Yd.	
	• Applied on Milled HMA	0.11 Gal. / Sq. Yd.	
3079	Permeable Friction Course (PG-Binder)	95 Lb. / Sq. Yd.-In.	TON
	• Asphalt	6.5 % by weight	
	• Aggregate	93.5 % by weight	
	Permeable Friction Course (A-R Binder)	95 Lb. / Sq. Yd.-In.	TON
	• Asphalt	8 % by weight	
	• Aggregate	92 % by weight	
	Tack Coat		GAL
	• Applied on New HMA	0.06 Gal. / Sq. Yd.	
	• Applied on Existing HMA	0.09 Gal. / Sq. Yd.	
	Applied on Milled HMA	0.11 Gal. / Sq. Yd.	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0111-09-042 **DISTRICT** Houston **COUNTY** Brazoria
HIGHWAY BS 288B

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0111-09-042**			
		PROJECT ID		**A00120490**			
		COUNTY		**Brazoria**			
		HIGHWAY		**BS 288B**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	104-6021	REMOVING CONC (CURB)	LF	80.000		80.000	
	105-6008	REMOVING STAB BASE AND ASPH PAV (6")	SY	61.000		61.000	
	112-6002	SUBGRADE WIDENING (DENS CONT)	STA	267.030		267.030	
	134-6004	BACKFILL (TY A OR B)	STA	58.180		58.180	
	161-6009	EROSION CONTROL COMPOST	CY	10.000		10.000	
	162-6002	BLOCK SODDING	SY	139,321.000		139,321.000	
	162-6003	STRAW OR HAY MULCH	SY	29,264.000		29,264.000	
	166-6001	FERTILIZER	AC	34.850		34.850	
	168-6001	VEGETATIVE WATERING	MG	4,182.720		4,182.720	
	276-6234	CEM TRT(PLNT MX) (CLN)(TYA)(GR1-2)(14")	SY	60,914.000		60,914.000	
	316-6001	ASPH (MULTI OPTION)	GAL	73,103.000		73,103.000	
	316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 (SAC-B)	CY	1,775.000		1,775.000	
	351-6008	FLEXIBLE PAVEMENT STRUCTURE REPAIR(12")	SY	600.000		600.000	
	351-6009	FLEXIBLE PAVEMENT STRUCTURE REPAIR(14")	SY	72.900		72.900	
	351-6013	FLEXIBLE PAVEMENT STRUCTURE REPAIR(4")	SY	1,915.000		1,915.000	
	354-6041	PLANE ASPH CONC PAV (1.5")	SY	176,734.000		176,734.000	
	361-6044	FULL - DEPTH REPAIR CPJR (9")	SY	302.000		302.000	
	400-6005	CEM STABIL BKFL	CY	337.000		337.000	
	400-6012	CUT AND RESTORE PAV (FLEX BASE)	SY	245.000		245.000	
	416-6018	DRILL SHAFT (SIGN MTS) (24 IN)	LF	20.000		20.000	
	416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	60.000		60.000	
	416-6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	44.000		44.000	
	462-6054	CONC BOX CULV (6 FT X 3 FT)(EXTEND)	LF	40.000		40.000	
	464-6008	RC PIPE (CL III)(36 IN)	LF	8.000		8.000	
	467-6006	SET (TY I) (24 IN) (4: 1) (C)	EA	4.000		4.000	
	467-6014	SET (TY I) (36 IN) (3: 1) (C)	EA	2.000		2.000	
	467-6207	SET (TY I)(S= 6 FT)(HW= 3 FT)(6:1) (C)	EA	4.000		4.000	
	467-6340	SET (TY II) (15 IN) (RCP) (6: 1) (C)	EA	3.000		3.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	20.000		20.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	34.000		34.000	
	467-6423	SET (TY II) (30 IN) (RCP) (6: 1) (P)	EA	10.000		10.000	
	467-6454	SET (TY II) (36 IN) (RCP) (6: 1) (P)	EA	2.000		2.000	
	480-6001	CLEAN EXIST CULVERTS	EA	20.000		20.000	
	496-6004	REMOV STR (SET)	EA	24.000		24.000	
	496-6005	REMOV STR (WINGWALL)	EA	4.000		4.000	
	496-6007	REMOV STR (PIPE)	LF	539.000		539.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0111-09-042 **DISTRICT** Houston **COUNTY** Brazoria
HIGHWAY BS 288B

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0111-09-042**			
		PROJECT ID		**A00120490**			
		COUNTY		**Brazoria**			
		HIGHWAY		**BS 288B**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	8.000		8.000	
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)	LF	588.000		588.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	588.000		588.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	2,000.000		2,000.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	2,000.000		2,000.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	3,140.000		3,140.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	3,140.000		3,140.000	
	529-6011	CONC CURB (DOWEL)	LF	80.000		80.000	
	530-6004	DRIVEWAYS (CONC)	SY	1,076.000		1,076.000	
	530-6005	DRIVEWAYS (ACP)	SY	2,565.000		2,565.000	
	530-6016	DRIVEWAYS (BASE)	SY	1,074.000		1,074.000	
	531-6002	CONC SIDEWALKS (5")	SY	23.000		23.000	
	531-6005	CURB RAMPS (TY 2)	EA	2.000		2.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	285.000		285.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	180.000		180.000	
	618-6053	CONDT (PVC) (SCH 80) (3")	LF	110.000		110.000	
	618-6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	115.000		115.000	
	620-6009	ELEC CONDR (NO.6) BARE	LF	585.000		585.000	
	620-6011	ELEC CONDR (NO.4) BARE	LF	100.000		100.000	
	620-6012	ELEC CONDR (NO.4) INSULATED	LF	200.000		200.000	
	621-6005	TRAY CABLE (4 CONDR) (12 AWG)	LF	1,240.000		1,240.000	
	624-6009	GROUND BOX TY D (162922)	EA	8.000		8.000	
	628-6145	ELC SRV TY D 120/240 060(NS)SS(E)SP(O)	EA	2.000		2.000	
	636-6001	ALUMINUM SIGNS (TY A)	SF	32.000		32.000	
	636-6002	ALUMINUM SIGNS (TY G)	SF	105.000		105.000	
	636-6007	REPLACE EXISTING ALUMINUM SIGNS(TY A)	SF	15.000		15.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	65.000		65.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	60.000		60.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	EA	7.000		7.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	17.000		17.000	
	644-6034	IN SM RD SN SUP&AM TYS80(1)SA(U-1EXT)	EA	4.000		4.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	130.000		130.000	
	647-6001	INSTALL LRSS (STRUCT STEEL)	LB	691.600		691.600	
	647-6003	REMOVE LRSA	EA	1.000		1.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA	40.000		40.000	
	658-6060	REMOVE DELIN & OBJECT MARKER ASSMS	EA	4.000		4.000	
	662-6001	WK ZN PAV MRK NON-REMOV (W)4"(BRK)	LF	29,740.000		29,740.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0111-09-042 **DISTRICT** Houston **COUNTY** Brazoria
HIGHWAY BS 288B

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0111-09-042**			
		PROJECT ID		**A00120490**			
		COUNTY		**Brazoria**			
		HIGHWAY		**BS 288B**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	122,570.000		122,570.000	
	662-6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF	18,098.000		18,098.000	
	662-6014	WK ZN PAV MRK NON-REMOV (W)12"(SLD)	LF	5,248.000		5,248.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	2,334.000		2,334.000	
	662-6017	WK ZN PAV MRK NON-REMOV (W)(ARROW)	EA	68.000		68.000	
	662-6018	WK ZN PAV MRK NON-REMOV (W)(DBL ARW)	EA	8.000		8.000	
	662-6029	WK ZN PAV MRK NON-REMOV(W)(WORD)	EA	62.000		62.000	
	662-6030	WK ZN PAV MRK NON-REMOV(W)18"(YLD TRI)	EA	24.000		24.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	131,150.000		131,150.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	9,049.000		9,049.000	
	666-6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	2,624.000		2,624.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	1,167.000		1,167.000	
	666-6141	REFL PAV MRK TY I (Y)12"(SLD)(100MIL)	LF	1,673.000		1,673.000	
	666-6162	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	LF	14,790.000		14,790.000	
	666-6212	REFL PAV MRK TY II (Y) 12" (SLD)	LF	1,683.000		1,683.000	
	666-6225	PAVEMENT SEALER 6"	LF	265.000		265.000	
	666-6226	PAVEMENT SEALER 8"	LF	598.000		598.000	
	666-6230	PAVEMENT SEALER 24"	LF	475.000		475.000	
	666-6243	PAVEMENT SEALER (YLD TRI)	EA	12.000		12.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	14,870.000		14,870.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	509.000		509.000	
	666-6343	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	LF	61,285.000		61,285.000	
	666-6347	REF PROF PAV MRK TY I(Y)6"(SLD)(100MIL)	LF	65,575.000		65,575.000	
	668-6064	PREFAB PAV MRK TY C (W) (4") (SLD)	LF	612.000		612.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	34.000		34.000	
	668-6078	PREFAB PAV MRK TY C (W) (DBL ARROW)	EA	4.000		4.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA	31.000		31.000	
	668-6092	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	EA	62.000		62.000	
	668-6111	PRE PM TY C (ACC PRK)(BLU)(SYMBL ONLY)	EA	2.000		2.000	
	672-6007	REFL PAV MRKR TY I-C	EA	1,042.000		1,042.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	944.000		944.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	90.000		90.000	
	677-6002	ELIM EXT PAV MRK & MRKS (6")	LF	265.000		265.000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	626.000		626.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	592.000		592.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	147.000		147.000	
	677-6019	ELIM EXT PAV MRK & MRKS (36")(YLD TRI)	EA	21.000		21.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0111-09-042 **DISTRICT** Houston **COUNTY** Brazoria
HIGHWAY BS 288B

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0111-09-042**			
		PROJECT ID		**A00120490**			
		COUNTY		**Brazoria**			
		HIGHWAY		**BS 288B**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	678-6002	PAV SURF PREP FOR MRK (6")	LF	156,928.000		156,928.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF	8,451.000		8,451.000	
	678-6006	PAV SURF PREP FOR MRK (12")	LF	5,980.000		5,980.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	692.000		692.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	34.000		34.000	
	678-6010	PAV SURF PREP FOR MRK (DBL ARROW)	EA	4.000		4.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA	31.000		31.000	
	678-6023	PAV SURF PREP FOR MRK (36")(YLD TRI)	EA	50.000		50.000	
	680-6003	INSTALL HWY TRF SIG (SYSTEM)	EA	2.000		2.000	
	680-6004	REMOVING TRAFFIC SIGNALS	EA	2.000		2.000	
	682-6001	VEH SIG SEC (12")LED(GRN)	EA	12.000		12.000	
	682-6002	VEH SIG SEC (12")LED(GRN ARW)	EA	1.000		1.000	
	682-6003	VEH SIG SEC (12")LED(YEL)	EA	16.000		16.000	
	682-6004	VEH SIG SEC (12")LED(YEL ARW)	EA	1.000		1.000	
	682-6005	VEH SIG SEC (12")LED(RED)	EA	12.000		12.000	
	682-6006	VEH SIG SEC (12")LED(RED ARW)	EA	2.000		2.000	
	682-6021	BACK PLATE (12")(1 SEC)	EA	4.000		4.000	
	682-6049	BACKPLATE W/REFL BRDR(4 SEC)	EA	1.000		1.000	
	682-6060	BACKPLATE W/REFL BRDR(3 SEC)	EA	12.000		12.000	
	684-6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	1,435.000		1,435.000	
	685-6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA	2.000		2.000	
	686-6031	INS TRF SIG PL AM(S)1 ARM(28')LUM	EA	1.000		1.000	
	686-6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA	1.000		1.000	
	686-6047	INS TRF SIG PL AM(S)1 ARM(44')LUM	EA	2.000		2.000	
	686-6055	INS TRF SIG PL AM(S)1 ARM(50')LUM	EA	2.000		2.000	
	721-6002	FIBER REINFORCED POLYMER PATCHING MATLS	LB	1,300.000		1,300.000	
	1004-6001	TREE PROTECTION	EA	1.000		1.000	
	3076-6071	D-GR HMA TY-D PG 64-22 (EXEMPT)	TON	4,470.000		4,470.000	
	3076-6076	D-GR HMA TY-D SAC-A PG70-22 (EXEMPT)	TON	2,475.000		2,475.000	
	3079-6003	PFC PG76-28 SAC-A	TON	14,153.000		14,153.000	
	4122-6004	THERMO PIPE(18")(HDPE)(TY S)(CSB)	LF	144.000		144.000	
	4122-6005	THERMO PIPE(24")(HDPE)(TY S)(CSB)	LF	325.000		325.000	
	4122-6006	THERMO PIPE(36")(HDPE)(TY S)(CSB)	LF	33.000		33.000	
	4122-6020	THERMO PIPE(30")(HDPE)(TY S)(CSB)	LF	92.000		92.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	21.000		21.000	
	6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	2.000		2.000	
	6062-6034	ITS RADIO (DUAL)(5 GHZ/5 GHZ)-I-U	EA	4.000		4.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0111-09-042 **DISTRICT** Houston **COUNTY** Brazoria
HIGHWAY BS 288B

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0111-09-042**			
		PROJECT ID		**A00120490**			
		COUNTY		**Brazoria**			
		HIGHWAY		**BS 288B**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	6185-6002	TMA (STATIONARY)	DAY	122.000		122.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	39.000		39.000	
	6306-6009	VIVDS PROSR SYS (INSTALL ONLY)	EA	6.000		6.000	
	6306-6010	VIVDS CAM ASSY (INSTALL ONLY)	EA	6.000		6.000	
	6306-6012	VIVDS CABLING (INSTALL ONLY)	LF	1,220.000		1,220.000	
	08	CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT LAW ENFORCEMENT (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000		1.000	

SUMMARY OF ROADWAY ITEMS																				
LOCATION	104 6021 REMOVING CONC (CURB) LF	EXCAVATION (ROADWAY) ** CY	112 6002 SUBGRADE WIDENING (DENS CONT) STA	EMBANKMENT (FINAL) (DENS CONT) (TY C) ** CY	134 6004 BACKFILL (TY A OR B) STA	276 6234 CEM TRT(PLNT MX) (CLN)(TYA) (GR1-2)(14") SY	316 6001 ASPH (MULTI OPTION) GAL	316 6434 AGGR (TY-PB GR-4 OR TY-PL GR-4 (SAC-B) CY	351 6013 FLEXIBLE PAVEMENT STRUCTURE REPAIR(4") SY	351 6008 FLEXIBLE PAVEMENT STRUCTURE REPAIR(12") SY	351 6009 FLEXIBLE PAVEMENT STRUCTURE REPAIR(14") SY	354 6041 PLANE ASPH CONC PAV (1.5") SY	361 6044 FULL - DEPTH REPAIR CPJR (9") SY	529 6011 CONC CURB (DOWEL) LF	531 6002 CONC SIDEWALKS (5") SY	531 6005 CURB RAMPS (TY 2) EA	721 6002 FIBER REINFORCED POLYMER PATCHING MATLS LB	3076 6071 D-GR HMA TY-D PG 64-22 (EXEMPT) TON	3076 6076 D-GR HMA TY-D SAC-A PG70-22 (EXEMPT) TON	3079 6003 PFC PG76-28 SAC-A TON
1	0	1009.64	16.06	188.78	3.72	3183	3920	96			72.9	10677		0	0	0	1300	233	0	874
2	0	2098.91	25	284.73	8.08	5603	6298	154			0	15606		0	0	0	0	240	0	1404
3	0	2133.52	25	371.73	0	6289	6160	150			0	13751		0	0	0	0	186	0	1373
4	0	1964.44	25	336.64	0	5641	5828	141			0	13751		0	0	0	0	104	0	1299
5	0	2206.74	25	310.41	0	5602	5823	140			0	13750		0	0	0	0	167	0	1297
6	0	2191.96	25	300.87	0	5602	5823	140			0	13750		0	23	2	0	349	0	1297
7	0	2176.78	25	1004.24	6.46	6178	6123	149	1915	600	0	13751	302	0	0	0	0	597	0	1366
8	0	1773.78	25	622.22	2.12	5791	5876	143			0	13750		0	0	0	0	557	0	1309
9	80	624.11	11.98	235.96	4.98	2685	7052	172			0	18972		80	0	0	0	423	1099	622
10	0	1243.58	18.45	456.5	3.9	4135	6501	158			0	16051		0	0	0	0	187	569	957
11	0	1539.26	25	615.68	0	5602	5823	140			0	13674		0	0	0	0	140	0	1297
12	0	1358.7	20.54	454.19	8.92	4603	5724	140			0	13751		0	0	0	0	464	252	1058
13	0	0	0	0	20	0	2152	52			0	5500		0	0	0	0	823	555	0
Total	80	20321.42	267.03	5181.95	58.18	60914	73103	1775	1915	600	73	176734	302	80	23	2	1300	4470	2475	14153

LOCATION	662 6001 WK ZN PAV MRK NON-REMOV (W)4" (BRK) LF	662 6004 WK ZN PAV MRK NON-REMOV (W)4" (SLD) LF	662 6012 WK ZN PAV MRK NON-REMOV (W)8" (SLD) LF	662 6016 WK ZN PAV MRK NON-REMOV (W)24" (SLD) LF	662 6014 WK ZN PAV MRK NON-REMOV (W)12" (SLD) LF	662 6017 WK ZN PAV MRK NON-REMOV (W) (ARROW) EA	662 6029 WK ZN PAV MRK NON-REMOV (W) (WORD) EA	662 6030 WK ZN PAV MRK NON-REMOV (W)18" (YLD TRI) EA	662 6018 WK ZN PAV MRK NON-REMOV (W) (DBL ARW) EA	662 6034 WK ZN PAV MRK NON-REMOV (Y)4" (SLD) LF
PLANING	14870	61285	9049	1167	2624	34	31	12	4	65575
ACP/PFC	14870	61285	9049	1167	2624	34	31	12	4	65575
PROJECT TOTALS	29740	122570	18098	2334	5248	68	62	24	8	131150

* DRIVEWAY LOCATIONS AND TYPE TO BE DETERMINED IN THE FIELD BY ENGINEER.

** FOR CONTRACTOR INFORMATION ONLY.

SUMMARY OF ROADWAY QUANTITIES

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		29

SUMMARY OF DRAINAGE ITEMS											
LOCATION	480 6001	400 6005	462 6054	464 6008	467 6006	467 6014	467 6207	467 6340	496 6004	496 6005	658 6047
	CLEAN EXIST CULVERTS	CEM STABIL BKFL	CONC BOX CULV (6 FT X 3	RC PIPE (CL III) (36 IN)	SET (TY I) (24 IN) (4: 1) (C)	SET (TY I) (36 IN) (3: 1) (C)	SET (TY I) (S=6 FT) (HW= 3)	SET (TY II) (15 IN) (6:1)(C)	REMOV STR (SET)	REMOV STR (WINGWALL)	INSTL OM ASSM (OM-2Y)(WC)GND
	EA	CY	LF	LF	EA	EA	EA	EA	EA	EA	EA
STA 147+39	1										2
STA 162+48	1										2
STA 178+74	1										2
STA 223+92	1										2
STA 239+92	1										2
STA 246+92	1										2
STA 268+42	1										2
STA 309+32	1	22	40				4		4	4	2
STA 343+00.66	1										2
STA 350+57.82	1				4						2
STA 372+01.65	1										2
STA 379+40.65	1										2
STA 409+90.46	1	22		8		2			2		2
STA 429+64.07	1										2
STA 436+06.37	1										2
STA 436+00 LS1	1							1			2
STA 436+00 LS2	1							1			2
STA 438+14.95	1										2
STA 439+56.86	1							1			2
STA 440+41.57	1										2
PROJECT TOTALS	20	44	40	8	4	2	4	3	6	4	40

NOTES

1- PUMPING WATER IS INCIDENTAL TO CULVERT EXTENSION BID ITEMS.

2- REMOVAL OF EXIST OBJECT MARKERS IS SUBSIDIARY TO PERTINENT ITEMS.

SUMMARY OF CROSS STRUCTURES

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		30

Summary of SWP3													
LOCATION	164 6009	162 6002	162 6003	164 6051	166 6001	168 6001	506 6003	506 6011	506 6020	506 6024	506 6038	506 6039
	BROADCAST SEED (TEMP) (WARM)	BLOCK SODDING	STRAW OR HAY MULCH	DRILL SEED (TEMP) (WARM OR	FERTILIZER	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 3)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	SY	SY	AC	MG	LF	LF	SY	SY	LF	LF
1	94	9365	1967	1873	2.34	280.8	42	42	2000	2000	200	200
2	111	11112	2334	2223	2.78	333.6	154	154			280	280
3	111	11112	2334	2223	2.78	333.6					200	200
4	111	11112	2334	2223	2.78	333.6	42	42			240	240
5	111	11112	2334	2223	2.78	333.6	84	84			240	240
6	111	11112	2334	2223	2.78	333.6	42	42			240	240
7	111	11112	2334	2223	2.78	333.6	42	42			240	240
8	111	11112	2334	2223	2.78	333.6					200	200
9	107	10667	2241	2134	2.67	320.4	42	42			160	160
10	111	11112	2334	2223	2.78	333.6	42	42			200	200
11	111	11112	2334	2223	2.78	333.6	42	42			240	240
12	111	11112	2334	2223	2.78	333.6	56	56			240	240
13	82	8169	1716	1634	2.04	244.8					460	460
Total	1393	139321	29264	27871	34.85	4182	588	588	2000	2000	3140	3140

NOTES:

VERIFY PLACEMENT OF ALL SWP3 DEVICES WITH THE ENGINEER IN THE FIELD.

SUMMARY OF SWP3 QUANTITIES

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		31

SUMMARY OF SIDE ROAD STRUCTURES

PLAN LAYOUT SHEET	105 6008 REMOVING STAB BASE AND ASPH PAV (6") SY	400 6005 CEM STABIL BKFL CY	400 6012 CUT AND RESTORE PAV (FLEX BASE) SY	467 6363 SET (TY II) (18 IN) (RCP) (6:1) (P) EA	467 6395 SET (TY II) (24 IN) (RCP) (6:1) (P) EA	467 6423 SET (TY II) (30 IN) (RCP) (6:1) (P) EA	467 6454 SET (TY II) (36 IN) (RCP) (6:1) (P) EA	496 6004 REMOV STR (SET) EA	496 6007 REMOV STR (PIPE) LF	530 6004 DRIVEWAYS (CONC) SY	530 6005 DRIVEWAYS (ACP) SY	530 6016 DRIVEWAYS (BASE) SY	658 6060 REMOVE DEL IN & OBJECT MARKER ASSMS EA	4122 6004 THERMO PIPE(18") (HDPE) (TYS) (CSB) LF	4122 6005 THERMO PIPE(24") (HDPE) (TYS) (CSB) LF	4122 6006 THERMO PIPE(36") (HDPE) (TYS) (CSB) LF	4122 6020 THERMO PIPE(30") (HDPE) (TYS) (CSB) LF
CR 339- STA 147+18 LT																	
EXIST 1-15" x 30' RCP W/SET																	
NO CULVERT WORK											49						
STA 147+61 RT																	
EXIST 1-24" x 18' RCP																	
PROP SET LT, RT					2							26					
STA 150+82 RT																	
EXIST 1-24" x 44' RCP W/SET																	
NO CULVERT WORK											162						
STA 154+23 RT																	
EXIST 1-24" x 32' RCP W/SET																	
NO CULVERT WORK											129						
STA 157+77 RT																	
EXIST 1-18" x 32' RCP																	
PROP RMV PIPE, DWY	25								32								
STA 162+75 LT																	
EXIST 2-18" x 83' RCP W/SET																	
NO CULVERT WORK											235						
STA 169+00 LT																	
EXIST 2-18" x 101' RCP W/SET																	
NO CULVERT WORK											274						
STA 170+45 RT																	
EXIST 1-18" x 26' RCP W/SET																	
NO CULVERT WORK												26					
STA 179+39 RT																	
EXIST 1-24" x 14' RCP																	
PROP 1-24" x 20' HDPE W/SET		10	9		2				14			25			20		
STA 180+17 LT																	
EXIST 1-18" x 25' RCP																	
PROP SET LT, RT				2								36					
STA 182+00 RT																	
EXIST 1-24" x 32' RCP																	
PROP 1-24" x 33' HDPE W/SET		16	15		2				32			38			33		
STA 182+60 LT																	
EXIST 1-24" x 30' CMP																	
PROP 1-24" x 33' HDPE W/SET		16	15		2				30			29			33		
STA 182+97 RT																	
EXIST 1-24" x 32' RCP																	
PROP RMV PIPE, DWY	36								32								
STA 194+05 LT																	
EXIST 1-24" x 10' PCLV																	
PROP 1-24" x 20' HDPE W/SET		10	9		2				10			25			20		
STA 202+36 RT																	
EXIST 2-18" x 32' RCP																	
PROP 2-18" x 33' HDPE W/SET		26	30	4					64			38		66			
SUBTOTALS SHEET 1	61	78	78	6	10	0	0	0	214	0	849	243	0	66	106	0	0

CONTRACTOR TO VERIFY ALL PIPE SIZES AND LENGTHS PRIOR TO REMOVAL AND REPLACING OF THE SIDE ROAD STRUCTURES.

N. T. S.
SHEET 1 OF 4

SUMMARY OF SIDE ROAD STRUCTURES

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		32

SUMMARY OF SIDE ROAD STRUCTURES

PLAN LAYOUT SHEET	105 6008 REMOVING STAB BASE AND ASPH PAV (6") SY	400 6005 CEM STABIL BKFL CY	400 6012 CUT AND RESTORE PAV (FLEX BASE) SY	467 6363 SET (TY II) (18 IN) (RCP) (6:1) (P) EA	467 6395 SET (TY II) (24 IN) (RCP) (6:1) (P) EA	467 6423 SET (TY II) (30 IN) (RCP) (6:1) (P) EA	467 6454 SET (TY II) (36 IN) (RCP) (6:1) (P) EA	496 6004 REMOV STR (SET) EA	496 6007 REMOV STR (PIPE) LF	530 6004 DRIVEWAYS (CONC) SY	530 6005 DRIVEWAYS (ACP) SY	530 6016 DRIVEWAYS (BASE) SY	658 6060 REMOVE DELIN & OBJECT MARKER ASSMS EA	4122 6004 THERMO PIPE(18") (HDPE) (TYS) (CSB) LF	4122 6005 THERMO PIPE(24") (HDPE) (TYS) (CSB) LF	4122 6006 THERMO PIPE(36") (HDPE) (TYS) (CSB) LF	4122 6020 THERMO PIPE(30") (HDPE) (TYS) (CSB) LF
STA 205+74 LT																	
EXIST 2-18" x 40' W/SET																	
NO CULVERT WORK												73					
STA 206+38 RT																	
EXIST 2-18" x 25' RCP W/SET																	
NO CULVERT WORK												22					
STA 207+36 LT																	
EXIST 2-18" x 25' RCP																	
PROP 2-18" x 26' HDPE W/SET		20	24	4					50		246			52			
STA 215+95 LT																	
EXIST 1-24" x 80' RCP W/SET																	
PROP RMV 6' RCP LT, SET RT PROP SET LT, RT					2			1	6		141						
STA 219+77 LT																	
EXIST 1-18" x 76' RCP																	
PROP RMV 6' RCP LT, SET RT PROP SET LT, RT				2				1	6		137						
STA 230+42 LT																	
EXIST 1-24" x 14' RCP W/SET																	
PROP 1-24" x 26' HDPE W/SET		13	12		2			2	14			24			26		
STA 231+61 RT																	
EXIST 1-18" x 28' RCP																	
PROP SET LT, RT				2							30						
STA 233+25 RT																	
EXIST 1-18" x 35' PCLV																	
PROP SET LT, RT				2							40						
STA 242+79 LT																	
EXIST 1-24" x 20' RCP																	
PROP SET LT, RT					2							25					
STA 243+89 RT																	
EXIST 1-24" x 24' RCP																	
PROP 1-24" x 26' HDPE W/SET		13	12		2				24			29			26		
STA 271+97 RT																	
EXIST 1-18" x 20' RCP W/SET																	
NO CULVERT WORK												41					
STA 276+69 RT																	
EXIST 1-24" x 20' RCP W/SET																	
PROP SET LT, RT					2			2				41					
STA 276+73 LT																	
EXIST 1-24" x 22' RCP																	
PROP SET LT, RT					2							31					
STA 277+78 LT																	
EXIST 1-24" x 42' RCP																	
PROP RMV DELIN LT, RT PROP SET LT, RT					2						68		2				
SUBTOTALS SHEET 2	0	46	48	10	14	0	0	6	100	0	662	286	2	52	52	0	0

CONTRACTOR TO VERIFY ALL PIPE SIZES AND LENGTHS PRIOR TO REMOVAL AND REPLACING OF THE SIDE ROAD STRUCTURES.

N.T.S.
SHEET 2 OF 4

SUMMARY OF SIDE ROAD STRUCTURES

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		33

SUMMARY OF SIDE ROAD STRUCTURES

PLAN LAYOUT SHEET	105 6008 REMOVING STAB BASE AND ASPH PAV (6") SY	400 6005 CEM STABIL BKFL CY	400 6012 CUT AND RESTORE PAV (FLEX BASE) SY	467 6363 SET (TY II) (18 IN) (RCP) (6:1) (P) EA	467 6395 SET (TY II) (24 IN) (RCP) (6:1) (P) EA	467 6423 SET (TY II) (30 IN) (RCP) (6:1) (P) EA	467 6454 SET (TY II) (36 IN) (RCP) (6:1) (P) EA	496 6004 REMOV STR (SET) EA	496 6007 REMOV STR (PIPE) LF	530 6004 DRIVEWAYS (CONC) SY	530 6005 DRIVEWAYS (ACP) SY	530 6016 DRIVEWAYS (BASE) SY	658 6060 REMOVE DELIN & OBJECT MARKER ASSMS EA	4122 6004 THERMO PIPE(18") (HDPE) (TYS) (CSB) LF	4122 6005 THERMO PIPE(24") (HDPE) (TYS) (CSB) LF	4122 6006 THERMO PIPE(36") (HDPE) (TYS) (CSB) LF	4122 6020 THERMO PIPE(30") (HDPE) (TYS) (CSB) LF
STA 279+23 RT																	
EXIST 1-18" x 22' RCP W/SET																	
NO CULVERT WORK												30					
STA 280+85 LT																	
EXIST 1-24" x 41' RCP																	
PROP RMV DELIN LT, RT PROP SET LT, RT					2						71		2				
STA 310+49 RT																	
EXIST 1-24" x 36' RCP																	
PROP 1-24" x 39' HDPE W/SET		19	18		2				36			23			39		
STA 320+24 LT																	
EXIST 2-24" x 41' RCP																	
PROP 2-24" x 52' HDPE W/SET		50	47		4				82			20			104		
STA 340+91 LT																	
EXIST 1-18" x 41' RCP W/SET																	
PROP SET LT, RT				2				2				26					
STA 350+19 LT																	
EXIST 2-24" x 36' RCP W/SET																	
NO CULVERT WORK											26						
STA 368+44 RT																	
EXIST 1-24" x 46' RCP W/SET																	
NO CULVERT WORK											154						
STA 368+51 LT																	
EXIST 1-24" x 48' RCP W/SET																	
NO CULVERT WORK												106					
STA 370+50 LT																	
EXIST 1-24" x 47' RCP W/DROP INLET & SET																	
PROP 1-24" x 12' RCP EXTEND W/SET LT, RT		12			2			2		165					24		
STA 372+42 RT																	
EXIST 1-24" x 46' RCP W/SET																	
NO CULVERT WORK										159							
STA 372+45 LT																	
EXIST 1-24" x 55' RCP W/SET																	
NO CULVERT WORK										146							
STA 373+44 LT																	
EXIST 1-24" x 55' RCP W/SET																	
NO CULVERT WORK										162							
STA 375+43 RT																	
EXIST 1-24" x 58' RCP W/SET																	
NO CULVERT WORK											165						
STA 375+54 LT																	
EXIST 1-24" x 60' RCP W/SET																	
NO CULVERT WORK												26					
SUBTOTALS SHEET 3	0	81	65	2	10	0	0	4	118	632	416	231	2	0	167	0	0

CONTRACTOR TO VERIFY ALL PIPE SIZES AND LENGTHS PRIOR TO REMOVAL AND REPLACING OF THE SIDE ROAD STRUCTURES.

N. T. S.
SHEET 3 OF 4

SUMMARY OF SIDE ROAD STRUCTURES

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		34

SUMMARY OF SIDE ROAD STRUCTURES

PLAN LAYOUT SHEET	105 6008 REMOVING STAB BASE AND ASPH PAV (6") SY	400 6005 CEM STABIL BKFL CY	400 6012 CUT AND RESTORE PAV (FLEX BASE) SY	467 6363 SET (TY II) (18 IN) (RCP) (6:1) (P) EA	467 6395 SET (TY II) (24 IN) (RCP) (6:1) (P) EA	467 6423 SET (TY II) (30 IN) (RCP) (6:1) (P) EA	467 6454 SET (TY II) (36 IN) (RCP) (6:1) (P) EA	496 6004 REMOV STR (SET) EA	496 6007 REMOV STR (PIPE) LF	530 6004 DRIVEWAYS (CONC) SY	530 6005 DRIVEWAYS (ACP) SY	530 6016 DRIVEWAYS (BASE) SY	658 6060 REMOVE DEL IN & OBJECT MARKER ASSMS EA	4122 6004 THERMO PIPE(18") (HDPE) (TYS) (CSB) LF	4122 6005 THERMO PIPE(24") (HDPE) (TYS) (CSB) LF	4122 6006 THERMO PIPE(36") (HDPE) (TYS) (CSB) LF	4122 6020 THERMO PIPE(30") (HDPE) (TYS) (CSB) LF
STA 377+30 RT																	
EXIST 1-24" x 58' RCP W/SET																	
NO CULVERT WORK											172						
STA 384+64 LT																	
EXIST 1-36" x 66' RCP W/SET																	
NO CULVERT WORK											169						
STA 398+06 RT																	
EXIST 2-30" x 54' RCP W/DROP INLET & SET																	
NO CULVERT WORK										136							
STA 400+79 LT																	
EXIST 1-36" x 58' RCP W/SET																	
NO CULVERT WORK											162						
STA 402+61 RT																	
EXIST 2-30" x 54' RCP W/DROP INLET & SET																	
NO CULVERT WORK										141							
STA 416+32 RT																	
EXIST 2-30" x 50' RCP W/SET																	
PROP SET LT, RT						4		4				152					
STA 423+37 RT																	
EXIST 2-30" x 50' RCP W/SET																	
PROP 2-30" x 8' RCP EXTEND W/SET LT, RT		19				4		4		167							32
STA 424+60 LT																	
EXIST 1-36" x 50' RCP W/SET																	
NO CULVERT WORK											167						
STA 430+28 RT																	
EXIST 1-30" x 60' CMP																	
PROP 1-30" x 60' HDPE W/SET		36	27			2			60			53					60
STA 449+15 RT																	
EXIST 1-18" x 25' RCP																	
PROP 1-18" x 26' HDPE W/SET		10	12	2					25			74		26			
STA 449+16 LT																	
EXIST 1-36" x 22' RCP																	
PROP 1-36" x 33' HDPE W/SET		23	15				2		22			35				33	
SUBTOTALS SHEET 4	0	88	54	2	0	10	2	8	107	444	670	314	0	26	0	33	92
PROJECT TOTALS	**61**	**293**	**245**	**20**	**34**	**10**	**2**	**18**	**539**	**1076**	**2565**	**1074**	**4**	**144**	**325**	**33**	**92**

CONTRACTOR TO VERIFY ALL PIPE SIZES AND LENGTHS PRIOR TO REMOVAL AND REPLACING OF THE SIDE ROAD STRUCTURES.

N. T. S.
SHEET 4 OF 4

SUMMARY OF SIDE ROAD STRUCTURES

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		35

636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF																											
	6001	ALUM SIGNS (TY A)	SF																											
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA		X				X					X			X		X			X			X		X	X		9
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA																											
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA																											
	6050	TY S80 (2) SA (P)	EA																											
	6044	TY S80 (1) SB (U)	EA																											
	6034	TY S80 (1) SA (U-1EXT)	EA						X																					1
	6033	TY S80 (1) SA (U)	EA																											
	6031	TY S80 (1) SA (T-2EXT)	EA																											
	6030	TY S80 (1) SA (T)	EA																											
	6028	TY S80 (1) SA (P-BM)	EA																											
	6027	TY S80 (1) SA (P)	EA																											
	6012	TY 10BWG (1) SB (T)	EA																											
	6009	TY 10BWG (1) SB (P)	EA																											
	6007	TY 10BWG (1) SA (U)	EA																											
	6005	TY 10BWG (1) SA (T-2EXT)	EA																											
	6004	TY 10BWG (1) SA (T)	EA		X																	X						X		3
	6002	TY 10BWG (1) SA (P-BM)	EA																											
	6001	TY 10BWG (1) SA (P)	EA												X			X		X		X				X				X	6
SUMMARY OF SMALL SIGNS		ALUMINUM TYPE A			X	X	X	X		X	X	X	X		X	X	X	X		X	X	X	X	X		X	X	X	X	
		PLYWOOD TYPE A																												
		SIGN DIMENSIONS			48X48X48	24X12	24X12	24X24		21X15	24X24	21X15	24X24		24X6	21X15	24X24	30X30		24X12	24X24	48X48X48	24X12	24X12		24X24	24X24	30X36	24X24	
		SIGN TEXT		PROPOSED	YIELD	SOUTH	BUSINESS									JCT		STOP		CROSS TRAFFIC DOES NOT STOP		YIELD	NORTH	BUSINESS				SPEED LIMIT XX		SHEET TOTAL
		SIGN TYPE			R1-2	M3-3	M4-3	M1-6TB-3		M6-3	M1-6F	M6-4	D9-2		D9-1dP	M2-1	M1-6F	R1-1		W4-4P	D20-1TR	R1-2	M3-1	M4-3		M1-6TB-3	D20-1TL	R2-1	D20-1TL	
		SIGN NO.			1	2							3			4		5			6	7	8				X8	9	10	
		PLAN SHEET NO.		1																										

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 1 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.			SHEET
12	6				36
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA		0111	09	042	BS 288B

SUMMARY OF SMALL SIGNS

Item	Code	Description	Unit																				Sheet Total
636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF																				
	6001	ALUM SIGNS (TY A)	SF																				
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA					X															1
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA																				
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA																				
	6050	TY S80 (2) SA (P)	EA																				
	6044	TY S80 (1) SB (U)	EA																				
	6034	TY S80 (1) SA (U-1EXT)	EA																				
	6033	TY S80 (1) SA (U)	EA				X		X	X						X						X	5
	6031	TY S80 (1) SA (T-2EXT)	EA																				
	6030	TY S80 (1) SA (T)	EA																				
	6028	TY S80 (1) SA (P-BM)	EA																				
	6027	TY S80 (1) SA (P)	EA																				
	6012	TY 10BWG (1) SB (T)	EA																				
	6009	TY 10BWG (1) SB (P)	EA																				
	6007	TY 10BWG (1) SA (U)	EA																				
	6005	TY 10BWG (1) SA (T-2EXT)	EA																				
	6004	TY 10BWG (1) SA (T)	EA					X															1
	6002	TY 10BWG (1) SA (P-BM)	EA																				
	6001	TY 10BWG (1) SA (P)	EA	X							X		X				X		X				5
		ALUMINUM TYPE A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		PLYWOOD TYPE A																					
		SIGN DIMENSIONS		24X12	24X24	21X15	96X36	30X36	78X30	78X30	30X30	24X12	24X12	24X24	21X15	96X36	30X30	36X8	24X12	24X24	21X15	96X36	
		SIGN TEXT		PROPOSED BUSINESS	288 TEXAS			SPEED LIMIT XX	Technology Dr NEXT SIGNAL	Technology Dr NEXT SIGNAL	STOP	CROSS TRAFFIC DOES NOT STOP	BUSINESS	288 TEXAS				Technology Dr	BUSINESS	288 TEXAS			SHEET TOTAL
		SIGN TYPE		M4-3	M1-6TB-3	M6-4	W1-7T	R2-1	D3-2	D3-2	R1-1	W4-4P	M4-3	M1-6TB-3	M6-4	W1-7T	W2-2L	W16-8P	M4-3	M1-6TB-3	M6-4	W1-7T	
		SIGN NO.		11			12	1	2	3	4		5			6	7		8			9	
		PLAN SHEET NO.		1				2															

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

© TxDOT 2022 SHEET 2 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.			SHEET
12	6				37
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA		0111	09	042	BS 288B

FILE: H:\T\Signing\0338-03-089\Summaries.xls

SUMMARY OF SMALL SIGNS

636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF																			
	6001	ALUM SIGNS (TY A)	SF																			
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA					X		X						X	X			X		5
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA																			
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA																			
	6050	TY S80 (2) SA (P)	EA																			
	6044	TY S80 (1) SB (U)	EA																			
	6034	TY S80 (1) SA (U-1EXT)	EA																			
	6033	TY S80 (1) SA (U)	EA												X							1
	6031	TY S80 (1) SA (T-2EXT)	EA																			
	6030	TY S80 (1) SA (T)	EA																			
	6028	TY S80 (1) SA (P-BM)	EA																			
	6027	TY S80 (1) SA (P)	EA																			
	6012	TY 10BWG (1) SB (T)	EA																			
	6009	TY 10BWG (1) SB (P)	EA																			
	6007	TY 10BWG (1) SA (U)	EA																			
	6005	TY 10BWG (1) SA (T-2EXT)	EA																			
	6004	TY 10BWG (1) SA (T)	EA			X	X										X					3
	6002	TY 10BWG (1) SA (P-BM)	EA																			
	6001	TY 10BWG (1) SA (P)	EA	X						X			X							X		4
		ALUMINUM TYPE A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	SHEET TOTAL
		PLYWOOD TYPE A																				
		SIGN DIMENSIONS		30X30	36X8	30X36	30X36	24X24	8X42	30X30	24X12	24X12	24X24	21X15	96X36	24X24	36X36	24X12	24X12	24X24	3X10	
		SIGN TEXT		PROPOSED 	Technology Dr	SPEED LIMIT XX	SPEED LIMIT XX	CO RD 453	Beechwood Dr	STOP	CROSS TRAFFIC DOES NOT STOP	BUSINESS	288 TEXAS			CO RD 453	PICNIC AREA 1 MILE ACCESSIBLE	SOUTH	BUSINESS	288 TEXAS	508	
		SIGN TYPE		W2-2R	W16-8P	R2-1	R2-1	D20-1TL	D3-4T	R1-1	W4-4P	M4-3	M1-6TB-3	M6-4	W1-7T	D20-1TR	D5-1bT	M3-3	M4-3	M1-6TB-3	D10-7aT	
SUMMARY OF SMALL SIGNS		SIGN NO.		1		2	3	X1	1			2			3	X1	1	1				
		PLAN SHEET NO.		3				4								5		6				

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 3 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.			SHEET
12	6				38
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA		0111	09	042	BS 288B

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636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF															6.25	1.33				7.6
	6001	ALUM SIGNS (TY A)	SF																				
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA		X					X	X		X	X		X				X	X		8
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA										MOUNTED BACK TO BACK										
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA																				
	6050	TY S80 (2) SA (P)	EA																				
	6044	TY S80 (1) SB (U)	EA																				
	6034	TY S80 (1) SA (U-1EXT)	EA																				
	6033	TY S80 (1) SA (U)	EA																				
	6031	TY S80 (1) SA (T-2EXT)	EA																				
	6030	TY S80 (1) SA (T)	EA																				
	6028	TY S80 (1) SA (P-BM)	EA																				
	6027	TY S80 (1) SA (P)	EA																				
	6012	TY 10BWG (1) SB (T)	EA																				
	6009	TY 10BWG (1) SB (P)	EA																				
	6007	TY 10BWG (1) SA (U)	EA																				
	6005	TY 10BWG (1) SA (T-2EXT)	EA																				
	6004	TY 10BWG (1) SA (T)	EA		X					X	X			X	X					X			6
	6002	TY 10BWG (1) SA (P-BM)	EA																				
	6001	TY 10BWG (1) SA (P)	EA					X					X			X					X		4
SUMMARY OF SMALL SIGNS		ALUMINUM TYPE A			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		PLYWOOD TYPE A																					
		SIGN DIMENSIONS			30X36	24X12	24X12	24X24	3X10	30X36	36X36	24X30	24X30	36X36	30X36	30X30	24X12	30X30	24X8	66X24	30X30	24X12	
		SIGN TEXT		PROPOSED	SPEED LIMIT XX	NORTH	BUSINESS	288 TEXAS	508	SPEED LIMIT XX	PICNIC AREA ACCESSIBLE			PICNIC AREA ACCESSIBLE	SPEED LIMIT XX	STOP	CROSS TRAFFIC DOES NOT STOP		CR 45	Brazoria County Sheriff Department And County Jail	STOP	CROSS TRAFFIC DOES NOT STOP	SHEET TOTAL
		SIGN TYPE			R2-1	M3-1	M4-3	M1-6TB-3	D10-7aT	R2-1	D5-2bTL	D9-4	D9-4	D5-2bTR	R2-1	R1-1	W4-4P	W2-1	W16-8P	D26-3TR	R1-1	W4-4P	
		SIGN NO.			2	3				4	1	2		3	1	2		R1		3	4		
		PLAN SHEET NO.		6							8				9								

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 4 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.	SHEET
12	6		39

COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA	0111	09	042	BS 288B

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SUMMARY OF SMALL SIGNS

636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF		6.25	1.33																7.6
	6001	ALUM SIGNS (TY A)	SF																			
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA	X				X		X		X			X	X		X		X		X	9
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA																			
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA																			
	6050	TY S80 (2) SA (P)	EA																			
	6044	TY S80 (1) SB (U)	EA																			
	6034	TY S80 (1) SA (U-1EXT)	EA																			
	6033	TY S80 (1) SA (U)	EA												X							1
	6031	TY S80 (1) SA (T-2EXT)	EA																			
	6030	TY S80 (1) SA (T)	EA																			
	6028	TY S80 (1) SA (P-BM)	EA																			
	6027	TY S80 (1) SA (P)	EA																			
	6012	TY 10BWG (1) SB (T)	EA																			
	6009	TY 10BWG (1) SB (P)	EA																			
	6007	TY 10BWG (1) SA (U)	EA																			
	6005	TY 10BWG (1) SA (T-2EXT)	EA																			
	6004	TY 10BWG (1) SA (T)	EA	X			X	X						X							X	5
	6002	TY 10BWG (1) SA (P-BM)	EA																			
	6001	TY 10BWG (1) SA (P)	EA							X		X					X		X			4
SUMMARY OF SMALL SIGNS		ALUMINUM TYPE A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		PLYWOOD TYPE A																				
		SIGN DIMENSIONS		66X24	30X30	24X8	30X36	36X36	21X15	24X24	24X12	24X12	24X24	30X36	30X78	24X12	24X12	24X24	24X24	24X6	36X36	
		SIGN TEXT		PROPOSED 			SPEED LIMIT XX		JCT		NORTH	BUSINESS		SPEED LIMIT XX		SOUTH	BUSINESS			X MILE		SHEET TOTAL
		SIGN TYPE		D26-3TL	W2-1	W16-8P	R2-1	D5-1bT	M2-1	M1-6TB-3	M3-1	M4-3	M1-6TB-3	R2-1	D2-2	M3-3	M4-3	M1-6TB-3	D9-2	D9-1aP	W6-1	
		SIGN NO.		1	R1		2	1	2		3			4	5	6			7		8	
		PLAN SHEET NO.		10				11														

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 5 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.			SHEET
12	6				40
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA		0111	09	042	BS 288B

SUMMARY OF SMALL SIGNS

Item	Code	Description	Unit																								SHEET TOTAL
636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF																								
	6001	ALUM SIGNS (TY A)	SF																								
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA		X	X		X		X	X		X			X			X			X			X		10
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA																								
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA													MOUNTED BACK TO BACK			MOUNTED BACK TO BACK								
	6050	TY S80 (2) SA (P)	EA																								
	6044	TY S80 (1) SB (U)	EA																								
	6034	TY S80 (1) SA (U-1EXT)	EA																								
	6033	TY S80 (1) SA (U)	EA																								
	6031	TY S80 (1) SA (T-2EXT)	EA																								
	6030	TY S80 (1) SA (T)	EA																								
	6028	TY S80 (1) SA (P-BM)	EA																								
	6027	TY S80 (1) SA (P)	EA																								
	6012	TY 10BWG (1) SB (T)	EA																								
	6009	TY 10BWG (1) SB (P)	EA																								
	6007	TY 10BWG (1) SA (U)	EA																								
	6005	TY 10BWG (1) SA (T-2EXT)	EA																								
	6004	TY 10BWG (1) SA (T)	EA	X	X					X			X			X			X			X			X		8
	6002	TY 10BWG (1) SA (P-BM)	EA																								
	6001	TY 10BWG (1) SA (P)	EA			X		X			X																3
SUMMARY OF SMALL SIGNS		ALUMINUM TYPE A		X	X	X	X		X	X	X	X		X	X	X	X	X	X	X	X		X	X		X	
		PLYWOOD TYPE A																							
		SIGN DIMENSIONS		30X36	36X36	24X24	24 DIA		21X15	48X48X48	24X24	36X36		48X48X48	36X36	36X36	30X24	36X36	36X36	30X24	36X36		18X6	36X36		12X9	
		SIGN TEXT	PROPOSED	PARK - RIDE	16-3	CO RD 49	EVACUATION ROUTE			YIELD	CO RD 49	DO NOT ENTER		YIELD	DO NOT ENTER	STOP	DIVIDED HIGHWAY	DO NOT ENTER	STOP	DIVIDED HIGHWAY	STOP		ALL WAY	STOP			
		SIGN TYPE		D4-2R	W12-2	D20-1TR	EM-1aT		M5-1BR	R1-2	D20-1TL	R5-1		R1-2	R5-1	R1-1	R6-3	R5-1	R1-1	R6-3	R1-1		R1-3P	R1-1		M6-2aL	
		SIGN NO.		9	10	11	12			1	2	3			4			5			6			7			
		PLAN SHEET NO.		11						12																	

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 6 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.			SHEET
12	6				41
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA		0111	09	042	BS 288B

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SUMMARY OF SMALL SIGNS

636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF																					
	6001	ALUM SIGNS (TY A)	SF																					
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA			X							X					X	X	X		X		6
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA			MOUNTED BACK TO BACK																		
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA																					
	6050	TY S80 (2) SA (P)	EA																					
	6044	TY S80 (1) SB (U)	EA																					
	6034	TY S80 (1) SA (U-1EXT)	EA										X											1
	6033	TY S80 (1) SA (U)	EA																X					1
	6031	TY S80 (1) SA (T-2EXT)	EA																					
	6030	TY S80 (1) SA (T)	EA																					
	6028	TY S80 (1) SA (P-BM)	EA																					
	6027	TY S80 (1) SA (P)	EA																					
	6012	TY 10BWG (1) SB (T)	EA																					
	6009	TY 10BWG (1) SB (P)	EA																					
	6007	TY 10BWG (1) SA (U)	EA														X							1
	6005	TY 10BWG (1) SA (T-2EXT)	EA																					
	6004	TY 10BWG (1) SA (T)	EA			X														X				2
	6002	TY 10BWG (1) SA (P-BM)	EA																					
	6001	TY 10BWG (1) SA (P)	EA															X				X		2
		ALUMINUM TYPE A			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
		PLYWOOD TYPE A																						
		SIGN DIMENSIONS			24X30		36X36	24X12	24X24	21X15	24X12	24X12	24X24	21X15	24 DIA	21X15	48X30	30X30	30X84	30X36	30X30		30X24	
		SIGN TEXT		PROPOSED			STOP	NORTH			SOUTH	BUSINESS									STOP			SHEET TOTAL
		SIGN TYPE			R4-7c		R1-1	M3-1	M1-6TB-3	M6-1L	M3-3	M4-3	M1-6TB-3	M6-3	EM-1aT	M6-1B	R3-8LSS	W3-1	D1-2	R3-5R	R1-1		R6-3	
		SIGN NO.			8			9									10	11	12	13	14			
		PLAN SHEET NO.		12																				

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 7 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.		SHEET
12	6			42
COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA	0111	09	042	BS 288B

636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF																				
	6001	ALUM SIGNS (TY A)	SF																				
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA		X										X				X		X	X	5
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA																				
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA																				
	6050	TY S80 (2) SA (P)	EA																				
	6044	TY S80 (1) SB (U)	EA																				
	6034	TY S80 (1) SA (U-1EXT)	EA		X																		1
	6033	TY S80 (1) SA (U)	EA																				
	6031	TY S80 (1) SA (T-2EXT)	EA																				
	6030	TY S80 (1) SA (T)	EA																				
	6028	TY S80 (1) SA (P-BM)	EA																				
	6027	TY S80 (1) SA (P)	EA																				
	6012	TY 10BWG (1) SB (T)	EA																				
	6009	TY 10BWG (1) SB (P)	EA																				
	6007	TY 10BWG (1) SA (U)	EA																				
	6005	TY 10BWG (1) SA (T-2EXT)	EA																				
	6004	TY 10BWG (1) SA (T)	EA																X		X		2
	6002	TY 10BWG (1) SA (P-BM)	EA																				
	6001	TY 10BWG (1) SA (P)	EA												X							X	2
SUMMARY OF SMALL SIGNS		ALUMINUM TYPE A			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		PLYWOOD TYPE A																					
		SIGN DIMENSIONS			24X12	24X24	24X12	24X24	21X15	24X12	24X24	21X15	24 DIA	21X15	24X12	24X24	24 DIA	21X15	36X36	12X9	54X18	30X30	
		SIGN TEXT		PROPOSED	TO		SOUTH			NORTH					NORTH				STOP				SHEET TOTAL
		SIGN TYPE			M4-5	M1-6F	M3-3	M1-6TB-3	M6-3	M3-1	M1-6TB-3	M6-2R	EM-1aT	M6-1B	M3-1	M1-6TB-3	EM-1aT	M6-2R	R1-1	M6-2aL	R6-1L	W3-1	
		SIGN NO.			15										16				17		18	19	
		PLAN SHEET NO.		12																			

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 8 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.			SHEET
12	6				43
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA		0111	09	042	BS 288B

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SUMMARY OF SMALL SIGNS

Item	Code	Description	Unit	20	1	2	3	4	5	6	7	8	9	10	11	12	SHEET TOTAL
636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF														
	6001	ALUM SIGNS (TY A)	SF														
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA	X	X	X	X	X	X	X	X	X	X	X	X	X	13
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA														
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA												MOUNTED BACK TO BACK		
	6050	TY S80 (2) SA (P)	EA														
	6044	TY S80 (1) SB (U)	EA														
	6034	TY S80 (1) SA (U-1EXT)	EA														
	6033	TY S80 (1) SA (U)	EA	X		X											2
	6031	TY S80 (1) SA (T-2EXT)	EA														
	6030	TY S80 (1) SA (T)	EA														
	6028	TY S80 (1) SA (P-BM)	EA														
	6027	TY S80 (1) SA (P)	EA														
	6012	TY 10BWG (1) SB (T)	EA														
	6009	TY 10BWG (1) SB (P)	EA														
	6007	TY 10BWG (1) SA (U)	EA										X	X			2
	6005	TY 10BWG (1) SA (T-2EXT)	EA														
	6004	TY 10BWG (1) SA (T)	EA		X		X	X	X	X	X	X			X		8
	6002	TY 10BWG (1) SA (P-BM)	EA														
	6001	TY 10BWG (1) SA (P)	EA													X	1
		ALUMINUM TYPE A		X	X	X X X X X X	X X	X	X	X X	X	X X X	X	X	X X	X X X	
		PLYWOOD TYPE A															
		SIGN DIMENSIONS		108X30	36X36	24X12 24X24 21X15 24X12 24X24 21X15	36X36 18X6	54X18	36X36	36X36 30X24	36X36	36X36 18X6 30X24	42X30	42X30	48X48X48 36X36	24X12 24X12 24X24	
		SIGN TEXT		PROPOSED Rosharon Lake Jackson		SOUTH 288 TEXAS TO FARM 521 ROAD 	STOP ALL WAY	ONE WAY	DO NOT ENTER	STOP DIVIDED HIGHWAY	DO NOT ENTER	STOP ALL WAY DIVIDED HIGHWAY	WRONG WAY	WRONG WAY	YEILD DO NOT ENTER	NORTH BUSINESS 288 TEXAS	
		SIGN TYPE		D1-2	R3-1	M3-3 M1-6TB-3 M6-1L M4-5 M1-6F M6-3	R1-1 R1-3P	R6-1R	R5-1	R1-1 R6-3	R5-1	R1-1 R1-3P R6-3	R5-1a	R5-1a	R1-2 R5-1	M3-1 M4-3 M1-6TB-3	
		SIGN NO.		20	1	2	3	4	5	6	7	8	9	10	11	12	
		PLAN SHEET NO.		12	13												

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

© TxDOT 2022 SHEET 9 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.	SHEET
12	6		44

COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA	0111	09	042	BS 288B

SUMMARY OF SMALL SIGNS

636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF																					
	6001	ALUM SIGNS (TY A)	SF																					
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA		X	X	X	X	X	X		X				X	X					X	X	11
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA																					
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA																					
	6050	TY S80 (2) SA (P)	EA																					
	6044	TY S80 (1) SB (U)	EA																					
	6034	TY S80 (1) SA (U-1EXT)	EA																					
	6033	TY S80 (1) SA (U)	EA																					
	6031	TY S80 (1) SA (T-2EXT)	EA																					
	6030	TY S80 (1) SA (T)	EA																					
	6028	TY S80 (1) SA (P-BM)	EA																					
	6027	TY S80 (1) SA (P)	EA																					
	6012	TY 10BWG (1) SB (T)	EA																					
	6009	TY 10BWG (1) SB (P)	EA																					
	6007	TY 10BWG (1) SA (U)	EA																					
	6005	TY 10BWG (1) SA (T-2EXT)	EA																					
	6004	TY 10BWG (1) SA (T)	EA		X	X															X		X	4
	6002	TY 10BWG (1) SA (P-BM)	EA																					
	6001	TY 10BWG (1) SA (P)	EA				X	X	X	X		X		X		X	X		X					9
		ALUMINUM TYPE A			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		PLYWOOD TYPE A																						
		SIGN DIMENSIONS			30X36	78X18	12X18	12X18	12X18	21X15	24X24	30X30	24X12	30X30	24X8	12X18	30X30	24X12	30X30	24X8	30X36	24X30	36X36	
		SIGN TEXT		PROPOSED	SPEED LIMIT XX					JCT		STOP	CROSS TRAFFIC DOES NOT STOP				STOP	CROSS TRAFFIC DOES NOT STOP			SPEED LIMIT XX			SHEET TOTAL
		SIGN TYPE			R2-1	D2-1	R7-1DBL	R7-1DBL	R7-1DBL	M2-1	M1-6TB-3	R1-1	W4-4P	W2-1	W16-8P	R7-1DBL	R1-1	W4-4P	W2-1	W16-8P	R2-1	D4-2	W6-1	
		SIGN NO.			13	14	1	2	3	4		5		6		7	8		9		1	X1	2	
		PLAN SHEET NO.		13			14														16			

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 10 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.			SHEET
12	6				45
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA		0111	09	042	BS 288B

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636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF																	
636	6001	ALUM SIGNS (TY A)	SF																	
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA	X	X		X		X		X	X	X	X		X		X	X	11
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA																	
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA																	
	6050	TY S80 (2) SA (P)	EA																	
	6044	TY S80 (1) SB (U)	EA																	
	6034	TY S80 (1) SA (U-1EXT)	EA																	
	6033	TY S80 (1) SA (U)	EA									X								1
	6031	TY S80 (1) SA (T-2EXT)	EA																	
	6030	TY S80 (1) SA (T)	EA																	
	6028	TY S80 (1) SA (P-BM)	EA																	
	6027	TY S80 (1) SA (P)	EA																	
	6012	TY 10BWG (1) SB (T)	EA																	
	6009	TY 10BWG (1) SB (P)	EA																	
	6007	TY 10BWG (1) SA (U)	EA																	
	6005	TY 10BWG (1) SA (T-2EXT)	EA																	
	6004	TY 10BWG (1) SA (T)	EA	X			X						X	X					X	5
	6002	TY 10BWG (1) SA (P-BM)	EA																	
	6001	TY 10BWG (1) SA (P)	EA		X				X		X					X		X		5
SUMMARY OF SMALL SIGNS		ALUMINUM TYPE A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	SHEET TOTAL
		PLYWOOD TYPE A																		
		SIGN DIMENSIONS		30X36	21X15	24X24	30X36	21X15	24X12	24X24	24X30	30X84	48X48X48	36X36	24X12	24X12	24X24	24X30	36X36	
		SIGN TEXT	PROPOSED	SPEED LIMIT XX	JCT		SPEED LIMIT XX	JCT	BUSINESS				YIELD		SOUTH	BUSINESS				
		SIGN TYPE		R2-1	M2-1	M1-6F	R2-1	M2-1	M4-3	M1-6TB-3	R4-7b	D1-2	R1-2	W6-2	M3-3	M4-3	M1-6TB-3	R4-7c	W6-2	
		SIGN NO.		3	4		1	2			3	4	5	6	7			8	9	
		PLAN SHEET NO.		16			17													

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 11 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.			SHEET
12	6				46
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA		0111	09	042	BS 288B

636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF																				
	6001	ALUM SIGNS (TY A)	SF																				
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA						X				X	X	X		X			X		X	7
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA																				
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA																				
	6050	TY S80 (2) SA (P)	EA																				
	6044	TY S80 (1) SB (U)	EA																				
	6034	TY S80 (1) SA (U-1EXT)	EA						X														1
	6033	TY S80 (1) SA (U)	EA												X					X			2
	6031	TY S80 (1) SA (T-2EXT)	EA																				
	6030	TY S80 (1) SA (T)	EA																				
	6028	TY S80 (1) SA (P-BM)	EA																				
	6027	TY S80 (1) SA (P)	EA																				
	6012	TY 10BWG (1) SB (T)	EA																				
	6009	TY 10BWG (1) SB (P)	EA																				
	6007	TY 10BWG (1) SA (U)	EA																				
	6005	TY 10BWG (1) SA (T-2EXT)	EA																				
	6004	TY 10BWG (1) SA (T)	EA										X	X			X					X	4
	6002	TY 10BWG (1) SA (P-BM)	EA																				
	6001	TY 10BWG (1) SA (P)	EA																				
SUMMARY OF SMALL SIGNS		ALUMINUM TYPE A			X	X	X	X		X	X		X	X	X	X	X	X		X	X	X	
		PLYWOOD TYPE A																					
		SIGN DIMENSIONS			24X12	24X24	21X15	24X12		24X12	24X24	21X15	36X36	54X18	78X30	48X48X48	36X36	24X24	21X15	24 DIA	21X15	78X18	
		SIGN TEXT		PROPOSED	EAST			SOUTH		BUSINESS			STOP			YIELD							SHEET TOTAL
		SIGN TYPE			M3-2	M1-6F	M5-1L	M3-3		M4-3	M1-6TB-3	M6-1R	R1-1	R6-1R	D1-2	R1-2	R3-2	M1-6F	M6-1L	EM-1aT	M6-1B	D1-1	
		SIGN NO.			10								11	12	13	14		15				16	
		PLAN SHEET NO.		17																			

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 12 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.			SHEET
12	6				47
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA		0111	09	042	BS 288B

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SUMMARY OF SMALL SIGNS

																				SHEET TOTAL
636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF																	
636	6001	ALUM SIGNS (TY A)	SF																	
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA			X		X	X		X		X		X	X	X	X		9
644-INS SM RD SN SUP & AM	6070	RELOCATE SM RD SN SUP&AM TY S80	EA																	
644-INS SM RD SN SUP & AM	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA																	
644-INS SM RD SN SUP & AM	6050	TY S80 (2) SA (P)	EA																	
644-INS SM RD SN SUP & AM	6044	TY S80 (1) SB (U)	EA																	
644-INS SM RD SN SUP & AM	6034	TY S80 (1) SA (U-1EXT)	EA																	
644-INS SM RD SN SUP & AM	6033	TY S80 (1) SA (U)	EA						X											1
644-INS SM RD SN SUP & AM	6031	TY S80 (1) SA (T-2EXT)	EA																	
644-INS SM RD SN SUP & AM	6030	TY S80 (1) SA (T)	EA																	
644-INS SM RD SN SUP & AM	6028	TY S80 (1) SA (P-BM)	EA																	
644-INS SM RD SN SUP & AM	6027	TY S80 (1) SA (P)	EA																	
644-INS SM RD SN SUP & AM	6012	TY 10BWG (1) SB (T)	EA																	
644-INS SM RD SN SUP & AM	6009	TY 10BWG (1) SB (P)	EA																	
644-INS SM RD SN SUP & AM	6007	TY 10BWG (1) SA (U)	EA								X		X						X	3
644-INS SM RD SN SUP & AM	6005	TY 10BWG (1) SA (T-2EXT)	EA																	
644-INS SM RD SN SUP & AM	6004	TY 10BWG (1) SA (T)	EA					X								X	X			3
644-INS SM RD SN SUP & AM	6002	TY 10BWG (1) SA (P-BM)	EA																	
644-INS SM RD SN SUP & AM	6001	TY 10BWG (1) SA (P)	EA			X									X					2
SUMMARY OF SMALL SIGNS		ALUMINUM TYPE A			X	X	X	X	X	X		X		X	X	X	X		X	
SUMMARY OF SMALL SIGNS		PLYWOOD TYPE A																		
SUMMARY OF SMALL SIGNS		SIGN DIMENSIONS			24X12	24X24	21X15	36X36	96X36	36X36	24X36	36X36	24X36	24X12	24X24	48X48X48	36X36		42X30	
SUMMARY OF SMALL SIGNS		SIGN TEXT		PROPOSED	WEST			STOP		DO NOT ENTER		DO NOT ENTER		WEST		YIELD	DO NOT ENTER		WRONG WAY	
SUMMARY OF SMALL SIGNS		SIGN TYPE			M3-4	M1-6F	M6-1L	R1-1	W1-9TR	R5-1	R12-IT	R5-1	R12-IT	M3-4B	M1-6F	R1-2	R5-1		R5-1a	
SUMMARY OF SMALL SIGNS		SIGN NO.			17			18	19	20		21		22		23	1	X2	2	
SUMMARY OF SMALL SIGNS		PLAN SHEET NO.		17													18			

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 13 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.			SHEET
12	6				48
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA		0111	09	042	BS 288B

636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF																					
	6001	ALUM SIGNS (TY A)	SF																					
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA		X						X		X	X	X	X		X		X	X			9
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA																					
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA																					
	6050	TY S80 (2) SA (P)	EA																					
	6044	TY S80 (1) SB (U)	EA																					
	6034	TY S80 (1) SA (U-1EXT)	EA																					
	6033	TY S80 (1) SA (U)	EA		X						X							X						3
	6031	TY S80 (1) SA (T-2EXT)	EA																					
	6030	TY S80 (1) SA (T)	EA																					
	6028	TY S80 (1) SA (P-BM)	EA																					
	6027	TY S80 (1) SA (P)	EA																					
	6012	TY 10BWG (1) SB (T)	EA																					
	6009	TY 10BWG (1) SB (P)	EA																					
	6007	TY 10BWG (1) SA (U)	EA													X								1
	6005	TY 10BWG (1) SA (T-2EXT)	EA																					
	6004	TY 10BWG (1) SA (T)	EA									X		X		X			X				X	5
	6002	TY 10BWG (1) SA (P-BM)	EA																					
	6001	TY 10BWG (1) SA (P)	EA										X							X	X			3
SUMMARY OF SMALL SIGNS		ALUMINUM TYPE A			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		PLYWOOD TYPE A																						
		SIGN DIMENSIONS			24X12	24X24	21X15	24X12	24X24	21X15	78X30	36X36	24X30	36X36	36X36	36X36	42X30	126X24	36X36	24X30	24X12	24X24	36X36	
		SIGN TEXT		PROPOSED	BUSINESS			WEST				DO NOT ENTER		LANE END MERGE RIGHT	LANE END MERGE LEFT		WRONG WAY		DO NOT ENTER		NORTH			SHEET TOTAL
		SIGN TYPE			M4-3	M1-6TB-3	M6-2L	M3-4	M1-6F	M6-2R	D1-2	R5-1	R4-3	W9-2TR	W9-2TL	W6-2	R5-1a	I-2aT	R5-1	R4-7	M3-1	M1-6F	W6-3	
		SIGN NO.			3						4	5	6	7	X7	8	9	10	11	12	13		14	
		PLAN SHEET NO.		18																				

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 14 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.		SHEET
12	6			49
COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA	0111	09	042	BS 288B

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SUMMARY OF SMALL SIGNS

636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF																
636	6001	ALUM SIGNS (TY A)	SF																
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA	X			X		X		X	X			X	X	X	X	9
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA																
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA																
	6050	TY S80 (2) SA (P)	EA																
	6044	TY S80 (1) SB (U)	EA																
	6034	TY S80 (1) SA (U-1EXT)	EA																
	6033	TY S80 (1) SA (U)	EA																
	6031	TY S80 (1) SA (T-2EXT)	EA																
	6030	TY S80 (1) SA (T)	EA																
	6028	TY S80 (1) SA (P-BM)	EA																
	6027	TY S80 (1) SA (P)	EA																
	6012	TY 10BWG (1) SB (T)	EA																
	6009	TY 10BWG (1) SB (P)	EA																
	6007	TY 10BWG (1) SA (U)	EA																
	6005	TY 10BWG (1) SA (T-2EXT)	EA																
	6004	TY 10BWG (1) SA (T)	EA			X													1
	6002	TY 10BWG (1) SA (P-BM)	EA																
	6001	TY 10BWG (1) SA (P)	EA	X			X		X		X		X		X	X	X	X	9
SUMMARY OF SMALL SIGNS		ALUMINUM TYPE A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		PLYWOOD TYPE A																	
		SIGN DIMENSIONS		21X15	24X24	36X36	30X30	12X18	18X9	18X9	30X12	24X6	12X18	18X9	30X12	30X48	30X12	30X12	
		SIGN TEXT	PROPOSED	JCT	288 TEXAS		FASTEN SAFETY BELTS STATE LAW	RESERVED PARKING	VAN ACCESSIBLE	VIOLATORS SUBJECT TO FINE AND TOWING	NO HOUSEHOLD GARBAGE	ACCESSIBLE	RESERVED PARKING	VIOLATORS SUBJECT TO FINE AND TOWING	NO HOUSEHOLD GARBAGE	NO DUMPING CAMPING LITTERING SOLICITING OR FIRES PROHIBITED BY STATE LAW	NO HOUSEHOLD GARBAGE	NO HOUSEHOLD GARBAGE	SHEET TOTAL
		SIGN TYPE		M2-1	M1-6TB-3	W6-1	R19-8T	R7-8T	R7-8P	R7-8aPT			R7-8T	R7-8aPT					
		SIGN NO.		15		16	1	2			3	X4	4		5	6	7	8	
		PLAN SHEET NO.	18				PICNIC AREA												

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 15 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.			SHEET
12	6				50
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA		0111	09	042	BS 288B

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SUMMARY OF SMALL SIGNS

Item	Code	Description	Unit	9	10	11	12	13	14	SHEET TOTAL	PROJECT TOTAL
636	6007	REPLACE EXT ALUM SIGNS (TY A)	SF								15
	6001	ALUM SIGNS (TY A)	SF								
644-INS SM RD SN SUP & AM	6076	REMOVE SM RD SN SUP & AM	EA	X	X	X	X	X	X	6	128
	6070	RELOCATE SM RD SN SUP&AM TY S80	EA								
	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA								
	6050	TY S80 (2) SA (P)	EA								
	6044	TY S80 (1) SB (U)	EA								
	6034	TY S80 (1) SA (U-1EXT)	EA								4
	6033	TY S80 (1) SA (U)	EA								17
	6031	TY S80 (1) SA (T-2EXT)	EA								
	6030	TY S80 (1) SA (T)	EA								
	6028	TY S80 (1) SA (P-BM)	EA								
	6027	TY S80 (1) SA (P)	EA								
	6012	TY 10BWG (1) SB (T)	EA								
	6009	TY 10BWG (1) SB (P)	EA								
	6007	TY 10BWG (1) SA (U)	EA								7
	6005	TY 10BWG (1) SA (T-2EXT)	EA								
	6004	TY 10BWG (1) SA (T)	EA								60
	6002	TY 10BWG (1) SA (P-BM)	EA								
	6001	TY 10BWG (1) SA (P)	EA	X	X	X	X	X	X	6	65
		ALUMINUM TYPE A		X	X	X	X	X	X		
		PLYWOOD TYPE A									
		SIGN DIMENSIONS		30X48	30X12	30X30	30X12	30X20	30X12		
		SIGN TEXT	PROPOSED								
		SIGN TYPE				R19-8T					
		SIGN NO.		9	10	11	12	13	14		
		PLAN SHEET NO.				PICNIC AREA					

NOTE:

1. Sign support shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).
3. Speed Limit with "XX" shall be provided after Speed Study. For futher clarification, refer General Notes item# 644.

ALUMINUM SIGN BLANKS (TYPE 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

SHEET 16 OF 16

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT NO.	SHEET
12	6		51

COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA	0111	09	042	BS 288B

FILE: H:\T\Signing\0338-03-089\Summaries.xls

SUMMARY OF LARGE SIGNS

LAYOUT SHEET NO.	SIGN NO.	STATION NO.	TYPE	BACKGROUND COLOR	TEXT	SIGN DIMENSIONS (FT)	636 (6002) ALUM SIGNS (TY G) SF	636 (6003) ALUM SIGNS (TY O) SF	647 (6001) * INSTALL LRSS (STRUCT STL) TYPE MOUNT	SIZE	LENGTH (FT) LEFT POST	LENGTH (FT) CENTER POST	LENGTH (FT) RIGHT POST	TOTAL WEIGHT LBS	416 DRILL SHAFT FND (6015) (NON-REINF) (12") LF	416 DRILL SHAFT FND (6018) (SIGN MTS) (24") LF
12	1	351+80	E6-2a	GREEN	TEXAS 288 NORTH Houston ⇗	14'-0"X7'-6"	105		121	W 8x18	17.00		19.00	691.6		20
										GROUND MOUNTED						

LAYOUT SHEET NO.	SIGN NO.	STATION NO.	TYPE	BACKGROUND COLOR	TEXT	SIGN DIMENSIONS (FT)	636 (6002) ALUM SIGNS (TY G) SF	636 (6003) ALUM SIGNS (TY O) SF	647 (6001) * INSTALL LRSS (STRUCT STL) TYPE MOUNT	SIZE	LENGTH (FT) LEFT POST	LENGTH (FT) CENTER POST	LENGTH (FT) RIGHT POST	TOTAL WEIGHT LBS	416 DRILL SHAFT FND (6015) (NON-REINF) (12") LF	416 DRILL SHAFT FND (6018) (SIGN MTS) (24") LF

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

** THE SLOPE OF THE ROADSIDE WAS APPROXIMATED BY FIELD MEASUREMENT. THE CONTRACTOR SHALL VERIFY THE LENGTH OF THE POST PRIOR TO ANY CONSTRUCTION.

*** OBJECT MARKET (OM1-1) OR (OM1-3) NEED TO BE INSTALLED ON EACH POST. FURNISHING AND INSTALLING OBJECT MARKER OM1-1 OR OM1-3 IS SUBSIDIARY TO THE ITEM, "ALUMINUM SIGNS (TYPE G)". (FOR MORE DETAILS SEE SIGNING & PAVEMENT MARKING LAYOUTS)

SUMMARY OF LARGE SIGNS

SHEET 1 OF 1

STATE DISTRICT	FEDERAL REGION	PROJECT NO.	SHEET
HOU	6		52

COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA	0111	09	042	BS 288B

STD-N34

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	666 6036	666 6042	666 6048	666 6141	666 6162	666 6212
	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	REFL PAV MRK TY I (Y)12"(SLD)(100MIL)	RE PV MRK TY I(BLACK)6"(SHADOW) (100MIL)	REFL PAV MRK TY II (Y) 12" (SLD)
	LF	LF	LF	LF	LF	LF
Sheet 1	848	0	656	0	480	0
Sheet 2	675	0	187	282	830	0
Sheet 3	0	0	0	116	990	0
Sheet 4	764	102	15	308	990	0
Sheet 5	0	0	0	12	990	0
Sheet 6	0	0	0	0	1000	0
Sheet 7	0	0	0	0	990	0
Sheet 8	0	0	0	0	990	0
Sheet 9	879	125	27	0	990	0
Sheet 10	604	79	0	85	1000	0
Sheet 11		0	0	56	1000	0
Sheet 12	3494	1626	116	332	410	1257
Sheet 13	1629	692	94	392	470	426
Sheet 14	0	0	27	0	960	0
Sheet 15	0	0	0	0	990	0
Sheet 16	0	0	0	0	1000	0
Sheet 17	156	0	45	63	480	0
Sheet 18	0	0	0	27	230	0
PICNIC AREA	0	0	0	0	0	0
PROJECT TOTALS	**9049**	**2624**	**1167**	**1673**	**14790**	**1683**

TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF PAVEMENT MARKING
(BS 288B, ETC.)

SCALE: N.S.T

SHEET 1 OF 6

ORIGINAL DRAWING DATE: APRIL, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO				SHEET
REVISIONS	HOU	6					53
	COUNTY		CONTROL	SECTION	JOB		HIGHWAY
	BRAZORIA		0111	09	044		BS 288B

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	666 6225	666 6226	666 6230	666 6243	666 6306	666 6309
	PAVEMENT SEALER 6"	PAVEMENT SEALER 8"	PAVEMENT SEALER 24"	PAVEMENT SEALER (YLD TRI)	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
	LF	LF	LF	EA	LF	LF
Sheet 1	265	598	475	12	480	40
Sheet 2	0	0	0	0	830	160
Sheet 3	0	0	0	0	1000	0
Sheet 4	0	0	0	0	1000	0
Sheet 5	0	0	0	0	1000	0
Sheet 6	0	0	0	0	1000	0
Sheet 7	0	0	0	0	1000	0
Sheet 8	0	0	0	0	1000	0
Sheet 9	0	0	0	0	990	0
Sheet 10	0	0	0	0	990	0
Sheet 11	0	0	0	0	990	0
Sheet 12	0	0	0	0	410	40
Sheet 13	0	0	0	0	490	120
Sheet 14	0	0	0	0	960	0
Sheet 15	0	0	0	0	1000	0
Sheet 16	0	0	0	0	1000	0
Sheet 17	0	0	0	0	500	149
Sheet 18	0	0	0	0	230	0
PICNIC AREA	0	0	0	0	0	0
PROJECT TOTALS	**265**	**598**	**475**	**12**	**14870**	**509**

TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF PAVEMENT MARKING
(BS 288B, ETC.)

SCALE: N.S.T

SHEET 2 OF 6

ORIGINAL DRAWING DATE: APRIL, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO				SHEET
REVISIONS	HOU	6					54
	COUNTY		CONTROL	SECTION	JOB		HIGHWAY
	BRAZORIA		0111	09	044		BS 288B

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	666 6343	666 6347	668 6064	668 6077	668 6078	668 6085
	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	REF PROF PAV MRK TY I(Y)6"(SLD)(100MIL)	PREFAB PAV MRK TY C (W) (4") (SLD)	PREFAB PAV MRK TY C (W) (ARROW)	PREFAB PAV MRK TY C (W) (DBL ARROW)	PREFAB PAV MRK TY C (W) (WORD)
	LF	LF	LF	EA	EA	EA
Sheet 1	2212	2107	0	4	2	4
Sheet 2	3864	4516	0	6	0	6
Sheet 3	4000	4000	0	0	0	0
Sheet 4	3992	4976	0	3	0	3
Sheet 5	4000	4188	0	0	0	0
Sheet 6	4000	4000	0	0	0	0
Sheet 7	4000	4000	0	0	0	0
Sheet 8	4000	4000	0	0	0	0
Sheet 9	4070	4468	0	4	0	4
Sheet 10	4033	4562	0	2	0	2
Sheet 11	3957	4250	0	0	0	0
Sheet 12	843	1519	0	4	0	4
Sheet 13	1622	1625	0	8	2	7
Sheet 14	3839	3854	0	0	0	0
Sheet 15	4000	4000	0	0	0	0
Sheet 16	4000	4000	0	0	0	0
Sheet 17	2174	2821	0	1	0	1
Sheet 18	2679	2689	0	2	0	0
PICNIC AREA	0	0	612	0	0	0
PROJECT TOTALS	**61285**	**65575**	**612**	**34**	**4**	**31**

TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF PAVEMENT MARKING
(BS 288B, ETC.)

SCALE: N.S.T

SHEET 3 OF 6

ORIGINAL DRAWING DATE: APRIL, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
DN.: - REVISIONS	HOU	6		55
CK.: -	COUNTY		CONTROL SECTION JOB	HIGHWAY
DN.: -	BRAZORIA		0111 09 044	BS 288B
CK.: -				

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	668 6092	668 6111	672 6007	672 6009	672 6010	677 6002
	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	PRE PM TY C (ACC PRK)(BLU)(SYMBL ONLY)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY II-C-R	ELIM EXT PAV MRK & MRKS (6")
	EA	EA	EA	EA	EA	LF
Sheet 1	24	0	36	26	0	265
Sheet 2	0	0	80	94	0	0
Sheet 3	0	0	50	72	0	0
Sheet 4	0	0	84	84	0	0
Sheet 5	0	0	50	56	0	0
Sheet 6	0	0	50	50	0	0
Sheet 7	0	0	50	50	0	0
Sheet 8	0	0	50	50	0	0
Sheet 9	0	0	98	74	0	0
Sheet 10	0	0	80	70	0	0
Sheet 11	0	0	50	58	0	0
Sheet 12	5	0	134	24	27	0
Sheet 13	10	0	78	44	17	0
Sheet 14	0	0	51	48	0	0
Sheet 15	0	0	50	50	0	0
Sheet 16	0	0	51	50	0	0
Sheet 17	23	0	0	22	34	0
Sheet 18	0	0	0	22	12	0
PICNIC AREA	0	2	0	0	0	0
PROJECT TOTALS	**62**	**2**	**1042**	**944**	**90**	**265**

TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF PAVEMENT MARKING
(BS 288B, ETC.)

SCALE: N.S.T

ORIGINAL DRAWING DATE: APRIL, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
DN.T: REVISIONS	HOU	6		56
CK.T:	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DN.T:	BRAZORIA	0111	09	044	BS 288B
CK.T:					

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	677 6003	677 6005	677 6007	677 6019	678 6002	678 6004
	ELIM EXT PAV MRK & MRKS (8")	ELIM EXT PAV MRK & MRKS (12")	ELIM EXT PAV MRK & MRKS (24")	ELIM EXT PAV MRK & MRKS (36")(YLD TRI)	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (8")
	LF	LF	LF	EA	LF	LF
Sheet 1	626	592	147	21	5218	250
Sheet 2	0	0	0	0	10200	675
Sheet 3	0	0	0	0	9990	0
Sheet 4	0	0	0	0	10958	764
Sheet 5	0	0	0	0	10178	0
Sheet 6	0	0	0	0	10000	0
Sheet 7	0	0	0	0	9990	0
Sheet 8	0	0	0	0	9990	0
Sheet 9	0	0	0	0	10518	879
Sheet 10	0	0	0	0	10585	604
Sheet 11	0	0	0	0	10197	0
Sheet 12	0	0	0	0	3222	3494
Sheet 13	0	0	0	0	4327	1629
Sheet 14	0	0	0	0	9613	0
Sheet 15	0	0	0	0	9990	0
Sheet 16	0	0	0	0	10000	0
Sheet 17	0	0	0	0	6124	156
Sheet 18	0	0	0	0	5828	0
PICNIC AREA	0	0	0	0	0	0
PROJECT TOTALS	**626**	**592**	**147**	**21**	**156928**	**8451**

TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF PAVEMENT MARKING
(BS 288B, ETC.)

SCALE: N.S.T

SHEET 5 OF 6

ORIGINAL DRAWING DATE: APRIL, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO				SHEET
REVISIONS	HOU	6					57
DN.: CK.: DN.: CK.:	COUNTY		CONTROL	SECTION	JOB	HIGHWAY	
	BRAZORIA		0111	09	044	BS 288B	

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	678 6006	678 6008	678 6009	678 6010	678 6016	678 6023
	PAV SURF PREP FOR MRK (12")	PAV SURF PREP FOR MRK (24")	PAV SURF PREP FOR MRK (ARROW)	PAV SURF PREP FOR MRK (DBL ARROW)	PAV SURF PREP FOR MRK (WORD)	PAV SURF PREP FOR MRK (36")(YLD TRI)
	LF	LF	EA	EA	EA	EA
Sheet 1	0	181	4	2	4	12
Sheet 2	282	187	6	0	6	0
Sheet 3	116	0	0	0	0	0
Sheet 4	410	15	3	0	3	0
Sheet 5	12	0	0	0	0	0
Sheet 6	0	0	0	0	0	0
Sheet 7	0	0	0	0	0	0
Sheet 8	0	0	0	0	0	0
Sheet 9	125	27	4	0	4	0
Sheet 10	164	0	2	0	2	0
Sheet 11	56	0	0	0	0	0
Sheet 12	3215	116	4	0	4	5
Sheet 13	1510	94	8	2	7	10
Sheet 14	0	27	0	0	0	0
Sheet 15	0	0	0	0	0	0
Sheet 16	0	0	0	0	0	0
Sheet 17	63	45	1	0	1	23
Sheet 18	27	0	2	0	0	0
PICNIC AREA	0	0	0	0	0	0
PROJECT TOTALS	**5980**	**692**	**34**	**4**	**31**	**50**

TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF PAVEMENT MARKING
(BS 288B, ETC.)

SCALE: N.S.T

SHEET 6 OF 6

ORIGINAL DRAWING DATE: APRIL, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO				SHEET
DN.: - CK.: - DW.: - CK.: - REVISIONS	HOU	6					58
	COUNTY		CONTROL	SECTION	JOB		HIGHWAY
	BRAZORIA		0111	09	044		BS 288B

MATERIALS FOR HIGHWAY TRAFFIC SIGNAL

ITEM	DESC CODE	DESCRIPTION	UNIT	BUISNESS 288-B AT TECHNOLOGY DR	BUISNESS 288-B AT DRIVEWAY	BUISNESS 288-B AT BEECHWOOD DR	BUSINESS 288-B AT FM 523	TOTAL
				QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY
416	6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	31	29			60
416	6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	22	22			44
618	6046	CONDT (PVC) (SCH 80) (2")	LF	205	80			285
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	80	100			180
618	6053	CONDT (PVC) (SCH 80) (3")	LF	15	95			110
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	115				115
620	6009	ELEC CONDR (NO.6) BARE	LF	360	225			585
620	6011	ELEC CONDR (NO.4) BARE	LF	50	50			100
620	6012	ELEC CONDR (NO.4) INSULATED	LF	95	105			200
621	6005	TRAY CABLE (4 CONDR) (12 AWG)	LF	775	465			1240
624	6009	GROUND BOX TY D (162922)	EA	4	4			8
628	6145	ELC SRV TY D 120/240 060(NS)SS(E)SP(O)	EA	1	1			2
636	6001	ALUMINUM SIGNS (TY A)	SF			32		32
		*INTERSECTION AHEAD (W2-2LR)(48"X48")(16SF)	EA			2		2
644	6076	REMOVE SM RD SN SUP&AM	EA			2		2
					1			1
680	6003	INSTALL HWY TRF SIG (SYSTEM)	EA	1	1			2
		*CELLULAR MODEM	EA	1	1			2
		*CONTROLLER FULLY-ACTUATED W/CABINET	EA	1	1			2
		*TRAFFIC SIGNAL CONTROLLER FOUNDATION	EA	1	1			2
		*LED RDWY LUMINAIRE (250 W EQ)	EA	3	3			6
		*STREET NAME SIGN, "BUSINESS SH 288 B" (108" X 18")	EA	1	1			2
		*DETECTOR CARD RACK (8 SLOT & 4 SLOT)	EA	1	1			2
		*DETECTOR UNIT (DUAL CHANNEL)	EA	12	12			24
		*18" CABINET BASE EXTENSION	EA	1	1			2
		*ROD, 5/8' X 10' COPPER-CLAD GROUND (CONTROLLER ONLY)	EA	1	1			2
		*MAST ARM DAMPER	EA	3	3			6
680	6004	REMOVING TRAFFIC SIGNALS	EA	1	1			2
682	6001	VEH SIG SEC (12")LED(GRN)	EA	6	6			12
682	6002	VEH SIG SEC (12")LED(GRN ARW)	EA	1				1
682	6003	VEH SIG SEC (12")LED(YEL)	EA	6	6	4		16
682	6004	VEH SIG SEC (12")LED(YEL ARW)	EA	1				1
682	6005	VEH SIG SEC (12")LED(RED)	EA	6	6			12
682	6006	VEH SIG SEC (12")LED(RED ARW)	EA	2				2
682	6021	BACK PLATE (12")(1 SEC)	EA			4		4
682	6060	BACKPLATE W/REFL BRDR(3 SEC)	EA	6	6			12
682	6049	BACKPLATE W/REFL BRDR(4 SEC)	EA	1				1
684	6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	920	515			1435
685	6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA			2		2
		*SCREW-IN TYPE ANCHOR FOUNDATION	EA			2		2
686	6031	INS TRF SIG PL AM(S)1 ARM(28')LUM	EA		1			1
686	6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA		1			1
686	6047	INS TRF SIG PL AM(S)1 ARM(44')LUM	EA	2				2
686	6055	INS TRF SIG PL AM(S)1 ARM(50')LUM	EA	1	1			2
6058	6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1	1			2
6062	6034	ITS RADIO (DUAL)(5 GHZ/5 GHZ)-I-U	EA	1	2		1	4
		*ITS RADIO POWER SUPPLY	EA	1	2		1	4
		*ITS RADIO ETHERNET COMMUNICATION CABLE	LF	155	140		125	420
6306	6009	VIVDS PROSR SYS (INSTALL ONLY)	EA	3	3			6
6306	6010	VIVDS CAM ASSY (INSTALL ONLY)	EA	3	3			6
6306	6012	VIVDS CABLING (INSTALL ONLY)	LF	705	515			1220

NOTE:
* MATERIALS SUBSIDIARY TO PERTINENT ITEMS

BS 288-B AT
VARIOUS LOCATIONS

TRAFFIC SIGNAL
SUMMARY OF QUANTITIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0111	09	042	SH 288-B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		59

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FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111090424 - Design\Plan Set\3. Roadway\Standards_HIBO\BC(1)-21 THRU BC (12) -21.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		60

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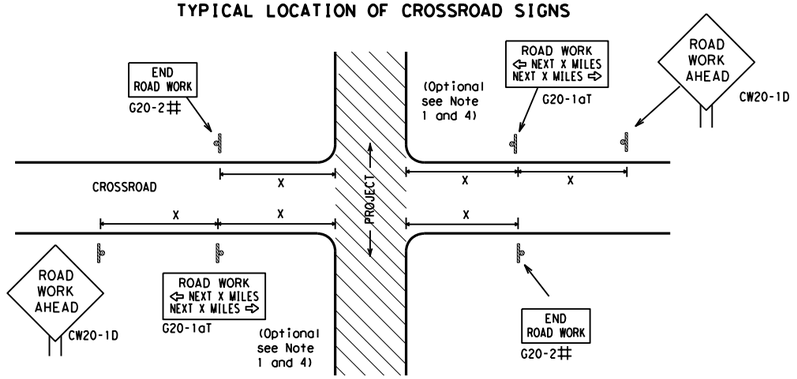
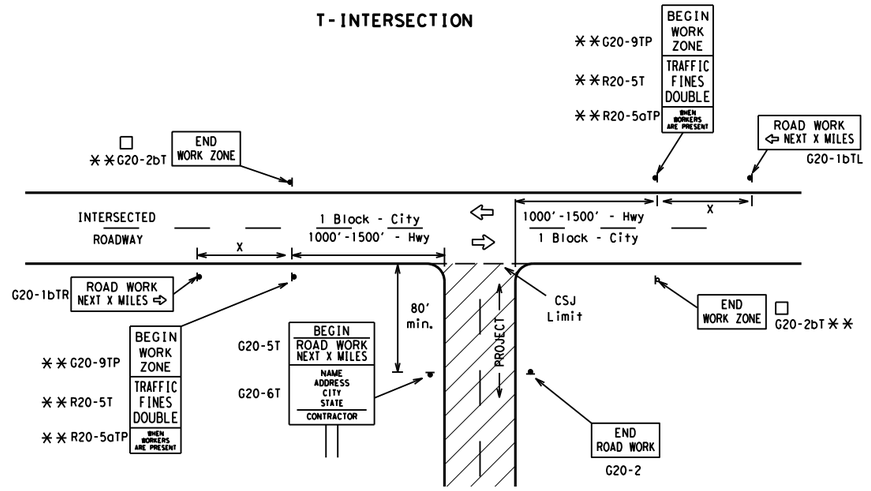
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

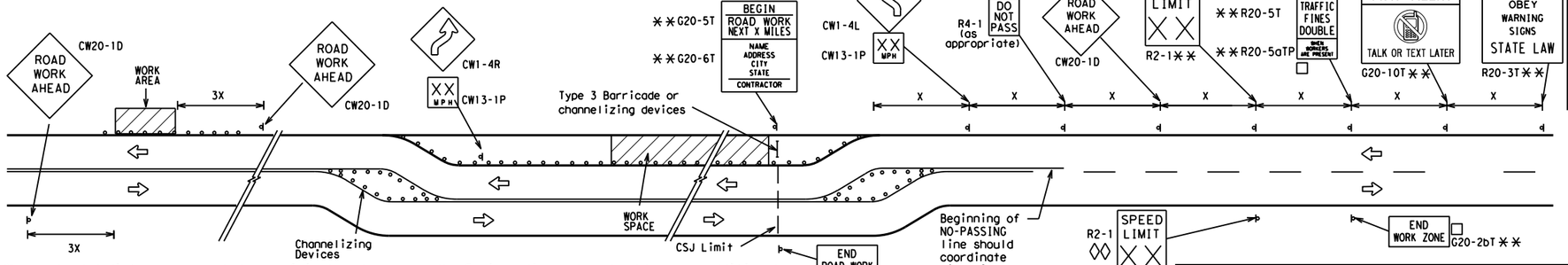
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

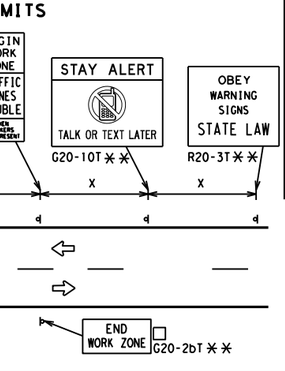
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

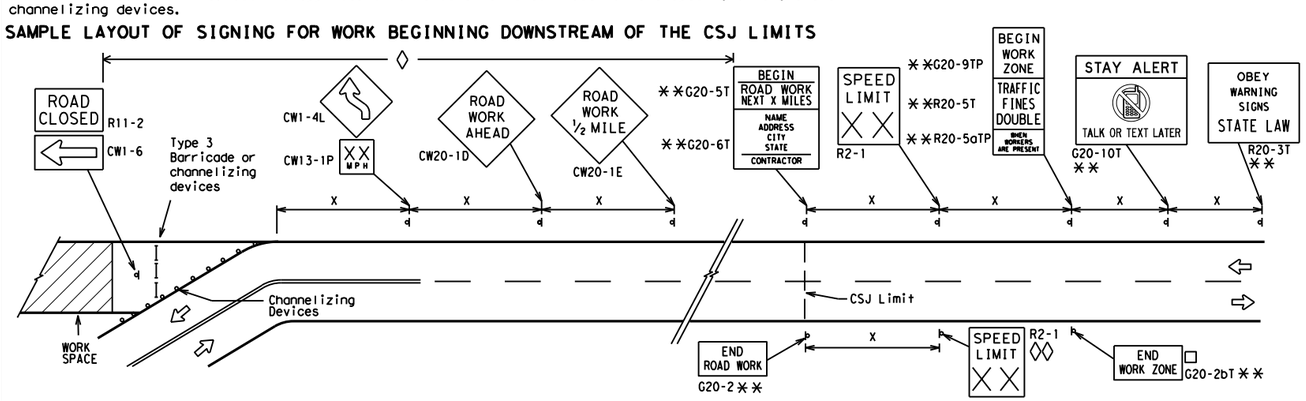


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	BRAZORIA		61

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

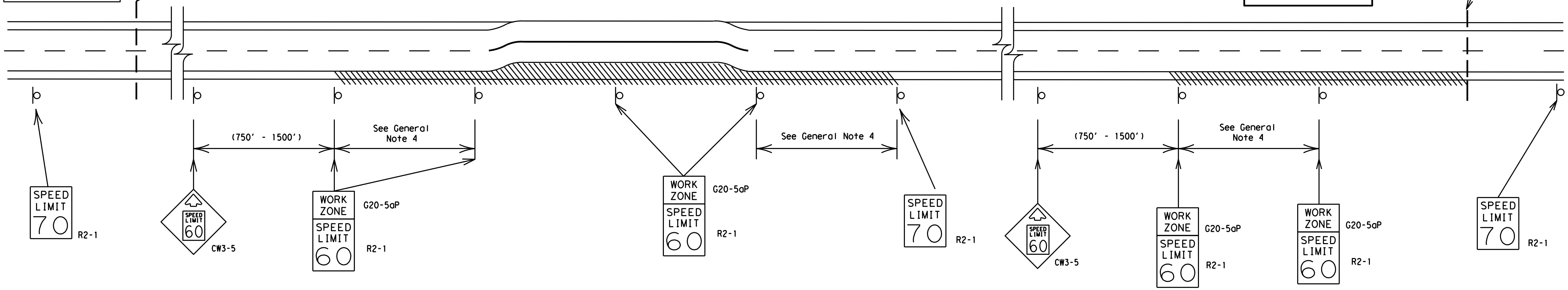
Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

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.

Signing shown for one direction only. See BC(2) for additional advance signing.

Signing shown for one direction only. See BC(2) for additional advance signing.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

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Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY			
REVISIONS 9-07 8-14 7-13 5-21	0111	09	042	BS 288B			
	DIST	COUNTY	SHEET NO.				
	HOU	BRAZORIA	62				

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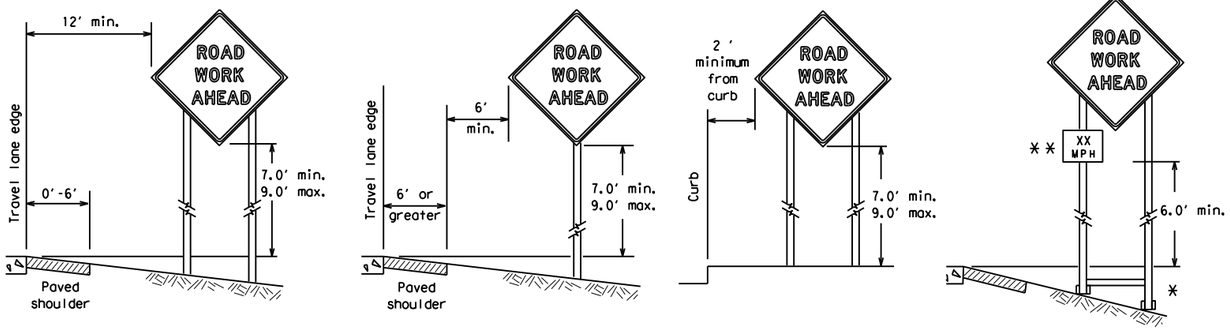
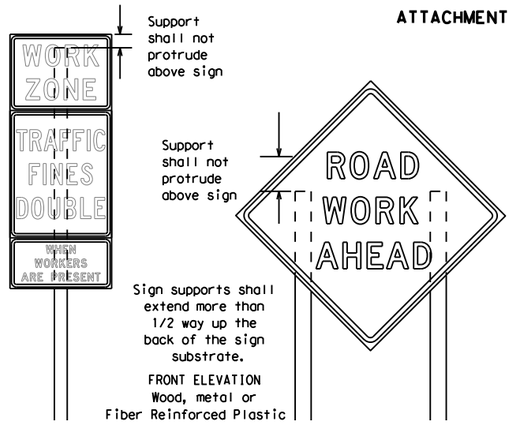
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

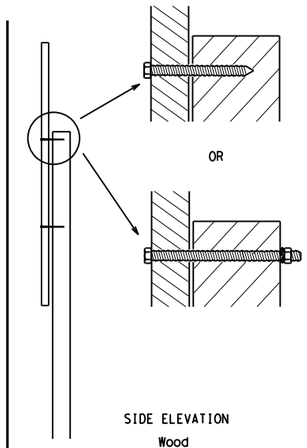


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





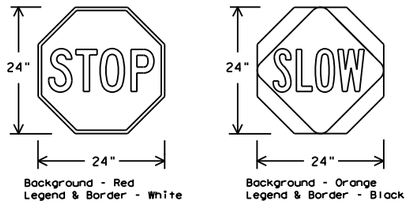
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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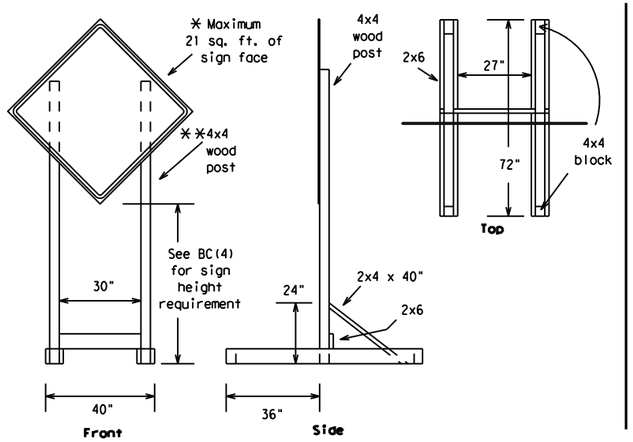
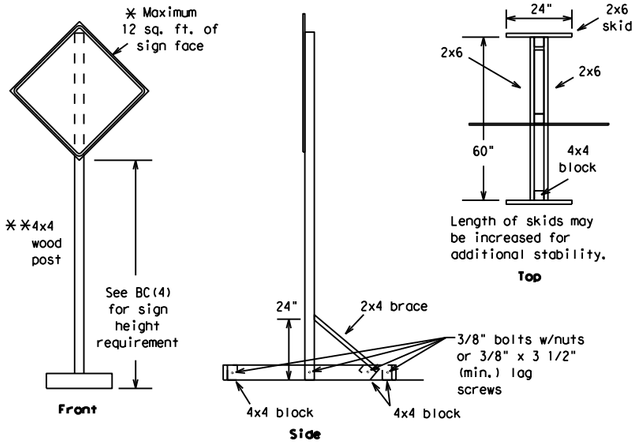
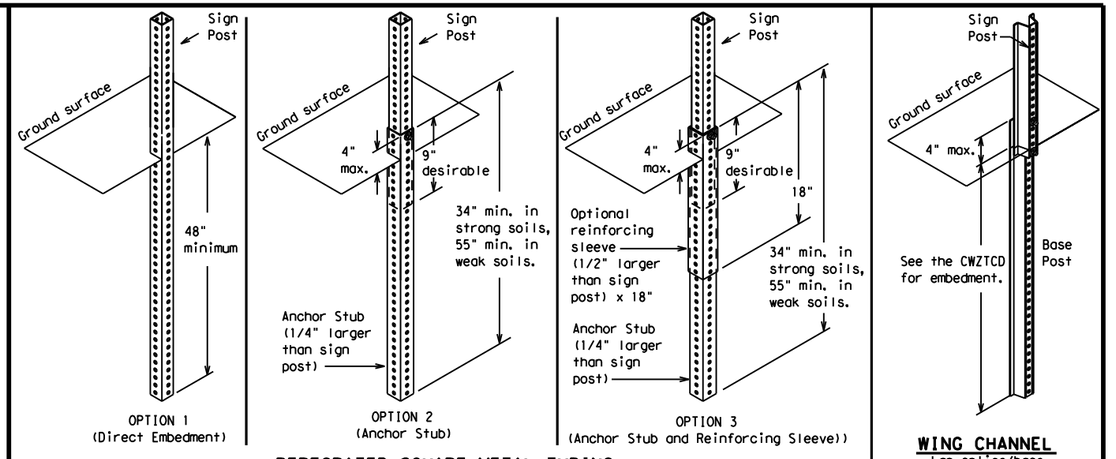
7-13 5-21	HOU	BRAZORIA		63





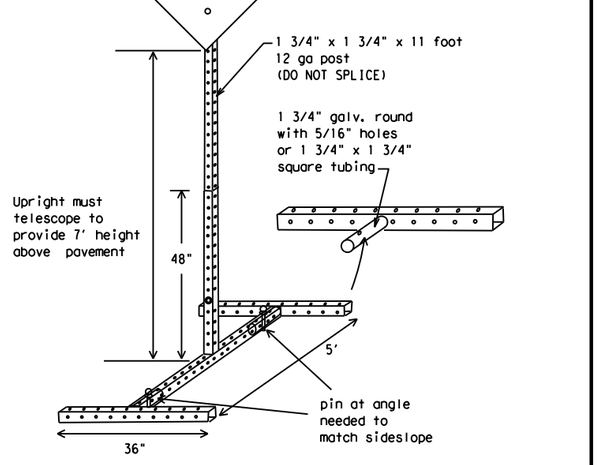
SKID MOUNTED WOOD SIGN SUPPORTS

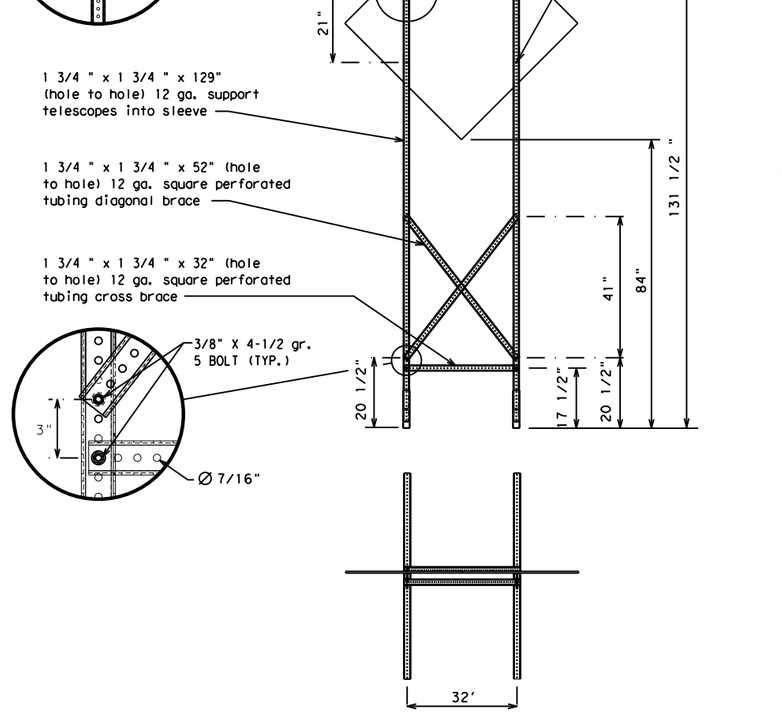
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

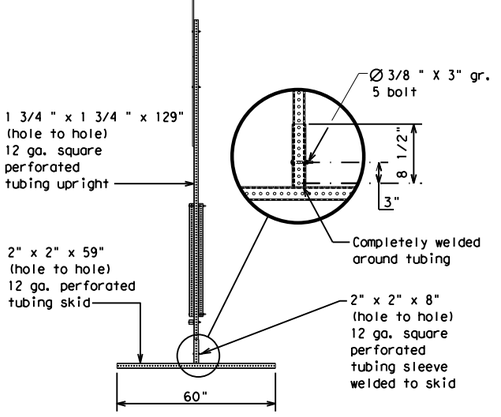


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	BRAZORIA		64

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

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

Phase 2: Possible Component Lists

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	BRAZORIA		65

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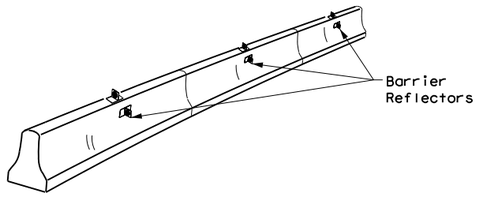
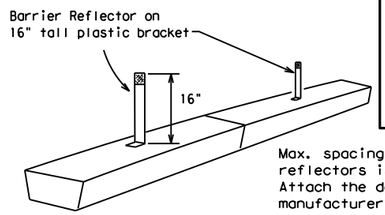
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)

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

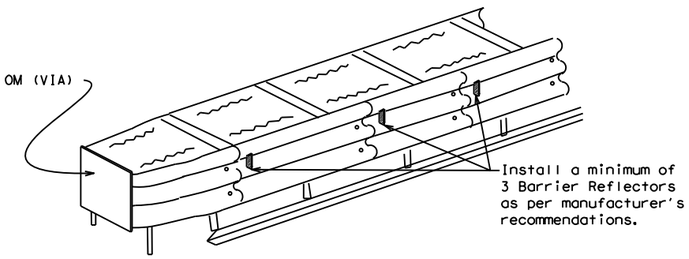


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

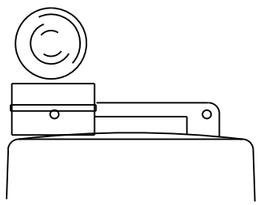


DELINEATION OF END TREATMENTS

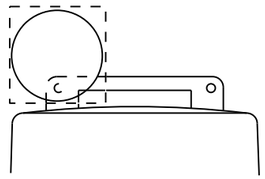
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

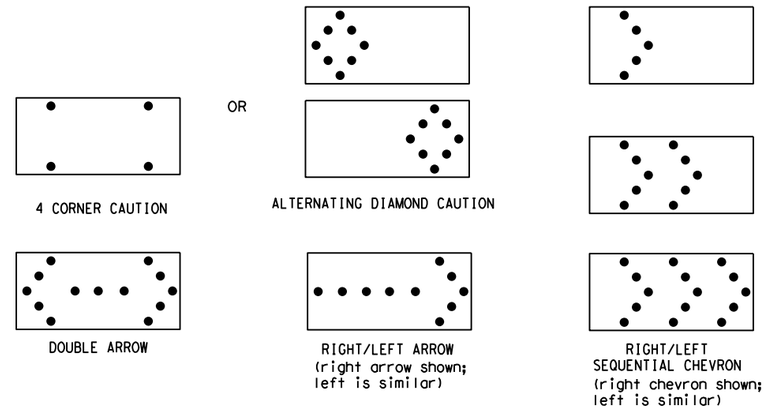
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	BRAZORIA		66

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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:

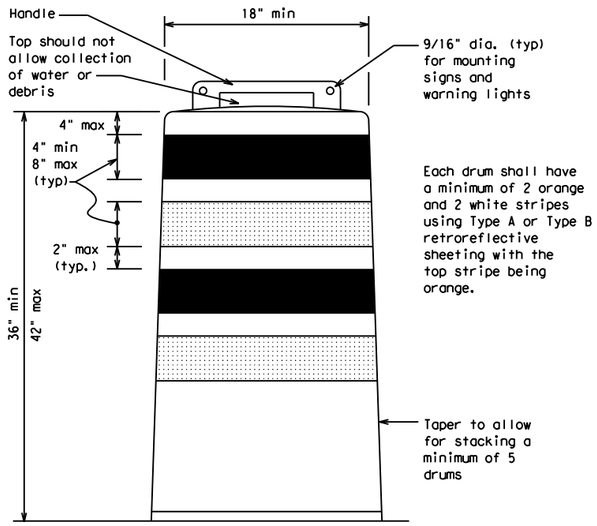
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.

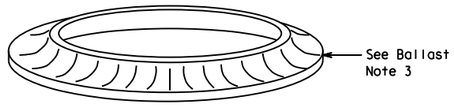
RETROREFLECTIVE SHEETING

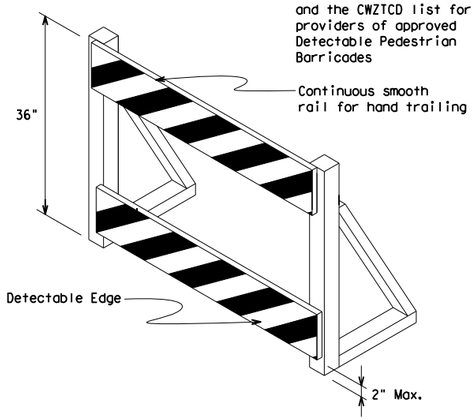
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall 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.

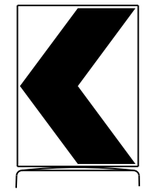




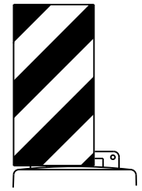


DETECTABLE PEDESTRIAN BARRICADES

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.

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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9-07 5-21	HOU	BRAZORIA		67
7-13				

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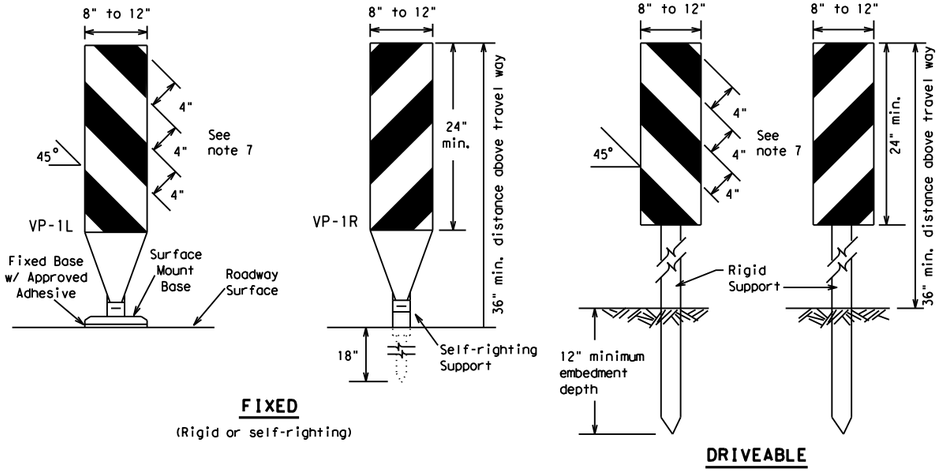
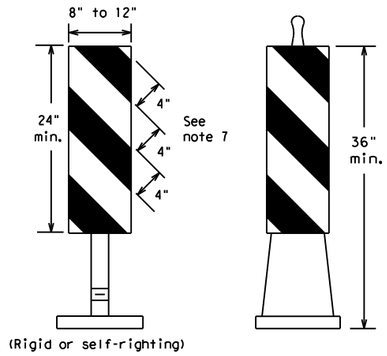


FIXED
(Rigid or self-righting)

DRIVEABLE

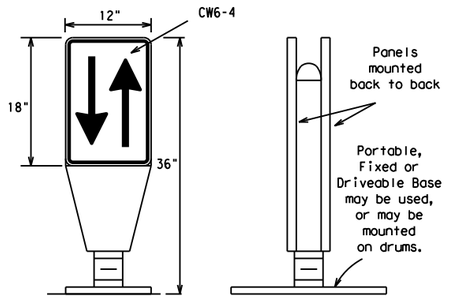


(Rigid or self-righting)

PORTABLE

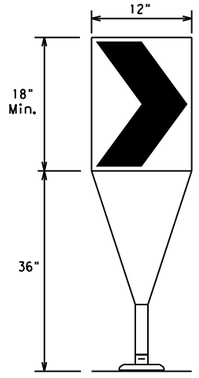
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



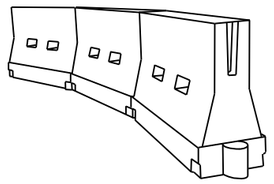
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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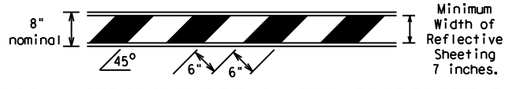
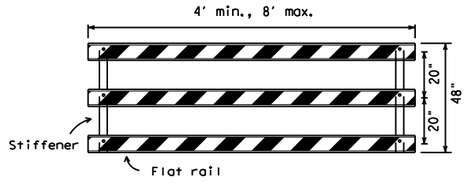
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



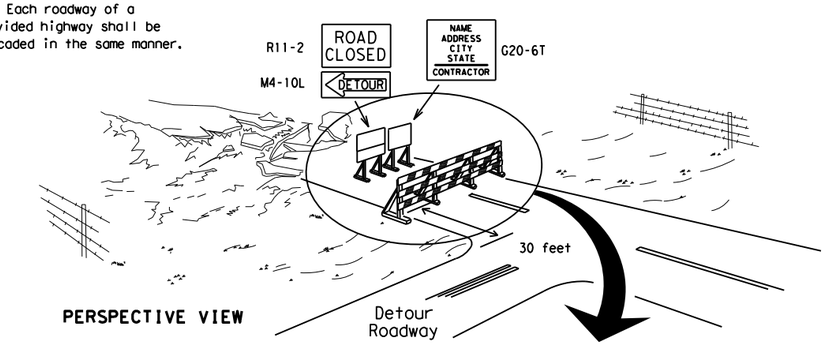
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

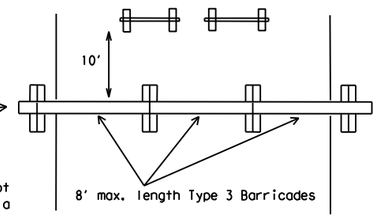
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

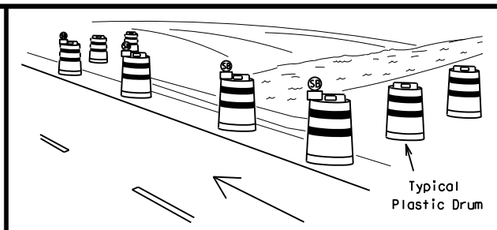
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

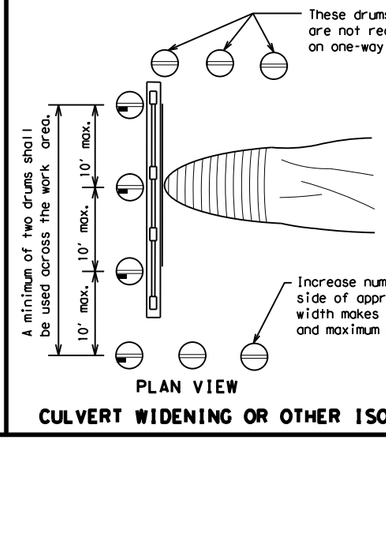
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

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



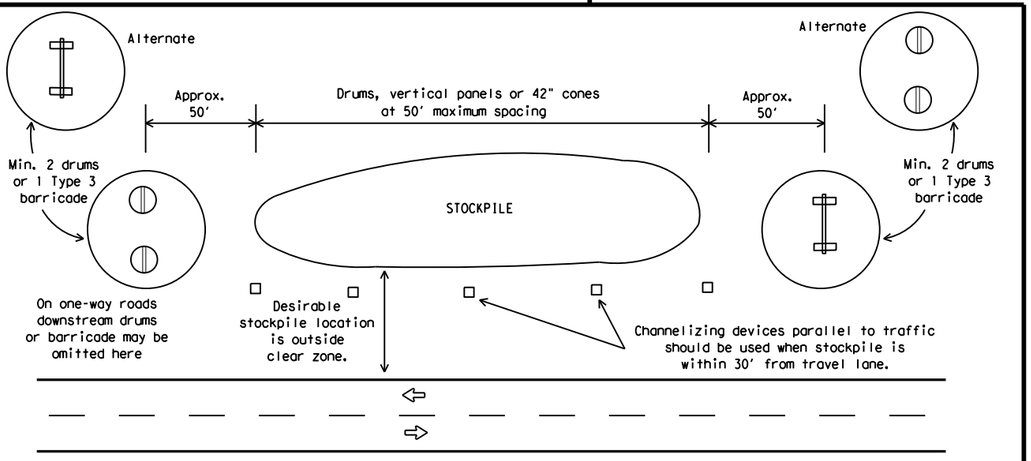
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

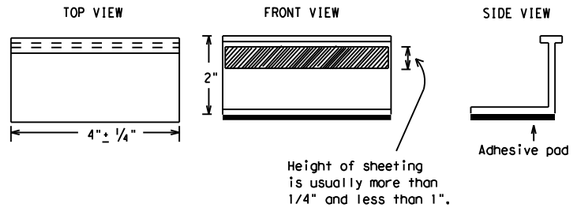
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-98 9-07 5-21 1-02 7-13 11-02 8-14	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		70

105

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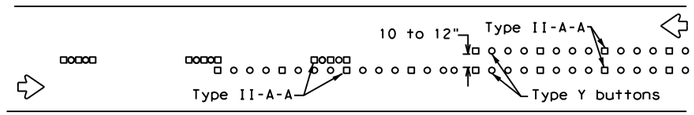
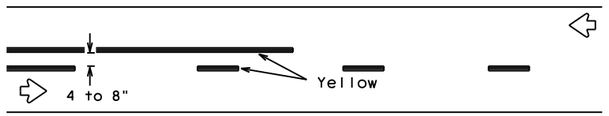
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\011109042\4 - Design\Plan Set\3. Roadway\Standards_Hiba\BC (1)-21 THRU BC (12) -21.dgn

PAVEMENT MARKING PATTERNS

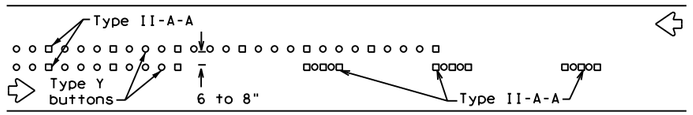
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



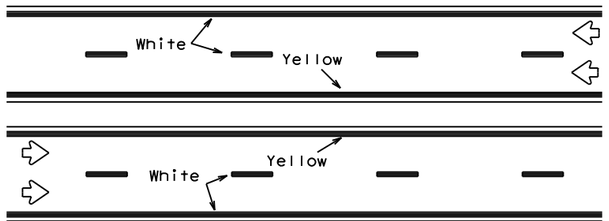
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



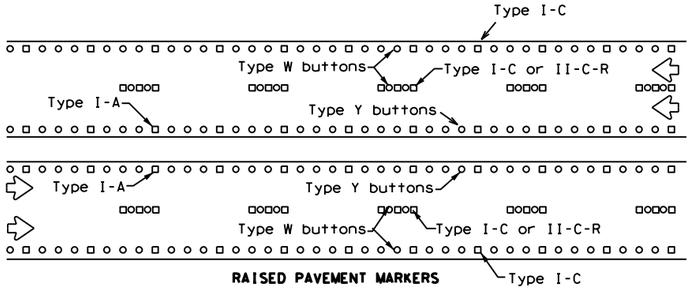
RAISED PAVEMENT MARKERS - PATTERN B

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

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



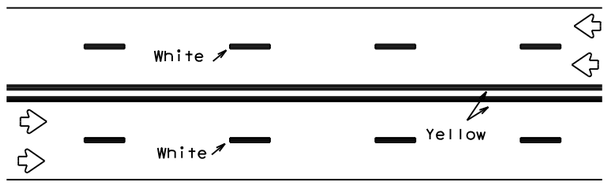
REFLECTORIZED PAVEMENT MARKINGS



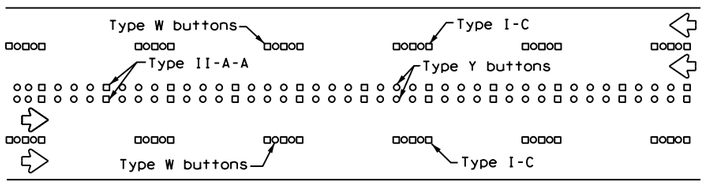
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



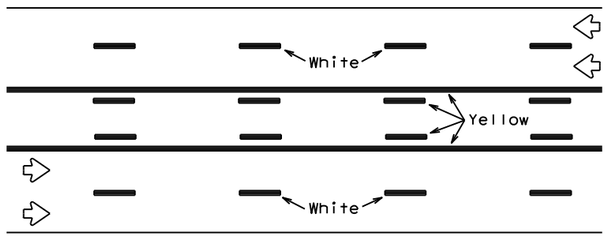
REFLECTORIZED PAVEMENT MARKINGS



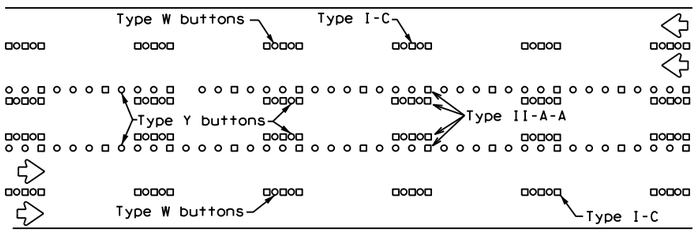
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

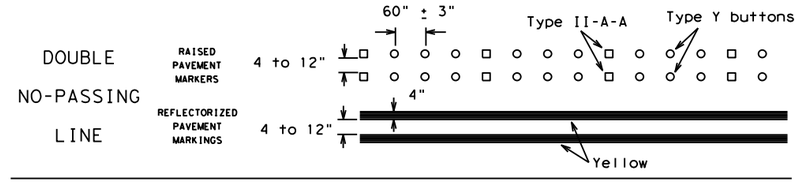
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

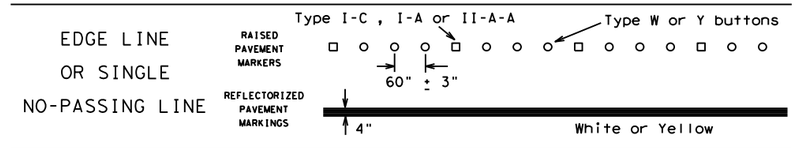
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

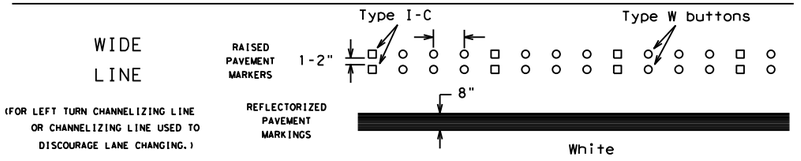


EDGE LINE OR SINGLE NO-PASSING LINE



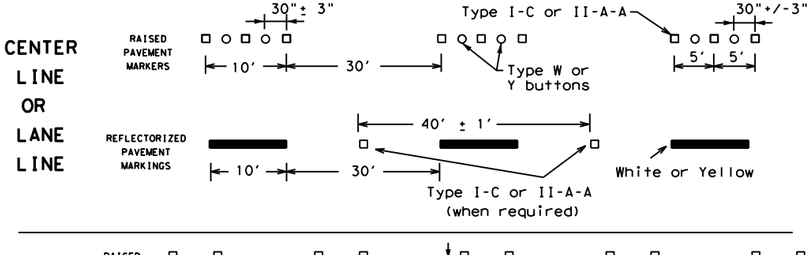
WIDE LINE

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

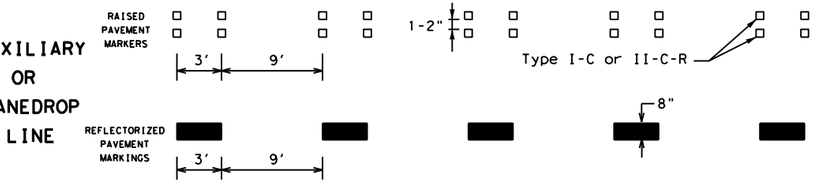


BROKEN LINES

CENTER LINE OR LANE LINE

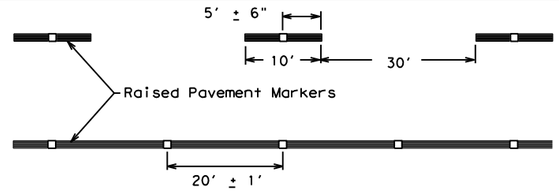


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		71

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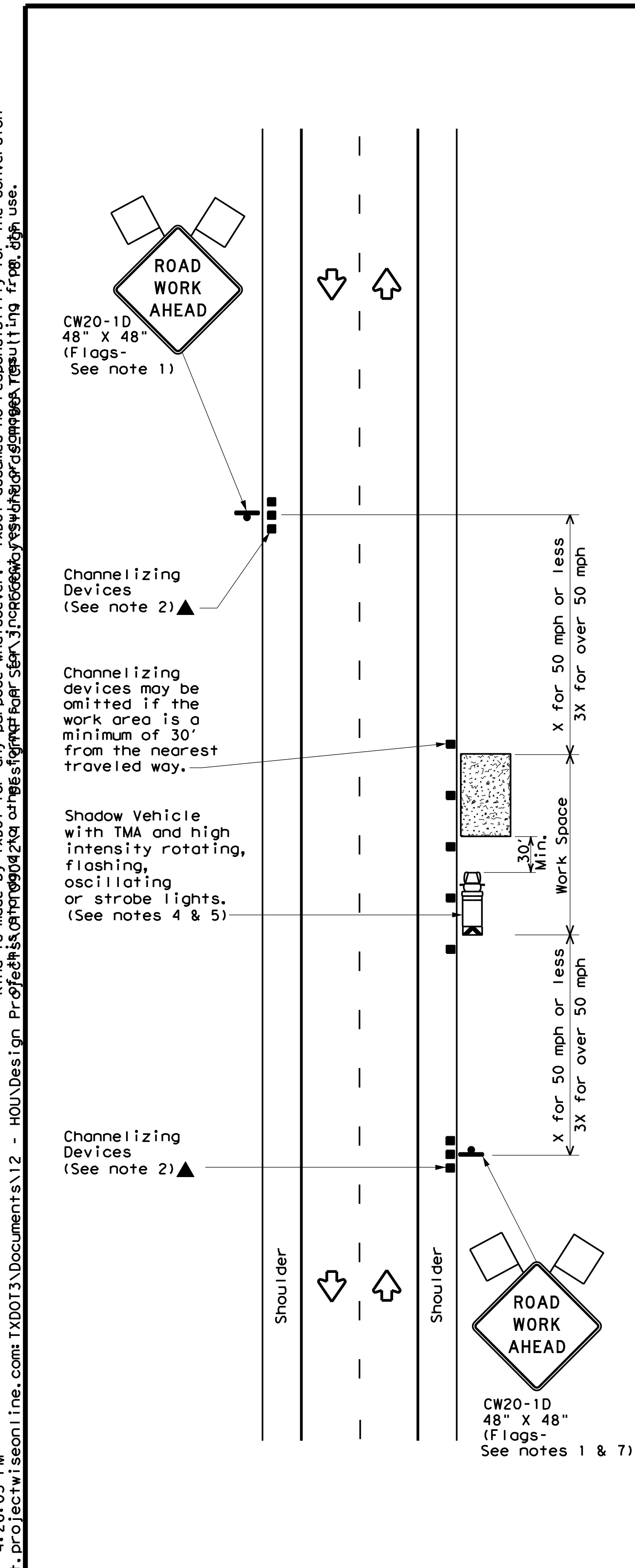
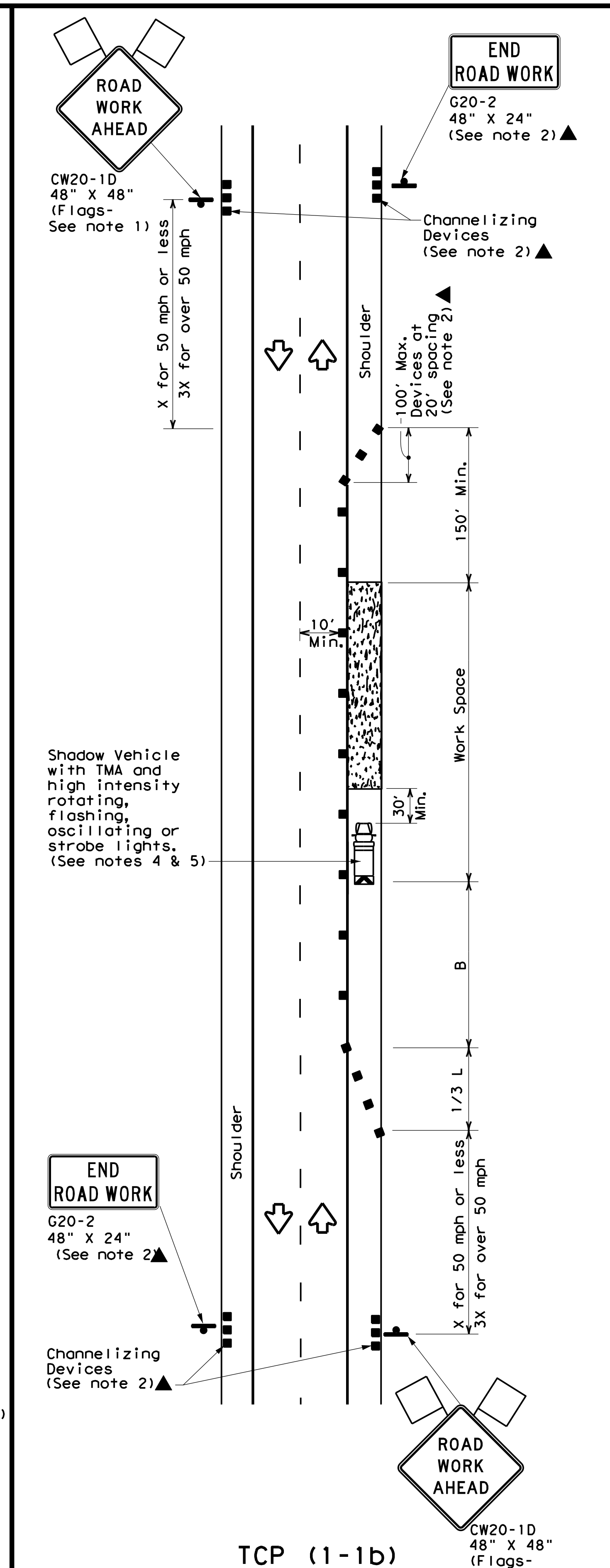


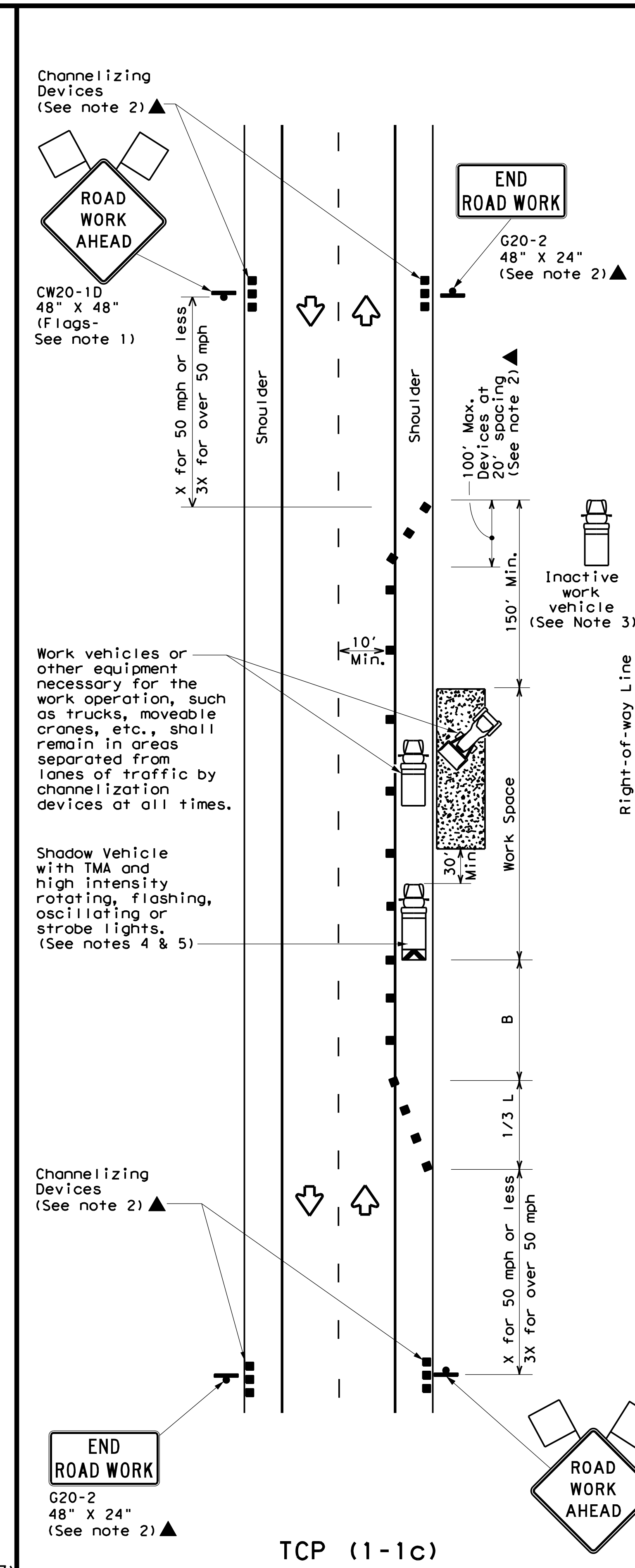
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT 0111	SECT 09	JOB 042	HIGHWAY BS 288B
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	DIST HOU		COUNTY BRAZORIA	SHEET NO. 72

151

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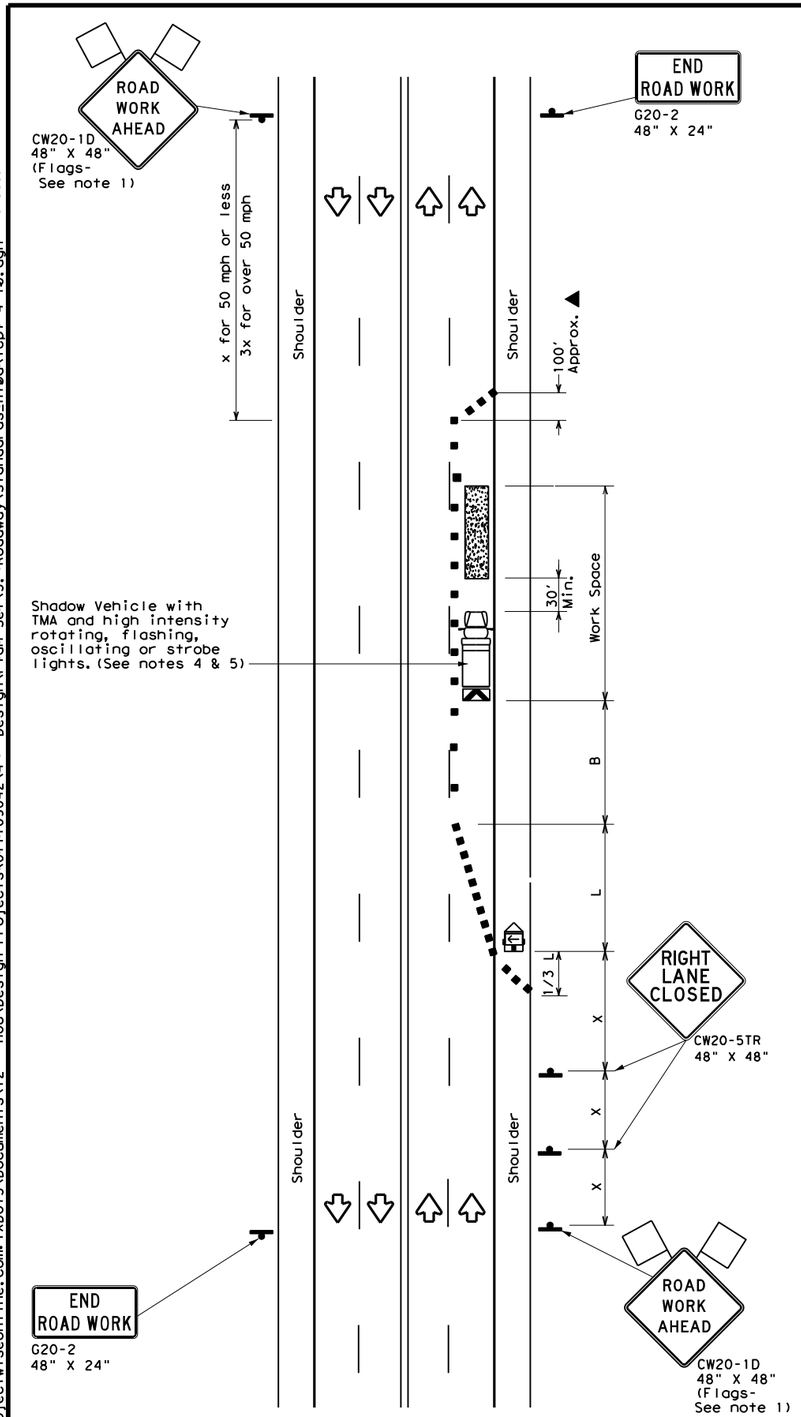
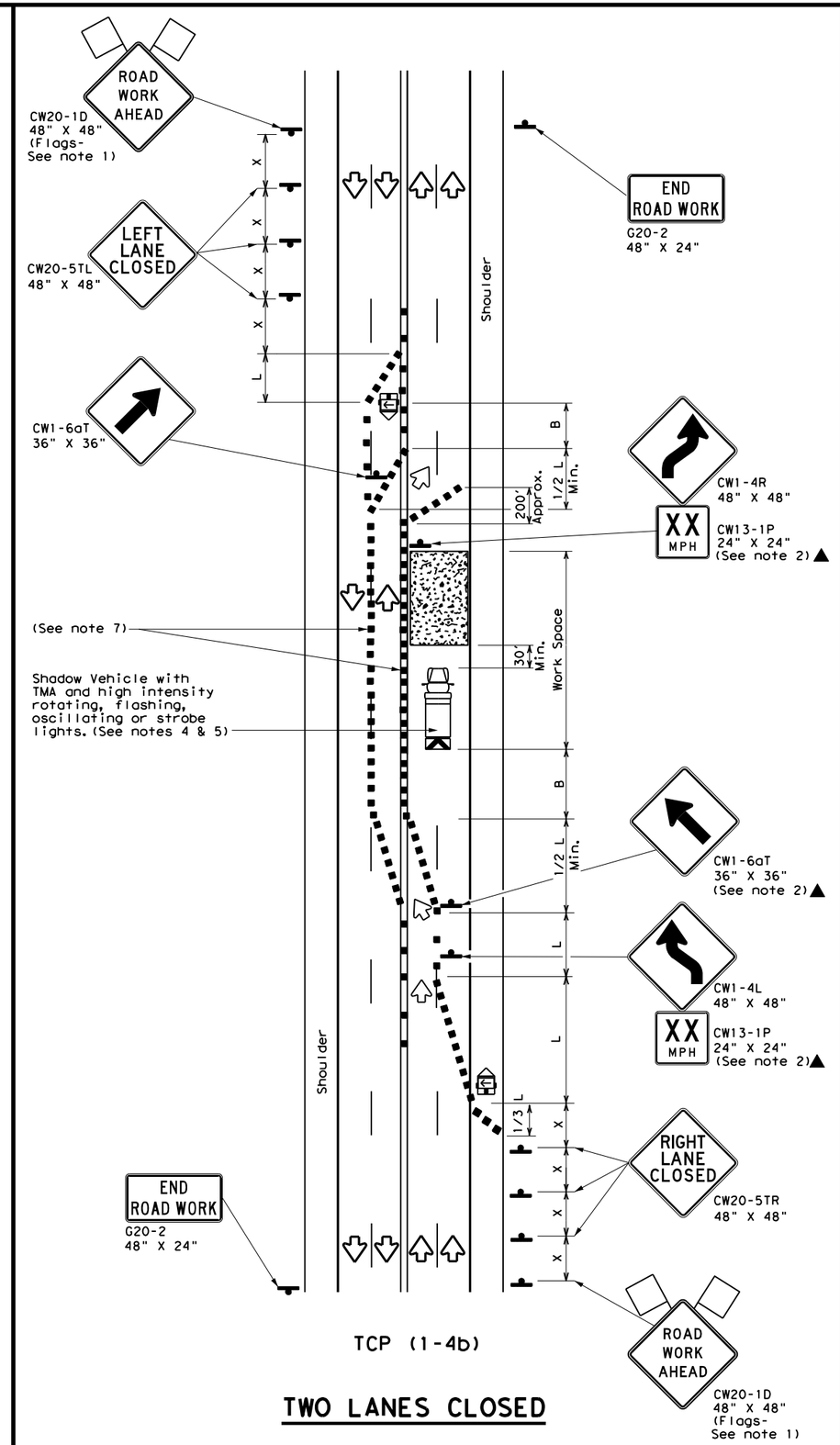


TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

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

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

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

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

GENERAL NOTES

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

TCP (1-4a)

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

TCP (1-4b)

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	HOU	BRAZORIA		73
1-97 2-18				

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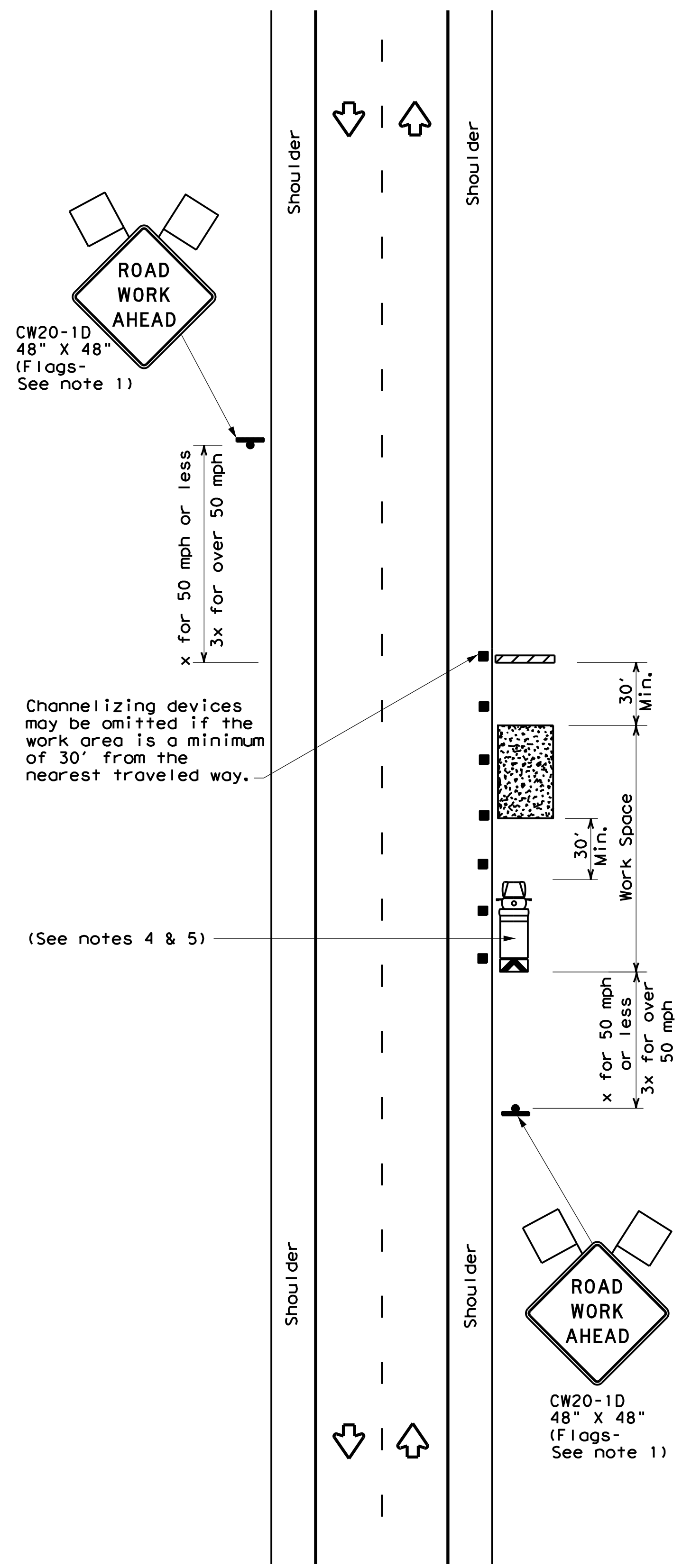
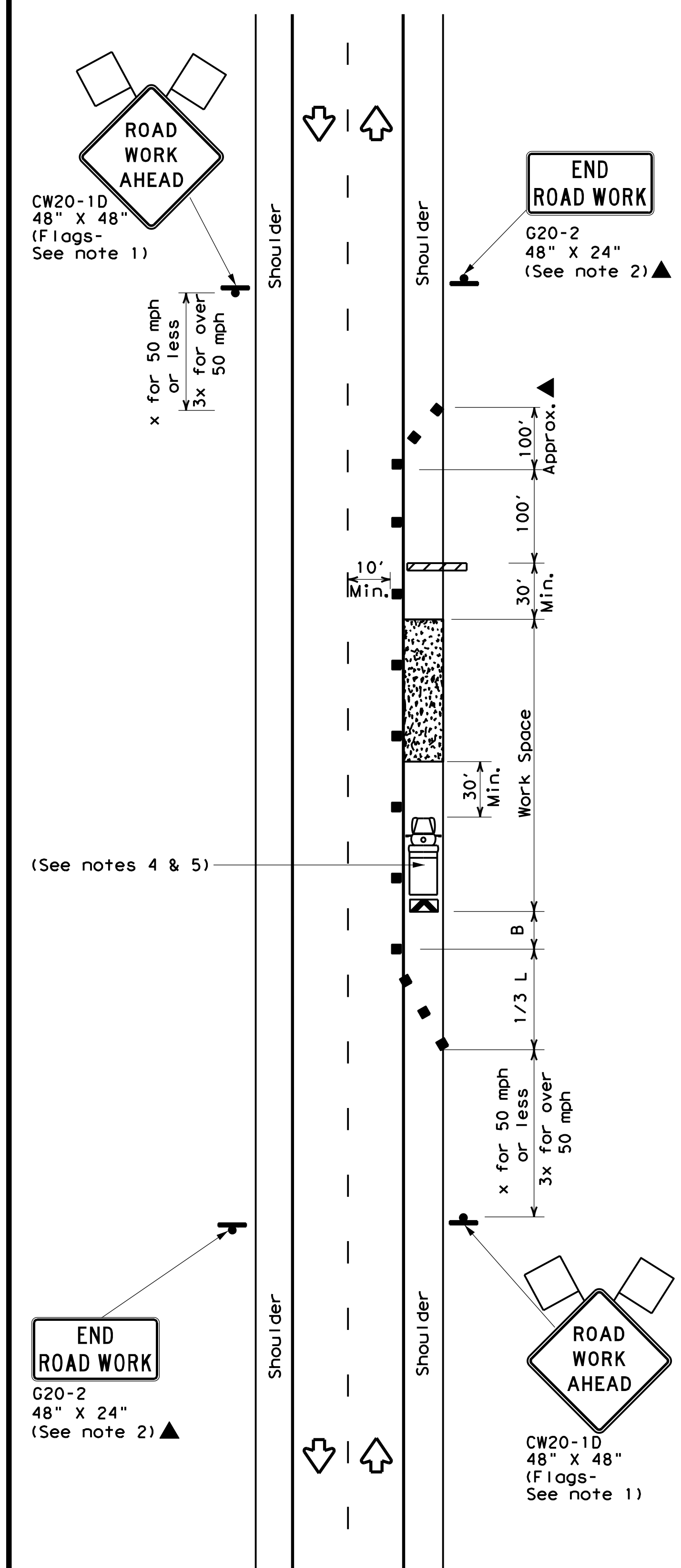


TCP (2-1a)

WORK SPACE NEAR SHOULDER

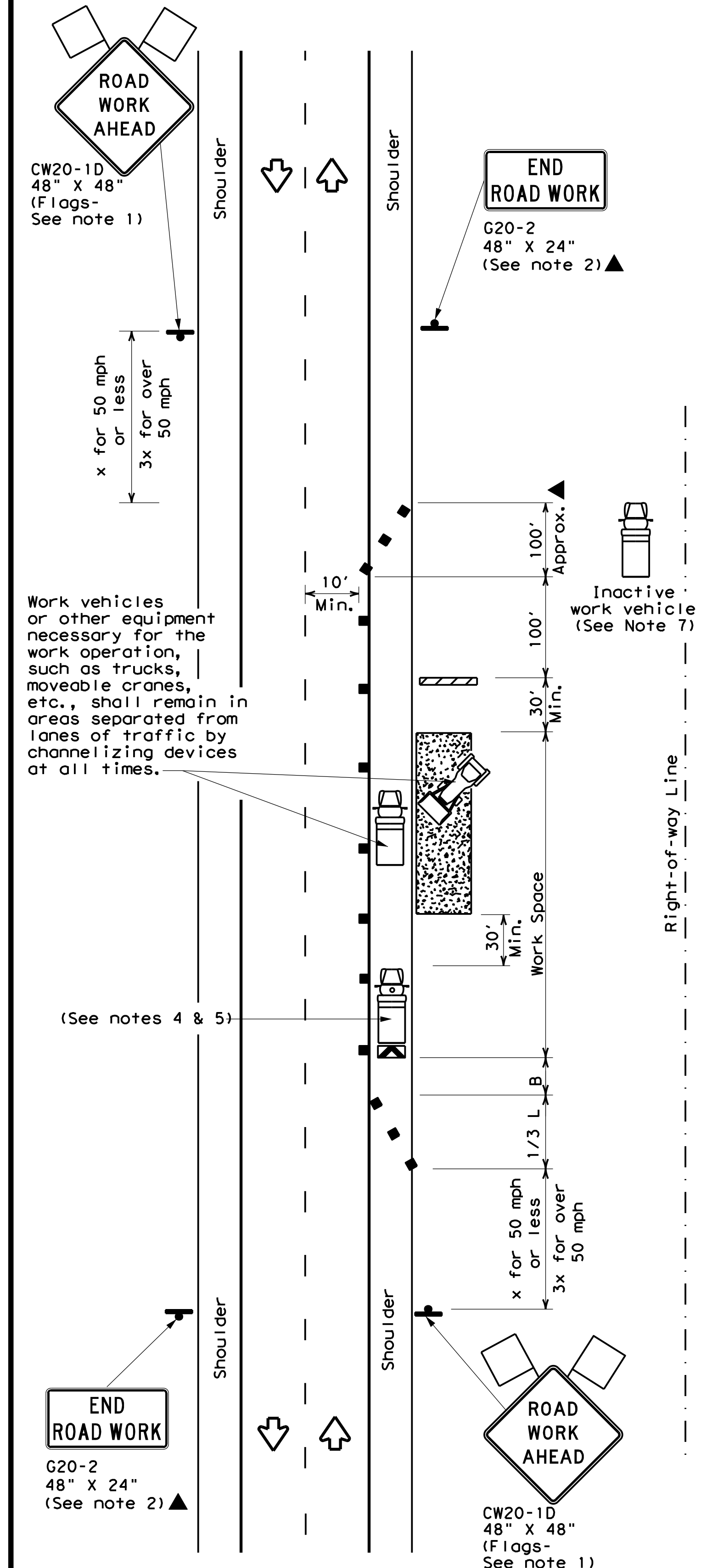
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER

Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER

Conventional Roads

LEGEND

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

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

* Conventional Roads Only

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

TYPICAL USAGE

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

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©TxDOT December 1985		CONT	SECT	JOB		HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18		0111	09	042		BS 288B
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		HOU		BRAZORIA		74

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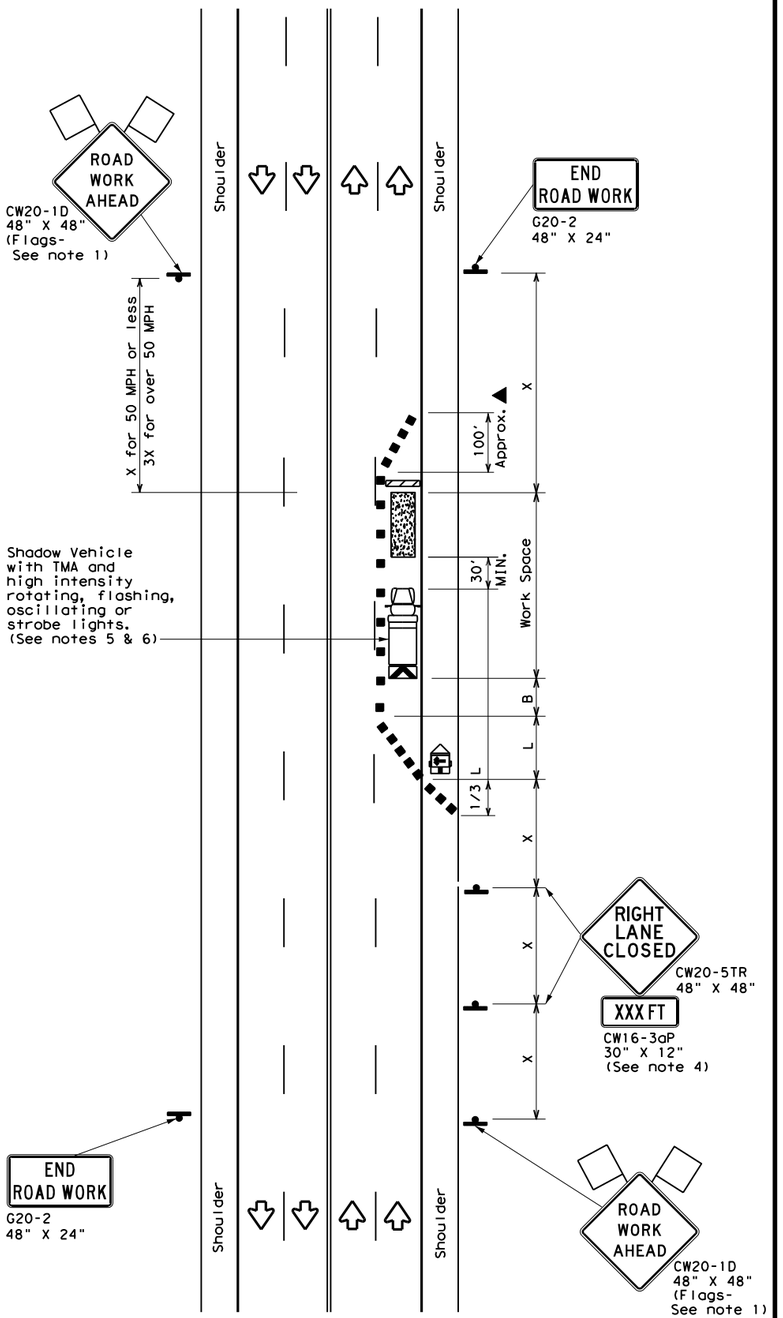
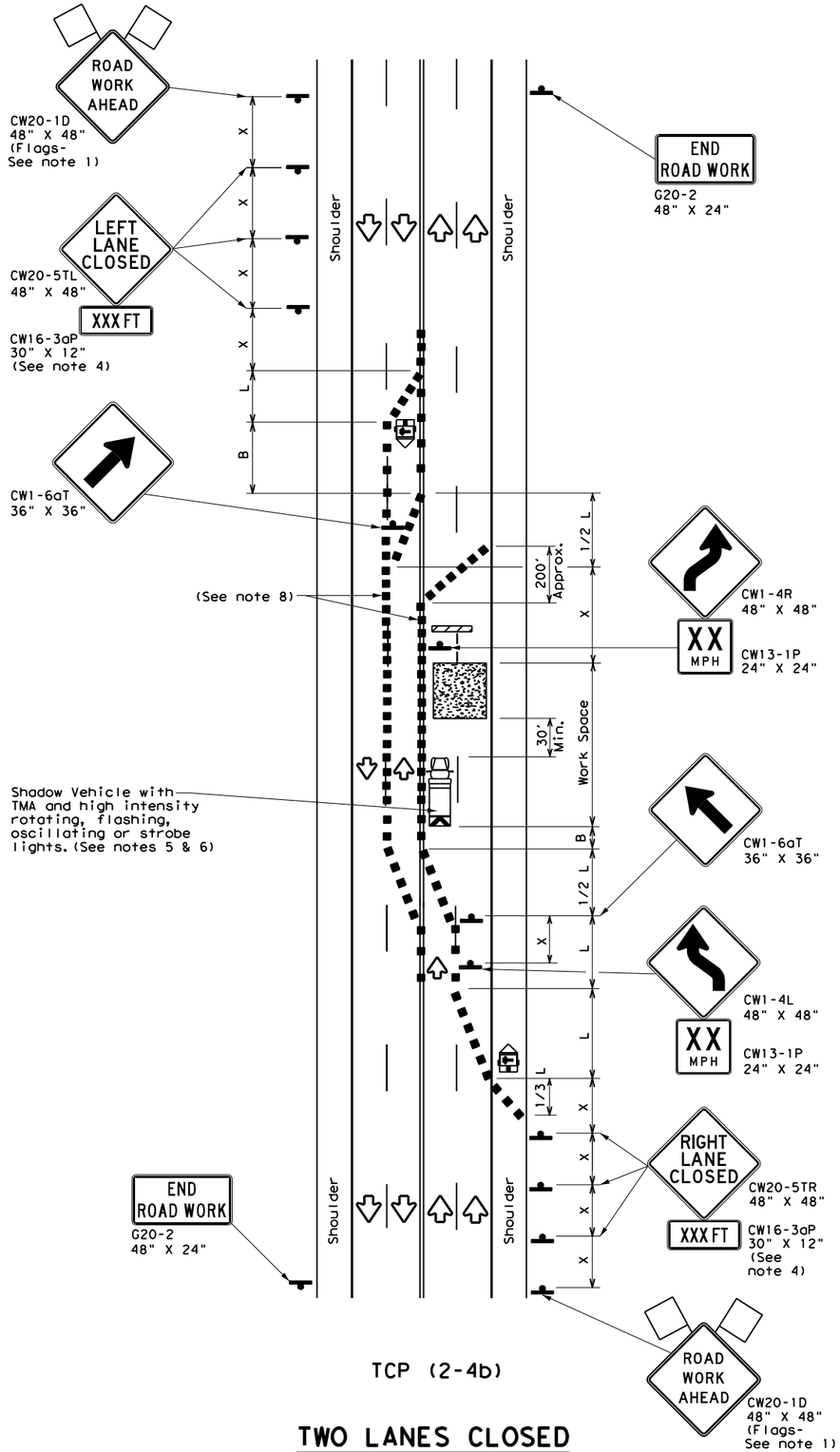


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

TCP (2-4a)

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

TCP (2-4b)

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

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	HOU	BRAZORIA		75

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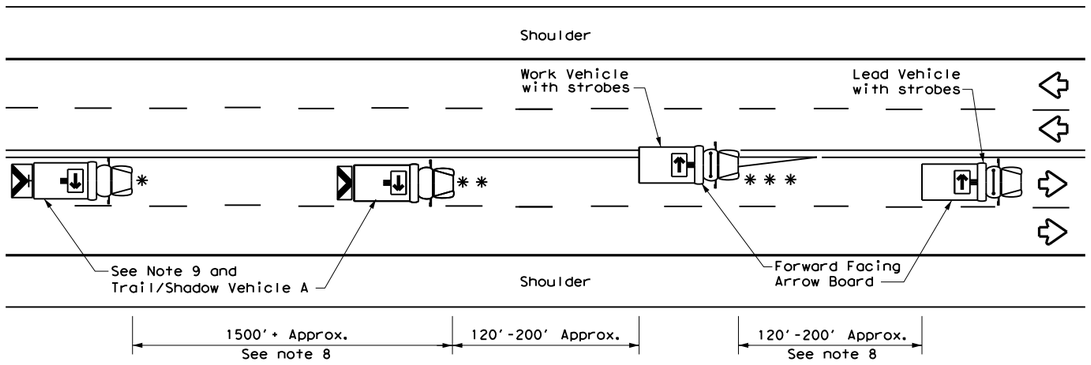
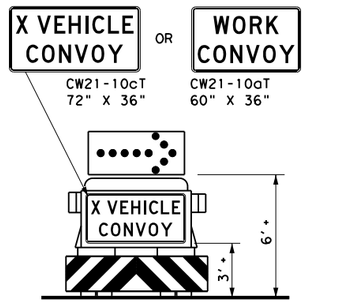


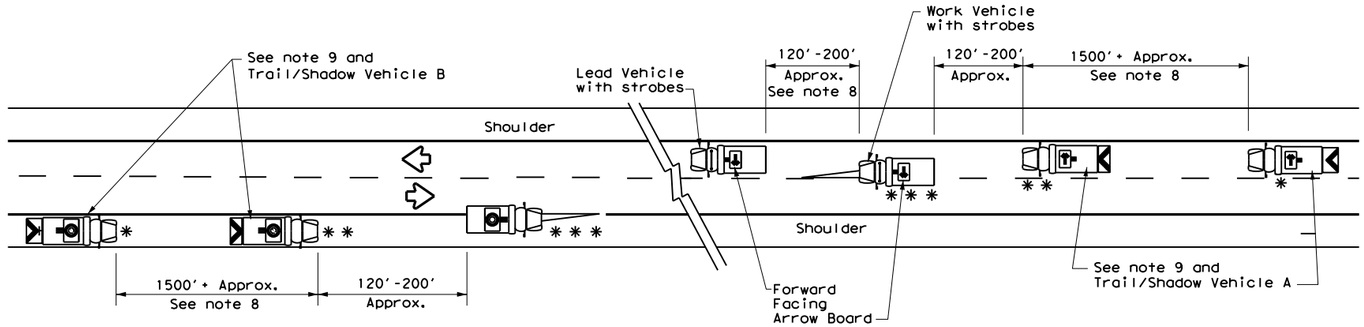
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

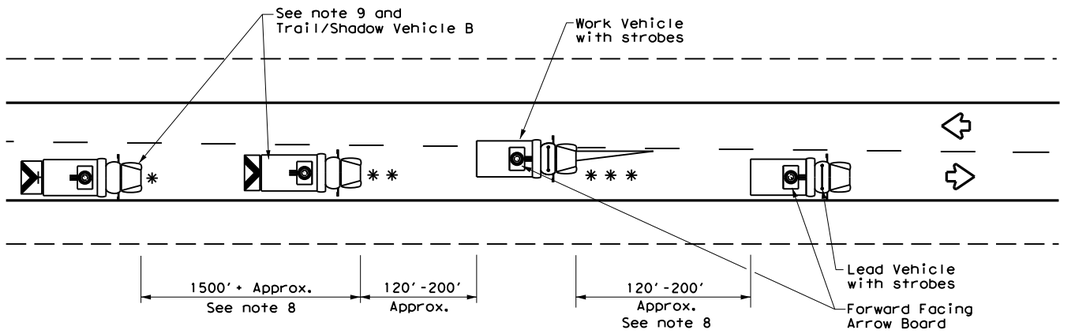


WORK ON SHOULDER

WORK ON TRAVEL LANE

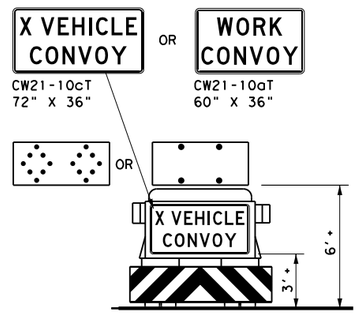
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

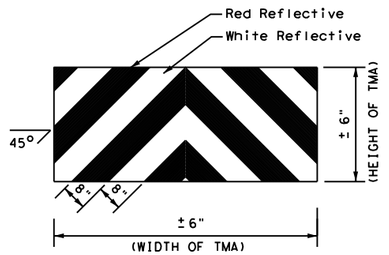
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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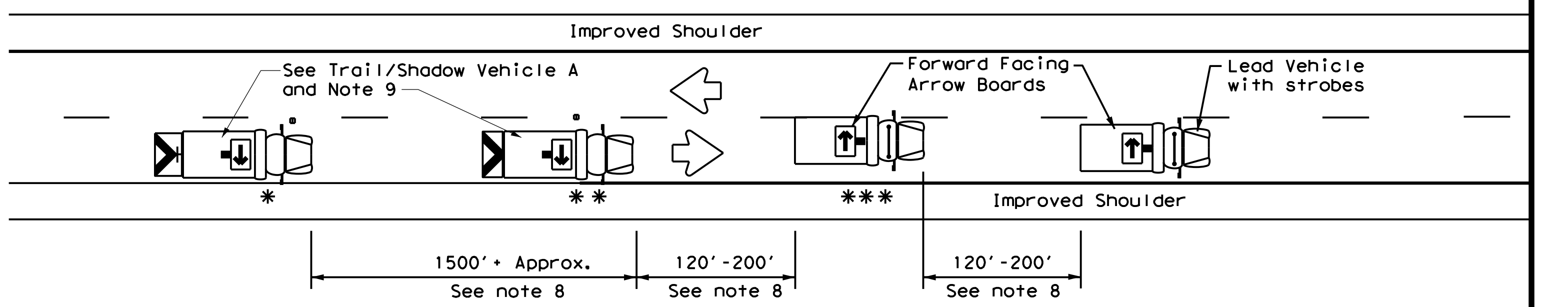
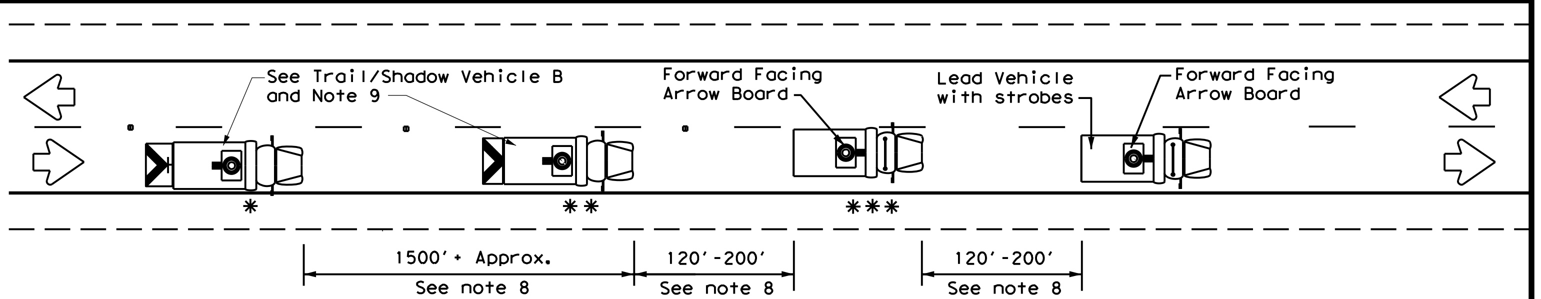


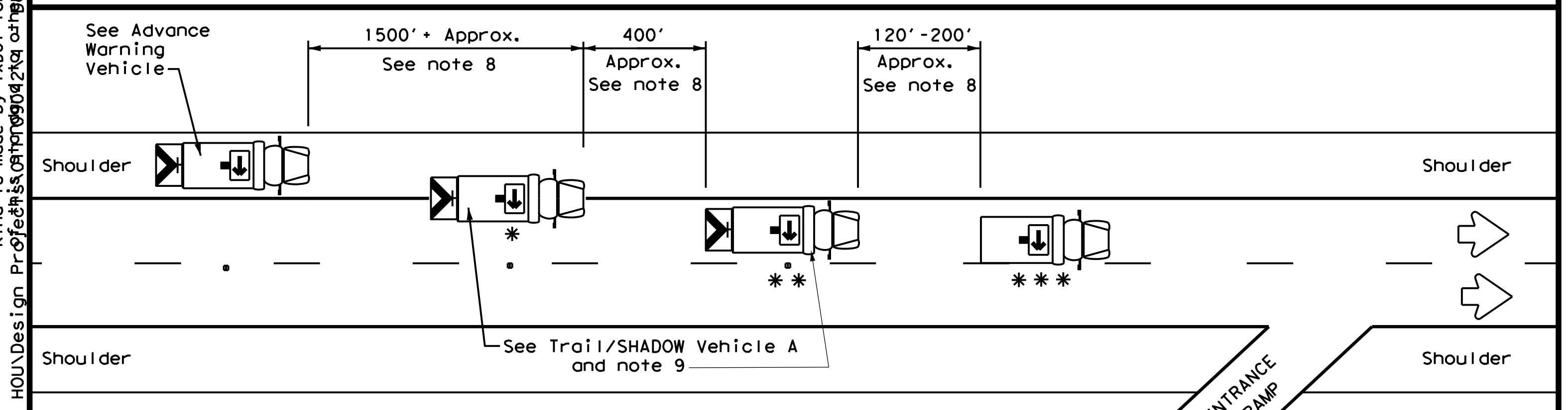
TCP (3-3a)

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



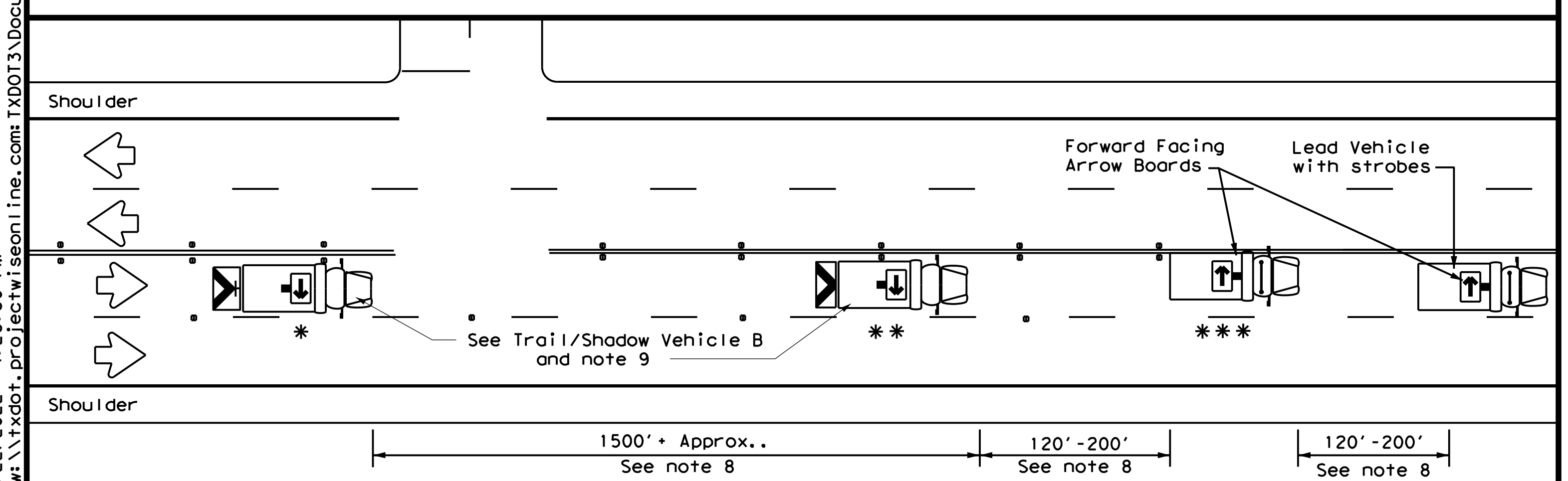
TCP (3-3b)

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



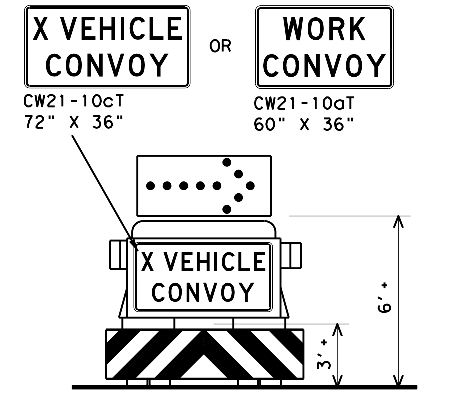
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



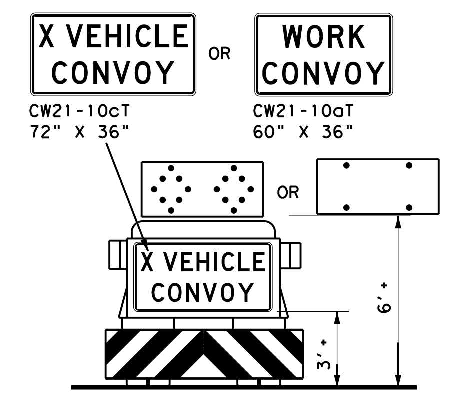
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



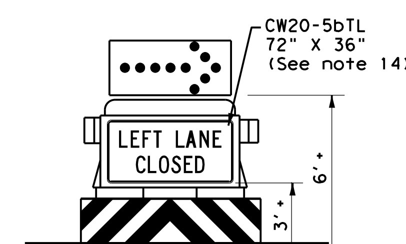
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

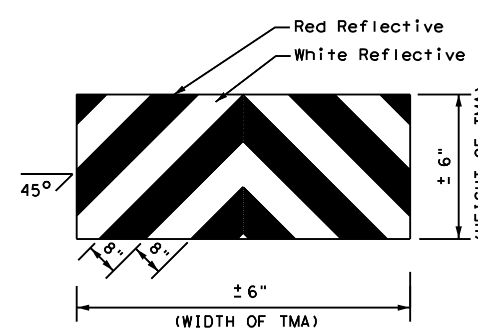


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND

Symbol		Arrow Board Display	
*	Trail Vehicle		
**	Shadow Vehicle		
***	Work Vehicle	(symbol)	RIGHT Directional
(symbol)	Heavy Work Vehicle	(symbol)	LEFT Directional
(symbol)	Truck Mounted Attenuator (TMA)	(symbol)	Double Arrow
(symbol)	Traffic Flow	(symbol)	CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

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©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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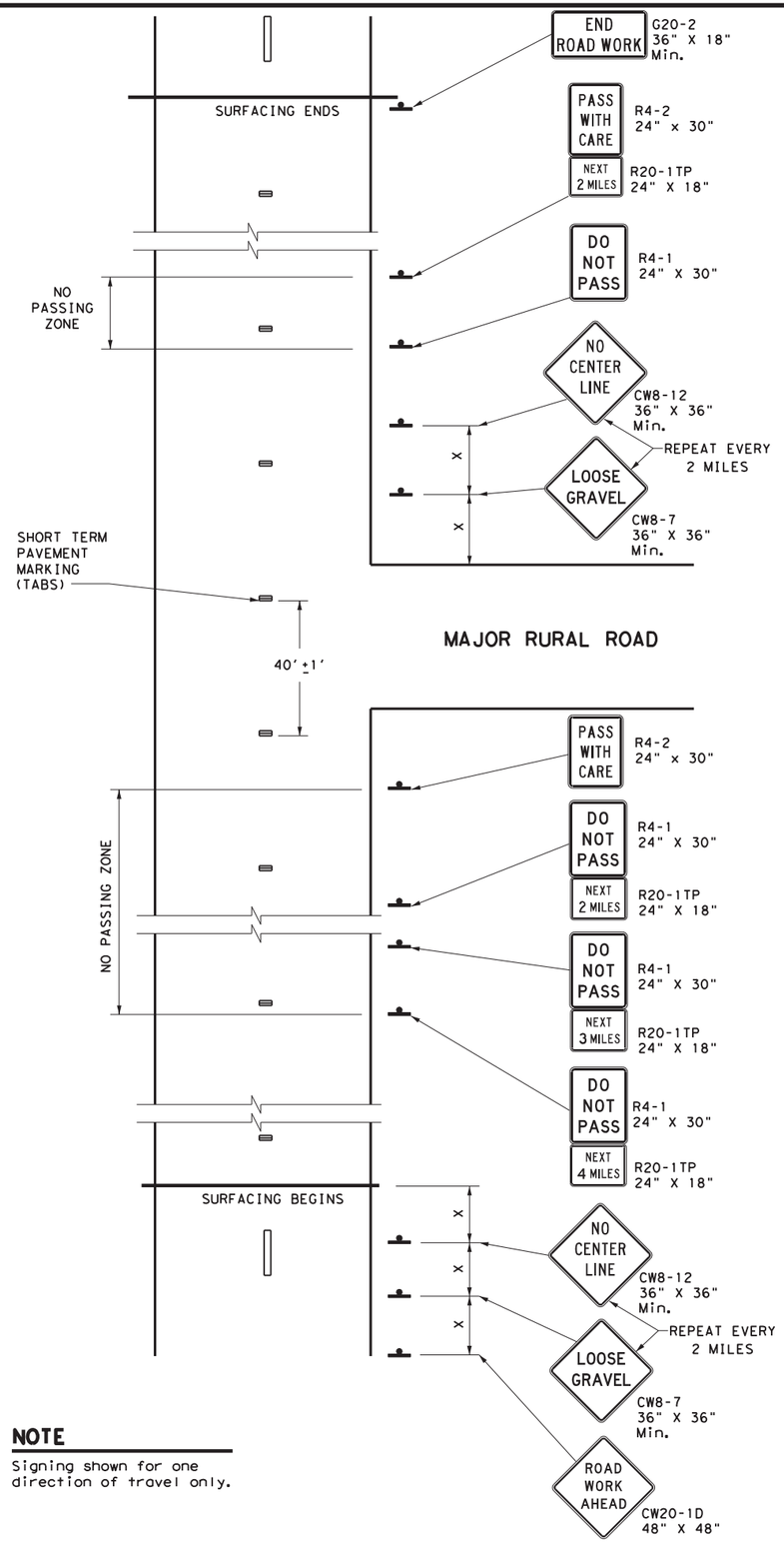
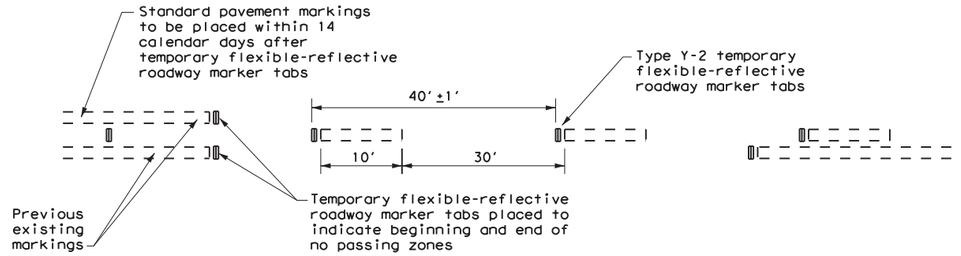


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

"NO CENTER LINE" SIGN (CW8-12)

A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings(low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

"LOOSE GRAVEL" SIGN (CW8-7)

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

PAVEMENT MARKINGS (FOR EMERGENCY USE ONLY) ⚠1

A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement
no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.

B. Tabs shall not be used to simulate edge lines.

C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T)sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

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

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

GENERAL NOTES

1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

STATE OF TEXAS
JAMIE A. H. JONES
128752
LICENSED PROFESSIONAL ENGINEER

Jamie A.H. Jones, P.E.

09/22/2022

⚠1 CHANGED VERBAGE FOR PAVEMENT MARKINGS

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13(MOD)

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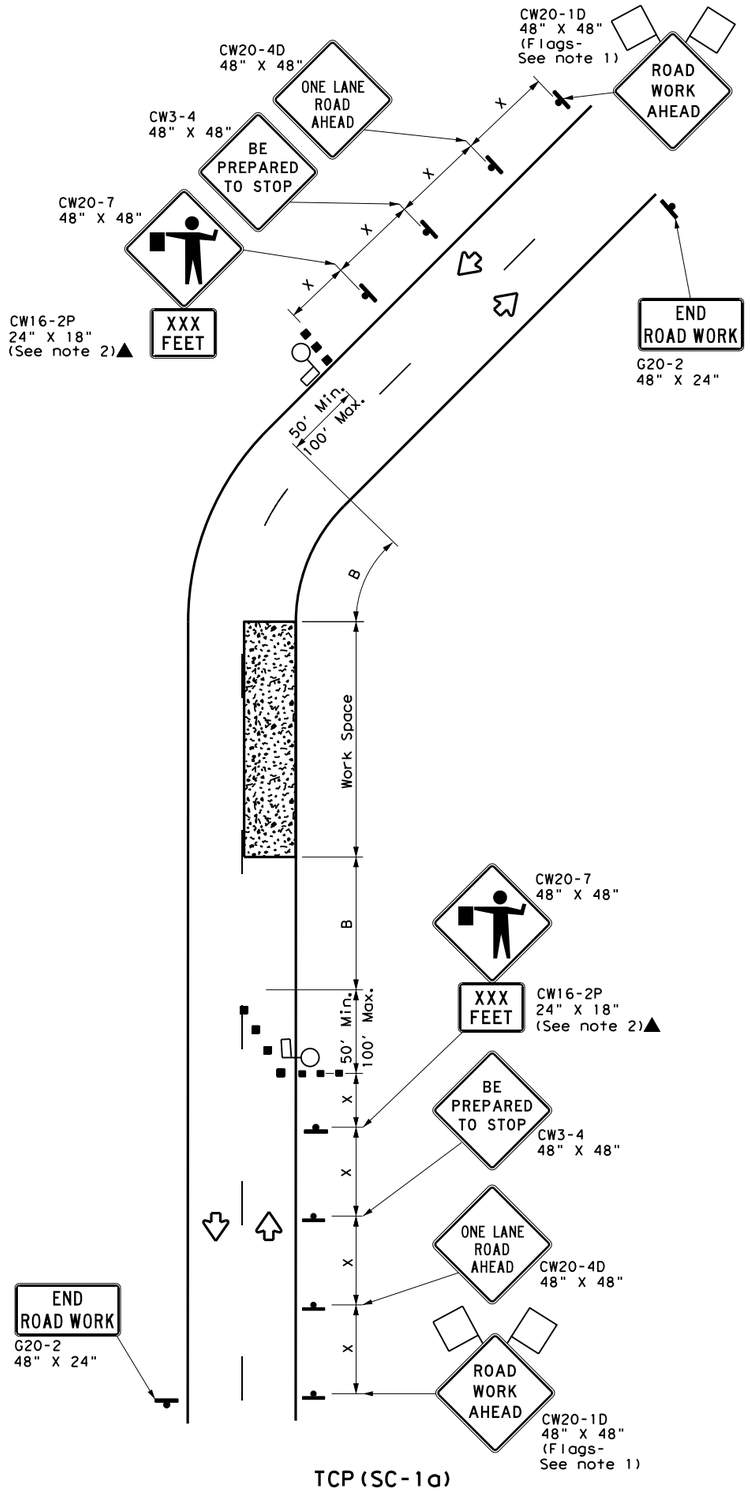
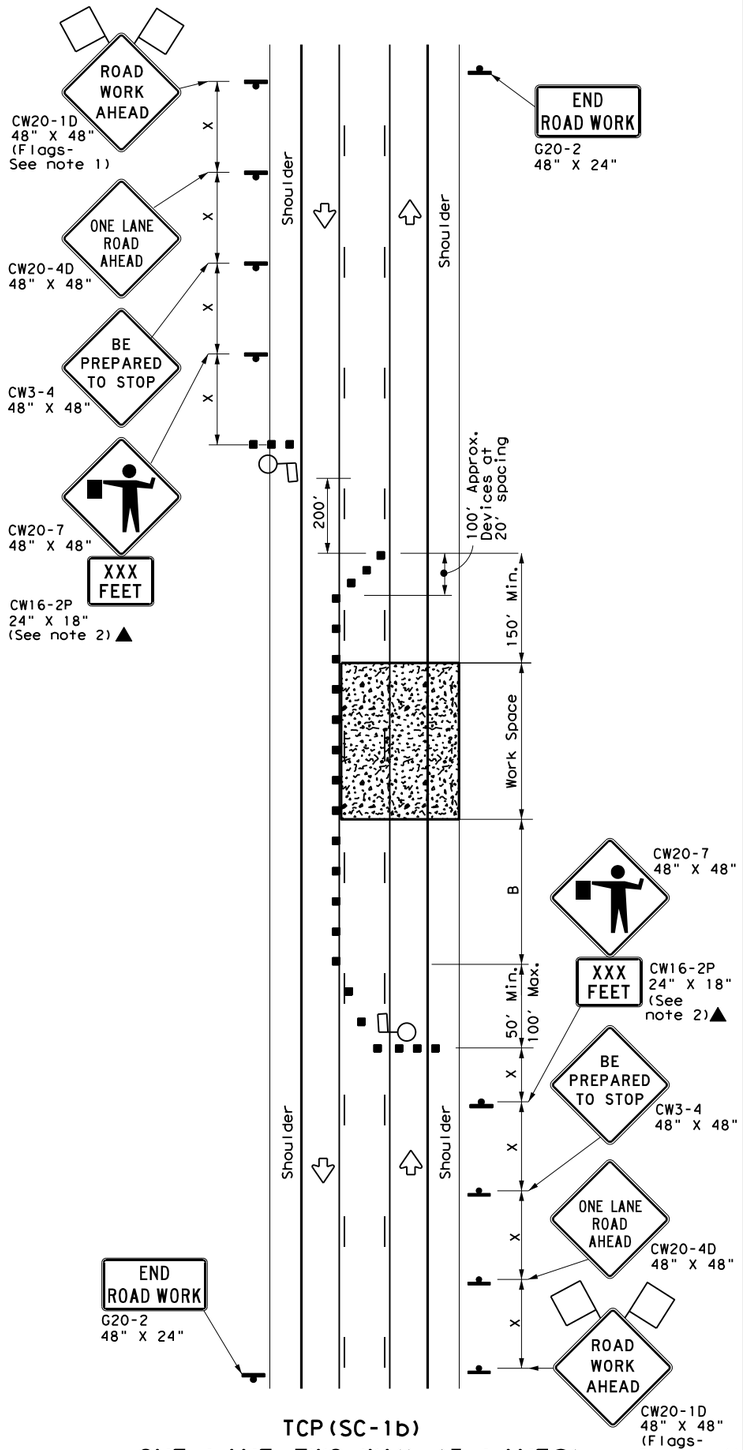


TCP(SC-1a)

ONE LANE TWO-WAY (2 LANES) CONTROL WITH PILOT VEHICLE



TCP(SC-1b)

ONE LANE TWO-WAY (3 LANES) CONTROL WITH PILOT VEHICLE AND CHANNELIZING DEVICES

LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only

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

TYPICAL USAGE

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger sign is less than 1500 feet.
5. Flaggers should use two-way radios or other methods of communication at all times to control traffic.
6. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.
7. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
8. If the seal coat operation crosses intersections, traffic in these areas must be controlled, Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning other member of the traffic control crew at the intersection.
9. Temporary rumble strips are not required on seal coat operations.
10. Pilot car is used to guide vehicles through traffic control zone, vehicle shall have an identification name displayed and "PILOT CAR, FOLLOW ME" (G20-4) sign or message board mounted in a conspicuous position on rear.

TCP (SC-1a)

1. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic.

Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS

TCP(SC-1)-21

FILE: tcpsc-1-21.dgn	DN:	CK:	DW:	CK:
© TxDOT April 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
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	HOU	BRAZORIA		79

DATE: 9/22/2022 4:26:47 PM
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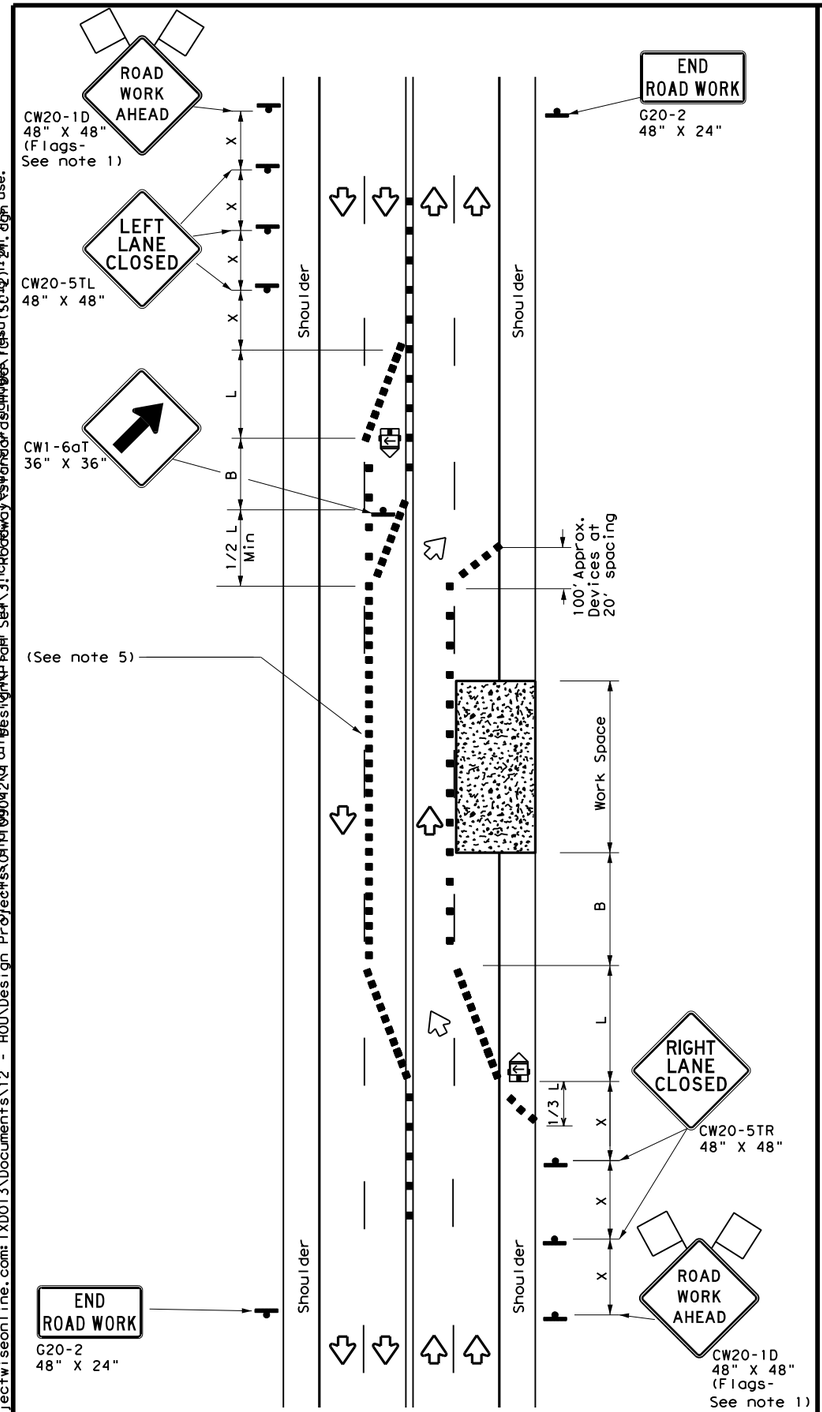
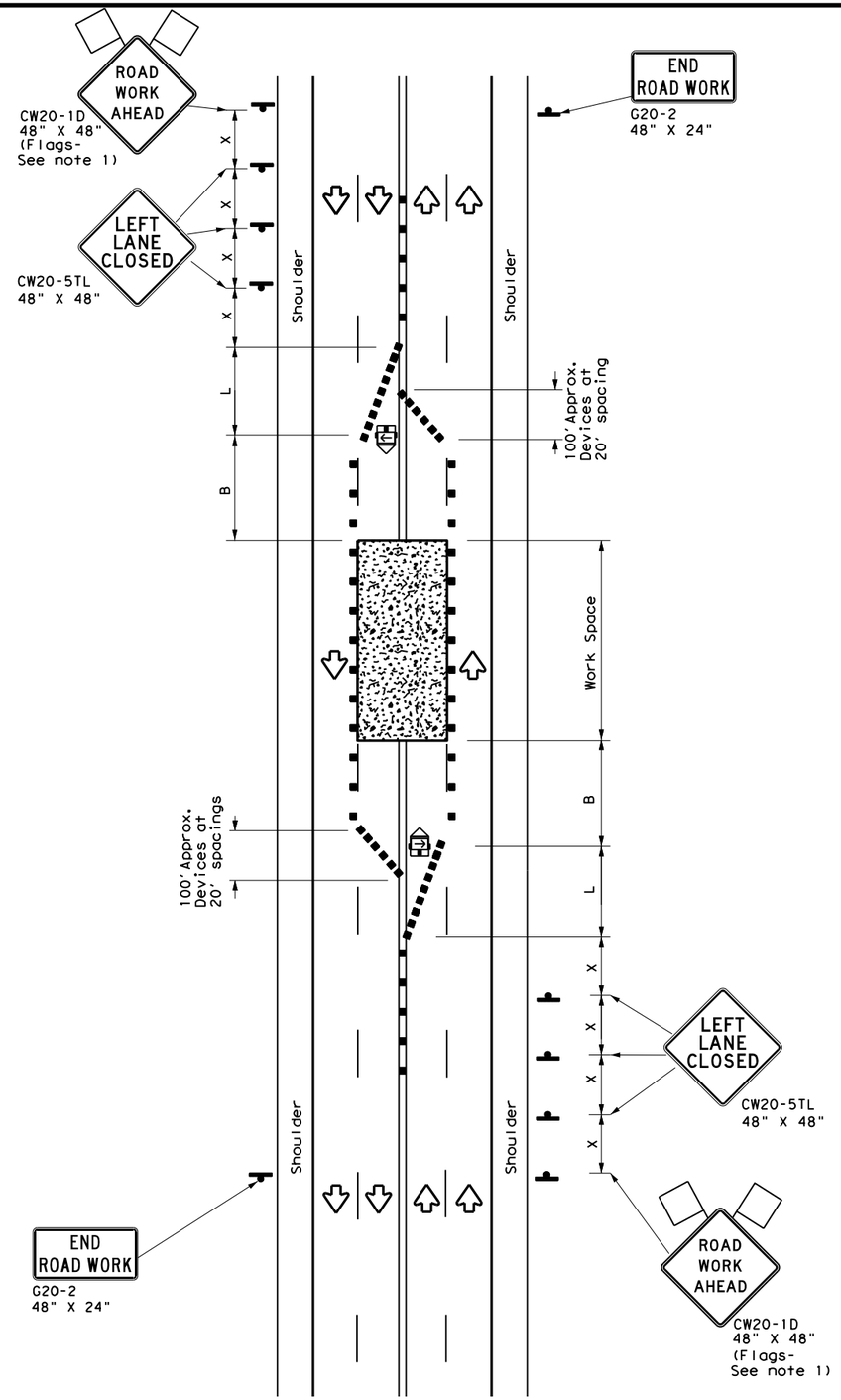


TCP (SC-2a)

ONE LANE CLOSED EACH DIRECTION
CONTROL WITH CHANNELIZING DEVICES



TCP (SC-2b)

CENTER LANES CLOSED
CONTROL WITH CHANNELIZING DEVICES

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
4. If the seal coat operation crosses intersections, traffic in these areas must be controlled, Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning other member of the traffic control crew at the intersection.
5. Temporary rumble strips are not required on seal coat operations.

TCP (SC-2a)

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(SC-2)-21

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© TxDOT April 2021	CONT	SECT	JOB	HIGHWAY
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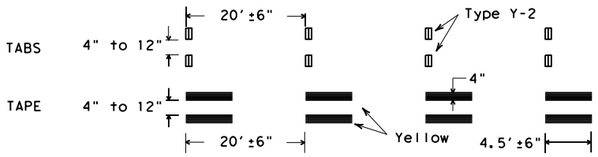
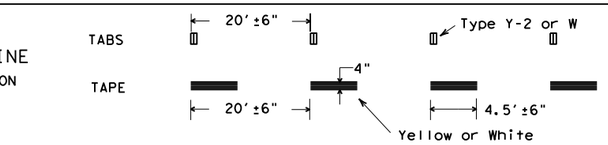
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

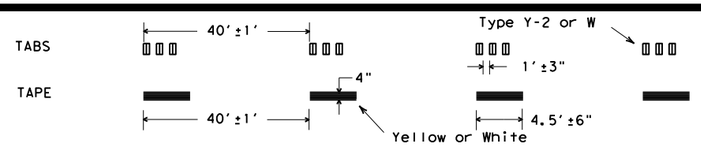


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



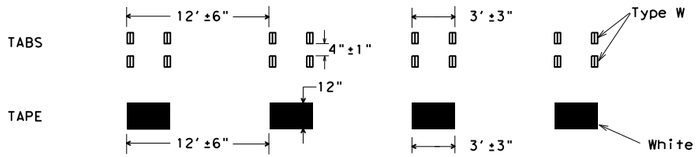
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

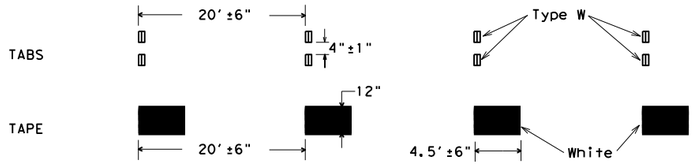


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



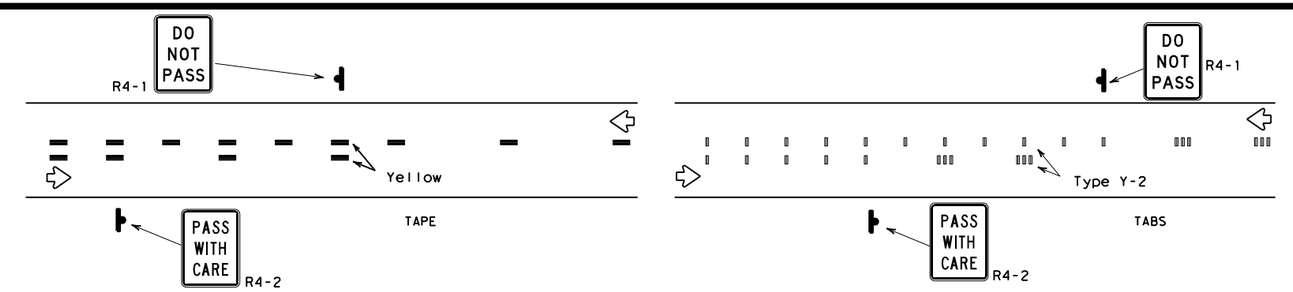
NOTES:

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

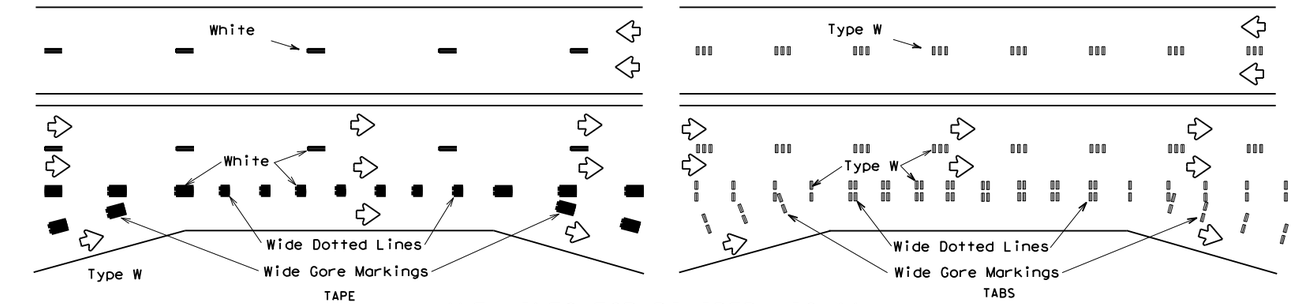
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

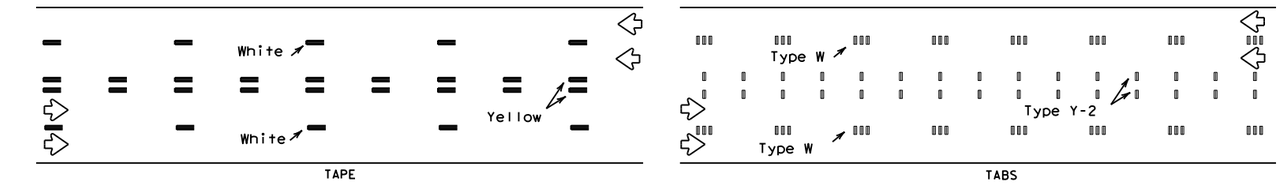
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



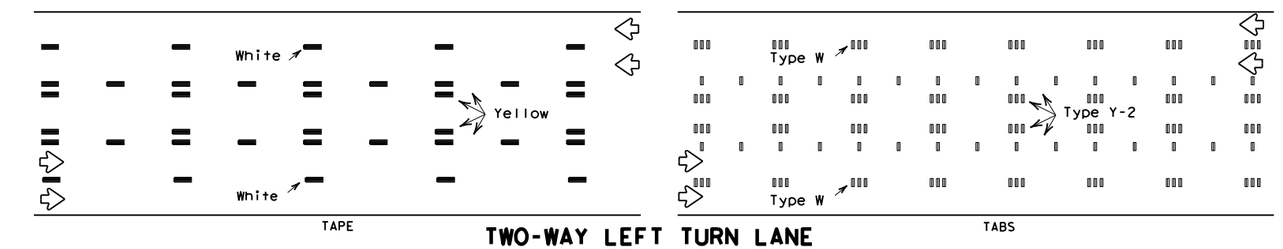
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



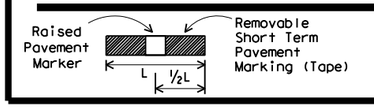
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

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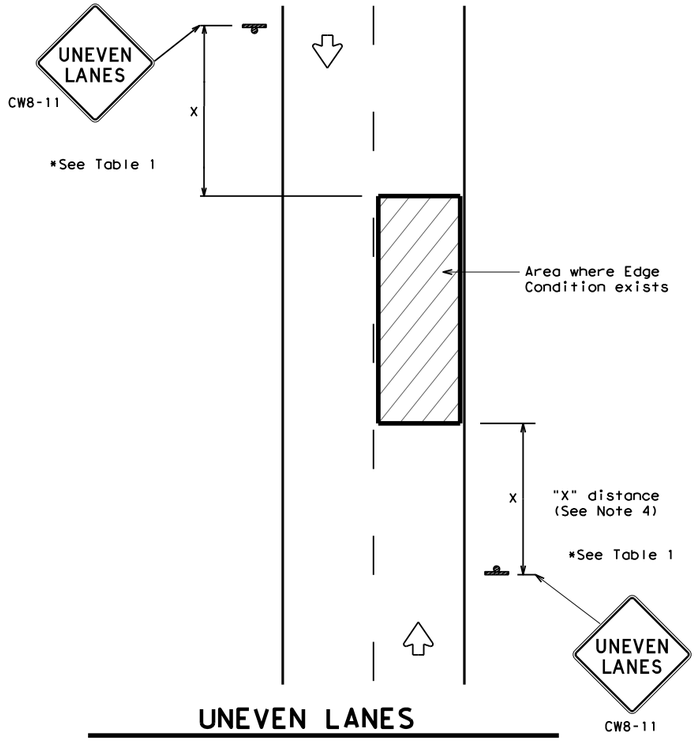
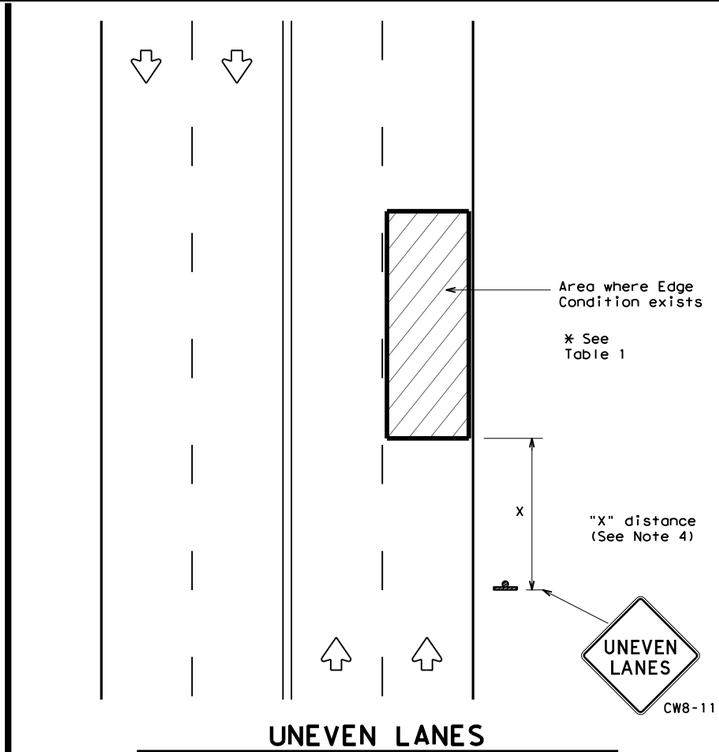
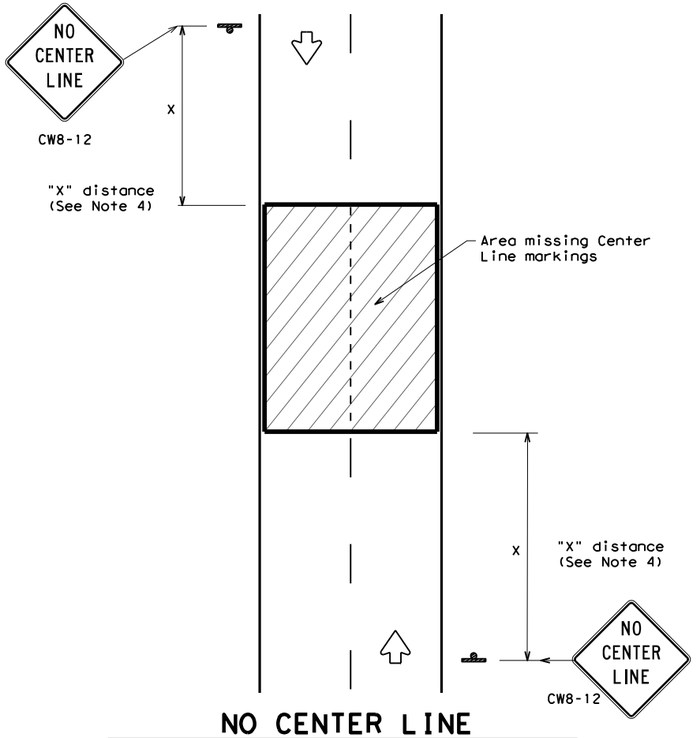


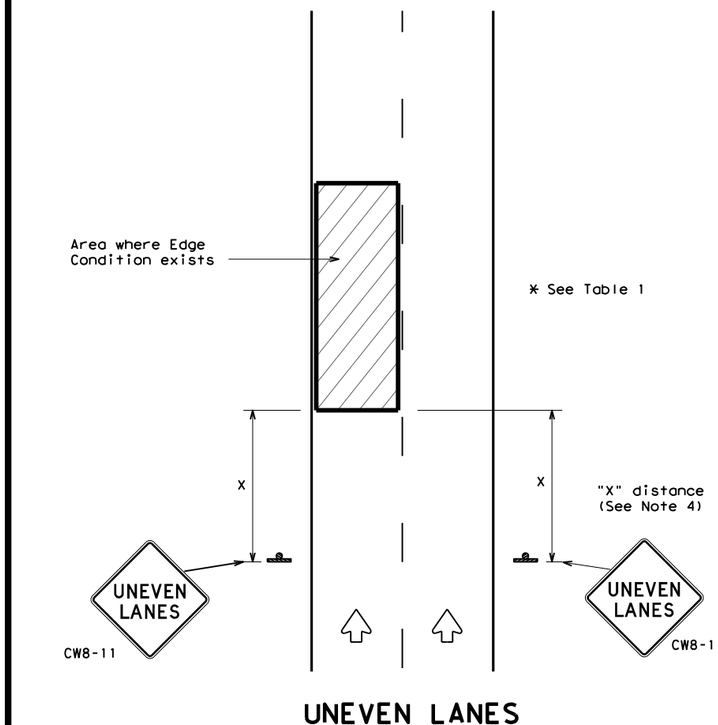
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

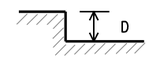
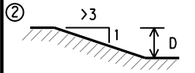
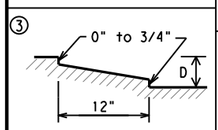
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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1-97 3-03	HOU	BRAZORIA		82

DATE: 9/22/2022 4:27:09 PM
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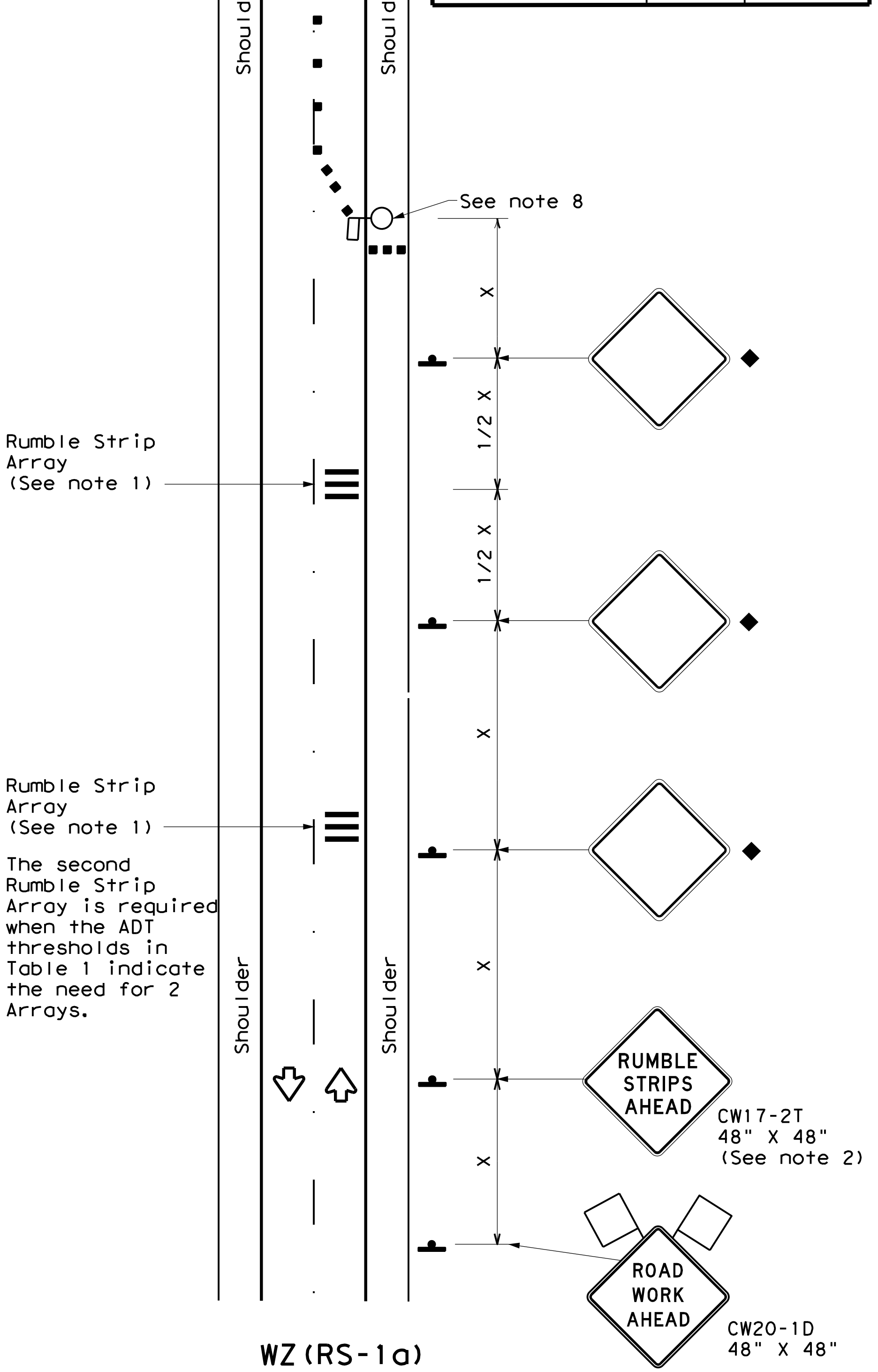
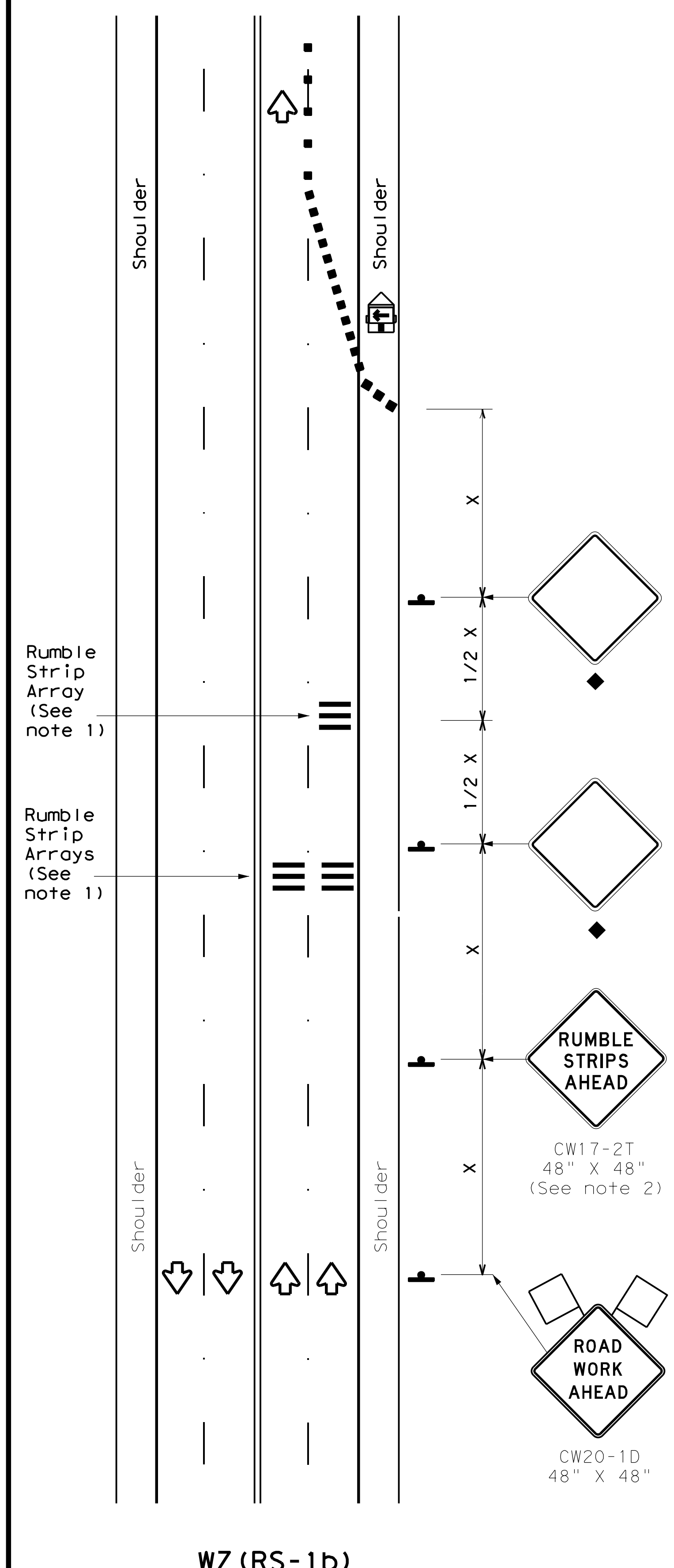
Warning sign and rumble strip sequence in opposite direction is same as below.

TABLE 1

Flagger to Flagger (Length of Work Area)	ADT	# of Rumble Strip Arrays
1/8 Mile	< 4,500	1
	≥ 4,500	2
1/4 Mile	< 3,500	1
	≥ 3,500	2
1/2 Mile	< 2,600	1
	≥ 2,600	2
1 Mile	< 1,600	1
	≥ 1,600	2
> 1 Mile	N/A	2



RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

1. Each Rumble Strip Array should consist of three rumble strips spaced center to center at the spacing shown in Table 2, placed transverse across the lane at locations shown.
2. The CW17-2T "RUMBLE STRIPS AHEAD" sign should be located after the CW20-1D "ROAD WORK AHEAD sign and spaced as shown. If traffic is observed to be queuing, or is expected to queue beyond the Rumble Strips, the CW17-2T sign and the first Rumble Strip Array may be located upstream of the CW20-1D sign as necessary to provide needed warning.
3. Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
4. Remove Temporary Rumble Strips before removing the advanced warning signs.
5. Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
6. Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
7. This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
8. The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
9. Replace defective Temporary Rumble Strips as directed by the Engineer.
10. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

LEGEND

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

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

* Conventional Roads Only

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

TYPICAL USAGE

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

◆ **Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.**

* **For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.**

TABLE 2

Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35'+

Texas Department of Transportation

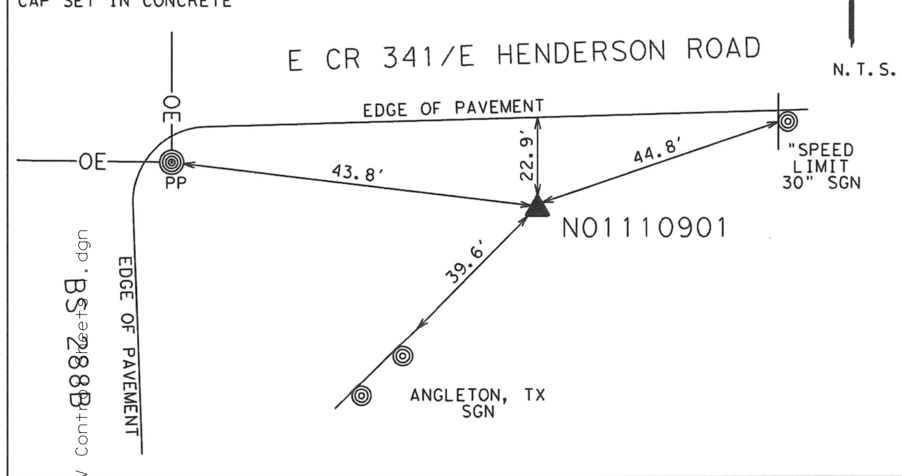
Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

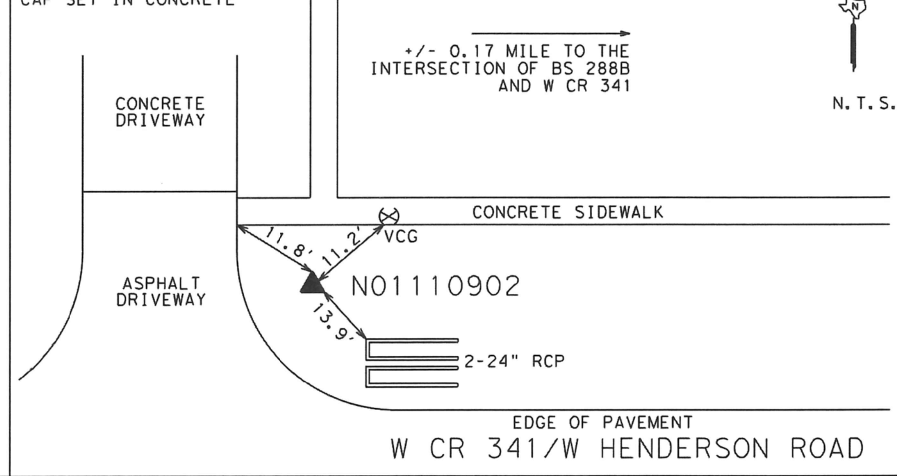
FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
2-14 1-22 4-16	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	83

N01110901
N: 13,637,021.99
E: 3,106,622.04
EL: 30.19'
3-1/4" TxDOT ALUMINUM CAP SET IN CONCRETE



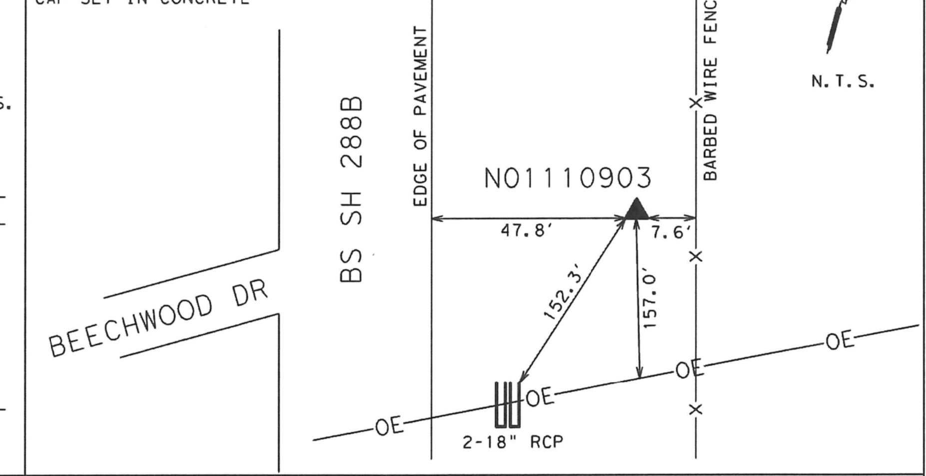
N01110901 is located at the southeast corner of the intersection of BS 288B and East CR 341. Said point is 22.9 feet perpendicular to the south of the southerly edge of pavement of E CR 341, 44.8 feet southwest of a "Speed Limit 30" sign, 43.8 feet southeast of a power pole, and 39.6 feet northeast of a double post sign that reads "Angleton, Texas".

N01110902
N: 13,637,057.39
E: 3,105,602.00
EL: 29.22'
3-1/4" TxDOT ALUMINUM CAP SET IN CONCRETE



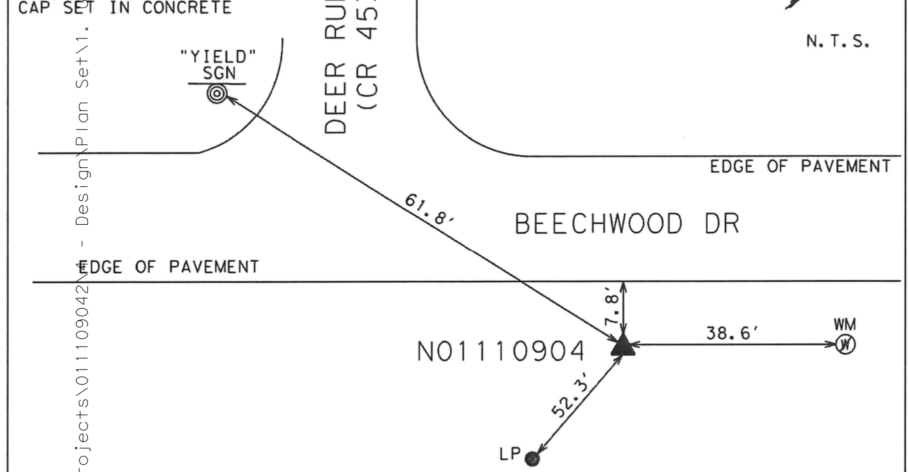
N01110902 is located on the north side of W CR 341, Said point being +/- 0.17 mile west of the intersection of BS 288B and W CR 341, 11.8 feet southeast of an intersection of the east edge of an asphalt driveway and a concrete sidewalk, 11.2 feet southwest of a gas valve cover, 13.9 feet northwest of the northwest corner of a concrete drainage structure.

N01110903
N: 13,646,993.54
E: 3,104,325.16
EL: 32.86'
3-1/4" TxDOT ALUMINUM CAP SET IN CONCRETE



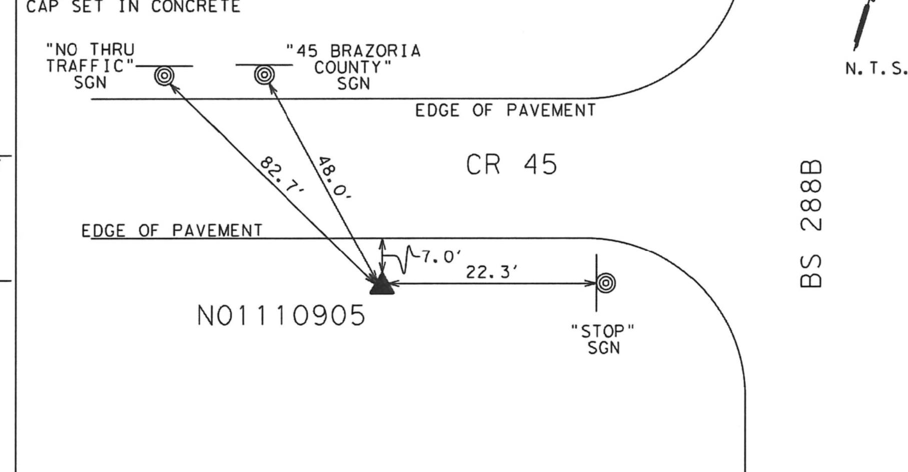
N01110903 is located on the northeast side of the intersection of BS 288B and Beechwood Dr. said point is 47.8 feet northeast of and perpendicular to the BS 288B east edge of pavement, 7.6 feet southwest of and perpendicular to a barbed wire fence that runs parallel with BS 288B, 152.3 feet north of two 18" reinforced concrete pipe culverts, and 157.0 feet northwest of and perpendicular to an overhead electric line.

N01110904
N: 13,646,416.86
E: 3,103,526.85
EL: 31.81'
3-1/4" TxDOT ALUMINUM CAP SET IN CONCRETE



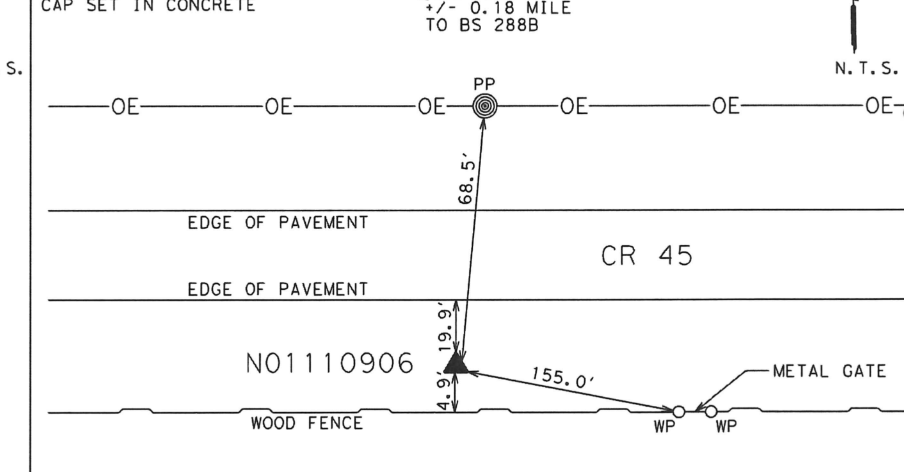
N01110904 is located on the southeast side of the intersection of Beechwood Dr and Deer Run Dr (CR 453A), said point is 7.8 feet southeast of and perpendicular to the Beechwood Drive southeast edge of pavement, 38.6 feet southwest of a water meter, 61.8 feet northeast of a yield sign west of Deer Run Dr, and 52.3 feet northeast of a light pole.

N01110905
N: 13,656,704.51
E: 3,101,675.49
EL: 37.56'
3-1/4" TxDOT ALUMINUM CAP SET IN CONCRETE



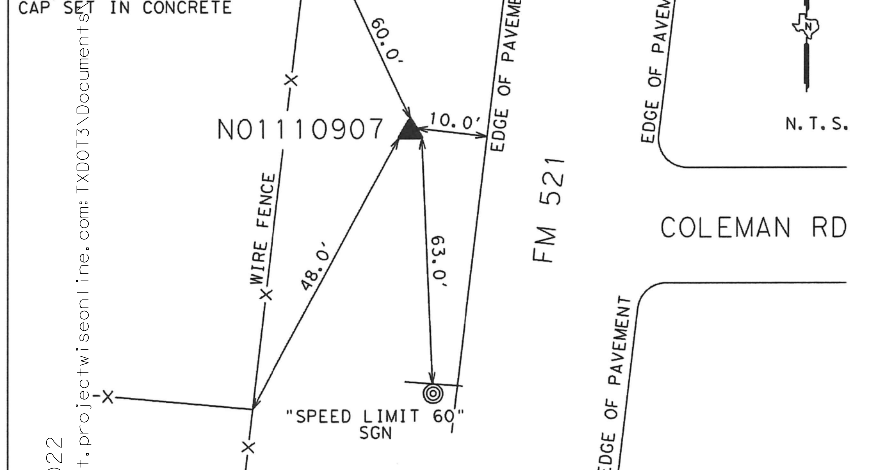
N01110905 is located at the southwest corner of the intersection of BS 288B and CR 45. Said point is 7.0 feet southeast of and perpendicular to the CR 45 southeast edge of pavement, 22.3 southwest of a "Stop" sign, 82.7 feet southeast of a traffic sign that reads "No Thru Traffic", and 48.0 feet southeast of a traffic sign that reads "45 Brazoria County".

N01110906
N: 13,656,760.72
E: 3,102,671.64
EL: 36.60'
3-1/4" TxDOT ALUMINUM CAP SET IN CONCRETE



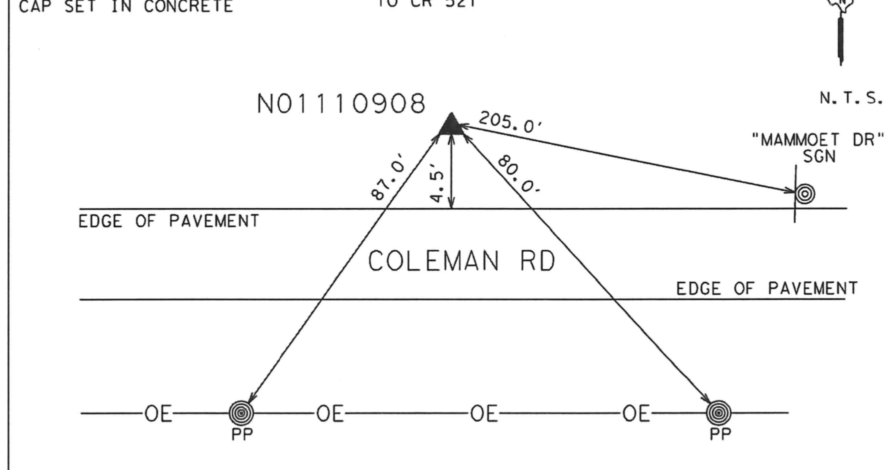
N01110906 is located south side of CR 45, said point is +/- 0.18 mile east of the intersection of BS 288B and CR 45, feet south of and perpendicular to the CR 45 south edge of pavement, 4.9 feet north of and perpendicular to a barbed wire fence that runs parallel with CR 45, 155.0 feet northwest of a wood post, 68.5 feet southwest of a power pole on the north side of CR 45.

N01110907
N: 13,671,104.48
E: 3,098,962.20
EL: 41.67'
3-1/4" TxDOT ALUMINUM CAP SET IN CONCRETE



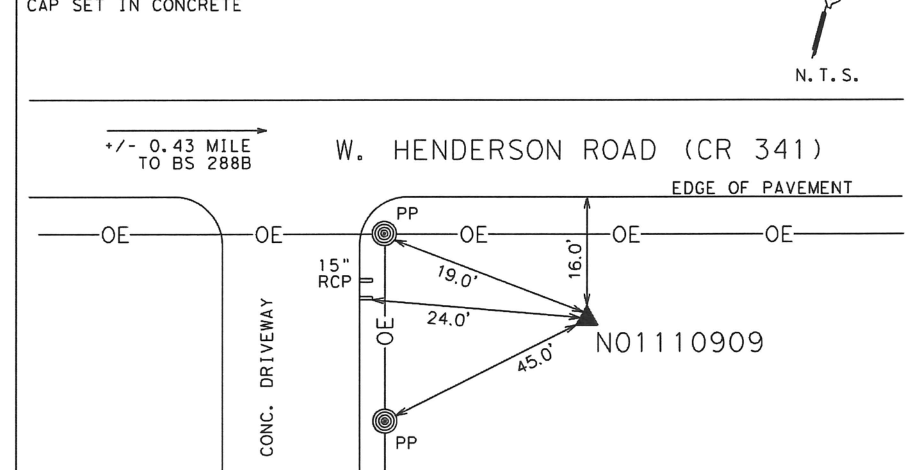
N01110907 is located on the northwest side of the intersection of FM 521 and Coleman Road. Said point is 10.0 feet northwest of and perpendicular to the northwest FM 521 edge of pavement, 63.0 feet northwest of a traffic sign that reads "Speed Limit 60", 48.0' feet northeast of a wire fence corner post, 60.0' feet southeast of a telephone pedestal.

N01110908
N: 13,671,208.77
E: 3,100,543.34
EL: 40.53'
3-1/4" TxDOT ALUMINUM CAP SET IN CONCRETE



N01110908 is located on the north side of Coleman Road, said point is +/- 0.29 mile east of the intersection of FM 521 and Coleman Rd, 4.5 feet north of and perpendicular to the Coleman Rd north edge of pavement, 205.0 feet northwest of the a sign that reads "Mammoet Dr.", 80.0 feet northwest of a power pole south of Coleman Road, and 87.0 feet northeast of another power pole south of Coleman Road.

N01110909
N: 13,636,915.70
E: 3,104,264.52
EL: 28.13'
3-1/4" TxDOT ALUMINUM CAP SET IN CONCRETE



N01110909 is located on the southeast side of W. Henderson Road (CR 341), said point being +/- 0.43 mile southwest of the BS 288B and W. Henderson Road (CR 341) intersection, 16.0 feet southeast of and perpendicular to the southeast W. Henderson Road (CR 341) edge of pavement, 19.0 feet southeast of a power pole, 24.0 feet east of a 15" reinforced concrete drainage pipe, and 45.0 feet northeast of a power pole.

NOTES:

1. ALL COORDINATES AND BEARINGS SHOWN ARE BASED ON TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM (NAD)83 (2011), EPOCH 2010.00.

2. ALL COORDINATES AND DISTANCES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR OF 1.00013. UNITS: U.S. SURVEY FEET.

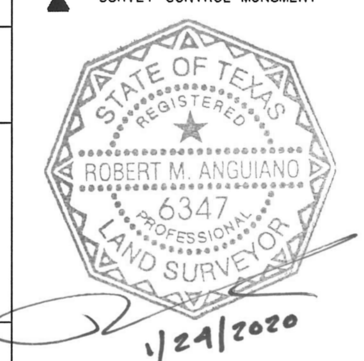
3. COORDINATES WERE DERIVED FROM STATIC AND RTK GPS OBSERVATIONS USING CORS STATIONS TXAG AND TXRS.

4. ALL ELEVATIONS SHOWN ARE BASED ON NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988, USING GEOID 12A AND WERE ESTABLISHED BY DIGITAL DIFFERENTIAL LEVELING.

5. PROJECT CONTROL POINTS WERE ESTABLISHED USING TXDOT LEVEL 2 AND 3 GPS SURVEY SPECIFICATIONS.

LEGEND

▲ SURVEY CONTROL MONUMENT



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

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

DESIGN ENGINEER DATE

2020

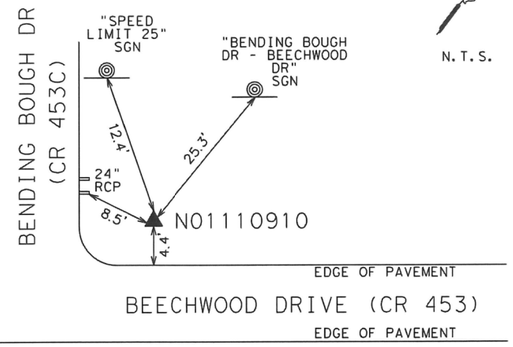
Texas Department of Transportation

VICKREY & ASSOCIATES, INC.
CONSULTING ENGINEERS
CIVIL • ENVIRONMENTAL • SURVEY
12940 Country Parkway
San Antonio, TX 78216
Telephone: (210) 349-3271
TBPLS #10004100 ©2020

BS 288B
HORIZONTAL & VERTICAL CONTROL SHEET
SHEET 1 OF 6

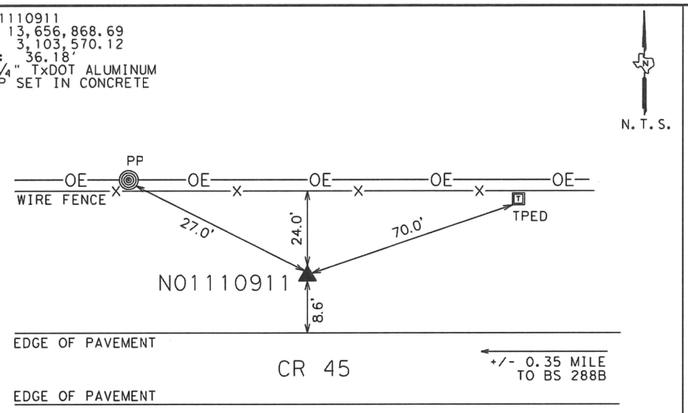
FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				BS 288B
DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	BRAZORIA	0111	09	042	84

N01110910
N: 13,645,816.76
E: 3,102,751.93
EL: 31.57'
3-1/4" TxDOT ALUMINUM
CAP SET IN CONCRETE



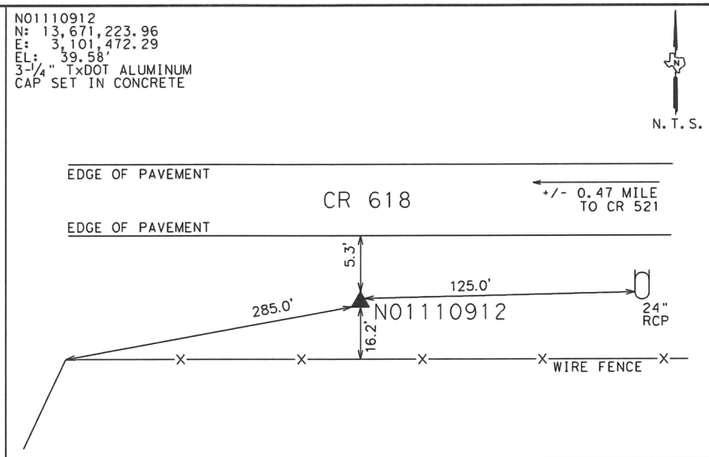
N01110910 is located at the north right-of-way intersection of Beechwood Drive (CR 453) and Bending Bough Drive (CR 453C), said point being 4.4 feet northwest of and perpendicular to the northwest Beechwood Drive (CR 453) edge of pavement, 8.5 feet northeast of a 24" reinforced concrete drainage pipe, 12.4 feet southeast of a sign that reads "Speed Limit 25", 25.3 feet south of a sign that reads "Bending Bough Dr. - Beechwood Dr.".

N01110911
N: 13,656,868.69
E: 3,103,570.12
EL: 36.18'
3-1/4" TxDOT ALUMINUM
CAP SET IN CONCRETE



N01110911 is located on the north side of CR 45, +/- 0.35 mile east of the BS 288B and CR 45 intersection, said point is 8.6 feet north of and perpendicular to the north CR 45 edge of pavement, 70.0 feet southwest of a telephone pedestal, 24.0 feet south of and perpendicular to a wire fence, and 27.0 feet southeast of a power pole.

N01110912
N: 13,671,223.96
E: 3,101,472.29
EL: 39.58'
3-1/4" TxDOT ALUMINUM
CAP SET IN CONCRETE



N01110912 is located on the south side of CR 618, said point being +/- 0.47 mile east of the BS 288B and CR 618 intersection, 5.3 feet south of and perpendicular to the south CR 618 edge of pavement, 125.0 feet west of a 24" reinforced concrete pipe culvert, 16.2 feet north of and perpendicular to a wire fence, and 285.0 feet northeast of a wire fence corner post.

NOTES:

1. ALL COORDINATES AND BEARINGS SHOWN ARE BASED ON TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM (NAD)83 (2011), EPOCH 2010.00.

2. ALL COORDINATES AND DISTANCES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR OF 1.00013. UNITS: U.S. SURVEY FEET.

3. COORDINATES WERE DERIVED FROM STATIC AND RTK GPS OBSERVATIONS USING CORS STATIONS TXAG AND TXRS.

4. ALL ELEVATIONS SHOWN ARE BASED ON NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988, USING GEOID 12A AND WERE ESTABLISHED BY DIGITAL DIFFERENTIAL LEVELING.

5. PROJECT CONTROL POINTS WERE ESTABLISHED USING TXDOT LEVEL 2 AND 3 GPS SURVEY SPECIFICATIONS.

LEGEND

▲ SURVEY CONTROL MONUMENT

STATE OF TEXAS
REGISTERED
ROBERT M. ANGUIANO
6347
PROFESSIONAL
LAND SURVEYOR

1/24/2020

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

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

DESIGN ENGINEER DATE

2020

Texas Department of Transportation

VICKREY & ASSOCIATES, INC.
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12940 Country Parkway
San Antonio, TX 78216
Telephone: (210) 349-3271
TBPLS #10004100

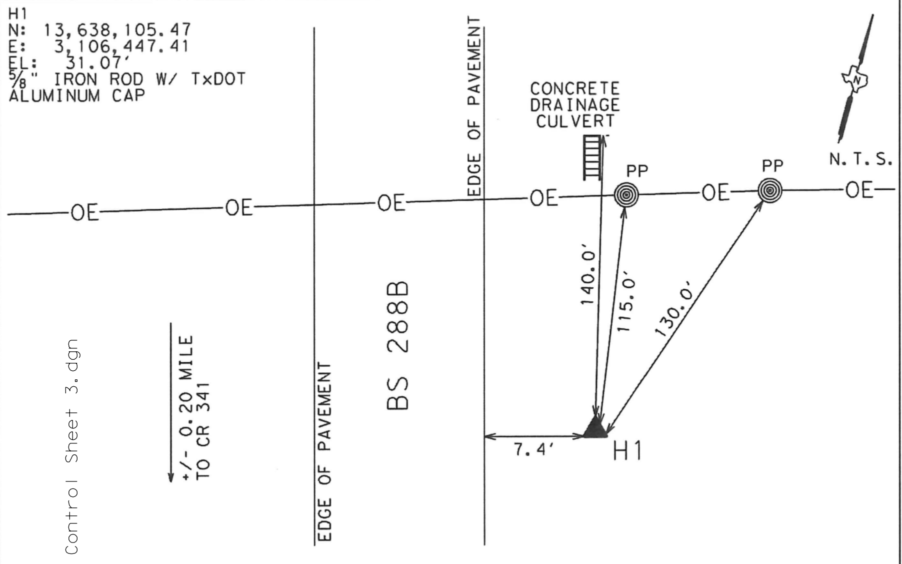
BS 288B

HORIZONTAL & VERTICAL CONTROL SHEET

SHEET 2 OF 6

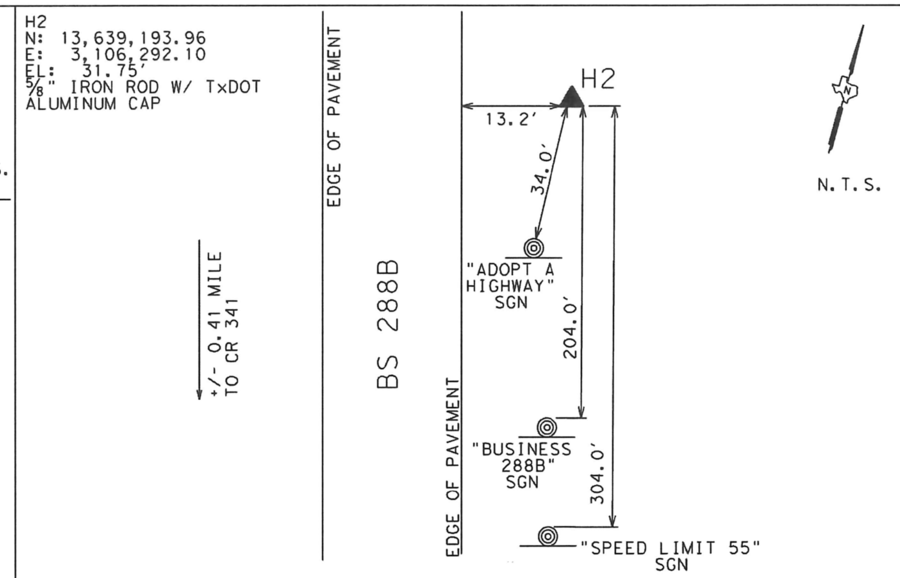
FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				BS 288B
DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB. NO.	SHEET NO.
HOU	BRAZORIA	0111	09	042	85

H1
N: 13,638,105.47
E: 3,106,447.41
EL: 31.07'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



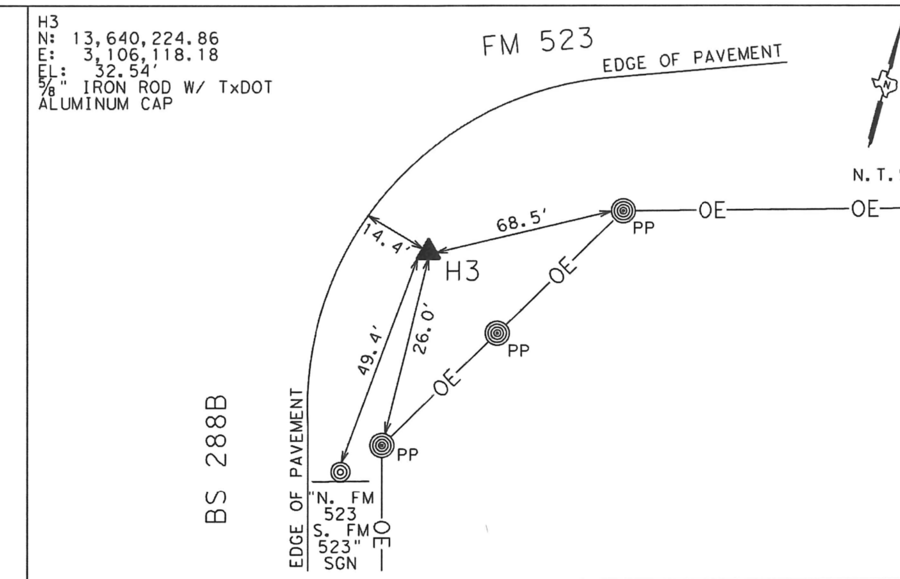
H1 is located on the northeast side of BS 288B, said point is +/- 0.20 mile northwest of the BS 288B and CR 341 intersection, 7.4 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 130.0 feet southwest of a power pole, 115.0 feet southwest of another power pole, and 140.0 feet southeast of the north corner of a concrete drainage culvert.

H2
N: 13,639,193.96
E: 3,106,292.10
EL: 31.75'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



H2 is located on the northeast side of BS 288B, said point is +/- 0.41 mile northwest of the BS 288B and CR 341 intersection. Said point is 13.2 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 34.0 feet north of a sign that reads "Adopt a Highway", 204.0 feet northwest of a sign that reads "Business 288 B", and 304.0 feet northwest of a sign that reads "Speed Limit 55".

H3
N: 13,640,224.86
E: 3,106,118.18
EL: 32.54'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



H3 is located at the southeast corner of the intersection of BS 288B and FM 523, said point is 14.4 feet east of and perpendicular to the BS 288B east edge of pavement, 68.5 feet southwest of a power pole, 26.0 feet northwest of another power pole, and 49.4 feet northeast of a sign that reads "N. FM 523 S. FM 523".

NOTES:

1. ALL COORDINATES AND BEARINGS SHOWN ARE BASED ON TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM (NAD)83 (2011), EPOCH 2010.00.

2. ALL COORDINATES AND DISTANCES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR OF 1.00013. UNITS: U.S. SURVEY FEET.

3. COORIDNATES WERE DERIVED FROM STATIC AND RTK GPS OBSERVATIONS USING CORS STATIONS TXAG AND TXRS.

4. ALL ELEVATIONS SHOWN ARE BASED ON NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988, USING GEOID 12A AND WERE ESTABLISHED BY DIGITAL DIFFERENTIAL LEVELING.

5. PROJECT CONTROL POINTS WERE ESTABLISHED USING TXDOT LEVEL 2 AND 3 GPS SURVEY SPECIFICATIONS.

LEGEND

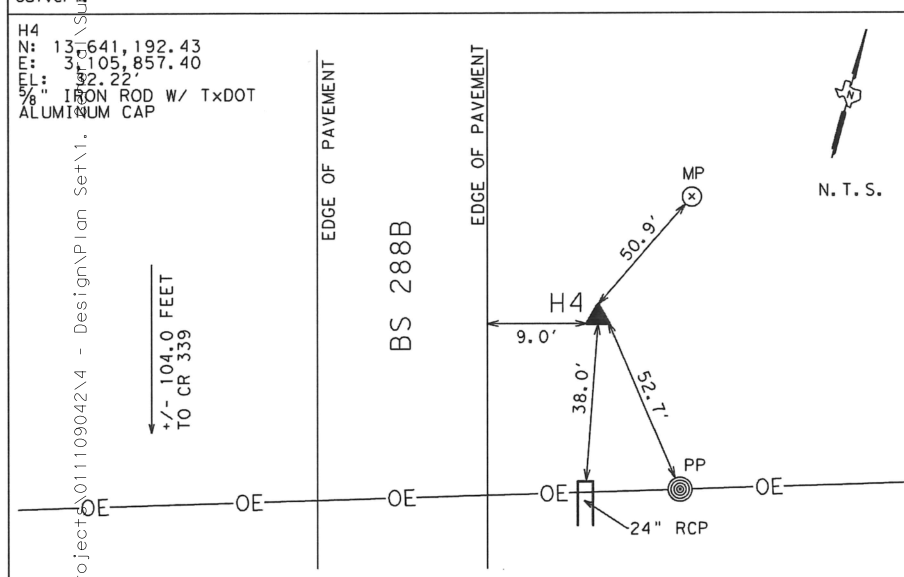
▲ SURVEY CONTROL MONUMENT

STATE OF TEXAS REGISTERED ROBERT M. ANGUIANO 6347 PROFESSIONAL LAND SURVEYOR

1/24/2020

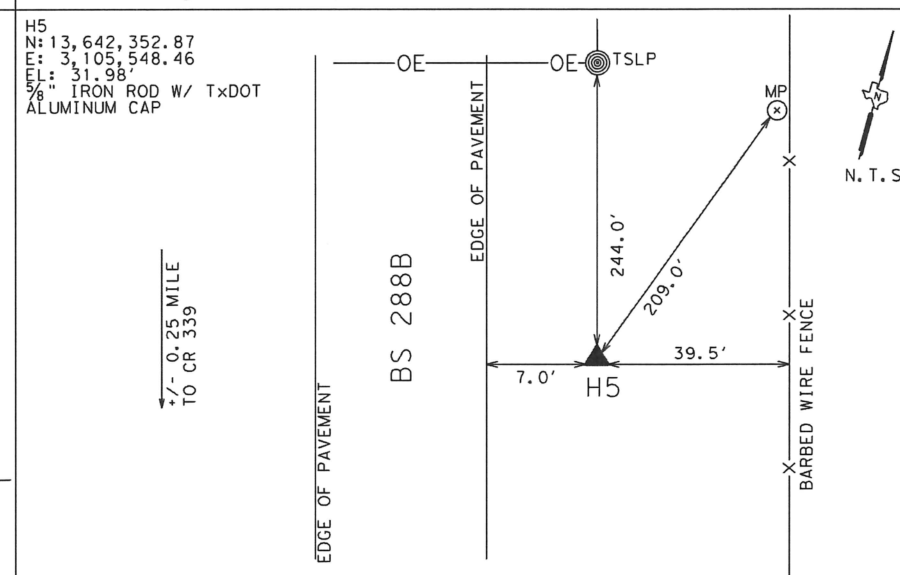
THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND AND UNDER MY SUPERVISION.

H4
N: 13,641,192.43
E: 3,105,857.40
EL: 32.22'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



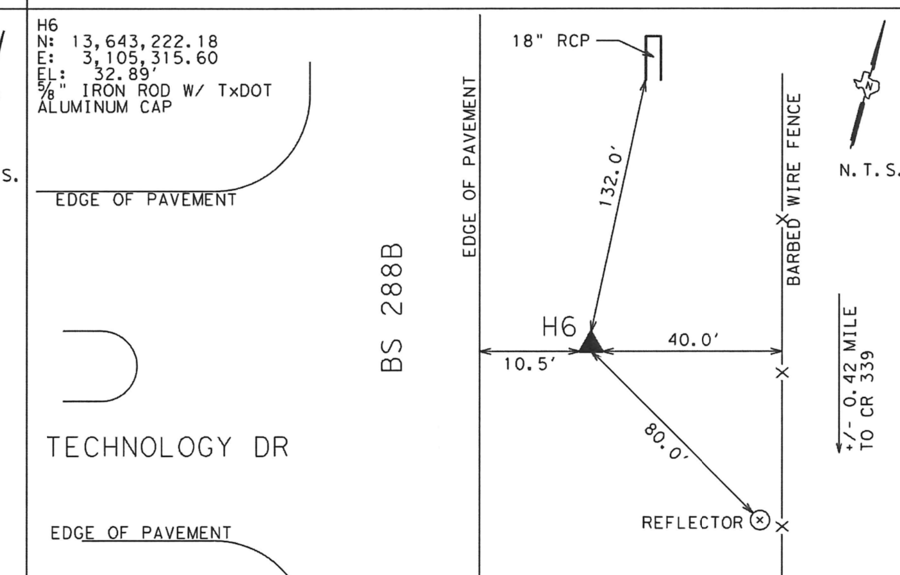
H4 is located on the northeast side of BS 288B, 104.0 feet northeast of the intersection of BS 288B and CR 339, said point is 9.0 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 50.9 feet southwest of a fiber optic line marker post, 52.7 feet northwest of a power pole, and 38.0 feet northwest of a 24" reinforced concrete pipe culvert.

H5
N: 13,642,352.87
E: 3,105,548.46
EL: 31.98'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



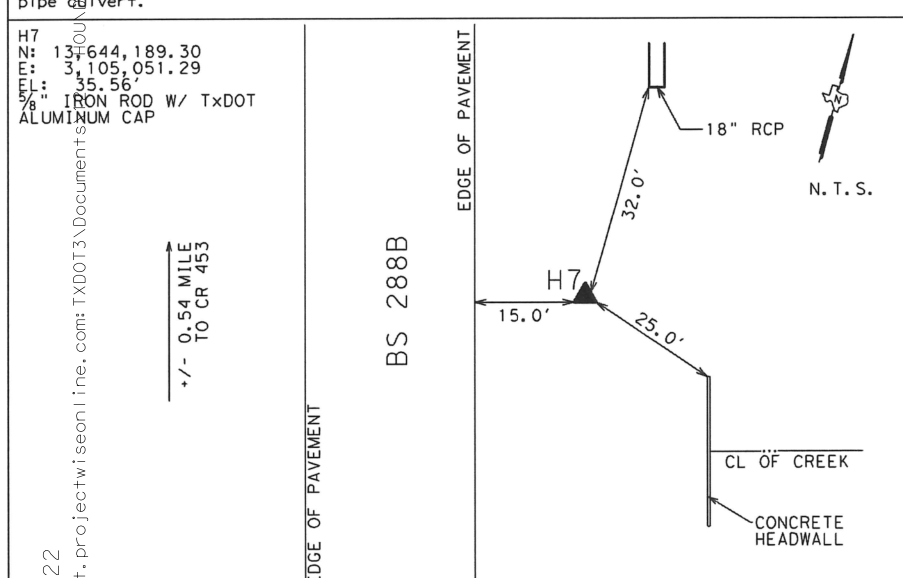
H5 is located on the northeast side of BS 288B, said point is +/- 0.25 mile northwest of the intersection of BS 288B and CR 339, 7.0 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 39.5 feet southwest of and perpendicular to a barbed wire fence, 209.0 feet south of a underground gas pipeline marker post, and 244.0 feet southeast of a traffic signal light pole.

H6
N: 13,643,222.18
E: 3,105,315.60
EL: 32.89'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



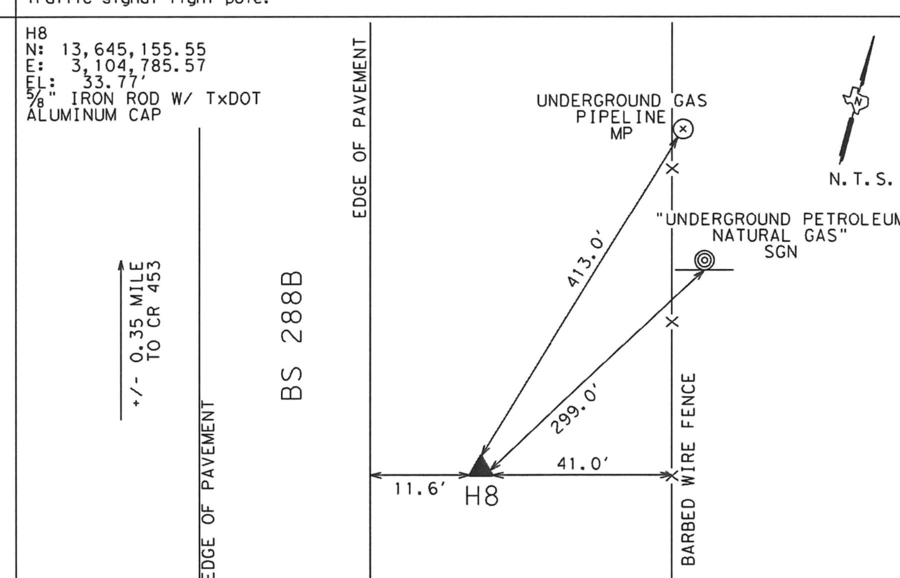
H6 is located on the northeast side of BS 288B, said point is at the intersection of BS 288B and Technology Dr., 10.5 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 40.0 feet southwest of and perpendicular to a barbed wire fence, 132.0 feet southwest of the southwest corner of a concrete drainage structure, and 80.0 feet northwest of a reflector.

H7
N: 13,644,189.30
E: 3,105,051.29
EL: 35.56'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



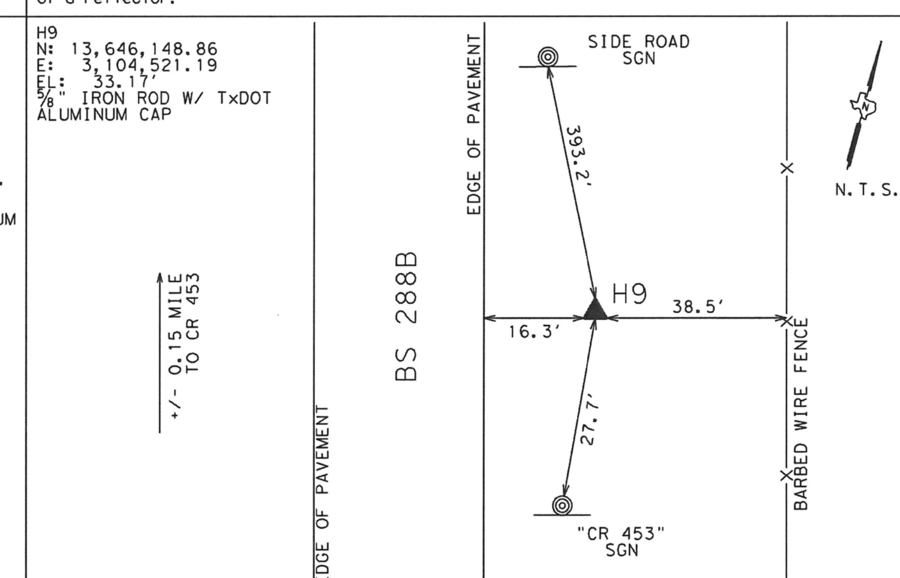
H7 is located on the northeast side of BS 288B, said point is +/- 0.54 mile southeast of the BS 288B and CR 453 intersection, 15.0 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 25.0 feet northwest of the northwest corner of a concrete headwall, and 32.0 feet south of an 18" reinforced concrete pipe culvert.

H8
N: 13,645,155.55
E: 3,104,785.57
EL: 33.77'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



H8 is located on the northeast side of BS 288B, said point is +/- 0.35 mile southeast of the BS 288B and CR 453 intersection, 11.6 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 41.0 feet southwest of and perpendicular to a barbed wire fence, 299.0 feet southwest of a sign that reads "Underground Petroleum Natural Gas line", and 413.0 feet south of a underground gas pipeline marker post.

H9
N: 13,646,148.86
E: 3,104,521.19
EL: 33.17'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



H9 is located on the northeast side of BS 288B, said point is +/- 0.15 mile southeast of the BS 288B and CR 453 intersection, 16.3 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 38.5 feet southwest of and perpendicular to a barbed wire fence, 393.2 feet southeast of a side road sign, 27.7 feet northwest of a sign that reads "CR 453".

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

DESIGN ENGINEER | DATE

2020

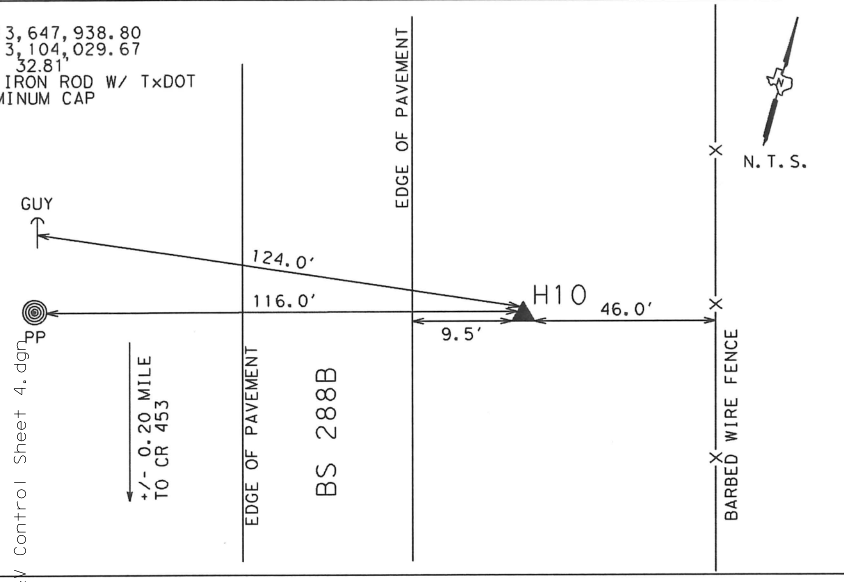
Texas Department of Transportation

VICKREY & ASSOCIATES, INC.
CONSULTING ENGINEERS
CIVIL • ENVIRONMENTAL • SURVEY
12940 Country Parkway
San Antonio, TX 78216
Telephone: (210) 349-3271
TBPLS #10004100 ©2020

BS 288B
HORIZONTAL & VERTICAL CONTROL SHEET
SHEET 3 OF 6

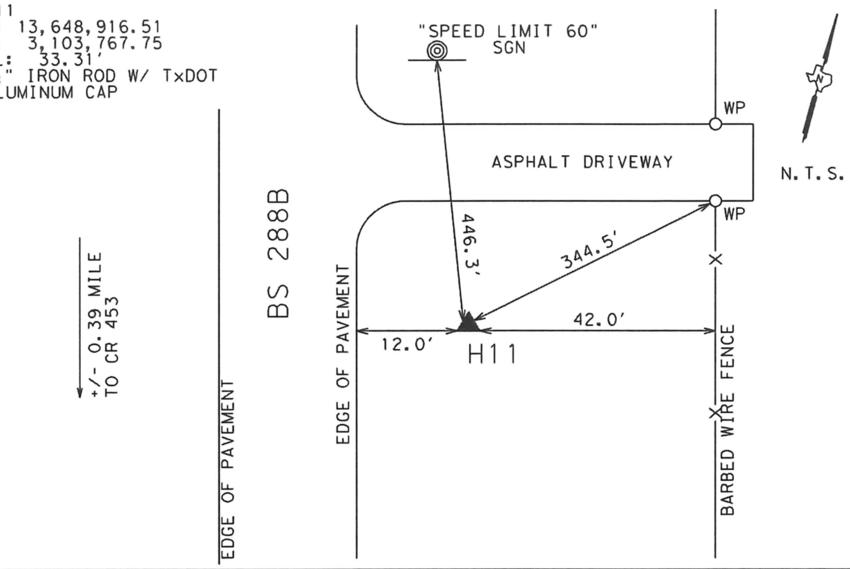
FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				BS 288B
DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	BRAZORIA	0111	09	042	86

H10
N: 13,647,938.80
E: 3,104,029.67
EL: 32.81'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



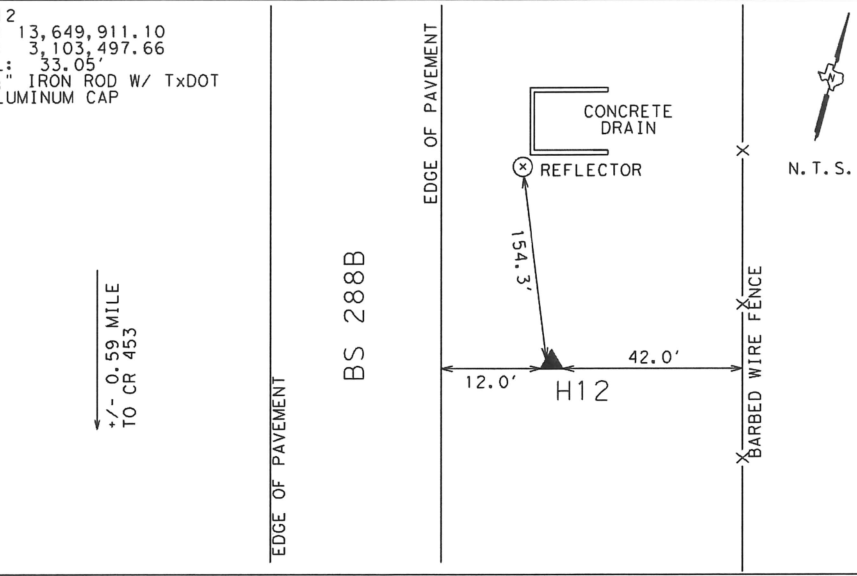
H10 is located on the northeast side of BS 288B, said point is +/- 0.20 mile northwest of the BS 288B and CR 453 intersection, 9.5 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 46.0 feet southwest of and perpendicular too barbed wire fence, 116.0 feet northeast of a power pole, and 124.0 feet northeast of a guy anchor.

H11
N: 13,648,916.51
E: 3,103,767.75
EL: 33.31'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



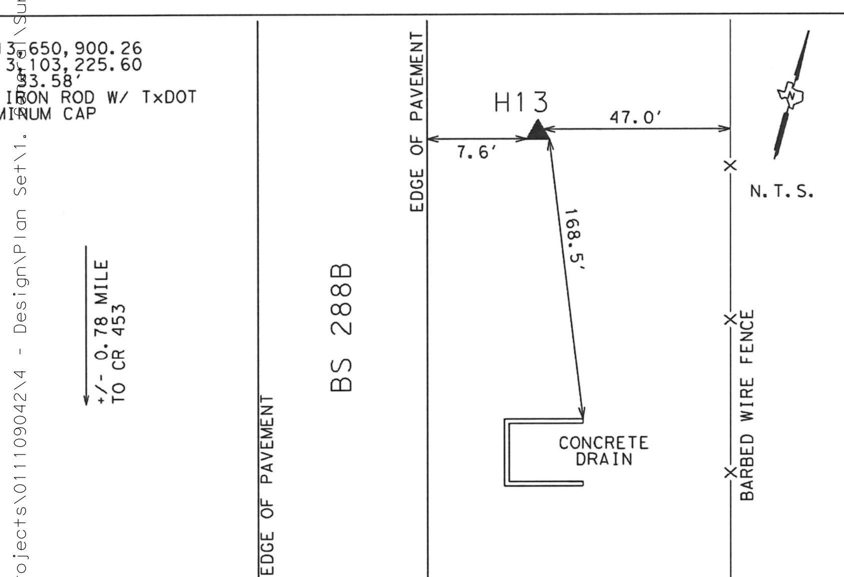
H11 is located on the northeast side of BS 288B, said point is +/- 0.39 mile northwest of the BS 288B and CR 453 intersection, 12.0 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 42.0 feet southwest of and perpendicular to a barbed wire fence, 344.5 feet southwest of a wood post, and 446.3 feet southeast of a sign that reads "Speed Limit 60".

H12
N: 13,649,911.10
E: 3,103,497.66
EL: 33.05'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



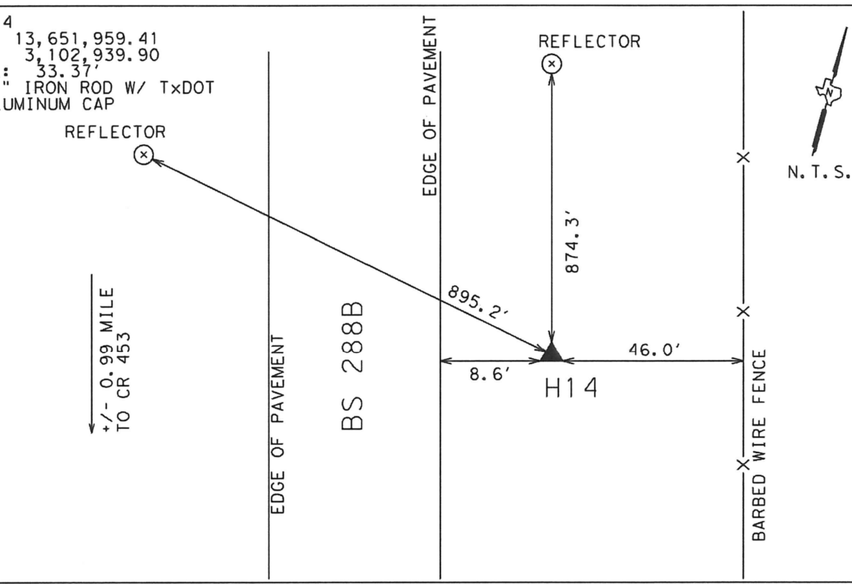
H12 is located on the northeast side of BS 288B, said point is +/- 0.59 mile northwest of the BS 288B and CR 453 intersection, 12.0 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 42.0 feet southwest of and perpendicular to a barbed wire fence, and 154.3 feet southeast of a reflector.

H13
N: 13,650,900.26
E: 3,103,225.60
EL: 33.58'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



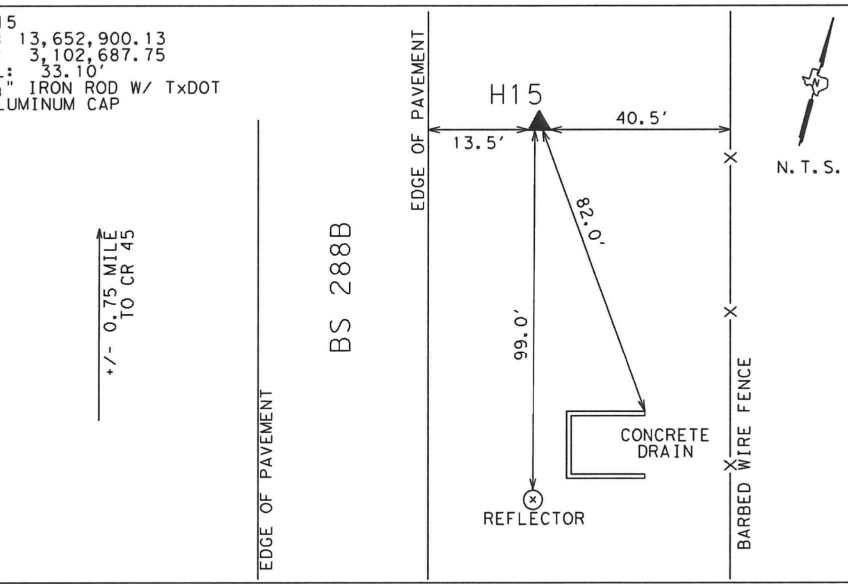
H13 is located on the northeast side of BS 288B, said point is +/- 0.78 mile northwest of the BS 288B and CR 453 intersection, 7.6 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 47.0 feet southwest of and perpendicular to a barbed wire fence, and 168.5 feet northwest of the north corner of a concrete drainage structure.

H14
N: 13,651,959.41
E: 3,102,939.90
EL: 33.37'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



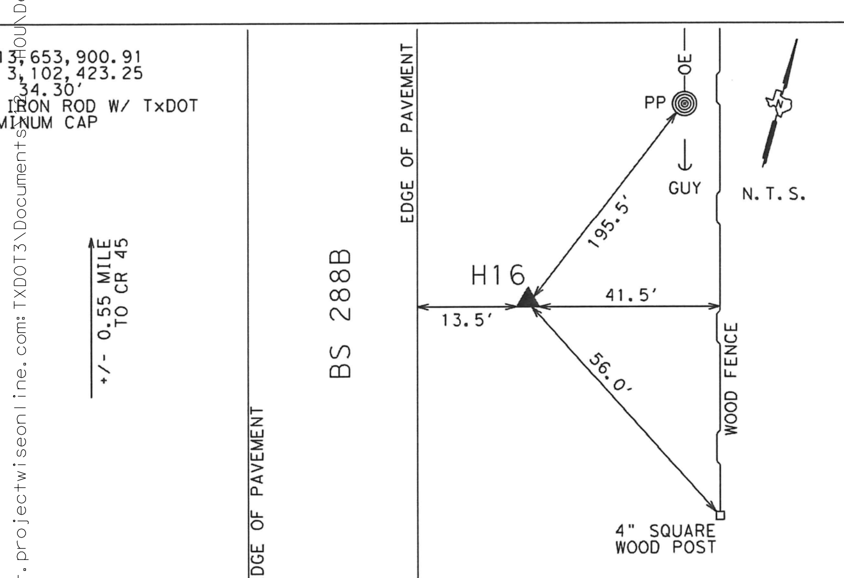
H14 is located on the northeast side of BS 288B, said point is +/- 0.99 mile northwest of the BS 288B and CR 453 intersection, 8.6 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 46.0 feet southwest of and perpendicular to a barbed wire fence, 874.3 feet southeast of a reflector, and 895.2 feet southeast of another reflector on the southwest side of BS 288B.

H15
N: 13,652,900.13
E: 3,102,687.75
EL: 33.10'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



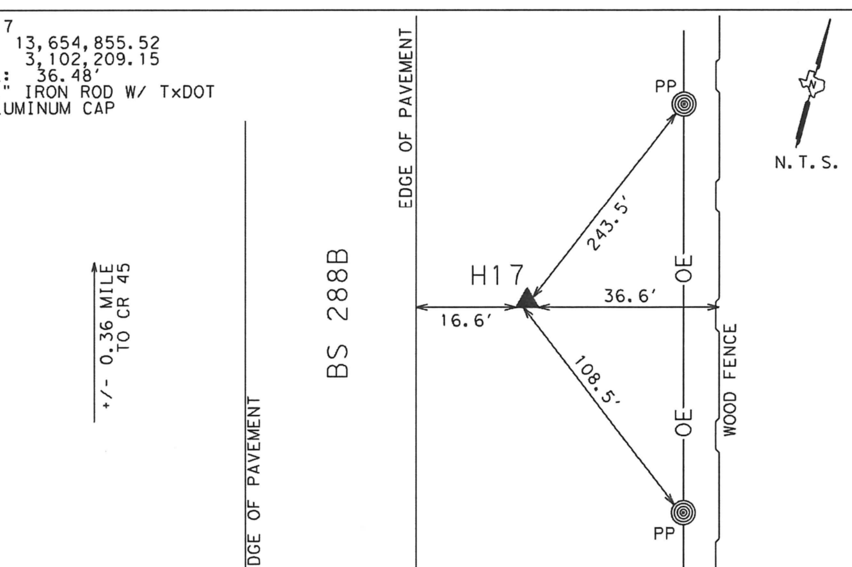
H15 is located on the northeast side of BS 288B, said point is +/- 0.75 mile southeast of the BS 288B and CR 45 intersection, 13.5 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 40.5 feet southwest of and perpendicular to a barbed wire fence, 82.0 feet northwest of the north corner of a concrete drainage structure, and 99.0 feet northwest of a reflector.

H16
N: 13,653,900.91
E: 3,102,423.25
EL: 34.30'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



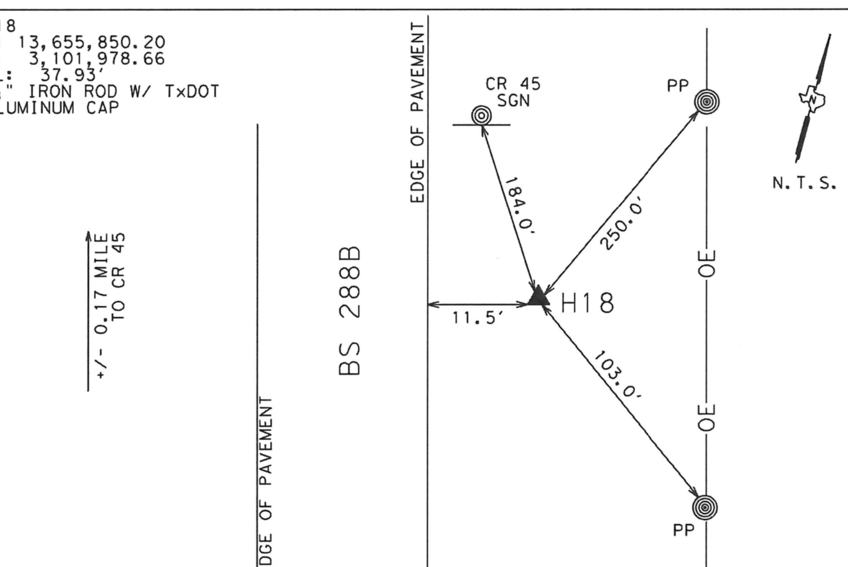
H16 is located on the northeast side of BS 288B, said point is +/- 0.55 mile southeast of the BS 288B and CR 45 intersection, 13.5 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 41.5 feet southwest of and perpendicular to a barbed wire fence, 56.0 feet northwest of a 4" square wooden post, and 195.5 feet southwest of a power pole.

H17
N: 13,654,855.52
E: 3,102,209.15
EL: 36.48'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



H17 is located on the northeast side of BS 288B, said point is +/- 0.36 mile southeast of the BS 288B and CR 45 intersection, 16.6 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 36.6 feet southwest of and perpendicular to a wood fence, 108.5 feet northwest of a power pole, and 243.5 feet southwest of another power pole.

H18
N: 13,655,850.20
E: 3,101,978.66
EL: 37.93'
5/8" IRON ROD W/ TxDOT ALUMINUM CAP



H18 is located on the northeast side of BS 288B, said point is +/- 0.17 mile southeast of the BS 288B and CR 45 intersection, 11.5 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 184.0 feet southeast of a sign that reads "CR 45", 103.0 feet northwest of a power pole, and 250.0 feet southwest of another power pole.

NOTES:

1. ALL COORDINATES AND BEARINGS SHOWN ARE BASED ON TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM (NAD)83 (2011), EPOCH 2010.00.

2. ALL COORDINATES AND DISTANCES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR OF 1.00013. UNITS: U.S. SURVEY FEET.

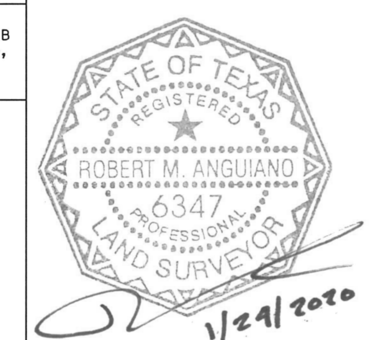
3. COORDINATES WERE DERIVED FROM STATIC AND RTK GPS OBSERVATIONS USING CORS STATIONS TXAG AND TXRS.

4. ALL ELEVATIONS SHOWN ARE BASED ON NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988, USING GEOID 12A AND WERE ESTABLISHED BY DIGITAL DIFFERENTIAL LEVELING.

5. PROJECT CONTROL POINTS WERE ESTABLISHED USING TXDOT LEVEL 2 AND 3 GPS SURVEY SPECIFICATIONS.

LEGEND

▲ SURVEY CONTROL MONUMENT



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

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

DESIGN ENGINEER — DATE

2020

Texas Department of Transportation

VICKREY & ASSOCIATES, INC.
CONSULTING ENGINEERS
CIVIL • ENVIRONMENTAL • SURVEY
12940 Country Parkway
San Antonio, TX 78216
Telephone: (210) 349-3271
TBPLS #10004100
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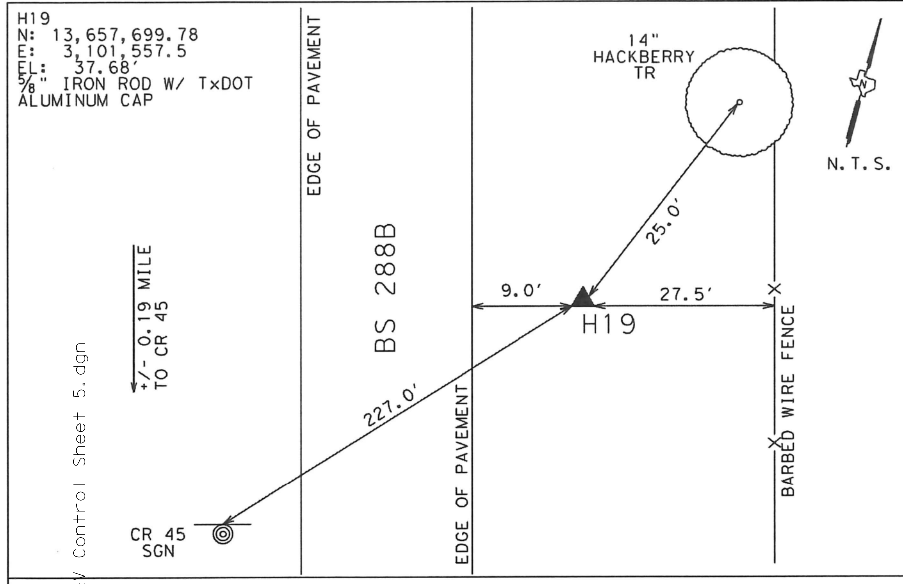
BS 288B

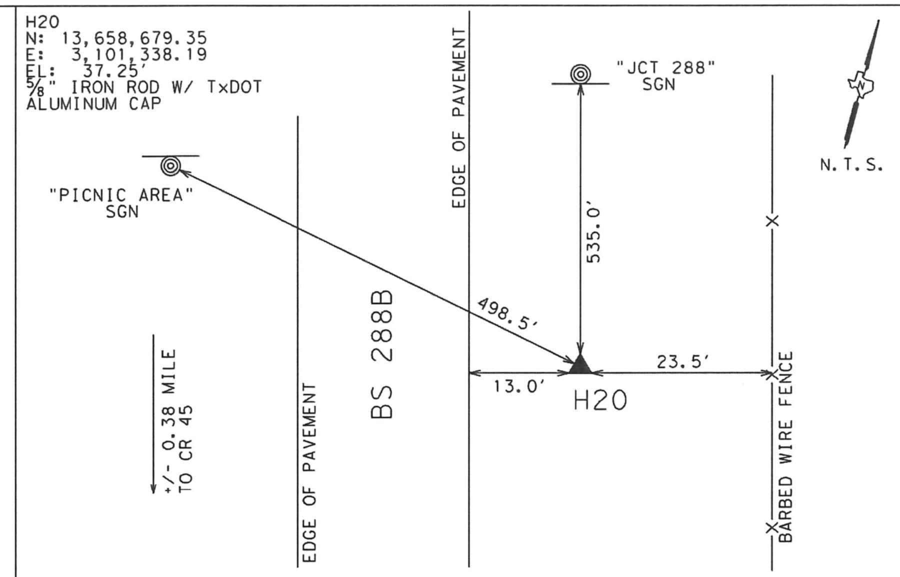
HORIZONTAL & VERTICAL CONTROL SHEET

SHEET 4 OF 6

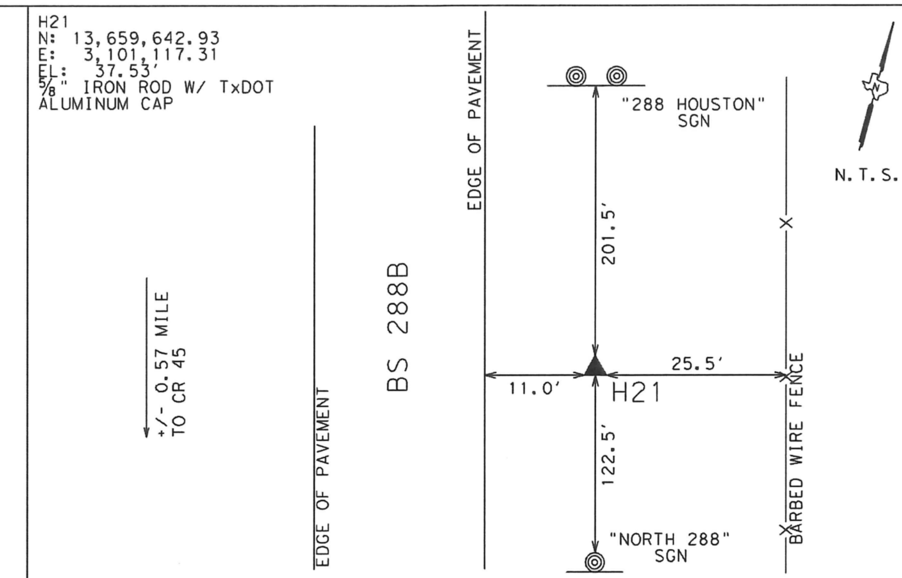
FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				BS 288B
DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	BRAZORIA	0111	09	042	87



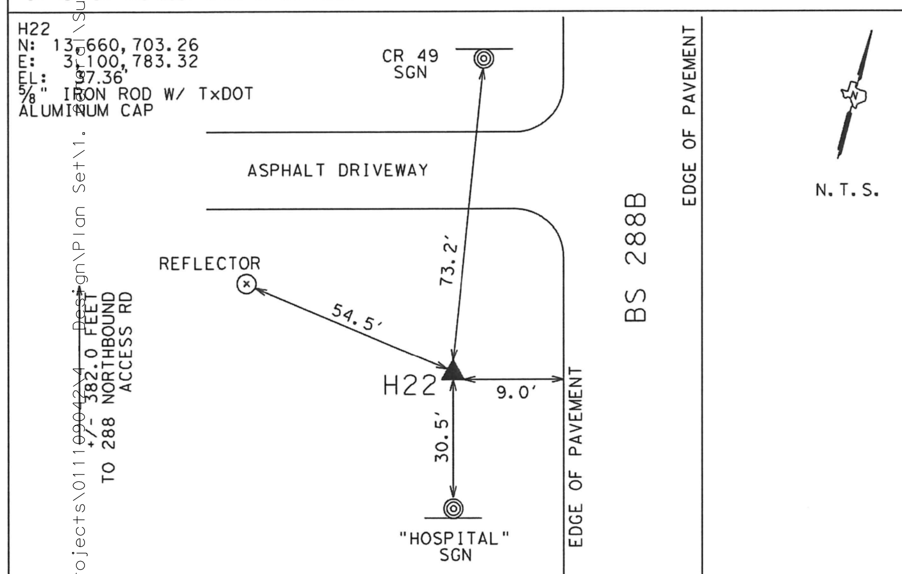
H19 is located on the northeast side of BS 288B, said point is +/- 0.19 mile northwest of the BS 288B and CR 45 intersection, 9.0 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 27.5 feet southwest of and perpendicular to a barbed wire fence, 25.0 feet southwest of a 14" hackberry tree, and 227.0 feet northeast of a sign that reads "CR 45" on the west side of BS 288B.



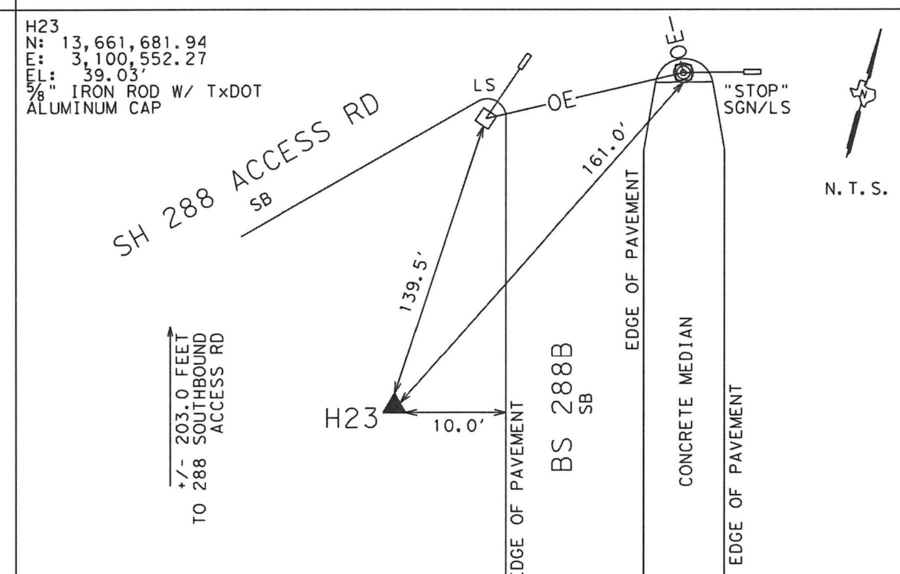
H20 is located on the northeast side of BS 288B, said point is +/- 0.38 mile northwest of the BS 288B and CR 45 intersection, 13.0 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 23.5 feet southwest of and perpendicular to a barbed wire fence, 535.0 feet southeast of a sign that reads "JCT 288", and 498.5 feet east of a sign that reads "Picnic Area" on the west side of BS 288B.



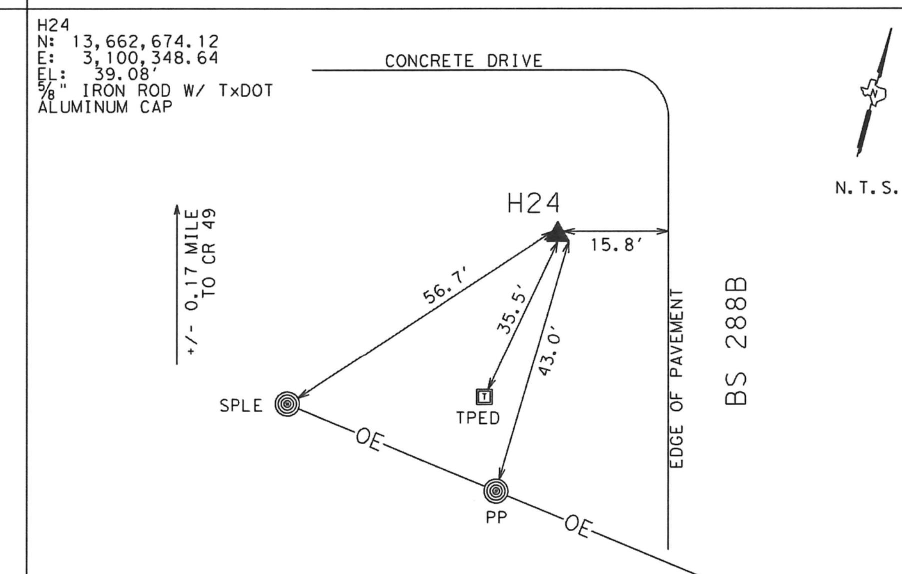
H21 is located on the northeast side of BS 288B, said point is +/- 0.57 mile northwest of the BS 288B and CR 45 intersection, 11.0 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 25.5 feet southwest of and perpendicular to a barbed wire fence, 201.5 feet southeast of a double post sign that reads "288 Houston", and 122.5 feet northwest of a sign that reads "North 288".



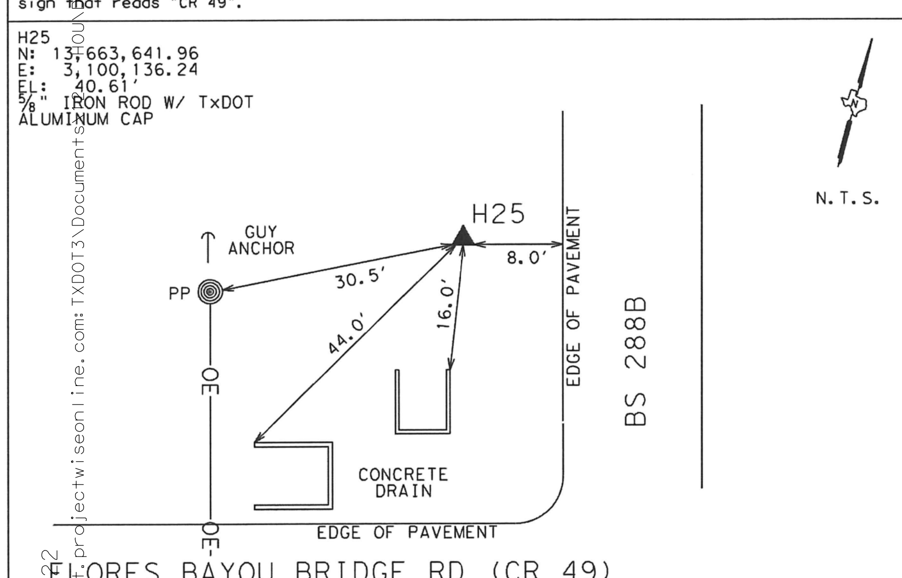
H22 is located on the southwest side of BS 288B, said point is 382.0 feet southeast of the BS 288B and the SH 288 northbound access road intersection, 9.0 feet southwest of and perpendicular to the BS 288B southwest edge of pavement, 30.5 feet northwest of a road sign that reads "Hospital", 54.5 feet southeast of a reflector, and 73.2 feet southeast of a sign that reads "CR 49".



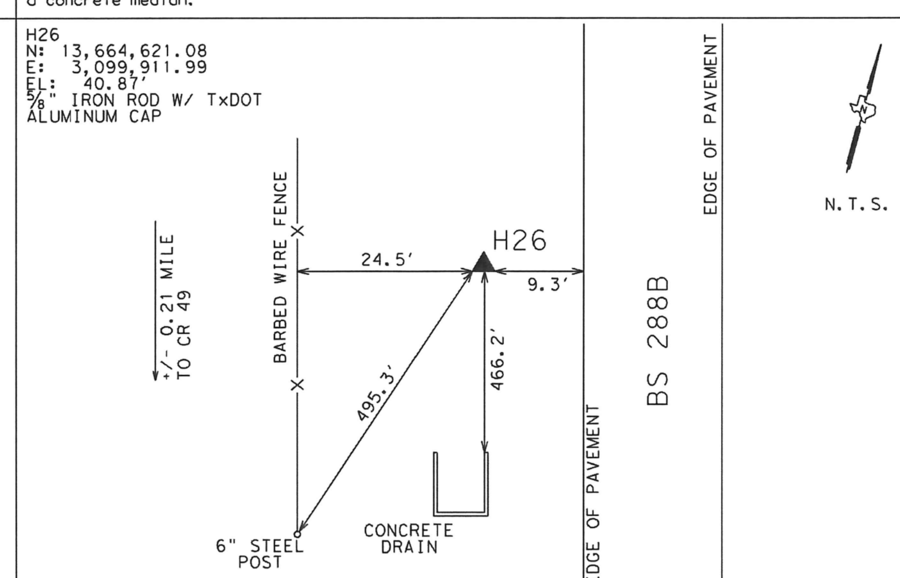
H23 is located on the southwest side of BS 288B, said point is 203.0 feet southeast of the BS 288B and the SH 288 southbound access road, 10.0 feet southwest of and perpendicular to the southbound BS 288B southwest edge of pavement, 139.5 feet southeast of a luminaire standard, and 161.0 feet southwest of a luminaire standard and stop sign at the north end of a concrete median.



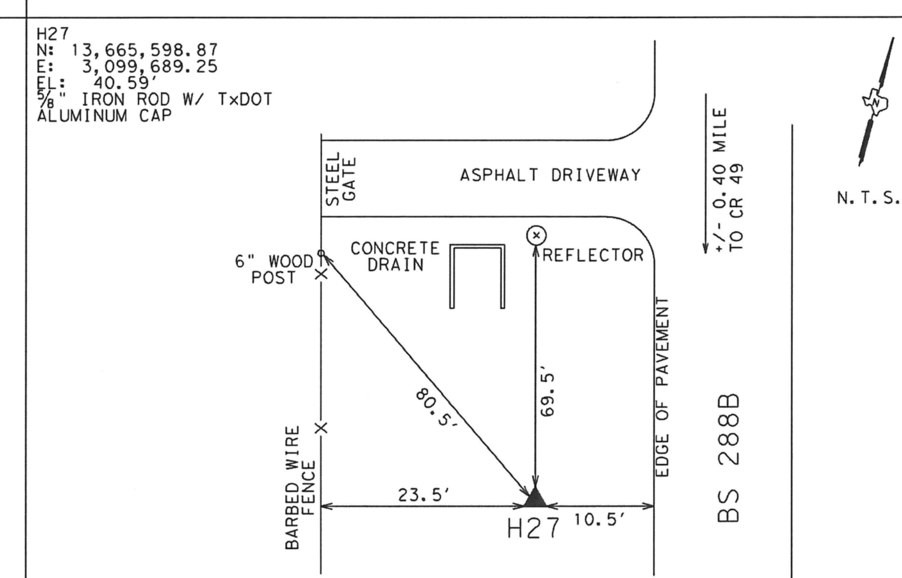
H24 is located on the southwest side of BS 288B, said point is +/- 0.17 mile southeast of the BS 288B and CR 49 intersection, 15.8 feet southwest of and perpendicular to BS 288B southwest edge of pavement, 43.0 feet northwest of a power pole, 35.5 feet north of a telephone pedestal, and 56.7 feet northeast of an electric service pole.



H25 is located at the northwest corner of the intersection of BS 288B and Flores Bayou Bridge Rd (CR 49), said point is 8.0 feet southwest of and perpendicular to the BS 288B southwest edge of pavement, 16.0 feet northwest of the north corner of a concrete drain, 44.0 feet northeast of the west corner of a more southerly concrete drain, and 30.5 feet northeast of a power pole.



H26 is located on the southwest side of BS 288B, said point is +/- 0.21 mile northwest of the BS 288B and CR 49 intersection, 9.3 feet southwest of and perpendicular to BS 288B southwest edge of pavement, 24.5 feet northeast of and perpendicular to a barbed wire fence, 495.3 feet northeast of a 6" steel fence post, 466.2 feet northwest of the north corner of a concrete drain.



H27 is located on the southwest side of BS 288B, said point is +/- 0.40 mile northwest of the BS 288B and CR 49 intersection, 10.5 feet southwest of and perpendicular to the BS 288B southwest edge of pavement, 23.5 feet northeast of and perpendicular to a barbed wire fence, 80.5 feet southeast of a 6" wood fence post, and 69.5 feet southeast of a reflector.

NOTES:

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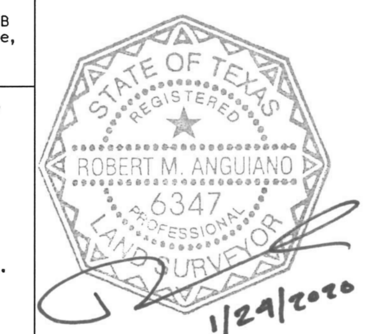
5. PROJECT CONTROL POINTS WERE ESTABLISHED USING TXDOT LEVEL 2 AND 3 GPS SURVEY SPECIFICATIONS.

LEGEND

▲ SURVEY CONTROL MONUMENT



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DESIGN ENGINEER | DATE

2020

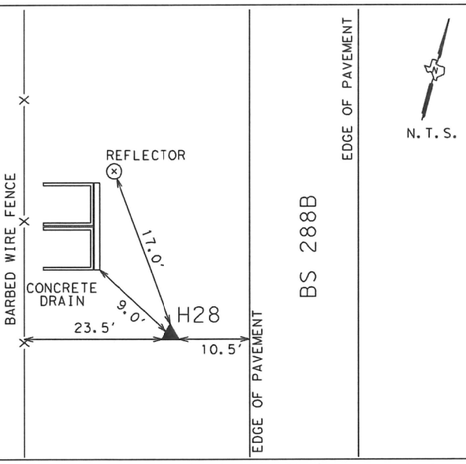
Texas Department of Transportation

VICKREY & ASSOCIATES, INC.
CONSULTING ENGINEERS
CIVIL • ENVIRONMENTAL • SURVEY
12940 Country Parkway
San Antonio, TX 78216
Telephone: (210) 349-3271
TBPLS #10004100 ©2020

BS 288B
HORIZONTAL & VERTICAL CONTROL SHEET
SHEET 5 OF 6

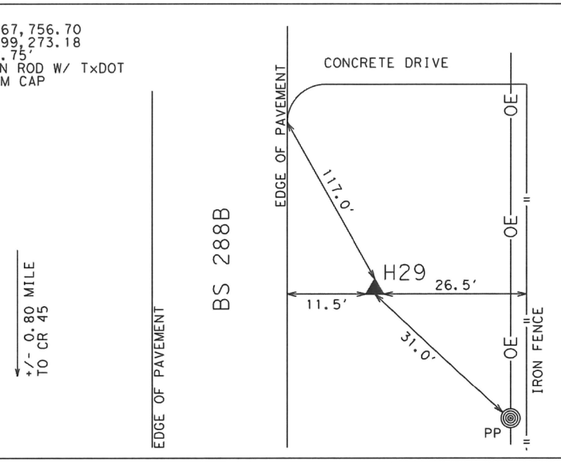
FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				BS 288B
DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	BRAZORIA	0111	09	042	88

H28
N: 13,666,572.46
E: 3,099,468.62
EL: 40.77'
⅝" IRON ROD W/ TxDOT ALUMINUM CAP



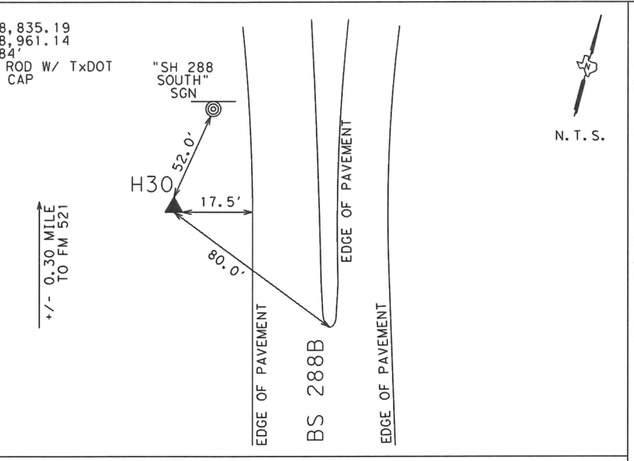
H28 is located on the southwest side of BS 288B, said point is +/- 0.59 mile northwest of the BS 288B and CR 45 intersection, 10.5 feet southwest of and perpendicular to BS 288B southwest edge of pavement, 23.5 feet northeast of and perpendicular to a barbed wire fence, 9.0 feet southeast of the east corner of a concrete headwall, and 17.0 feet southeast of a reflector.

H29
N: 13,667,756.70
E: 3,099,273.18
EL: 40.75'
⅝" IRON ROD W/ TxDOT ALUMINUM CAP



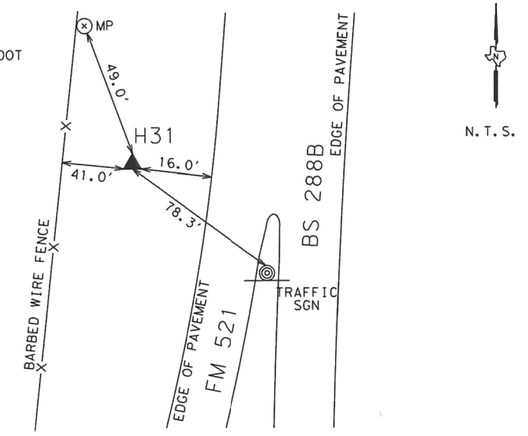
H29 is located on the northeast side of BS 288B, said point is +/- 0.80 mile northwest of the BS 288B and CR 49 intersection, 11.5 feet northeast of and perpendicular to the BS 288B northeast edge of pavement, 26.5 feet southwest of and perpendicular to a barbed wire fence, 117.0 feet southeast of the south corner of a concrete drive, and 31.0 feet northwest of a power pole.

H30
N: 13,668,835.19
E: 3,098,961.14
EL: 39.84'
⅝" IRON ROD W/ TxDOT ALUMINUM CAP



H30 is located on the southwest side of BS 288B, said point is +/- 0.30 mile southeast of the BS 288B and FM 521 intersection, 17.5 feet southwest of and perpendicular to the southbound BS 288B edge of pavement, 80.0 feet northwest of the southeast end of the grass median within BS 288B, and 52.0 feet southeast of a road sign that reads "SH 288 South".

H31
N: 13,669,817.77
E: 3,098,834.80
EL: 40.52'
⅝" IRON ROD W/ TxDOT ALUMINUM CAP



H31 is located on the northwest side of FM 521, at the BS 288B and FM 521 intersection, said point is 16.0 feet northwest of and perpendicular to the BS 288B northwest edge of pavement, 41.0 feet southeast of and perpendicular to a barbed wire fence, 78.3 feet northwest of a traffic sign in the grass median, and 49.0 feet southeast of a buried cable marker post.

NOTES:

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5. PROJECT CONTROL POINTS WERE ESTABLISHED USING TXDOT LEVEL 2 AND 3 GPS SURVEY SPECIFICATIONS.

LEGEND

▲ SURVEY CONTROL MONUMENT

STATE OF TEXAS
REGISTERED
ROBERT M. ANGUIANO
6347
PROFESSIONAL
LAND SURVEYOR
1/24/2020

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

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

DESIGN ENGINEER DATE

2020

Texas Department of Transportation

VICKREY & ASSOCIATES, INC.
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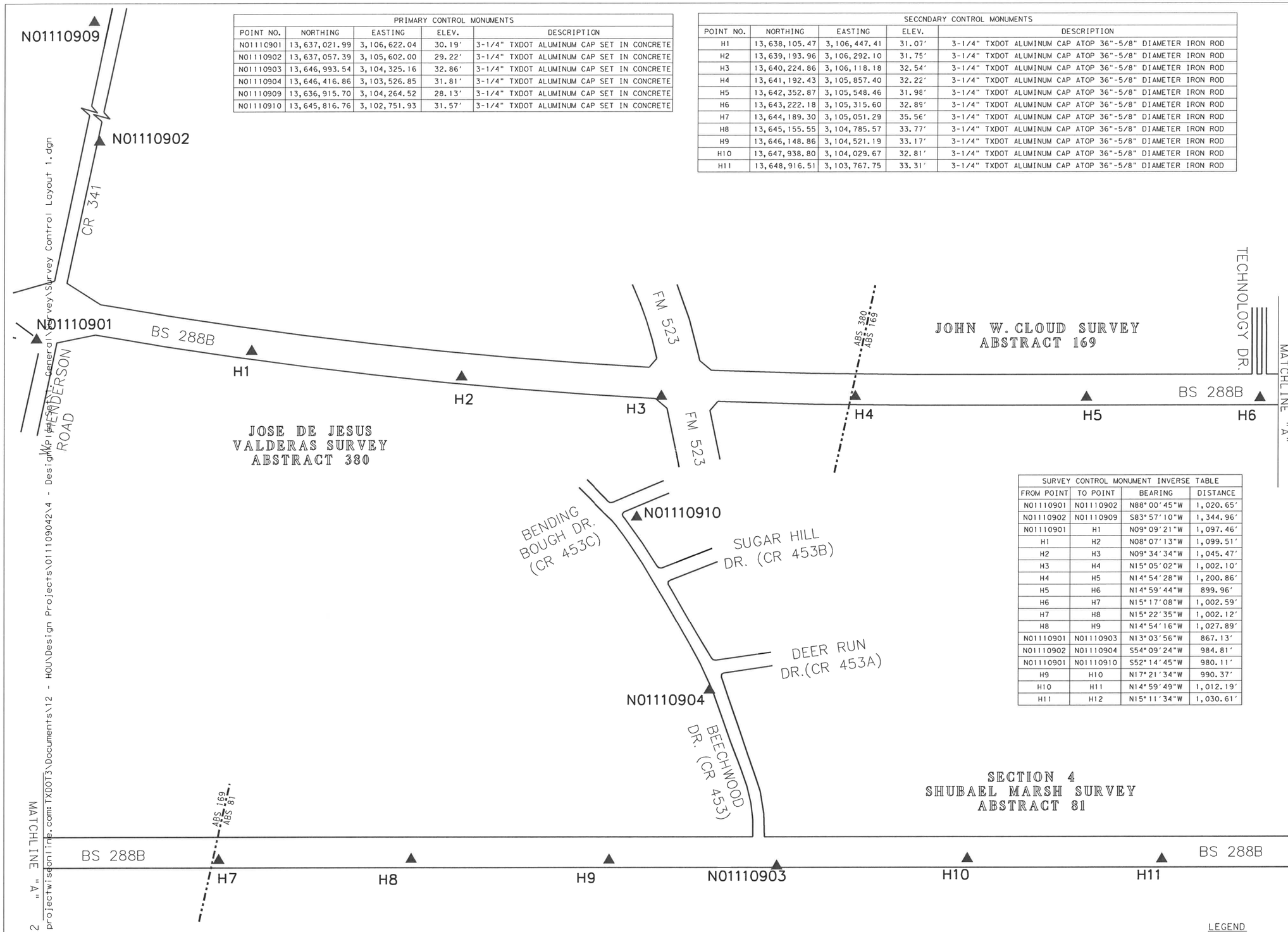
San Antonio, TX 78216
Telephone: (210) 349-3271
TBPLS #10004100

BS 288B
HORIZONTAL & VERTICAL CONTROL SHEET
SHEET 6 OF 6

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				BS 288B
DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB. NO.	SHEET NO.
HOU	BRAZORIA	0111	09	042	89

PRIMARY CONTROL MONUMENTS				
POINT NO.	NORTHING	EASTING	ELEV.	DESCRIPTION
N01110901	13,637,021.99	3,106,622.04	30.19′	3-1/4" TXDOT ALUMINUM CAP SET IN CONCRETE
N01110902	13,637,057.39	3,105,602.00	29.22′	3-1/4" TXDOT ALUMINUM CAP SET IN CONCRETE
N01110903	13,646,993.54	3,104,325.16	32.86′	3-1/4" TXDOT ALUMINUM CAP SET IN CONCRETE
N01110904	13,646,416.86	3,103,526.85	31.81′	3-1/4" TXDOT ALUMINUM CAP SET IN CONCRETE
N01110909	13,636,915.70	3,104,264.52	28.13′	3-1/4" TXDOT ALUMINUM CAP SET IN CONCRETE
N01110910	13,645,816.76	3,102,751.93	31.57′	3-1/4" TXDOT ALUMINUM CAP SET IN CONCRETE

SECCNDARY CONTROL MONUMENTS				
POINT NO.	NORTHING	EASTING	ELEV.	DESCRIPTION
H1	13,638,105.47	3,106,447.41	31.07′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H2	13,639,193.96	3,106,292.10	31.75′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H3	13,640,224.86	3,106,118.18	32.54′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H4	13,641,192.43	3,105,857.40	32.22′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H5	13,642,352.87	3,105,548.46	31.98′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H6	13,643,222.18	3,105,315.60	32.89′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H7	13,644,189.30	3,105,051.29	35.56′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H8	13,645,155.55	3,104,785.57	33.77′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H9	13,646,148.86	3,104,521.19	33.17′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H10	13,647,938.80	3,104,029.67	32.81′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H11	13,648,916.51	3,103,767.75	33.31′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD



SURVEY CONTROL MONUMENT INVERSE TABLE			
FROM POINT	TO POINT	BEARING	DISTANCE
N01110901	N01110902	N88°00′45"W	1,020.65′
N01110902	N01110909	S83°57′10"W	1,344.96′
N01110901	H1	N09°09′21"W	1,097.46′
H1	H2	N08°07′13"W	1,099.51′
H2	H3	N09°34′34"W	1,045.47′
H3	H4	N15°05′02"W	1,002.10′
H4	H5	N14°54′28"W	1,200.86′
H5	H6	N14°59′44"W	899.96′
H6	H7	N15°17′08"W	1,002.59′
H7	H8	N15°22′35"W	1,002.12′
H8	H9	N14°54′16"W	1,027.89′
N01110901	N01110903	N13°03′56"W	867.13′
N01110902	N01110904	S54°09′24"W	984.81′
N01110901	N01110910	S52°14′45"W	980.11′
H9	H10	N17°21′34"W	990.37′
H10	H11	N14°59′49"W	1,012.19′
H11	H12	N15°11′34"W	1,030.61′

LEGEND

▲ SURVEY CONTROL MONUMENT

GRAPHIC SCALE

0′ 125′ 250′ 500′

SCALE: 1"=250′ (22" x 34")
SCALE: 1"=500′ (11" x 17")

NOTES:

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2. ALL COORDINATES AND DISTANCES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR OF 1.00013. UNITS: U.S. SURVEY FEET.

3. COORDINATES WERE DERIVED FROM STATIC AND RTK GPS OBSERVATIONS USING CORS STATIONS TXAG AND TXRS.

4. ALL ELEVATIONS SHOWN ARE BASED ON NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988, USING GEOID 12A AND WERE ESTABLISHED BY DIGITAL DIFFERENTIAL LEVELING.

5. PROJECT CONTROL POINTS WERE ESTABLISHED USING TXDOT LEVEL 2 AND 3 GPS SURVEY SPECIFICATIONS.

STATE OF TEXAS
REGISTERED
ROBERT M. ANGUIANO
6347
PROFESSIONAL
LAND SURVEYOR

1/24/2020

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

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

VICKREY & ASSOCIATES, INC.
CONSULTING ENGINEERS
CIVIL • ENVIRONMENTAL • SURVEY
12940 Country Parkway
San Antonio, TX 78216
Telephone: (210) 349-3271
TBPLS #10004100

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				BS 288B
DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	BRAZORIA	0111	09	042	90

U.S. SURVEY FEET

SURVEY CONTROL LAYOUT SHEET

9/22/2022
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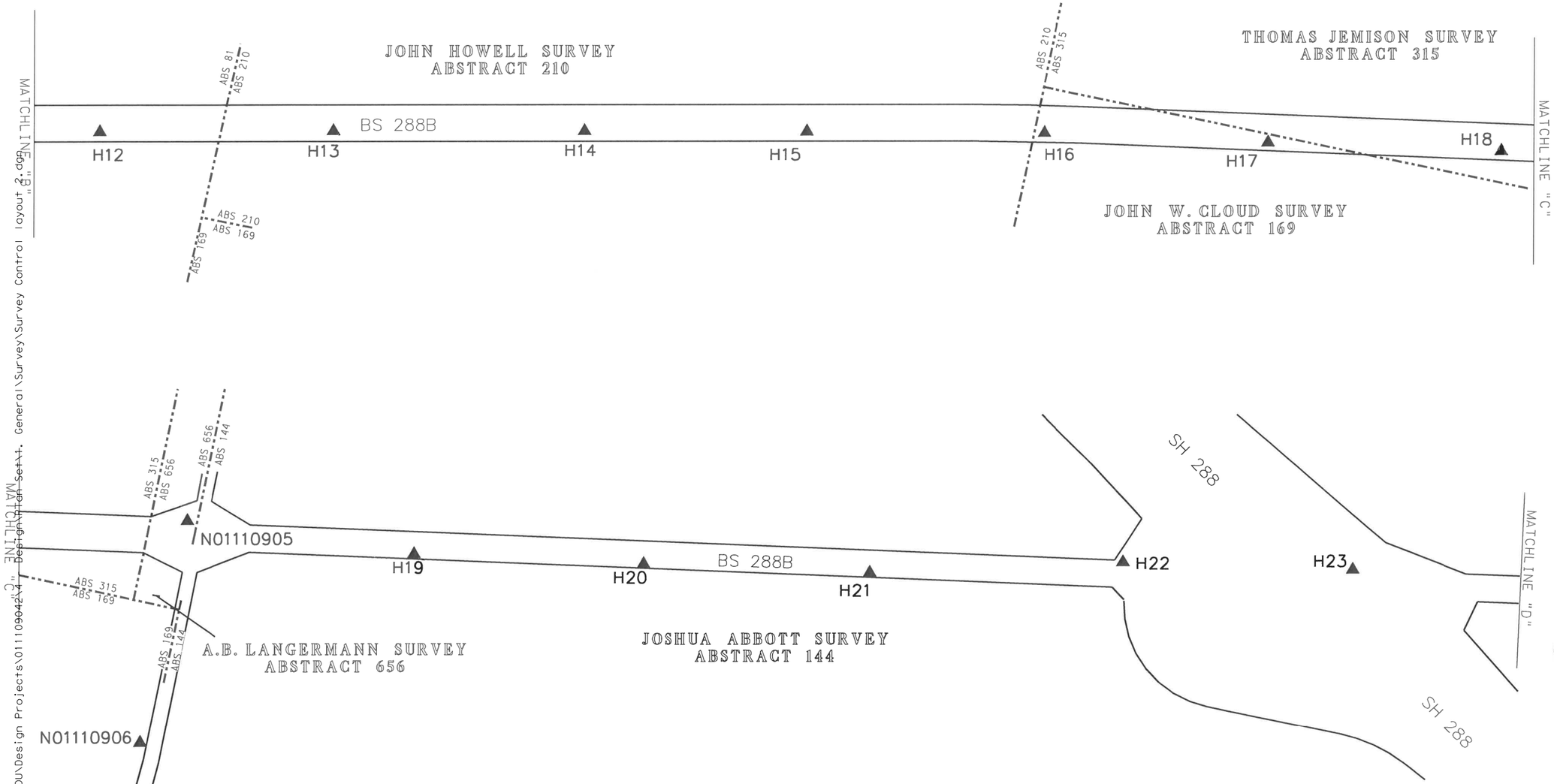

GRAPHIC SCALE
0' 125' 250' 500'
SCALE: 1"=250' (22" x 34")
SCALE: 1"=500' (11" x 17")

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PRIMARY CONTROL MONUMENTS				
POINT NO.	NORTHING	EASTING	ELEV.	DESCRIPTION
N01110905	13,656,704.51	3,101,675.49	37.56'	3-1/4" TXDOT ALUMINUM CAP SET IN CONCRETE
N01110906	13,656,760.72	3,102,671.64	36.60'	3-1/4" TXDOT ALUMINUM CAP SET IN CONCRETE
N01110911	13,656,868.68	3,103,570.12	36.18'	3-1/4" TXDOT ALUMINUM CAP SET IN CONCRETE

SECONDARY CONTROL MONUMENTS				
POINT NO.	NORTHING	EASTING	ELEV.	DESCRIPTION
H12	13,649,911.10	3,103,497.66	33.05'	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H13	13,650,900.26	3,103,225.60	33.58'	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H14	13,651,959.41	3,102,939.90	33.37'	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H15	13,652,900.13	3,102,687.75	33.10'	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H16	13,653,900.91	3,102,423.25	34.30'	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H17	13,654,855.52	3,102,209.15	36.48'	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H18	13,655,850.20	3,101,978.66	37.93'	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H19	13,657,699.78	3,101,557.52	37.68'	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H20	13,658,679.35	3,101,338.19	37.25'	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H21	13,659,642.93	3,101,117.31	37.53'	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H22	13,660,703.26	3,100,783.32	37.36'	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H23	13,661,681.94	3,100,552.27	39.03'	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD

SURVEY CONTROL MONUMENT INVERSE TABLE			
FROM POINT	TO POINT	BEARING	DISTANCE
H12	H13	N15°22'42"W	1,025.89'
H13	H14	N15°05'45"W	1,097.01'
H14	H15	N15°00'17"W	973.93'
H15	H16	N14°48'16"W	1,035.14'
H16	H17	N12°38'28"W	978.32'
H17	H18	N13°02'47"W	1,021.04'
H18	N01110905	N19°32'18"W	906.51'
N01110905	N01110906	N86°46'13"E	997.73'
N01110906	N01110911	N83°08'54"E	904.94'
N01110905	H19	N06°45'35"W	1,002.24'
H19	H20	N12°37'14"W	1,003.82'
H20	H21	N12°54'39"W	988.57'
H21	H22	N17°29'01"W	1,111.69'
H22	H23	N13°17'00"W	1,005.58'
H23	H24	N11°35'53"W	1,012.86'

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

LEGEND
▲ SURVEY CONTROL MONUMENT

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6	TEXAS				BS 288B
DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	BRAZORIA	0111	09	042	91

U.S. SURVEY FEET

SURVEY CONTROL LAYOUT SHEET

9/22/2022
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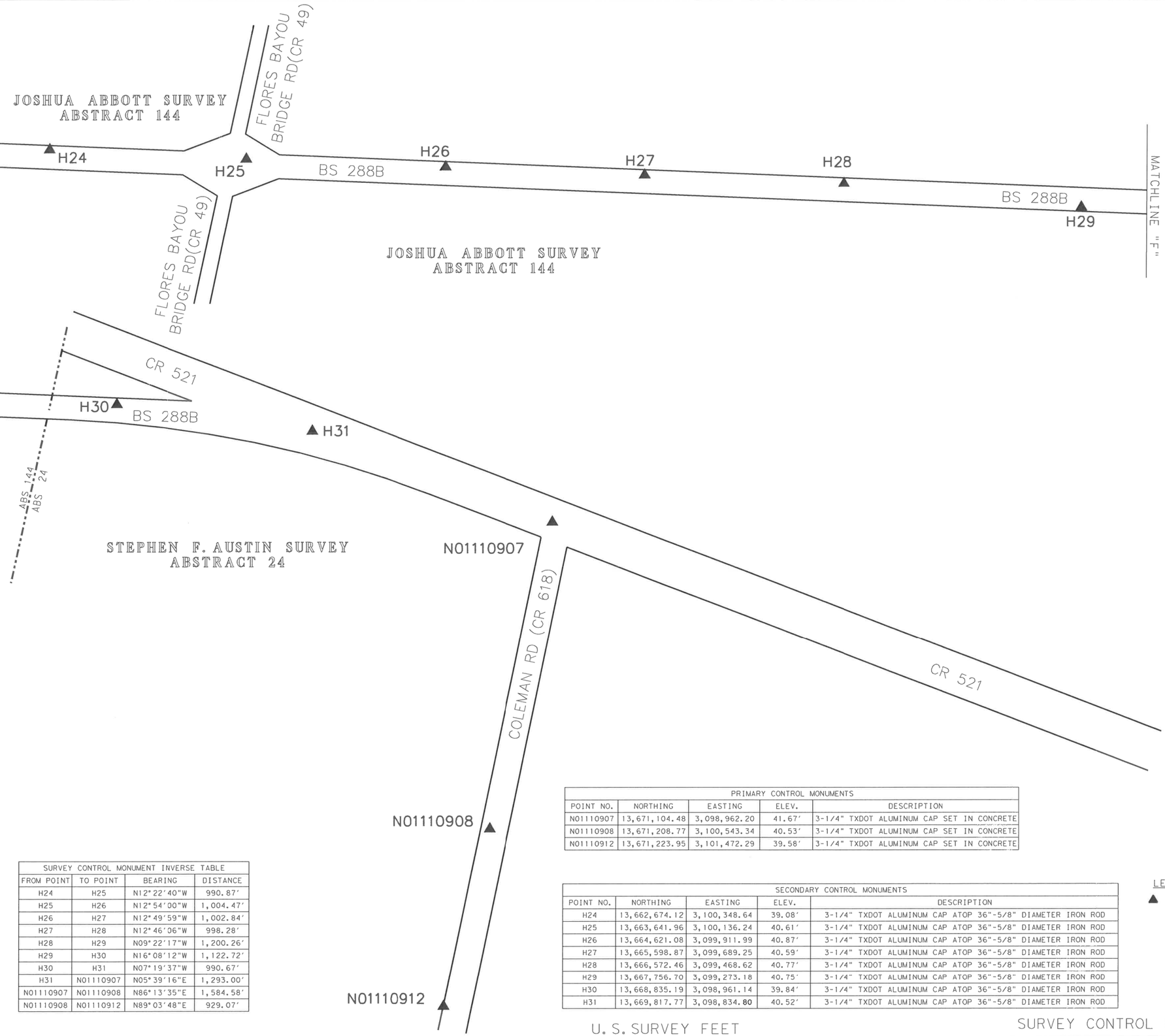

GRAPHIC SCALE

0′ 125′ 250′ 500′

SCALE: 1"=250′ (22" x 34")
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PRIMARY CONTROL MONUMENTS				
POINT NO.	NORTHING	EASTING	ELEV.	DESCRIPTION
N01110907	13,671,104.48	3,098,962.20	41.67′	3-1/4" TXDOT ALUMINUM CAP SET IN CONCRETE
N01110908	13,671,208.77	3,100,543.34	40.53′	3-1/4" TXDOT ALUMINUM CAP SET IN CONCRETE
N01110912	13,671,223.95	3,101,472.29	39.58′	3-1/4" TXDOT ALUMINUM CAP SET IN CONCRETE

SECONDARY CONTROL MONUMENTS				
POINT NO.	NORTHING	EASTING	ELEV.	DESCRIPTION
H24	13,662,674.12	3,100,348.64	39.08′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H25	13,663,641.96	3,100,136.24	40.61′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H26	13,664,621.08	3,099,911.99	40.87′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H27	13,665,598.87	3,099,689.25	40.59′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H28	13,666,572.46	3,099,468.62	40.77′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H29	13,667,756.70	3,099,273.18	40.75′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H30	13,668,835.19	3,098,961.14	39.84′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD
H31	13,669,817.77	3,098,834.80	40.52′	3-1/4" TXDOT ALUMINUM CAP ATOP 36"-5/8" DIAMETER IRON ROD

SURVEY CONTROL MONUMENT INVERSE TABLE			
FROM POINT	TO POINT	BEARING	DISTANCE
H24	H25	N12°22′40"W	990.87′
H25	H26	N12°54′00"W	1,004.47′
H26	H27	N12°49′59"W	1,002.84′
H27	H28	N12°46′06"W	998.28′
H28	H29	N09°22′17"W	1,200.26′
H29	H30	N16°08′12"W	1,122.72′
H30	H31	N07°19′37"W	990.67′
H31	N01110907	N05°39′16"E	1,293.00′
N01110907	N01110908	N86°13′35"E	1,584.58′
N01110908	N01110912	N89°03′48"E	929.07′

LEGEND

▲ SURVEY CONTROL MONUMENT

U.S. SURVEY FEET

SURVEY CONTROL LAYOUT SHEET

Texas Department of Transportation

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6	TEXAS				BS 288B
DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	BRAZORIA	0111	09	042	92

9/22/2022
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	STATION	X	Y
POT	9886.060 R1	3106582.482	13636332.321
PC	10827.433 R1	3106497.552	13637269.855
Tangential Direction:	N5.176°W		
Tangential Length:	941.373		

PC	10827.433 R1	3106497.552	13637269.855
PI	12971.300 R1	3106304.133	13639404.979
CC		3082042.361	13635054.480
PT	15104.322 R1	3105743.635	13641474.280
Radius:	24555.330		
Delta:	9.979° Left		
Degree of Curvature(Arc):	0.233°		
Length:	4276.888		
Tangent:	2143.867		
Chord:	4271.484		
Middle Ordinate:	93.056		
External:	93.410		
Tangent Back Direction:	N5.176°W		
Radial Direction:	N84.824°E		
Chord Direction:	N10.166°W		
Radial Direction:	N74.844°E		
Tangent Ahead Direction:	N15.156°W		

PT	15104.322 R1	3105743.635	13641474.280
PI	21287.709 R1	3104127.037	13647442.603
Tangential Direction:	N15.156°W		
Tangential Length:	6183.387		

PI	21287.709 R1	3104127.037	13647442.603
PC	27648.656 R1	3102464.565	13653582.460
Tangential Direction:	N15.151°W		
Tangential Length:	6360.947		

PC	27648.656 R1	3102464.565	13653582.460
PI	27885.356 R1	3102402.674	13653810.925
CC		3113525.062	13656578.750
PT	28121.989 R1	3102350.269	13654041.751
Radius:	11459.160		
Delta:	2.367° Right		
Degree of Curvature(Arc):	0.500°		
Length:	473.333		
Tangent:	236.700		
Chord:	473.299		
Middle Ordinate:	2.444		
External:	2.444		
Tangent Back Direction:	N15.158°W		
Radial Direction:	N74.842°E		
Chord Direction:	N13.974°W		
Radial Direction:	N77.209°E		
Tangent Ahead Direction:	N12.791°W		

PT	28121.989 R1	3102350.269	13654041.751
PI	30890.703 R1	3101737.705	13656741.852
Tangential Direction:	N12.782°W		
Tangential Length:	2768.714		

PI	30890.703 R1	3101737.705	13656741.852
PI	31791.444 R1	3101539.030	13657620.410
Tangential Direction:	N12.742°W		
Tangential Length:	900.742		

PI	31791.444 R1	3101539.030	13657620.410
PC	42640.004 R1	3099134.848	13668199.216
Tangential Direction:	N12.804°W		
Tangential Length:	10848.559		

PC	42640.004 R1	3099134.848	13668199.216
PI	43090.933 R1	3099034.952	13668638.941
CC		3104722.062	13669468.507
PT	43540.008 R1	3099005.075	13669088.880
Radius:	5729.578		
Delta:	9.000° Right		
Degree of Curvature(Arc):	1.000°		
Length:	900.004		
Tangent:	450.930		
Chord:	899.079		
Middle Ordinate:	17.663		
External:	17.717		
Tangent Back Direction:	N12.799°W		
Radial Direction:	N77.201°E		
Chord Direction:	N8.299°W		
Radial Direction:	N86.201°E		
Tangent Ahead Direction:	N3.799°W		

PT	43540.008 R1	3099005.075	13669088.880
PC	44360.142 R1	3098950.735	13669907.212
Tangential Direction:	N3.799°W		
Tangential Length:	820.134		

PC	44360.142 R1	3098950.735	13669907.212
PI	44819.915 R1	3098920.271	13670365.975
CC		3104667.722	13670286.838
PT	45277.722 R1	3098963.354	13670823.725
Radius:	5729.578		
Delta:	9.176° Right		
Degree of Curvature(Arc):	1.000°		
Length:	917.580		
Tangent:	459.773		
Chord:	916.600		
Middle Ordinate:	18.359		
External:	18.418		
Tangent Back Direction:	N3.799°W		
Radial Direction:	N86.201°E		
Chord Direction:	N0.789°E		
Radial Direction:	S84.623°E		
Tangent Ahead Direction:	N5.377°E		

PT	45277.722 R1	3098963.354	13670823.725
POT	45537.604 R1	3098987.706	13671082.464
Tangential Direction:	N5.377°E		
Tangential Length:	259.882		

STATE OF TEXAS
JAMIE A. H. JONES
128752
LICENSED PROFESSIONAL ENGINEER

Jamie A.H. Jones, P.E.

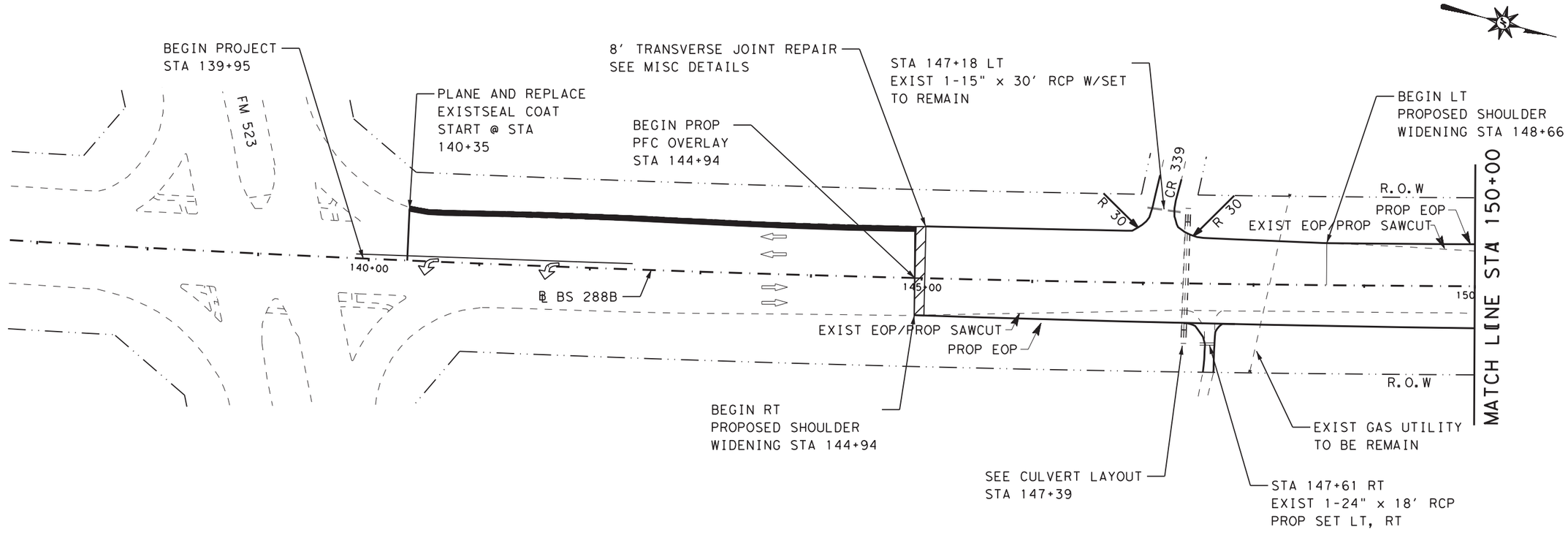
09/23/2022

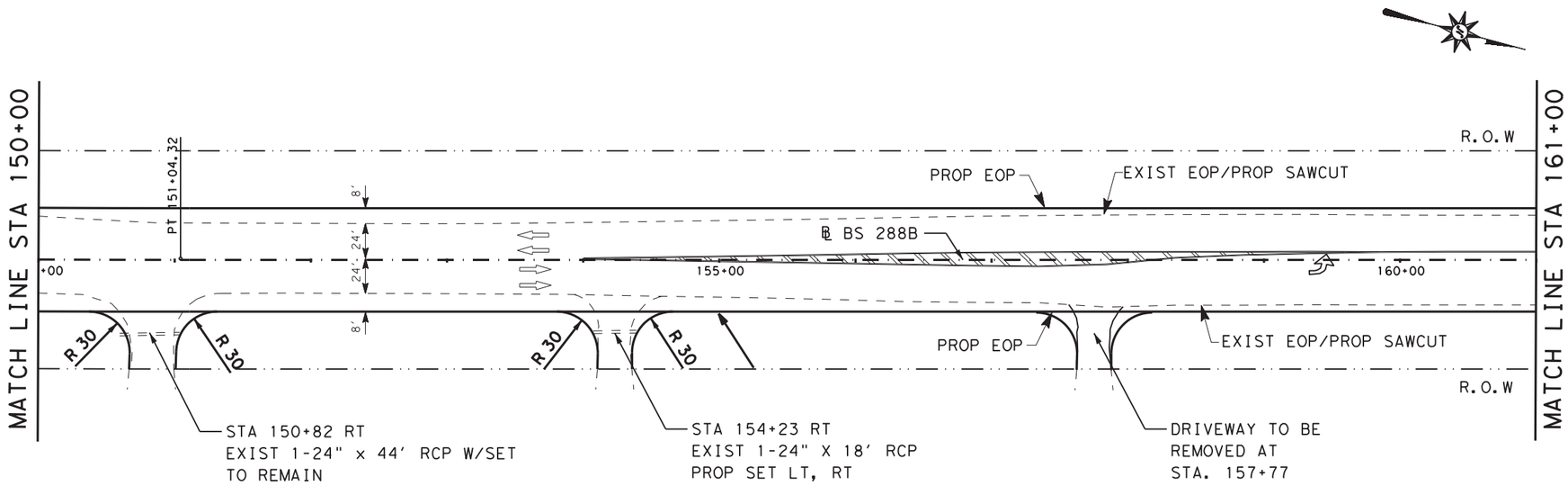
BS 288B HORIZONTAL DATA SHEET

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		93

N.T.S
SHEET 1 OF 1





SCALE 1"=100'
SHEET 1 OF 13

STATE OF TEXAS
JAMIE A. H. JONES
128752
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PROFESSIONAL ENGINEER

Jamie A.H. Jones, P.E.
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CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		94

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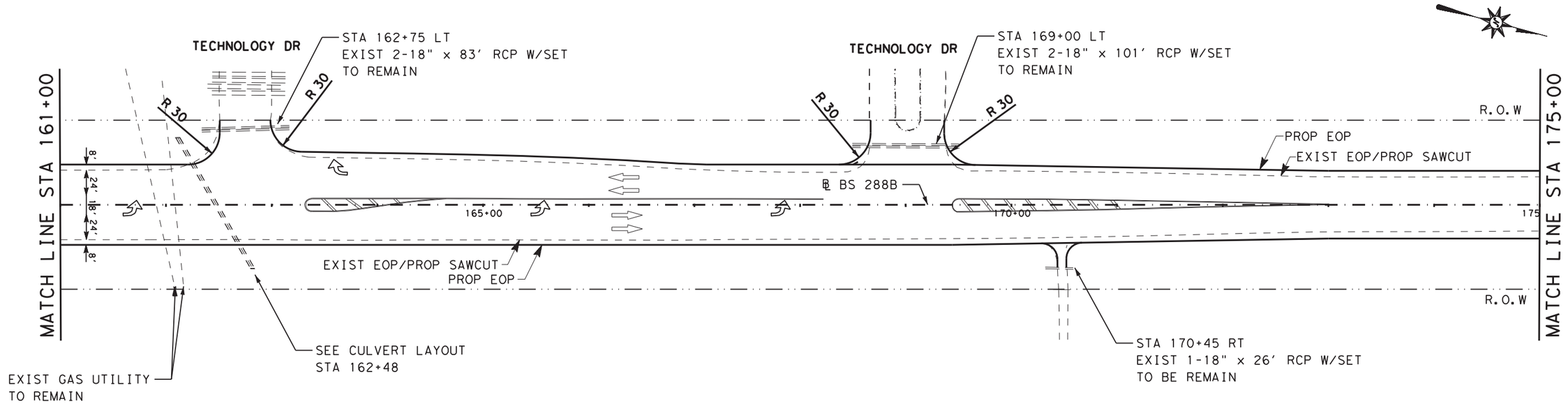

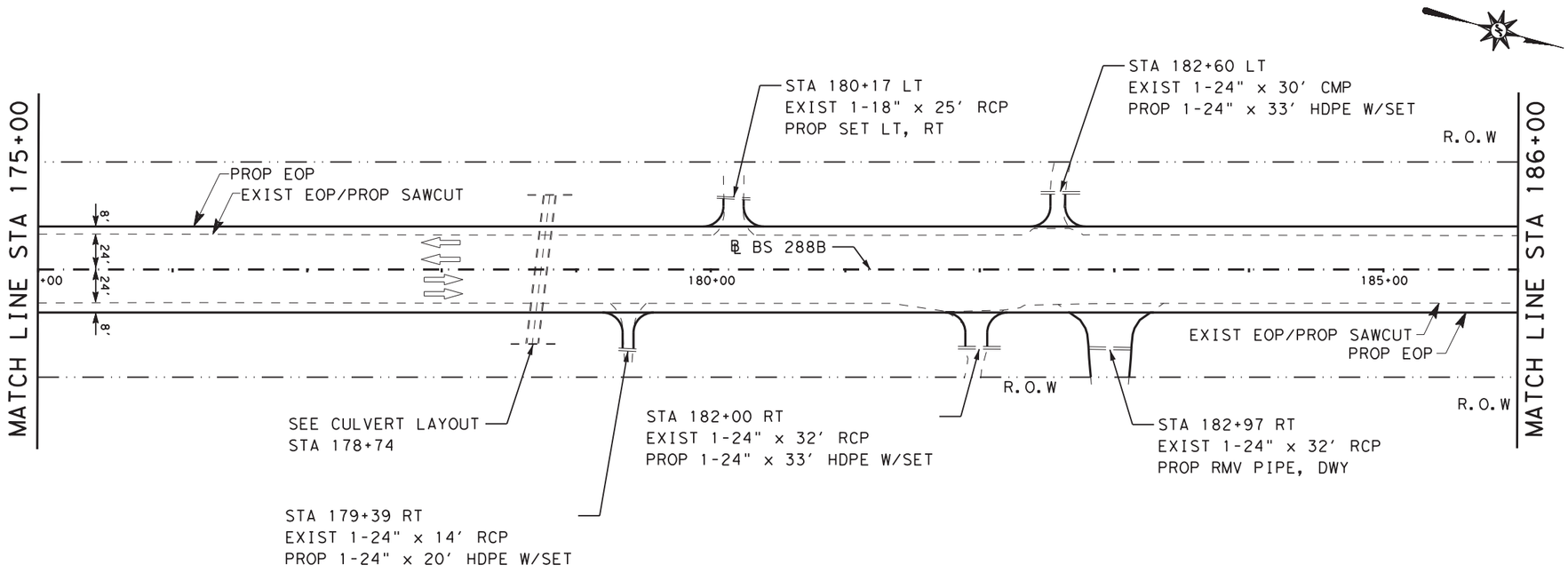

SCALE 1"=100'
SHEET 2 OF 13

STATE OF TEXAS
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CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		95

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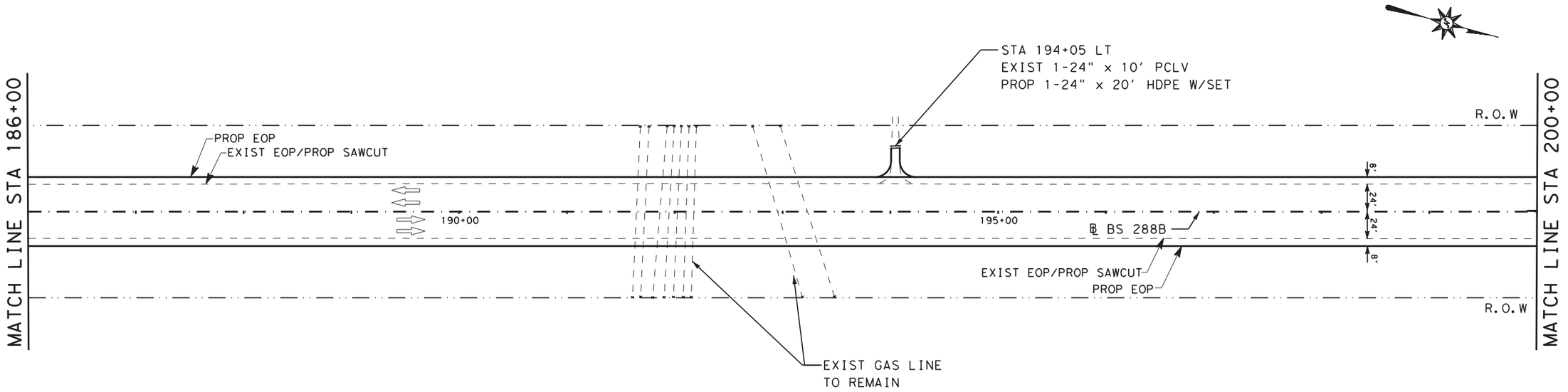

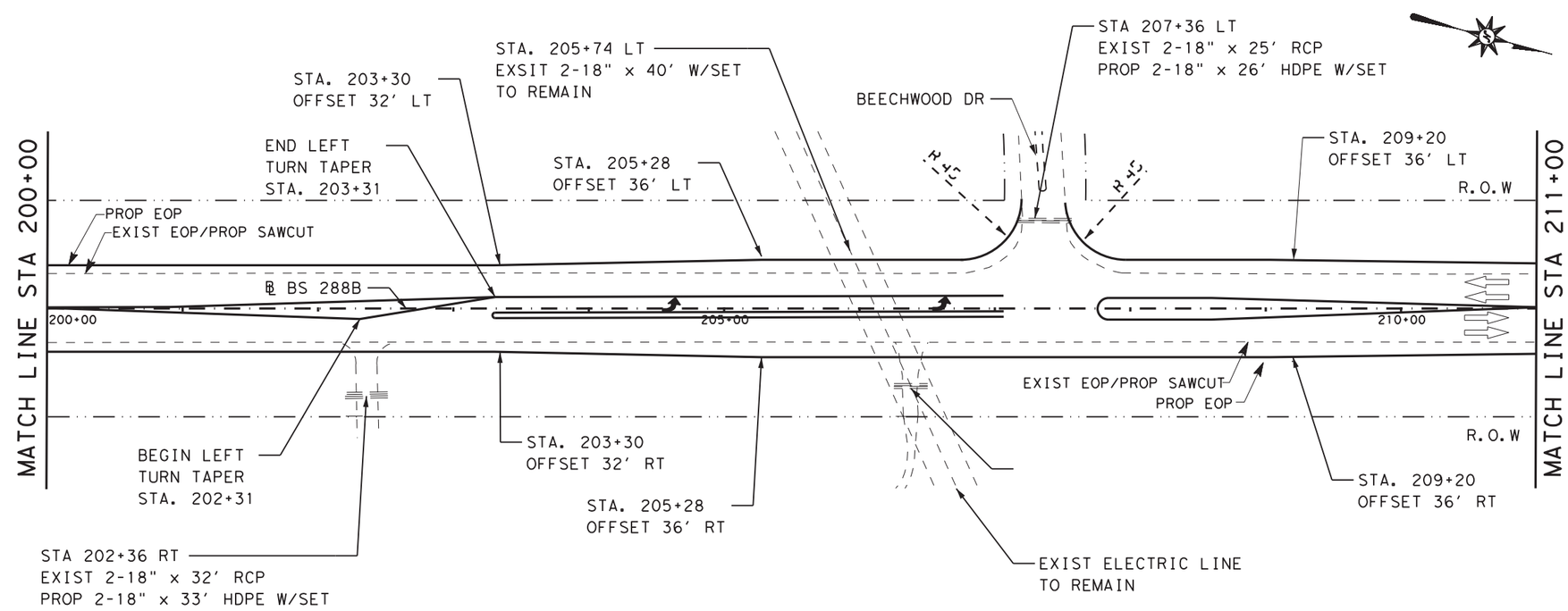

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09/29/2022

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CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		96

SCALE 1"=100'
SHEET 3 OF 13

9/29/2022
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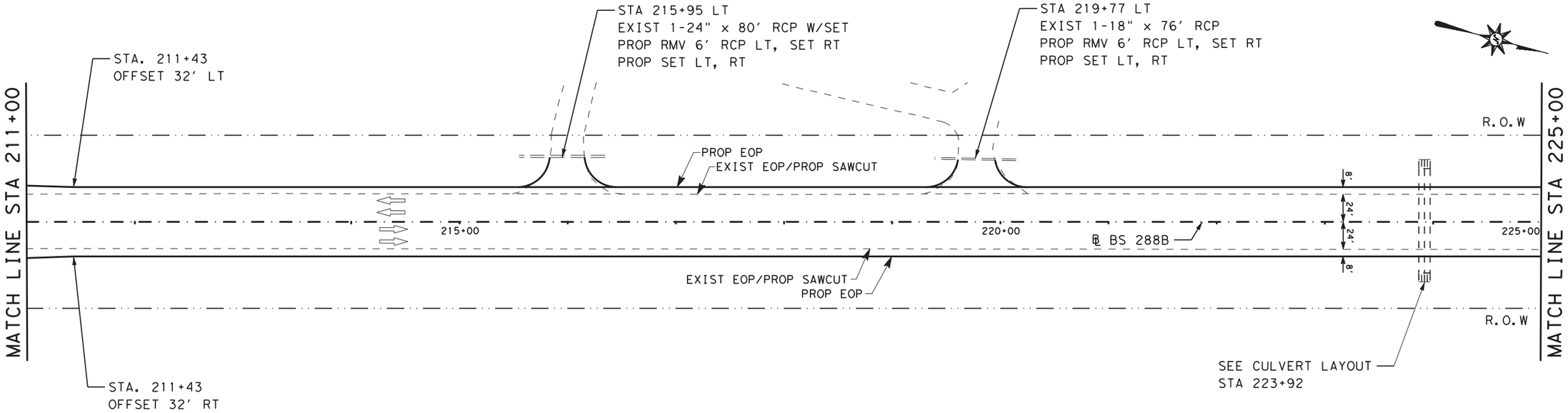

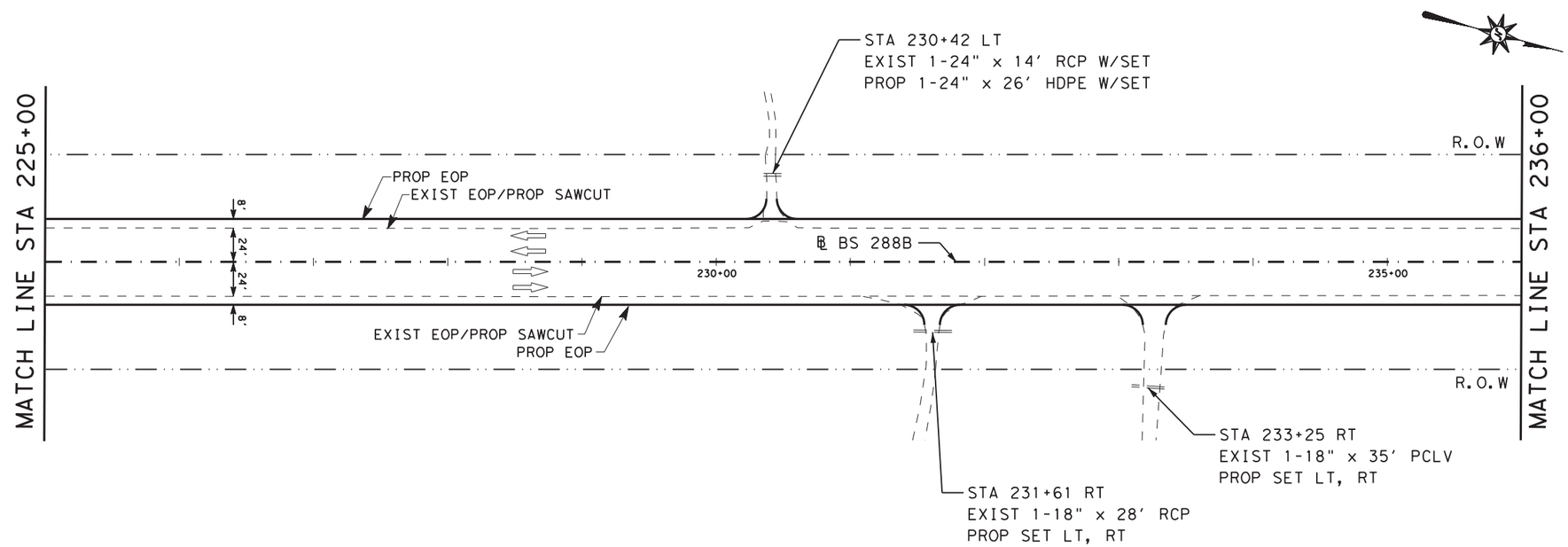

SCALE 1"=100'
SHEET 4 OF 13

STATE OF TEXAS
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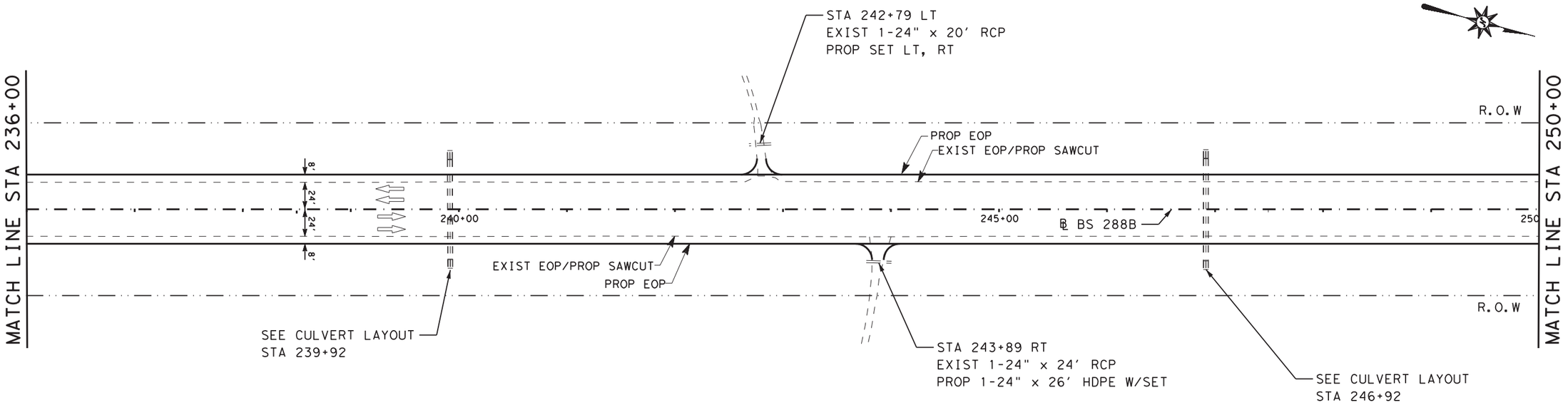
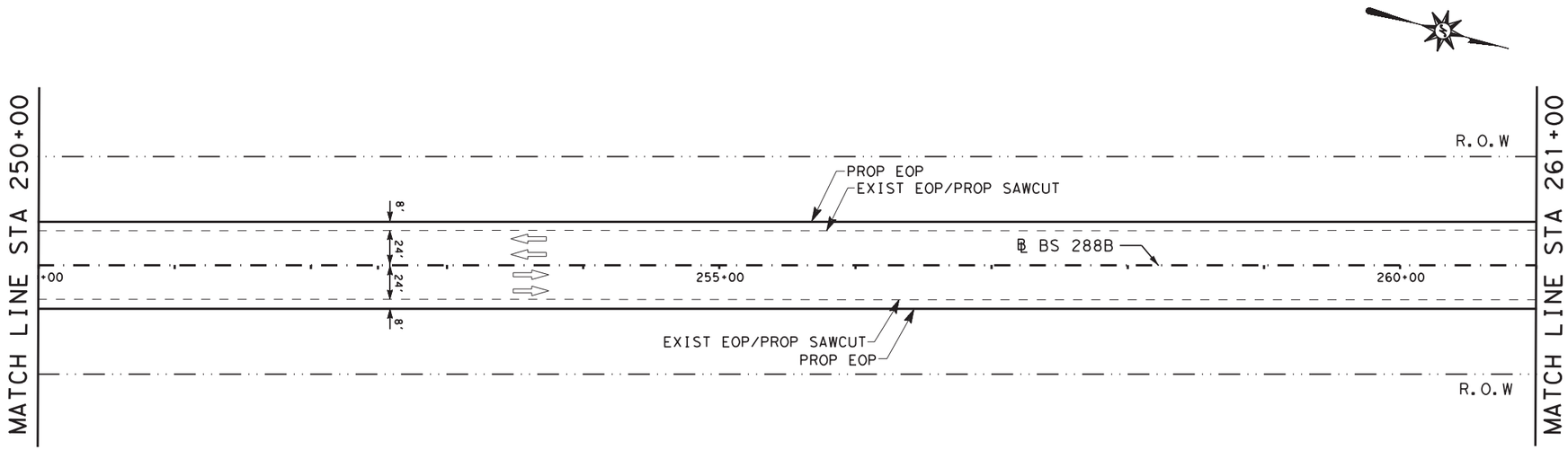
PLAN LAYOUTS

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		97





SCALE 1"=100'
SHEET 5 OF 13

STATE OF TEXAS
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128752
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Jamie A.H. Jones, P.E.
09/22/2022

PLAN LAYOUTS

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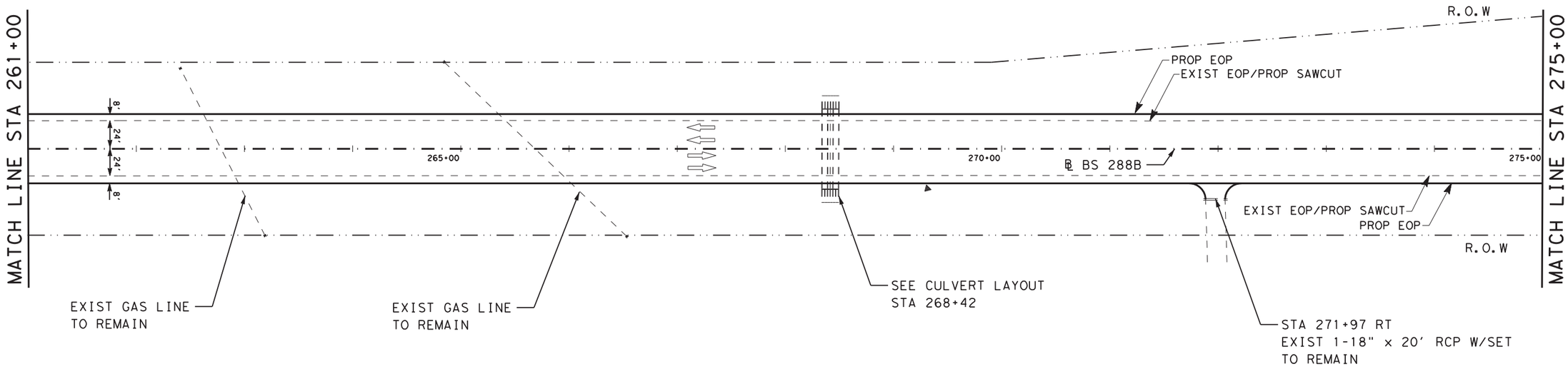
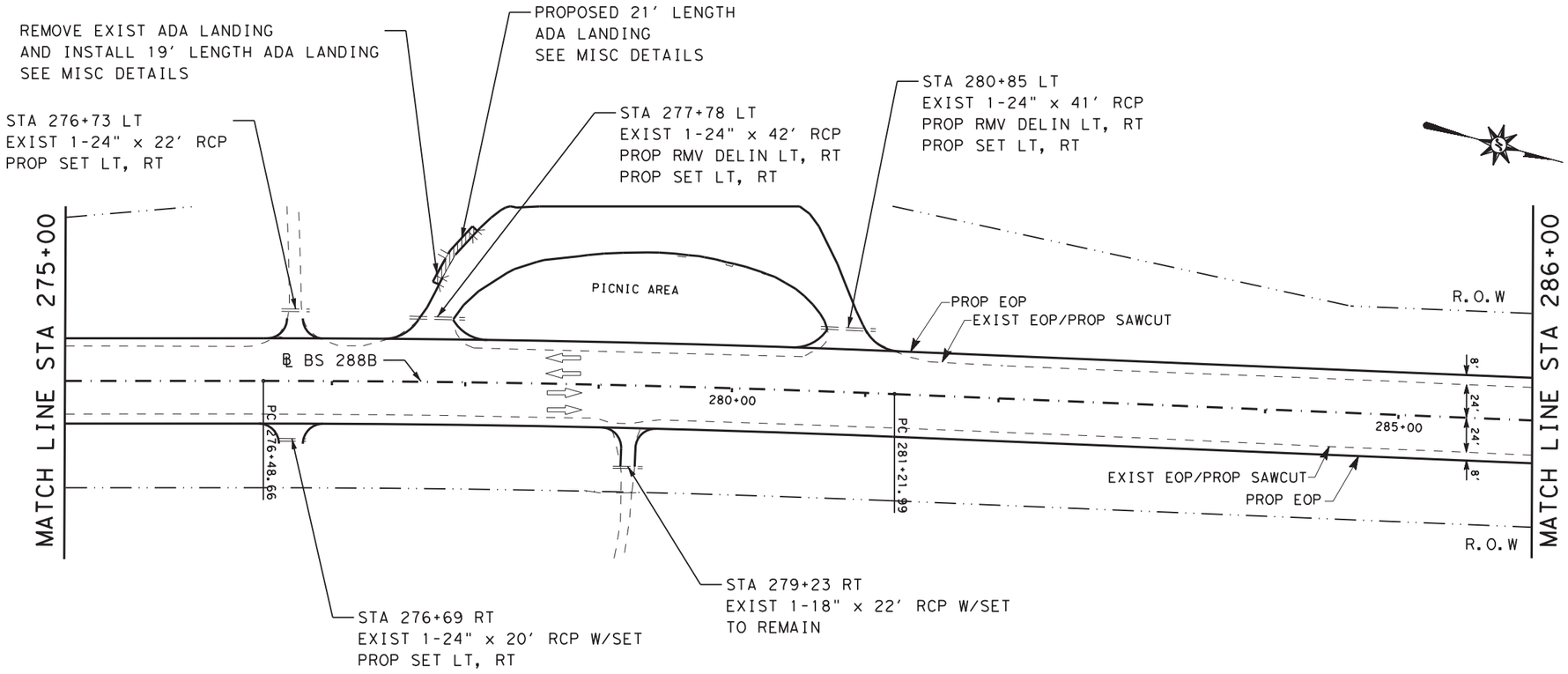
CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		98





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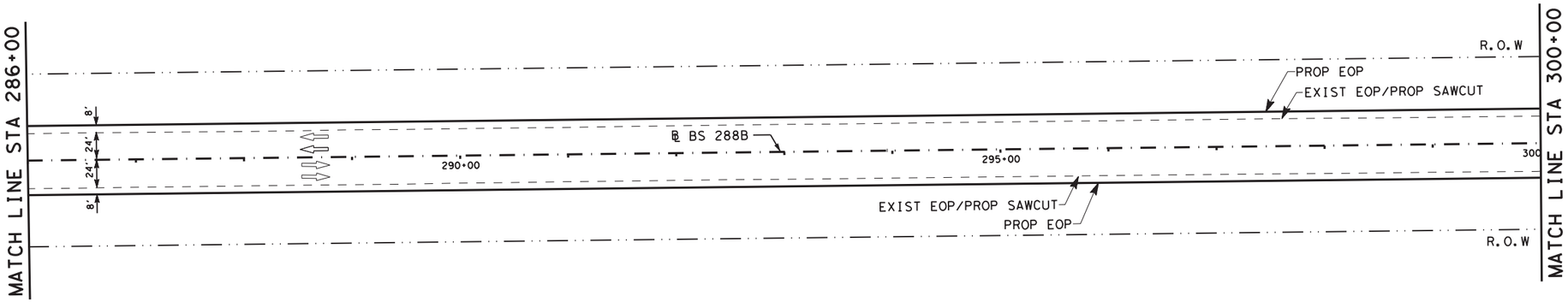
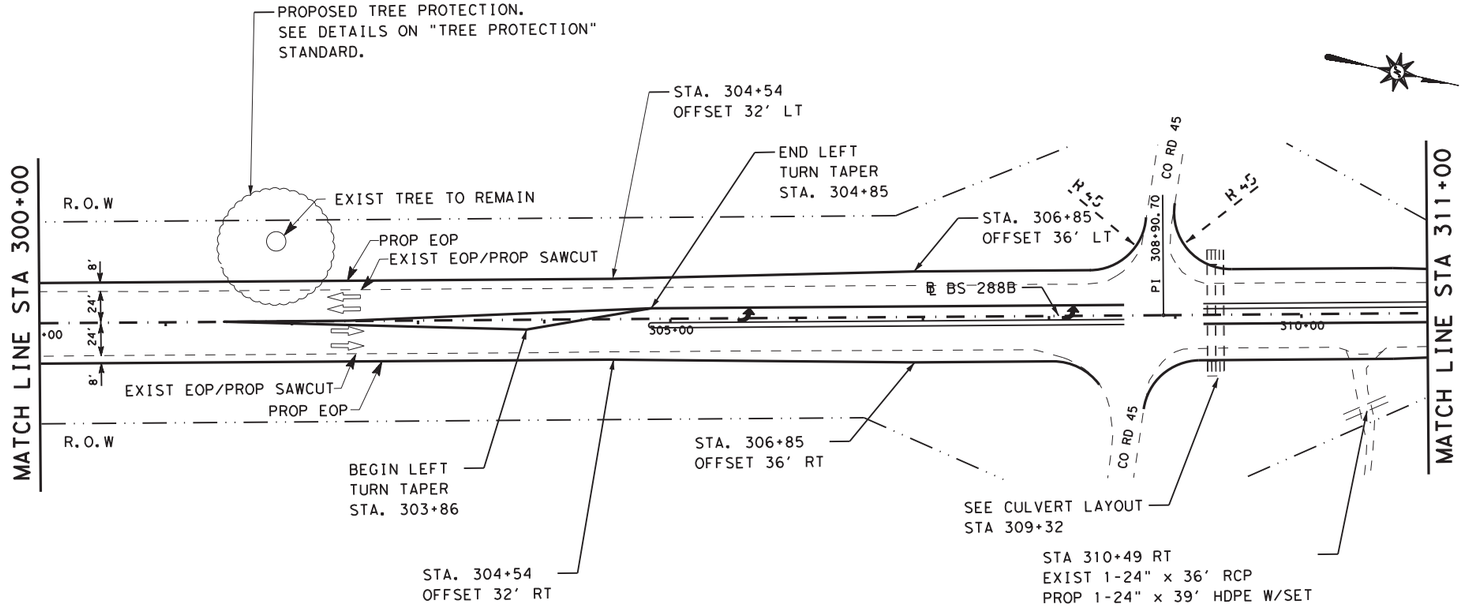
CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		99

SCALE 1"=100'
SHEET 6 OF 13





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DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		100

SCALE 1"=100'
SHEET 7 OF 13

9/28/2022
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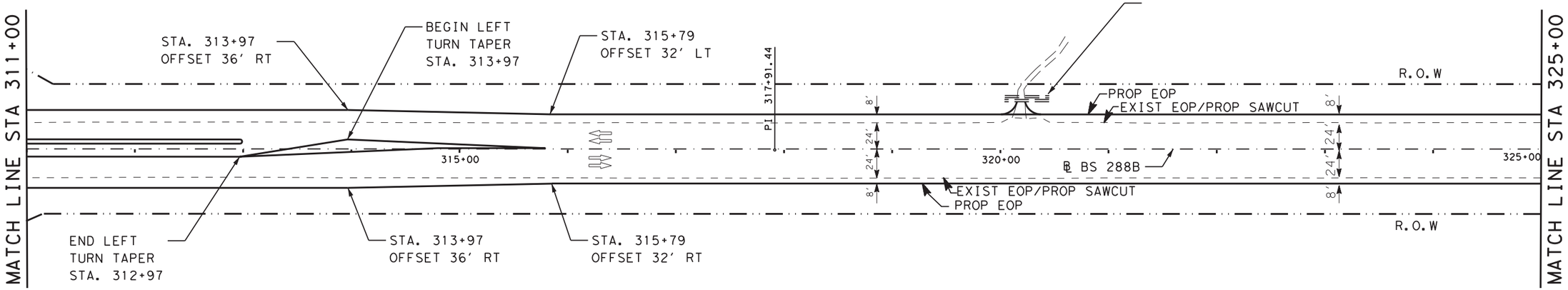

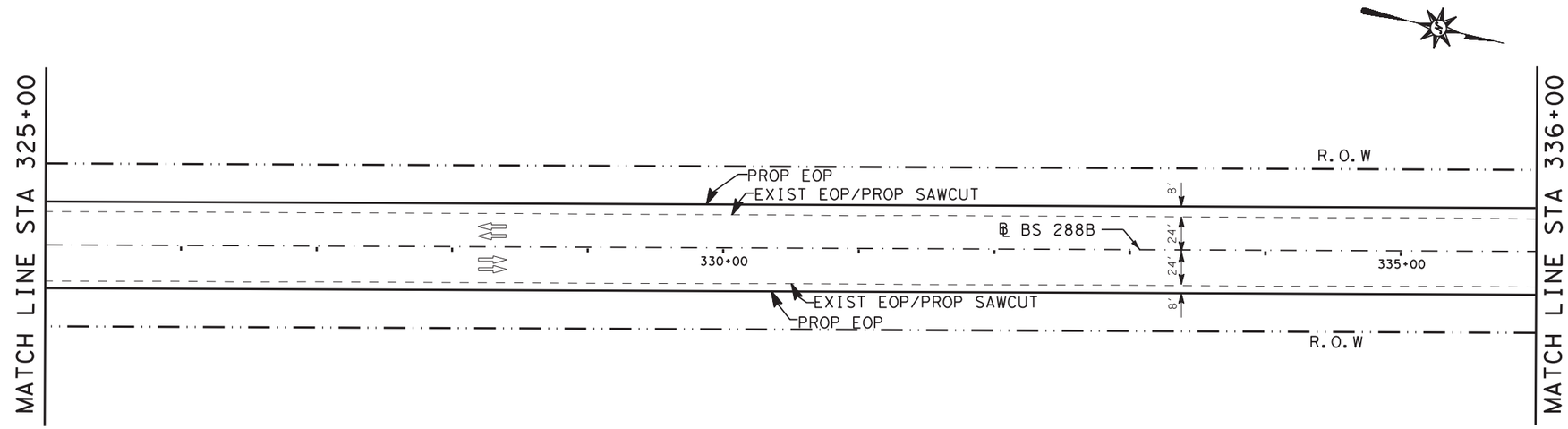

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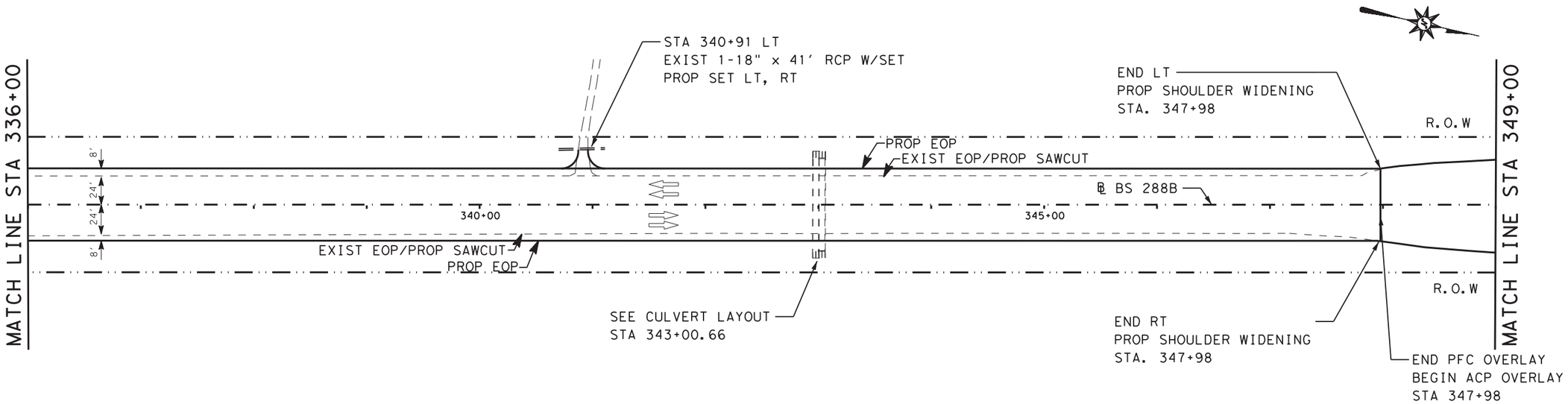
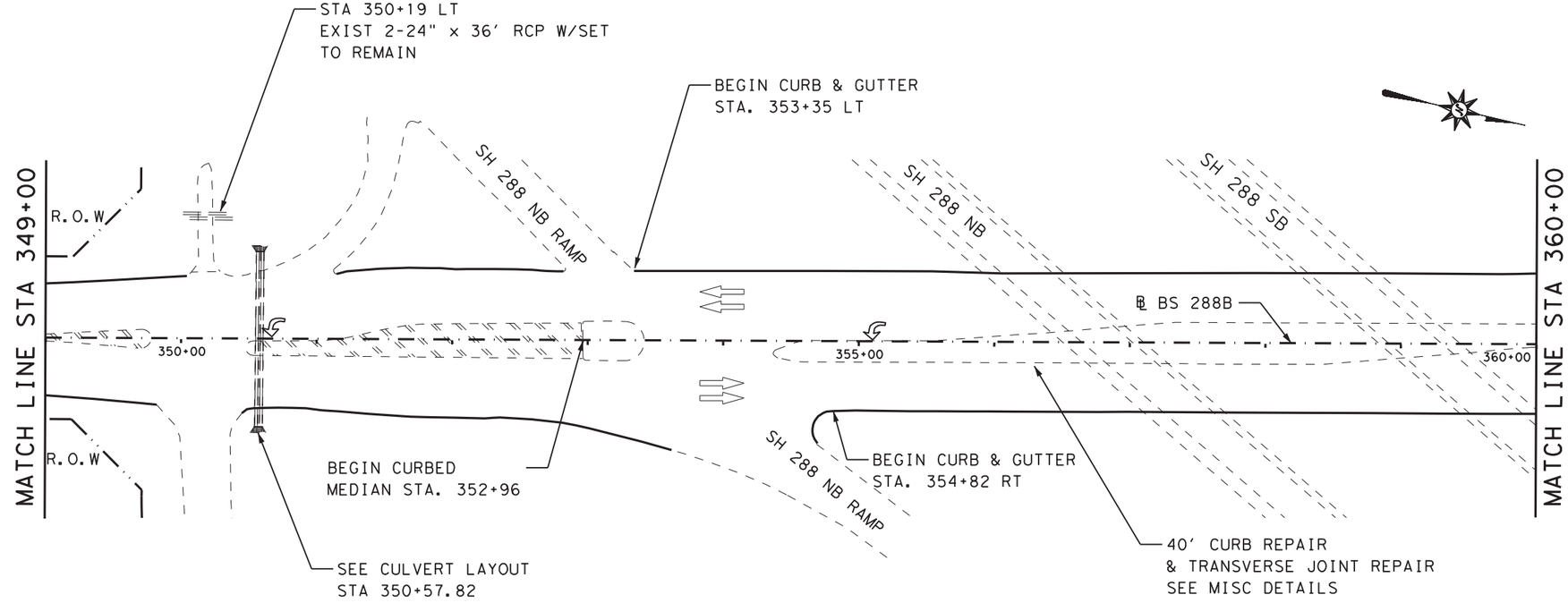
CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		101

SCALE 1"=100'
SHEET 8 OF 13





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CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		102

SCALE 1"=100'
SHEET 9 OF 13

9/29/2022
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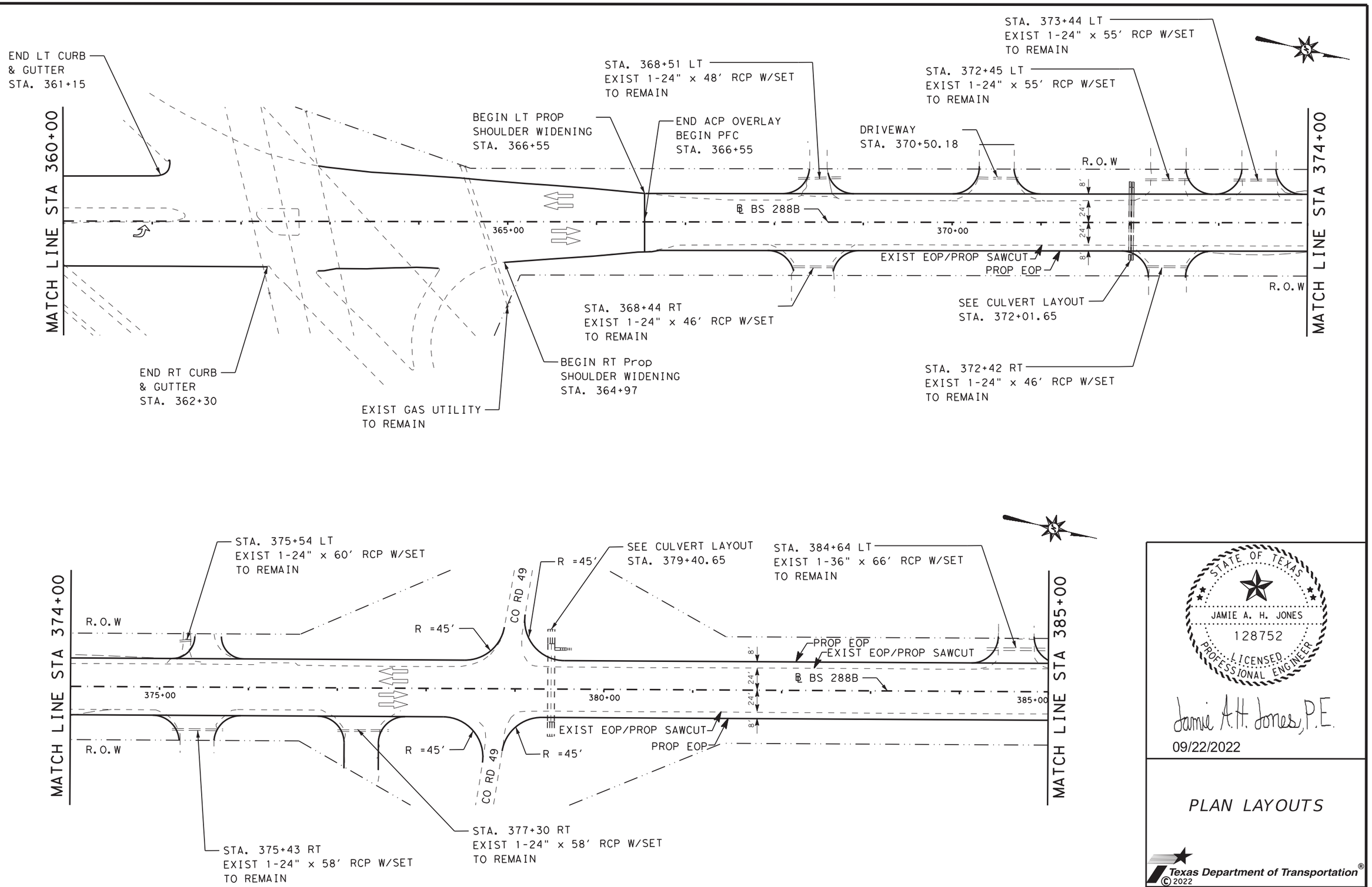

SCALE 1"=100'
SHEET 10 OF 13

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09/22/2022

PLAN LAYOUTS

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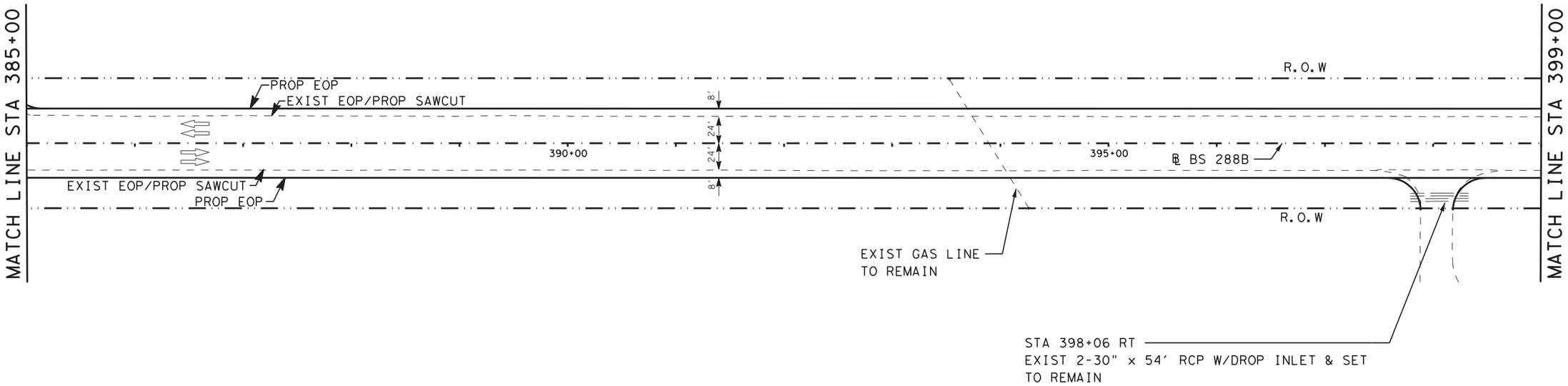
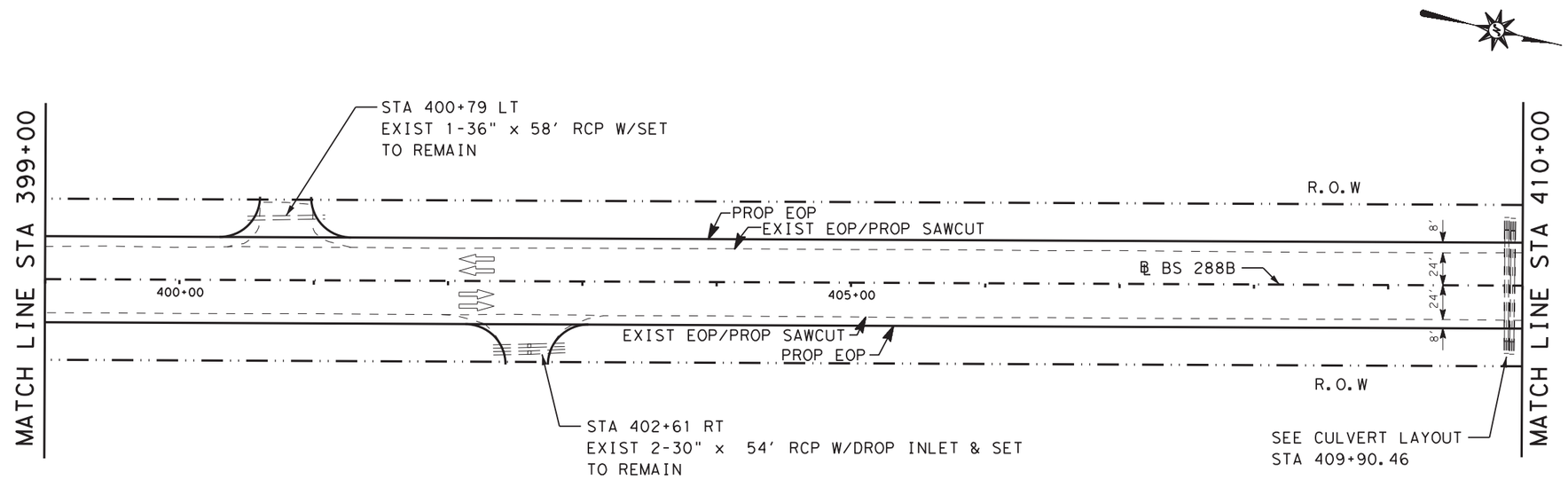
CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		103





SCALE 1"=100'
SHEET 11 OF 13

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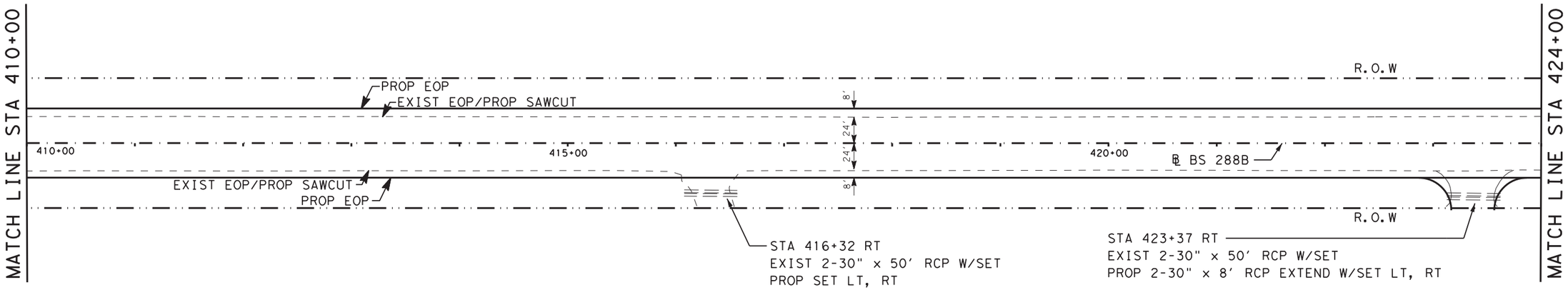
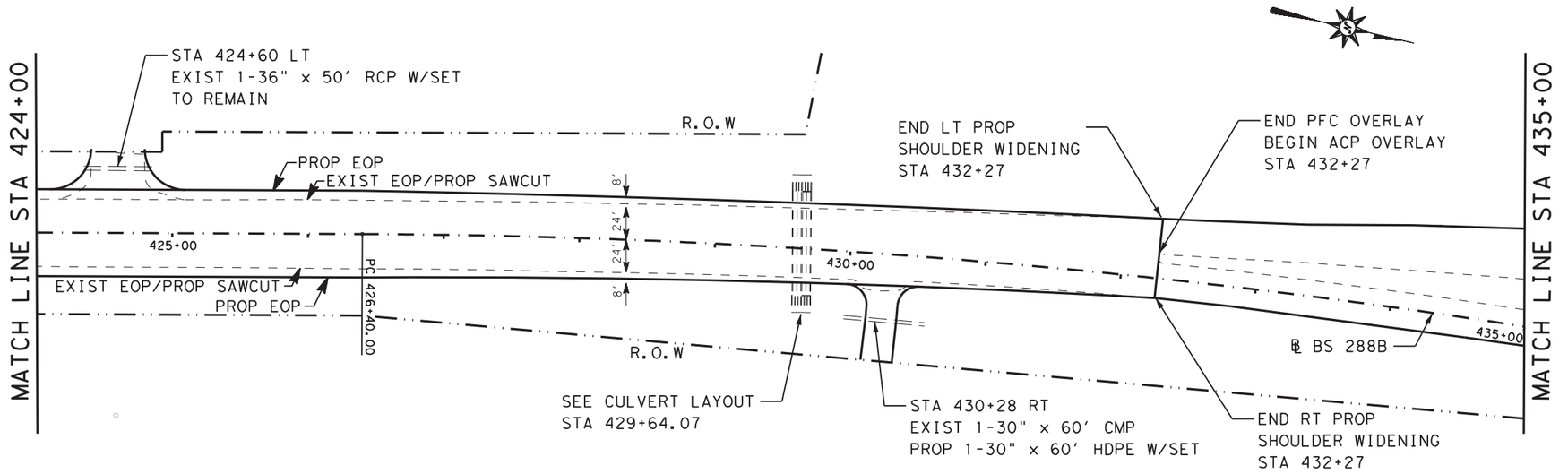
CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		104





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PLAN LAYOUTS

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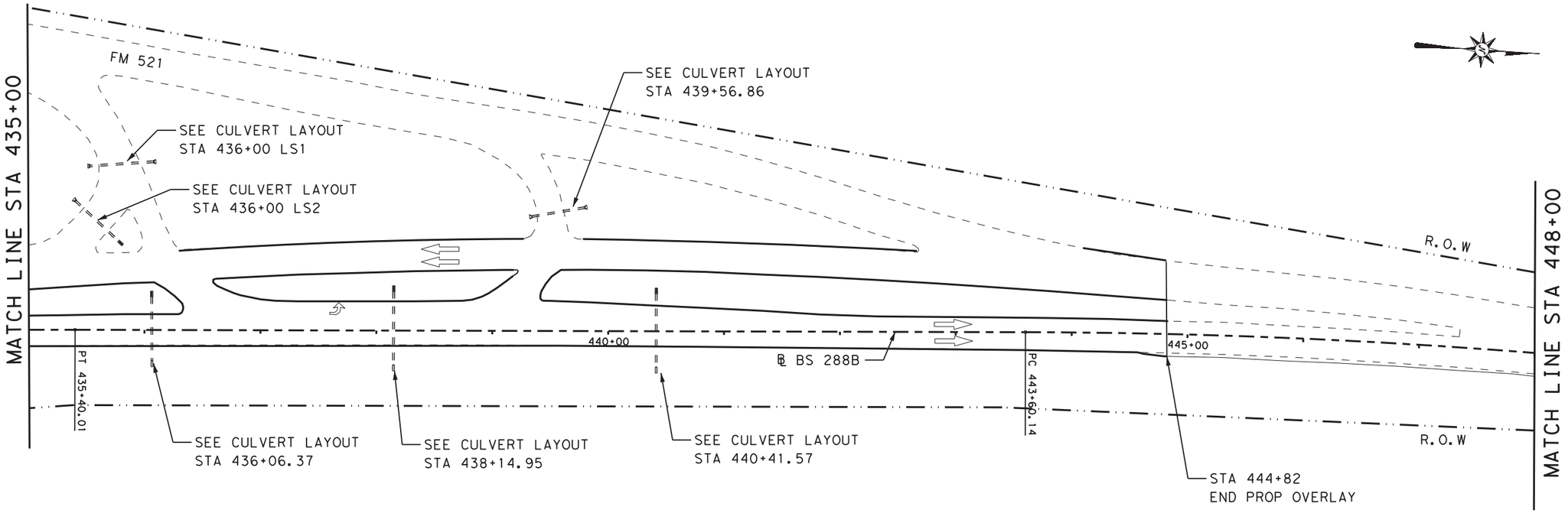
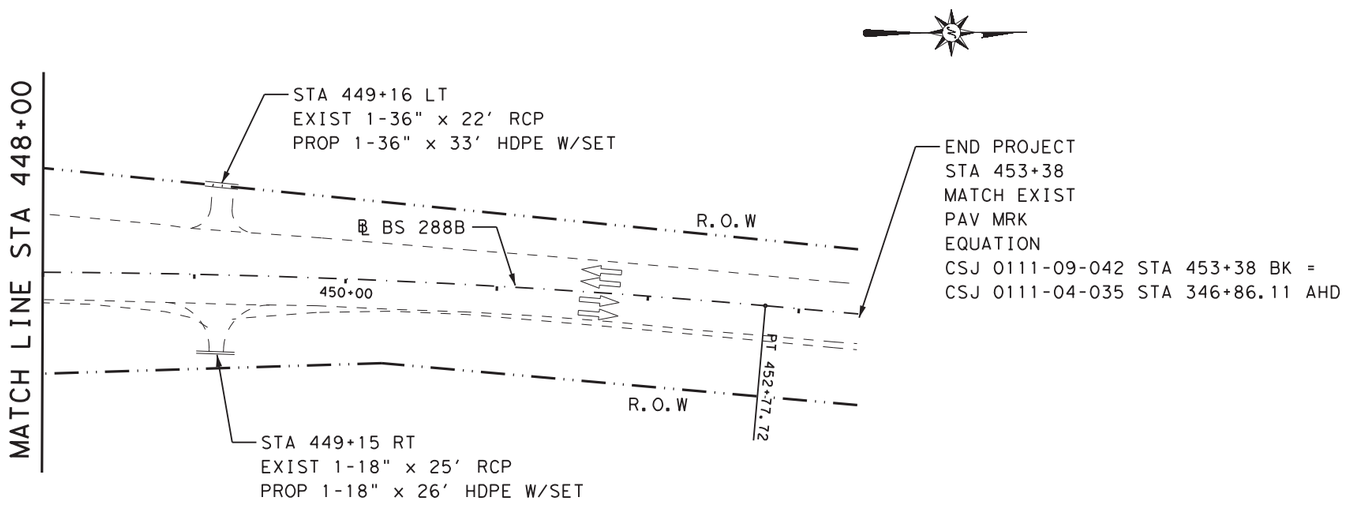
CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		105

SCALE 1"=100'
SHEET 12 OF 13





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PLAN LAYOUTS

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CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		106

SCALE 1"=100'
SHEET 13 OF 13

9/22/2022
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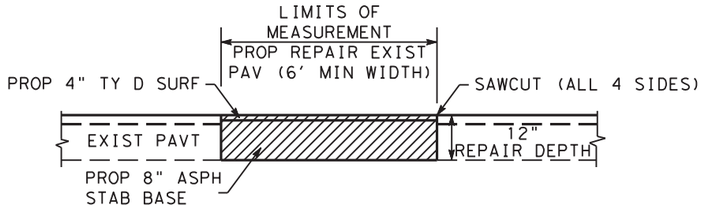
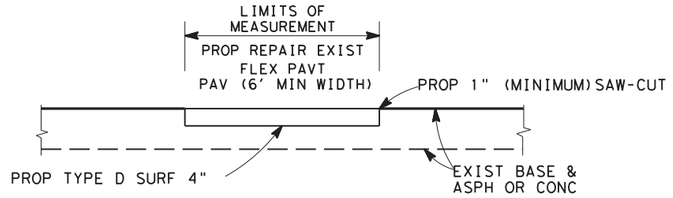


12" FLEX PAV REPAIR DETAIL

ITEM 351
N. T. S.



4" FLEX PAV REPAIR DETAIL

ITEM 351
N. T. S.

PAVEMENT REPAIR NOTES:

THE LOCATION OF ALL REPAIRS SHALL BE MARKED BY THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.

ALL BASE REPAIR SHALL BE PERFORMED IN ACCORDANCE WITH ITEM 351.

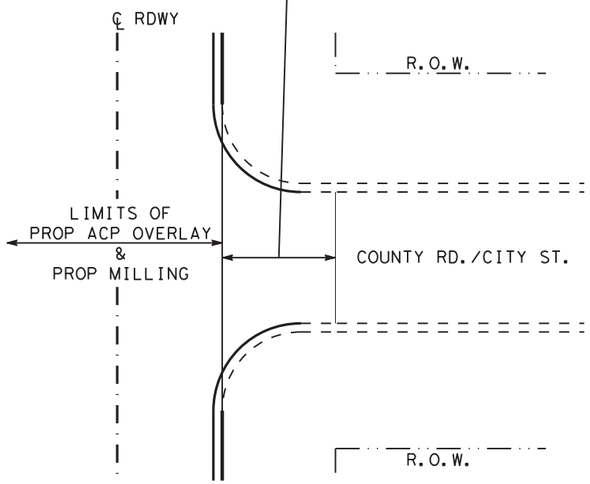
ON ALL REPAIR LOCATIONS, THE SIDES SHALL BE CUT VERTICAL THEN CLEANED OF ALL LOOSE MATERIAL AND TACKED PRIOR TO ANY PLACEMENT OF ASPH STAB BASE.

SAWCUTS SHALL BE INCIDENTAL TO ITEM 351.

ASPH STAB BASE SHALL MEET THE REQUIREMENTS OF ITEM 292.

ASPH CONC PAV SHALL MEET THE REQUIREMENTS OF ITEM 3076.

REPAIR OR PLANE AND OVERLAY EXISTING PAVEMENT AS NEEDED AND APPROVED BY THE ENGINEER. ALL APPROACH PAVEMENT MARKINGS ARE TO BE RETRACED WITHIN THE TXDOT ROW.



SIDE STREET OVERLAY DETAIL
(FULL-WIDTH MILLING AREA)
NOT TO SCALE

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MISCELLANEOUS DETAILS

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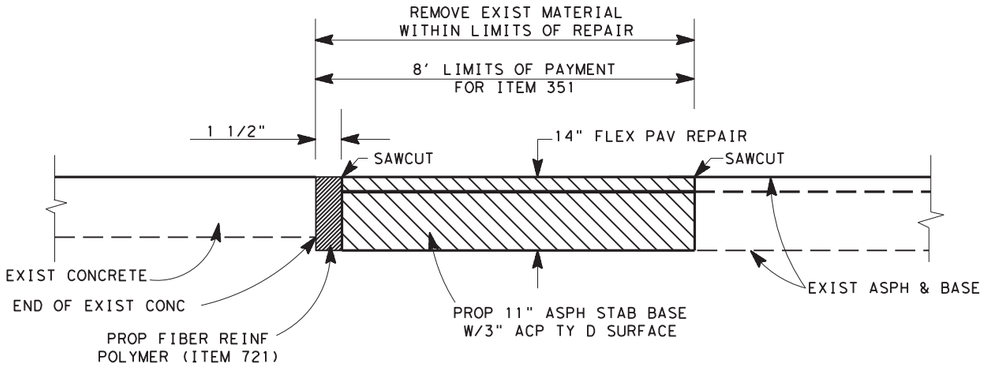
CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		107

SCALE N. T. S.
SHEET 1 OF 2

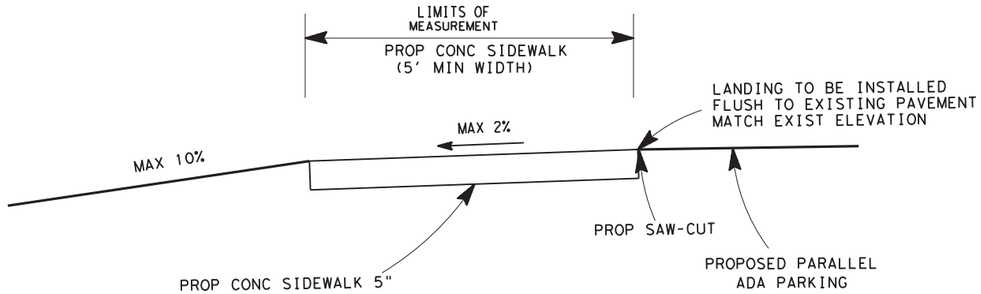


TRANSVERSE JOINT REPAIR

ITEM 351

N. T. S.

NOTE:
REMOVE THE 8' OF MATERIAL FROM THE EDGE OF THE EXISTING CONCRETE PAVEMENT AND PLACE THE ASB AND TY D SURFACE.
SAWCUT AT THE WIDTH SHOWN AFTER PLACEMENT OF THE ASPHALT MATERIAL AND PLACE THE FIBER REINFORCED POLYMER. SAWCUT IS INCIDENTAL TO VARIOUS BID ITEMS.



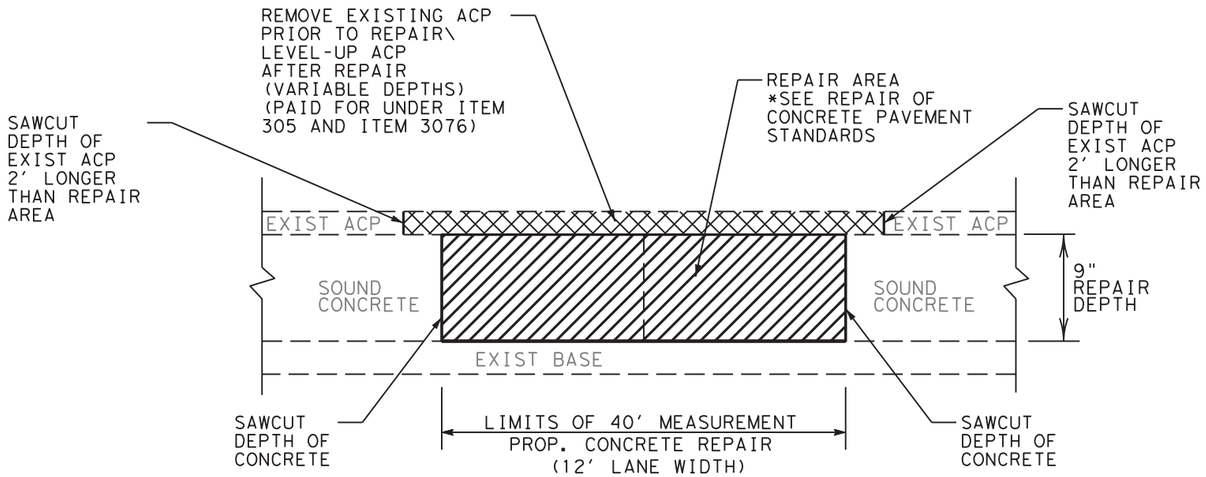
LANDING SIDEWALK DETAILS FOR ADA PARKING

ITEM 531

N. T. S.

SHOULDERING UP TO SIDEWALK IS INCIDENTAL TO ITEM 531.

SAWCUTS SHALL BE INCIDENTAL TO OTHER PERTINENT ITEMS.



9" REPAIR OF CONCRETE PAVEMENT

N. T. S.

ITEM 361 9" CONCRETE REPAIR
**SEE REPAIR OF CONCRETE PAVEMENT STANDARDS

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09/28/2022

MISCELLANEOUS DETAILS

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CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		108

SCALE N. T. S.
SHEET 2 OF 2

DATE: 9/22/2022
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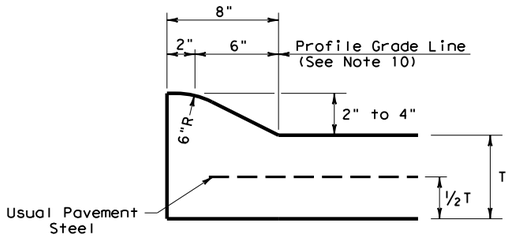
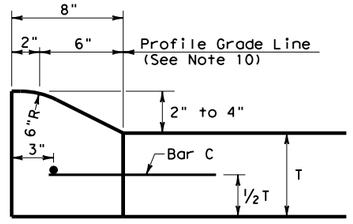


TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



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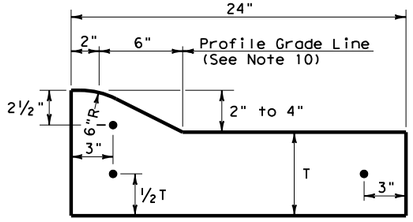
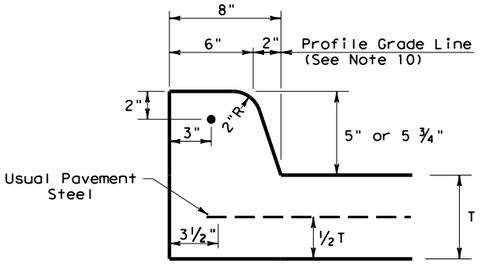
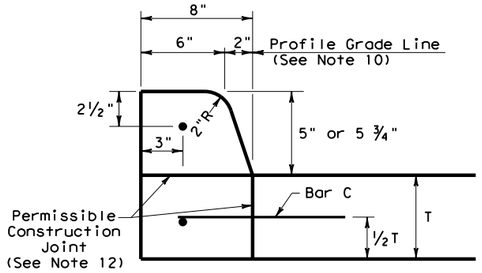


TYPE I CURB AND GUTTER
2" - 4" HEIGHT



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



TYPE II CURB
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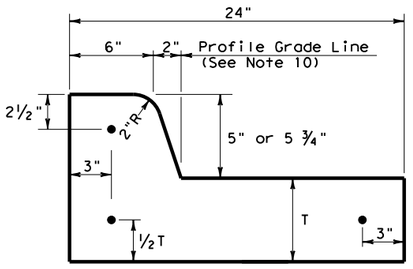

TYPE II CURB AND GUTTER
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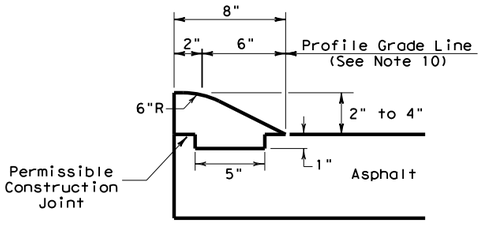
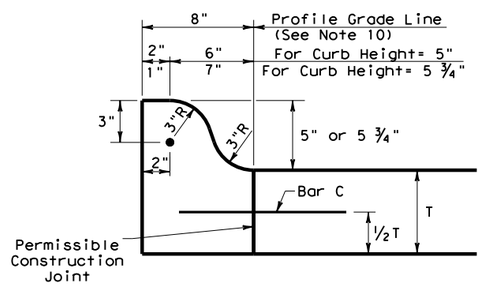
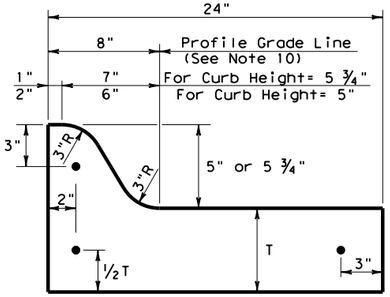


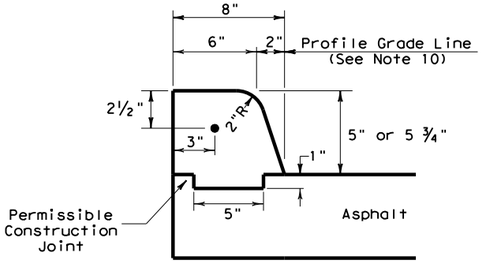
TYPE III CURB (KEYED)
2" - 4" HEIGHT



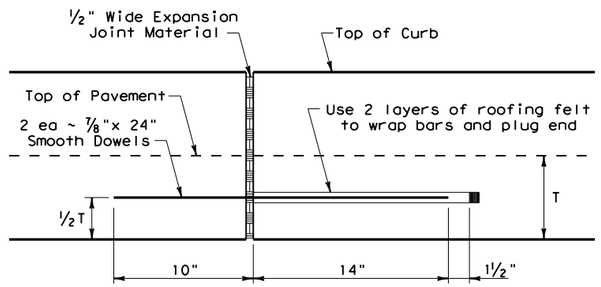
TYPE IIa CURB
5" - 5 ¾" HEIGHT



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

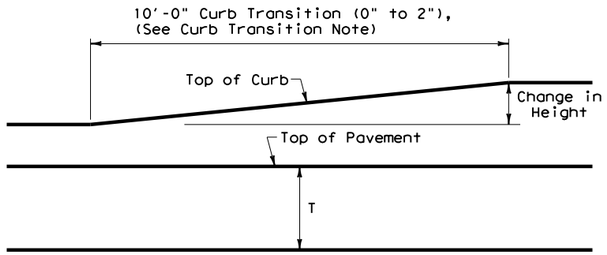


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

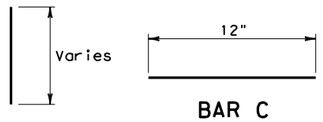
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and the grouted in place, or may be inserted into fresh concrete.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
13. Bar B used as needed to support curb reinforcing steel during concrete placement.



BAR B

BAR C

Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-21

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: SS	CK: KM
© TxDOT: FEBRUARY 2021 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		109

DATE: 9/22/2022 4:55:13 PM
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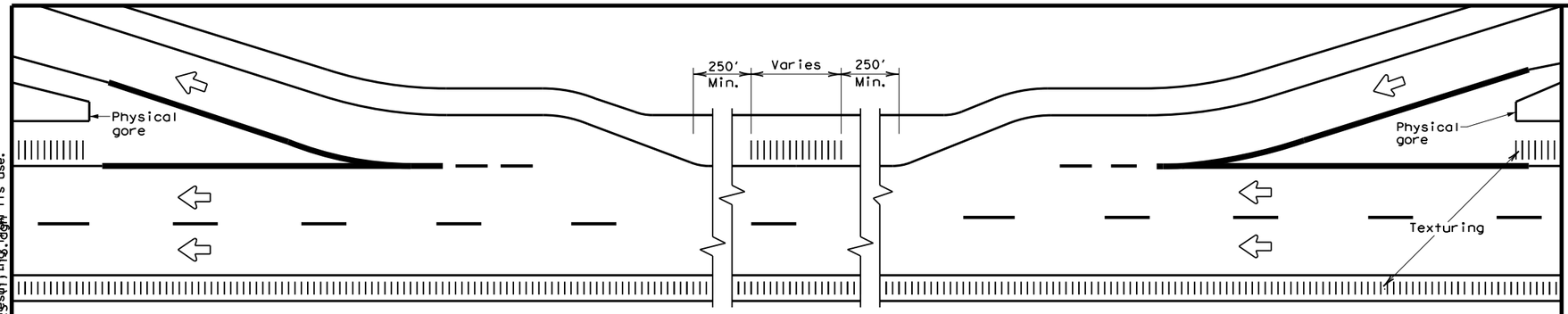
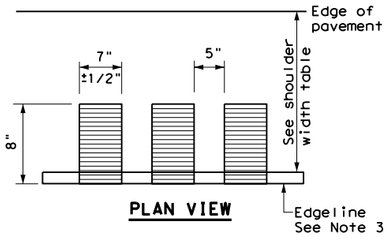
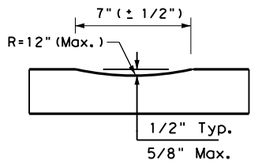


TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS

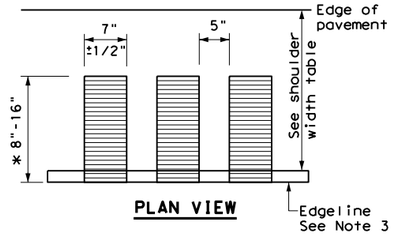


PLAN VIEW



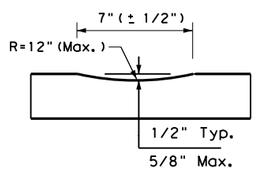
PROFILE VIEW
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



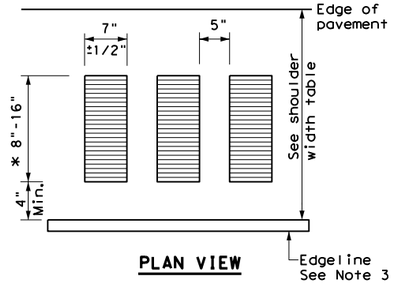
PLAN VIEW

* This distance may vary based on width of shoulder



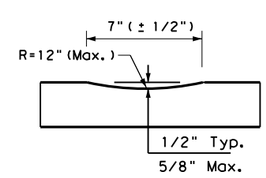
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



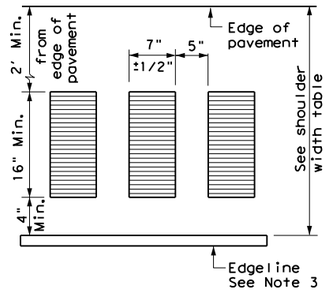
PLAN VIEW

* This distance may vary based on width of shoulder

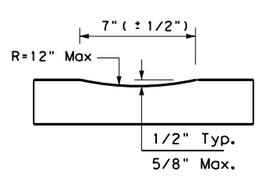


PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

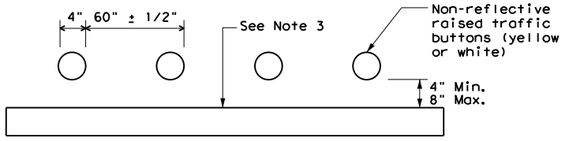


PLAN VIEW



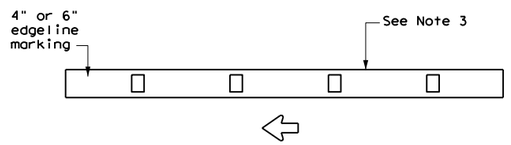
PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5 OR 6	Option 1, 2, 3, 5 or 6	Option 2, 4, 5 OR 6

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.

Texas Department of Transportation

Traffic Operations Division Standard

EDGELINE RUMBLE STRIPS ON FREEWAYS AND DIVIDED HIGHWAYS
RS(1)-13

FILE: rs(1)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-10 10-13	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		110

DATE: 9/22/2022 4:55:20 PM
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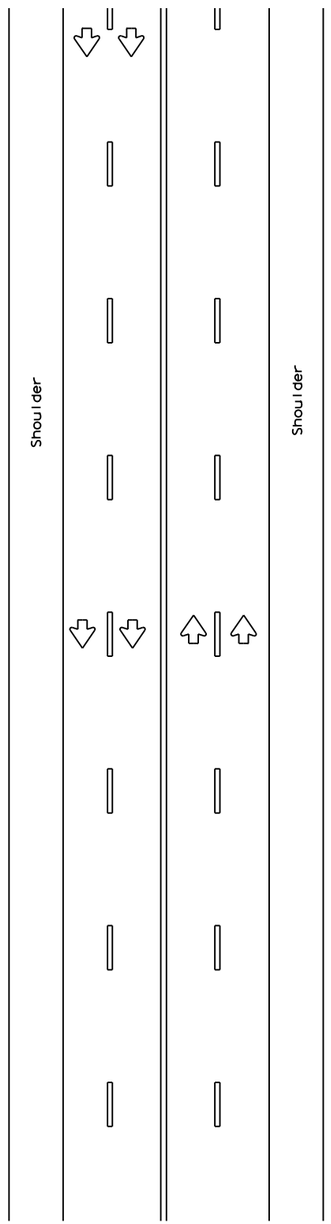
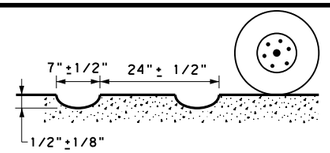
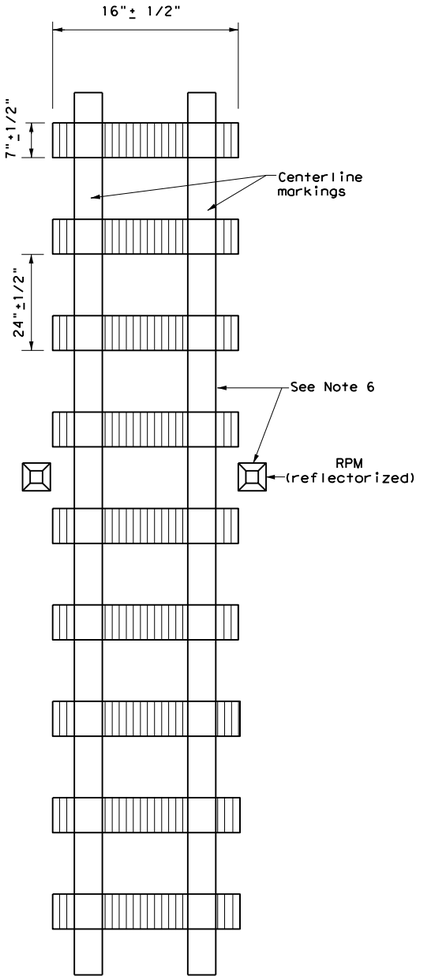
CENTERLINE RUMBLE STRIPS



MULTILANE UNDIVIDED HIGHWAY WITH SHOULDER

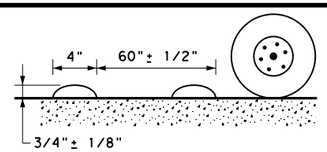


PROFILE VIEW

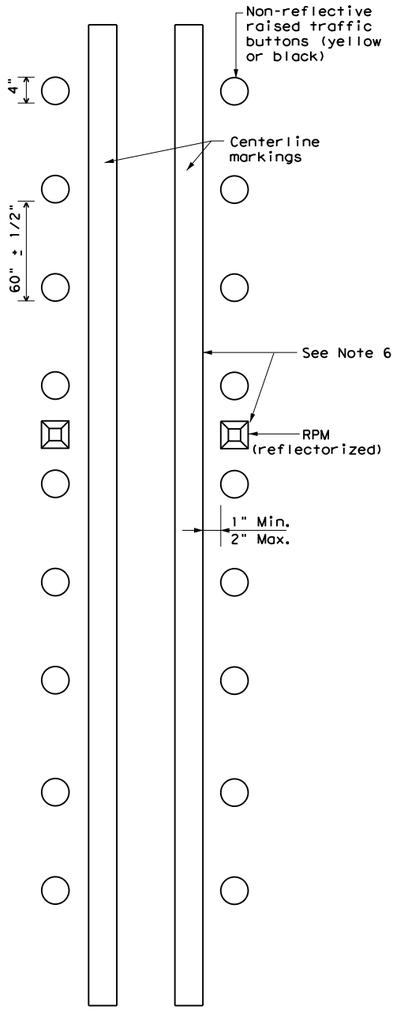


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

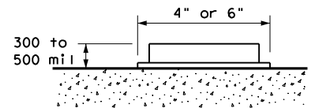


PROFILE VIEW

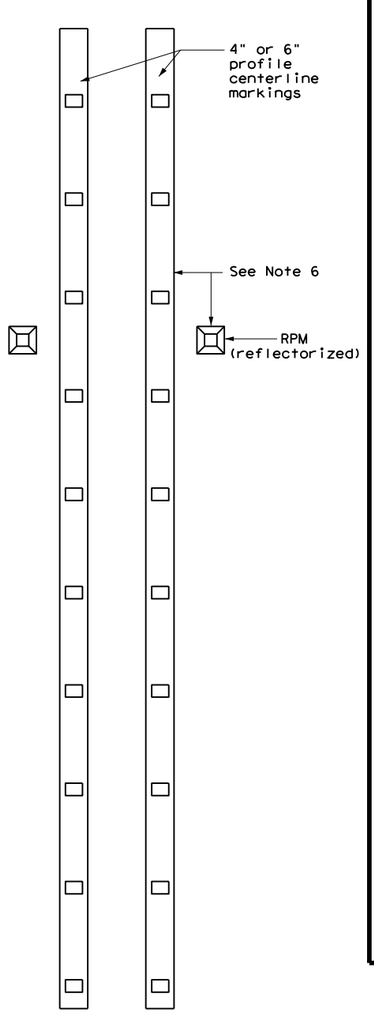


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 3

PROFILE CENTERLINE MARKINGS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on multilane undivided highways.
2. Centerline and edgeline rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks.
6. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inch depth of milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips for normal centerline spacing. For wider medians, specify in the plans the exact placement of the rumble strips. Place the rumble strips under each centerline marking or centered in the middle of the median.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The color of the button should be yellow for a continuous no passing roadway. The button will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.

WHEN INSTALLING EDGELINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

11. See standard sheet RS(4).

Texas Department of Transportation®

Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON MULTILANE UNDIVIDED HIGHWAYS

RS(2)-13

FILE: rs(2)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		111

DATE: 9/22/2022 4:55:27 PM
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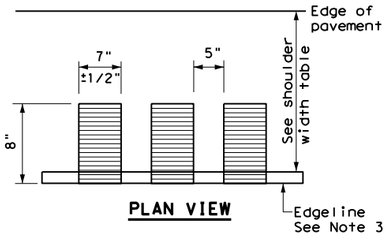
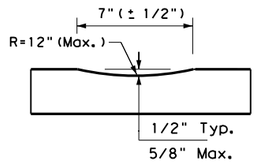
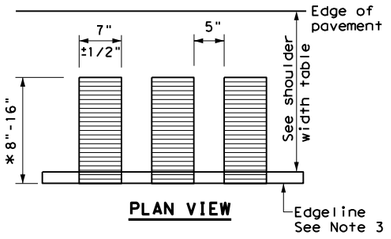


PLAN VIEW

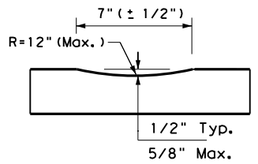


PROFILE VIEW
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



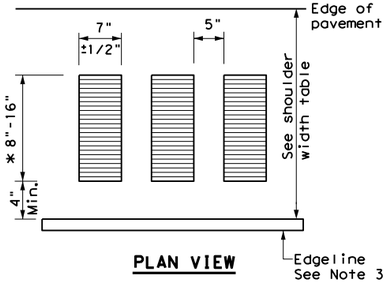
PLAN VIEW



* This distance may vary based on width of shoulder

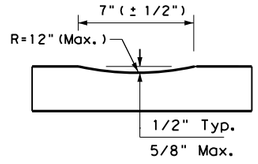
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



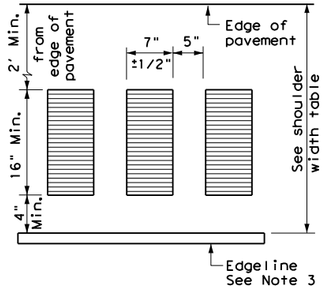
PLAN VIEW

* This distance may vary based on width of shoulder

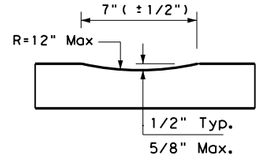


PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

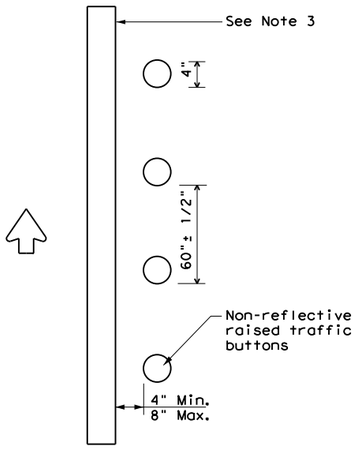


PLAN VIEW



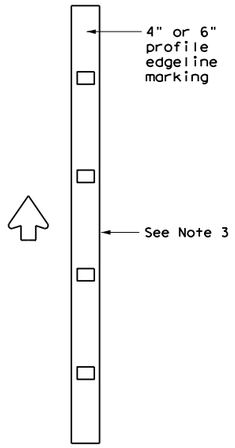
PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5 OR 6	Option 1, 2, 3 5 OR 6	Option 2, 4, 5 OR 6

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.

Texas Department of Transportation

Traffic Operations Division Standard

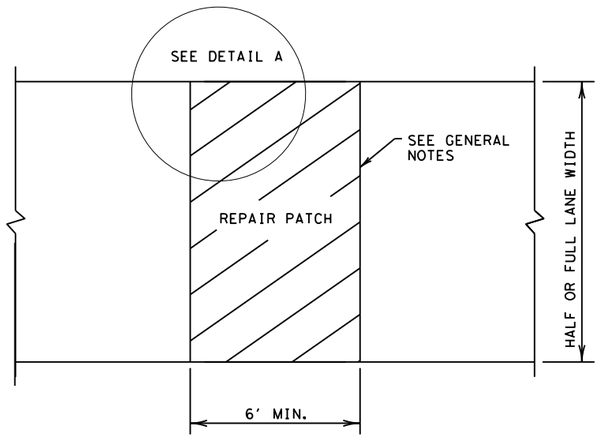
EDGELINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS
RS(4)-13

FILE: rs(4)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		112

DATE: 9/22/2022
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111090424 - Design\Plan Set\3. Roadway\Standards_Hibo\REPCP -14.dgn

TABLE NO.1 STEEL BAR SIZE AND SPACING						
TYPE PAVEMENT	SLAB THICKNESS AND BAR SIZE		LONGITUDINAL*		TRANSVERSE*	
			REGULAR BARS	TIEBARS	BARS	TIEBARS
	T (IN.)	BAR SIZE	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)
CRCP	6.0	#5	7.5	7.5	24	24
	6.5		7.0	7.0		
	7.0		6.5	6.5		
	7.5		6.0	6.0		
	8.0	#6	9.0	9.0	24	24
	8.5		8.5	8.5		
	9.0		8.0	8.0		
	9.5		7.5	7.5		
	10.0		7.0	7.0		
	10.5		6.75	6.75		
	11.0		6.5	6.5		
	11.5		6.25	6.25		
	≥12.0		6.0	6.0		
JRCP	<8.0	#5	24.0	12.0	24	24
	≥8.0	#6	24.0	12.0	24	24
CPCD	<8.0	#5	NONE	12.0	NONE	24
	≥8.0	#6	NONE	12.0	NONE	24

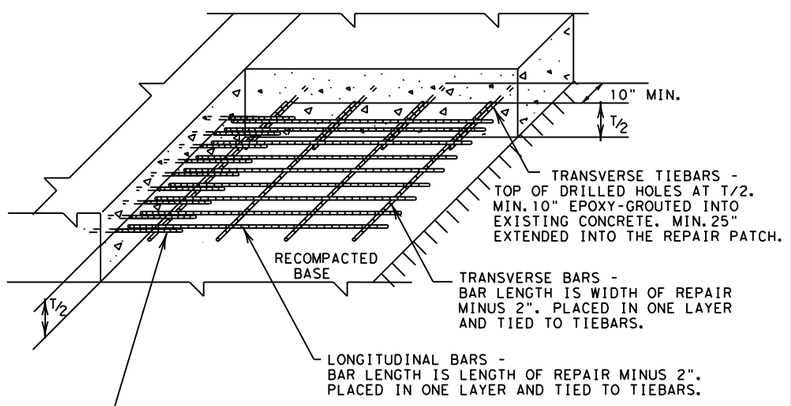
* USE 12" SPACING AS FIRST AND LAST SPACING AT END OR SIDE FOR ALL BARS.



PLAN VIEW

GENERAL NOTES

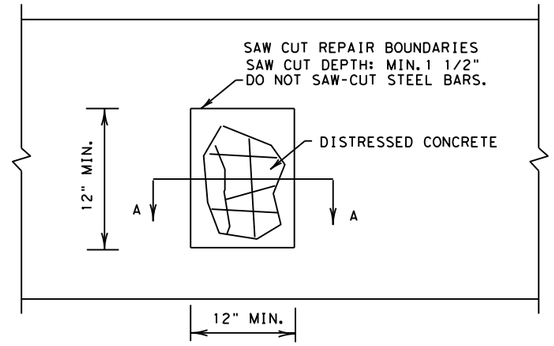
1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



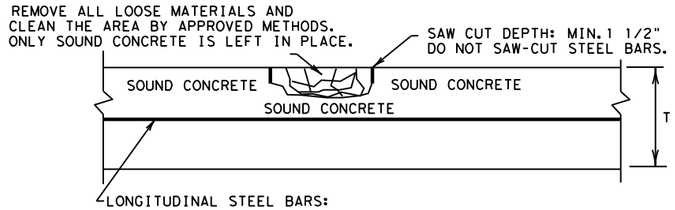
DETAIL A
GROUTED TIEBARS & REINFORCEMENT

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
3. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



PLAN VIEW



LONGITUDINAL STEEL BARS:

*REPAIR AREAS MAY BE ADJUSTED AFTER REMOVING DISTRESSED CONCRETE. SWITCH THE HALF-DEPTH REPAIR TO FULL-DEPTH REPAIR IF EXPOSED EXISTING LONGITUDINAL BARS ARE DEFICIENT, AS APPROVED. COMPENSATION WILL BE MADE FOR UNEXPECTED VOLUMES OF REPAIR AREAS OR CHANGES IN SCOPE OF WORK.

*INCREASE THE REPAIR AREA AND PERFORM A FULL-DEPTH REPAIR AS DIRECTED IF LONGITUDINAL STEEL BARS WERE DAMAGED BY THE REMOVAL OPERATIONS. NO ADDITIONAL COMPENSATION WILL BE MADE.

SECTION A-A

HALF-DEPTH REPAIR

FULL-DEPTH REPAIR OF CRCP, JRCP, AND CPCD

Texas Department of Transportation

Design Division Standard

REPAIR OF CONCRETE PAVEMENT

REPCP-14

FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
©TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		113

DATE: 9/22/2022
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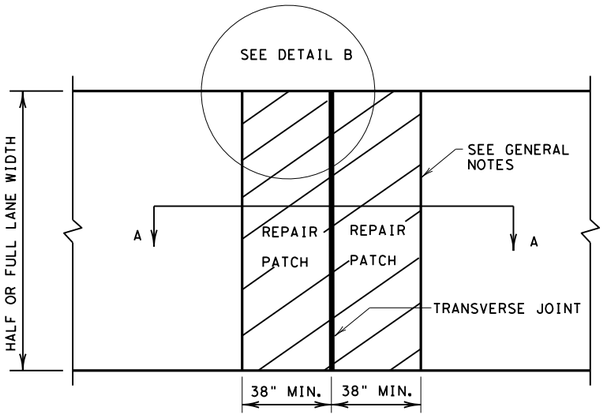
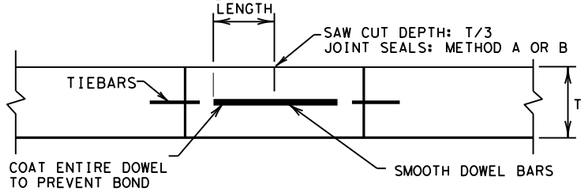
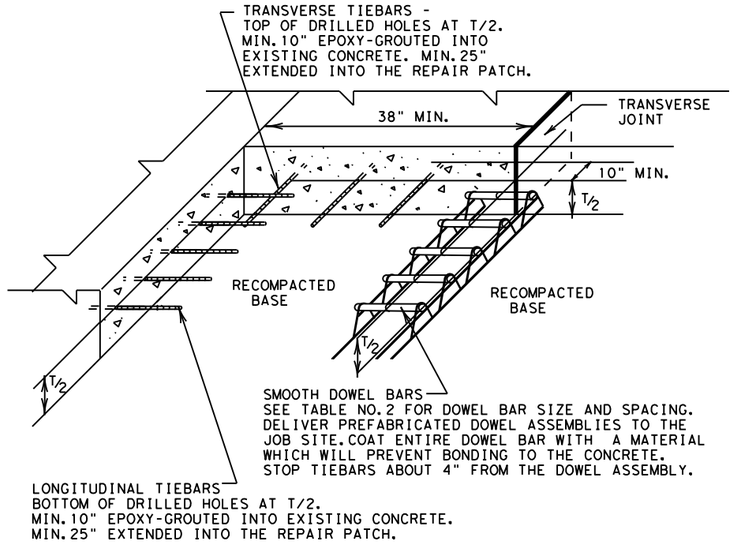


PLAN VIEW



SECTION A-A



DETAIL B
GROUTED TIEBARS & DOWELS

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."
8. DOWEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1/4 IN. HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED. WHERE DOWEL BAR BASKETS ARE USED, REMOVE THE SHIPPING WIRES.

TABLE NO. 2 DOWELS (SMOOTH BARS)			
PAVEMENT THICKNESS (INCHES)	SIZE AND DIA.	LENGTH (IN.)	SPACING (IN.)
<10	#8 (1 IN.)	18.0	12.0
≥10	#10 (1 1/4 IN.)		

REPAIR OF TRANSVERSE JOINT OF CPCD

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

REPAIR OF CONCRETE PAVEMENT

REPCP-14

FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
©TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		114

DATE: 9/22/2022 4:55:40 PM
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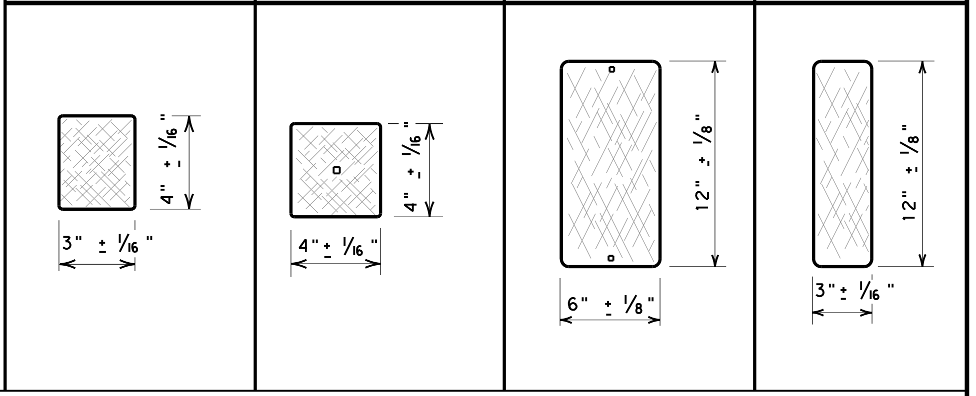
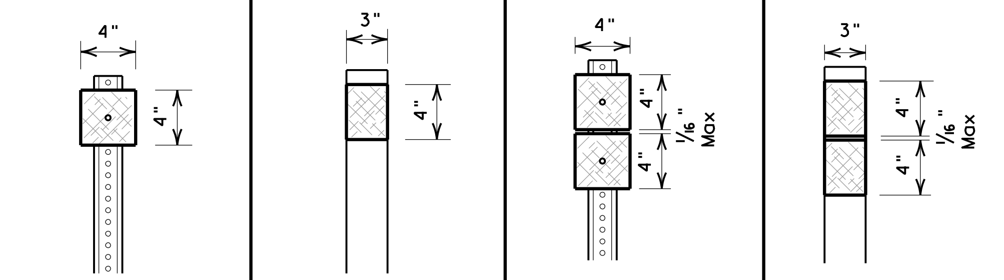
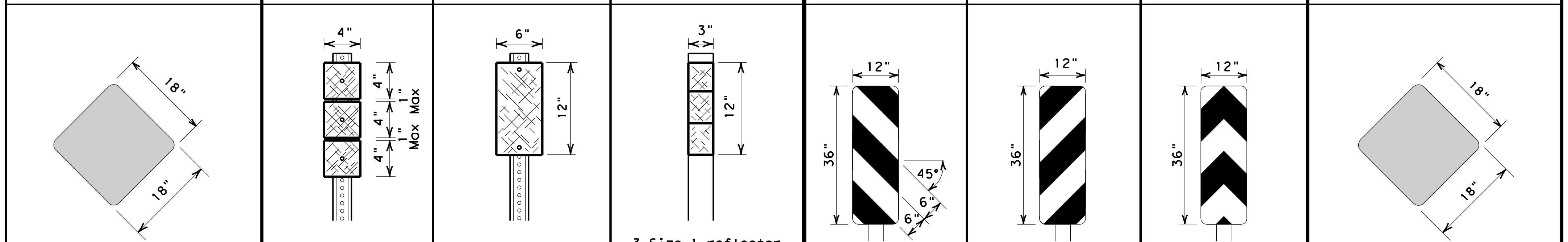
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	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.			

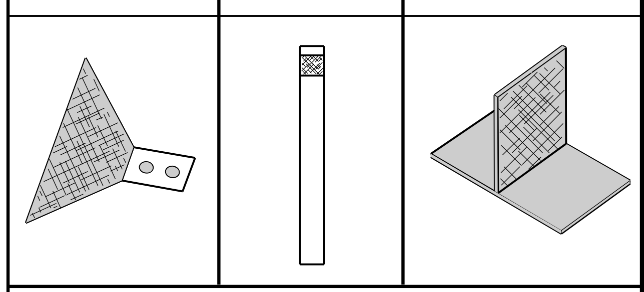
DELINEATORS

	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

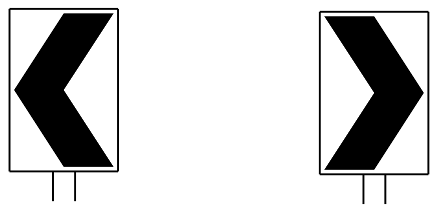
OBJECT MARKERS

	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

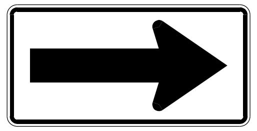
BARRIER REFLECTORS (BRF)

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

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

ONE DIRECTION LARGE ARROW

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

NOTE

1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

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

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

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

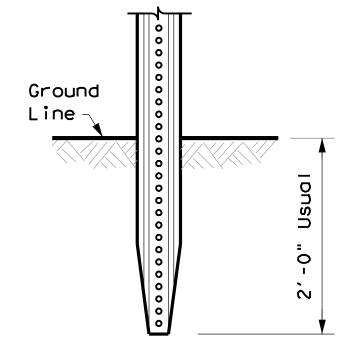
D & OM(1)-20

FILE: dom1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
10-09 3-15 / 4-10 7-20	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	115

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

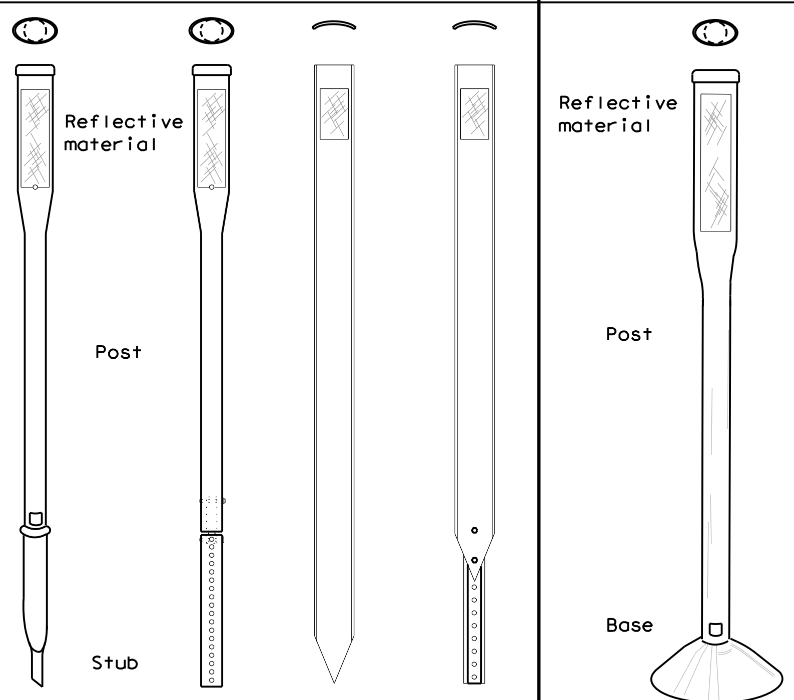


NOTES

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 | SRF



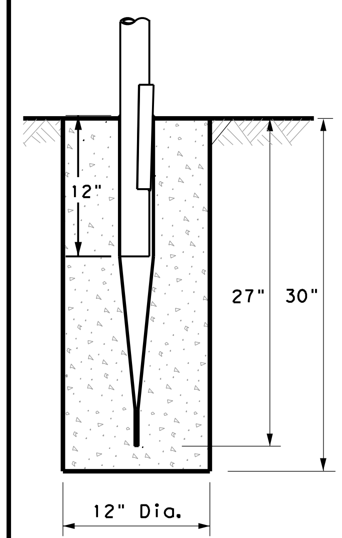
EMBEDDED | SURFACE MOUNT

NOTES

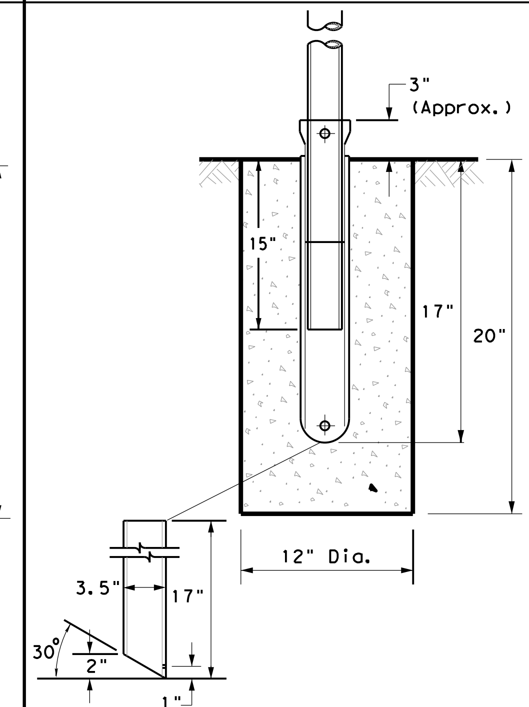
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline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

WEDGE ANCHOR SYSTEMS

WAS



WAP



STEEL | PLASTIC

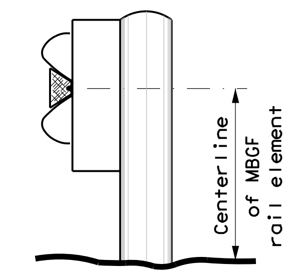
NOTE

1. Install per manufacturer's recommendations.

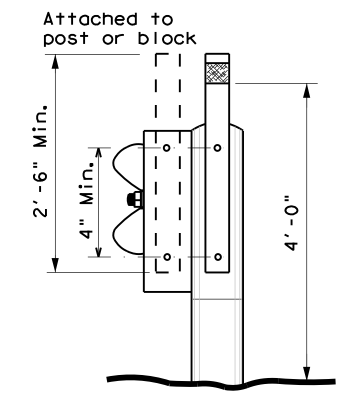
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

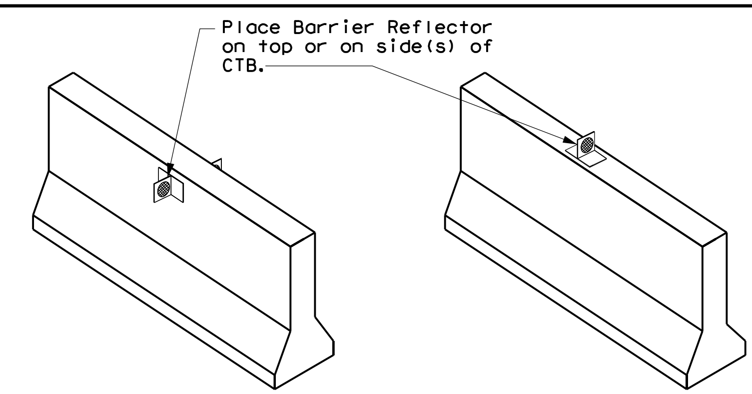
GF1



GF2



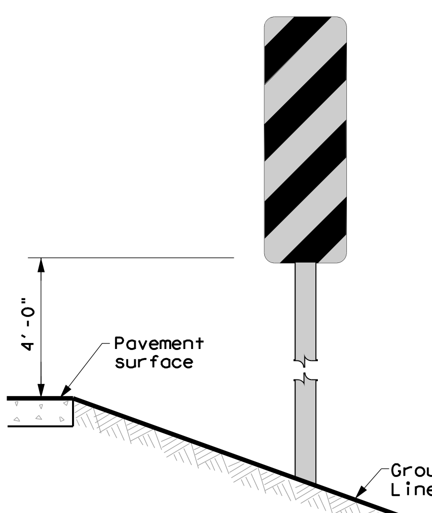
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

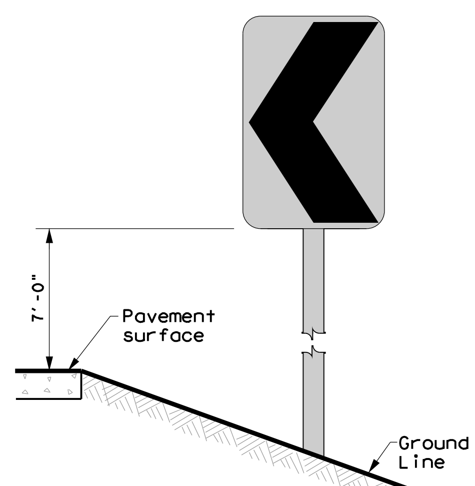
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

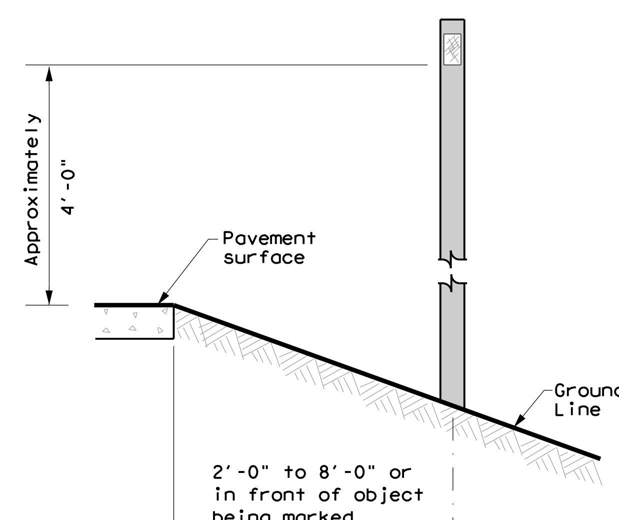
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation | Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS	0111	09	042	BS 288B
10-09 3-15	DIST		COUNTY	SHEET NO.
4-10 7-20	HOU		BRAZORIA	116

20B

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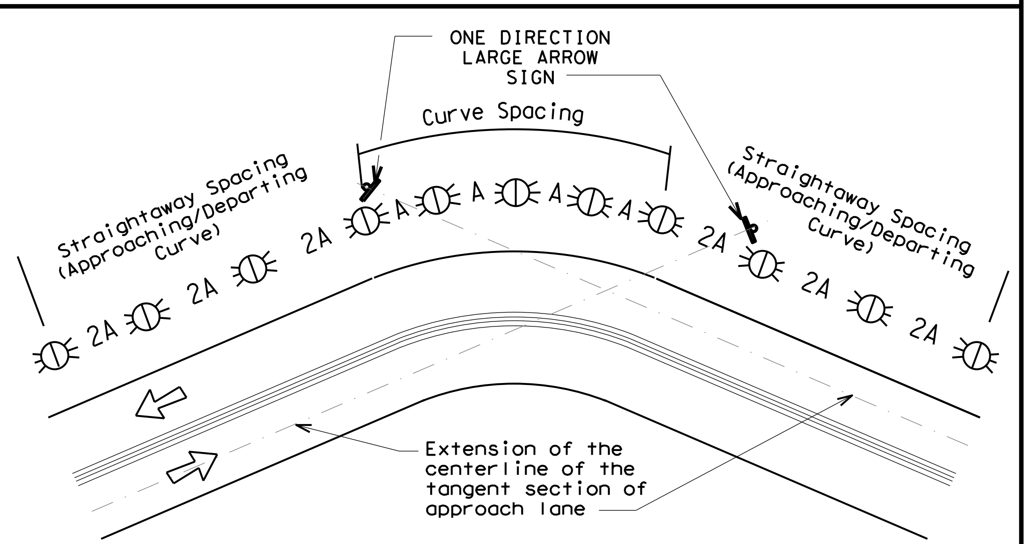
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed: Turn (30 MPH or less)	Curve Advisory Speed: 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

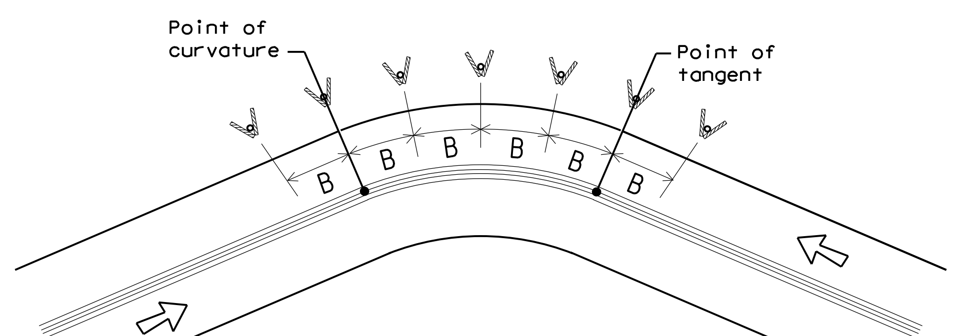
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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	Radius of Curve (FEET)	Spacing in Curve (FEET)	Spacing in Straightaway (FEET)	Chevron Spacing in Curve (FEET)
		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

Symbol	Meaning
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT 0111	SECT 09	JOB 042	HIGHWAY BS 288B
REVISIONS 3-15 8-15 8-15 7-20	DIST HOU	COUNTY BRAZORIA		SHEET NO. 117

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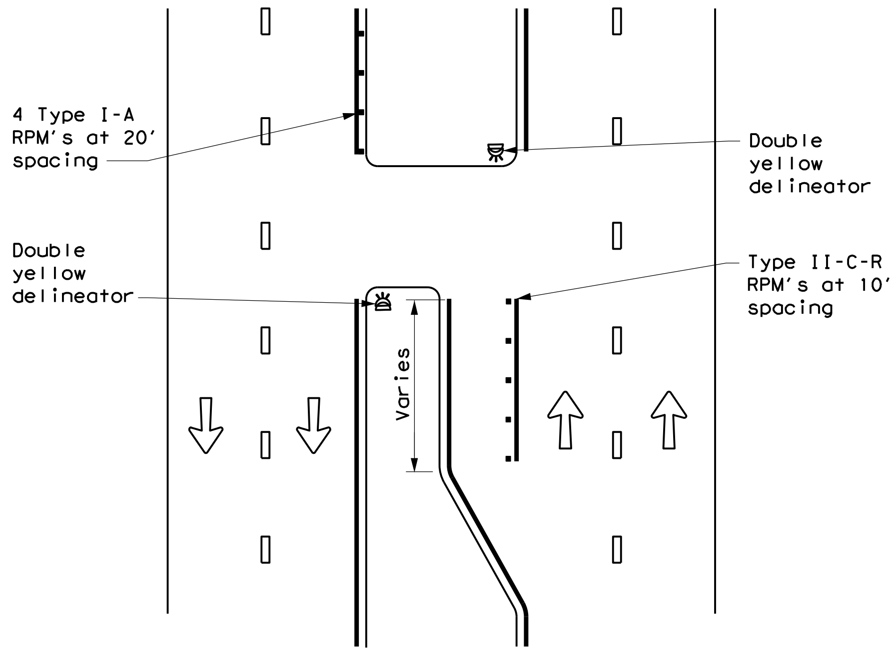
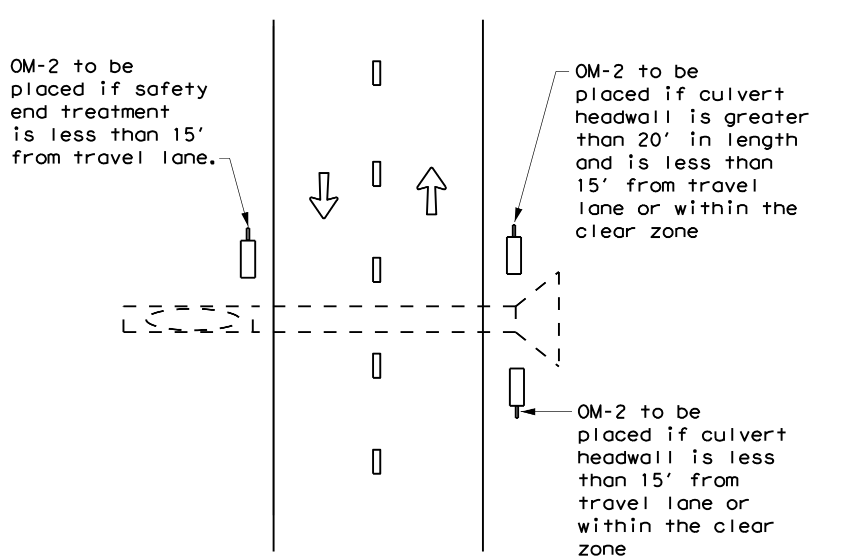
CROSSOVERS



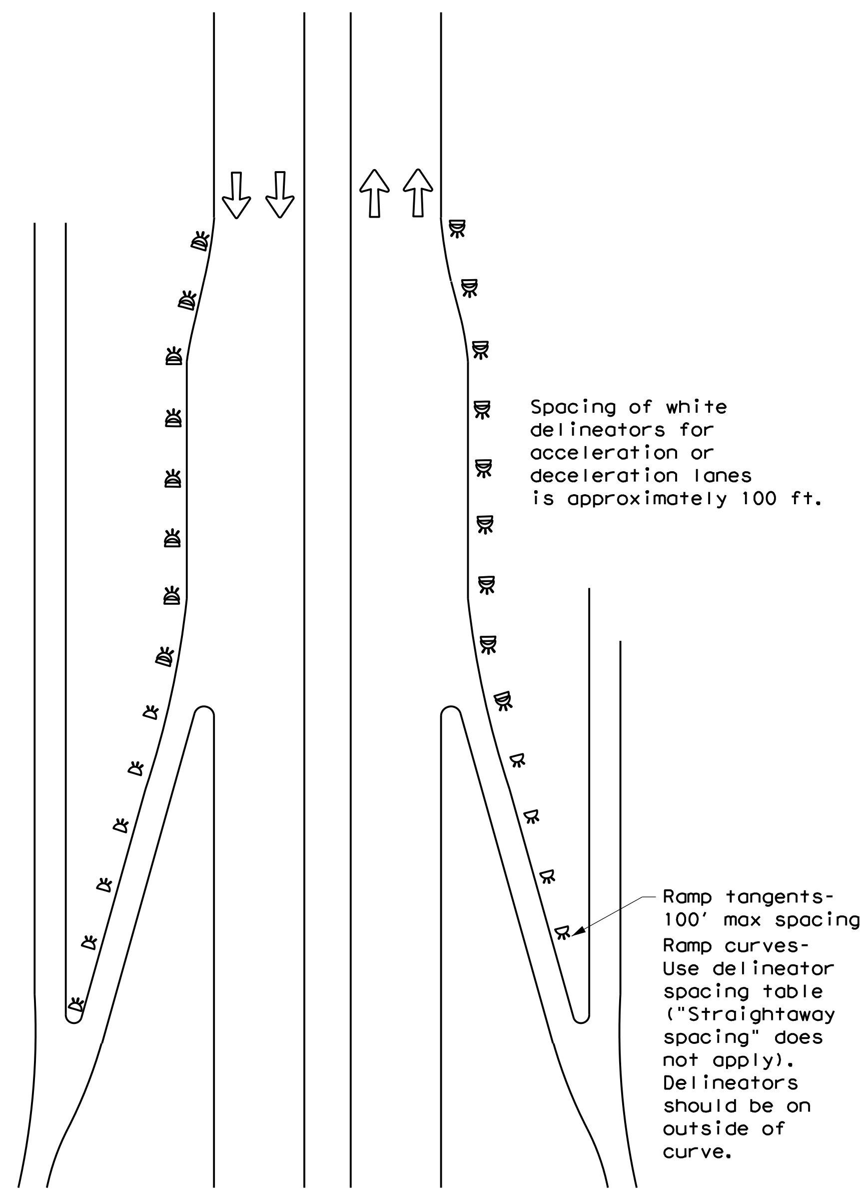
DETAIL 1

FOR CULVERTS WITHOUT MBGF



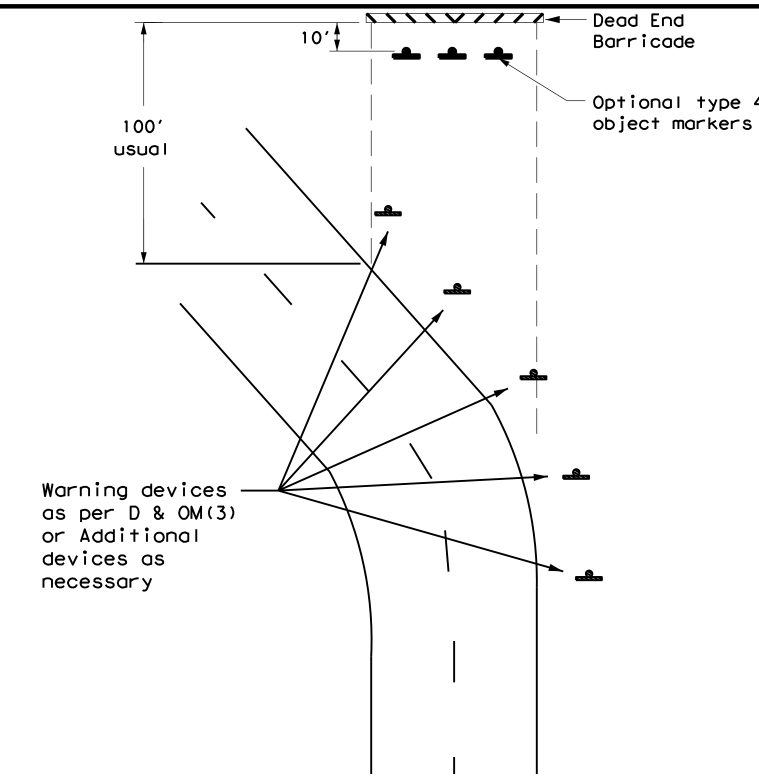
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



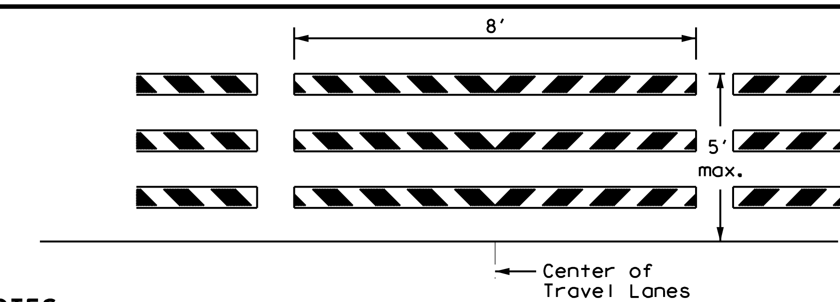
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

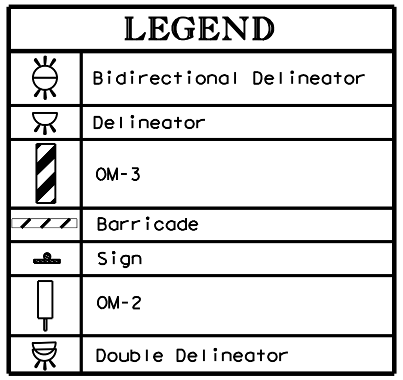
TYPICAL DEAD END BARRICADE INSTALLATION



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



Texas Department of Transportation

Traffic Safety Division Standard

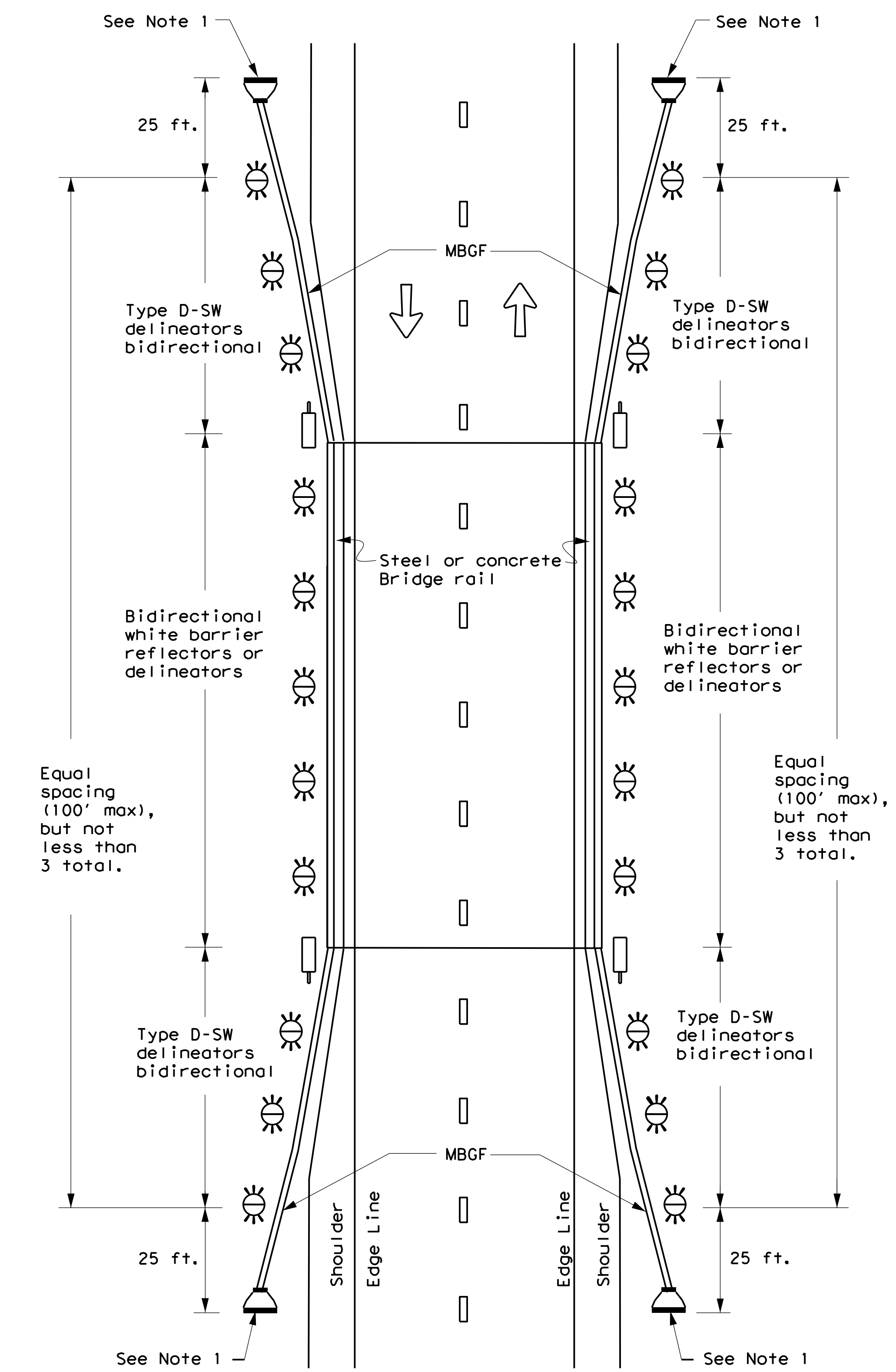
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 3-15 7-20	0111	09	042	BS 288B
	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	118

20D

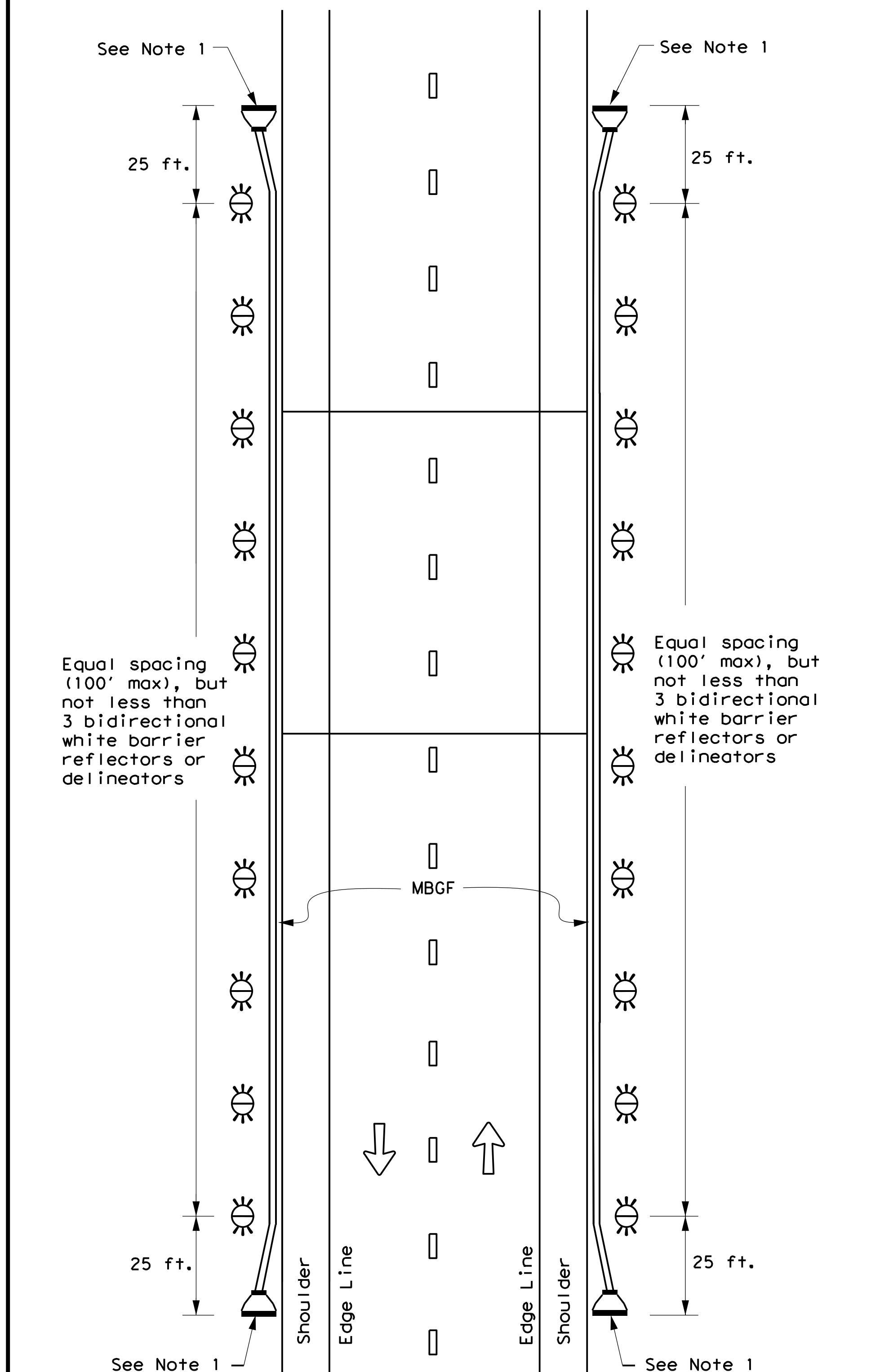
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

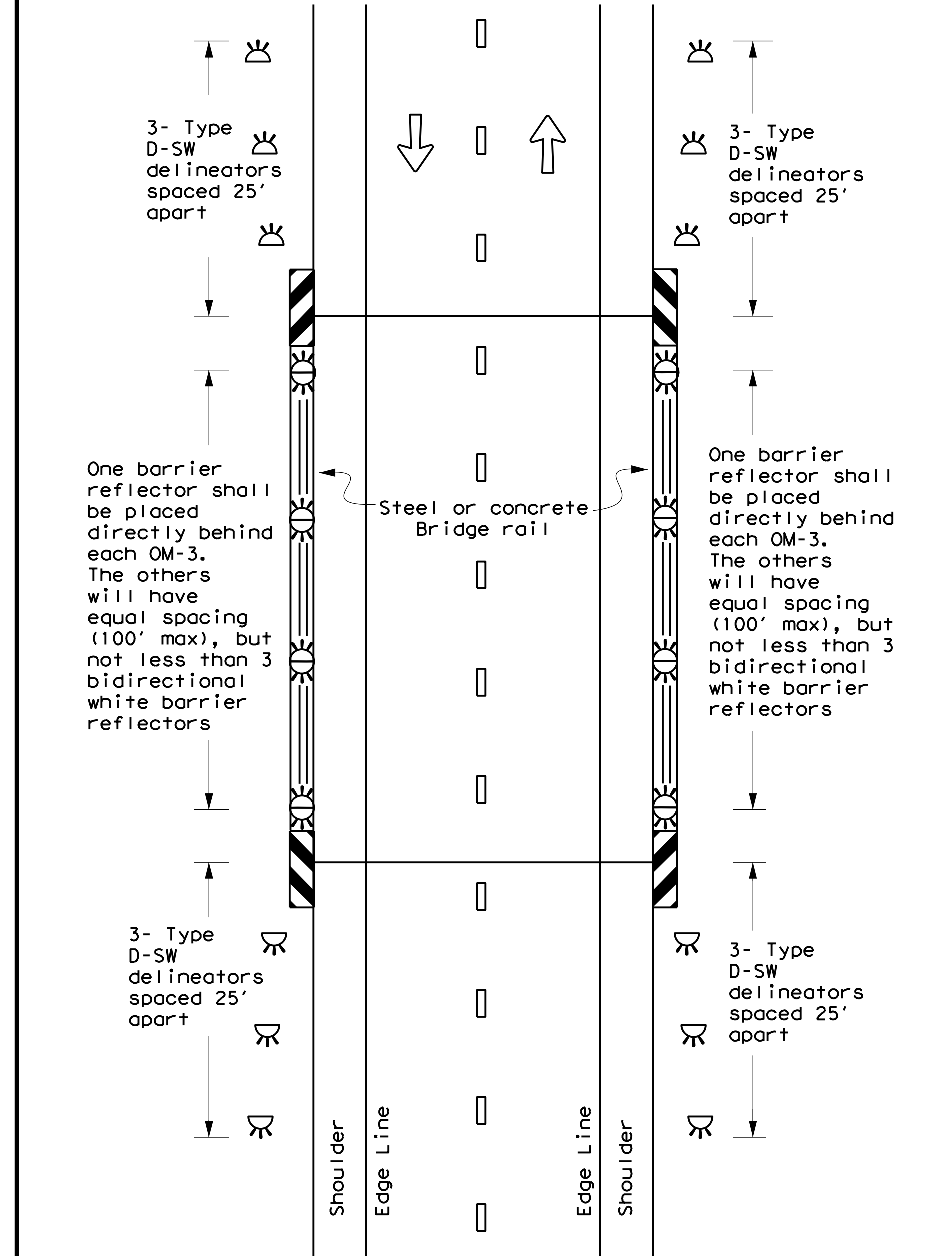
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

Symbol	Description
	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	0111	09	042	BS 288B
7-20	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	119

20E

DATE: 9/22/2022 4:56:07 PM
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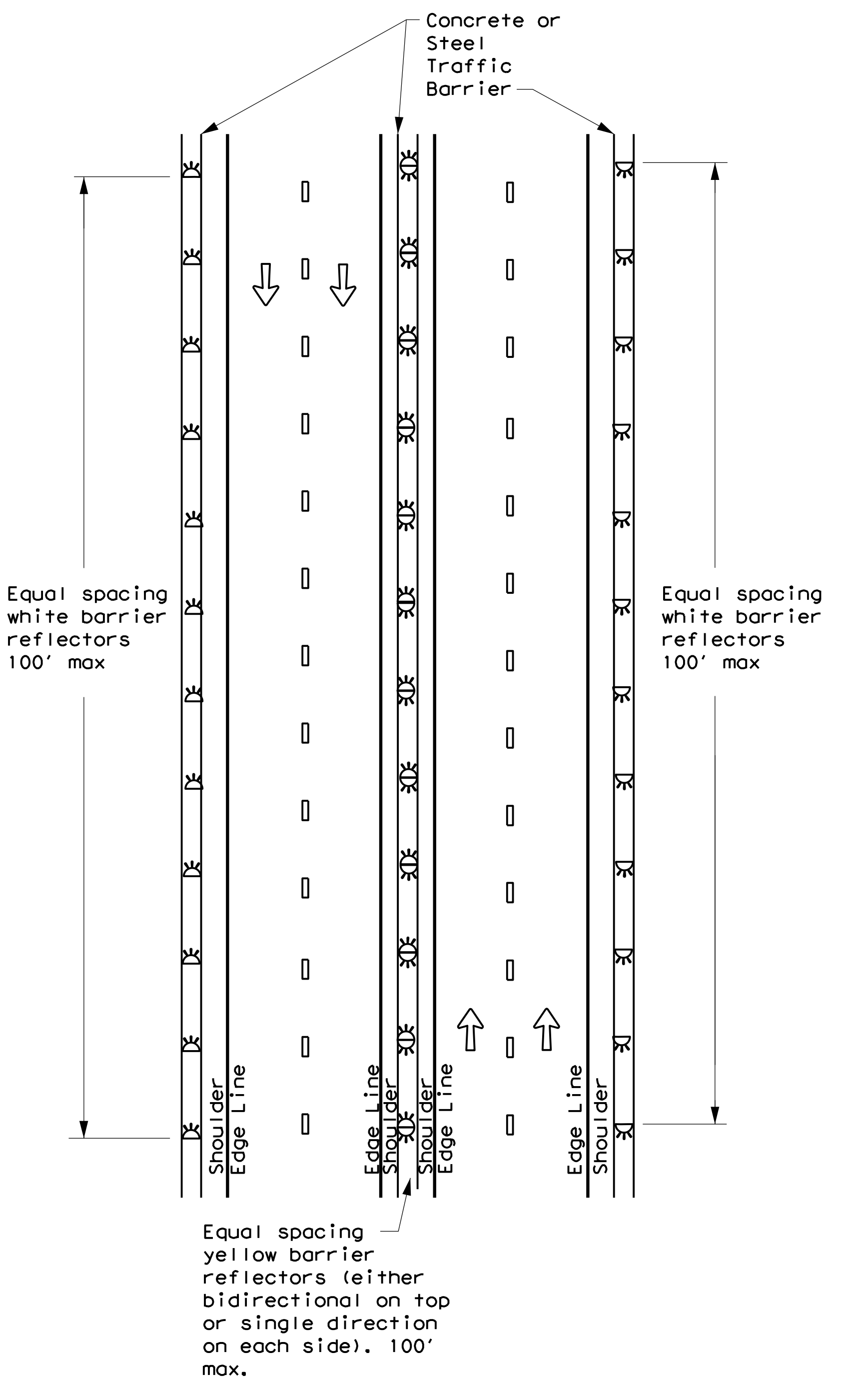
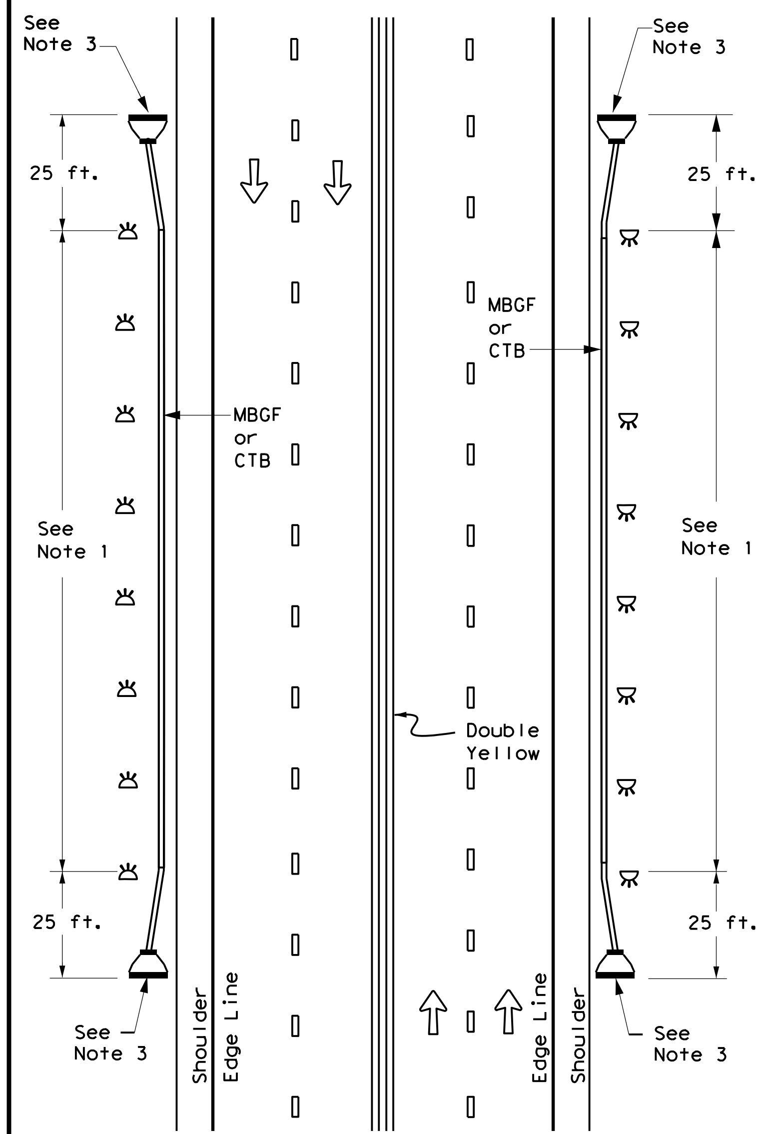
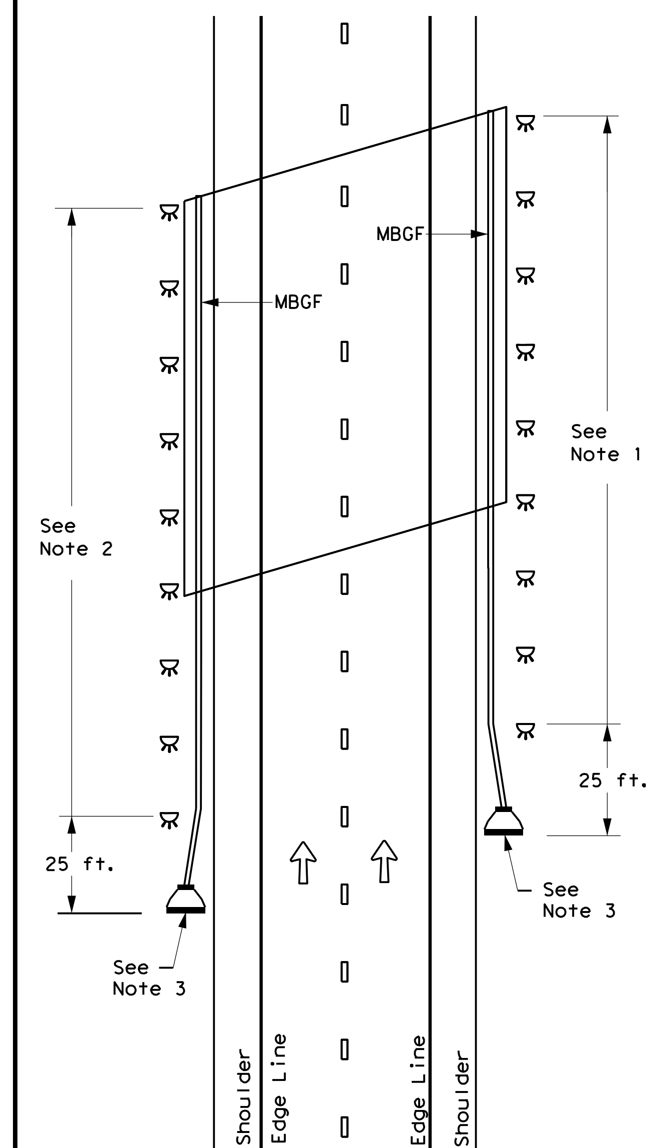
CONTINUOUS CONCRETE OR STEEL BARRIER



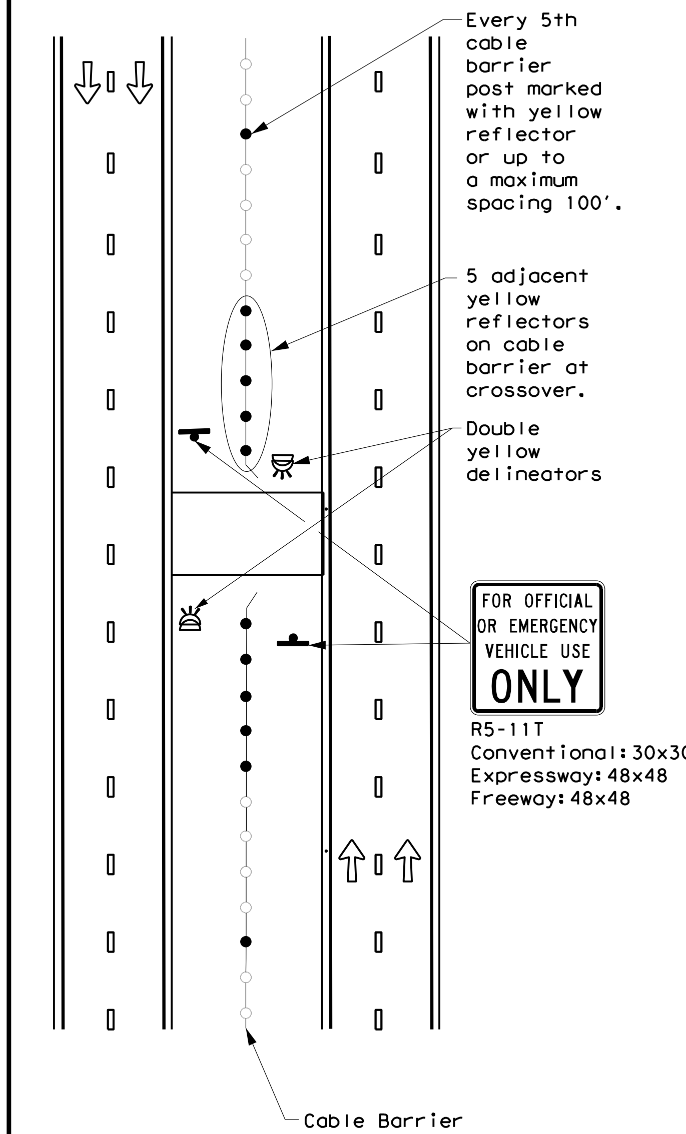
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

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

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

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
7-20	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	120

20F

DATE: 9/22/2022 4:56:19 PM
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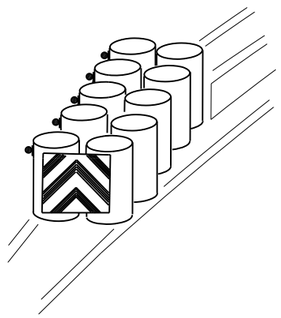
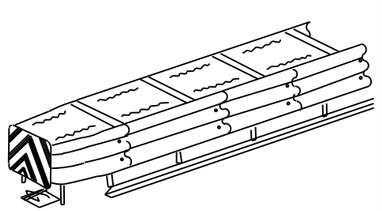
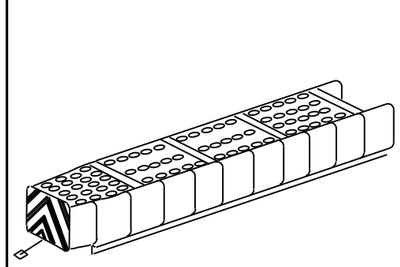
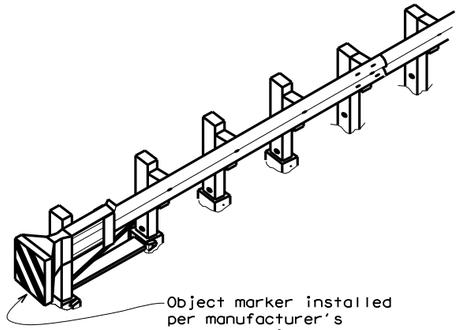
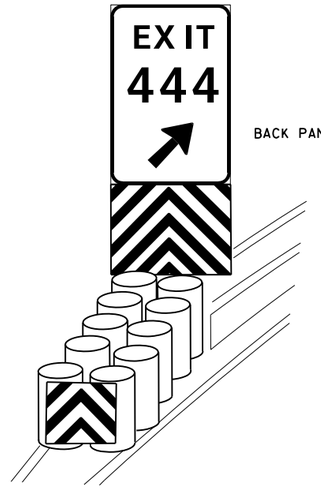
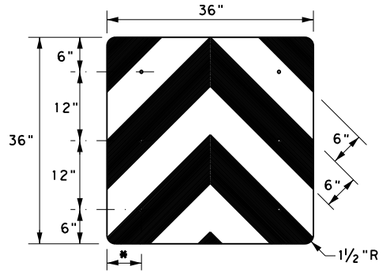


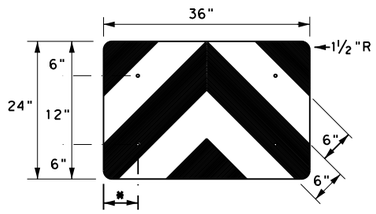




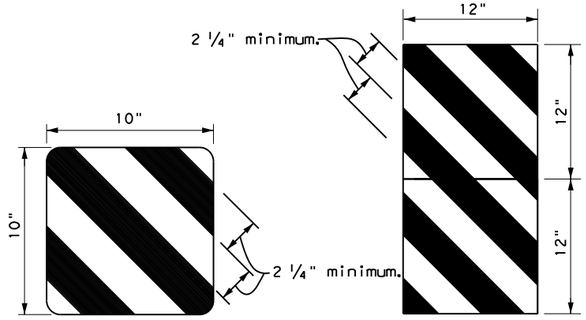




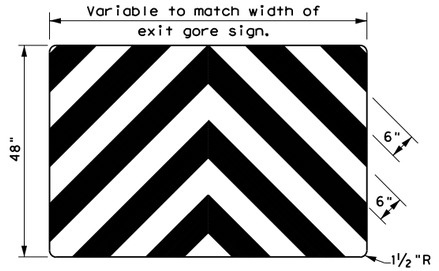


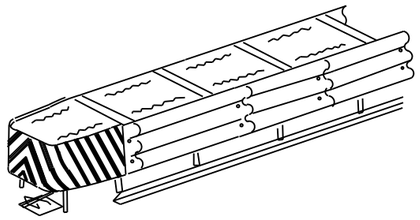


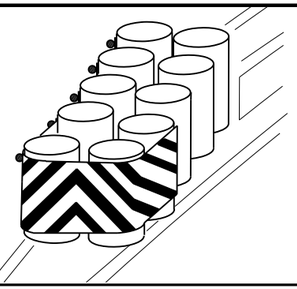
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

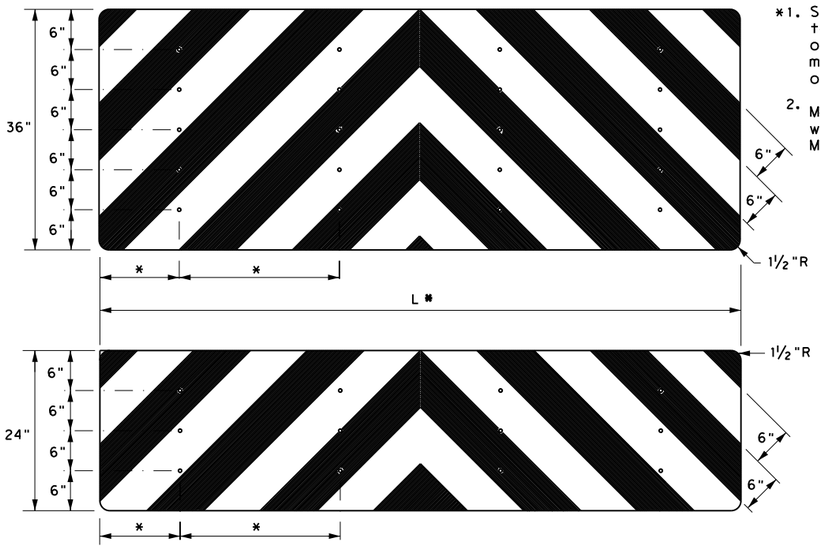


OBJECT MARKERS SMALLER THAN 3 FT^2









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

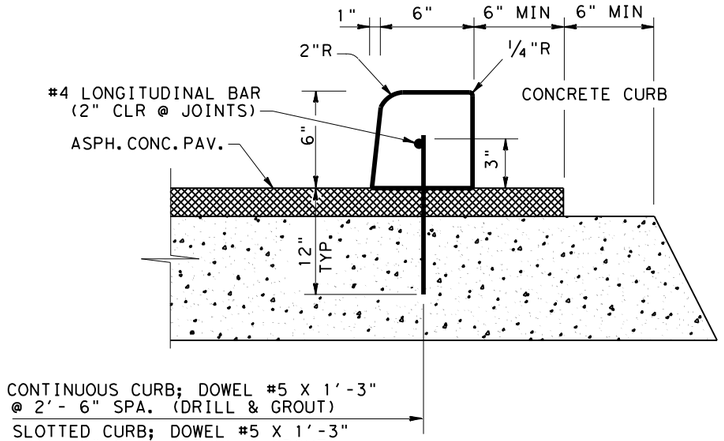
Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

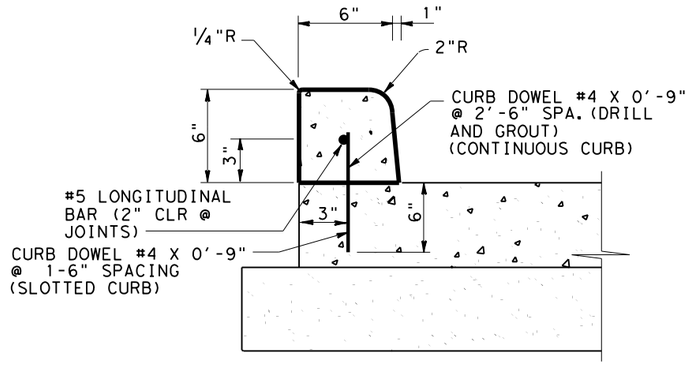
FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	HOU	BRAZORIA		121
4-98 7-20				

20G



SHOWN ON EXISTING OR PROPOSED ACP PAVEMENT

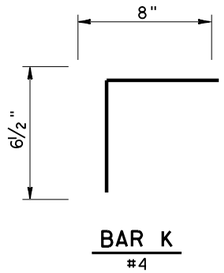
(PAY ITEM 529-6011) - FOR CONTINUOUS



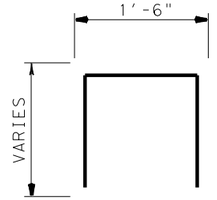
SHOWN ON EXISTING OR PROPOSED CONCRETE PAVEMENT

(PAY ITEM 529-6011) - FOR CONTINUOUS

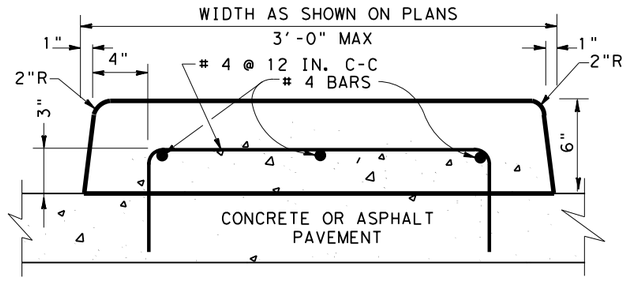
CONCRETE CURB (DOWEL) (6 IN.)



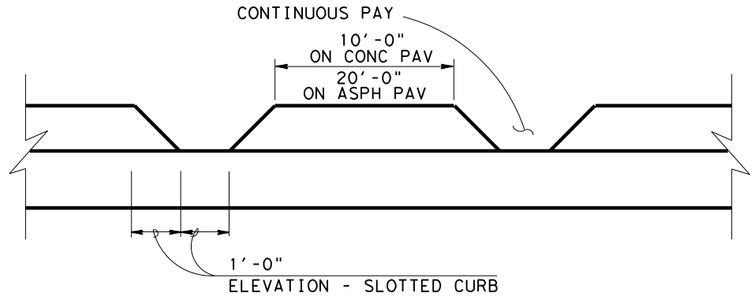
BAR K
#4



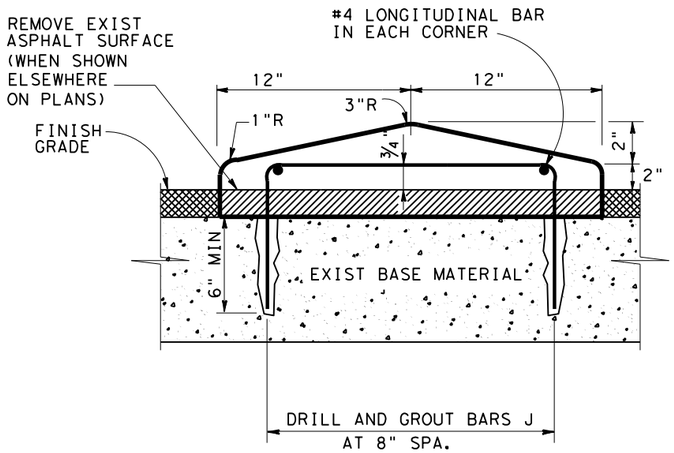
BAR J
#4



ITEM 536-6001 CONCRETE MEDIAN
SEE NOTE 2

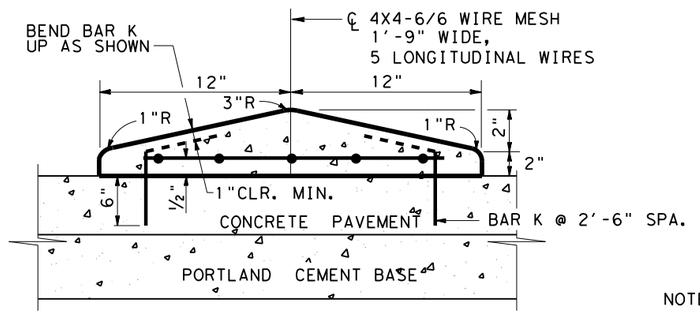


ITEM 529-6012 CONCRETE CURB (SLOTTED) - ON CONC.
ITEM 529-6009 CONC CURB (DOWEL)(SLOTTED) - ON ASPH.



SHOWN ON EXISTING ACP PAVEMENT

SEE NOTE 2 - ITEM 536-6003 CONC DIRECTIONAL ISLAND



SHOWN ON EXISTING OR PROPOSED CONCRETE PAVEMENT

SEE NOTE 2 - ITEM 536-6003 CONC DIRECTIONAL ISLAND

NOTES:

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

CONCRETE DIRECTIONAL ISLAND

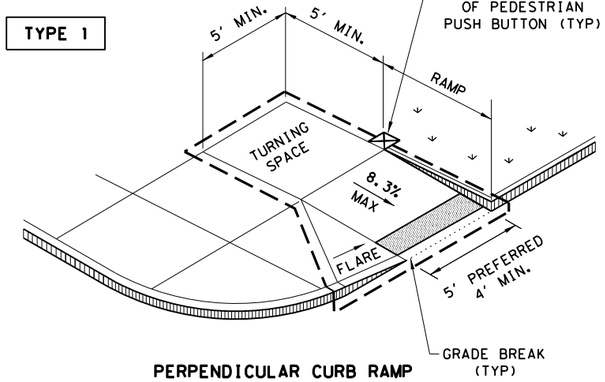
Texas Department of Transportation
Houston District

CONCRETE CURB AND DIRECTIONAL ISLAND DETAILS
CC & DID

FILE: STDB-9.dgn	DN:	CK:	DW:	CK:
©TxDOT 2014	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6	C 111-9-42	122
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	94	0111	09 042	BS 288B

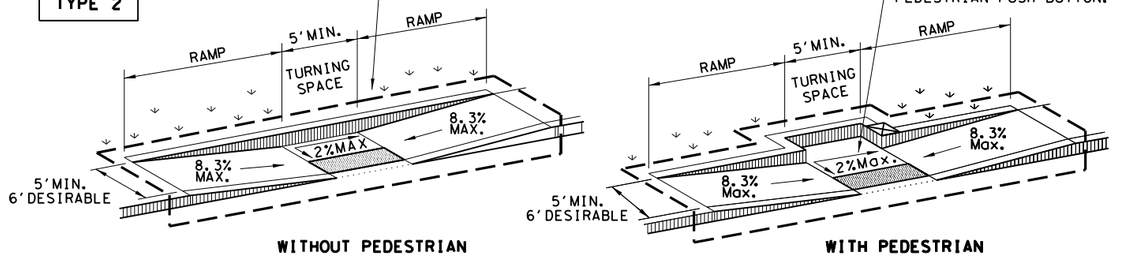
DATE:
FILE:

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

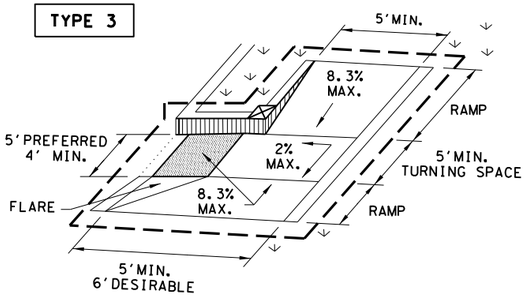


WITHOUT PEDESTRIAN PUSH BUTTON

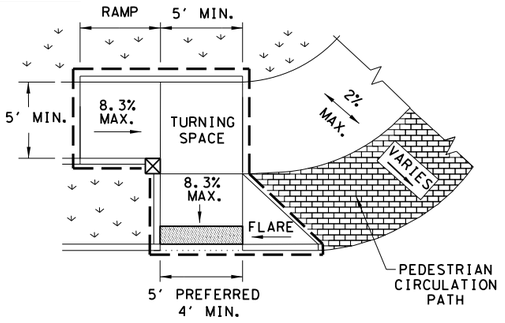
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

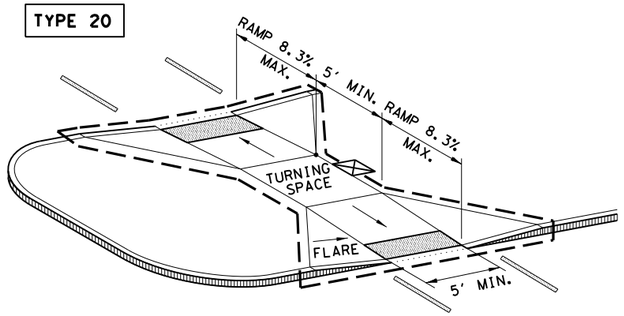


TYPE 6



COMBINATION CURB RAMPS

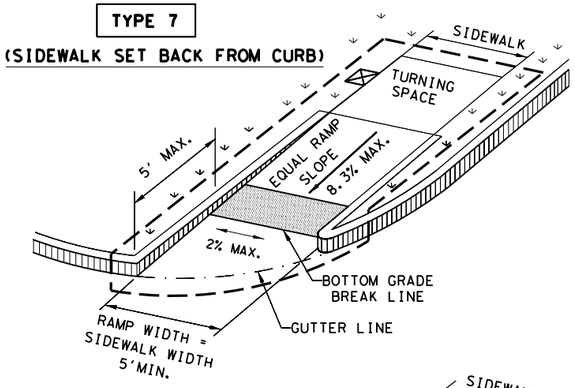
TYPE 20



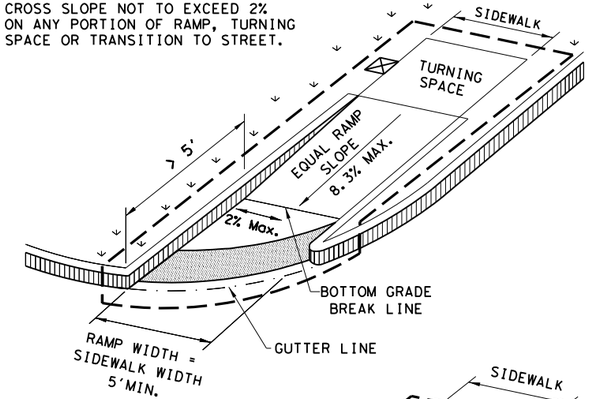
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

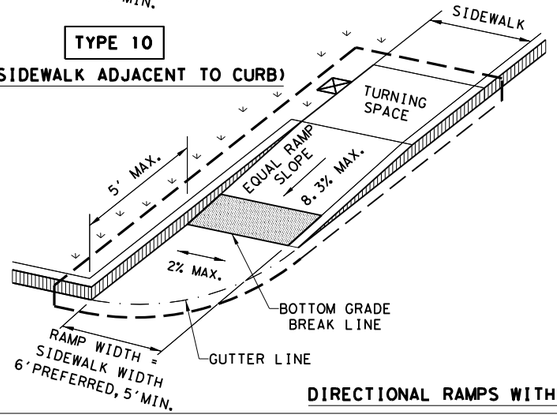


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

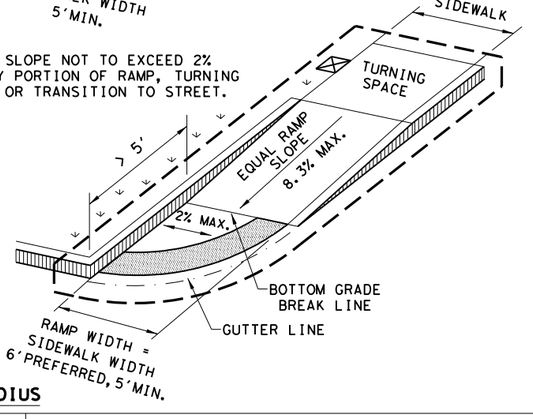


TYPE 10

(SIDEWALK ADJACENT TO CURB)

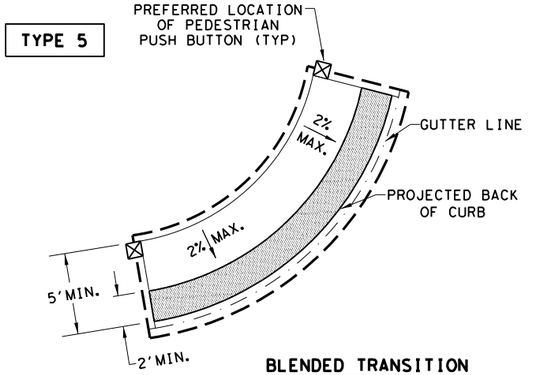


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



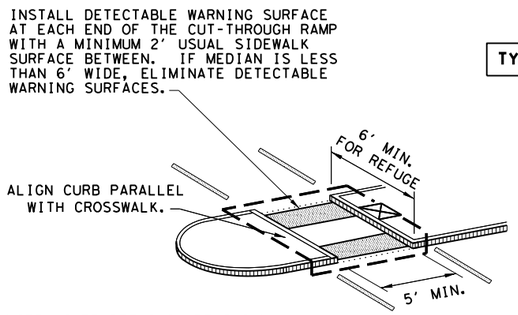
DIRECTIONAL RAMPS WITHIN RADIUS

TYPE 5



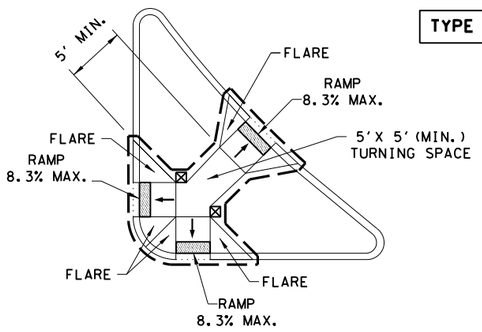
BLENDED TRANSITION
(FLUSH LANDING)

TYPE 21

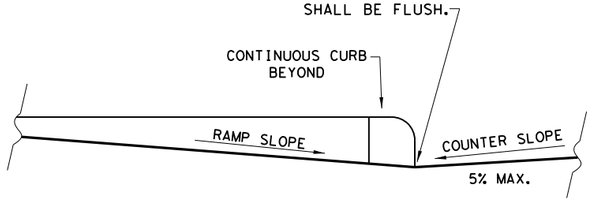


NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

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

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

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0111	09	042	BS 288B	
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.	
	HOU	BRAZORIA		122A	

DATE:
FILE:

GENERAL NOTES

CURB RAMPS

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

DETECTABLE WARNING MATERIAL

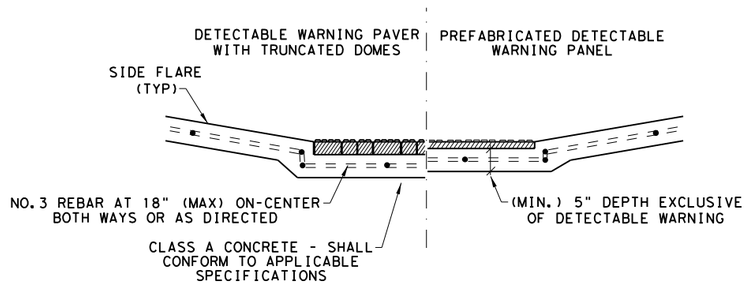
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material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

DETECTABLE WARNING PAVERS (IF USED)

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

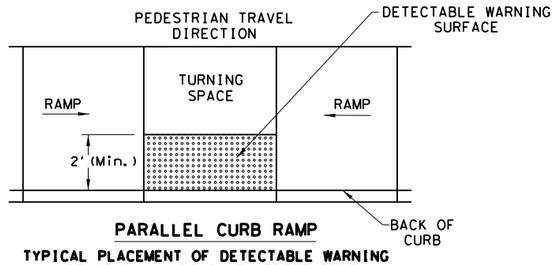
SIDEWALKS

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

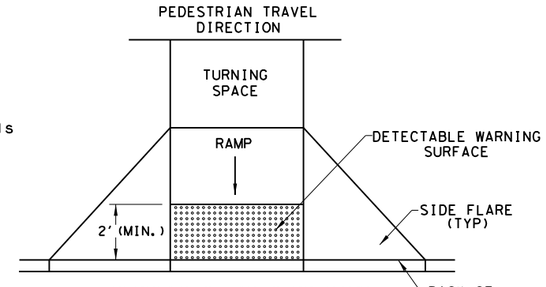


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

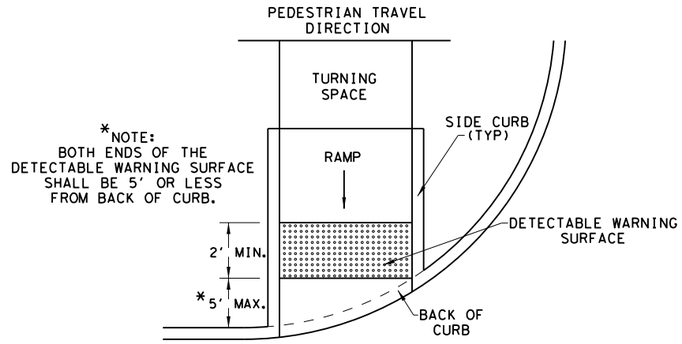
DETECTABLE WARNING SURFACE DETAILS



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



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



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

Texas Department of Transportation | Design Division Standard

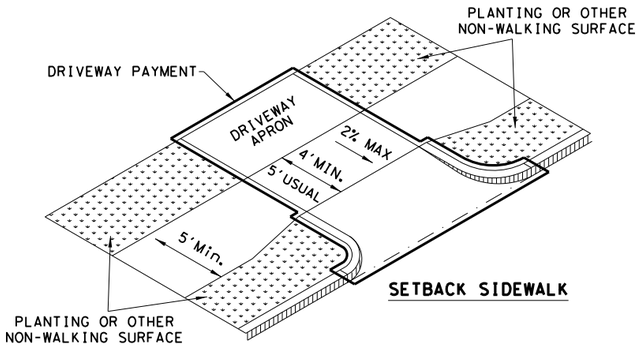
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

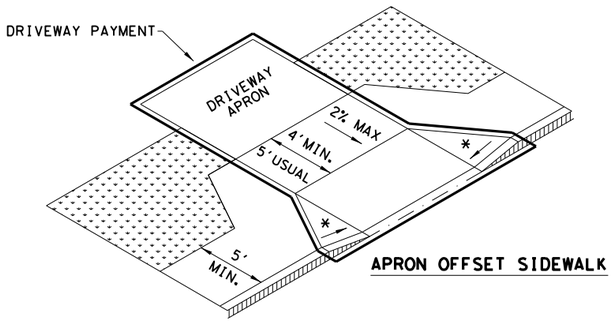
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0111	09	042		BS 288B
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	HOU	BRAZORIA			122B

DATE:
FILE:

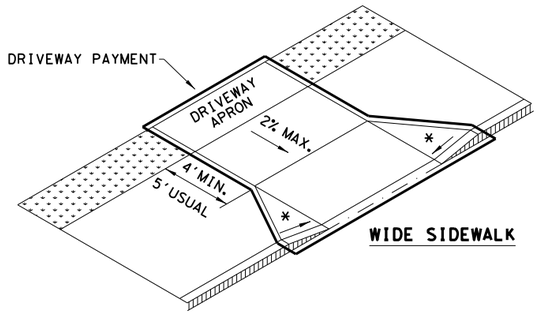
SIDEWALK TREATMENT AT DRIVEWAYS



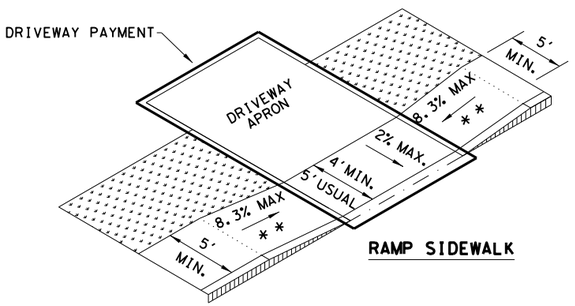
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

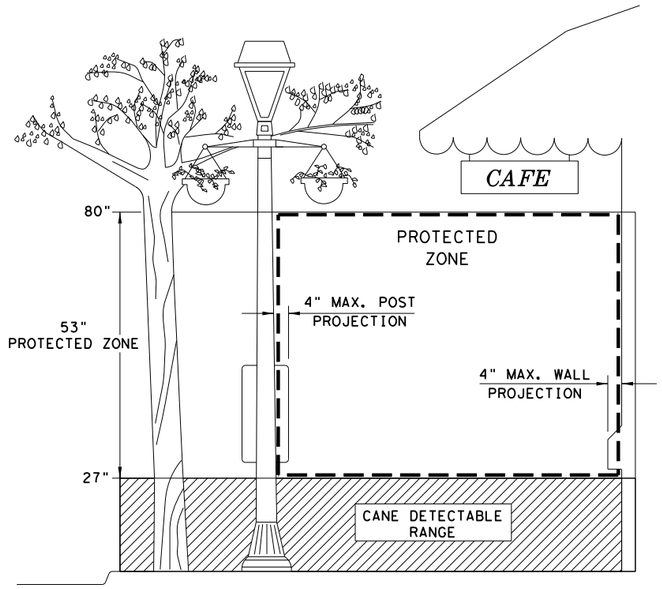


RAMP SIDEWALK

NOTES:

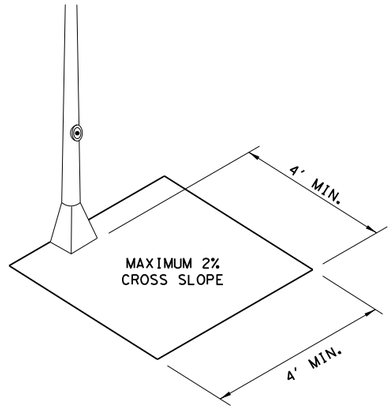
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

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

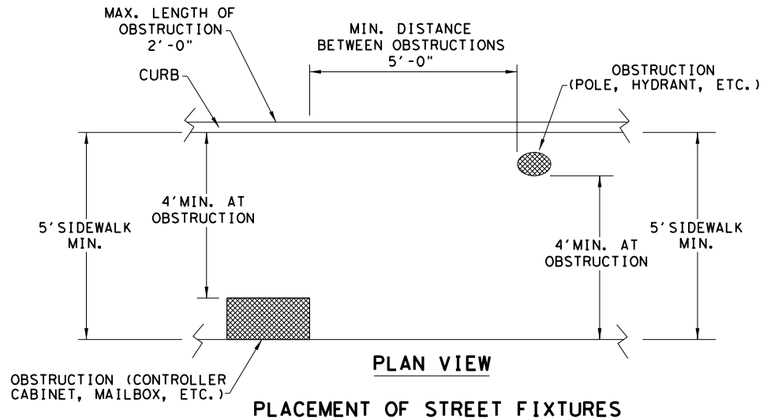


PROTECTED ZONE

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



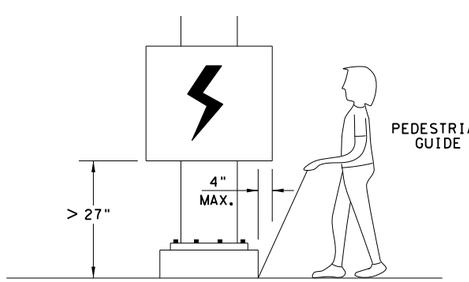
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



PLAN VIEW

PLACEMENT OF STREET FIXTURES

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



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

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

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

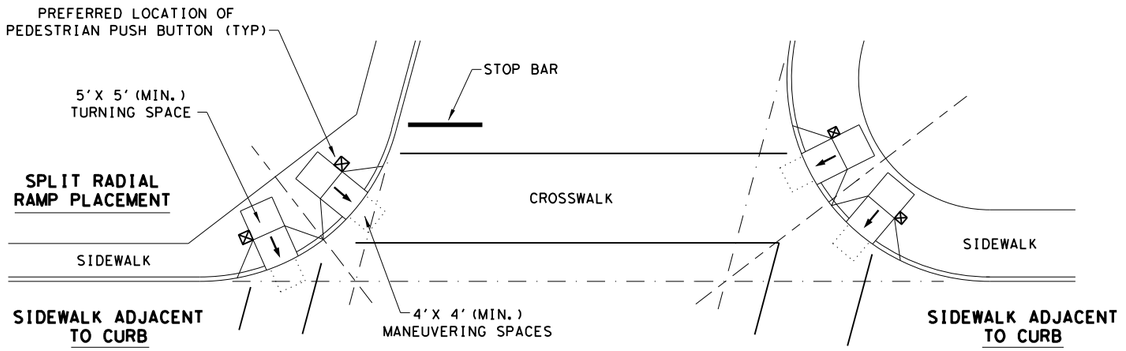
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

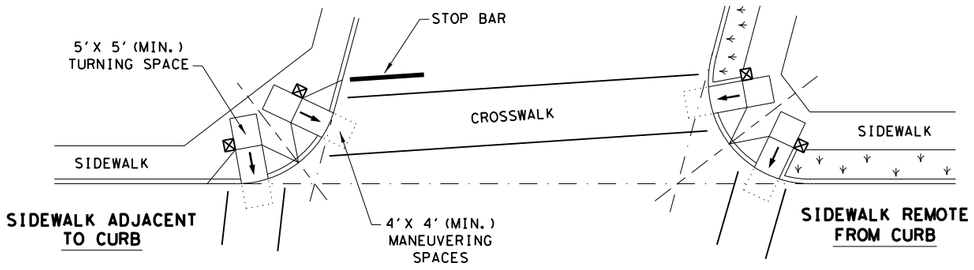
FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0111	09	042	BS 288B	
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.	
	HOU	BRAZORIA		122C	

DATE:
FILE:

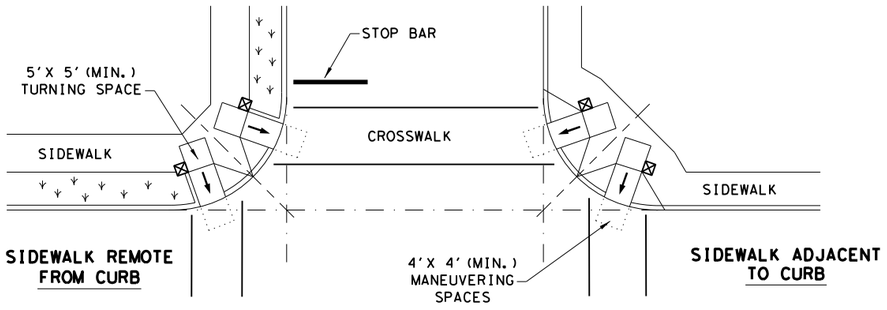
TYPICAL CROSSING LAYOUTS
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



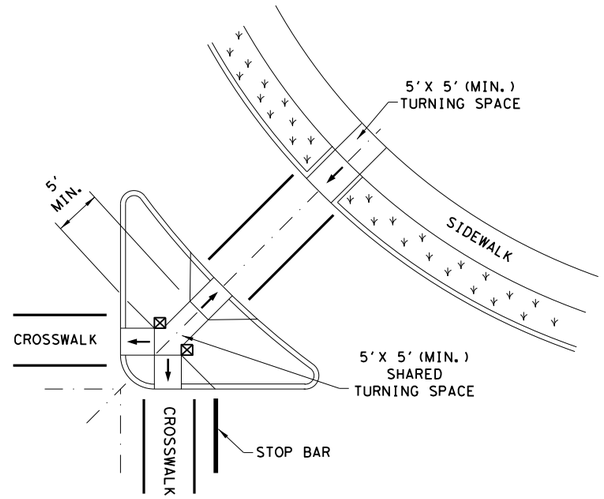
SKEWED INTERSECTION WITH "LARGE" RADIUS



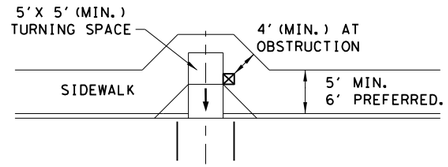
SKEWED INTERSECTION WITH "SMALL" RADIUS

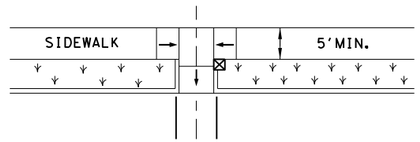


NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND





MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

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

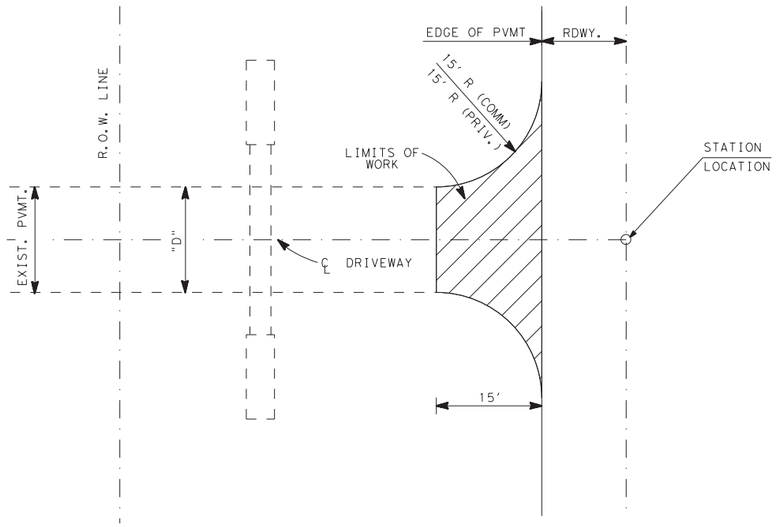
DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

Texas Department of Transportation | Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0111	09	042	BS 288B	
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.	
	HOU	BRAZORIA		122D	

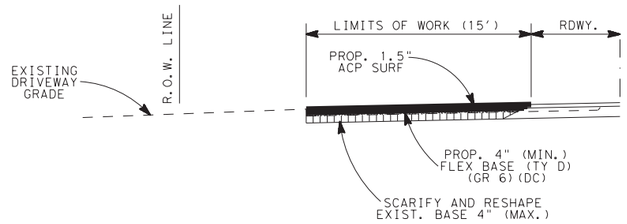


PLAN (TYPE I & II)

PRIVATE & COMMERCIAL DRIVEWAYS

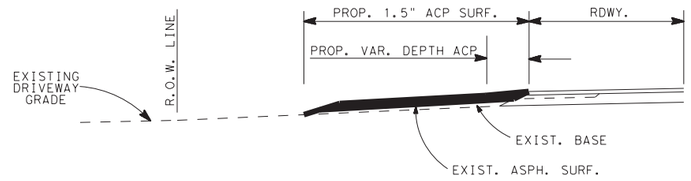
NOTE:
1. EMBANKMENT, SCARIFYING OF BASE, PRIME, FLEX BASE, AND ASPH CONC PAV SHALL BE PLACED IN ACCORDANCE WITH ITEM 132, 247, 251, 310, 3076 AND SHALL BE INCIDENTAL TO ITEM 530.

* MATCH WIDTH OF EXISTING DRIVEWAY.



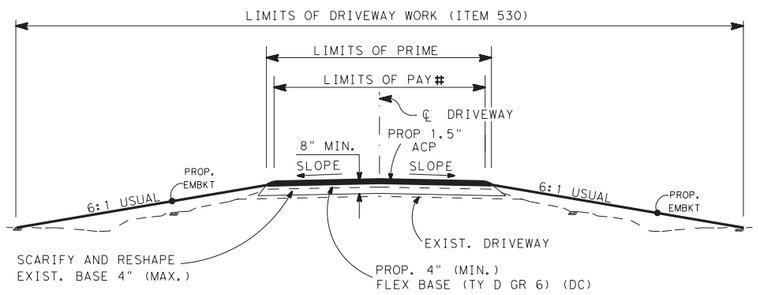
PROFILE (TYPE I)

PRIVATE & COMMERCIAL DRIVEWAYS



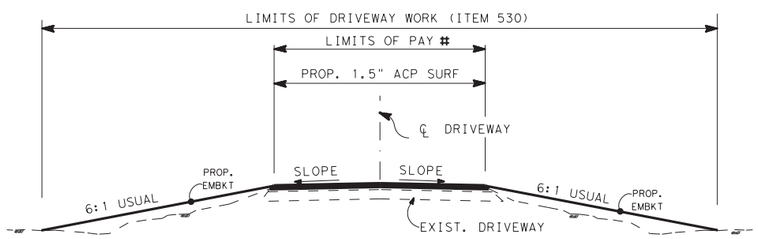
PROFILE (TYPE II)

PRIVATE & COMMERCIAL DRIVEWAYS



SECTION "A-A"

(TYPE I)



SECTION "A-A"

(TYPE II)

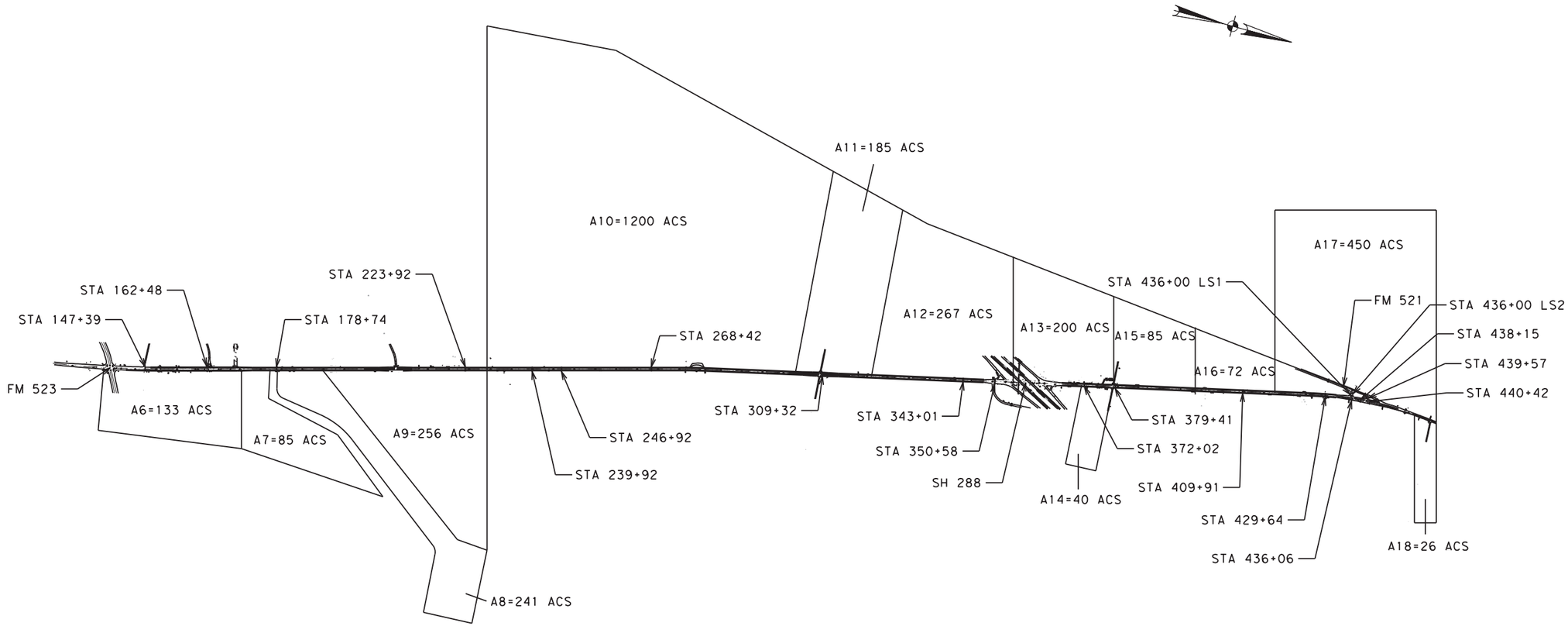
Jamie A.H. Jones, P.E.
09/23/2022

DRIVEWAY DETAILS

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		123

SCALE N.T.S.
SHEET 1 OF 1



STATE OF TEXAS
JAMIE A. H. JONES
128752
LICENSED PROFESSIONAL ENGINEER

Jamie A.H. Jones

09/29/2022

DRAINAGE AREA MAP

Texas Department of Transportation®
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CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		124

SCALE N.T.S
SHEET 1 OF 1

9/29/2022
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111090042\4 - Design\Plan Set\5. Drainage\Drainage Areas.dgn

Culvert Summary					
Allowable HW Elevation	N/A	ft	Storm Event	Design	
Computed Headwater Elev	37.87	ft	Discharge	148.54	cfs
Headwater Depth/Height	1.22		Tailwater Elevation	37.30	ft
Inlet Control HW Elev.	37.30	ft	Control Type	Outlet Control	
Outlet Control HW Elev.	37.87	ft			

Grades					
Upstream Invert	34.20	ft	Downstream Invert	33.83	ft
Length	96.00	ft	Constructed Slope	0.003854	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	3.47	ft
Slope Type	N/A		Normal Depth	1.67	ft
Flow Regime	N/A		Critical Depth	1.68	ft
Velocity Downstream	4.13	ft/s	Critical Slope	0.003749	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	6.00	ft
Section Size	6 x 3 ft		Rise	3.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	37.87	ft	Upstream Velocity Head	0.26	ft
Ke	0.70		Entrance Loss	0.19	ft

Inlet Control Properties					
Inlet Control HW Elev.	37.30	ft	Flow Control	Unsubmerged	
Inlet Type	0° wingwall flares		Area Full	36.0	ft²
K	0.06100		HDS 5 Chart	8	
M	0.75000		HDS 5 Scale	3	
C	0.04230		Equation Form	1	
Y	0.82000				

Culvert Summary					
Allowable HW Elevation	N/A	ft	Storm Event	Check	
Computed Headwater Elev	39.04	ft	Discharge	200.73	cfs
Headwater Depth/Height	1.61		Tailwater Elevation	37.99	ft
Inlet Control HW Elev.	37.99	ft	Control Type	Outlet Control	
Outlet Control HW Elev.	39.04	ft			

Grades					
Upstream Invert	34.20	ft	Downstream Invert	33.83	ft
Length	96.00	ft	Constructed Slope	0.003854	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	4.16	ft
Slope Type	N/A		Normal Depth	2.06	ft
Flow Regime	N/A		Critical Depth	2.06	ft
Velocity Downstream	5.58	ft/s	Critical Slope	0.003884	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	6.00	ft
Section Size	6 x 3 ft		Rise	3.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	39.04	ft	Upstream Velocity Head	0.48	ft
Ke	0.70		Entrance Loss	0.34	ft

Inlet Control Properties					
Inlet Control HW Elev.	37.99	ft	Flow Control	Unsubmerged	
Inlet Type	0° wingwall flares		Area Full	36.0	ft²
K	0.06100		HDS 5 Chart	8	
M	0.75000		HDS 5 Scale	3	
C	0.04230		Equation Form	1	
Y	0.82000				

STATE OF TEXAS
JAMIE A. H. JONES
128752
LICENSED PROFESSIONAL ENGINEER

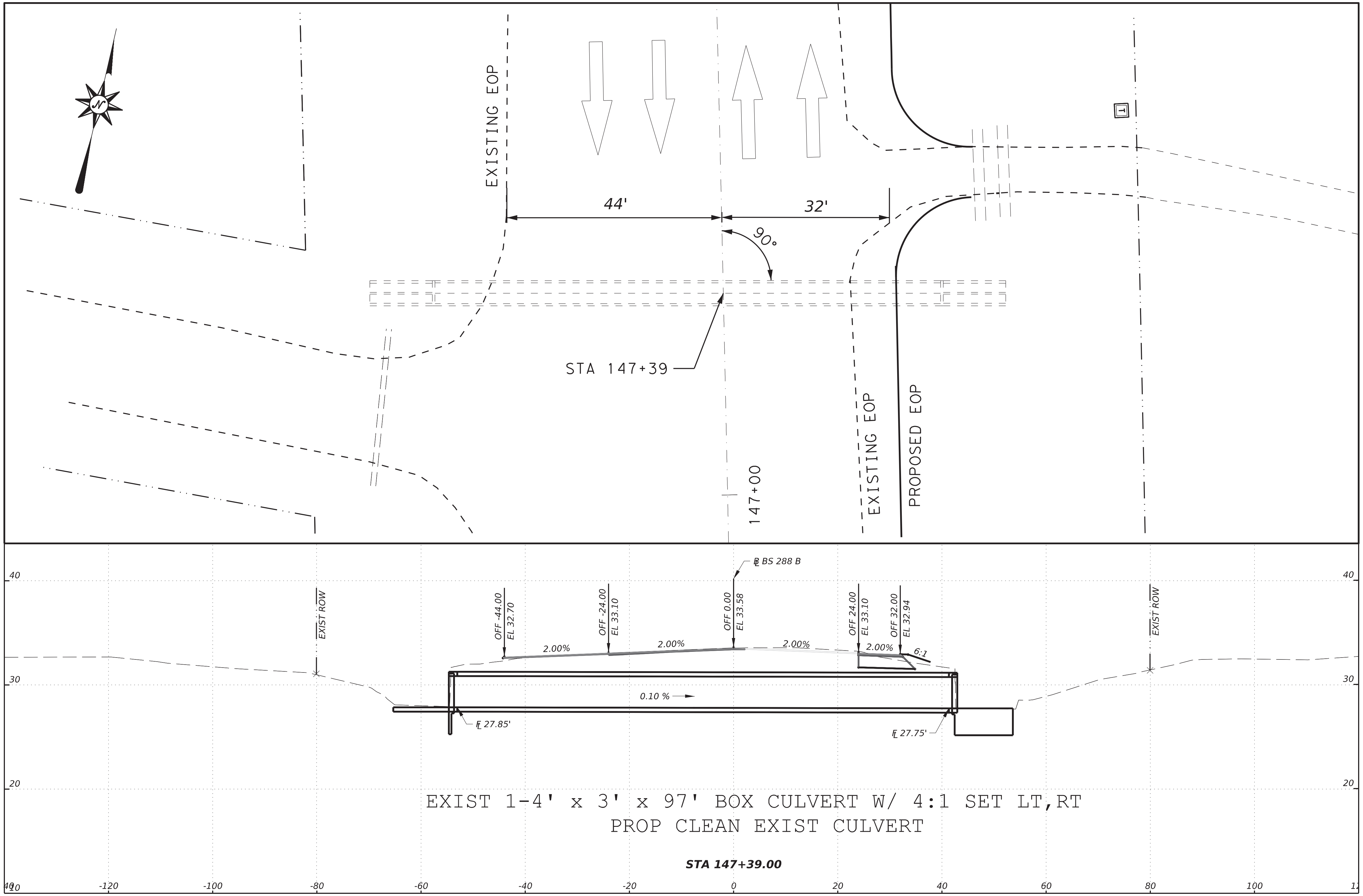
Jamie A.H. Jones, P.E.

09/23/2022

Culvert 309+32
HYDRAULIC DATA

CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		125

SHEET 1 OF 1



EXIST 1-4' x 3' x 97' BOX CULVERT W/ 4:1 SET LT,RT
PROP CLEAN EXIST CULVERT

STA 147+39.00

STATE OF TEXAS
JAMIE A. H. JONES
128752
LICENSED
PROFESSIONAL ENGINEER

Jamie A.H. Jones
09/28/2022

Texas Department of Transportation

SHEET 1 OF 20

SCALE 1"=20' HOR
1"=10' VERT

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	126

DATE: 9/28/2022 10:24:00 PM
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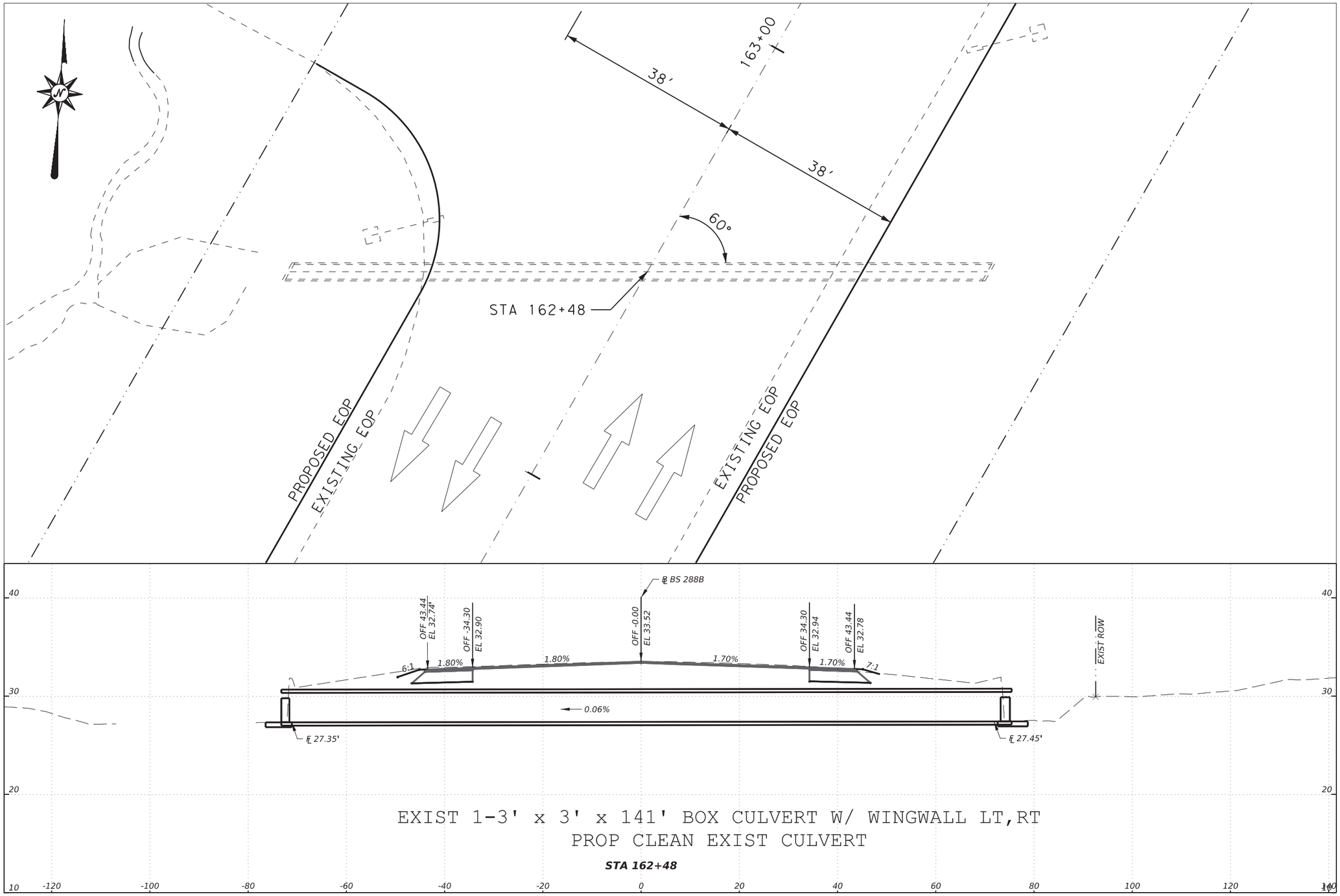

EXIST 1-3' x 3' x 141' BOX CULVERT W/ WINGWALL LT,RT
PROP CLEAN EXIST CULVERT

STA 162+48

STATE OF TEXAS
JAMIE A. H. JONES
128752
LICENSED
PROFESSIONAL ENGINEER

Jamie A.H. Jones

09/28/2022

Texas Department of Transportation

SHEET 2 OF 20

SCALE 1"=20' HOR
1"=10' VERT

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	127

DW: CK: DW: CK:

DATE: 9/26/2022 2:51:27 PM
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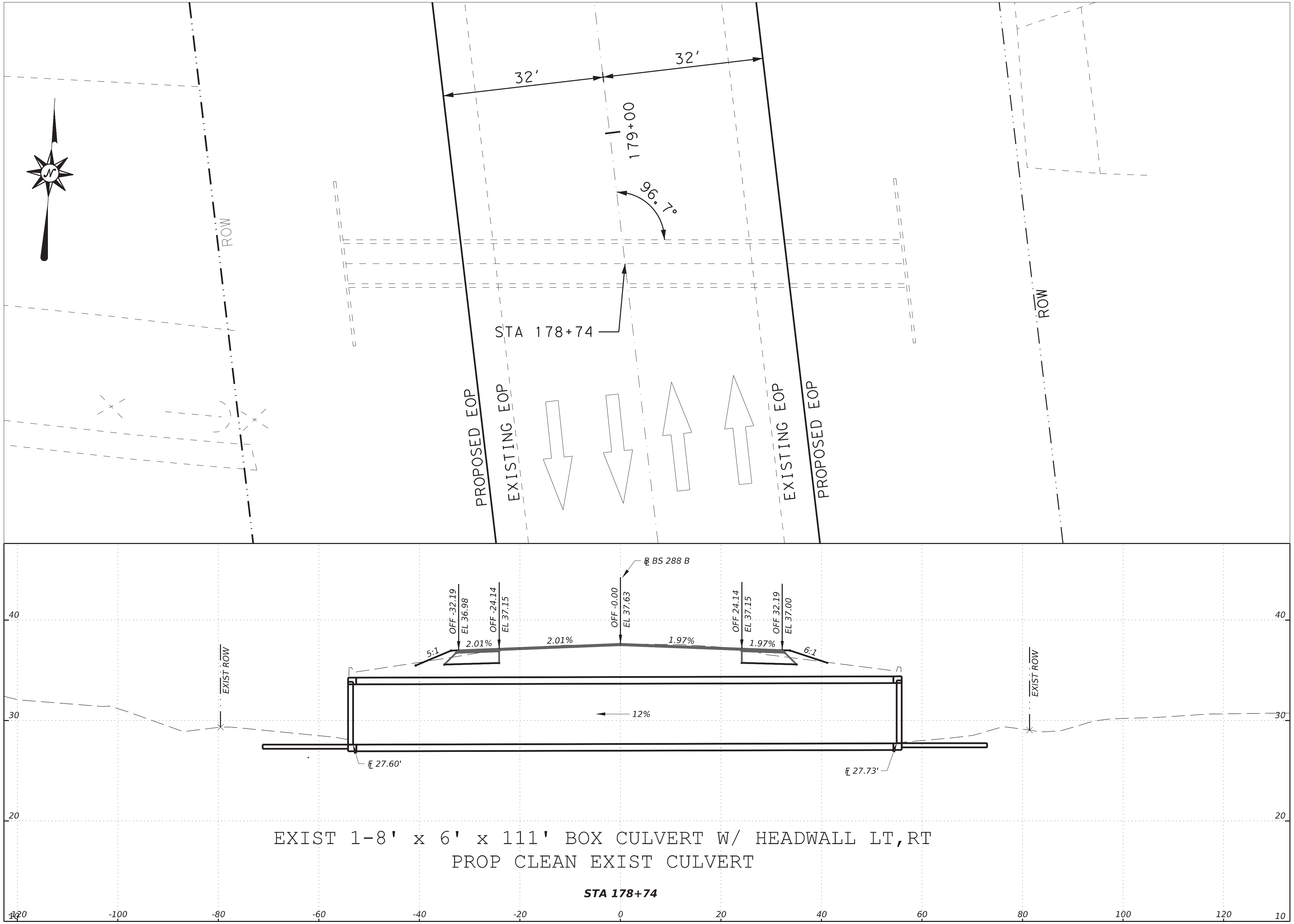

STATE OF TEXAS
JAMIE A. H. JONES
128752
LICENSED
PROFESSIONAL ENGINEER

Jamie A.H. Jones

09/28/2022

Texas Department of Transportation

SHEET 3 OF 20

SCALE 1"=20' HOR
1"=10' VERT

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	128

DATE: 9/28/2022 02:40:49 PM
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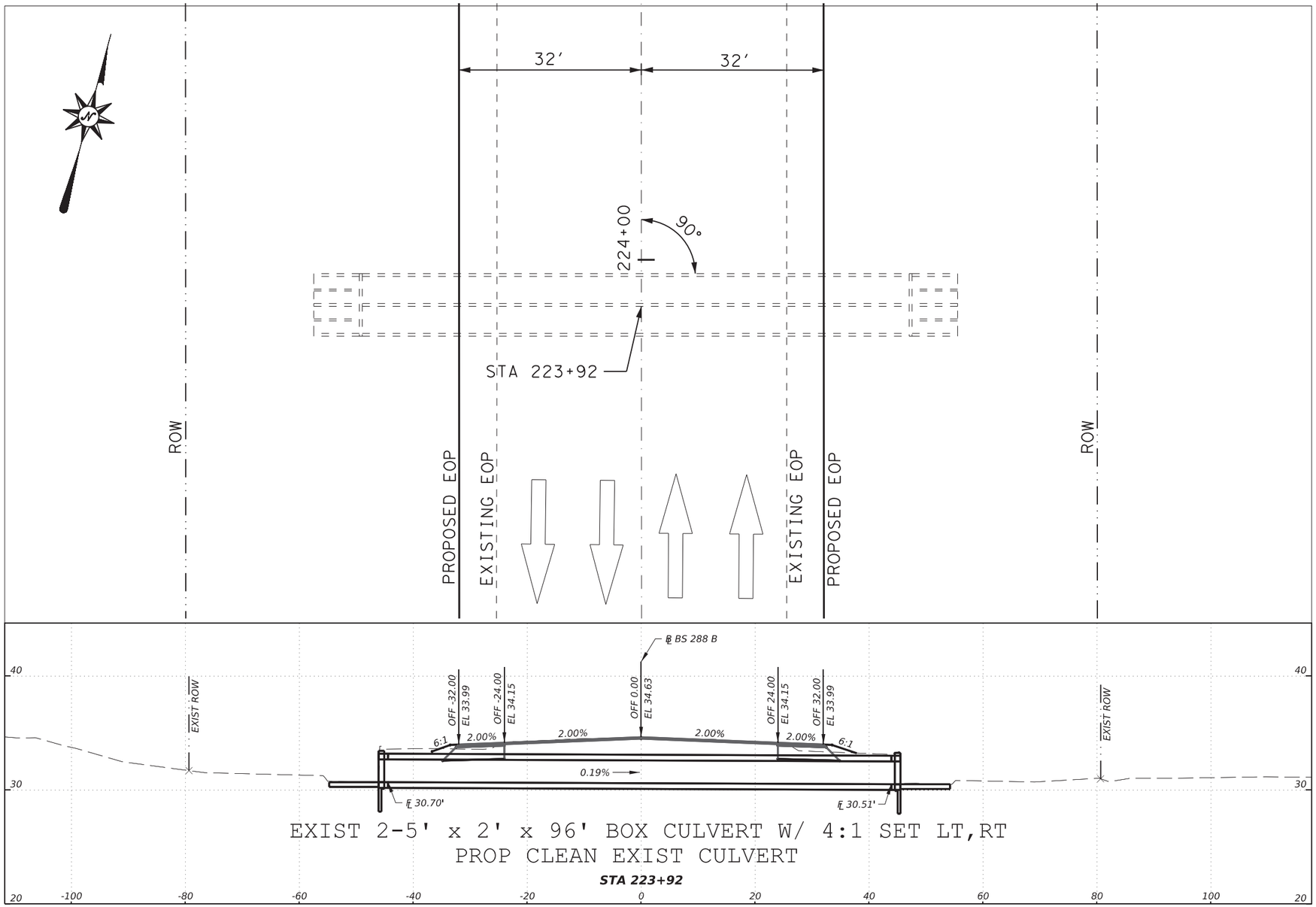

EXIST 2-5' x 2' x 96' BOX CULVERT W/ 4:1 SET LT,RT
PROP CLEAN EXIST CULVERT

STA 223+92

STATE OF TEXAS
JAMIE A. H. JONES
128752
LICENSED
PROFESSIONAL ENGINEER

Jamie A.H. Jones

09/28/2022

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SHEET 4 OF 20

SCALE 1"=20' HOR
1"=10' VERT

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	129

DATE: 9/26/2022 2:24:51 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT3/Documents/12 - HOU/Design Projects/1111-22-333 ORD-Practice 5/4 - Design/Working/0111-09-042/CULVERT LAYOUTS/BS 288 B- 223+92.dgn

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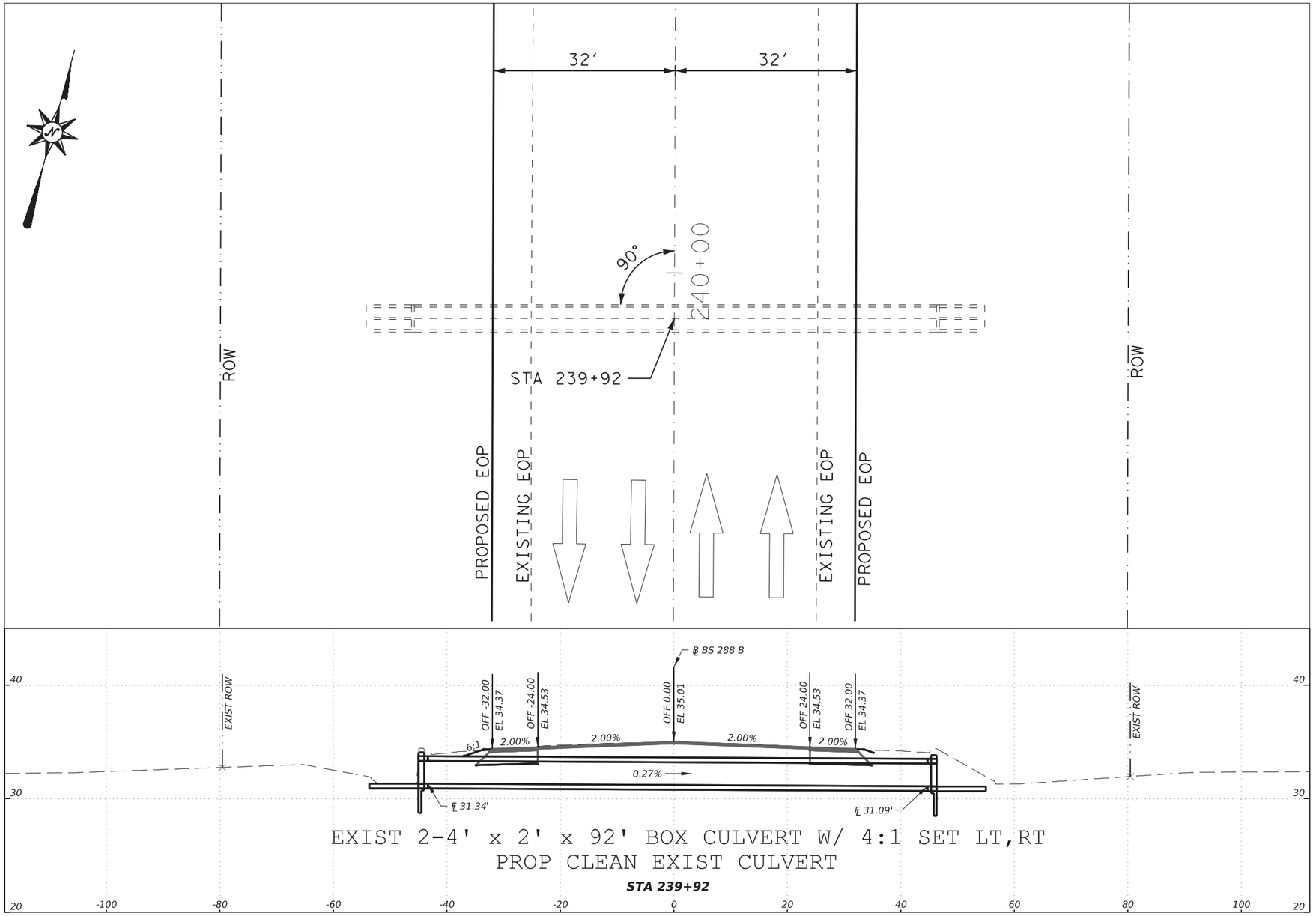

EXIST 2-4' x 2' x 92' BOX CULVERT W/ 4:1 SET LT,RT
PROP CLEAN EXIST CULVERT

STA 239+92

STATE OF TEXAS
JAMIE A. H. JONES
128752
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Jamie A.H. Jones

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DATE: 9/28/2022 12:05:00 PM
FILE: p:\0111-09-042\CULVERT LAYOUTS\BS 288 B- 239+92.dgn

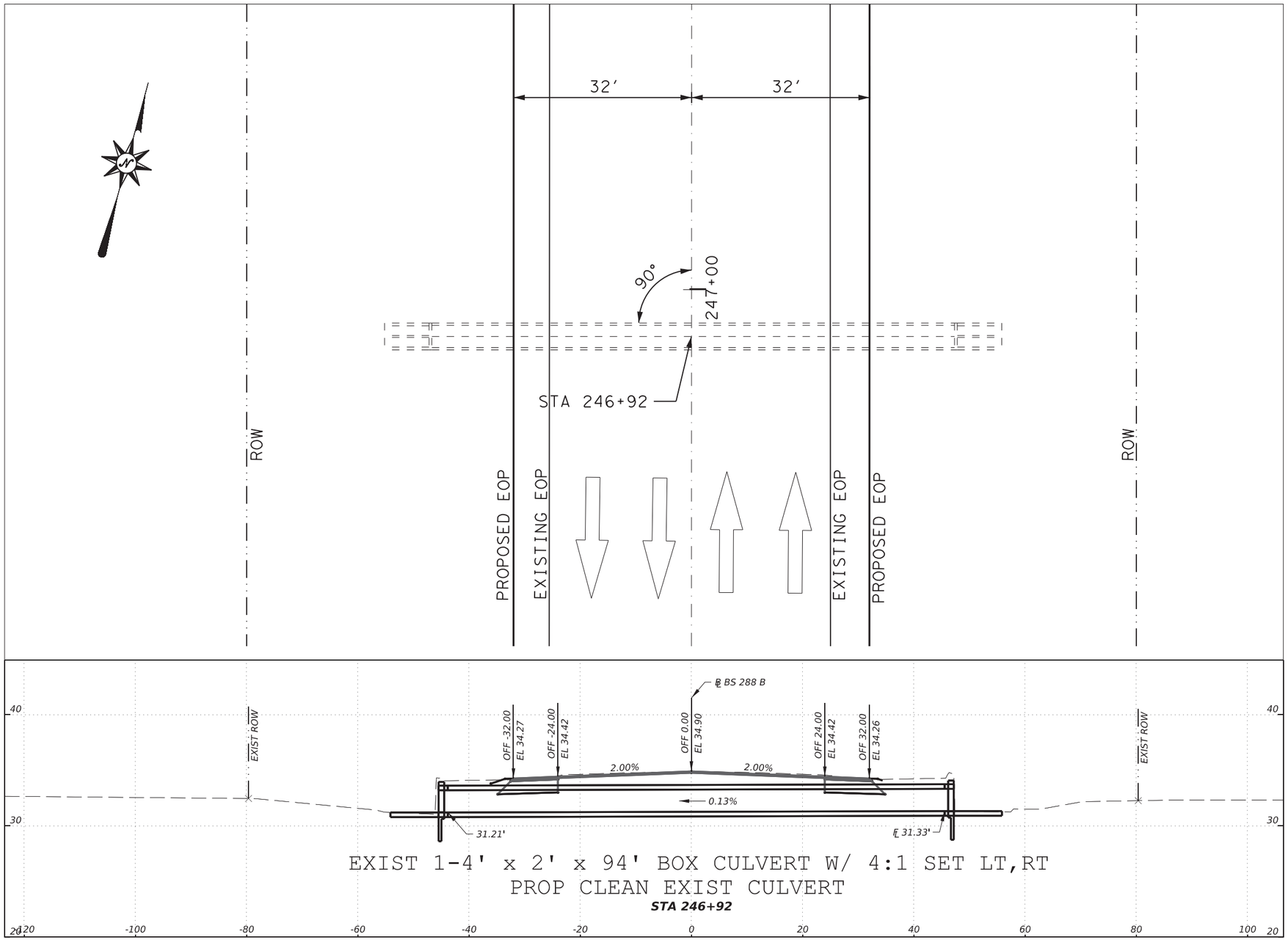
DW: CK: DW: CK:

SCALE 1"=20' HOR
1"=10' VERT

SHEET 5 OF 20

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	130

Texas Department of Transportation



EXIST 1-4' x 2' x 94' BOX CULVERT W/ 4:1 SET LT,RT

PROP CLEAN EXIST CULVERT

STA 246+92

STATE OF TEXAS
JAMIE A. H. JONES
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Jamie A.H. Jones

09/28/2022

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SHEET 6 OF 20

SCALE 1"=20' HOR
1"=10' VERT

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	131

DW: CK: DW: CK:

DATE: 9/28/2022 12:02:52 PM
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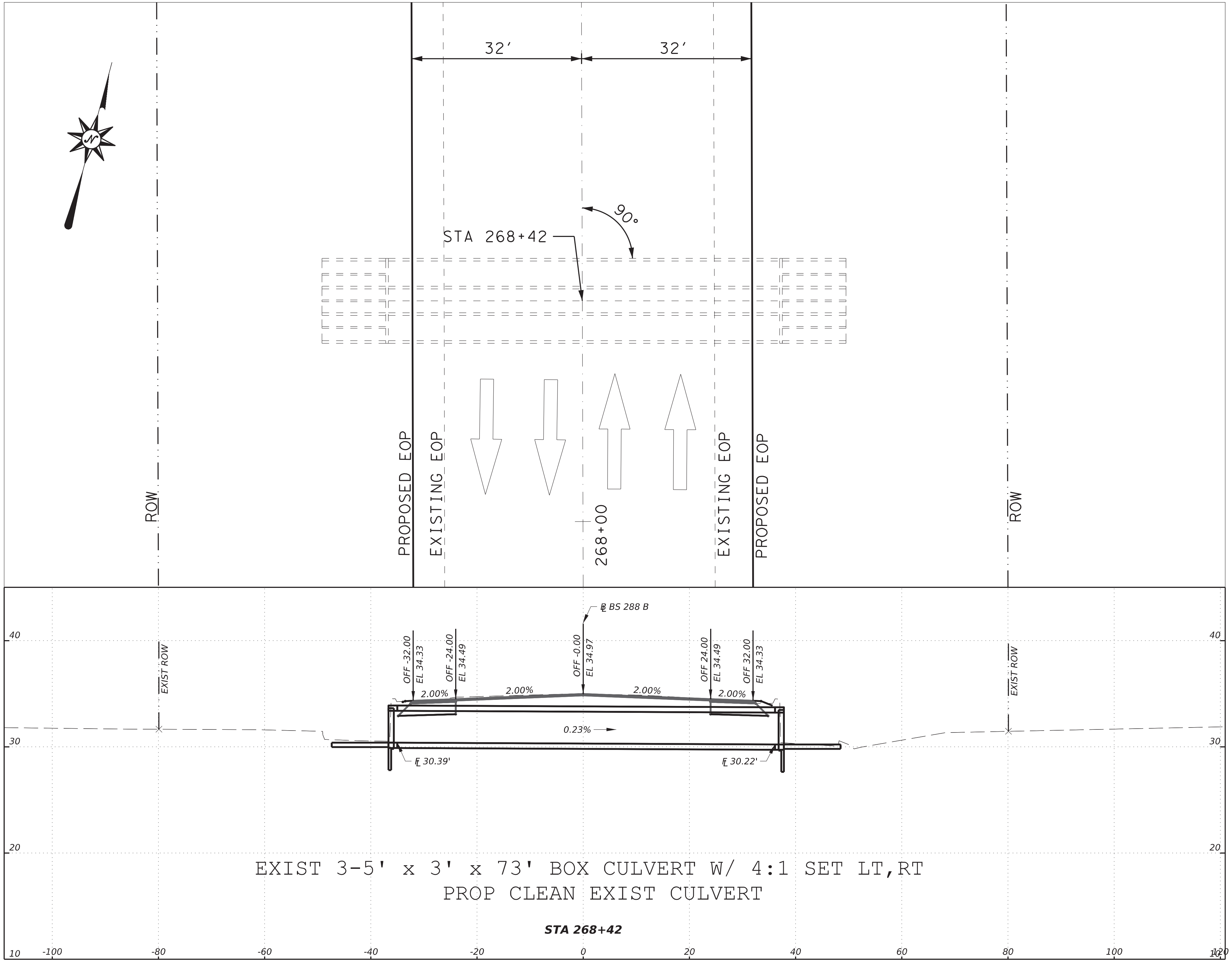

EXIST 3-5' x 3' x 73' BOX CULVERT W/ 4:1 SET LT,RT
PROP CLEAN EXIST CULVERT

STA 268+42

STATE OF TEXAS
JAMIE A. H. JONES
128752
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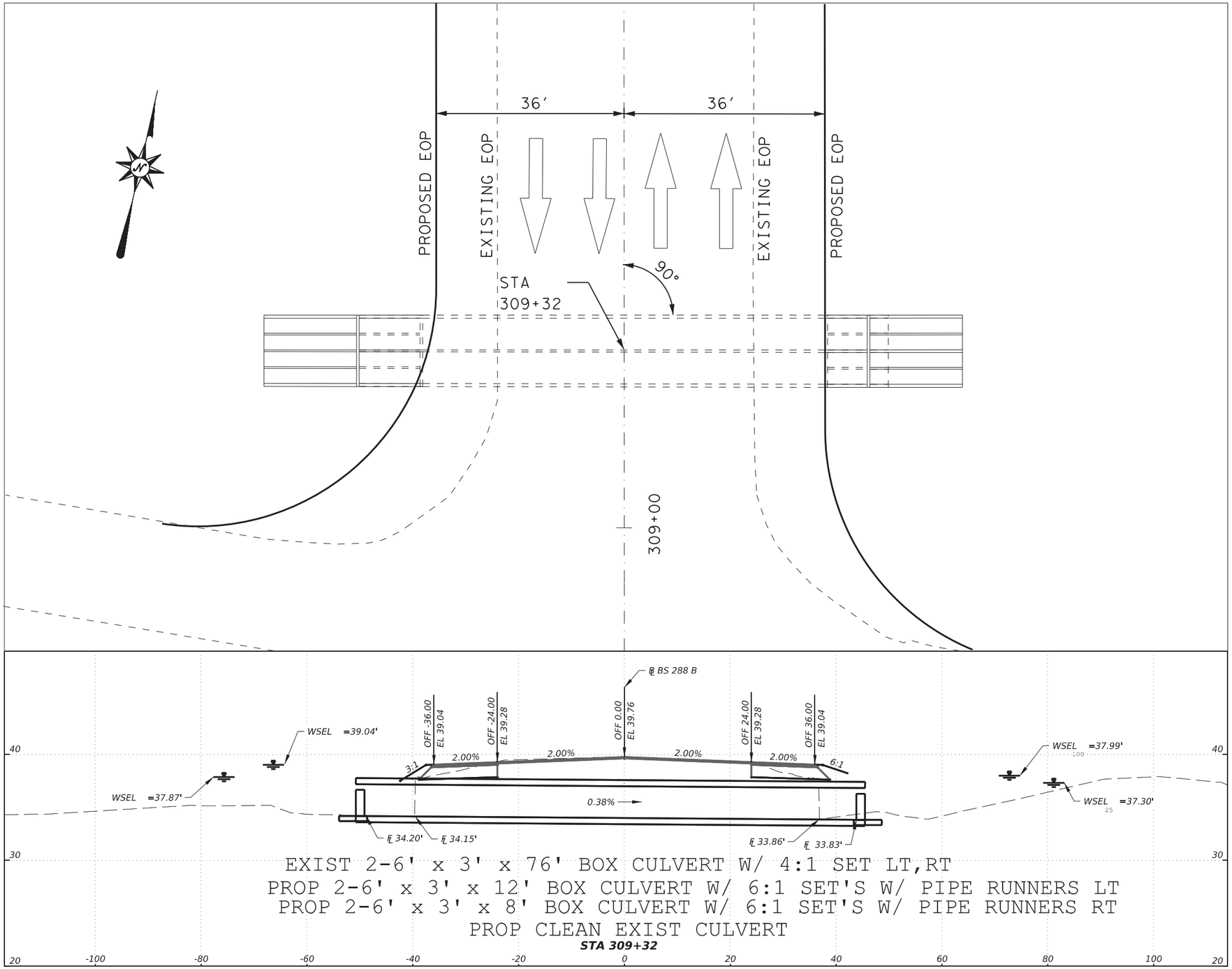
SCALE 1"=20' HOR
1"=10' VERT

SHEET 7 OF 20

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	132

Texas Department of Transportation

DATE: 9/28/2022 12:05:34 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\1111-22-333 ORD-Practice 5\4 - Design\Working\0111-09-042\CULVERT LAYOUTS\BS 288 B- 268+42.dgn



EXIST 2-6' x 3' x 76' BOX CULVERT W/ 4:1 SET LT,RT
PROP 2-6' x 3' x 12' BOX CULVERT W/ 6:1 SET'S W/ PIPE RUNNERS LT
PROP 2-6' x 3' x 8' BOX CULVERT W/ 6:1 SET'S W/ PIPE RUNNERS RT
PROP CLEAN EXIST CULVERT

STA 309+32

STATE OF TEXAS
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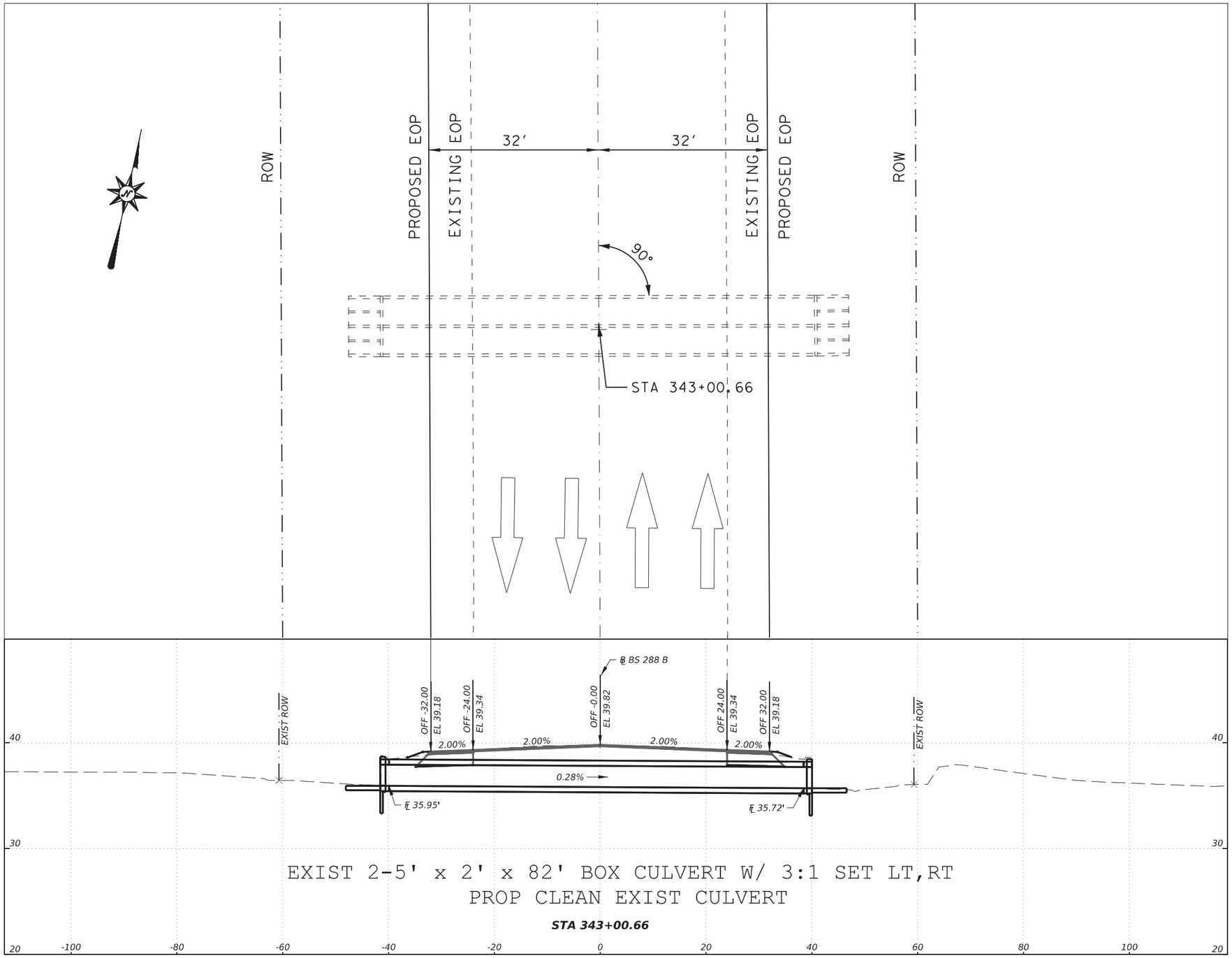
SCALE 1"=20' HOR
1"=10' VERT

SHEET 8 OF 20

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	133

DATE: 9/26/2022 2:25:45 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT3/Documents/12 - HOU/Design Projects/1111-22-333 ORD-Practice 5/4 - Design/Working/0111-09-042/CULVERT LAYOUTS/BS 288 B- 309+32.dgn

DW: CK: DW: CK:



EXIST 2-5' x 2' x 82' BOX CULVERT W/ 3:1 SET LT,RT

PROP CLEAN EXIST CULVERT

STA 343+00.66

STATE OF TEXAS
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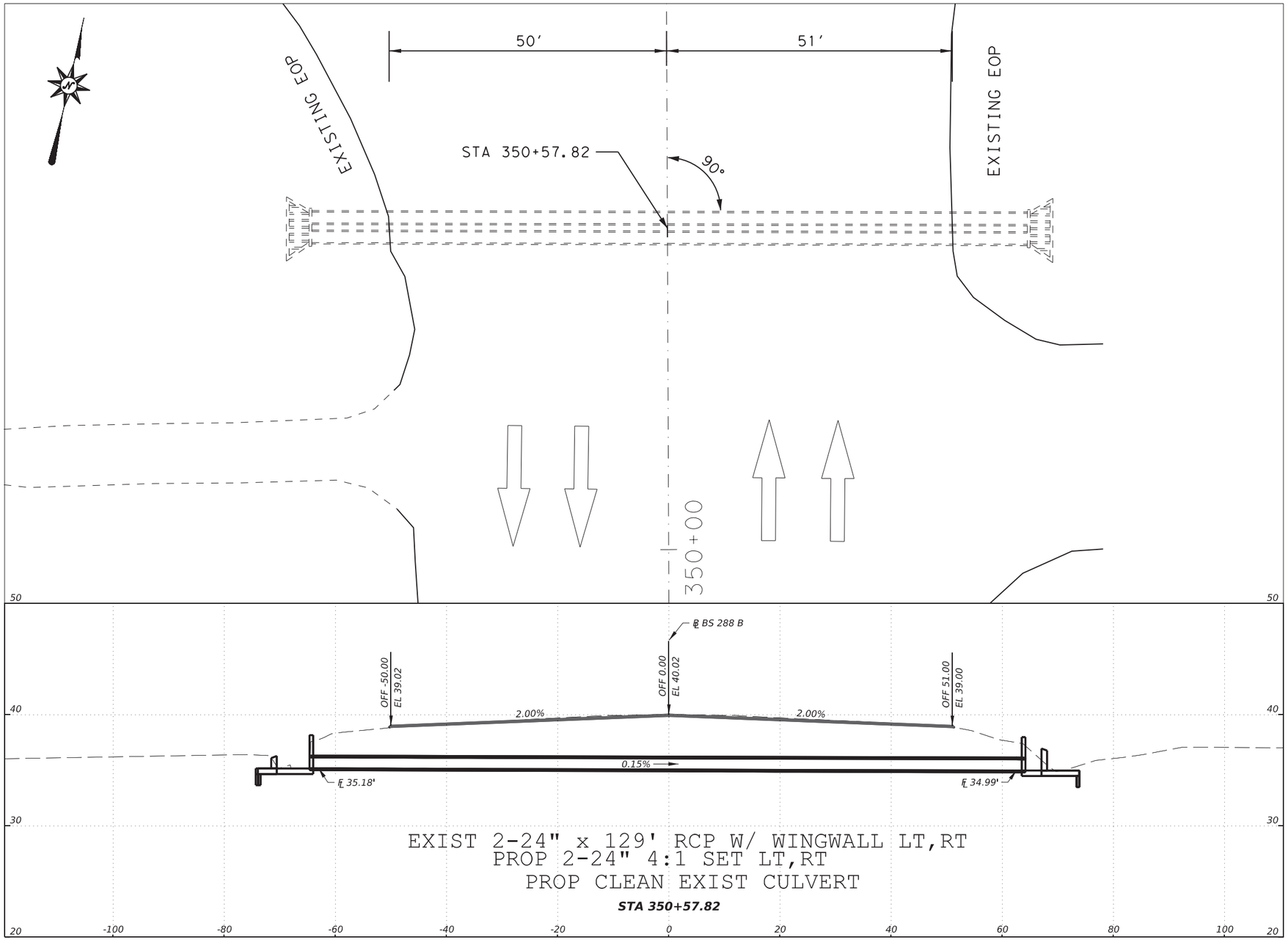
SHEET 9 OF 20

SCALE 1"=20' HOR
1"=10' VERT

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	134

DW: CK: DW: CK:

DATE: 9/26/2022 2:25:56 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT3/Documents/12 - HOU/Design Projects/1111-22-333 ORD-Practice 5/4 - Design/Working/0111-09-042/CULVERT LAYOUTS/BS 288 B - 343+00.66.dgn



EXIST 2-24" x 129' RCP W/ WINGWALL LT,RT
PROP 2-24" 4:1 SET LT,RT
PROP CLEAN EXIST CULVERT

STA 350+57.82

STATE OF TEXAS
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Jamie A.H. Jones

09/28/2022

DW: CK: DW: CK:

DATE: 9/26/2022 2:26:08 PM
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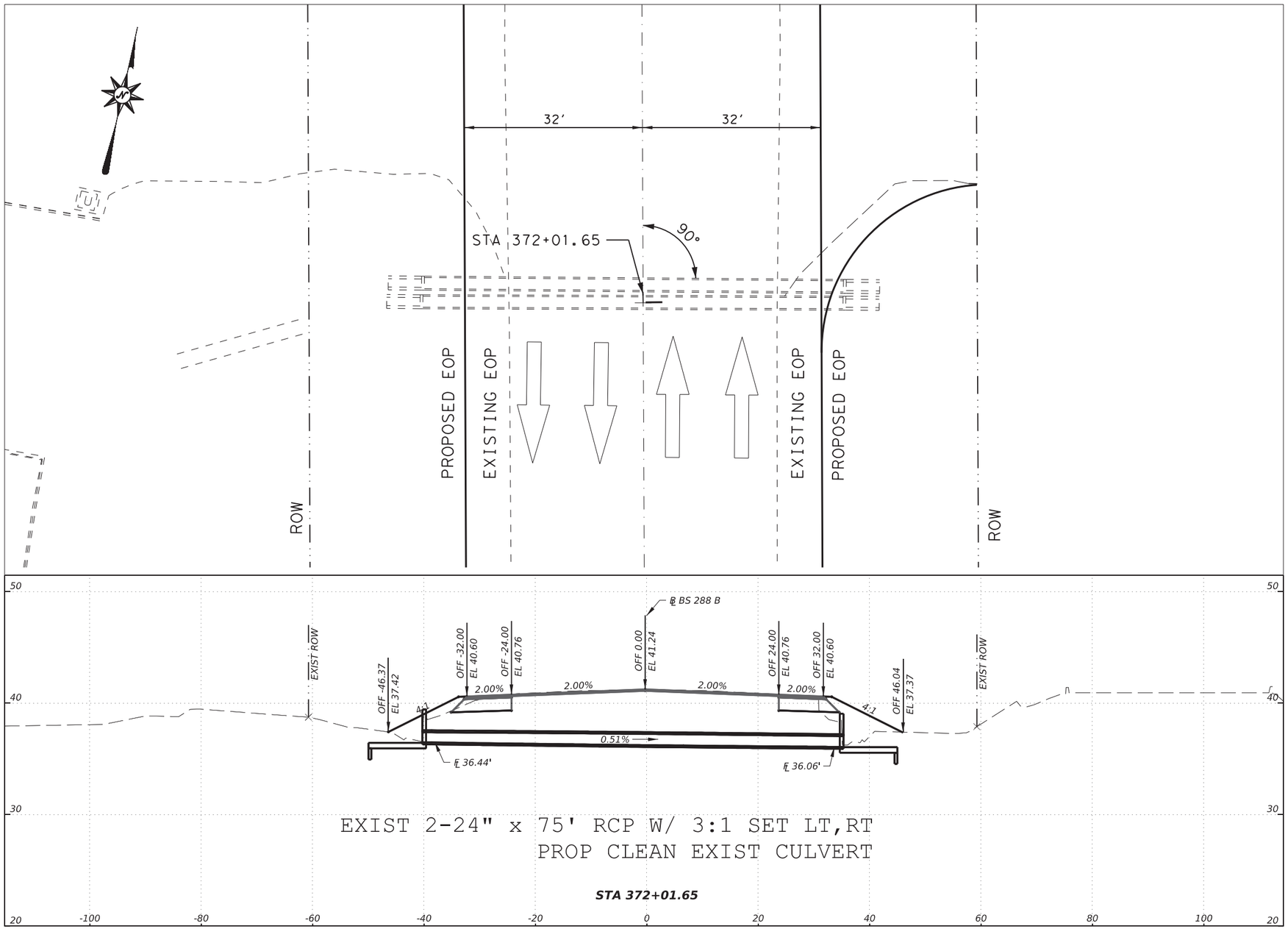
SCALE 1"=20' HOR
1"=10' VERT

SHEET 10 OF 20

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	135

Texas Department of Transportation



EXIST 2-24" x 75' RCP W/ 3:1 SET LT,RT
PROP CLEAN EXIST CULVERT

STA 372+01.65

STATE OF TEXAS
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09/28/2022

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SCALE 1"=20' HOR
1"=10' VERT

SHEET 11 OF 20

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	136

DATE: 9/26/2022 2:26:20 PM
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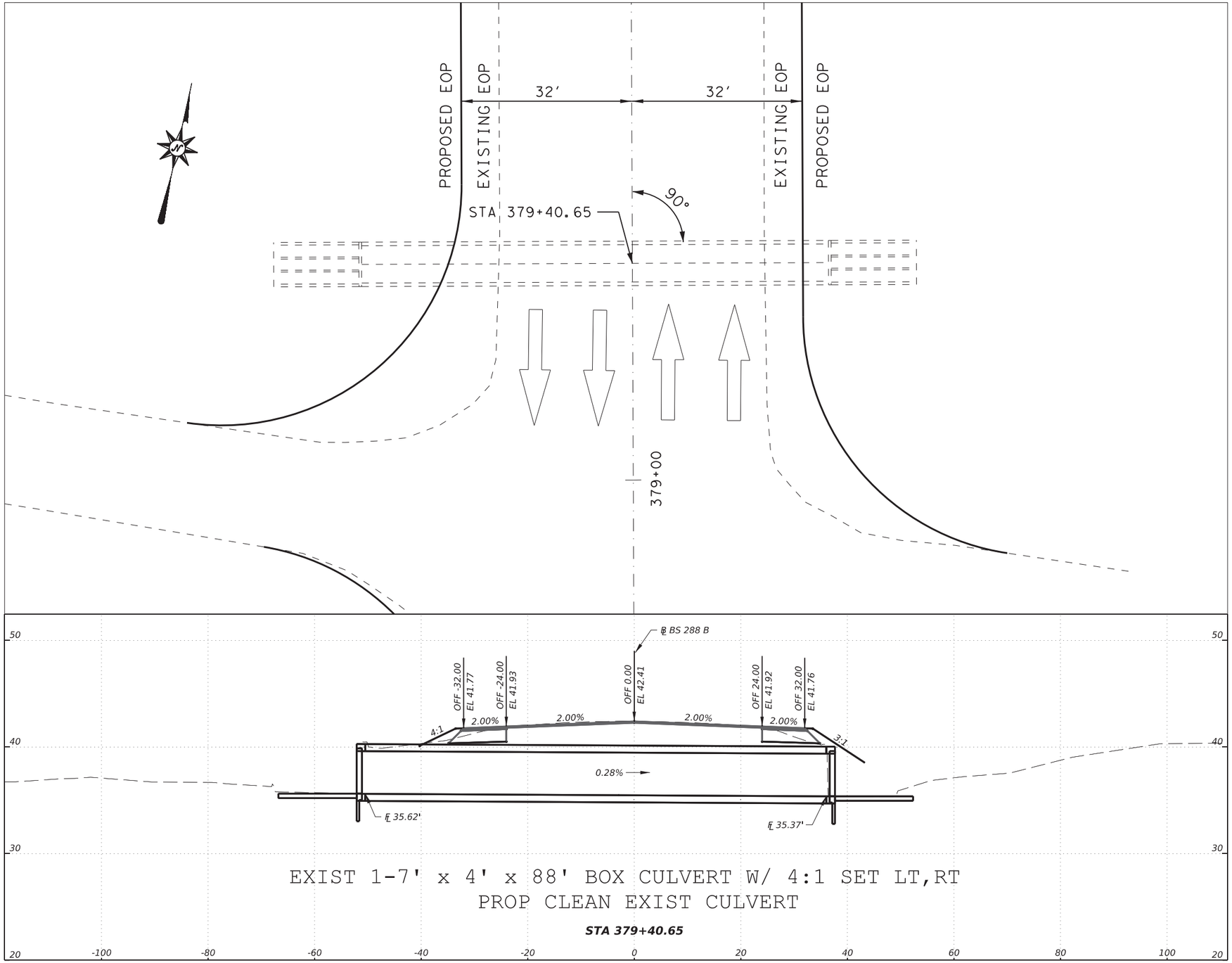

EXIST 1-7' x 4' x 88' BOX CULVERT W/ 4:1 SET LT,RT
PROP CLEAN EXIST CULVERT

STA 379+40.65

STATE OF TEXAS
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09/28/2022

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SHEET 12 OF 20

SCALE 1"=20' HOR
1"=10' VERT

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	137

DATE: 9/26/2022 2:26:32 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT3/Documents/12 - HOU/Design Projects/1111-22-333 ORD-Practice 5/4 - Design/Working/0111-09-042/CULVERT LAYOUTS/BS 288 B- 379+40.65.dgn

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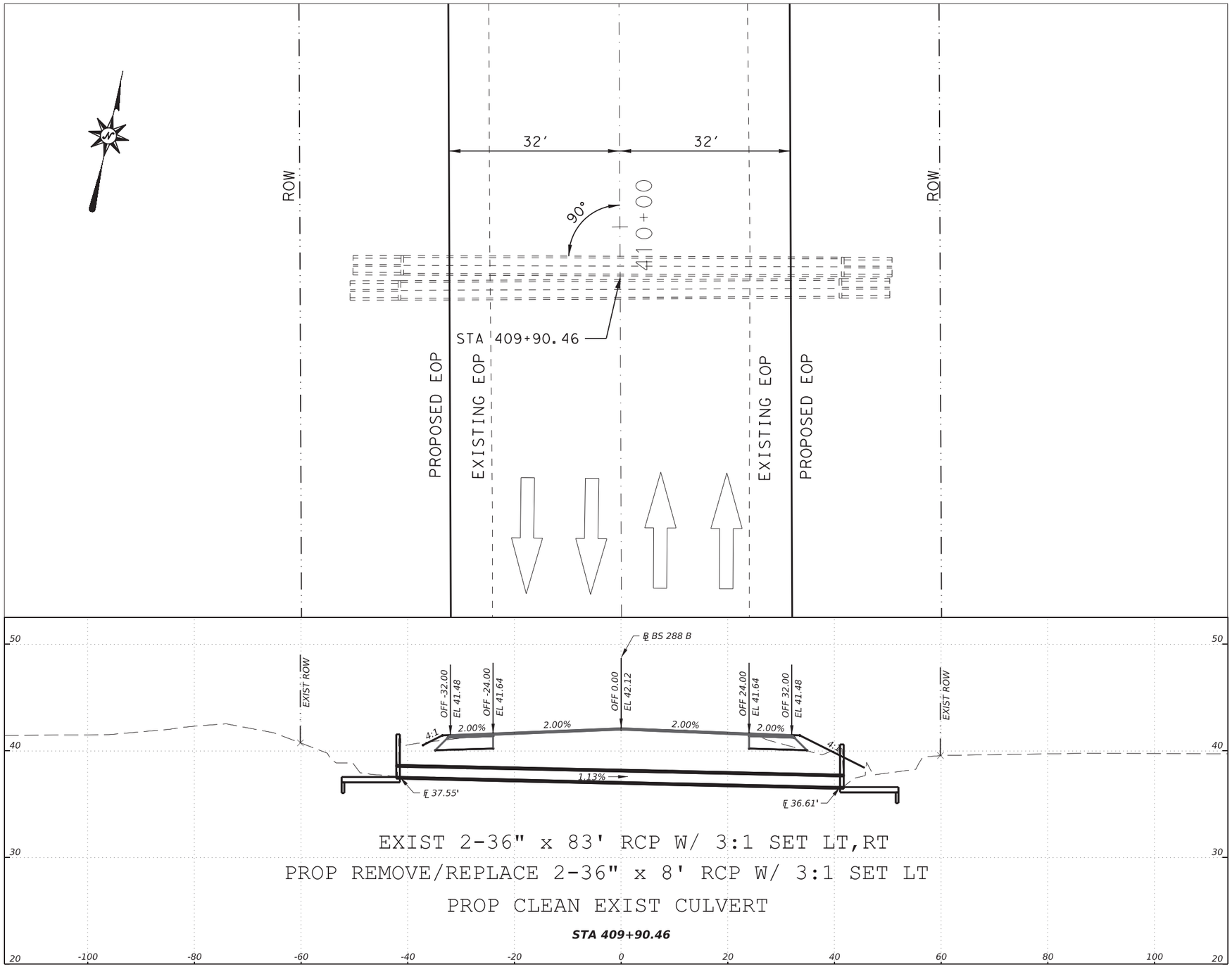

EXIST 2-36" x 83' RCP W/ 3:1 SET LT,RT

PROP REMOVE/REPLACE 2-36" x 8' RCP W/ 3:1 SET LT

PROP CLEAN EXIST CULVERT

STA 409+90.46

STATE OF TEXAS
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Jamie A.H. Jones

09/29/2022

DATE: 9/29/2022 6:53:32 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT3/Documents/12 - HOU/Design Projects/1111-22-333 ORD-Practice 5/4 - Design/Working/0111-09-042/CULVERT LAYOUTS/BS 288 B - 409+90.46.dgn

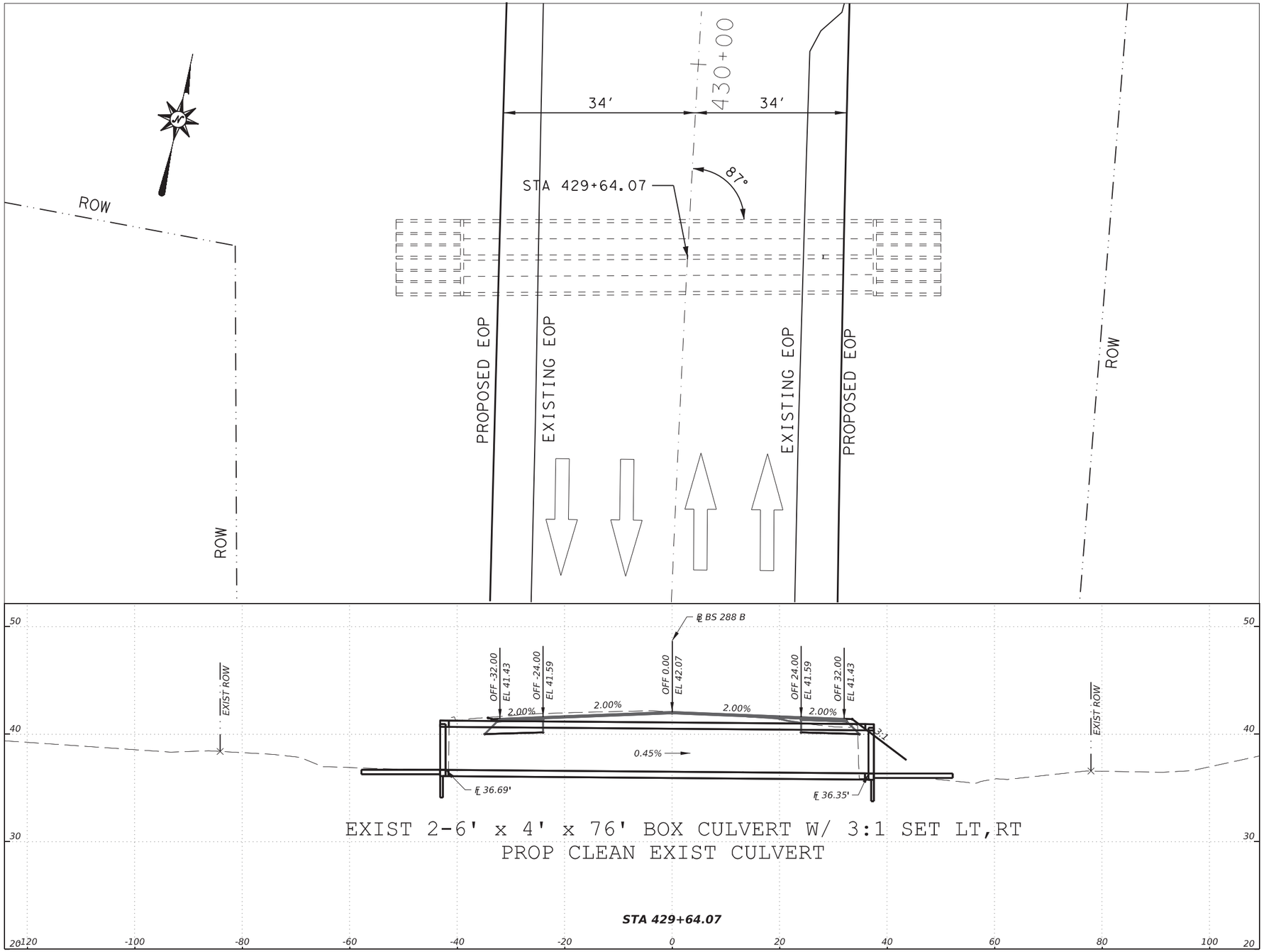
DW: CK: DW: CK:

SCALE 1"=20' HOR
1"=10' VERT

Texas Department of Transportation

SHEET 13 OF 20

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	138



EXIST 2-6' x 4' x 76' BOX CULVERT W/ 3:1 SET LT,RT
PROP CLEAN EXIST CULVERT

STA 429+64.07

STATE OF TEXAS
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09/28/2022

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SHEET 14 OF 20

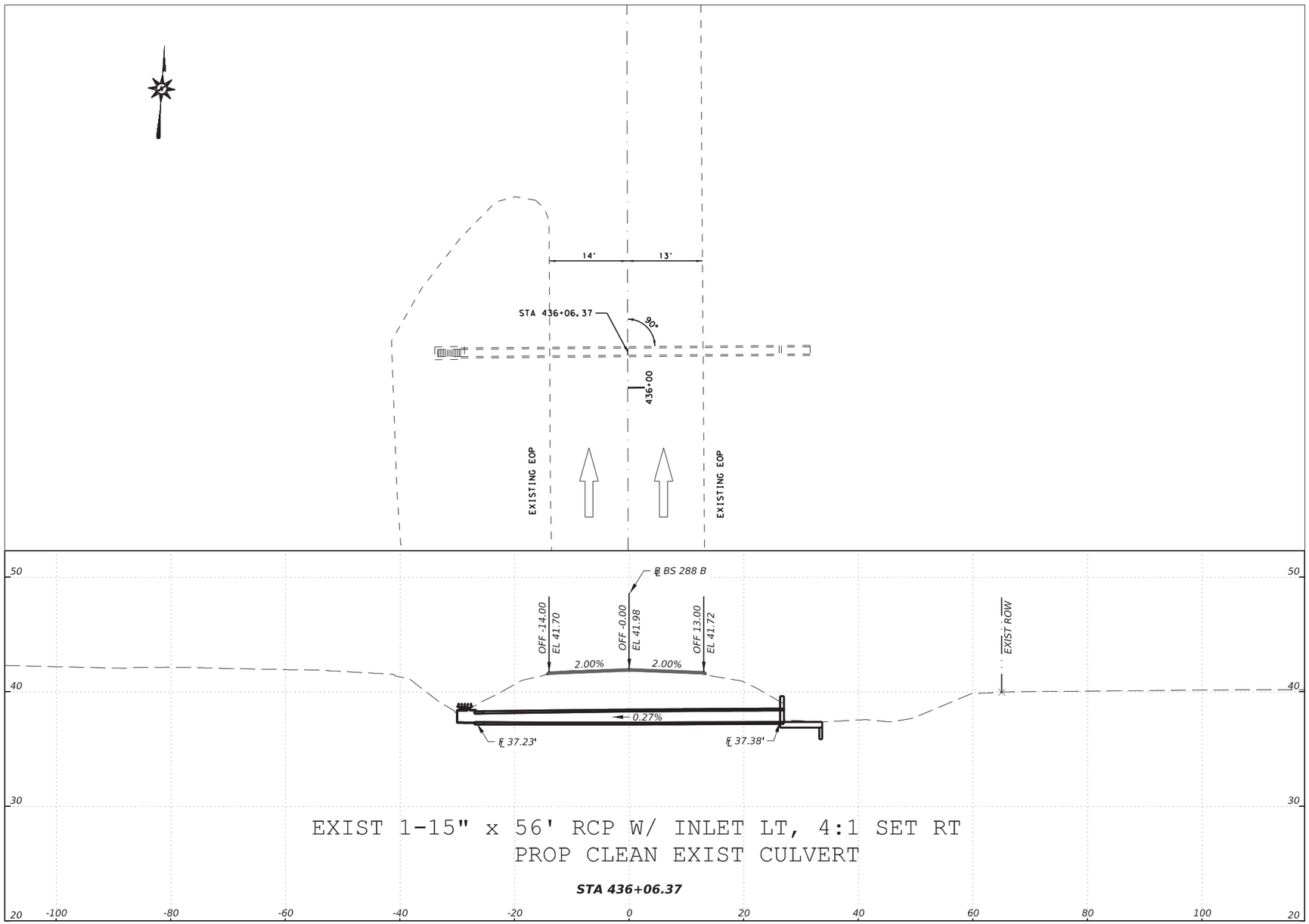
SCALE 1"=20' HOR
1"=10' VERT

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	139

DATE: 9/26/2022 2:26:56 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT3/Documents/12 - HOU/Design Projects/1111-22-333 ORD-Practice 5/4 - Design/Working/0111-09-042/CULVERT LAYOUTS/BS 288 B- 429+64.07.dgn

DW: CK: DW: CK:

DW: | CK: | DW: | CK:



EXIST 1-15" x 56' RCP W/ INLET LT, 4:1 SET RT
PROP CLEAN EXIST CULVERT

STA 436+06.37

STATE OF TEXAS
JAMIE A. H. JONES
128752
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Jamie A.H. Jones

09/28/2022

DATE: 9/26/2022 2:27:18 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT3/Documents/12 - HOU/Design Projects/1111-22-333 ORD-Practice 5/4 - Design/Working/0111-09-042/CULVERT LAYOUTS/BS 288 B- 436+06.37.dgn

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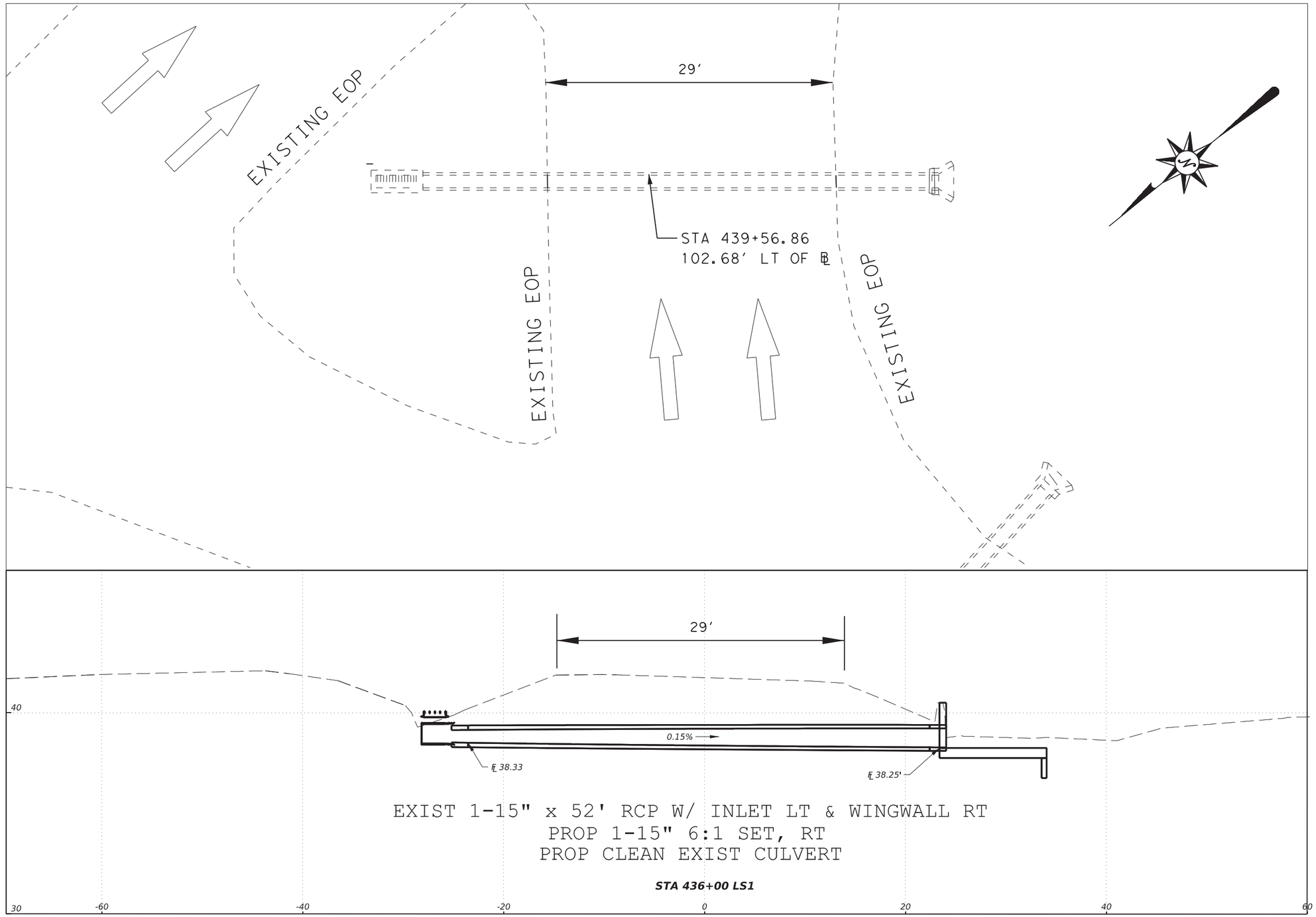
SHEET 15 OF 20

SCALE 1"=20' HOR
1"=10' VERT

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	140



EXIST 1-15" x 52' RCP W/ INLET LT & WINGWALL RT
PROP 1-15" 6:1 SET, RT
PROP CLEAN EXIST CULVERT

STA 436+00 LS1

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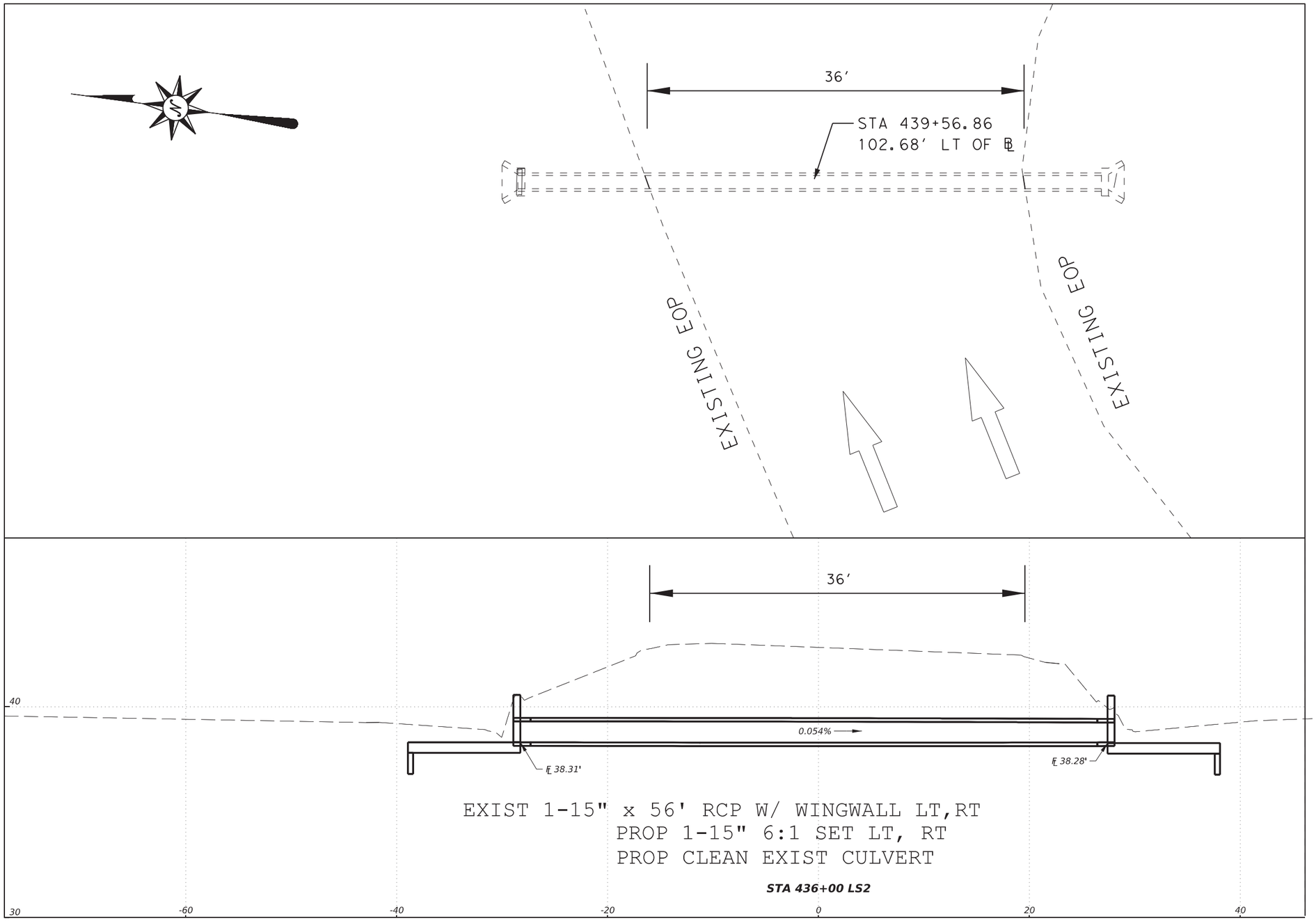
SCALE 1"=10' HOR
1"=5' VERT

SHEET 16 OF 20

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	141

DATE: 9/26/2022 3:01:14 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT3/Documents/12 - HOU/Design Projects/1111-22-333 ORD-Practice 5/4 - Design/Working/0111-09-042/CULVERT LAYOUTS/BS 288 B 436+00 LS1.dgn

DW: CK: DW: CK:



EXIST 1-15" x 56' RCP W/ WINGWALL LT,RT
PROP 1-15" 6:1 SET LT, RT
PROP CLEAN EXIST CULVERT

STA 436+00 LS2

STATE OF TEXAS
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128752
LICENSED
PROFESSIONAL ENGINEER

Jamie A.H. Jones

09/28/2022

Texas Department of Transportation

SCALE 1"=10' HOR
1"=5' VERT

SHEET 17 OF 20

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	142

DATE: 9/26/2022 2:27:42 PM
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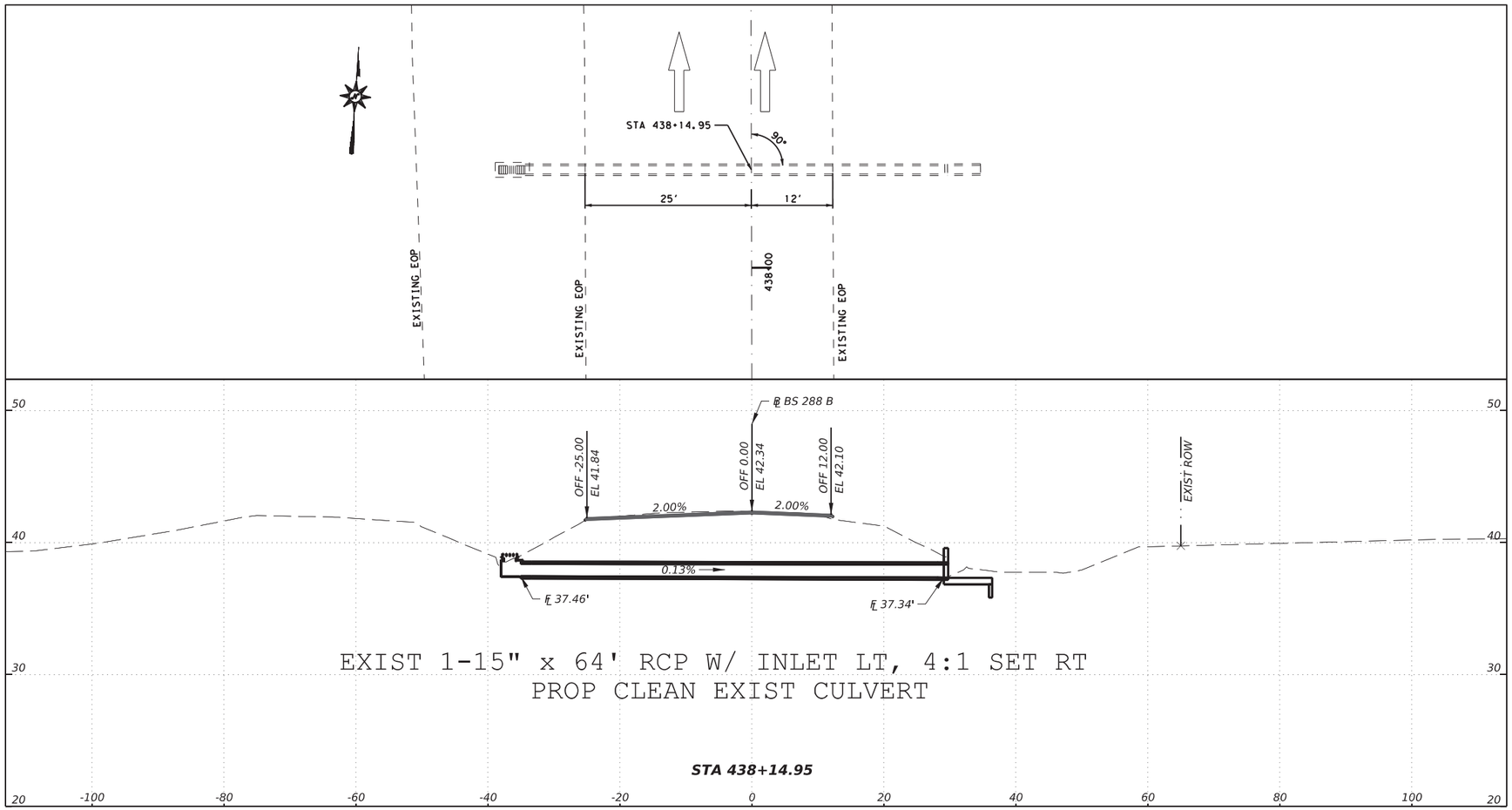
DW: CK: DW: CK:

DW: | CK: | DW: | CK:



EXIST 1-15" x 64' RCP W/ INLET LT, 4:1 SET RT
PROP CLEAN EXIST CULVERT

STA 438+14.95

STATE OF TEXAS
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Jamie A.H. Jones

09/28/2022

DATE: 9/26/2022 2:56:52 PM
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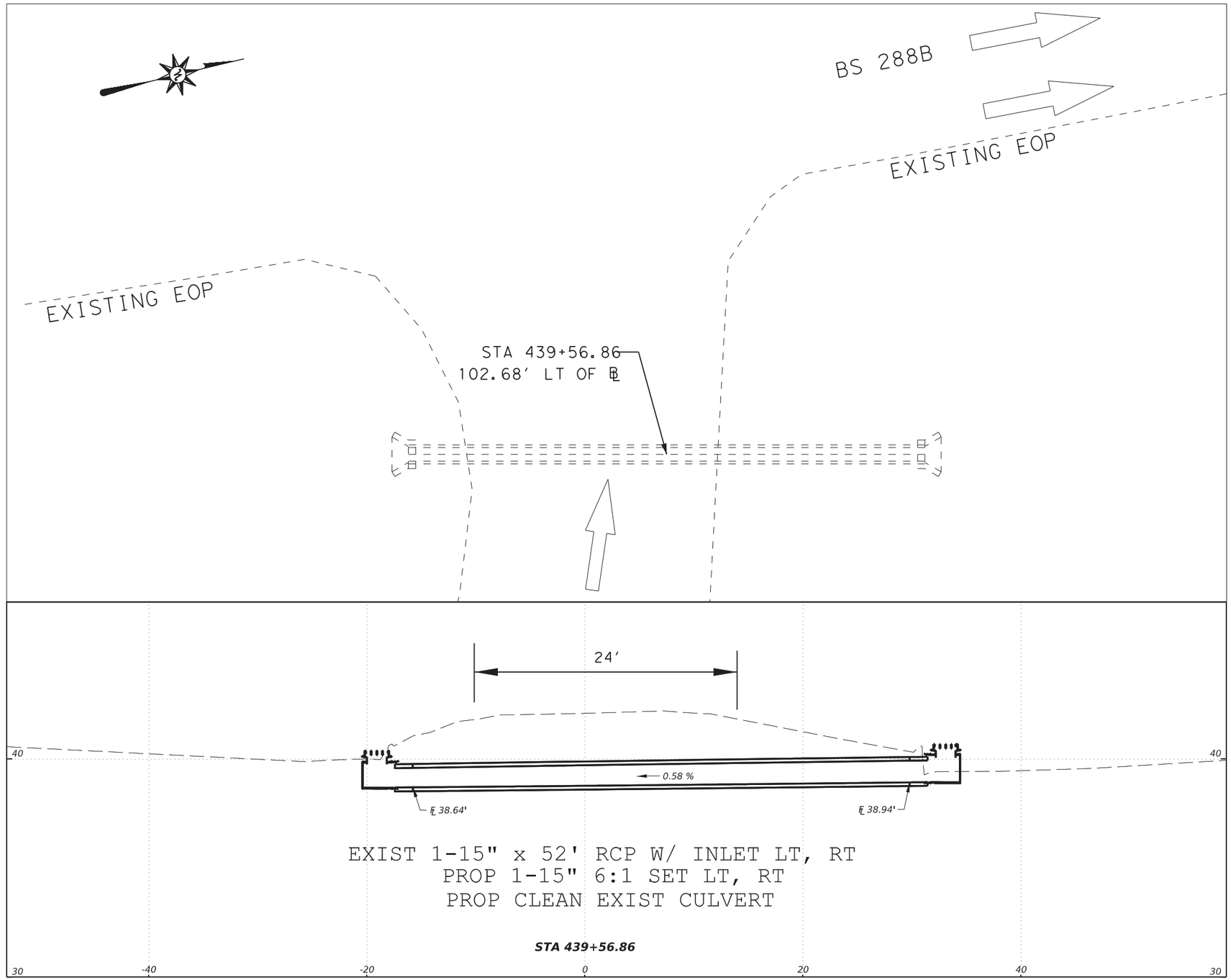
SHEET 18 OF 20

SCALE 1"=20' HOR
1"=10' VERT

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	143



STATE OF TEXAS
JAMIE A. H. JONES
128752
LICENSED
PROFESSIONAL ENGINEER

Jamie A.H. Jones

09/28/2022

DW: CK: DW: CK:

DATE: 9/26/2022 2:27:53 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT3/Documents/12 - HOU/Design Projects/1111-22-333 ORD-Practice 5/4 - Design/Working/0111-09-042/CULVERT LAYOUTS/BS 288 B -439+56.86.dgn

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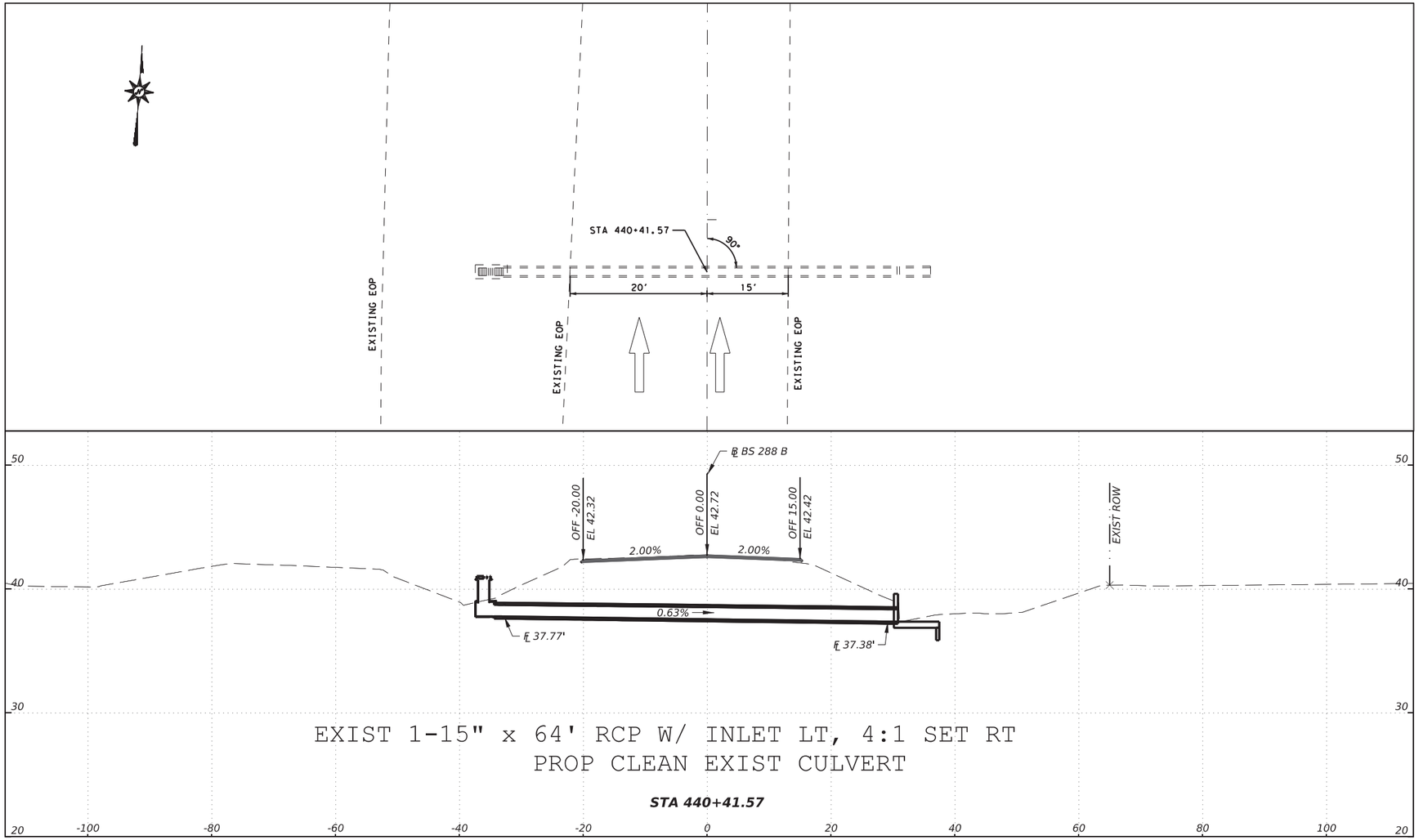
SCALE 1"=10' HOR
1"=5' VERT

SHEET 19 OF 20

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	144

DW: | CK: | DW: | CK:



EXIST 1-15" x 64' RCP W/ INLET LT, 4:1 SET RT
PROP CLEAN EXIST CULVERT

STA 440+41.57

STATE OF TEXAS
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128752
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09/28/2022

DATE: 9/26/2022 2:28:03 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT3/Documents/12 - HOU\Design Projects/1111-22-333 ORD-Practice 5/4 - Design/Working/0111-09-042/CULVERT LAYOUTS/BS 288 B - 440+41.50.dgn

SCALE 1"=20' HOR
1"=10' VERT

SHEET 20 OF 20

CONT	SECT	JOB	HIGHWAY	DIST	COUNTY	SHEET NO.
0111	09	042	BS 288B	HOU	BRAZORIA	145

Texas Department of Transportation

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)
309+32 (Lt)	2 ~ 6' X 3'	0.5'	SCP-6	SETB-CD	0	6:1	8"	7"	0.500	3.917	N/A	N/A	21.500	N/A	14.833	0.0	0.3	10.2	N/A
309+32 (Rt)	2 ~ 6' X 3'	0.5'	SCP-6	SETB-CD	0	6:1	8"	7"	0.500	3.917	N/A	N/A	21.500	N/A	14.833	0.0	0.3	10.2	N/A

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.

STATE OF TEXAS
JAMIE A. H. JONES
128752
LICENSED
PROFESSIONAL ENGINEER

Jamie A.H. Jones
09/23/2022

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 0111	SECT 09	JOB 042	HIGHWAY BS 288B
REVISIONS	DIST HOU	COUNTY BRAZORIA		SHEET NO. 146

DATE: 9/23/2022 7:42:46 AM
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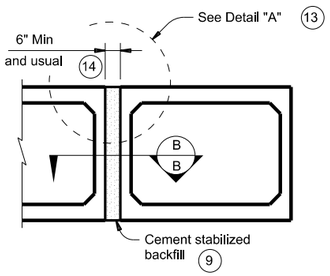
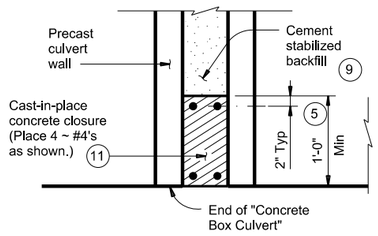
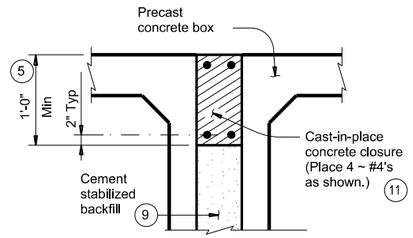


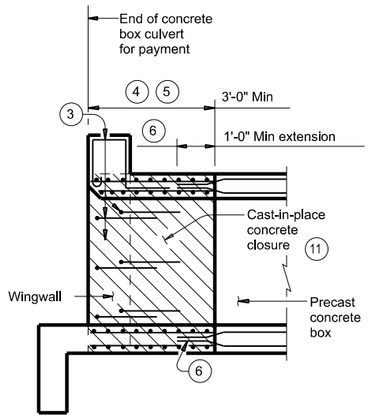
MULTIPLE UNIT PLACEMENT



SECTION B-B

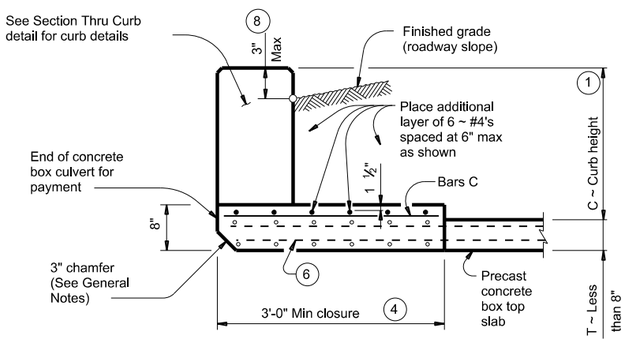


DETAIL "A" (13)

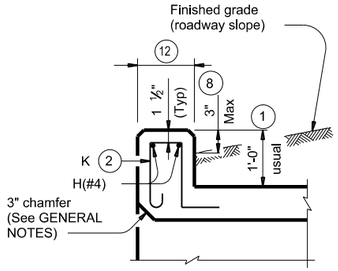


WINGWALL CONNECTION

(Also applies to safety end treatment.)

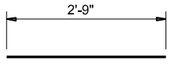


SECTION THRU TOP SLABS LESS THAN 8"

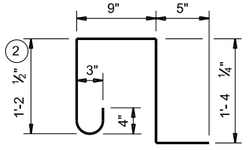


SECTION THRU CURB

QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



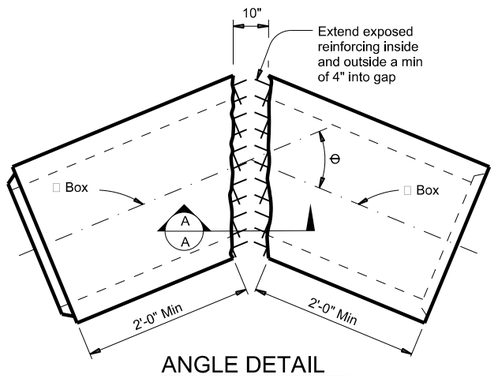
BARS C (#4)
(Spa = 1'-0" Max)



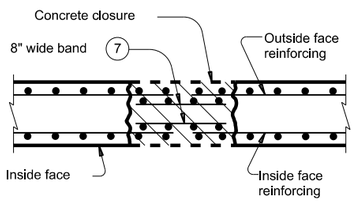
BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle 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.
2. 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.
3. Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.
4. Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast-in-place closure flush with the inside and outside faces of the precast box section.
5. For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'-0" Min cast-in-place closure in the top slab, bottom slab, and exterior wall. See Section B-B detail when interior walls are cast full length.
6. Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).
7. Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.
8. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

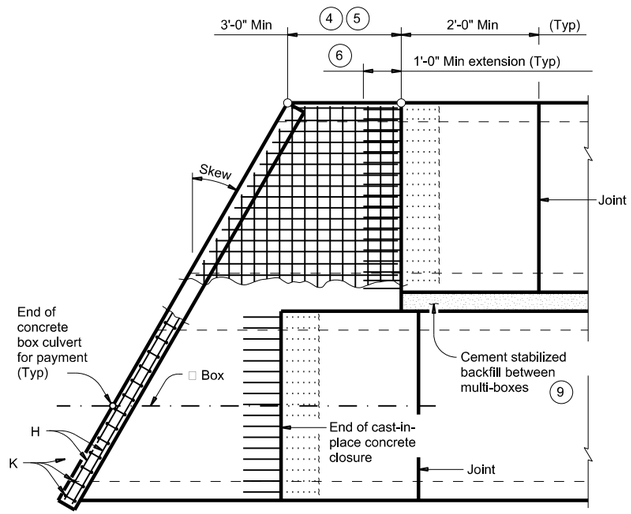
   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. Cement stabilized backfill between boxes is considered part of the box culvert for payment.
10. All curb concrete and reinforcing is considered part of the box culvert for payment.
11. Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
12. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
13. For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".
14. This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

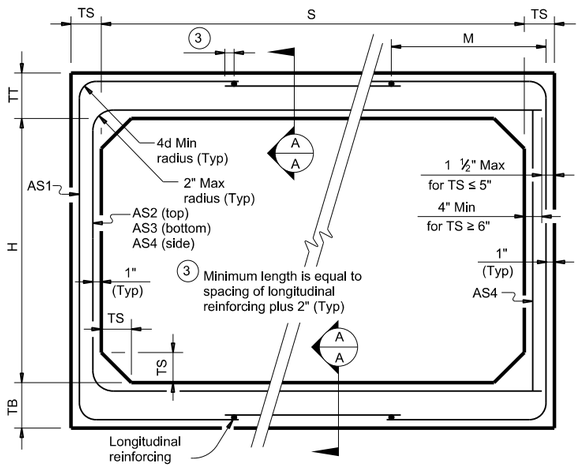
FILE: scpmdsts-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		147

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
6	2	8	7	7	< 2	-	0.23	0.27	0.19	0.17	0.19	0.19	0.17	7.2
6	2	7	7	7	2 < 3	43	0.25	0.21	0.17	0.17	-	-	-	6.8
6	2	7	7	7	3 - 5	43	0.20	0.17	0.17	0.17	-	-	-	6.8
6	2	7	7	7	10	39	0.20	0.17	0.17	0.17	-	-	-	6.8
6	2	7	7	7	15	39	0.26	0.20	0.20	0.17	-	-	-	6.8
6	2	7	7	7	20	39	0.34	0.26	0.26	0.17	-	-	-	6.8
6	2	7	7	7	25	39	0.43	0.32	0.32	0.17	-	-	-	6.8
6	2	7	7	7	30	39	0.52	0.38	0.39	0.17	-	-	-	6.8
6	3	8	7	7	< 2	-	0.20	0.31	0.22	0.17	0.19	0.19	0.17	7.9
6	3	7	7	7	2 < 3	43	0.21	0.24	0.19	0.17	-	-	-	7.5
6	3	7	7	7	3 - 5	39	0.17	0.18	0.17	0.17	-	-	-	7.5
6	3	7	7	7	10	39	0.17	0.18	0.19	0.17	-	-	-	7.5
6	3	7	7	7	15	38	0.22	0.24	0.24	0.17	-	-	-	7.5
6	3	7	7	7	20	38	0.28	0.31	0.31	0.17	-	-	-	7.5
6	3	7	7	7	25	38	0.35	0.38	0.39	0.17	-	-	-	7.5
6	3	7	7	7	30	38	0.42	0.46	0.46	0.17	-	-	-	7.5
6	4	8	7	7	< 2	-	0.19	0.34	0.25	0.17	0.19	0.19	0.17	8.6
6	4	7	7	7	2 < 3	43	0.19	0.27	0.21	0.17	-	-	-	8.2
6	4	7	7	7	3 - 5	39	0.17	0.21	0.19	0.17	-	-	-	8.2
6	4	7	7	7	10	39	0.17	0.20	0.21	0.17	-	-	-	8.2
6	4	7	7	7	15	38	0.18	0.27	0.27	0.17	-	-	-	8.2
6	4	7	7	7	20	38	0.24	0.34	0.35	0.17	-	-	-	8.2
6	4	7	7	7	25	38	0.29	0.43	0.42	0.17	-	-	-	8.2
6	4	7	7	7	30	38	0.35	0.51	0.52	0.17	-	-	-	8.2
6	5	8	7	7	< 2	-	0.19	0.37	0.28	0.17	0.19	0.19	0.17	9.3
6	5	7	7	7	2 < 3	43	0.17	0.30	0.24	0.17	-	-	-	8.9
6	5	7	7	7	3 - 5	43	0.17	0.23	0.21	0.17	-	-	-	8.9
6	5	7	7	7	10	39	0.17	0.22	0.23	0.17	-	-	-	8.9
6	5	7	7	7	15	38	0.17	0.28	0.29	0.17	-	-	-	8.9
6	5	7	7	7	20	38	0.20	0.37	0.38	0.17	-	-	-	8.9
6	5	7	7	7	25	38	0.25	0.45	0.46	0.17	-	-	-	8.9
6	5	7	7	7	30	38	0.30	0.54	0.55	0.17	-	-	-	8.9
6	6	8	7	7	< 2	-	0.19	0.38	0.30	0.17	0.19	0.19	0.17	10
6	6	7	7	7	2 < 3	52	0.17	0.32	0.26	0.17	-	-	-	9.6
6	6	7	7	7	3 - 5	52	0.17	0.24	0.22	0.17	-	-	-	9.6
6	6	7	7	7	10	43	0.17	0.23	0.24	0.17	-	-	-	9.6
6	6	7	7	7	15	39	0.17	0.29	0.31	0.17	-	-	-	9.6
6	6	7	7	7	20	39	0.18	0.38	0.39	0.17	-	-	-	9.6
6	6	7	7	7	25	38	0.23	0.46	0.48	0.17	-	-	-	9.6
6	6	7	7	7	30	38	0.27	0.55	0.57	0.17	-	-	-	9.6

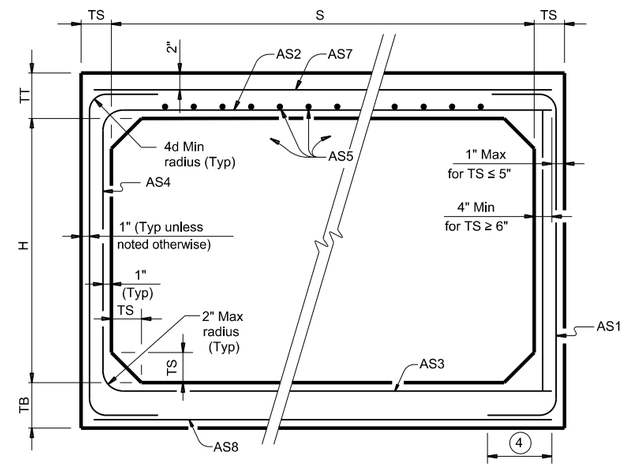
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

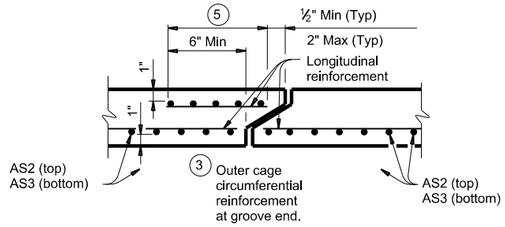
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f'c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

6'-0" SPAN

SCP-6

FILE:	scp06s1s-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0111	09	042	BS 288B
		DIST	COUNTY		SHEET NO.
		HOU	BRAZORIA		148

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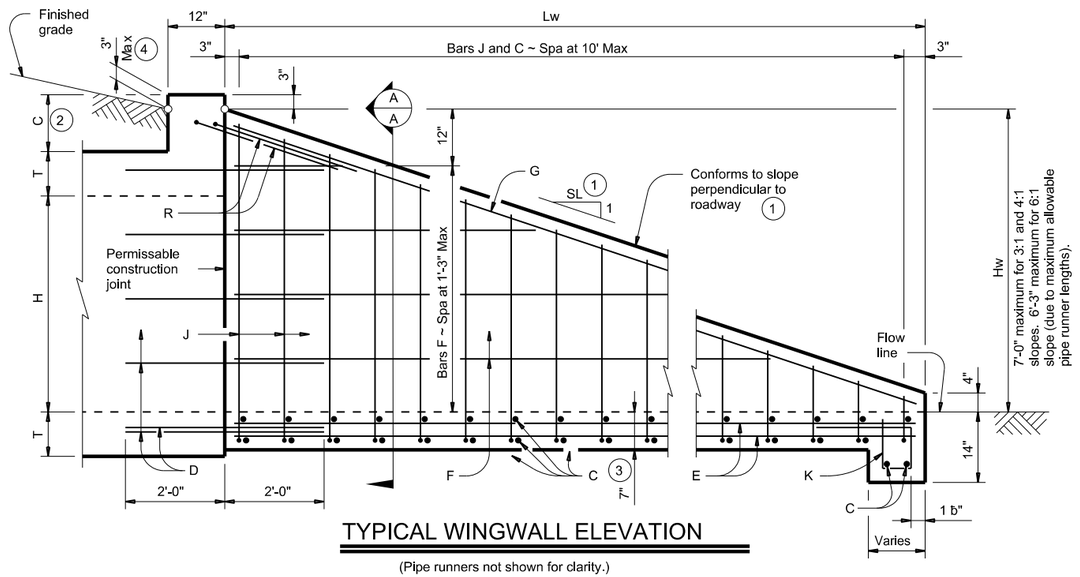
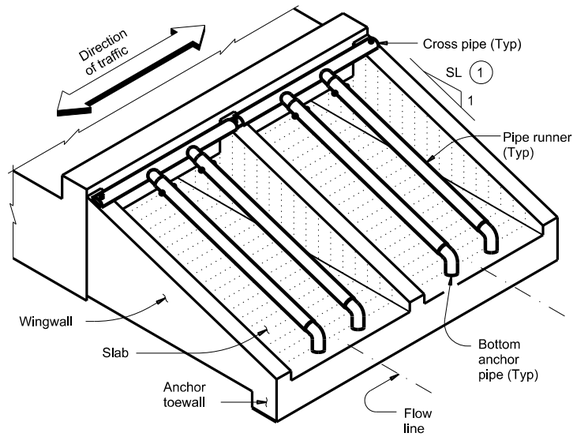


TYPICAL WINGWALL ELEVATION

(Pipe runners not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

WING DIMENSION CALCULATIONS:

Hw = H + T + C - 0.250'
Lw = (Hw - 0.333') (SL)

For cast-in-place culverts:
Atw = (N) (S) + (N + 1) (U)
For precast culverts:
Atw = (N) (2U + S) + (N - 1) (0.500')

Total Wingwall Area (SF)
= (0.5) (Hw + 0.333') (Lw) (N + 1)
Total Concrete Volume (CY)
= [(Wingwall Area) (0.583') +
(Lw) (Atw) (0.583') +
(Atw) (1.167') (1.167' - 0.583')] ÷ (27)

PIPE RUNNER DIMENSION CALCULATIONS:

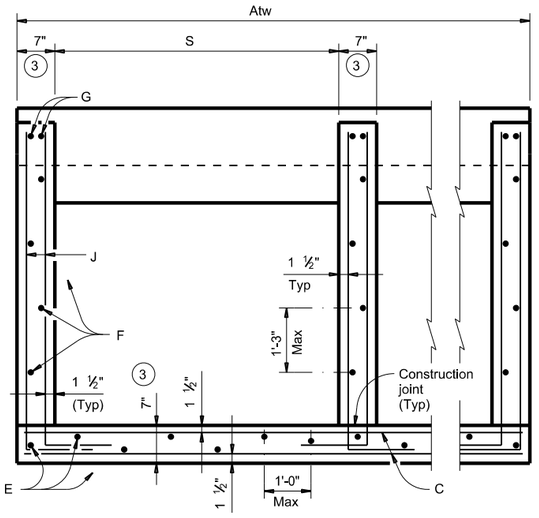
Pipe Runner Length
= (Lw) (K1) (1.917')
Total Reinforcing (Lb)
= (1.55) (Lw) (Atw) +
(4.43) (Atw) +
(K2) (Hw) (N + 1) (Lw) √

C = Height of curb above top of top slab (feet)
Hw = Height of wingwall (feet)
K = Constant value for use in formulas

Slope SL:1	K1	K2
3:1	~ 1.054 ~	7.45
4:1	~ 1.031 ~	8.49
6:1	~ 1.014 ~	10.30

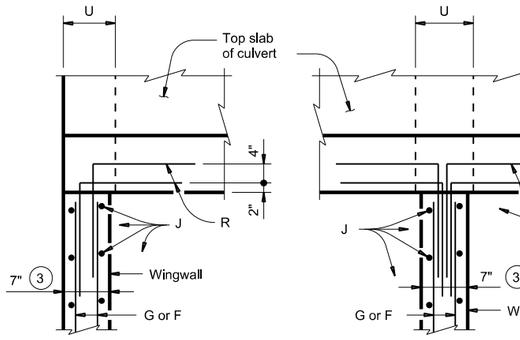
Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)

See applicable box culvert standard for H, S, T, and U values.

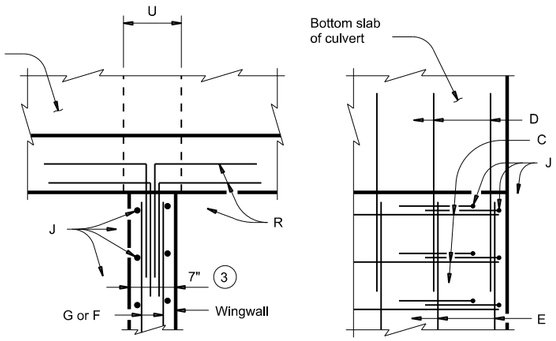


SECTION A-A

(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)

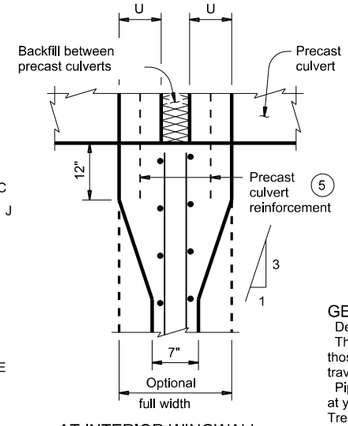


AT TOP OF EXTERIOR WINGWALL
(Cast-in-place culvert)



AT TOP OF INTERIOR WINGWALL
(Cast-in-place culvert)

AT OUTSIDE OF BOTTOM SLAB
(Cast-in-place culvert)



AT INTERIOR WINGWALL
(Precast culvert)

PLAN VIEWS OF CORNER DETAILS

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Adjust reinforcing as necessary to provide a minimum clear cover of 1 ½".
Provide Class "C" concrete (f'c = 3,600 psi).
Provide pipe runners, cross pipes, and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts.
Galvanize all steel components, except the concrete reinforcing, unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing".

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.
The quantities for pipe runners, reinforcing steel, and concrete resulting from the formulas given herein are for Contractor's information only.
See the Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
Alternate design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the safety end treatments.

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

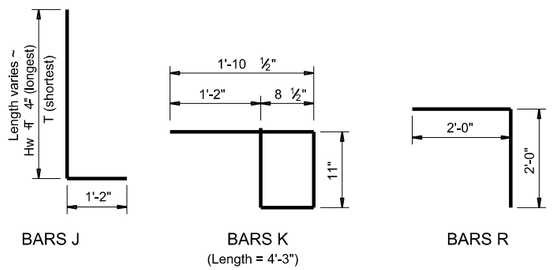


TABLE OF REINFORCING BAR SIZES AND SPACING

Bar	Size	Spacing
C	#4	10" Max
D	#4	Match F and E
E	#4	1'-0" Max
F	#4	1'-3" Max
G	#6	As shown
J	#4	10" Max
K	#4	1'-0" Max
R	#4	As shown

1. Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.
2. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet.
3. Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.
4. For vehicle safety, reduce curb height, if necessary, to provide a maximum 3" projection. No changes will be made in quantities and no additional compensation will be allowed for this work.
5. For culverts with C = 0", the precast culvert reinforcing may extend 1'-0" minimum into wingwall. Wingwall Bars D and R may be omitted. Otherwise, refer to the Wingwall Connection detail on the Box Culvert Precast Miscellaneous Details (SCP-MD) standard sheet.

SHEET 1 OF 2

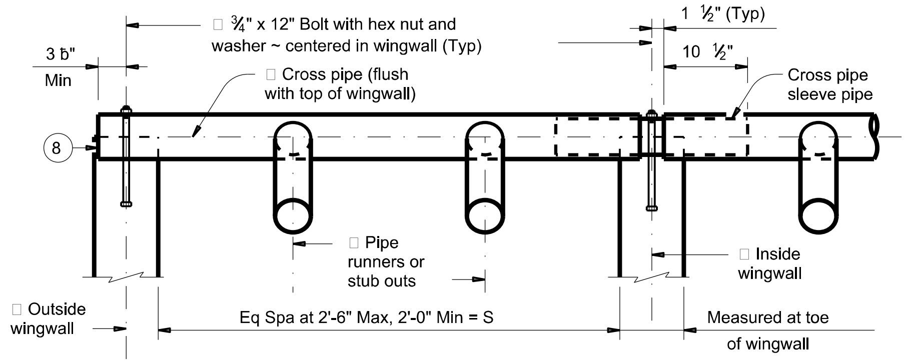
Texas Department of Transportation
Bridge Division Standard

SAFETY END TREATMENT

FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ CROSS DRAINAGE

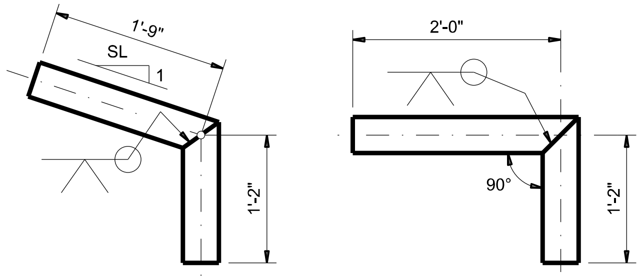
SETB-CD

FILE:	setbcdse-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0111	09	042	BS 288B
		DIST	COUNTY		SHEET NO.
		HOU	BRAZORIA		149



NOTE: At Contractor's option, make the cross pipe continuous across the inside wingwalls. If option is selected, omit the sleeve pipe and make a Ǝ" diameter through hole in the cross pipe to accept the anchor bolt at the centerline of each inside wingwall.

CROSS PIPE INSTALLATION DETAILS



OPTION A

OPTION B

10

BOTTOM ANCHOR PIPE DETAILS

6 Cross pipe is the same size as the pipe runner. Cross pipe stub out is the same size as the anchor pipe.

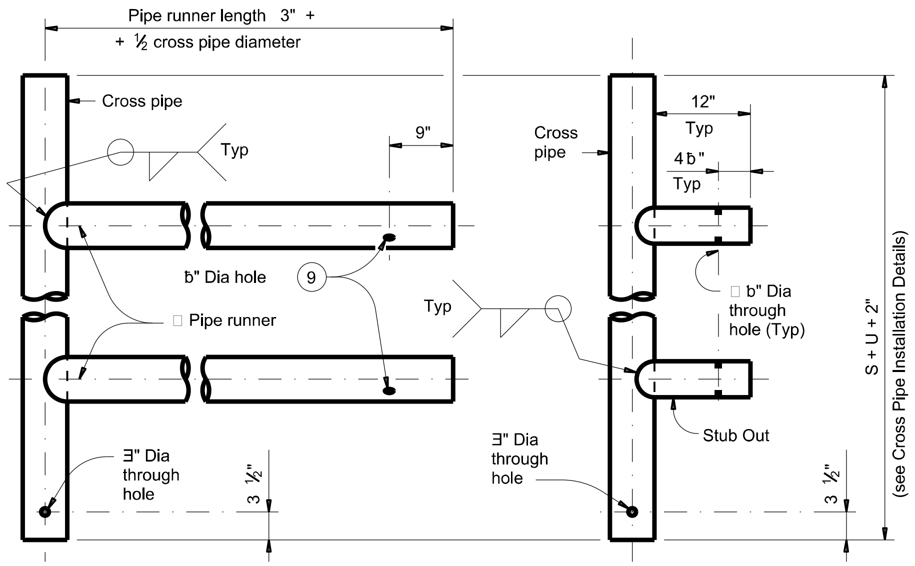
7 Note that actual slope of safety pipe runner may vary slightly from side slope.

8 Take care to ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

9 After installation, inspect the 1#2" hole to ensure that the lap of the safety pipe runner with the bottom anchor pipe is adequate.

10 At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

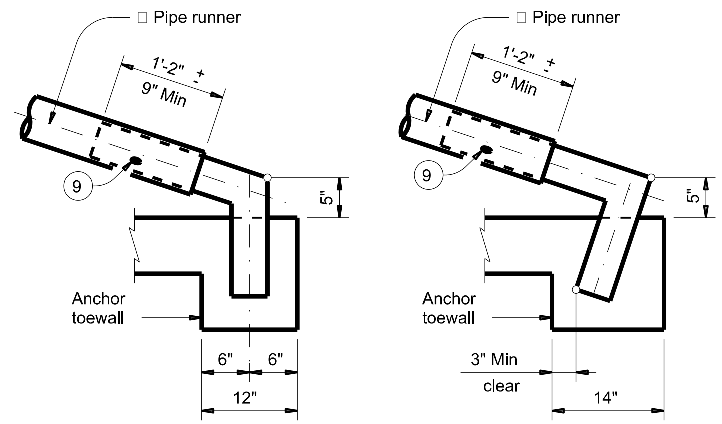
MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES 6						
Maximum Pipe Runner Length	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
10'- 0"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'- 8"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
34'- 2"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"



OPTION A2

OPTION A1

FOR USE IN OUTSIDE CULVERT BAY

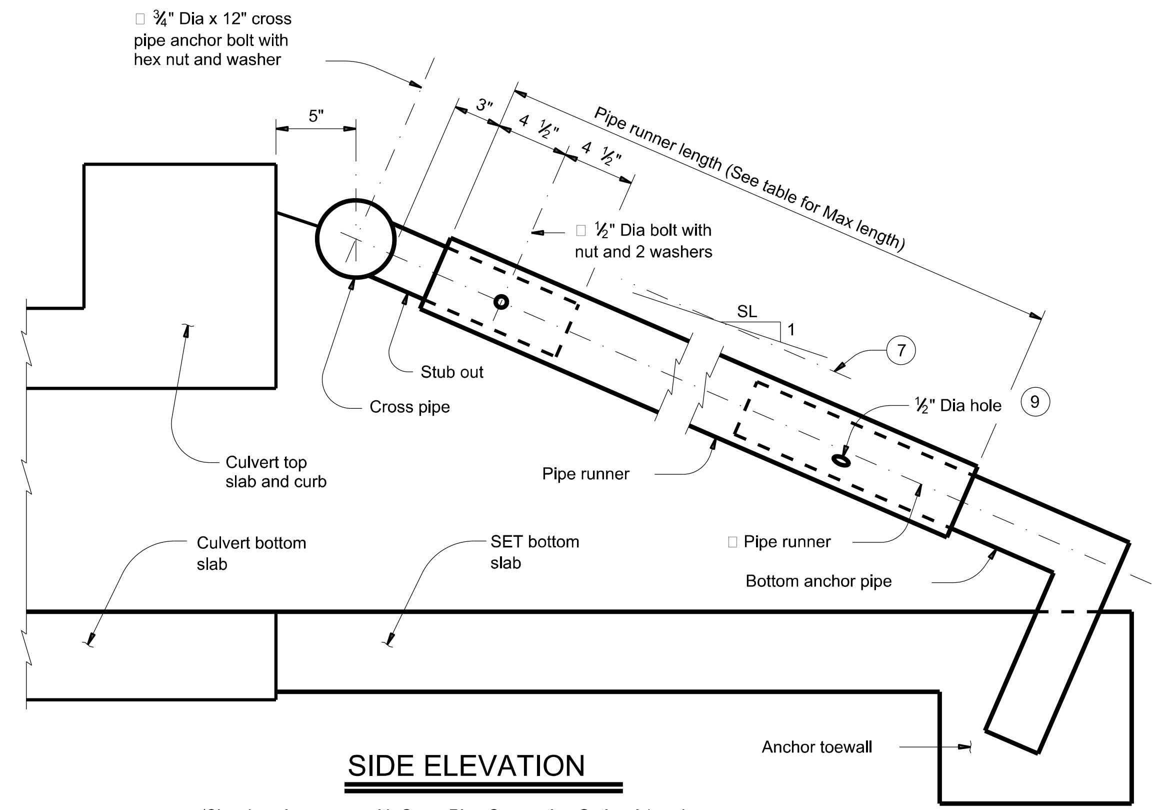


OPTION B1

OPTION B2

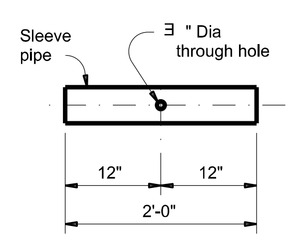
BOTTOM ANCHOR TOEWALL DETAILS

(Wingwall not shown for clarity.)

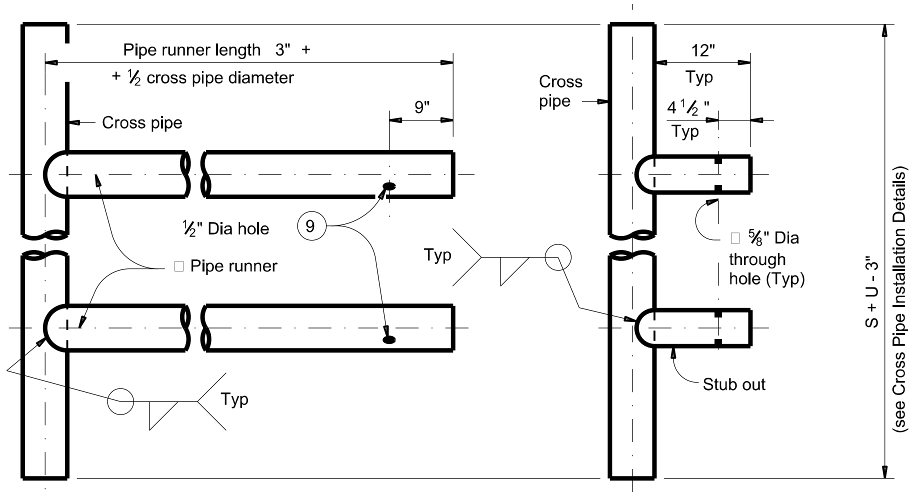


SIDE ELEVATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Bottom Anchor Toewall Option B2. Wingwall not shown for clarity.)



CROSS PIPE SLEEVE PIPE DETAILS

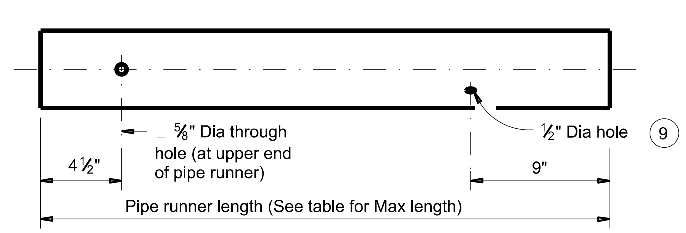


OPTION A2

OPTION A1

FOR USE IN INSIDE CULVERT BAY

CROSS PIPE AND CONNECTIONS DETAILS



NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ CROSS DRAINAGE

SETB-CD

FILE: setbcdse-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT 0111	SECT 09	JOB 042	HIGHWAY BS 288B
REVISIONS	DIST HOU		COUNTY BRAZORIA	SHEET NO. 150

DATE: 9/22/2022 6:11:47 PM
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DATE: 9/22/2022 6:11:55 PM
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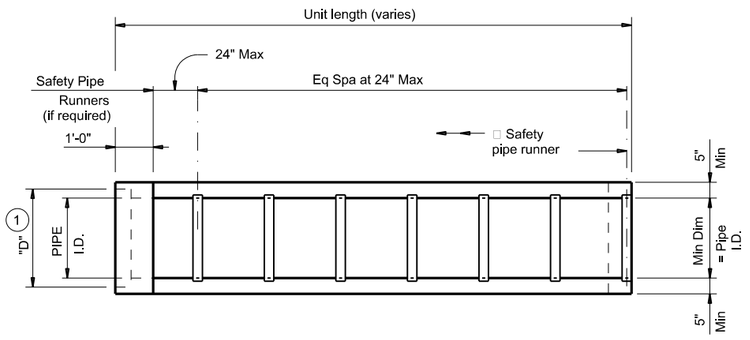
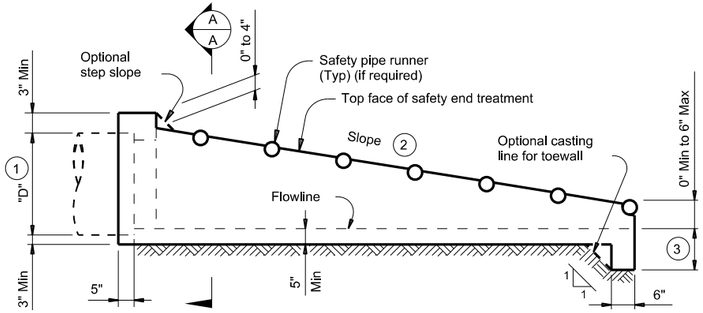


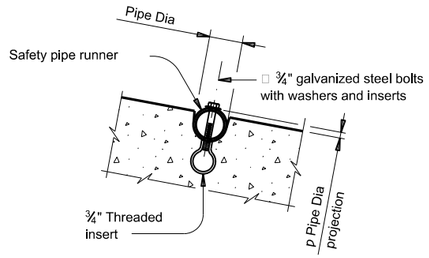
PLAN

(Showing bell end connection.)



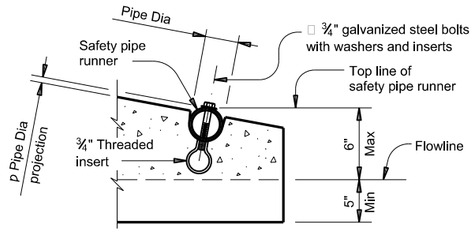
LONGITUDINAL ELEVATION

(Showing bell end connection.)

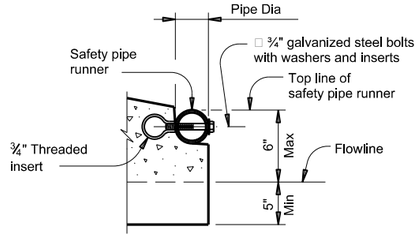


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



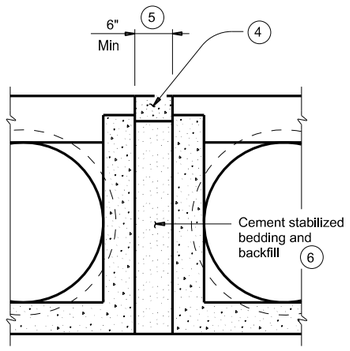
OPTION A



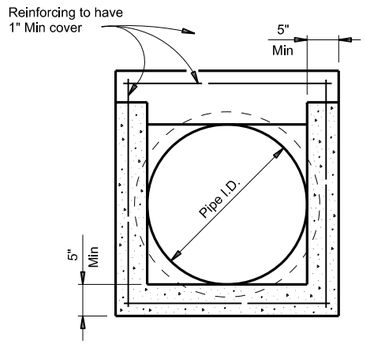
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

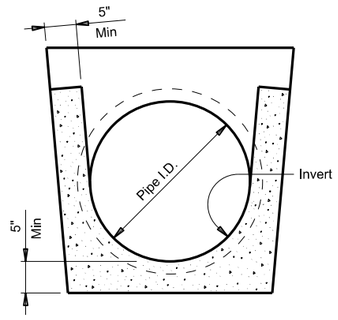
(If required)



MULTIPLE PIPE INSTALLATION

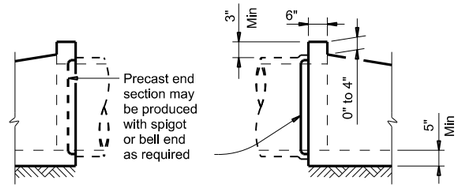


OPTION WITH SQUARE BOTTOM



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	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		151

DATE: 9/22/2022 6:12:00 PM
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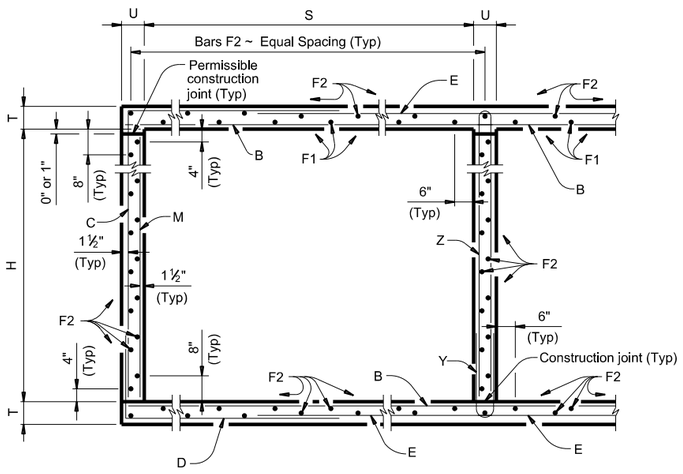
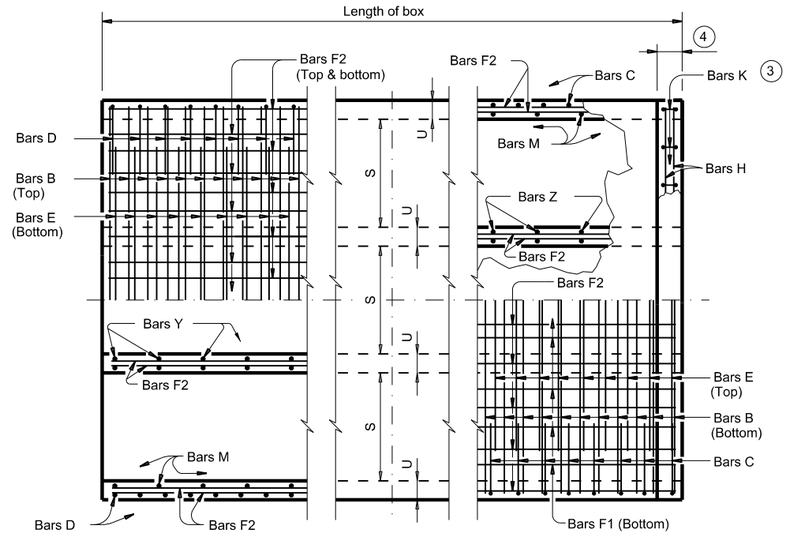


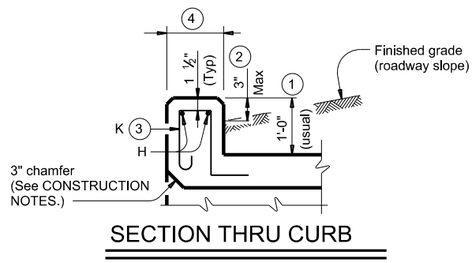
TYPICAL SECTION



BOTTOM SLAB

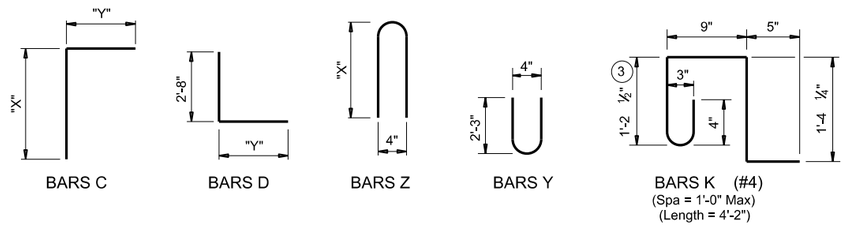
TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
2'-0"	2'-7 ½"	4'-1"
3'-0"	3'-7 ½"	4'-1"
4'-0"	4'-7 ½"	4'-1"
5'-0"	5'-7 ½"	4'-1"
6'-0"	6'-7 ½"	4'-1"



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

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
6'-0" SPAN
0' TO 16' FILL

MC-6-16

FILE: mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		152

NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																																								QUANTITIES					
					Bars B					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4						Bars H 4 ~ #4		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	6' - 0"	2' - 0"	9"	7"	108	#6	9"	13' - 6"	2,190	108	#5	9"	6' - 8"	751	6' - 9"	760	108	#6	9"	10' - 2"	1,649	10	18"	39' - 9"	266	44	18"	39' - 9"	1,168	108	9"	2' - 0"	144	54	9"	4' - 9"	171	5' - 5"	195	13' - 6"	36	30	84	0.894	182.4	1.0	120	36.8	7,414
3	6' - 0"	2' - 0"	9"	7"	108	#6	9"	20' - 1"	3,258	108	#5	9"	6' - 8"	751	6' - 9"	760	108	#6	9"	16' - 9"	2,717	15	18"	39' - 9"	398	63	18"	39' - 9"	1,673	108	9"	2' - 0"	144	108	9"	4' - 9"	343	5' - 5"	391	20' - 1"	54	44	122	1.302	260.9	1.5	176	53.6	10,611
4	6' - 0"	2' - 0"	9"	7"	108	#6	9"	26' - 8"	4,326	108	#5	9"	6' - 8"	751	6' - 9"	760	108	#6	9"	23' - 4"	3,785	20	18"	39' - 9"	531	82	18"	39' - 9"	2,177	108	9"	2' - 0"	144	162	9"	4' - 9"	514	5' - 5"	586	26' - 8"	71	56	156	1.711	339.4	2.0	227	70.4	13,801
5	6' - 0"	2' - 0"	9"	7"	108	#6	9"	33' - 3"	5,394	108	#5	9"	6' - 8"	751	6' - 9"	760	108	#6	9"	29' - 11"	4,853	25	18"	39' - 9"	664	101	18"	39' - 9"	2,682	108	9"	2' - 0"	144	216	9"	4' - 9"	685	5' - 5"	782	33' - 3"	89	70	195	2.120	417.9	2.5	284	87.3	16,999
6	6' - 0"	2' - 0"	9"	7"	108	#6	9"	39' - 10"	6,462	108	#5	9"	6' - 8"	751	6' - 9"	760	108	#6	9"	36' - 6"	5,921	30	18"	39' - 9"	797	120	18"	39' - 9"	3,186	108	9"	2' - 0"	144	270	9"	4' - 9"	857	5' - 5"	977	39' - 10"	106	82	228	2.529	496.4	3.0	334	104.1	20,189
2	6' - 0"	3' - 0"	9"	7"	108	#6	9"	13' - 6"	2,190	108	#5	9"	7' - 8"	864	6' - 9"	760	108	#6	9"	10' - 2"	1,649	10	18"	39' - 9"	266	50	18"	39' - 9"	1,328	108	9"	3' - 0"	216	54	9"	4' - 9"	171	7' - 5"	268	13' - 6"	36	30	84	0.958	192.8	1.0	120	39.3	7,832
3	6' - 0"	3' - 0"	9"	7"	108	#6	9"	20' - 1"	3,258	108	#5	9"	7' - 8"	864	6' - 9"	760	108	#6	9"	16' - 9"	2,717	15	18"	39' - 9"	398	71	18"	39' - 9"	1,885	108	9"	3' - 0"	216	108	9"	4' - 9"	343	7' - 5"	535	20' - 1"	54	44	122	1.389	274.4	1.5	176	57.1	11,152
4	6' - 0"	3' - 0"	9"	7"	108	#6	9"	26' - 8"	4,326	108	#5	9"	7' - 8"	864	6' - 9"	760	108	#6	9"	23' - 4"	3,785	20	18"	39' - 9"	531	92	18"	39' - 9"	2,443	108	9"	3' - 0"	216	162	9"	4' - 9"	514	7' - 5"	803	26' - 8"	71	56	156	1.819	356.1	2.0	227	74.7	14,469
5	6' - 0"	3' - 0"	9"	7"	108	#6	9"	33' - 3"	5,394	108	#5	9"	7' - 8"	864	6' - 9"	760	108	#6	9"	29' - 11"	4,853	25	18"	39' - 9"	664	113	18"	39' - 9"	3,000	108	9"	3' - 0"	216	216	9"	4' - 9"	685	7' - 5"	1,070	33' - 3"	89	70	195	2.250	437.7	2.5	284	92.5	17,790
6	6' - 0"	3' - 0"	9"	7"	108	#6	9"	39' - 10"	6,462	108	#5	9"	7' - 8"	864	6' - 9"	760	108	#6	9"	36' - 6"	5,921	30	18"	39' - 9"	797	134	18"	39' - 9"	3,558	108	9"	3' - 0"	216	270	9"	4' - 9"	857	7' - 5"	1,338	39' - 10"	106	82	228	2.681	519.3	3.0	334	110.2	21,107
2	6' - 0"	4' - 0"	9"	7"	108	#6	9"	13' - 6"	2,190	108	#5	9"	8' - 8"	976	6' - 9"	760	108	#6	9"	10' - 2"	1,649	10	18"	39' - 9"	266	50	18"	39' - 9"	1,328	108	9"	4' - 0"	289	54	9"	4' - 9"	171	9' - 5"	340	13' - 6"	36	30	84	1.023	199.2	1.0	120	41.9	8,089
3	6' - 0"	4' - 0"	9"	7"	108	#6	9"	20' - 1"	3,258	108	#5	9"	8' - 8"	976	6' - 9"	760	108	#6	9"	16' - 9"	2,717	15	18"	39' - 9"	398	71	18"	39' - 9"	1,885	108	9"	4' - 0"	289	108	9"	4' - 9"	343	9' - 5"	679	20' - 1"	54	44	122	1.475	282.6	1.5	176	60.5	11,481
4	6' - 0"	4' - 0"	9"	7"	108	#6	9"	26' - 8"	4,326	108	#5	9"	8' - 8"	976	6' - 9"	760	108	#6	9"	23' - 4"	3,785	20	18"	39' - 9"	531	92	18"	39' - 9"	2,443	108	9"	4' - 0"	289	162	9"	4' - 9"	514	9' - 5"	1,019	26' - 8"	71	56	156	1.927	366.1	2.0	227	79.1	14,870
5	6' - 0"	4' - 0"	9"	7"	108	#6	9"	33' - 3"	5,394	108	#5	9"	8' - 8"	976	6' - 9"	760	108	#6	9"	29' - 11"	4,853	25	18"	39' - 9"	664	113	18"	39' - 9"	3,000	108	9"	4' - 0"	289	216	9"	4' - 9"	685	9' - 5"	1,359	33' - 3"	89	70	195	2.380	449.5	2.5	284	97.7	18,264
6	6' - 0"	4' - 0"	9"	7"	108	#6	9"	39' - 10"	6,462	108	#5	9"	8' - 8"	976	6' - 9"	760	108	#6	9"	36' - 6"	5,921	30	18"	39' - 9"	797	134	18"	39' - 9"	3,558	108	9"	4' - 0"	289	270	9"	4' - 9"	857	9' - 5"	1,698	39' - 10"	106	82	228	2.832	533.0	3.0	334	116.2	21,652
2	6' - 0"	5' - 0"	9"	7"	108	#6	9"	13' - 6"	2,190	108	#5	9"	9' - 8"	1,089	6' - 9"	760	108	#6	9"	10' - 2"	1,649	10	18"	39' - 9"	266	56	18"	39' - 9"	1,487	108	9"	5' - 0"	361	54	9"	4' - 9"	171	11' - 5"	412	13' - 6"	36	30	84	1.088	209.6	1.0	120	44.5	8,505
3	6' - 0"	5' - 0"	9"	7"	108	#6	9"	20' - 1"	3,258	108	#5	9"	9' - 8"	1,089	6' - 9"	760	108	#6	9"	16' - 9"	2,717	15	18"	39' - 9"	398	79	18"	39' - 9"	2,098	108	9"	5' - 0"	361	108	9"	4' - 9"	343	11' - 5"	824	20' - 1"	54	44	122	1.562	296.2	1.5	176	64.0	12,024
4	6' - 0"	5' - 0"	9"	7"	108	#6	9"	26' - 8"	4,326	108	#5	9"	9' - 8"	1,089	6' - 9"	760	108	#6	9"	23' - 4"	3,785	20	18"	39' - 9"	531	102	18"	39' - 9"	2,708	108	9"	5' - 0"	361	162	9"	4' - 9"	514	11' - 5"	1,235	26' - 8"	71	56	156	2.035	382.7	2.0	227	83.4	15,536
5	6' - 0"	5' - 0"	9"	7"	108	#6	9"	33' - 3"	5,394	108	#5	9"	9' - 8"	1,089	6' - 9"	760	108	#6	9"	29' - 11"	4,853	25	18"	39' - 9"	664	125	18"	39' - 9"	3,319	108	9"	5' - 0"	361	216	9"	4' - 9"	685	11' - 5"	1,647	33' - 3"	89	70	195	2.509	469.3	2.5	284	102.8	19,056
6	6' - 0"	5' - 0"	9"	7"	108	#6	9"	39' - 10"	6,462	108	#5	9"	9' - 8"	1,089	6' - 9"	760	108	#6	9"	36' - 6"	5,921	30	18"	39' - 9"	797	148	18"	39' - 9"	3,930	108	9"	5' - 0"	361	270	9"	4' - 9"	857	11' - 5"	2,059	39' - 10"	106	82	228	2.983	555.9	3.0	334	122.3	22,570
2	6' - 0"	6' - 0"	9"	7"	108	#6	9"	13' - 6"	2,190	108	#5	9"	10' - 8"	1,202	6' - 9"	760	108	#6	9"	10' - 2"	1,649	10	18"	39' - 9"	266	62	18"	39' - 9"	1,646	108	9"	6' - 0"	433	54	9"	4' - 9"	171	13' - 5"	484	13' - 6"	36	30	84	1.153	220.0	1.0	120	47.1	8,921
3	6' - 0"	6' - 0"	9"	7"	108	#6	9"	20' - 1"	3,258	108	#5	9"	10' - 8"	1,202	6' - 9"	760	108	#6	9"	16' - 9"	2,717	15	18"	39' - 9"	398	87	18"	39' - 9"	2,310	108	9"	6' - 0"	433	108	9"	4' - 9"	343	13' - 5"	968	20' - 1"	54	44	122	1.648	309.7	1.5	176	67.4	12,565
4	6' - 0"	6' - 0"	9"	7"	108	#6	9"	26' - 8"	4,326	108	#5	9"	10' - 8"	1,202	6' - 9"	760	108	#6	9"	23' - 4"	3,785	20	18"	39' - 9"	531	112	18"	39' - 9"	2,974	108	9"	6' - 0"	433	162	9"	4' - 9"	514	13' - 5"	1,452	26' - 8"	71	56	156	2.144	399.4	2.0	227	87.7	16,204
5	6' - 0"	6' - 0"	9"	7"	108	#6	9"	33' - 3"	5,394	108	#5	9"	10' - 8"	1,202	6' - 9"	760	108	#6	9"	29' - 11"	4,853	25	18"	39' - 9"	664	137	18"	39' - 9"	3,638	108	9"	6' - 0"	433	216	9"	4' - 9"	685	13' - 5"	1,936	33' - 3"	89	70	195	2.639	489.1	2.5	284	108.0	19,849
6	6' - 0"	6' - 0"	9"	7"	108	#6	9"	39' - 10"	6,462	108	#5	9"	10' - 8"	1,202	6' - 9"	760	108	#6	9"	36' - 6"	5,921	30	18"	39' - 9"	797	162	18"	39' - 9"	4,302	108	9"	6' - 0"	433	270	9"	4' - 9"	857	13' - 5"	2,420	39' - 10"	106	82	228	3.134	578.9	3.0	334	128.3	23,488

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HL93 LOADING

Texas Department of Transportation

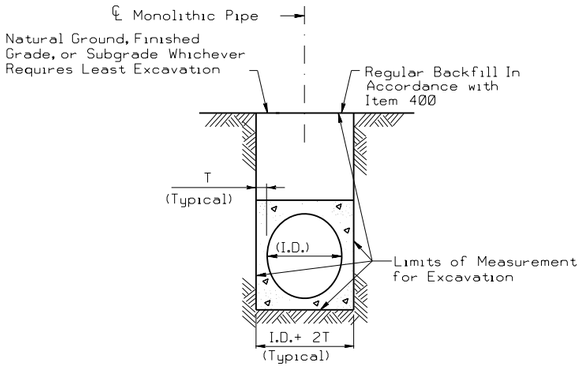
Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE

6'-0" SPAN 0' TO 16' FILL

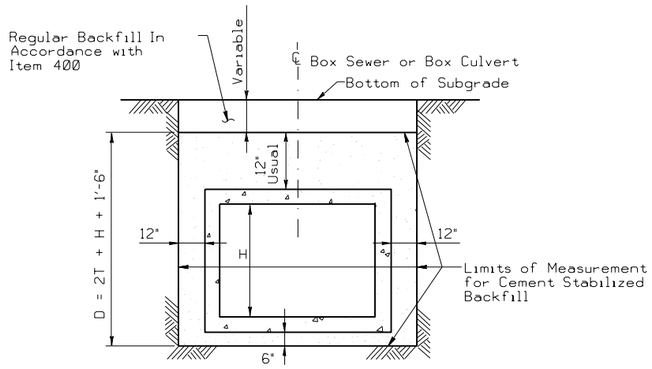
MC-6-16

FILE:	mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0111	09	042	BS 288B
		DIST	COUNTY		SHEET NO.
		HOU	BRAZORIA		153



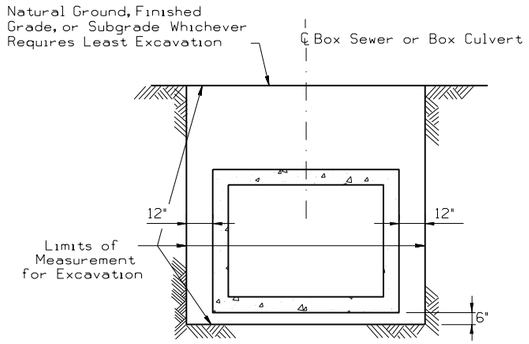
EXCAVATION DETAIL

MONOLITHIC PIPE
IN A PAVED OR GRADED AREA



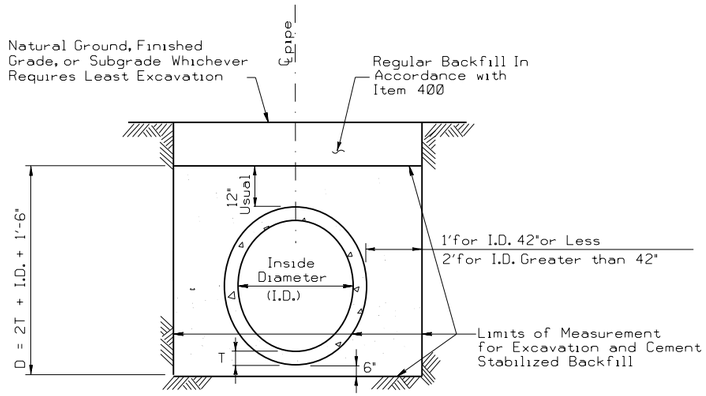
BACKFILL DETAIL

BOX CULVERTS
IN A GRADED OR PAVED AREA
INCLUDING DETOURS *



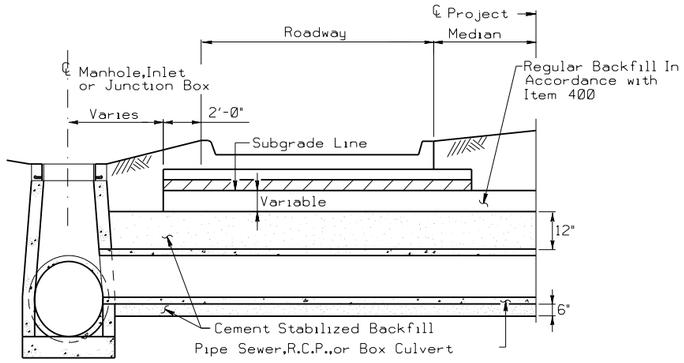
EXCAVATION DETAIL

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.

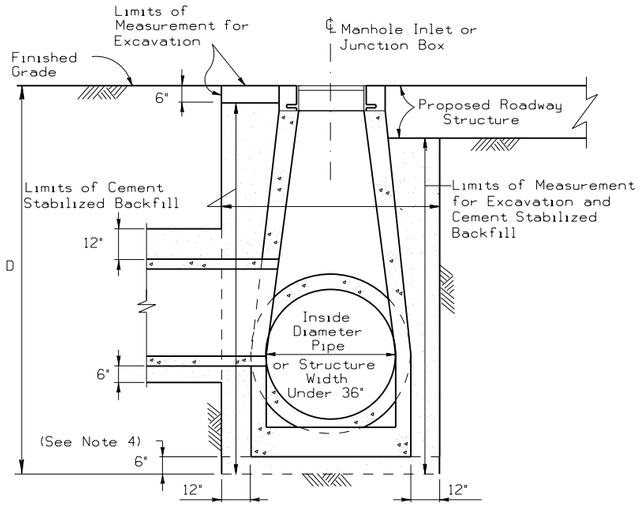
D = Depth
H = Height
T = Thickness
R = Radius
Dia = Diameter

Texas Department of Transportation
Houston District

EXCAVATION AND BACKFILL DIAGRAMS

E&BD

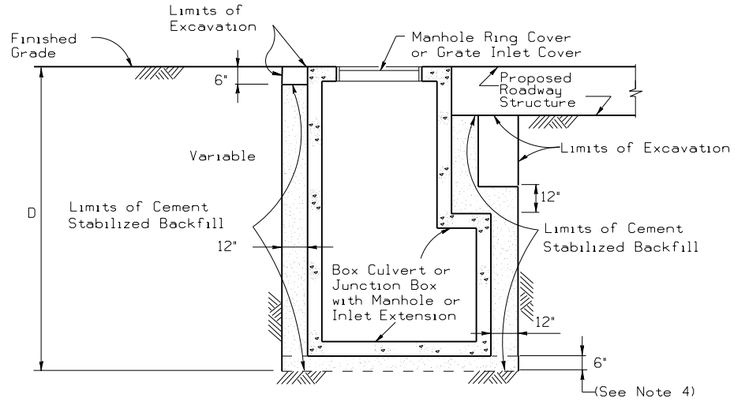
FILE: STDE1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT FEB 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOUSTON	6	C 111-9-42	154
REVISED 11/05 REVISED 2/2010 Added note to Table 1,Sht 2 of 2. REVISED 6/12 REVISED 9/14	COUNTY		CONTROL SECT JOB	HIGHWAY
	BRAZORIA		0111 09 042	BS 2888



EXCAVATION AND BACKFILL DETAIL

MANHOLES SMALLER THAN 36 IN.
IN A PAVED OR GRADED AREAS

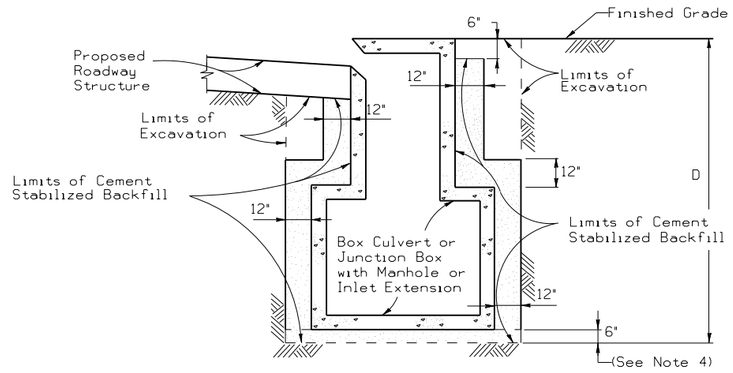
N.T.S.



EXCAVATION AND BACKFILL DETAIL

JUNCTION BOXES IN A
PAVED OR GRADED AREA

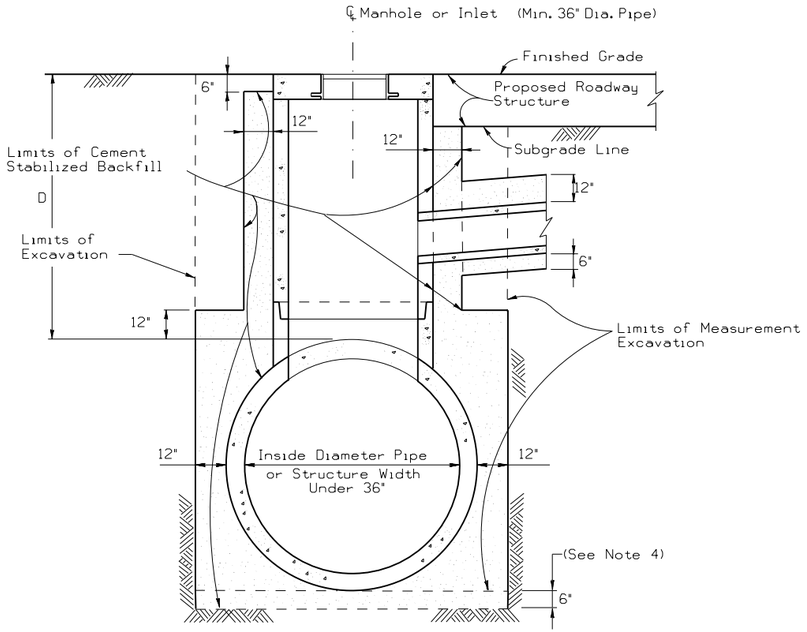
N.T.S.



EXCAVATION AND BACKFILL DETAIL

INLET EXTENSIONS ON A BOX CULVERT
IN A PAVED OR GRADED AREA

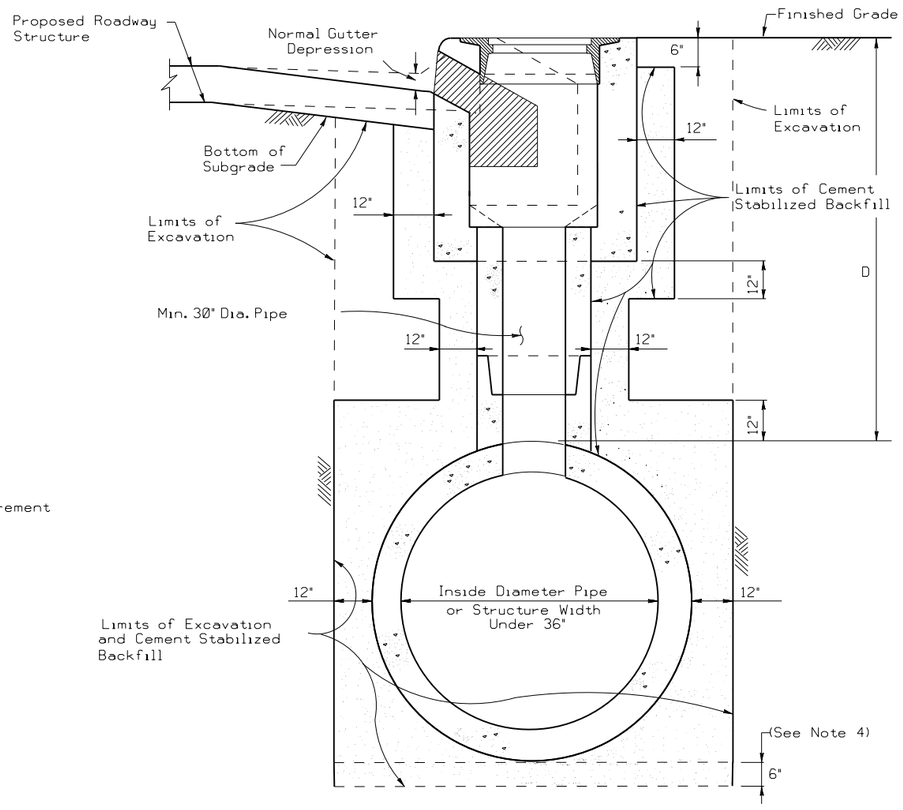
N.T.S.



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 1

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	C 111-9-42	155
	COUNTY		CONTROL SECT JOB	HIGHWAY
	BRAZORIA		0111 09 042	BS 288B

NOTES FOR PERMANENT TRAFFIC SIGNAL(S):

1. INSTALL SIGNALS HORIZONTALLY ON MAST ARM, 17 FT. - 6 IN. ABOVE THE ROADWAY.

2. FURNISH BLACK HOUSING FOR VEHICLE SIGNALS. FURNISH BLACK VEHICLE SIGNAL HEAD BACK FURNISH WITH 2 IN. RETROFLECTIVE YELLOW BORDER.

3. FURNISH VEHICLE WITH LIGHT EMITTING DIODE (LED) SIGNAL LAMP UNITS.

4. USE TYPE D (DIAMOND GRADE) RETROREFLECTIVE SHEETING FOR SIGNS MOUNTED UNDER OR ADJACENT TO THE SIGNAL HEADS.

5. ROUTE CABLE FOR LUMINAIRES (#12/4C - TRAY CABLE) TO THE SERVICE ENCLOSURE. SEE ELECTRICAL DETAIL SHEETS. DO NOT PASS LUMINAIRE CONDUCTORS THROUGH THE SIGNAL CONTROLLER CABINET.

6. FURNISH AND INSTALL FULL-ACTUATED CONTROLLER WITH INTERNAL TIME BASE COORDINATION UNIT IN A CABINET, MOUNTED ON AN 18-INCH BASE EXTENSION.

7. FURNISH ALL MATERIALS. SUPPLY THE CONTROLLER WITH DETECTION PHASE SEQUENCE, DETECTOR UNITS, DETECTOR CARDS, DETECTOR CARD RACK, AND POWER SUPPLY, TO THE DEPARTMENT'S SIGNAL SHOP, 6810 KATY ROAD, HOUSTON, TEXAS FORTY FIVE (45) DAYS IN ADVANCE FOR INSPECTION, SET UP, AND TESTING. CONTACT MR. MICHAEL AWA, P. E., IN WRITING, AT LEAST FIFTEEN (15) WORKING DAYS PRIOR TO PICKING UP THE MATERIALS.

   ADDRESS: TEXAS DEPARTMENT OF TRANSPORTATION
   P. O. BOX 1386
   HOUSTON, TEXAS 77251-1386
   TEL. NO. (713) 802-5661

8. THE DEPARTMENT'S TRAFFIC SIGNAL MAINTENANCE OFFICE WILL PROVIDE PHASING FOR TEMPORARY AND PERMANENT TRAFFIC SIGNALS. THE CONTRACTOR WILL PROVIDE TIMING.

9. LOCATE CABINET(S), STEEL SIGNAL POLES, SIGNAL DETECTORS, ETC., AS APPROVED.

10. REPAIR OR REPLACE PAVEMENT AND SIDEWALKS DAMAGED BY THE CONTRACTORS FORCES DURING CONSTRUCTION AT NO COST TO THE DEPARTMENT.

11. ALL TRAFFIC SIGNAL DETECTION DEVICES AND RELATED COMPONENTS SHALL BE SALVAGED AND RETURNED TO THE DEPARTMENT'S SIGNAL SHOP AT 6810 OLD KATY ROAD, HOUSTON, TEXAS, BETWEEN 9:00 AM AND 3:00 PM, MONDAY THROUGH FRIDAY. CAREFULLY REMOVE THE MATERIALS SO THAT THEY WILL NOT BE MARRED OR DAMAGED. REPLACE MATERIALS THAT ARE SCARRED, BATTERED OR BROKEN BY THE CONTRACTOR AT NO EXPENSE TO THE DEPARTMENT.

12. FOR ALL OTHER TRAFFIC SIGNAL-RELATED COMPONENTS, CONTACT MR. MICHAEL AWA, P. E., AT TEXAS DEPARTMENT OF TRANSPORTATION, P. O. BOX 1386, HOUSTON, TEXAS 77251-1386, TEL. NO. (713) 802-5661; HIS EMPLOYEES WILL DETERMINE WHICH ITEMS WILL BE SALVAGED. ITEMS DEEMED SALVAGEABLE WILL BE DELIVERED TO THE DEPARTMENT'S SIGNAL SHOP AT 6810 OLD KATY ROAD, HOUSTON, TEXAS, BETWEEN 9:00 AM AND 3:00 PM, MONDAY THROUGH FRIDAY. CAREFULLY REMOVE THE MATERIALS SO THAT THEY WILL NOT BE MARRED OR DAMAGED. REPLACE MATERIALS THAT ARE SCARRED, BATTERED OR BROKEN BY THE CONTRACTOR AT NO EXPENSE TO THE DEPARTMENT. DISPOSE OF OTHER ITEMS REMOVED BY THE CONTRACTOR AT NO EXPENSE TO THE DEPARTMENT.

13. ASSUME OWNERSHIP OF THE REMOVED EXISTING SIGNS.

14. SEAL ENDS OF ALL CONDUITS WITH DUCT SEAL, EXPANDABLE FOAM, OR BY OTHER METHODS APPROVED BY THE ENGINEER. SEAL CONDUIT IMMEDIATELY AFTER COMPLETION OF CONDUCTOR INSTALLATION AND PULL TESTS. DO NOT USE DUCT TAPE AS PERMANENT CONDUIT SEALANT. DO NOT USE SILICON CAULK AS A CONDUIT SEALANT.

15. CAP SPARE CONDUITS INSTALLED IN POLE FOUNDATIONS AND GROUND BOXES USING APPROVED CAPPING DEVICES.

16. DO NOT PLACE SIGNAL HEADS OVER THE ROADWAY UNTIL ALL NECESSARY MATERIALS ARE ON HAND AS APPROVED.

17. INSTALL TWO SET SCREWS ON ALL VEHICLE SIGNAL HEAD MOUNTING HARDWARE FITTINGS.

18. PROVIDE CONTINUED OPERATION OF THE EXISTING SIGNAL(S) DURING CONSTRUCTION AND UNTIL THE PROPOSED OPERATION IS COMPLETED.

19. ONCE THE INTEGRITY AND/OR FUNCTION OF THE EXISTING TRAFFIC SIGNAL(S) IS ALTERED BY THE CONTRACTOR, MAINTAIN AND OPERATE THE EXISTING TRAFFIC SIGNAL(S) UNTIL THE TRAFFIC SIGNAL WORK IS ACCEPTED BY THE DEPARTMENT. DURING THE CONSTRUCTION OF THE PROPOSED TRAFFIC SIGNAL WORK, MAINTAIN THE EXISTING TRAFFIC SIGNAL(S) AND/OR TEMPORARY CONSTRUCTION TRAFFIC SIGNAL(S) IN CONFORMANCE WITH THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

20. DURING CONSTRUCTION OF THE PROPOSED SIGNAL WORK, IF THE EXISTING TRAFFIC SIGNAL EQUIPMENT REQUIRES REPLACEMENT DUE TO WEAR, DETERIORATION, OR ANY CIRCUMSTANCE OVER WHICH THE CONTRACTOR HAS NO CONTROL, THE EQUIPMENT WILL BE FURNISHED BY THE DEPARTMENT AT NO COST TO THE CONTRACTOR. INSTALL THIS EQUIPMENT AT NO COST TO THE DEPARTMENT. SUCH MATERIALS WILL BE PROVIDED AT THE DEPARTMENTS SIGNAL SHOP LOCATED AT 6810 KATY ROAD, HOUSTON, TEXAS. CONTACT MR. MICHAEL AWA, P.E., AT TELEPHONE NUMBER (713) 802-5661.

21. MAINTAIN THE INTEGRITY AND FUNCTION OF EACH EXISTING SIGNALIZED INTERSECTION. ONCE THE INTEGRITY OR FUNCTION OF THE SIGNAL HAS BEEN ALTERED, PURSUE THE WORK AT THAT LOCATION WITHOUT DELAY OR INTERRUPTION TO RESTORE OPERATION TO ITS ORIGINAL OR FINAL OPERATIONAL DESIGN.

22. INSTALL A 5/8-IN. (MINIMUM) EYE BOLT FOR THE POINT OF ATTACHMENT BELOW THE SERVICE ENTRANCE WEATHERHEAD FOR THE SERVICE DROP TO STEEL OR WOOD POLE.

23. AIM LUMINAIRE ARMS MOUNTED ON TRAFFIC SIGNAL POLES PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY IT IS INTENDED TO COVER, TO DEVELOP THE PROPER ILLUMINATION PATTERN FOR THE INTERSECTION.

24. PROVIDE 250 WATT HPS (HIGH PRESSURE SODIUM) EQUIVALENT LIGHT EMITTING DIODE (LED) LUMINAIRES OPERATING AT 240 VOLTS.

25. WRAP SIGNAL HEADS WITH DARK PLASTIC OR SUITABLE MATERIAL TO CONCEAL THE SIGNAL FACES FROM THE TIME OF INSTALLATION UNTIL PLACING INTO OPERATION.

26. GROUND STEEL MAST ARM POLE ASSEMBLIES IN ACCORDANCE WITH REQUIREMENTS SHOWN ON THE LATEST TRAFFIC SIGNAL POLE FOUNDATION STANDARD. USE THE GROUNDING LUG ON THE POLE TO GROUND THE POLE TO THE GROUND CONDUCTORS FROM THE CONDUITS.

27. VERIFY THE CORRECT MAST ARM POLE LENGTHS FOR EACH SIGNALIZED INTERSECTION PRIOR TO ORDERING THE EQUIPMENT.

28. INSTALL A CLOSE NIPPLE WITH LOCK NUT AND BUSHING (SIZE AS REQUIRED) WHERE THE CABLE ENTERS THE UPPER PORTION OF THE SIGNAL POLE.

29. REFER TO TXDOT'S WEBSITE FOR PREQUALIFIED PRODUCTS LIST REGARDING RADAR DETECTORS, VIVDS CAMERAS, WIRELESS MAGNETOMETERS, VEHICLE LED TRAFFIC SIGNAL LAMP UNIT, SYMBOLIC PEDESTRIAN SIGNAL HEAD, SYMBOLIC PEDESTRIAN SIGNAL LAMP, ACCESSIBLE PEDESTRIAN SIGNALS, SIGNAL CONTROLLERS, SIGNAL CABINETS, BUS INTERFACE UNITS, BATTERY BACKUP UNITS. CHECK WEBSITE PERIODICALLY FOR CURRENT UPDATES.

30. THE CONTRACTOR IS RESPONSIBLE FOR THE SIGNAL CARRYING CAPABILITY AND PERFORMANCE OF THE CABLE. INSTALL EACH WIRE WITH A LIGHTNING PROTECTION DEVICE UNLESS OTHERWISE NOTED.

31. CONTRACTOR TO ADJUST SIGNAL HEAD ALIGNMENT, AS NEEDED, USING ARTICULATING SIGNAL BRACKET ASSEMBLIES WITH A MINIMUM OF THREE ADJUSTABLE AXES.

32. SEAL WITH WATERPROOF SEALANT EACH END OF THE COMMUNICATIONS CABLE THAT IS EXPOSED TO THE ELEMENTS DURING STORAGE OR AFTER INSTALLATION.

33. THE CONTRACTOR TO FURNISH AND INSTALL ALL EQUIPMENT CALLED FOR AND REQUIRED AS NEEDED FOR A FULLY OPERATIONAL TRAFFIC SIGNAL.

34. WIMAX OR OTHER COMMUNICATION SYSTEM AND OTHER I.T.S. EQUIPMENTS MAY EXIST AT THE INTERSECTIONS. CONTACT THE OWNER PRIOR TO CONSTRUCTION. EQUIPMENT WILL NEED TO BE REMOVED AND REINSTALLED BY OTHERS.

35. FURNISH VIDEO IMAGING VEHICLE DETECTION SYSTEM (VIVDS) CABLE RECOMMENDED BY MANUFACTURER OR PURCHASE CABLE FROM THE SAME MANUFACTURER THAT SUPPLIED/PROVIDED THE VIVDS EQUIPMENT.

36. FOR VIVDS CAMERA(S) MOUNTED TO LUMINAIRE ARMS, STRAP THE VIVDS CABLE TO THE LUMINAIRE ARMS WITH A METAL CABLE STRAP (ALUMINUM OR STAINLESS STEEL), 3/4-IN MINIMUM WIDTH AND TWO WRAPS AT 8 IN. MAXIMUM SPACING.

37. THE LOCATION OF THE VIVDS DETECTION ZONE IS APPROXIMATE. THE EXACT LOCATION WILL BE DETERMINED BY THE ENGINEER AND/OR DEPARTMENT'S TRAFFIC OPERATIONS SECTION.

TRAFFIC SIGNAL NOTES FOR PROPOSED LAYOUT

BS 288-B AT VARIOUS LOCATIONS

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/29/2022

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288-B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		156

DATE: 9/22/2022 2:54:54 PM
FILE: C:\Users\rolivas\Desktop\TXDOT HOUSTON\WORK AT HOME\BS 288-B AT BEECHWOOD DR\0111-09-042 BS 288-B AT BEECHWOOD DR PROPOSED.dgn

LEGEND:

TRAFFIC DIRECTION

PP POWER POLE

PP/T POWER POLE W/TRANSFORMER

OE OVERHEAD POWER LINE

NB 288-B (60MPH)

210+00

SB 288-B (60MPH)

BEECHWOOD DR

EXISTING INTERSECTION AHEAD SIGN,
48x48 BLACK ON YELLOW W2-2R;
LOCATED APPROX. 425 FEET FROM
CENTER LINE OF BEECHWOOD DR. TO
BE REMOVED.

BS 288-B AT BEECHWOOD DR

EXISTING ADVANCE WARNING SIGNS

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

09/29/2022

0 20 40
SCALE: 1" = 40'

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288-B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		157

DATE: 9/22/2022 2:41:42 PM
FILE: C:\Users\rolivas\Desktop\TXDOT HOUSTON\WORK AT HOME\BS 288-B AT BEECHWOOD DR\0111-09-042 BS 288-B AT BEECHWOOD DR EXISTING.dgn

LEGEND:

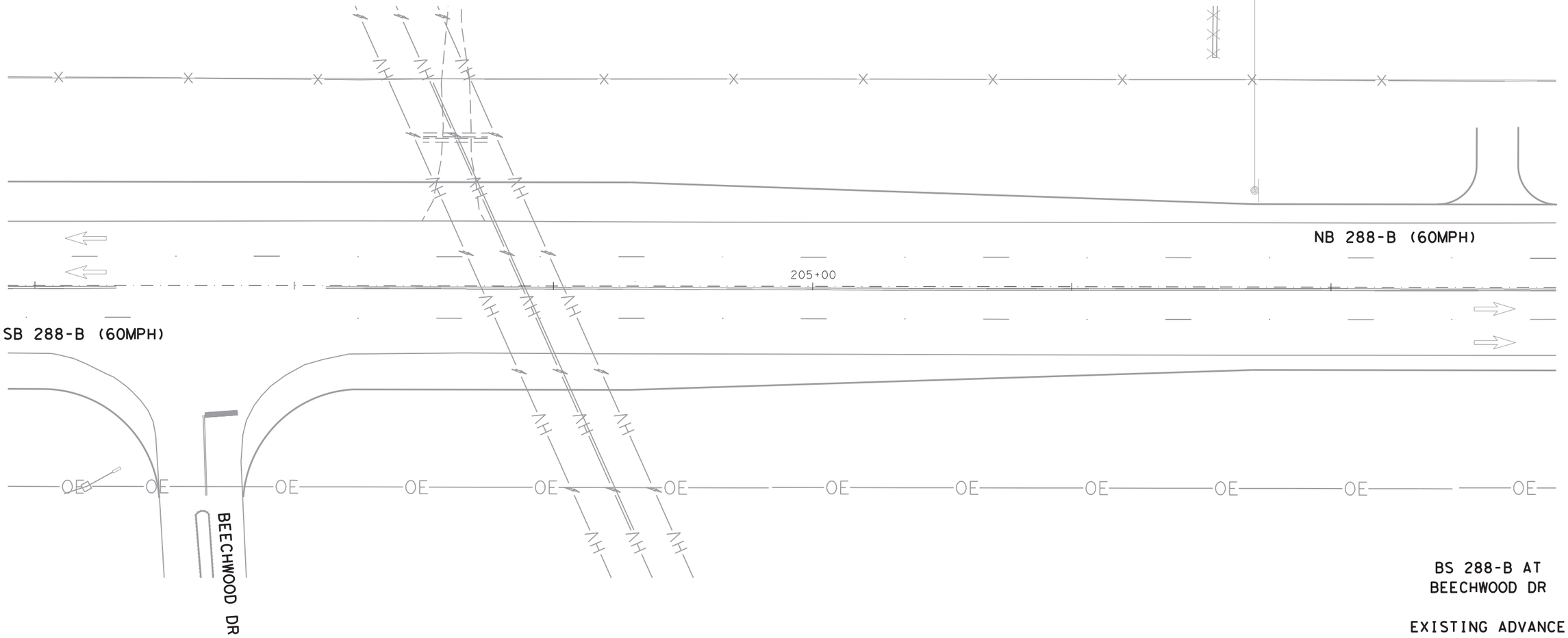
TRAFFIC DIRECTION

PP POWER POLE

PP/T POWER POLE W/TRANSFORMER

OE OVERHEAD POWER LINE

EXISTING INTERSECTION AHEAD SIGN, 48x48 BLACK ON YELLOW W2-2L; LOCATED APPROX. 400 FEET FROM CENTER LINE OF BEECHWOOD DR. TO BE REMOVED.



BS 288-B AT BEECHWOOD DR

EXISTING ADVANCE WARNING SIGNS

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

09/29/2022

0 20 40
SCALE: 1" = 40'

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288-B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		158

DATE: 9/22/2022 2:42:16 PM
FILE: C:\Users\rolivas\Desktop\TXDOT HOUSTON\WORK AT HOME\BS 288-B AT BEECHWOOD DR\0111-09-042 BS 288-B AT BEECHWOOD DR EXISTING.dgn

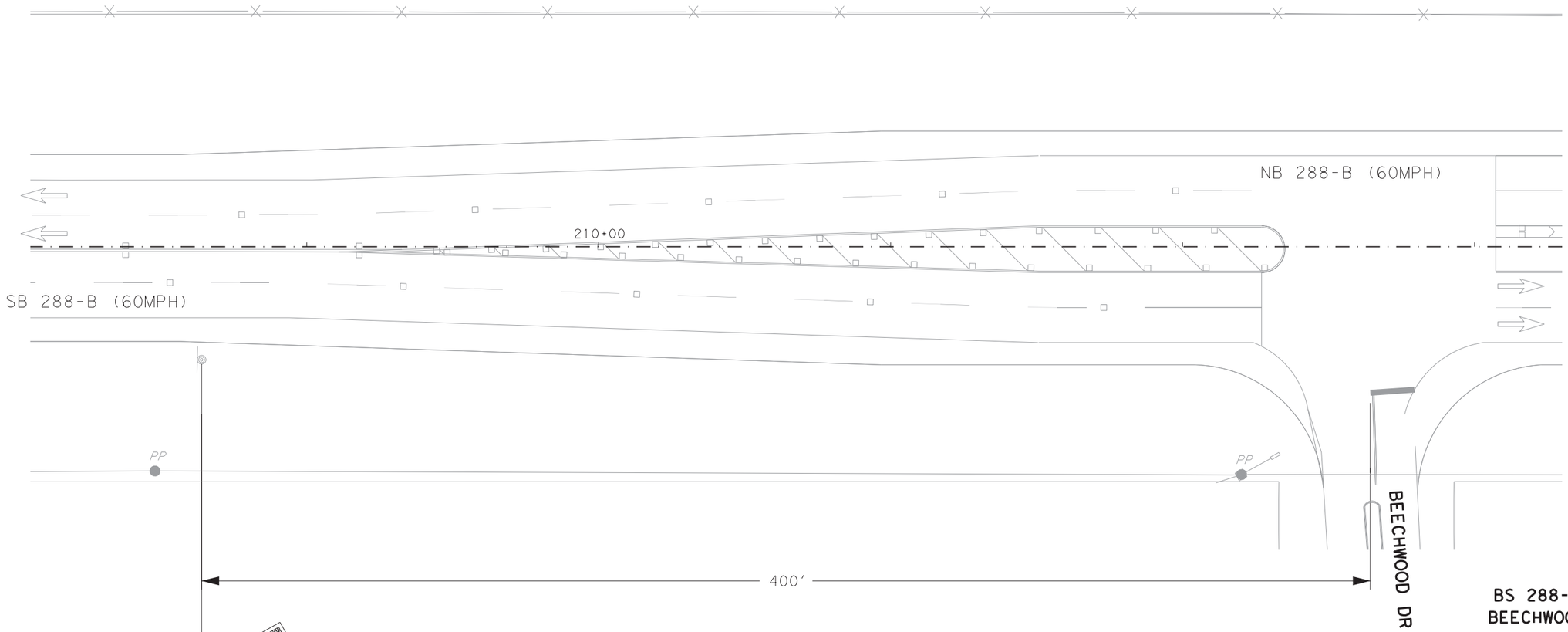
LEGEND:

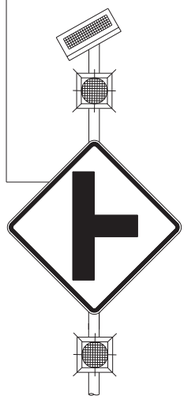
TRAFFIC DIRECTION

PP POWER POLE

PP/T POWER POLE W/TRANSFORMER

—OE— OVERHEAD POWER LINE





PROPOSED SOLAR POWERED ROADSIDE FLASHING BEACONS ASSEMBLY W/ALTERNATING 12" YELLOW LED SIGNAL BEACONS. INSTALL WITH "INTERSECTION AHEAD" ADVANCE WARNING SIGN (W2-2R) (48"X48")(24 HRS BACK UP BATTERY). TO BE INSTALLED APPROXIMATELY 400' FROM CENTER LINE OF BEECHWOOD DR.

W2-2R 48x48

STATE OF TEXAS
MICHAEL A. OLIVO
108793
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09/29/2022

BS 288-B AT BEECHWOOD DR

PROPOSED ADVANCE WARNING SIGN

0 20 40
SCALE: 1" = 40'

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288-B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		159

DATE: 9/23/2022 1:33:20 PM
FILE: C:\Users\rolivas\Desktop\TXDOT HOUSTON\WORK AT HOME\BS 288-B AT BEECHWOOD DR\0111-09-042 BS 288-B AT BEECHWOOD DR PROPOSED.dgn

LEGEND:

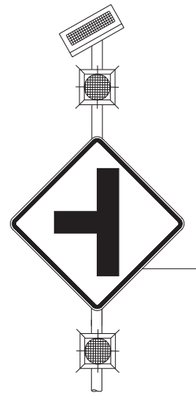
TRAFFIC DIRECTION

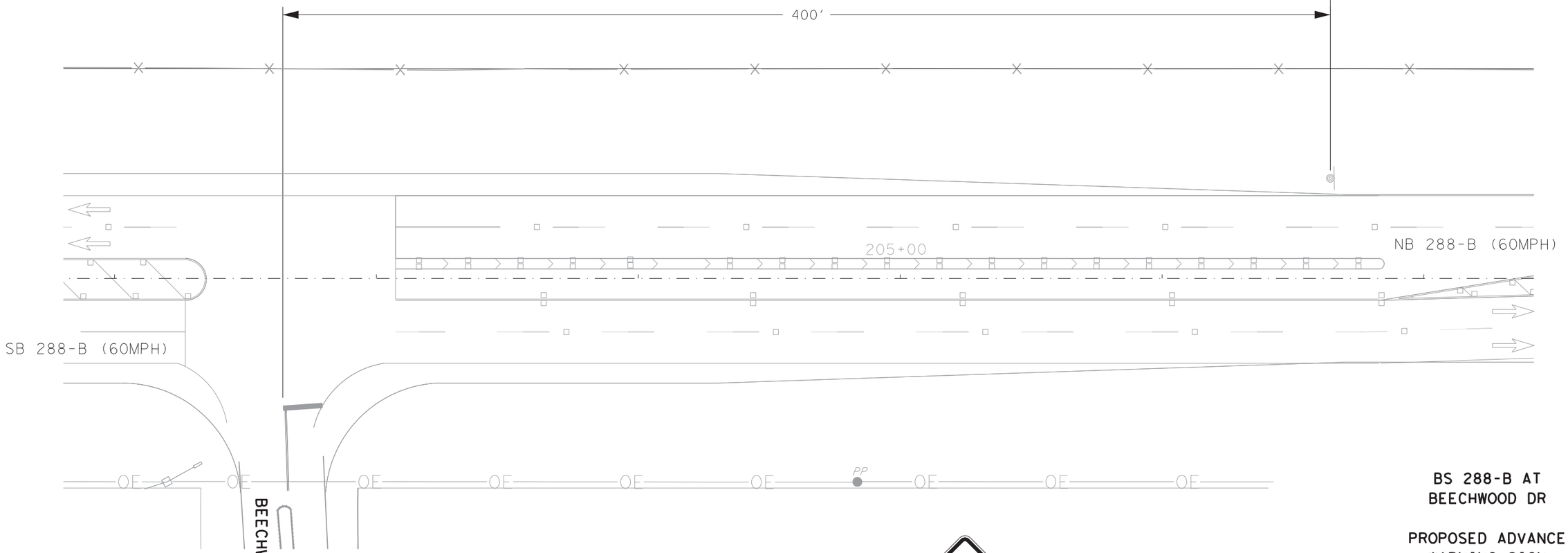
PP POWER POLE

PP/T POWER POLE W/TRANSFORMER

OE OVERHEAD POWER LINE

PROPOSED SOLAR POWERED ROADSIDE FLASHING BEACONS ASSEMBLY W/ALTERNATING 12" YELLOW LED SIGNAL BEACONS. INSTALL WITH "INTERSECTION AHEAD" ADVANCE WARNING SIGN (W2-2L) (48"X48")(24 HRS BACK UP BATTERY). TO BE INSTALLED APPROXIMATELY 400' FROM CENTER LINE OF BEECHWOOD DR.





W2-2L 48x48

BS 288-B AT BEECHWOOD DR

PROPOSED ADVANCE WARNING SIGN

0 20 40

SCALE: 1" = 40'

SHEET 2 OF 2

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER

P.E.

09/29/2022

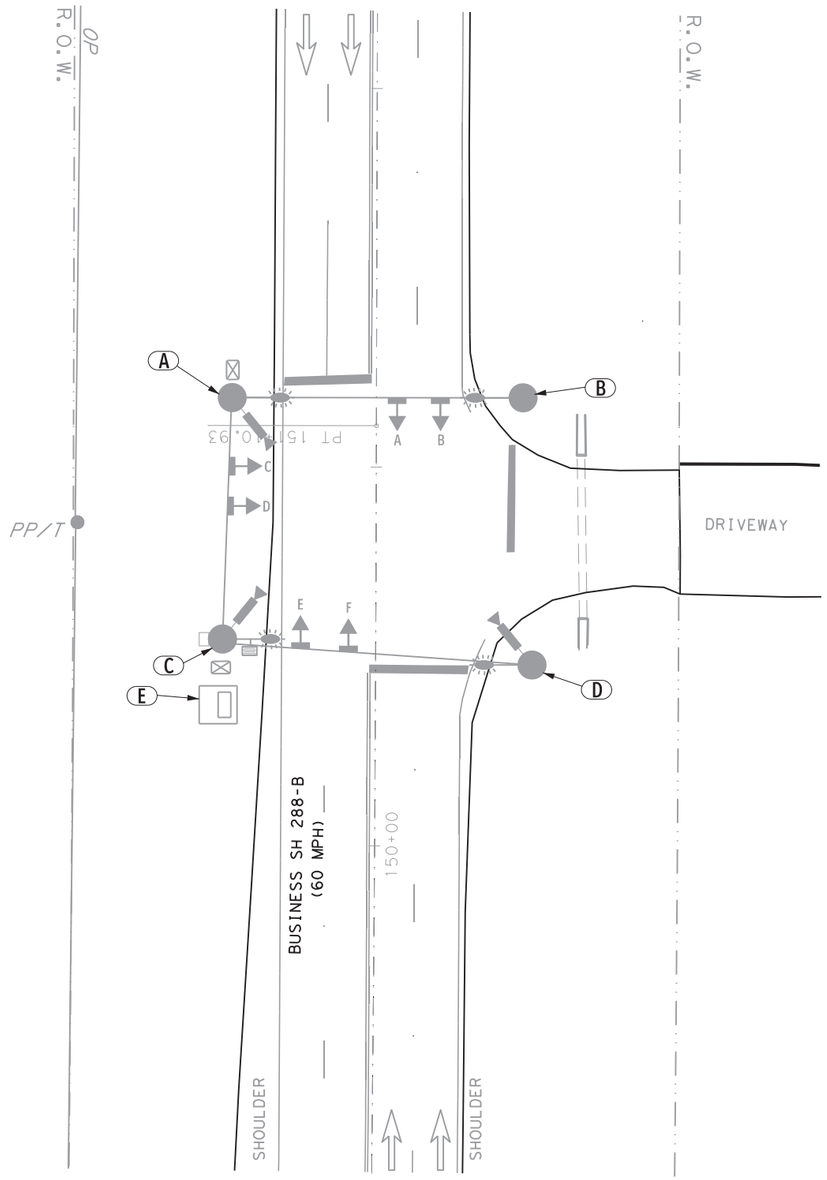
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288-B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		160

DATE: 9/23/2022 1:33:38 PM
FILE: C:\Users\rolivos\Desktop\TXDOT HOUSTON\WORK AT HOME\BS 288-B AT BEECHWOOD DR\0111-09-042 BS 288-B AT BEECHWOOD DR PROPOSED.dgn

LEGEND:

- TRAFFIC DIRECTION
- PP — POWER POLE
- PP/T — POWER POLE W/TRANSFORMER
- OP — OVERHEAD POWER LINE
- RIGHT OF WAY
- EXISTING GROUND BOX
- E — EXISTING SIGNAL HEAD
- EXISTING LUMINAIRE
- EXISTING SIGNAL CONTROLLER
- EXISTING VIVDS CAMERA
- EXISTING RADIO ANTENNA



LEGEND:

- (A) EXISTING STEEL SIGNAL POLE w/METER, SERVICE ENCLOSURE & SERVICE DISCONNECT, LUMINAIRE & VIDEO CAMERA (TO BE REMOVED)
- (B) EXISTING STEEL SIGNAL POLE w/LUMINAIRE (TO BE REMOVED)
- (C) EXISTING STEEL SIGNAL POLE w/LUMINAIRE, VIDEO CAMERA & RADIO ANTENNA (TO BE REMOVED)
- (D) EXISTING STEEL SIGNAL POLE w/LUMINAIRE & VIDEO CAMERA (TO BE REMOVED)
- (E) EXISTING SIGNAL CONTROLLER (TO BE REMOVED)

EXISTING SIGN SCHEDULE:

S1	BUSINESS SH 288 B

EXISTING SIGNAL SCHEDULE:

R Y G

A, B, C, D, E, F

BS 288-B AT DRIVEWAY

TRAFFIC SIGNAL EXISTING PLAN

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/29/2022

0 20 40
SCALE: 1" = 40'

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288-B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		161

DATE: 9/22/2022 TIME
FILE: \\FS-HOUHQ.dot.state.tx.us\Data4\data\engdata\TrfSignals\Greg Sosa\2022 Projects\0111-09-042 BS 288-B Signal design\BS 288-B Signal Design.dgn

LEGEND:

TRAFFIC DIRECTION

PP — POWER POLE

PP/T — POWER POLE W/TRANSFORMER & DOWN GUY

—OP— OVERHEAD ELECTRIC

RIGHT OF WAY

PROPOSED FULLY-ACTUATED CONTROLLER W/CABINET, CELLULAR MODEM, AND BATTERY BACK-UP (BBU)

PROPOSED GROUND BOX

E — PROPOSED SIGNAL HEAD

PROPOSED MAST ARM POLE

PROPOSED SERVICE POLE

VC 1 — PROPOSED VIVDS CAMERA

PROPOSED LUMINAIRE

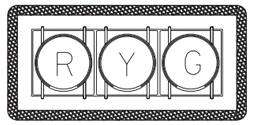
PROPOSED CONDUIT (TRENCH)

PROPOSED CONDUIT (BORE)

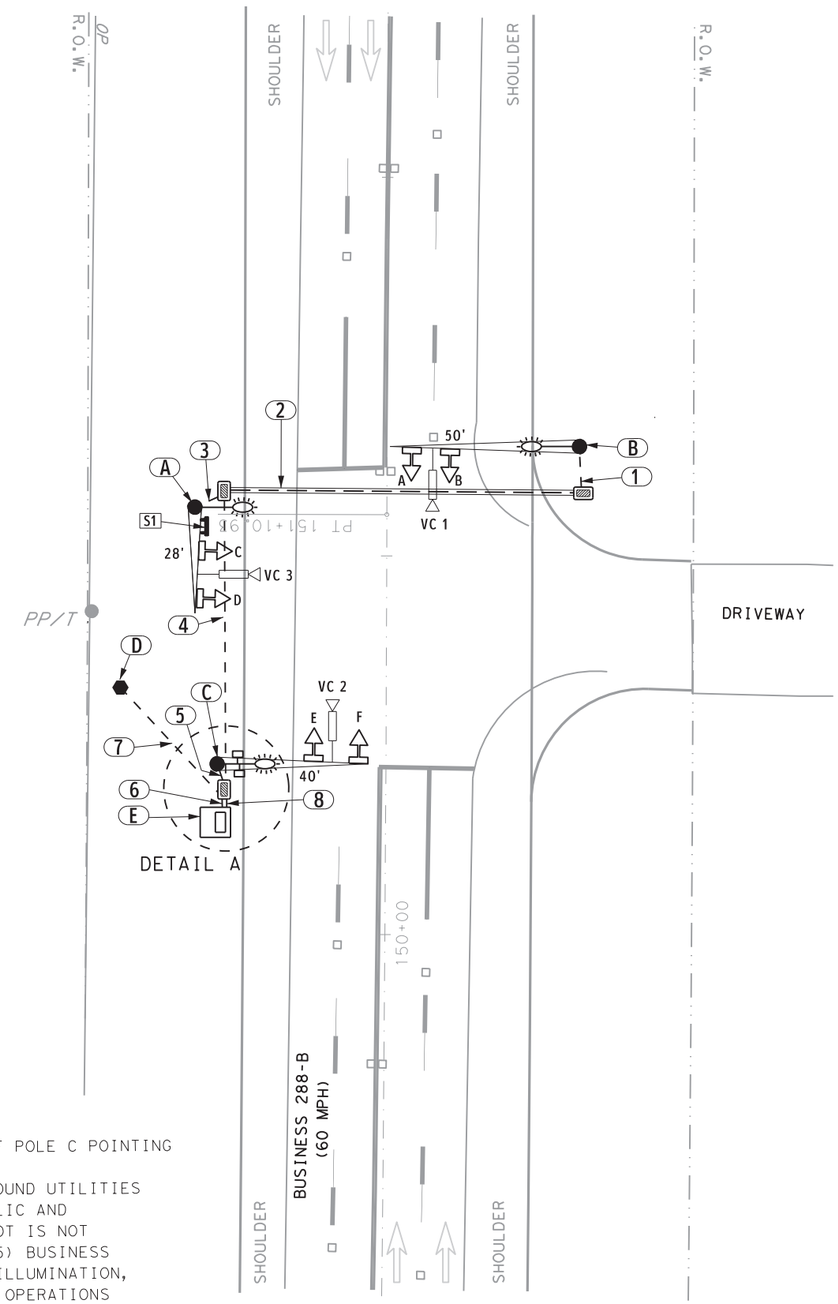
S1 — PROPOSED SIGN

PROPOSED RADIO ANTENNA

PROPOSED SIGNAL HEAD SCHEDULE:



A, B, C, D, E, F



LEGEND:

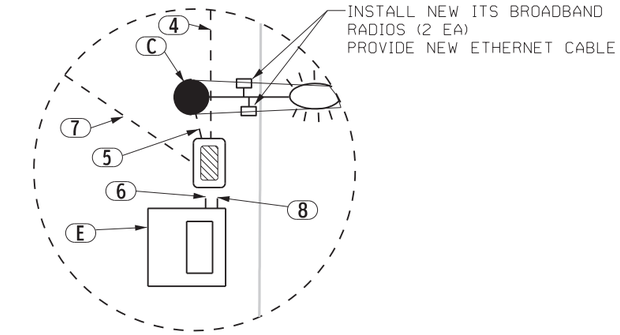
(A) PROP. 28' MAST ARM SIGNAL POLE w/VIVDS CAMERA & LUMINAIRE

(B) PROP. 50' MAST ARM SIGNAL POLE w/LUMINAIRE & VIVDS CAMERA

(C) PROP. 40' MAST ARM SIGNAL POLE w/LUMINAIRE, VIVDS CAMERA & ITS BROADBAND RADIO (2 EA)

(D) PROP. SERVICE POLE TY D WITH SERVICE (120/240 VOLTS), METER, SERVICE ENCLOSURE AND SERVICE DISCONNECT

(E) PROP. FULL-ACTUATED CONTROLLER WITH CABINET, CELLULAR MODEM AND BATTERY BACK-UP (BBU)



DETAIL A

NOTES:

- RADIOS w/ANTENNA TO BE INSTALLED ON LUMINAIRE MAST ARM OF POLE C POINTING TOWARD TECHNOLOGY DR AND FM 523.
- THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND AND ABOVE GROUND UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES AT LEAST 72 HOURS PRIOR TO ANY WORK. TXDOT IS NOT A MEMBER OF 811. THE CONTRACTOR SHALL CONTACT TXDOT FIVE (5) BUSINESS DAYS TO LOCATE TXDOT OWNED EXISTING TXDOT COMMUNICATIONS, ILLUMINATION, AND TRAFFIC SIGNAL CABLING. TXDOT HOUSTON DISTRICT TRAFFIC OPERATIONS OFFICE CAN BE REACHED AT: HOU-LOCATEREQUEST@TXDOT.GOV
- THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY CONTRACTOR S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND OR ABOVE GROUND. UTILITIES ON THE PLANS ARE SHOWN IN APPROXIMATE LOCATIONS.

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/29/2022

BS 288-B AT DRIVEWAY

TRAFFIC SIGNAL PROPOSED PLAN

0 20 40
SCALE: 1" = 40'

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288-B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		162

DATE: 9/22/2022 TIME
FILE: \\FS-HOUHQ.dot.state.tx.us\Data4\data\engdata\TrfSignals\Greg Sosa\2022 Projects\0111-09-042 BS 288-B Signal design\BS 288-B Signal Design.dgn

PROPOSED STREET NAME SIGN:

S1

1.50" Radius, 0.50" Border, White on, Green;
"BUSINESS SH 288 B", ClearviewHwy-2-W;

CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT (618)						CONDUCTORS (620)						TRAY CABLE (621)		CABLES (684)		VIVDS (6306)		BROADBAND (6062)	
	PVC						POWER		GROUND				LUMINAIRE		SIGNAL		VIVDS		ETHERNET	
	2" (SCHD 80)				3" (SCHD 80)		#4 INSULATED		#4 BARE		#6 BARE		#12/4C Tray Cable		#12/7C		#14/3C (* 1000 FT)		CAT 5	
	(6046)		(6047)		(6053)		(6012)		(6011)		(6009)		(6005)		(6012)		(Subsidiary)		(Subsidiary)	
	NO.	TRENCH	NO.	BORE	NO.	TRENCH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF
1	1	10									1	10	1	10	1	10	1	10		
2			1	95							1	95	1	95	1	95	1	95		
3	1	10									1	10	1	10	1	10	1	10		
4					1	80					1	80	1	80	2	80	2	80		
5	1	5									1	5	1	5	1	5	1	5	2	5
6					1	10					1	10	2	10	3	10	3	10	2	10
7	1	40					2	40	1	40			3	40						
8	1	10					2	10	1	10										
Pole A															1	20	1	20		
Mast Arm A 28'															1	30	1	30		
Pole B													1	50	1	20	1	20		
Mast Arm B 50'															1	50	1	50		
Pole C													1	50	1	20	1	20	2	50
Mast Arm C 40'															1	40	1	40		
TOTAL (LF)		75		95		90		100		50		210		440		490		490		130
EST. TOTAL		80		100		95		105		55		225		465		515		515		140

ELECTRICAL SERVICE DATA:

ELECTRICAL SERVICE NAME	CALLOUT	ELECTRICAL SERVICE DESCRIPTION (SEE ED(5),ED(6),ED(7),ED(8)-14)	SERVICE CONDUIT SIZE (RMC)	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BRK. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD./ LOADCENTER AMP RATING (MIN)	CIRCUIT NO.	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
SH 288-B AT DRIVEWAY	(D)	ELEC SERV TY D (120/240)060(NS)SS(E)SP(O)	1-1/4"	3/#6	N/A	2P/60		100	TRF. SIG	1P/50	40	<5.8
							30		LIGHTING	2P/20	3	

VIDEO DETECTION CHART:

VC1	DESIGNATED FOR NORTHBOUND BS-288B APPROACHING VEHICLES
VC2	DESIGNATED FOR SOUTHBOUND BS-288B APPROACHING VEHICLES
VC3	DESIGNATED FOR WESTBOUND APPROACHING VEHICLES

STATE OF TEXAS
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BS 288-B AT DRIVEWAY

TRAFFIC SIGNAL PROPOSED PLAN

SHEET 2 OF 2

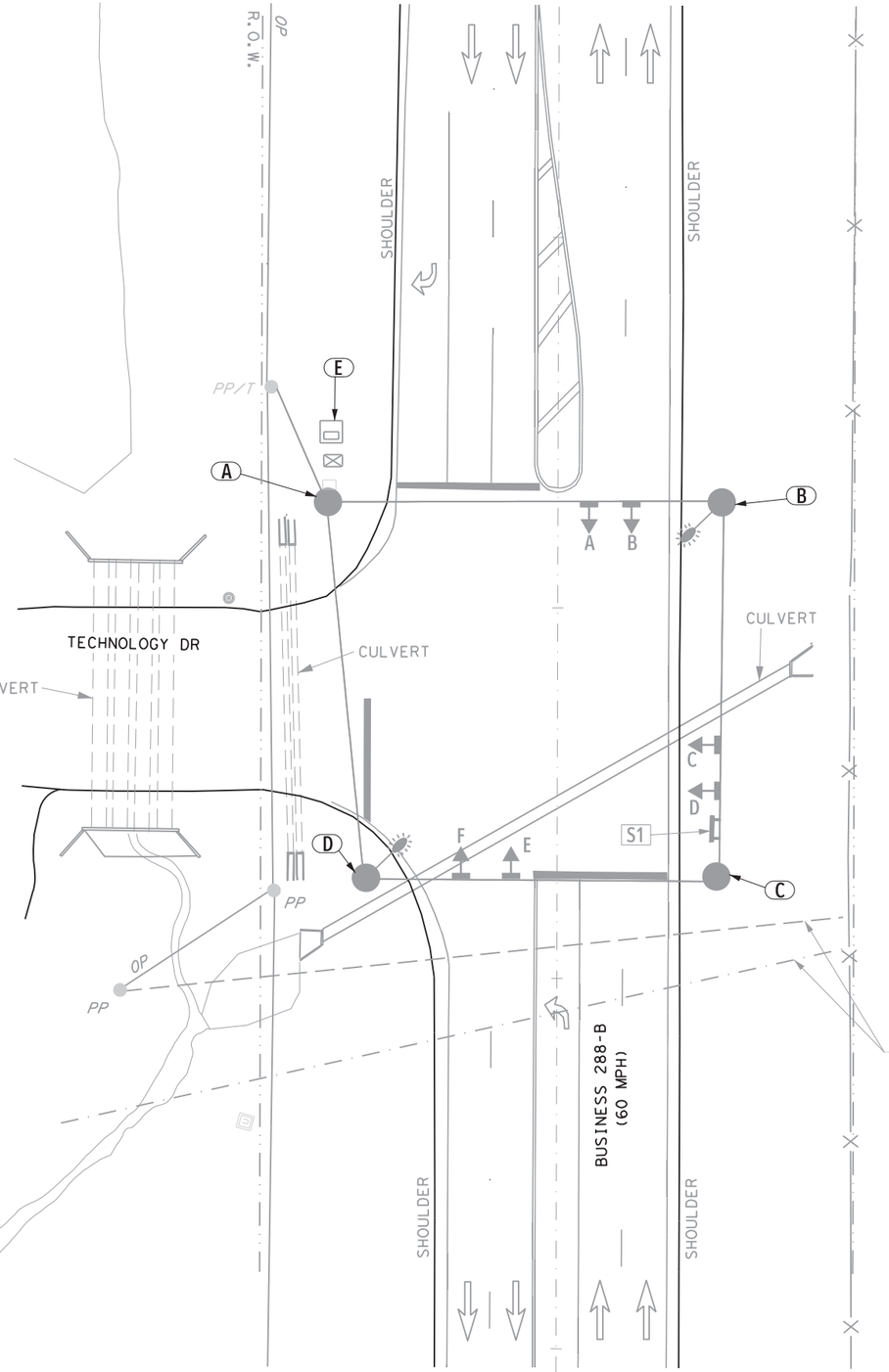
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288-B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		163

DATE: 9/22/2022 TIME
FILE: \\FS-HOUHQ.dot.state.tx.us\Data4\data\engdata\TrfSignals\Greg Sosa\2022 Projects\0111-09-042 BS 288-B Signal design\BS 288-B Signal Design.dgn

LEGEND:

- TRAFFIC DIRECTION
- PP — POWER POLE
- PP/T — POWER POLE W/TRANSFORMER
- OP — OVERHEAD POWER LINE
- RIGHT OF WAY
- FENCE
- HIGH PRESSURE GAS LINE
- LOW PRESSURE GAS LINE
- EXISTING GROUND BOX
- E — EXISTING SIGNAL HEAD
- EXISTING LUMINAIRE
- EXISTING SIGNAL CONTROLLER
- S1 — EXISTING ROADWAY/STREET SIGN



LEGEND:

- (A) EXISTING STEEL SIGNAL POLE w/METER, SERVICE ENCLOSURE & SERVICE DISCONNECT(TO BE REMOVED)
- (B) EXISTING STEEL SIGNAL POLE w/LUMINAIRE(TO BE REMOVED)
- (C) EXISTING STEEL SIGNAL POLE (TO BE REMOVED)
- (D) EXISTING STEEL SIGNAL POLE w/LUMINAIRE(TO BE REMOVED)
- (E) EXISTING SIGNAL CONTROLLER (TO BE REMOVED)

EXISTING SIGN SCHEDULE:

S1 — BUSINESS SH 288 B

EXISTING SIGNAL SCHEDULE:

R Y G

A, B, C, D, E, F

BS 288-B AT TECHNOLOGY DR

TRAFFIC SIGNAL EXISTING PLAN

SCALE: 1" = 40'

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288-B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		164

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

09/29/2022

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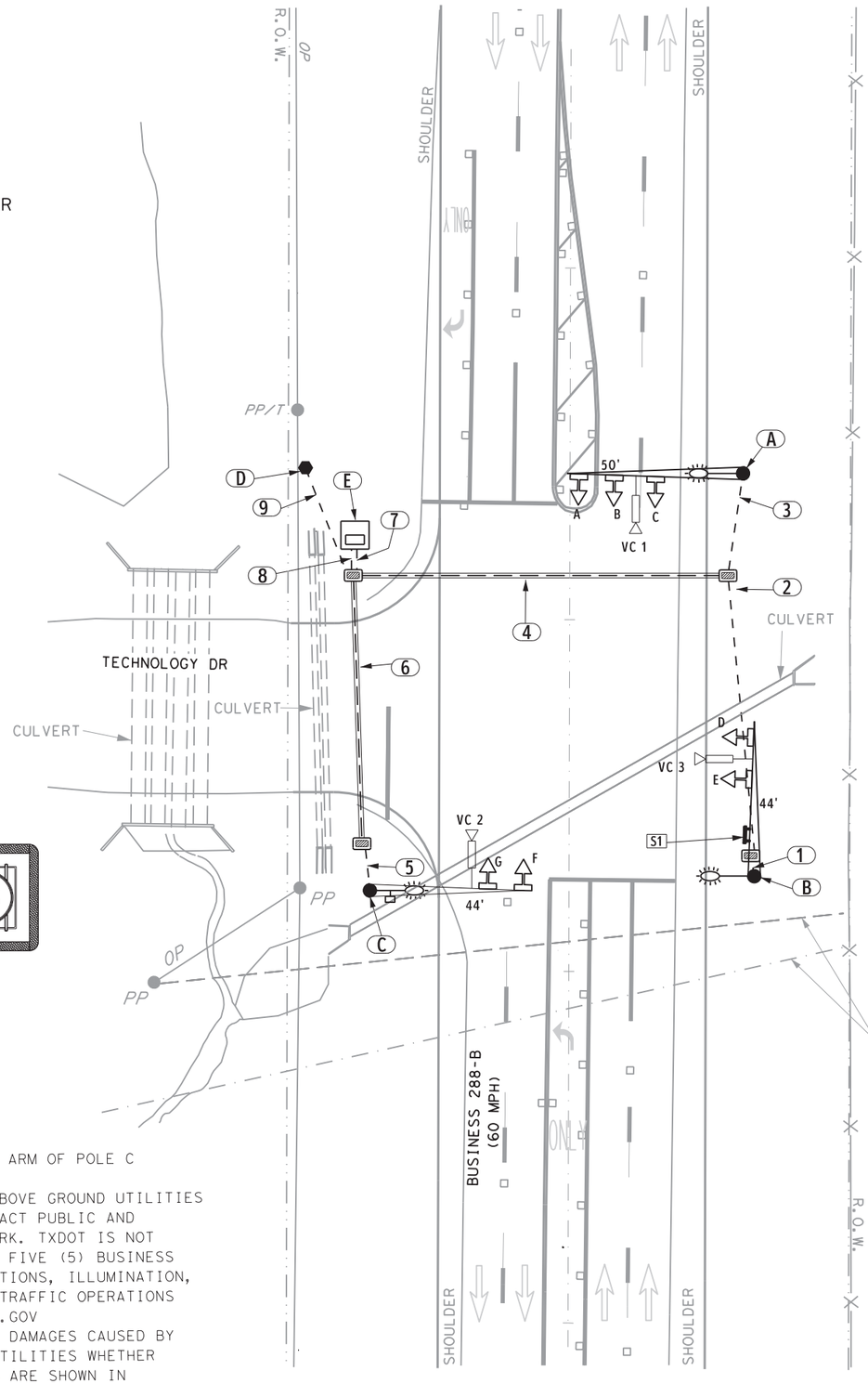
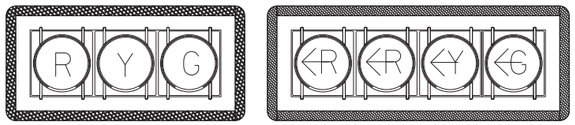
FILE: \\FS-HOUHQ.dot.state.tx.us\Data4\data\engdata\TrfSignals\Greg Sosa\2022 Projects\0111-09-042 BS 288-B Signal design\BS 288-B Signal Design.dgn

LEGEND:

- TRAFFIC DIRECTION
- PP — POWER POLE
- PP/T — POWER POLE W/TRANSFORMER
- OP — OVERHEAD POWER LINE
- R.O.W. — RIGHT OF WAY
- PROPOSED FULLY-ACTUATED CONTROLLER W/CABINET, CELLULAR MODEM, AND BATTERY BACK-UP (BBU)
- PROPOSED GROUND BOX
- E — PROPOSED SIGNAL HEAD
- PROPOSED MAST ARM POLE
- PROPOSED SERVICE POLE
- VC 1 — PROPOSED VIVDS CAMERA
- PROPOSED LUMINAIRE
- PROPOSED CONDUIT (TRENCH)
- PROPOSED CONDUIT (BORE)
- S1 — PROPOSED SIGN
- PROPOSED RADIO ANTENNA



PROPOSED SIGNAL HEAD SCHEDULE:



B, C, D, E, F, G

A

LEGEND:

- (A) PROP. 50' MAST ARM SIGNAL POLE w/LUMINAIRE & VIVDS CAMERA
- (B) PROP. 44' MAST ARM SIGNAL POLE w/LUMINAIRE & VIVDS CAMERA
- (C) PROP. 44' MAST ARM SIGNAL POLE w/LUMINAIRE, VIVDS CAMERA & ITS BROADBAND RADIO (1 EA)
- (D) PROP. SERVICE POLE TY D WITH SERVICE (120/240 VOLTS), METER, SERVICE ENCLOSURE AND SERVICE DISCONNECT
- (E) PROP. FULL-ACTUATED CONTROLLER WITH CABINET, CELLULAR MODEM AND BATTERY BACK-UP (BBU)

NOTES:

- RADIO w/ANTENNA TO BE INSTALLED ON LUMINAIRE MAST ARM OF POLE C TOWARD DRIVEWAY.
- THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND AND ABOVE GROUND UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES AT LEAST 72 HOURS PRIOR TO ANY WORK. TXDOT IS NOT A MEMBER OF 811. THE CONTRACTOR SHALL CONTACT TXDOT FIVE (5) BUSINESS DAYS TO LOCATE TXDOT OWNED EXISTING TXDOT COMMUNICATIONS, ILLUMINATION, AND TRAFFIC SIGNAL CABLING. TXDOT HOUSTON DISTRICT TRAFFIC OPERATIONS OFFICE CAN BE REACHED AT: HOU-LOCATEREQUEST@TXDOT.GOV
- THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY CONTRACTOR S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND OR ABOVE GROUND. UTILITIES ON THE PLANS ARE SHOWN IN APPROXIMATE LOCATIONS.

BS 288-B AT TECHNOLOGY DR

TRAFFIC SIGNAL PROPOSED PLAN

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

09/29/2022

0 20 40
SCALE: 1" = 40'

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288-B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		165

DATE: 9/22/2022 TIME
FILE: \\FS-HOUHQ.dot.state.tx.us\Data4\data\engdata\TrfSignals\Greg Sosa\2022 Projects\0111-09-042 BS 288-B Signal design\BS 288-B Signal Design.dgn

PROPOSED STREET NAME SIGNS:

S1

1.50" Radius, 0.50" Border, White on, Green;
"BUSINESS SH 288 B", ClearviewHwy-2-W;

CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT(618)								CONDUCTORS(620)						TRAY CABLE (621)		CABLES(684)		VIVDS (6306)		BROADBAND (6062)	
	PVC								POWER		GROUND				LUMINAIRE		SIGNAL		VIVDS		ETHERNET	
	2" (SCHD 80)				3" (SCHD 80)				#4 INSULATED		#4 BARE		#6 BARE		#12/4C Tray Cable		#12/7C		#14/3C (* 1000 FT)		CAT 5	
	(6046)		(6047)		(6053)		(6054)		(6012)		(6011)		(6009)		(6005)		(6012)		(Subsidiary)		(Subsidiary)	
	NO.	TRENCH	NO.	BORE	NO.	TRENCH	NO.	BORE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF
1	1	5											1	5	1	5	1	5				
2	1	100											1	100	1	100	1	100	1	100		
3	1	30											1	30	1	30	2	30	1	30		
4							1	105					1	105	2	105	3	105	2	105		
5	1	15											1	15	1	15	1	15	1	15	1	10
6			1	75									1	75	1	75	1	75	1	75	1	75
7					1	10							1	10			4	10	3	10	1	10
8	1	10							2	10	1	10							1	10		
9	1	35							2	35	1	35			3	35						
Pole A															1	50	2	20	1	20		
Mast Arm A 50'																	2	50	1	50		
Pole B															1	50	1	20	1	20		
Mast Arm B 44'																	1	45	1	45		
Pole C															1	50	1	20	1	20	1	50
Mast Arm C 40'																	1	40	1	40		
TOTAL (LF)		195		75		10		105		90		45		340		735		875		670		145
EST. TOTAL		205		80		15		115		95		50		360		775		920		705		155

ELECTRICAL SERVICE DATA:

ELECTRICAL SERVICE NAME	CALLOUT	ELECTRICAL SERVICE DESCRIPTION (SEE ED(5),ED(6),ED(7),ED(8)-14)	SERVICE CONDUIT SIZE (RMC)	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BRK. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD./ LOADCENTER AMP RATING (MIN)	CIRCUIT NO.	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
SH 288-B AT TECHNOLOGY DR	(D)	ELEC SERV TY D (120/240)060(NS)SS(E)SP(O)	1-1/4"	3/#6	N/A	2P/60		100	TRF. SIG	1P/50	40	<5.8
							30		LIGHTING	2P/20	3	

VIDEO DETECTION CHART:

VC1	DESIGNATED FOR NORTHBOUND BS-288B APPROACHING VEHICLES
VC2	DESIGNATED FOR SOUTHOUND BS-288B APPROACHING VEHICLES
VC3	DESIGNATED FOR EASTBOUND APPROACHING VEHICLES

BS 288-B AT
TECHNOLOGY DR

TRAFFIC SIGNAL
PROPOSED PLAN

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/29/2022

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288-B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		166

DATE: 9/23/2022 TIME
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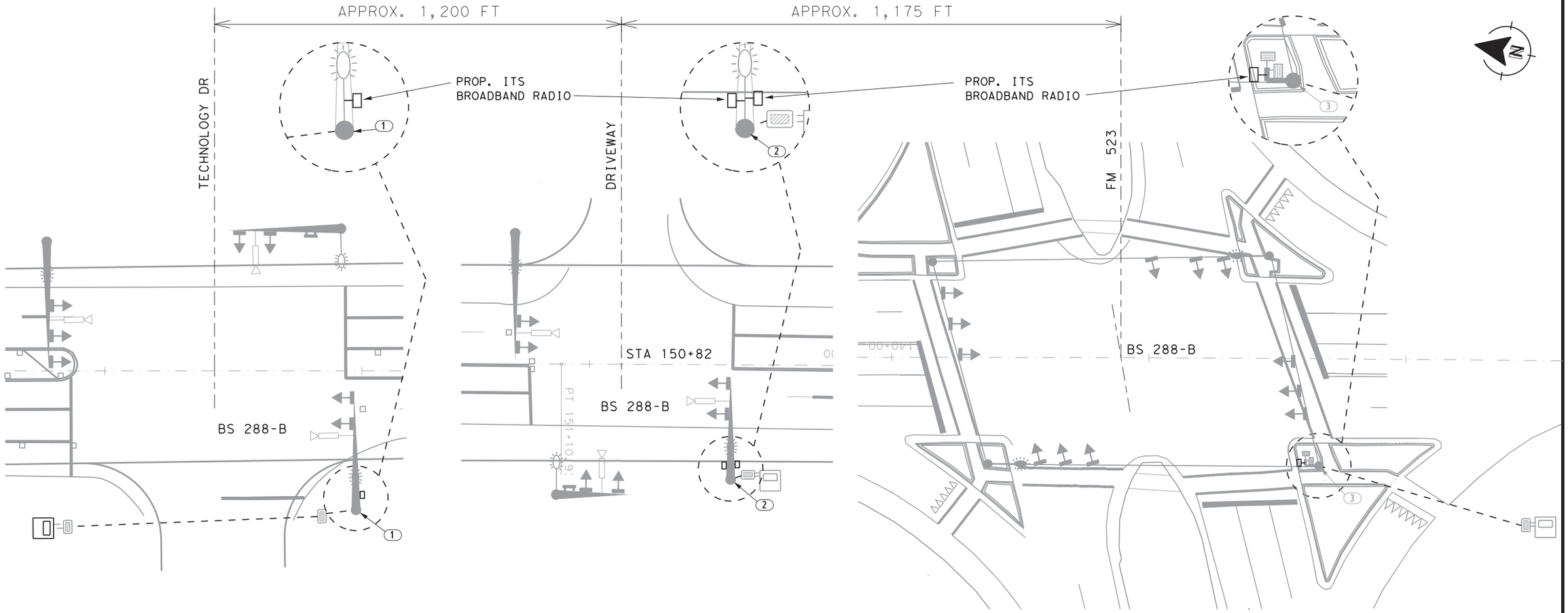

PROPOSED
TRAFFIC SIGNAL

BS 288-B AT TECHNOLOGY DR

(1) PROP. ITS BROADBAND RADIO (1 EA)

PROPOSED
TRAFFIC SIGNAL

BS 288-B AT DRIVEWAY

(2) PROP. ITS BROADBAND RADIOS (2 EA)

EXISTING
SIGNALIZED INTERSECTION

BS 288-B AT FM 523

(3) PROP. ITS BROADBAND RADIO (1 EA)

DESCRIPTION	UNIT	TECHNOLOGY DR	DRIVEWAY	FM 523
ITS RADIO (DUAL) (4GHZ/5 GHZ)-I-U	EA	1	2	1
* ITS RADIO POWER SUPPLY	EA	1	2	1
* ITS RADO ETHERNET COMMUNICATION CABLE	FT	155	140	125

* MATERIALS SUBSIDIARY TO PERTINENT ITEMS.

LEGEND:

- MAST ARM POLE
- PROPOSED ITS CABLE AND CONDUIT
- PROPOSED VIVDS CAMERA
- TRAFFIC SIGNAL CONTROLLER
- PROPOSED ITS BROADBAND RADIO
- EXIST. INTUICOM BROADBAND RADIO

NOTES:

1. PROPOSED ITS BROADBAND RADIO EQUIPMENT MUST BE COMPATIBLE WITH EXISTING RADIO COMMUNICATION SYSTEM.

2. FURNISH ALL MATERIALS, ETHERNET COMMUNICATION CABLE, ACCESSORIES FOR A COMPLETE AND OPERATIONAL SYSTEM. SUPPLY ITS RADIO EQUIPMENT FROM THE SAME MANUFACTURER.

3. RADIO EQUIPMENT SHALL BE INSTALLED BY CONTRACTOR AS DIRECTED BY ENGINEER IN THE FIELD.

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/29/2022

TRAFFIC SIGNAL RADIO INTERCONNECT PROPOSED LAYOUT

0 20 40
SCALE: 1" = 40'

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288-B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		167

DATE: 9/22/2022 7:25:31 AM
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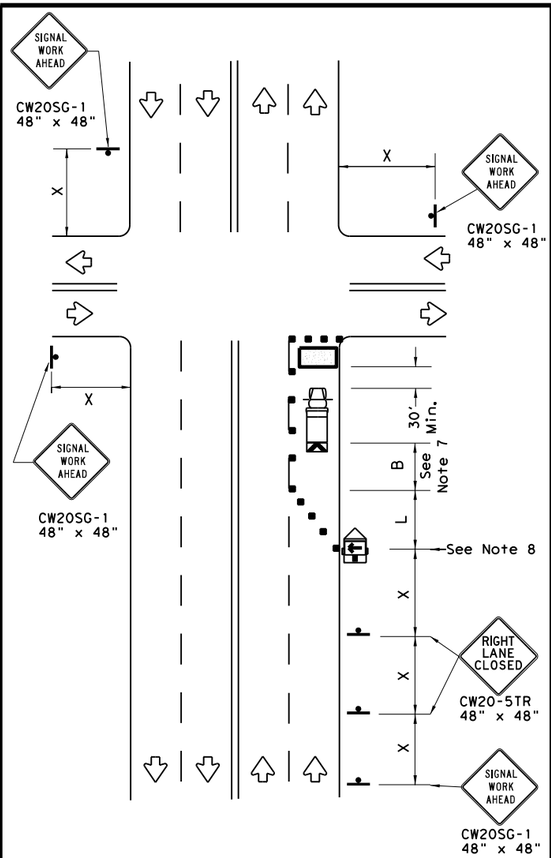
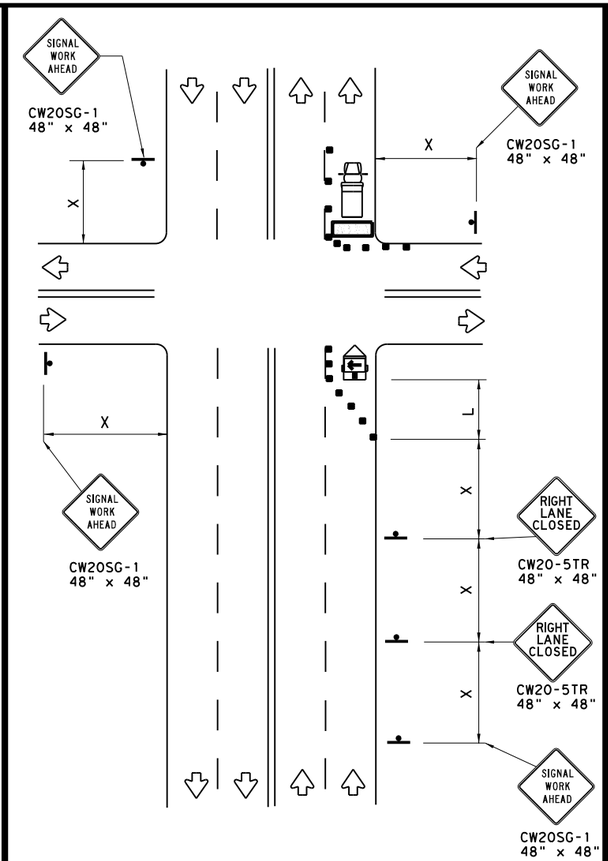


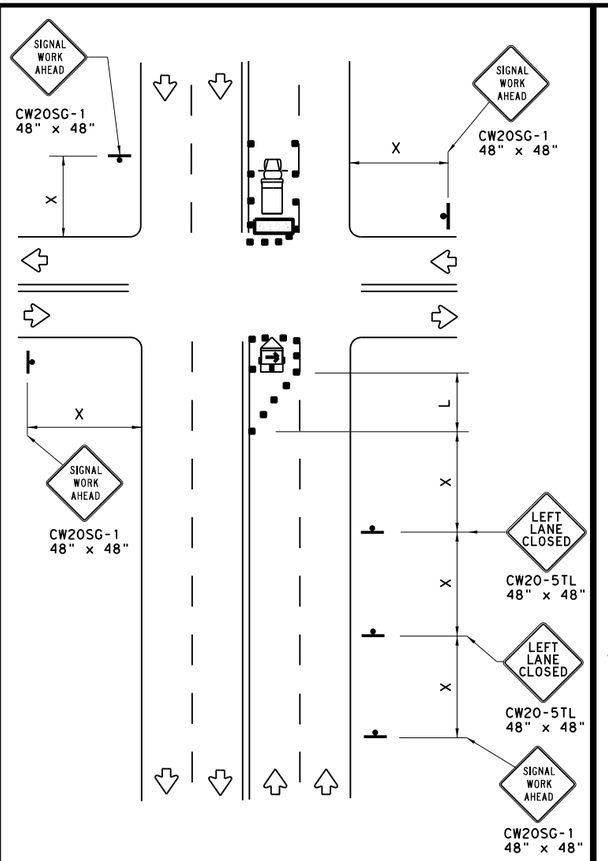
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



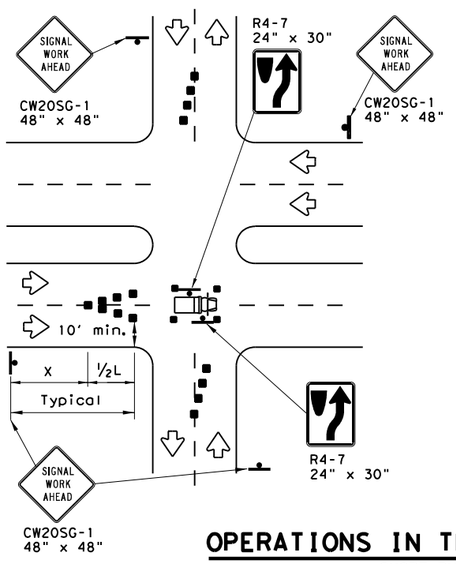
FAR SIDE RIGHT LANE CLOSURE

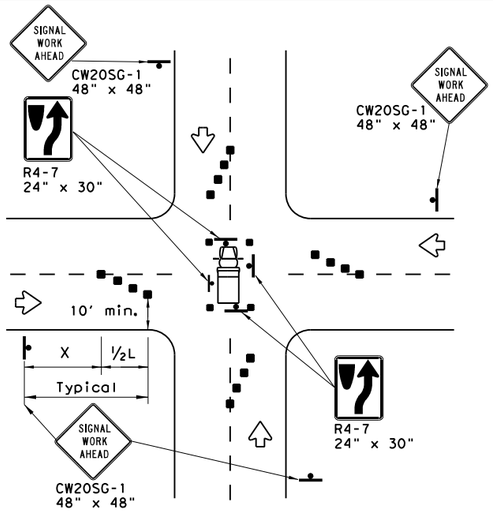
SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY





OPERATIONS IN THE INTERSECTION

SHORT DURATION

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	HOU	BRAZORIA		168

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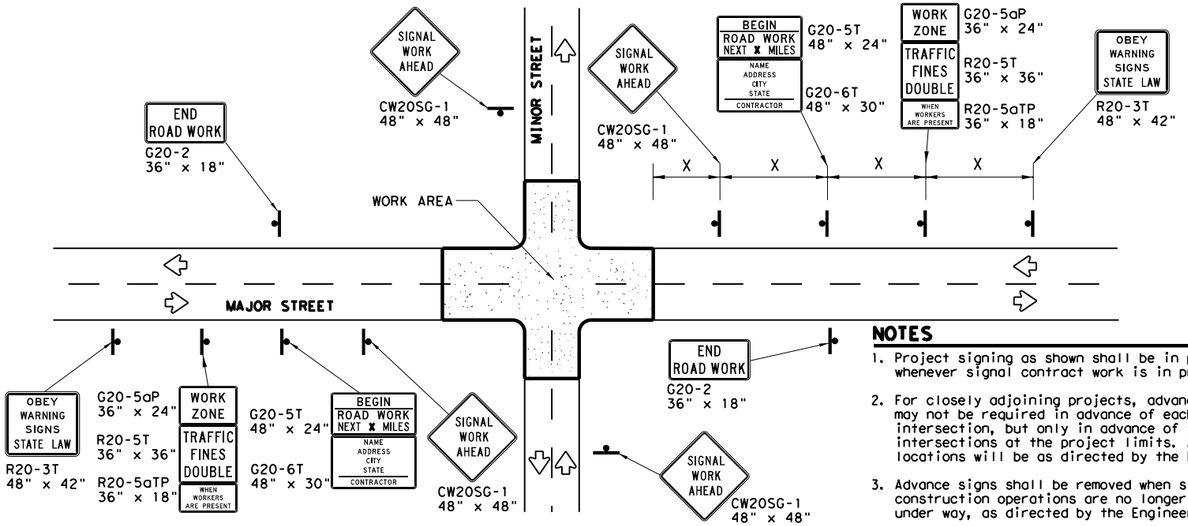


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

DURATION OF WORK

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

SIGN MOUNTING HEIGHT

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

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night without damaging the sign sheeting. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

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

SIGN SUPPORT WEIGHTS

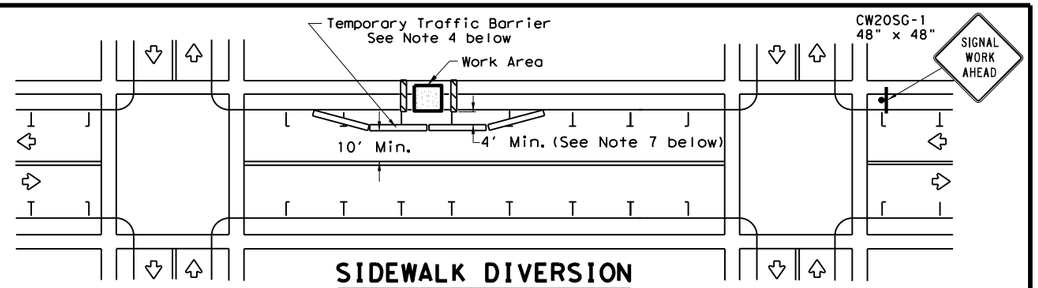
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support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

LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

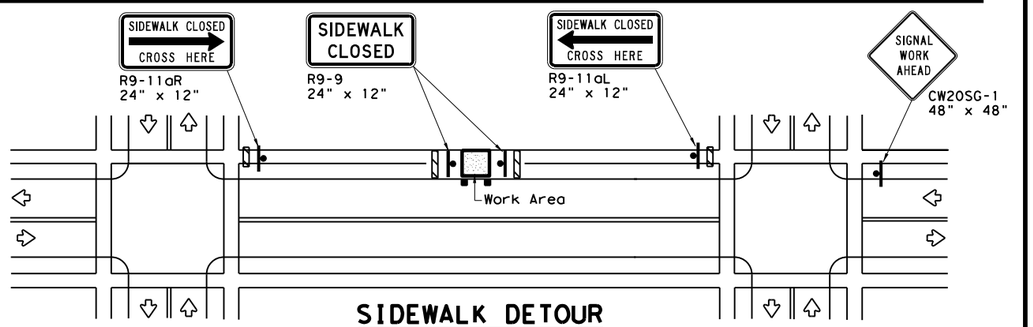
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

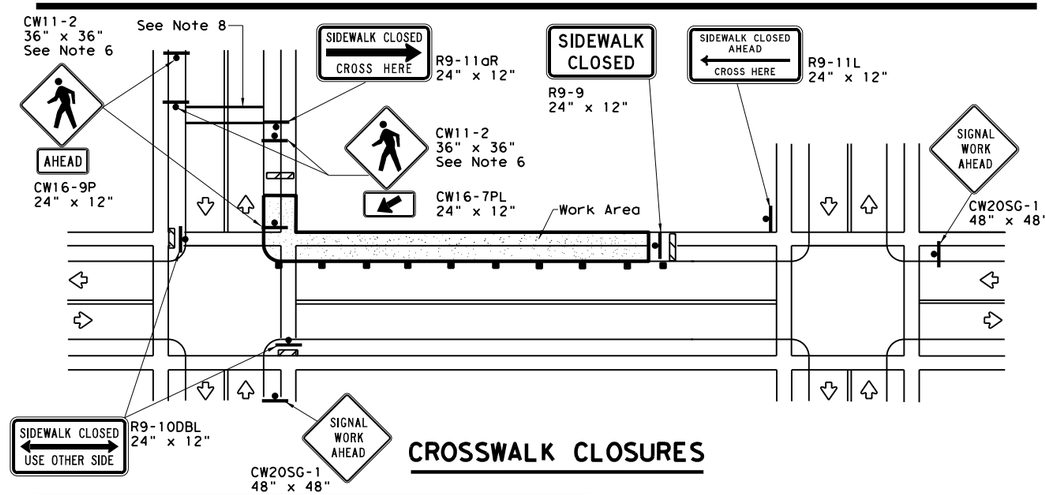
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

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

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
2-98 10-99 7-13 4-98 3-03	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		169

DATE: 9/22/2022 6:00:30 PM
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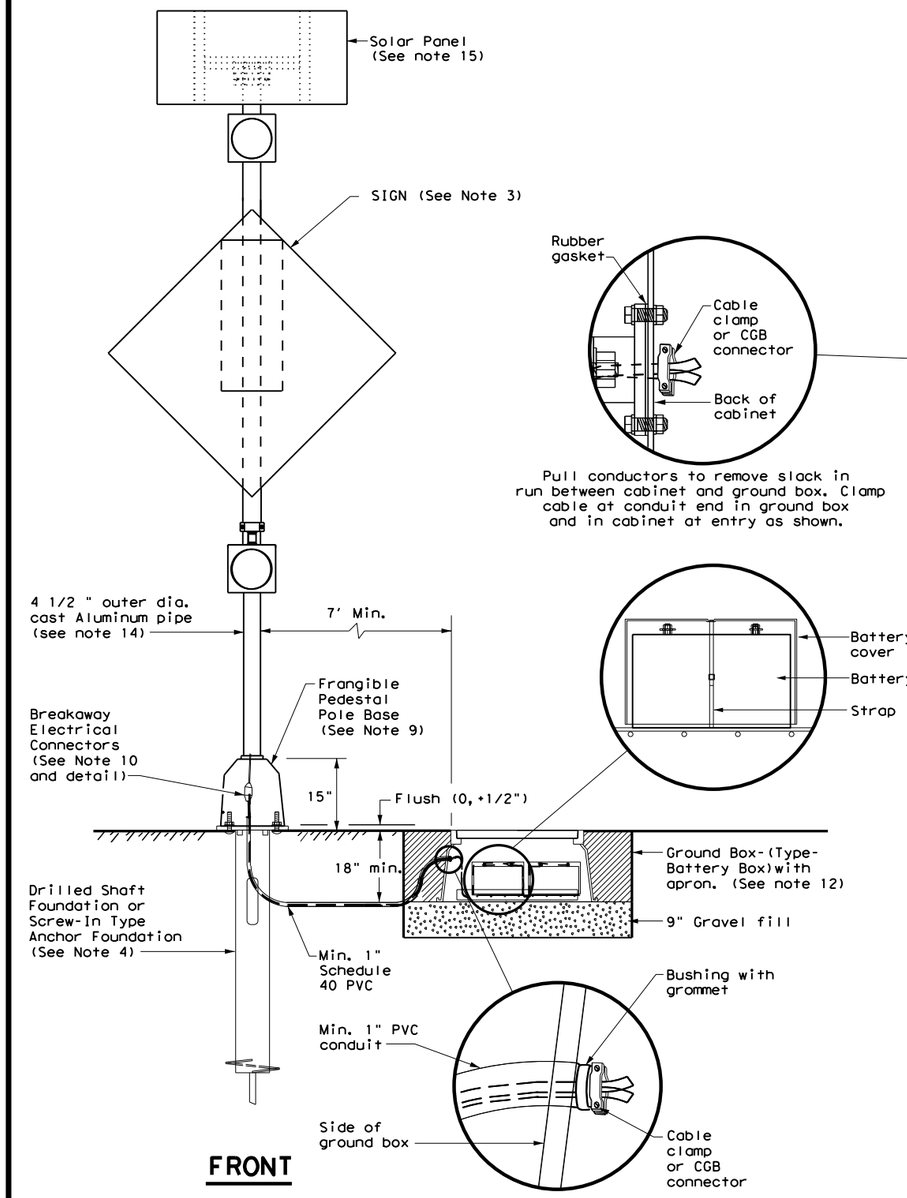
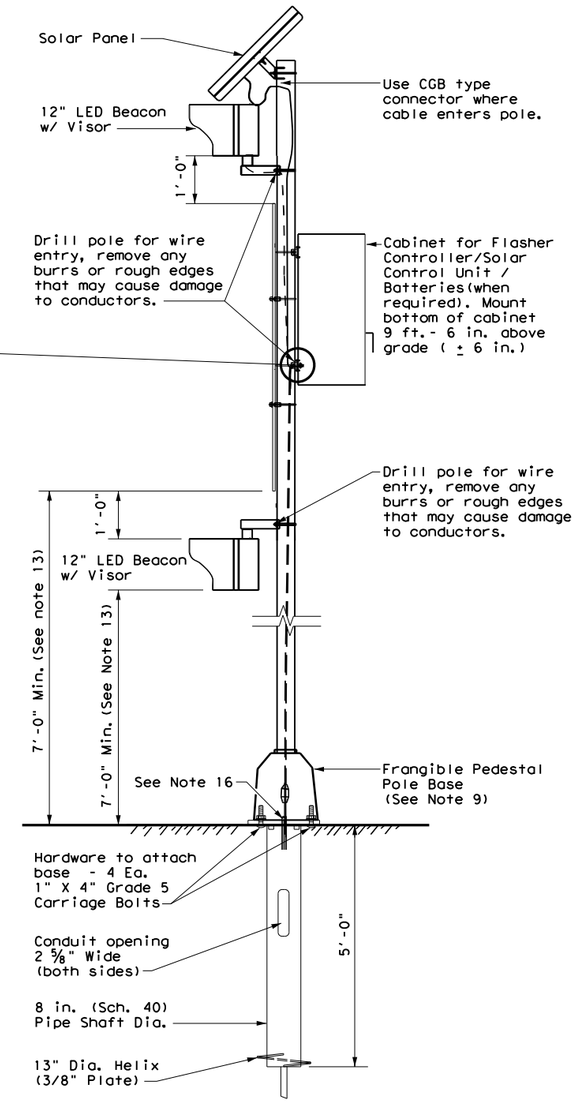
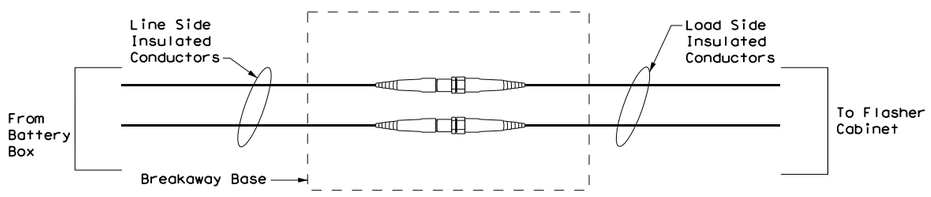
GENERAL NOTES:

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

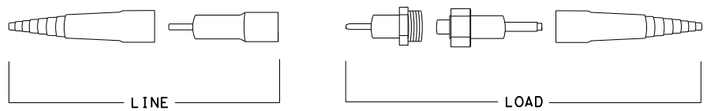


Pull conductors to remove slack in run between cabinet and ground box. Clamp cable at conduit end in ground box and in cabinet at entry as shown.





NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS

SPRFBA(1)-13

FILE: spb1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
12-04 3-13	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		170

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DATE: 9/22/2022 6:00:38 PM
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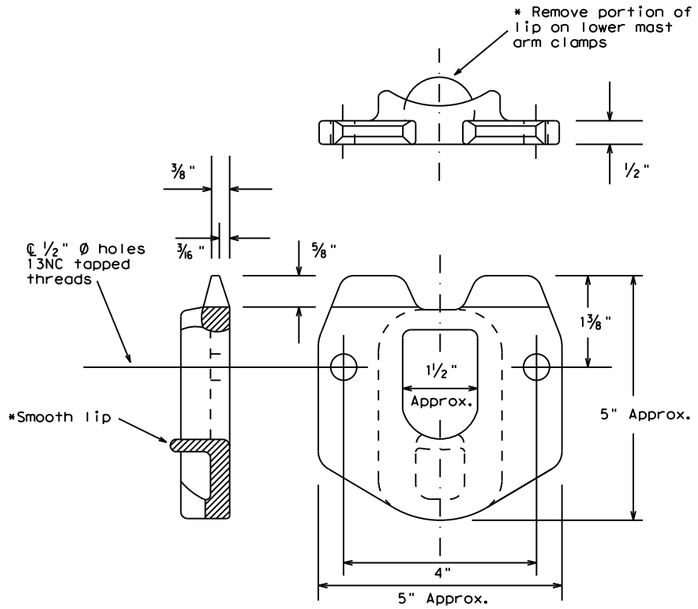
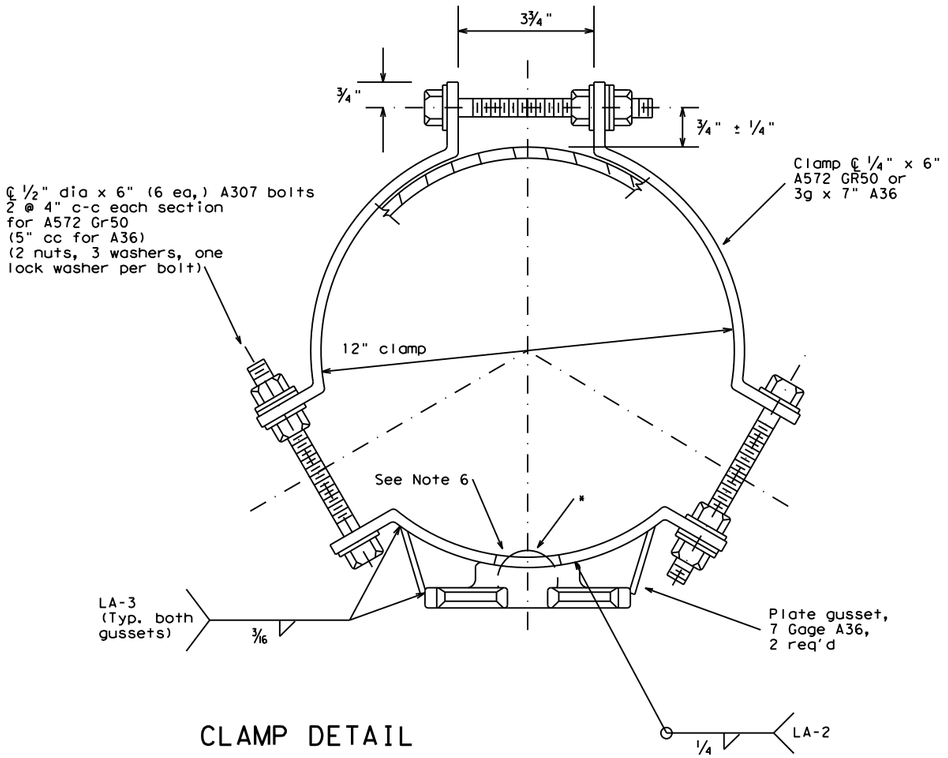
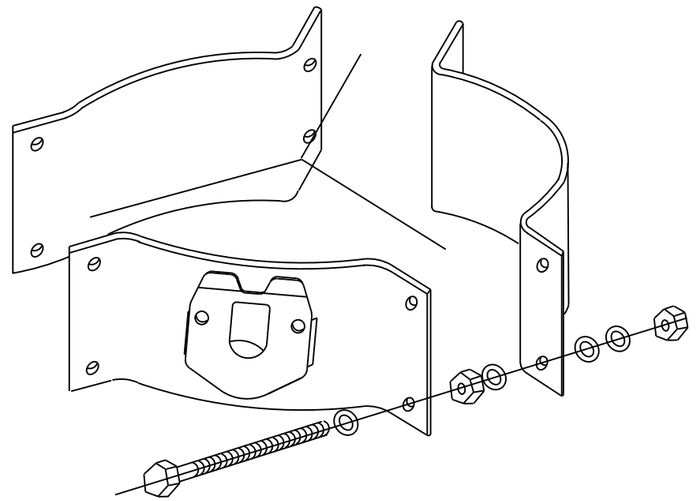


POLE SIMPLEX DETAILS



CLAMP DETAIL



PROJECTION

OTHER MATERIALS:

1. Pole simplex shall be ASTM A27 GR65-35 or A148 GR80-50 or A576 GR1021. ASTM A576 must be suitable for forging and also meet minimum tensile of 65ksi, minimum yield of 35ksi, and a minimum elongation of 22 percent in 2 inches.
2. Welded tabs and backplates shall be ASTM A-36 steel or better.
3. Nylon insert locknuts shall conform to ASTM A563.

GENERAL NOTES:

1. Materials and fabrication shall be in accordance with Standard Sheet "MA-C" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
2. All parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing". The throat of the Simplex shall be made free of all rough or sharp edges resulting from the galvanizing process.
3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts, ½in. X 1½in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.
4. Design conforms to 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq.ft.,12 ft. maximum arm length.
5. Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.
6. Approximately 2 in. diameter hole in upper mast arm clamp.

For 8.9 - 12 inch diameter Signal Poles
(Two req'd for each mast arm)

Texas Department of Transportation
Traffic Operations Division

CLAMP ON FITTING ASSEMBLY FOR LUMINAIRE MAST ARM

CFA-12

© TxDOT	DN: KAB	CK: RES	DW: FDN	CK: CAL
REVISIONS	CONT	SECT	JOB	HIGHWAY
11-99	0111	09	042	BS 288B
1-12	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		171

GENERAL NOTES FOR ALL ELECTRICAL WORK

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

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

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

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

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

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

CONDUIT

A. MATERIALS

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

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

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

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

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

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

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

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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©TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
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		HOU		BRAZORIA	172

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

C. TEMPORARY WIRING

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

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

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

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

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

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

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

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

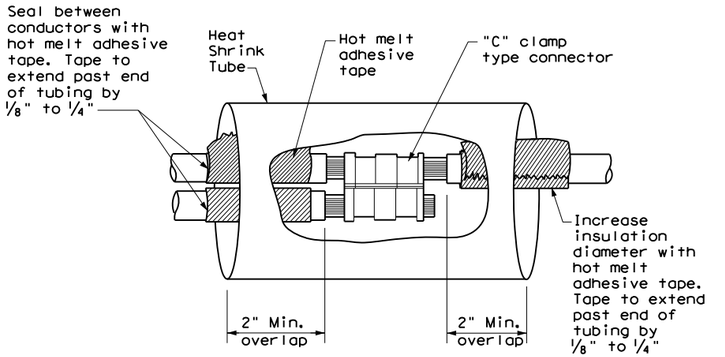
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

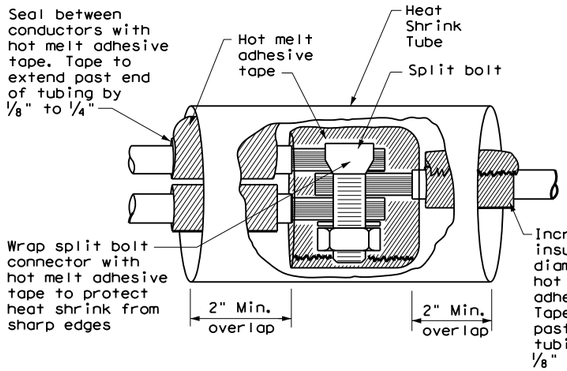
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

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

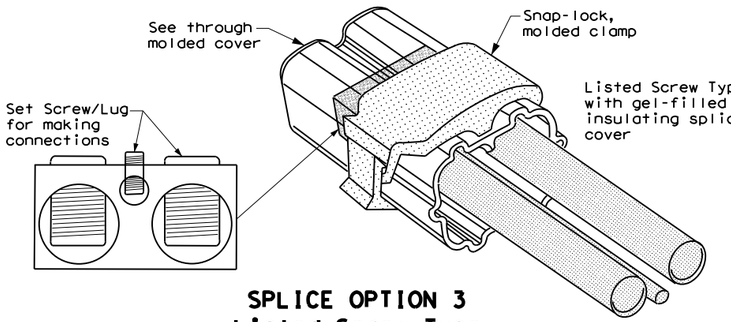
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		173

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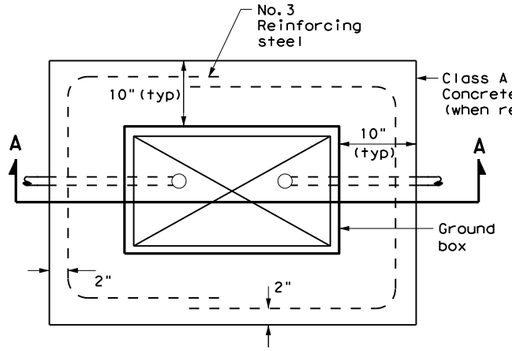
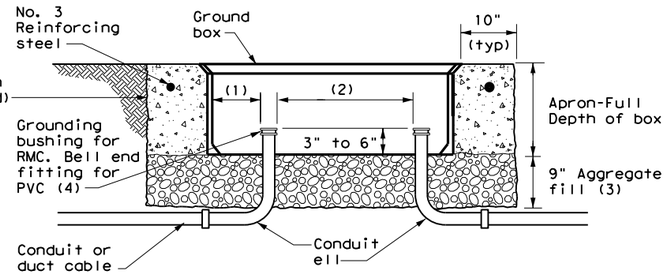


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

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

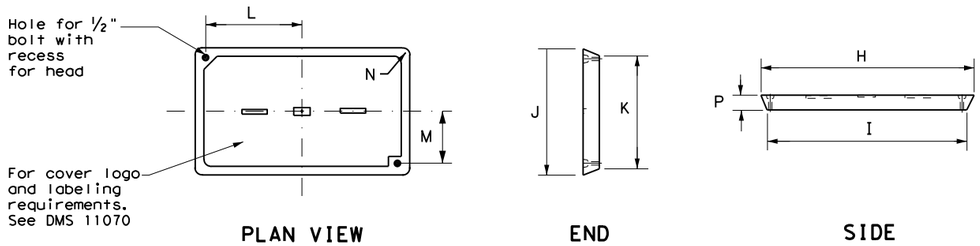
7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.



PLAN VIEW | END | SIDE

GROUND BOX COVER

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

ED(4)-14

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ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services,"DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

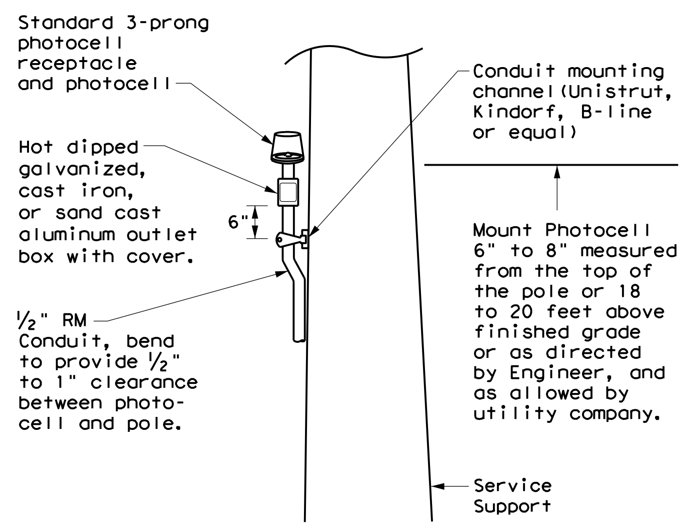
* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National ELectrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

- Schematic Type
- Service Voltage V / V
- Disconnect Amp Rating
  000 indicates main lug only/
  Typically Type T
- (SS)= Safety Switch Ahead of Meter-Check with Utility
  (NS)= No safety Switch Ahead of Meter-Check with Utility
- Enclosure Type
  GS= Galvanized steel("off the shelf")
  SS= Stainless steel(Custom Enclosure)See MPL
  AL= Aluminum (Custom Enclosure)See MPL
- Photocell Mounting Location
  (E)= Inside Service/Enclosure Mounted
  (T)= Top of pole
  (L)= Luminaire mounted
  (N)= None/No Photocell or Lighting Contactor Required
- Service Support Type
  GC= Granite concrete
  OC= Other concrete
  TP= Timber pole
  SP= Steel pole
  SF= Steel frame
  OT= Pole by others or paid for separately
  EX= Existing pole
  TS= Service on traffic signal pole
  PS= Pedestal Service
- O= Overhead Service Feed from Utility
  U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation | Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

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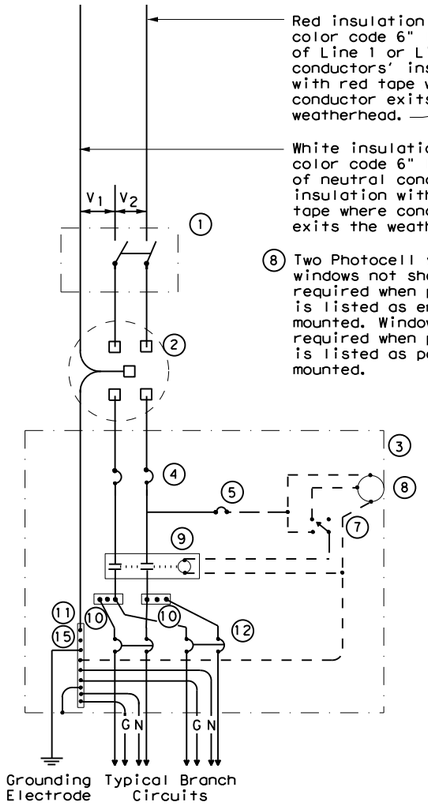
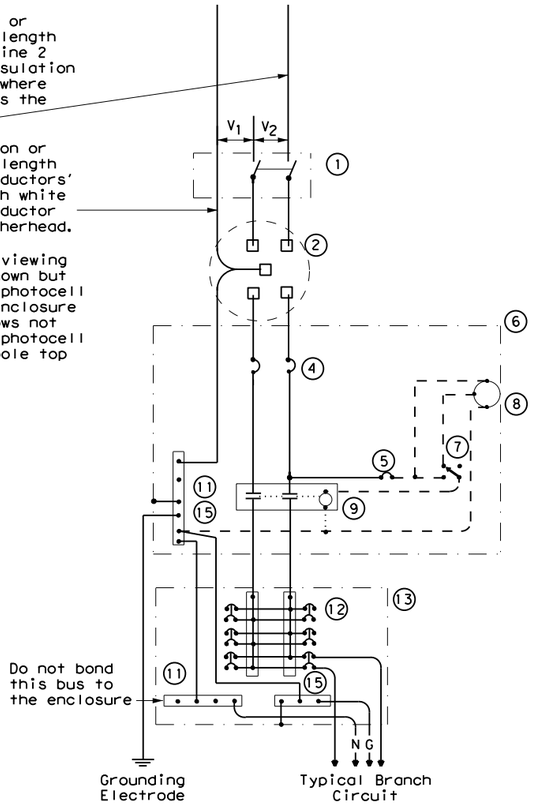
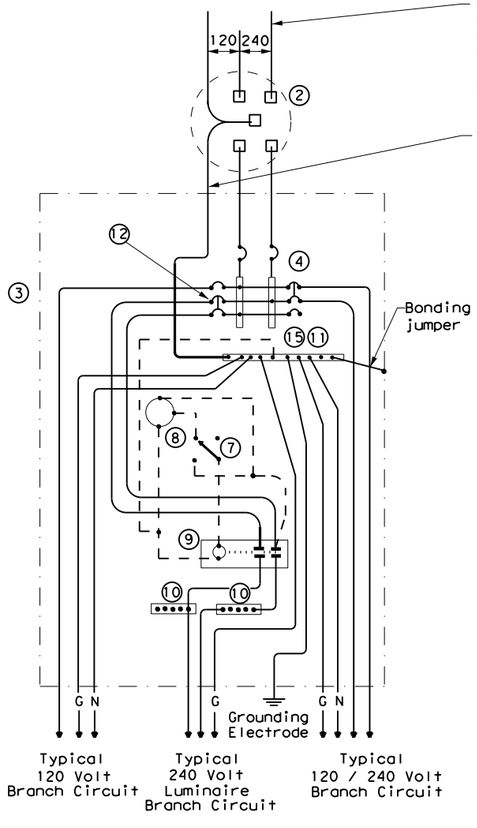


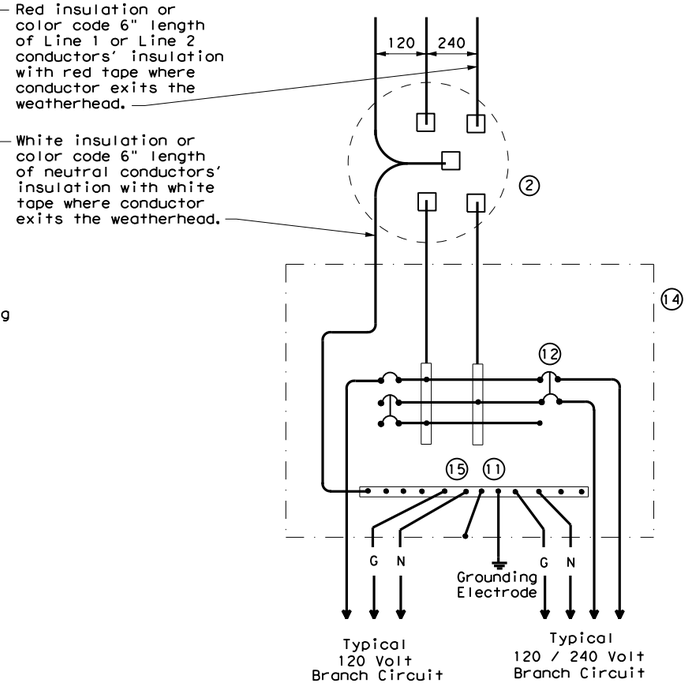
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
———	Power Wiring
- - - -	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

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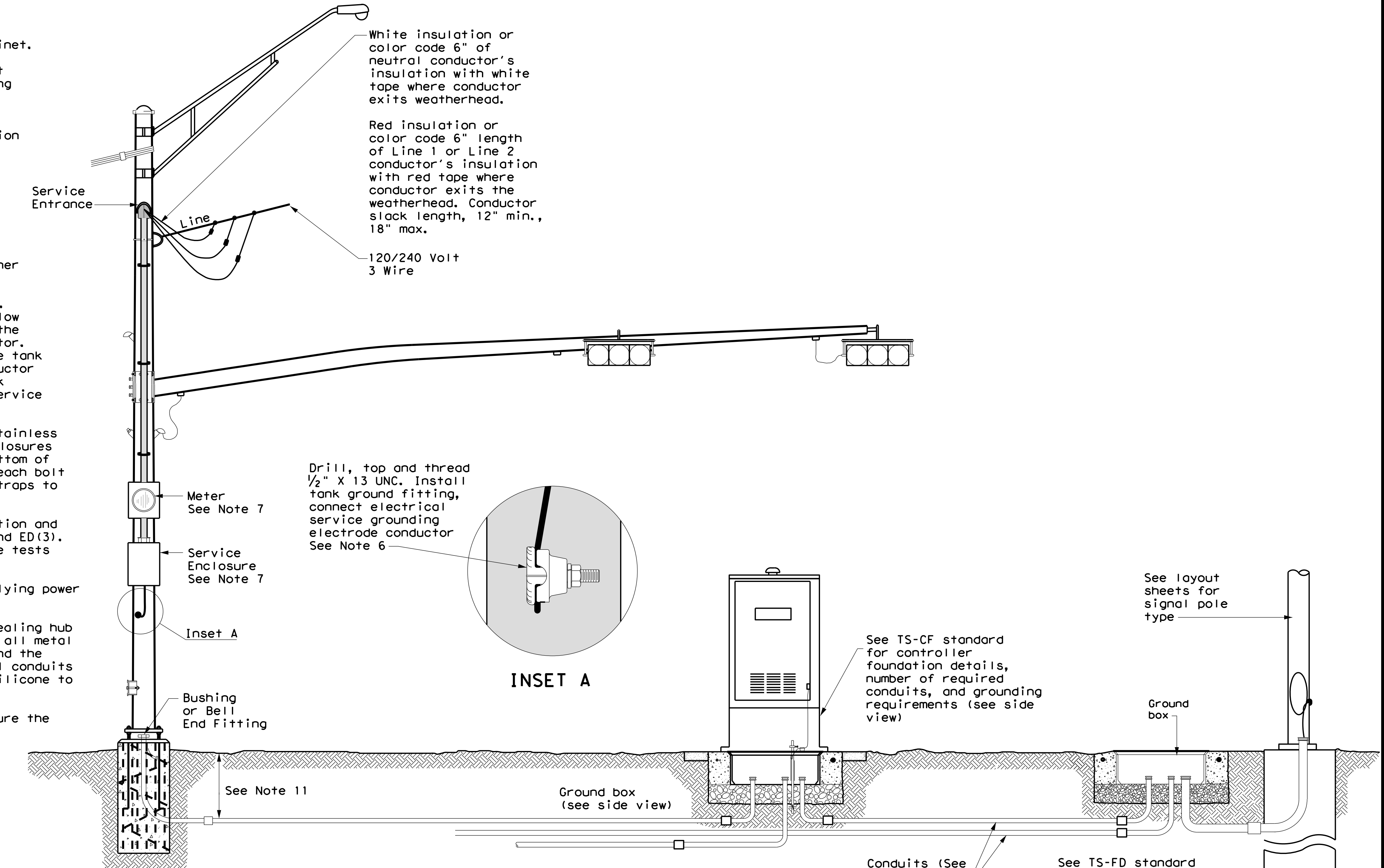
TRAFFIC SIGNAL NOTES

1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TXDOT standard TS-FD for further details.
6. Drill and tap signal poles for 1/2 in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of 3/4 in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".

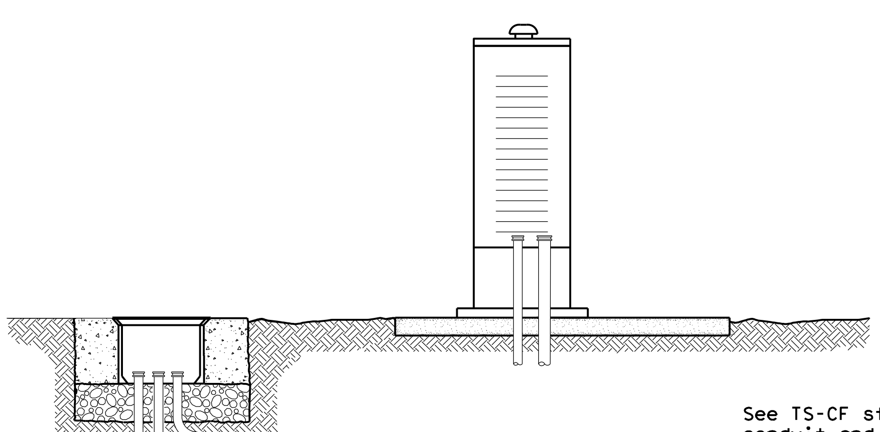


SIGNAL POLE WITH SERVICE

Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE



SIGNAL CONTROLLER SIDE VIEW

See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.

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Texas Department of Transportation | Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

ED(8)-14

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	HOU	BRAZORIA		177

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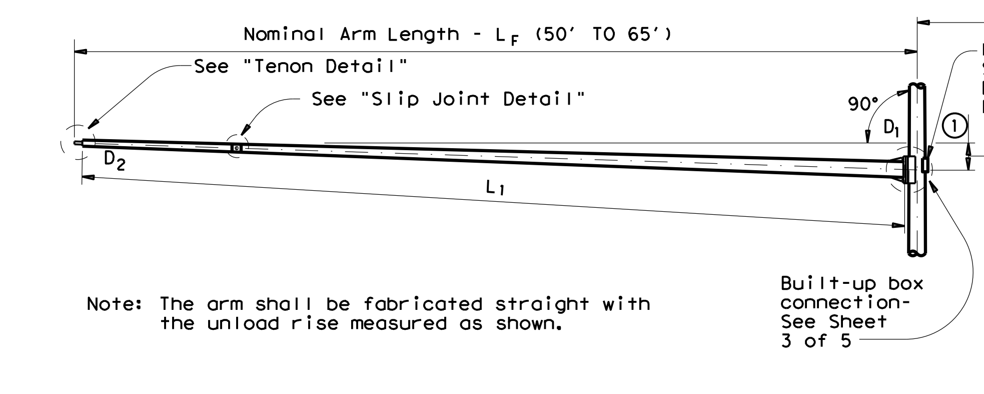
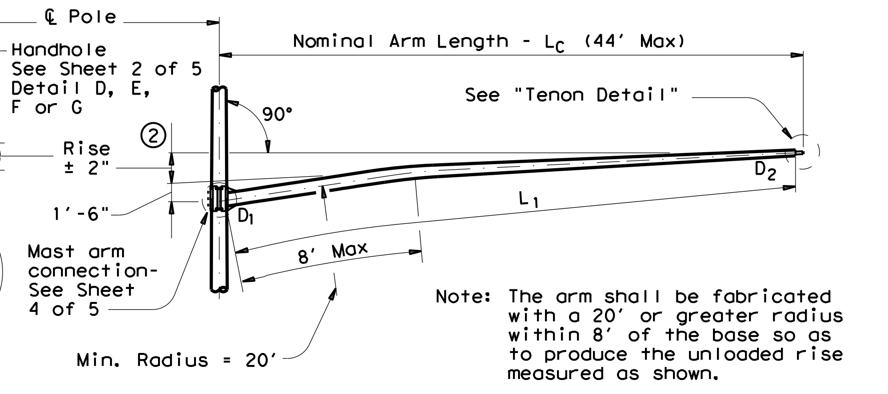


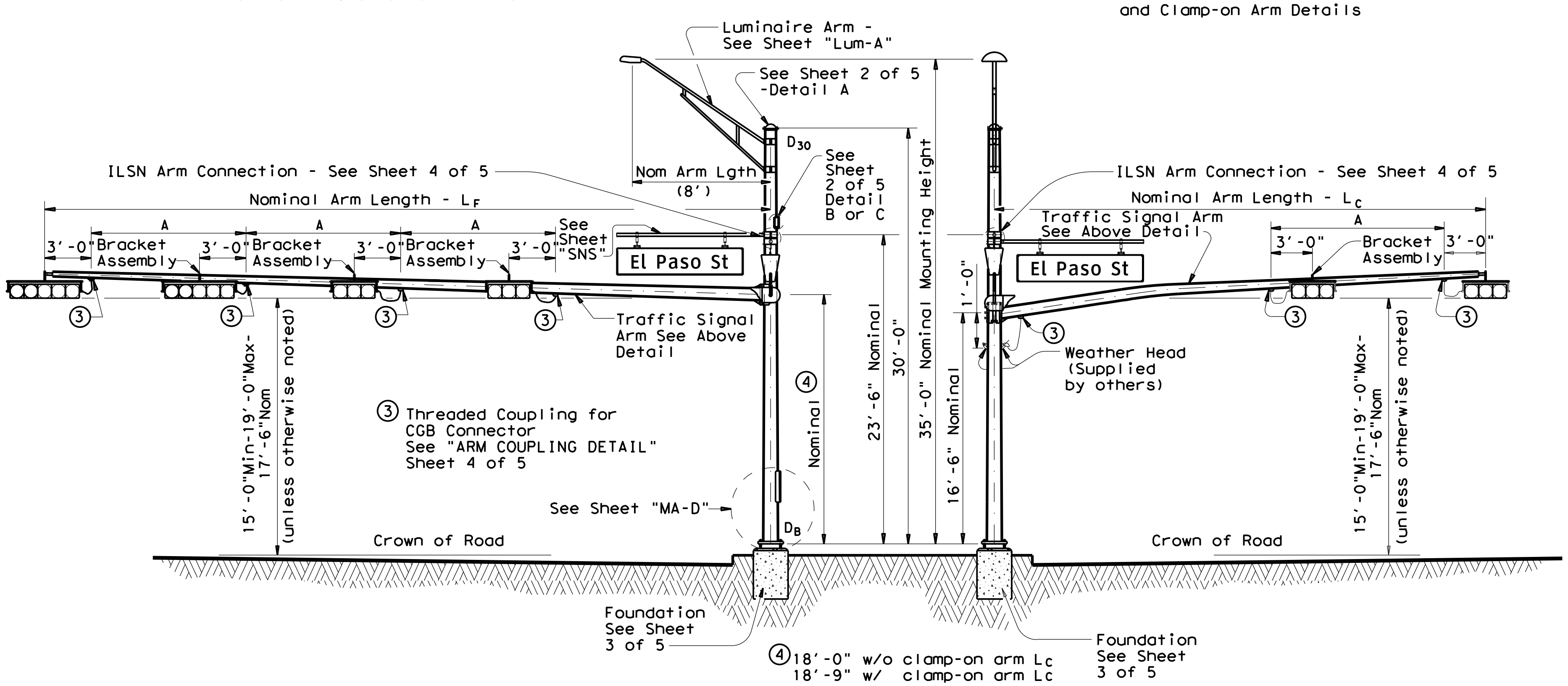
FIXED MOUNT TRAFFIC SIGNAL ARM

① See Sheet 3 of 5 for Arm Rise



CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)

② See Sheet 4 of 5 for Arm Rise and Clamp-on Arm Details



ELEVATION

(Showing fixed mount arm)

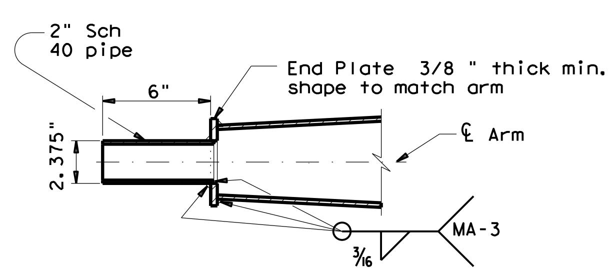
STRUCTURE ASSEMBLY

ELEVATION

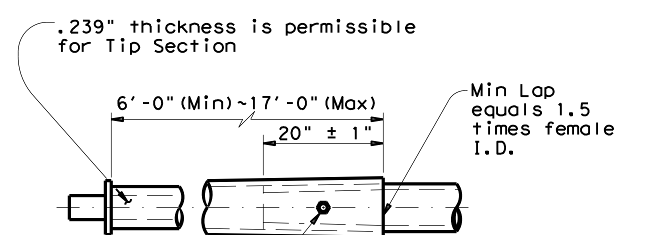
(Showing clamp-on arm)

TABLE OF DIMENSIONS "A"

Arm Length	24'	28'	32'	36'	40'	44'	50'	55'	60'	65'
Arm Type II	10'	11'	12'	13'						
Arm Type III			10'	11'	12'	12'				
Arm Type IV							12'	12'	12'	12'



TENON DETAIL



Note: A slip joint is permissible for arms 50' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

4 - 3/4" Dia holes and 1 - 5/8" Dia galv A307 bolt. Tack weld nut to thread projection after making joint. Repair damaged galvanizing in accordance with Item 445, "Galvanizing".

SLIP JOINT DETAIL (FIXED MOUNT ARM)

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

Arm	Equivalent DL ⑤	WL EPA ⑤⑥
8' Luminaire Arm	Luminaire 60 lbs	1.6 sq ft
9' ILSN Arm	Sign 85 lbs	11.5 sq ft
50' to 65' Fixed Mount Arm	Signal Loads 310 lbs	52 sq ft
Up to 44' Clamp-on Arm	Signal Loads 180 lbs	32.4 sq ft

⑤ Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.

⑥ Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Material, fabrication tolerances, and shipping practices shall also meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing" after fabrication.

Deviations from the details and dimensions shown herein require submission of shop drawings in accordance with the Item 441, "Steel Structures". Alternate designs are not acceptable.

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)
LMA(1)-12

Sheet 1 of 5

REVISIONS	CONT	SECT	JOB	HIGHWAY
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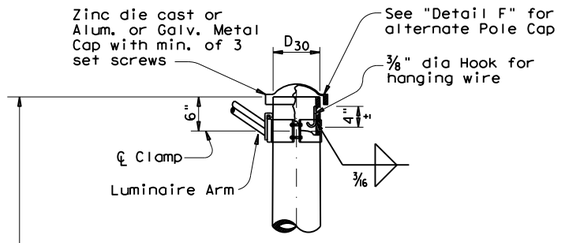
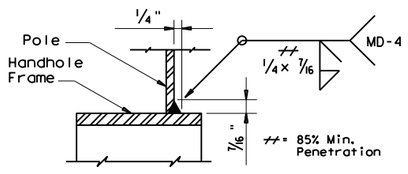
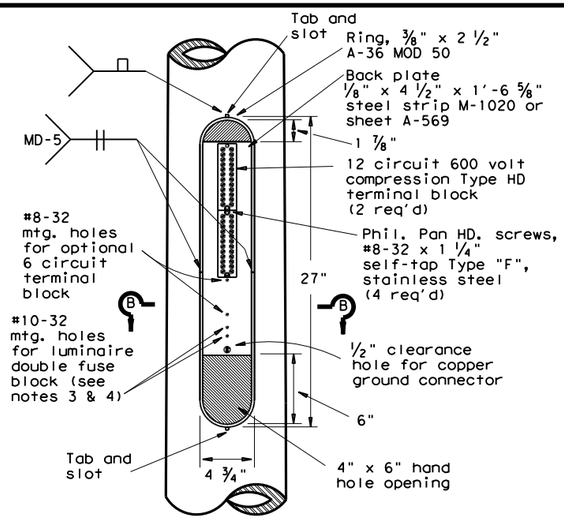


DETAIL A
(for pole with luminaire)



DETAIL H

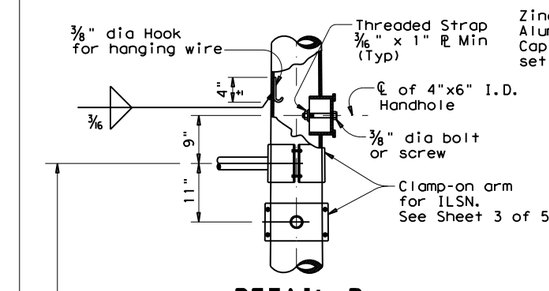


ACCESS COMPARTMENT

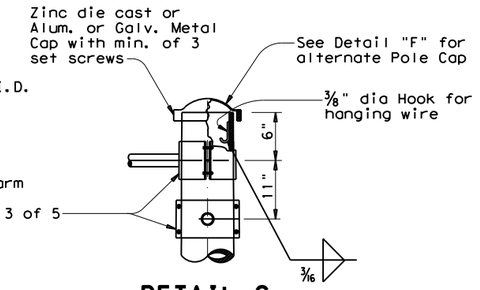
MATERIALS	
Round Shafts or Polygonal Shafts (7)	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 (8)
Plates (7)	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325, or A449 except where noted
Pin Bolts	ASTM A325
Pipe (7)	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

(7) ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

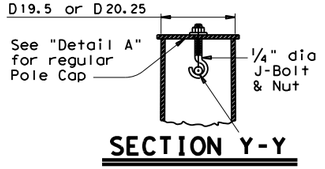
(8) ASTM A1011 SS Gr.50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.



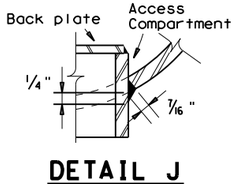
DETAIL B
(If ILSN applied)



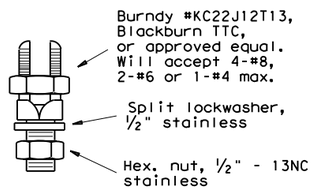
DETAIL C



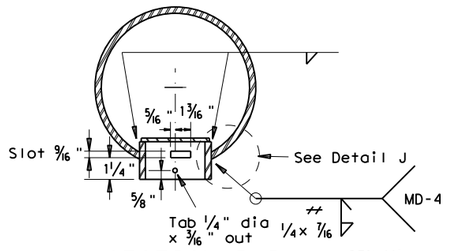
SECTION Y-Y



DETAIL J

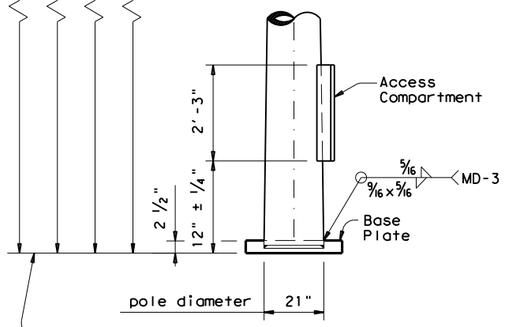


COPPER GROUND CONNECTOR

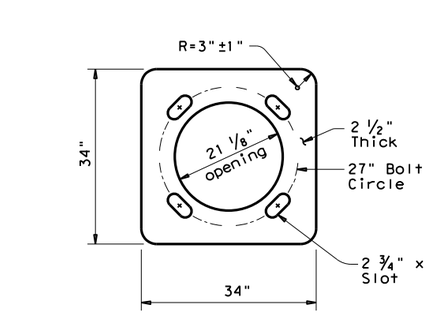


SECTION B-B
// = 85% Min. Penetration

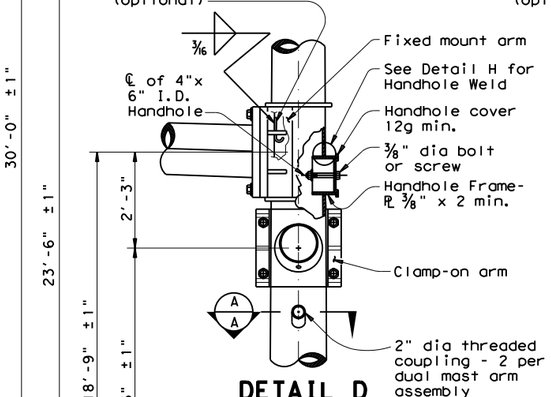
Opening for access compartment shall be no more than 1⁄16 inch wider than the access compartment itself.



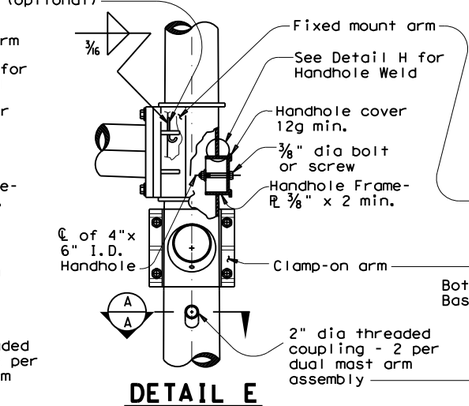
POLE ELEVATION



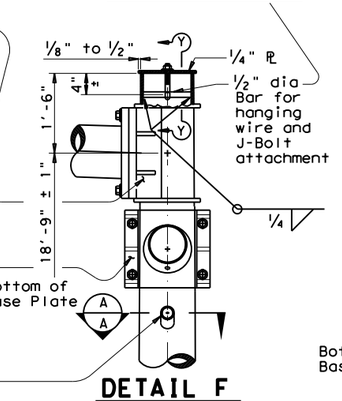
BASE PLATE



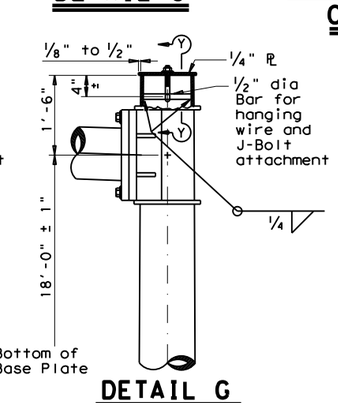
DETAIL D
(for 30' pole with luminaire and ILSN sign)



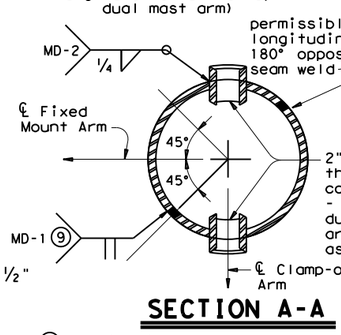
DETAIL E
(for 24' pole with ILSN sign and no luminaire, single or dual mast arm)



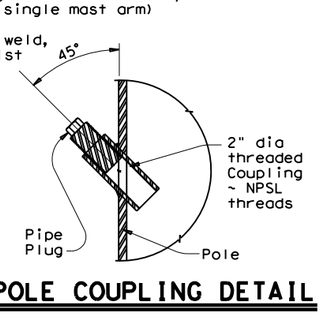
DETAIL F
(for 20.25' pole with no ILSN sign and no luminaire, dual mast arm)



DETAIL G
(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)



SECTION A-A



POLE COUPLING DETAIL

(9) Longitudinal seam weld must be oriented within 90° (45° rotation each side) along the fixed mount arm. 60% min penetration required, 100% penetration within 6" of circumferential base weld.

ACCESS COMPARTMENT NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 ¼" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 2 of 5 — LMA(2)-12

DN: JSY	CK: ARC	DW: TGG	CK: JSY

REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288B

DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	179

131B

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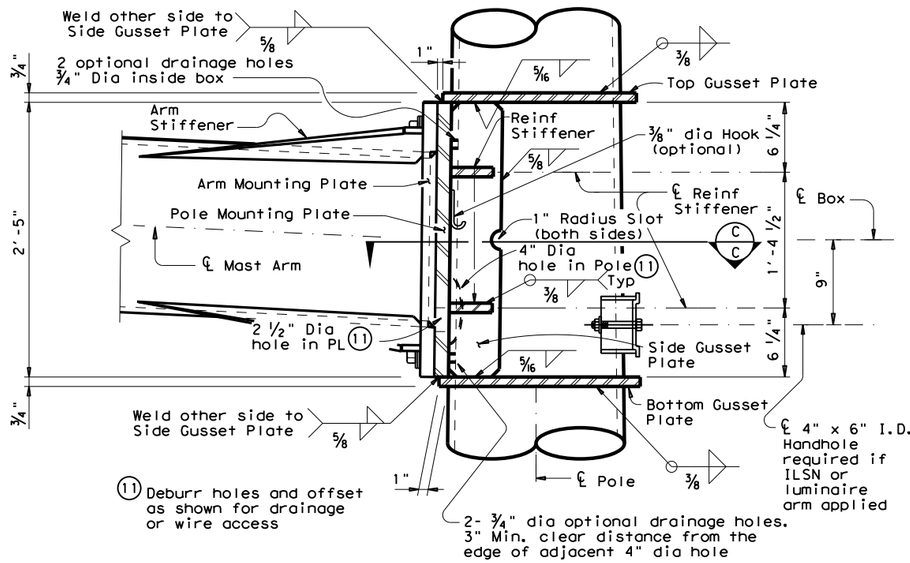
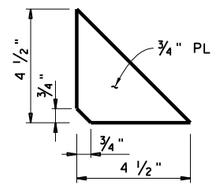
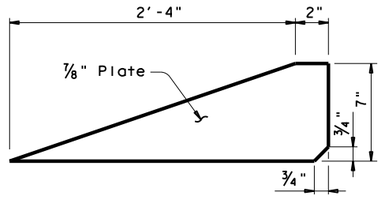


BUILT-UP BOX CONNECTION



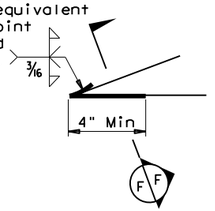
REINFORCING STIFFENER



ARM STIFFENER

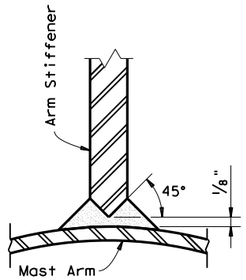
(Cut to match arm inclination and taper)

Provide Detail shown in SECTION F-F or equivalent 100% complete joint penetration weld from both sides.



Only 4" length at tip of Arm Stiffener requires a complete joint penetration weld. Smooth weld radius to connect Stiffener. Only a fillet weld is required for the remaining weld length.

DETAIL "K"



SECTION F-F

Fixed Mount Arm L_F	ROUND POLES (13)					Foundation Type
	D_B	$D_{19.5}$ or $D_{20.25}$	D_{24}	D_{30}	(12) thk	
ft.	in.	in.	in.	in.	in.	
50', 55' 60', 65'	21.0	18.2	17.6	16.8	.3125	48-A

Fixed Mount Arm L_F	ROUND ARMS (13)					
	L_1	D_1	D_2	(12) thk	Rise	
ft.	ft.	in.	in.	in.		
50	49	18.5	11.7	.3125	3'- 3"	
55	54	18.5	11.0	.3125	3'- 7"	
60	59	18.5	10.3	.3125	3'-11"	
65	64	18.5	9.6	.3125	4'- 4"	

D_B = Pole Base O.D.
$D_{19.5}$ = Pole Top O.D. with no Luminaire and no ILSN (single mast arm)
$D_{20.25}$ = Pole Top O.D. with no Luminaire and no ILSN (dual mast arm)
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L_F = Fixed Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

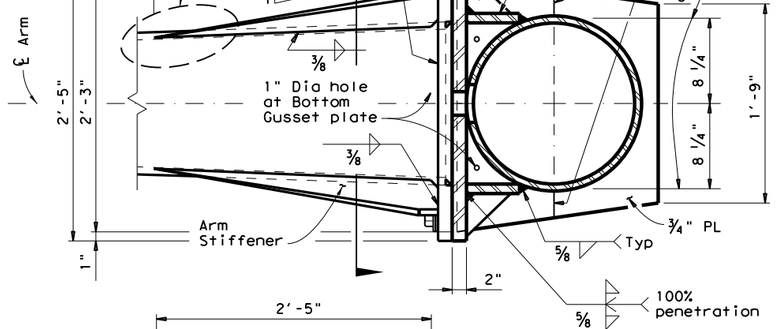
(13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.

GENERAL NOTES:

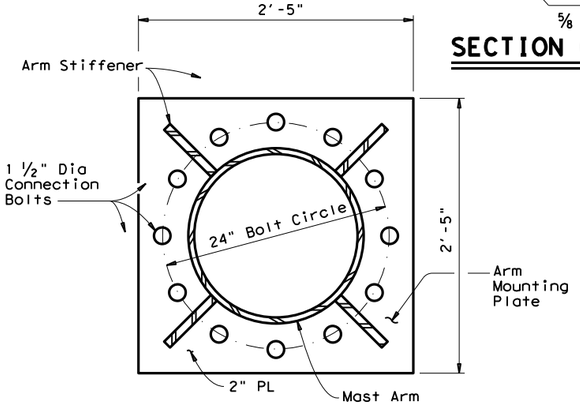
Built-up Box Connection: For the welded arm-to-pole connection as a build-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise creation. Specify the proper location of drain holes along the pole. 2 1/2" dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed 1/32 in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

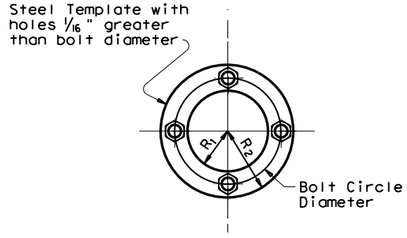


SECTION C-C



SECTION D-D

NUT ANCHOR (TYPE 2)



TEMPLATE DETAIL

ANCHOR BOLT ASSEMBLY

ANCHOR BOLT & TEMPLATE SIZE						
Bolt Dia in.	Length ‡	Top Thread	Bottom Thread	Bolt Circle	R_2	R_1
2 1/2"	5'-2"	10"	6 1/2"	27"	16"	11"

‡ Min dimension given, longer bolts are acceptable.

FOUNDATION DESIGN TABLE													
FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		DRILLED SHAFT LENGTH-ft (16), (17), (18)			ANCHOR BOLT DESIGN (14)				FOUNDATION DESIGN LOAD (15)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
48-A	48"	20 #9	#4 at 6"	21.9	19.5	14.7	2 1/2"	55	27"	2	490	10	50' to 65' Mast arm assembly.

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

(14) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

(15) Foundation Design Loads are the allowable moments and shears at the base of the structure.

(16) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

(17) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

(18) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

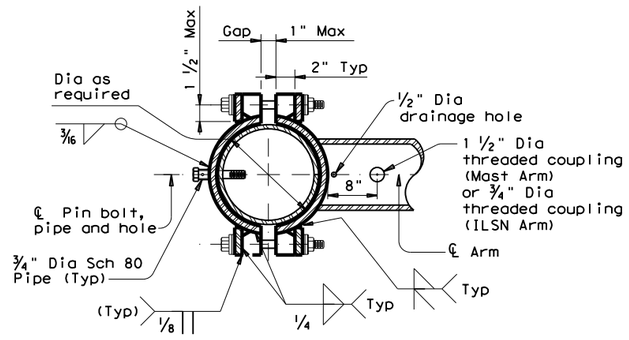
Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

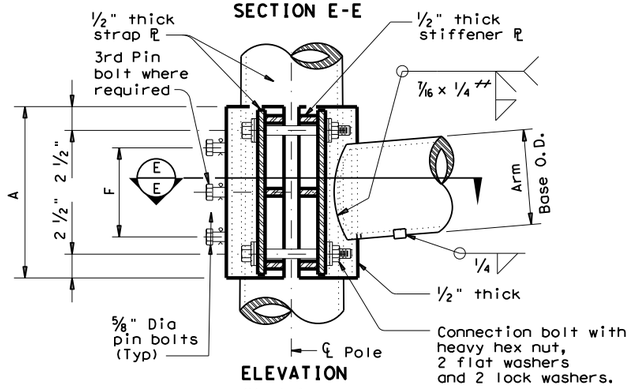
Sheet 3 of 5 — LMA(3)-12

REVISIONS	DN: JSY	CK: ARC	DW: TGG	CK: JSY
4-20-01 1-12	CONT	SECT	JOB	HIGHWAY
	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		180

131C



SECTION E-E



ELEVATION
(Mast Arm or ILSN Arm to pole)

CLAMP-ON CONNECTION

80 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk (12)	Rise	L_1	D_1	D_2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"

100 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk (12)	Rise	L_1	D_1	D_2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

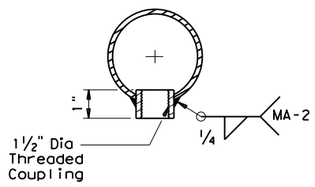
D1 = Arm Base O.D.
D2 = Arm End O.D.
L1 = Shaft Length
Lc = Clamp-on Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

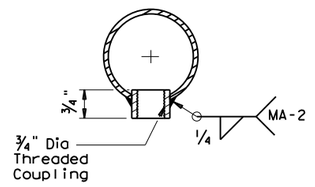
CLAMP-ON ARM CONNECTION

ILSN Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Sch 40 pipe Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
3	.216	10	4	¾	2

Mast Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Base Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
6.5	.179	12	6	1	2
7.5	.179	14	8	1	2
8.0	.179	14	8	1	2
9.0	.179	16	10	1	2
9.5	.179	18	12	1 ¼	3
9.5	.239	18	12	1 ¼	3
10.0	.239	18	12	1 ¼	3
10.5	.239	18	12	1 ¼	3
11.0	.239	18	12	1 ¼	3
11.5	.239	18	12	1 ¼	3



ARM COUPLING DETAIL



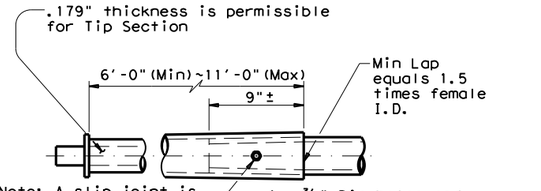
ILSN ARM COUPLING DETAIL

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 ½" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1". For an ILSN arm, a 1 ½" diameter hole shall be cut in the front clamp plate for wire access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and ¾" diameter pipe shall have 3/16" diameter holes for a 1/8" diameter galvanized cotter pin. Back clamp plate shall be furnished with a ¾" diameter hole for each pin bolt. An 11/16" diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

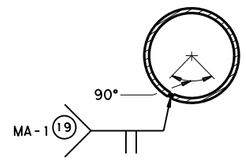


Note: A slip joint is permissible for arms 40' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL (CLAMP-ON ARM)

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.
60% Min penetration
100% penetration within 6" of circumferential base welds.

= 85% Min. Penetration

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 4 of 5 — LMA(4)-12

DN: JK	CK: GRB	DW: FDN	CK: CAL

REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288B

DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	181

131D

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Shipping Parts List

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed arm connection bolts and washers, and any additional hardware listed in the table.

Nominal Arm Length	30' Poles with Luminaire: See note above plus: one (or two if ILSN attached) small hand hole, clamp-on simplex		24' Poles with ILSN: See note above plus one small hand hole		19.50' (Single Mast Arm) 20.25' (Dual Mast Arm) Poles with no Luminaire and no ILSN: See note above	
Single Mast Arm						
Lf ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50	50L		50S		50	
55	55L		55S		55	
60	60L		60S		60	
65	65L		65S		65	
Dual Mast Arm						
Lf ft. / Lc ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50 / 20	5020L		5020S		5020	
24	5024L		5024S		5024	
28	5028L		5028S		5028	
32	5032L		5032S		5032	
36	5036L		5036S		5036	
40	5040L		5040S		5040	
44	5044L		5044S		5044	
55 / 20	5520L		5520S		5520	
24	5524L		5524S		5524	
28	5528L		5528S		5528	
32	5532L		5532S		5532	
36	5536L		5536S		5536	
40	5540L		5540S		5540	
44	5544L		5544S		5544	
60 / 20	6020L		6020S		6020	
24	6024L		6024S		6024	
28	6028L		6028S		6028	
32	6032L		6032S		6032	
36	6036L		6036S		6036	
40	6040L		6040S		6040	
44	6044L		6044S		6044	
65 / 20	6520L		6520S		6520	
24	6524L		6524S		6524	
28	6528L		6528S		6528	
32	6532L		6532S		6532	
36	6536L		6536S		6536	
40	6540L		6540S		6540	
44	6544L		6544S		6544	

Foundation Summary Table **

Location Ident.	Avg. N Blow/ft.	No. Each	Drill Shaft *** Length (feet)
			48-A
AT DRIVEWAY			
POLE B	10	1	22
AT TECHNOLOGY DR			
POLE A	10	1	22
Total Drill Shaft Length			44

Notes

** Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

*** Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Shipping Parts List

Traffic Signal Arms (Fixed Mount) (1 per pole)
Ship each arm with listed equipment attached

Nominal Arm Length	Type IV Arm (4 Signals) 3 Bracket Assembly and 4 CGB Connectors	
ft.	Designation	Quantity
50	50IV	2
55	55IV	
60	60IV	
65	65IV	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	2

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Traffic Signal Arms (80 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp w/bolts and washers		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp w/bolts and washers	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80			
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	

Traffic Signal Arms (100 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100					
24	24I-100		24II-100			
28	28I-100		28II-100			
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	
44					44III-100	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
2 1/2 "	5' - 3"	2

Each anchor bolt assembly consists of the following: Top and bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers and 4 nut anchor devices (type 2) per Standard Drawing "TS-FD". Templates may be removed for shipment.

Abbreviations
Lf= Fixed Arm Length
Lc= Clamp-on Arm Length (44' Max.)

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

09/29/2022

Texas Department of Transportation
Traffic Operations Division

LONG MAST ARM ASSEMBLY PARTS LIST

LMA(5)-12

Sheet 5 of 5

DN: JK	CK: GRB	DW: FDN	CK: CAL

REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288 B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		182

131E

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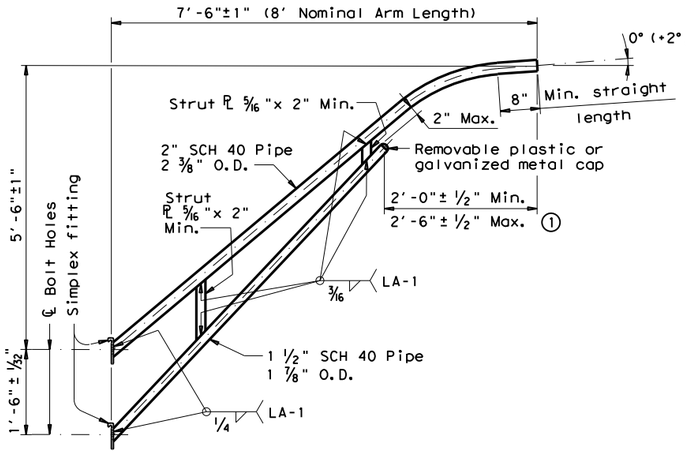
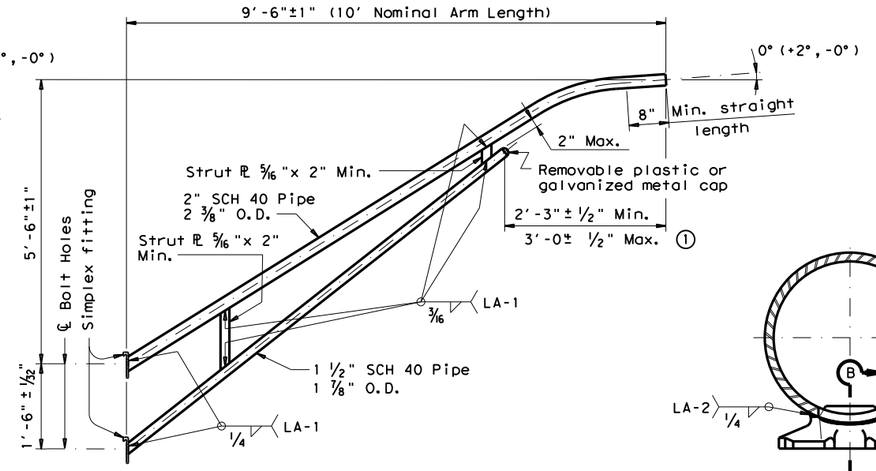


8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM

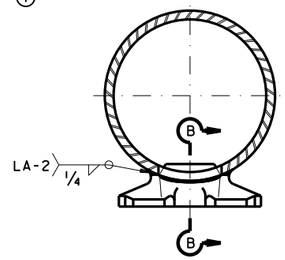
MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr.65-35 or A148 Gr.80-50, A576 Gr.1021 (3), or A36 (Arm only)
Arm Pipes	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50 (4), or A1011 HSLAS-F Gr.50 (4)
Arm Strut Plates (2)	ASTM A36, A572 Gr.50 (4), or A588
Misc.	ASTM designations as noted

(1) Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

(2) Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

(3) A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

(4) ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.



DIRECT ATTACHMENT DETAIL

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. Design Wind Speed equals 90 mph plus a 1.3 gust factor. Arms are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq. ft.

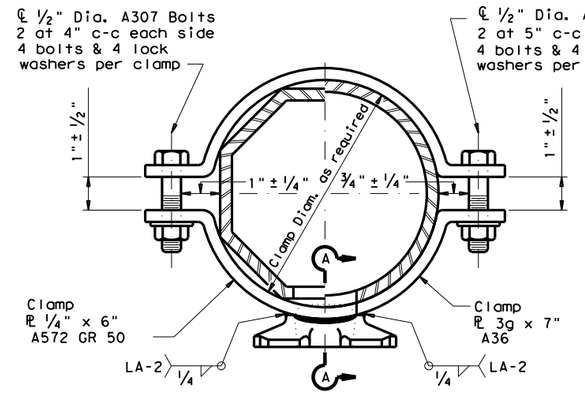
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absense of specified Fabricaton tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing".

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

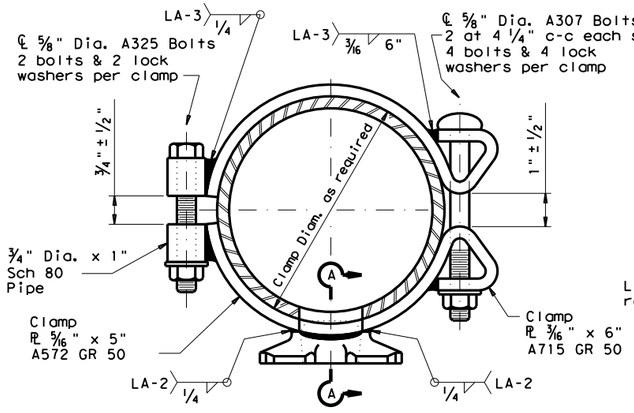
Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly securely attached to the pole at the location shown on the plans.

If clamp assemblies are ordered without poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.



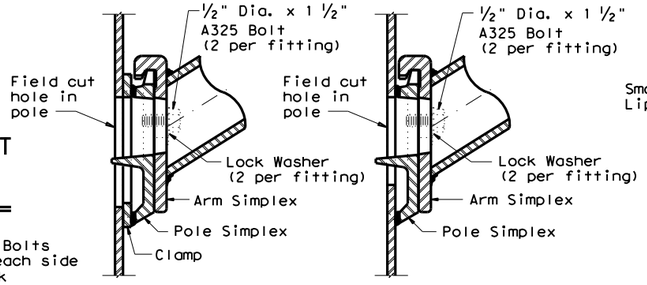
CLAMP ATTACHMENT DETAIL NO. 1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)



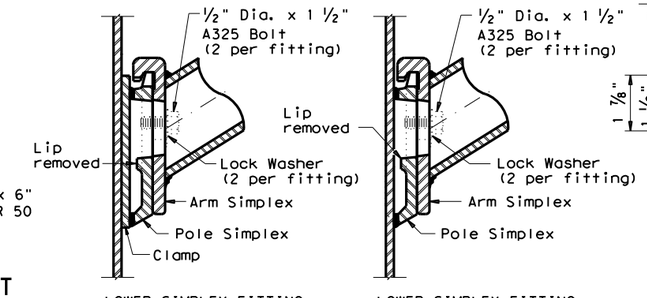
CLAMP ATTACHMENT DETAIL NO. 3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)



UPPER SIMPLEX FITTING

UPPER SIMPLEX FITTING

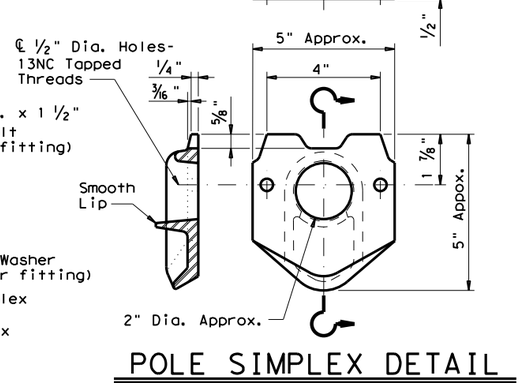


LOWER SIMPLEX FITTING

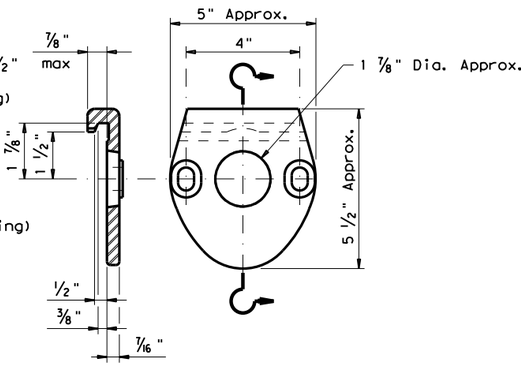
SECTON A-A

LOWER SIMPLEX FITTING

SECTON B-B



POLE SIMPLEX DETAIL



ARM SIMPLEX DETAIL

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES

ARM DETAILS

LUM-A-12

DN: LEH	CK: JSY	DW: LTT	CK: TEB

REVISIONS
5-96
1-99
1-12

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288B

DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	183

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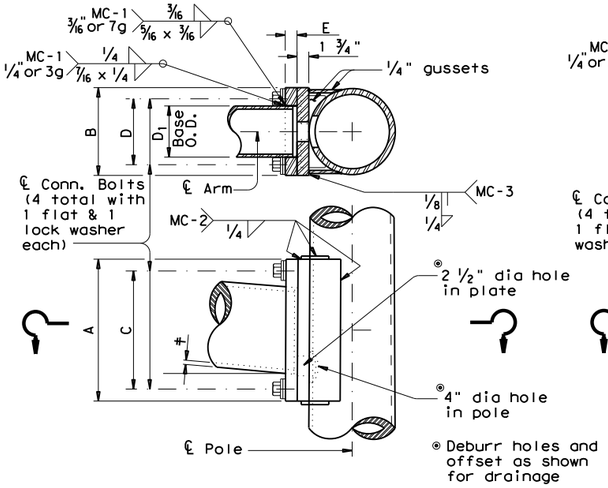
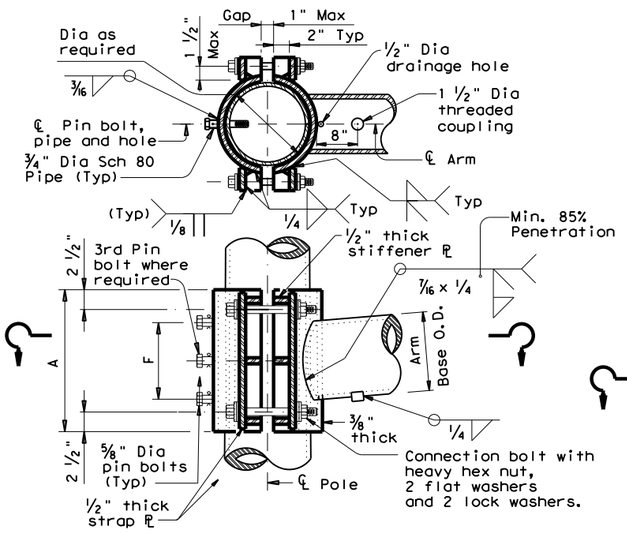
ARM SIZE D_1 in.	ARM SIZE ∓ in.	A in.	B in.	C in.	D in.	E in.	CONN BOLT DIA in.
6.5	.179	12	9	9	6	1 ¾	1
7.5	.179	13	9	10	6	1 ¾	1
8.0	.179	14	10	11	7	2	1 ¼
9.0	.179	16	11	13	8	2	1 ¼
9.5	.179	17	12	14	9	2	1 ¼
9.5	.239	18	12	15	9	2	1 ¼
10.0	.239	18	12	15	9	2	1 ¼
10.5	.239	18	13	15	10	3	1 ½
11.0	.239	18	13	15	10	3	1 ½



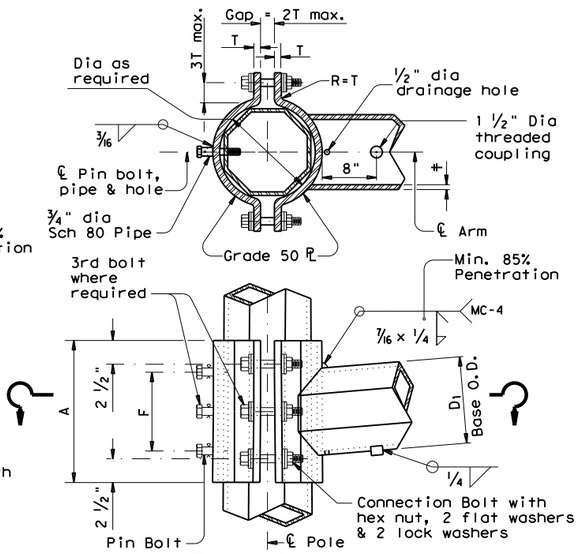
FIXED MOUNT DETAIL 1

ARM SIZE D_1 in.	ARM SIZE ∓ in.	A in.	F in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	4	1 ¼	3	5/8
9.5	.239	18	12	4	1 ¼	3	5/8
10.0	.239	18	12	4	1 ¼	3	5/8

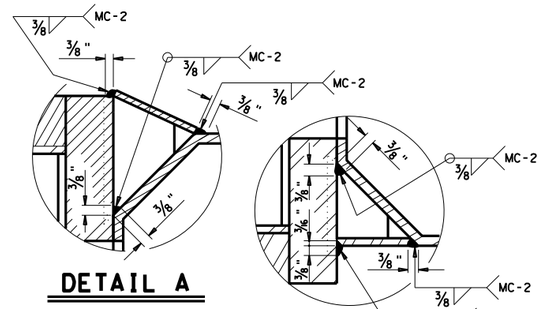


CLAMP-ON DETAIL 1

ARM SIZE D_1 in.	ARM SIZE ∓ in.	A in.	F in.	T in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia in.
7.0	.179	12	6	¾	4	¾	2	5/8
7.5	.179	14	8	¾	4	¾	2	5/8
8.0	.179	14	8	¾	4	¾	2	5/8
9.0	.179	16	10	⅞	4	1	2	5/8
10.0	.179	18	10	⅞	4	1	2	5/8
9.5	.239	18	10	1	6	1	3	5/8
10.0	.239	18	10	1	6	1	3	5/8

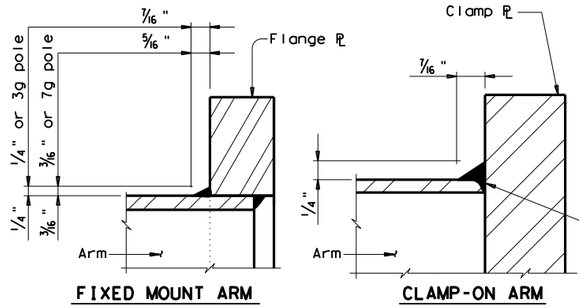


CLAMP-ON DETAIL 2



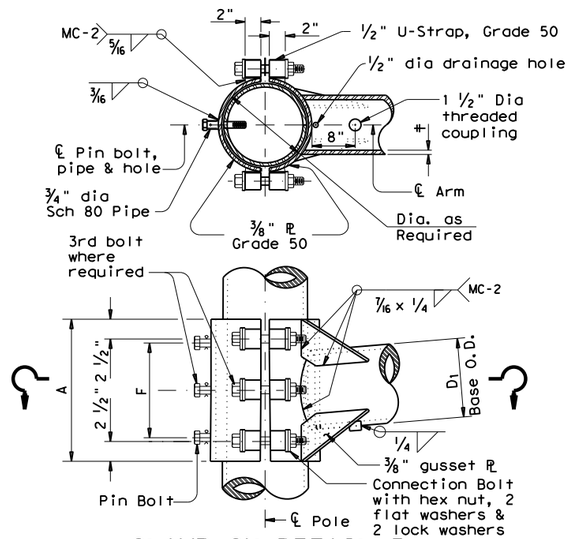
DETAIL A

DETAIL B



ARM BASE WELD DETAILS

ARM SIZE D_1 in.	ARM SIZE ∓ in.	A in.	F in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8



CLAMP-ON DETAIL 3

MATERIALS	
Round Shafts or Polygonal Shafts ①	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ②
Plates ①	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ①	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 ½" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and ¾" dia pipe shall have 5/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a ¾" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

MA-C-12

DN: MS	CK: JSY	DW: MMF	CK: JSY
REVISIONS 5-96 5-09 1-12	CONT 0111	SECT 09	JOB 042
	DIST HOU	COUNTY BRAZORIA	HIGHWAY BS 288B
			SHEET NO. 184

126A

DATE: 9/22/2022 6:01:45 PM
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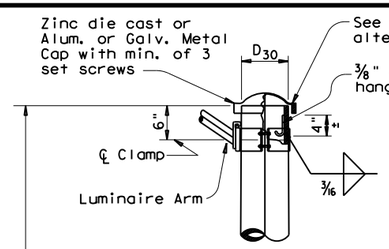
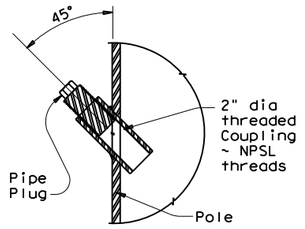
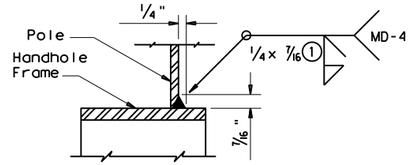


DETAIL A

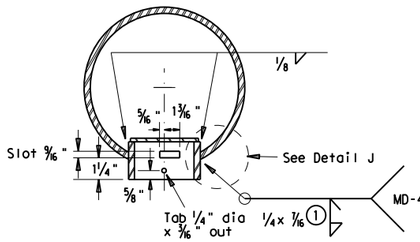
(for pole with luminaire)



POLE COUPLING DETAIL

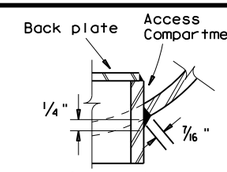


DETAIL G

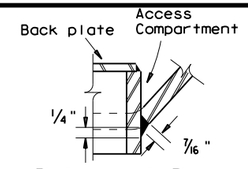


SECTION X-X

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

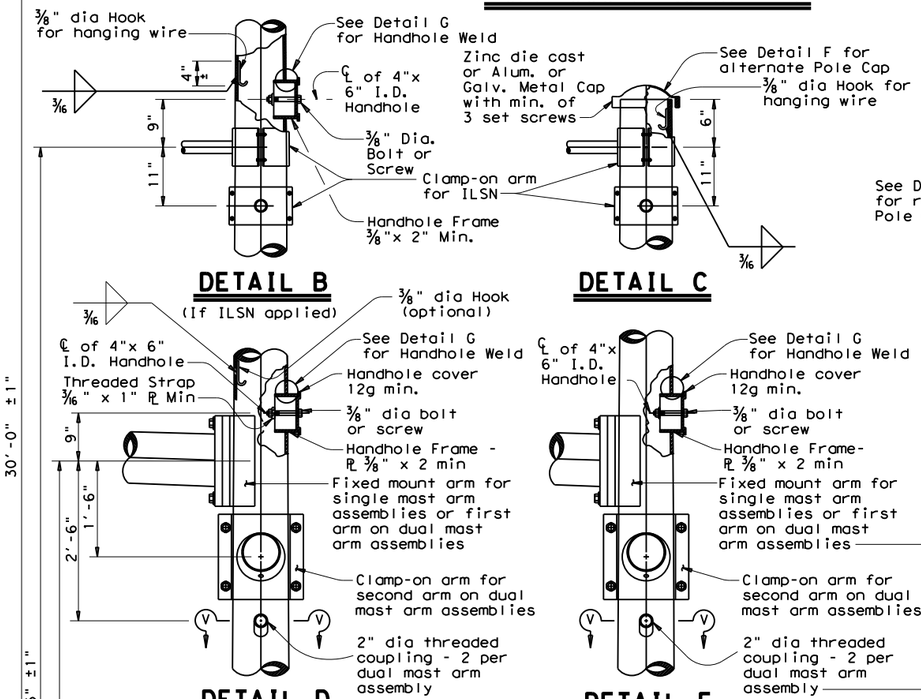


Round Pole



Polygonal Pole

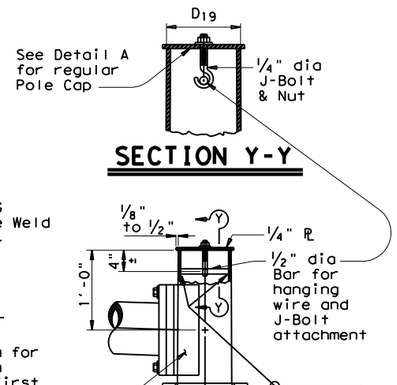
DETAIL J



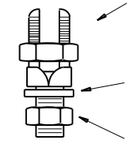
DETAIL B

(If ILSN applied)

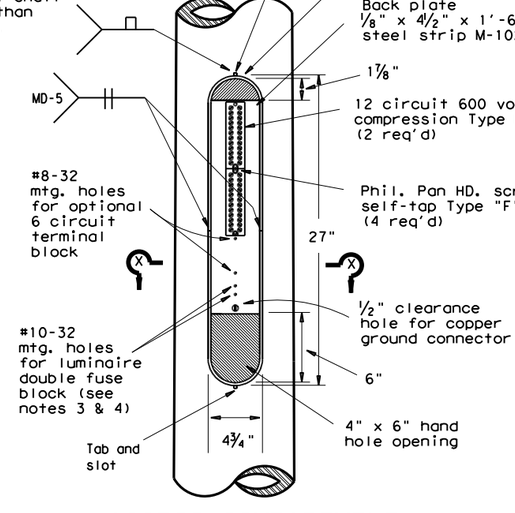
DETAIL C



SECTION Y-Y



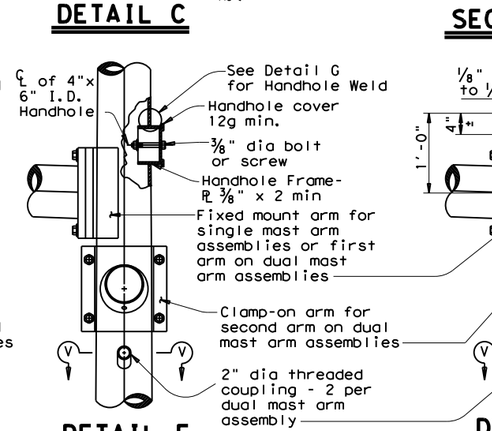
COPPER GROUND CONNECTOR



ACCESS COMPARTMENT

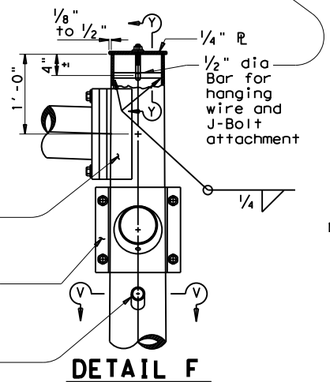
DETAIL D

(for 30' pole with luminaire and ILSN sign)



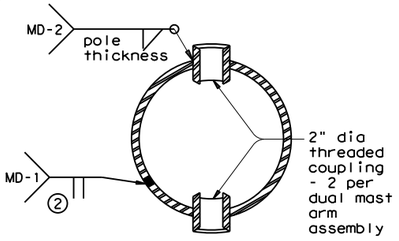
DETAIL E

(for 24' pole with ILSN sign and no luminaire)

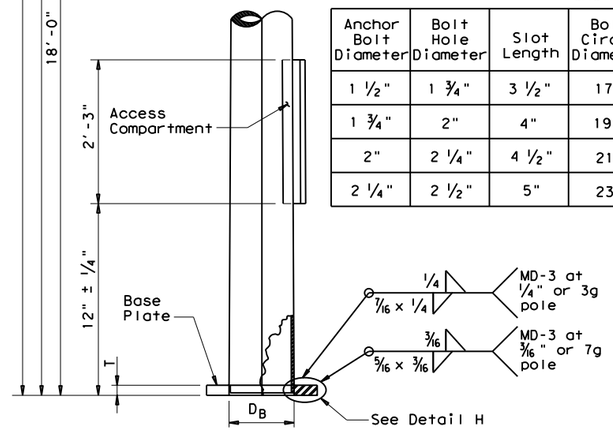


DETAIL F

(for 19' pole with no ILSN sign and no luminaire)

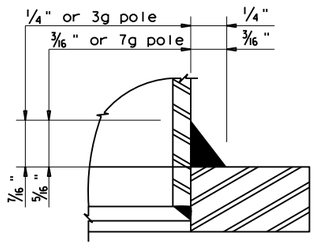


SECTION V-V

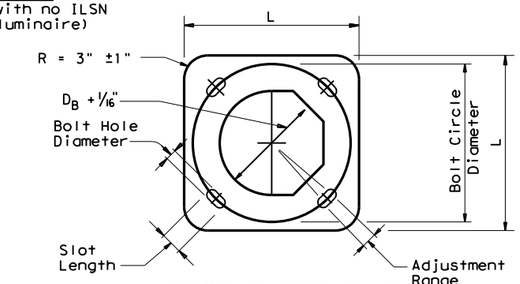


POLE ELEVATION

Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base PL Dim. L x T	Adjust. Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4°
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5°
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6°
2 1/4"	2 1/2"	5"	23"	24" x 2 1/4"	13.7°



DETAIL H



BASE PLATE PLAN

(1) 85% Min. penetration

(2) 60% Min. penetration 100% pemetration within 6" of circumferential base welds.

NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Texas Department of Transportation
Traffic Operations Division

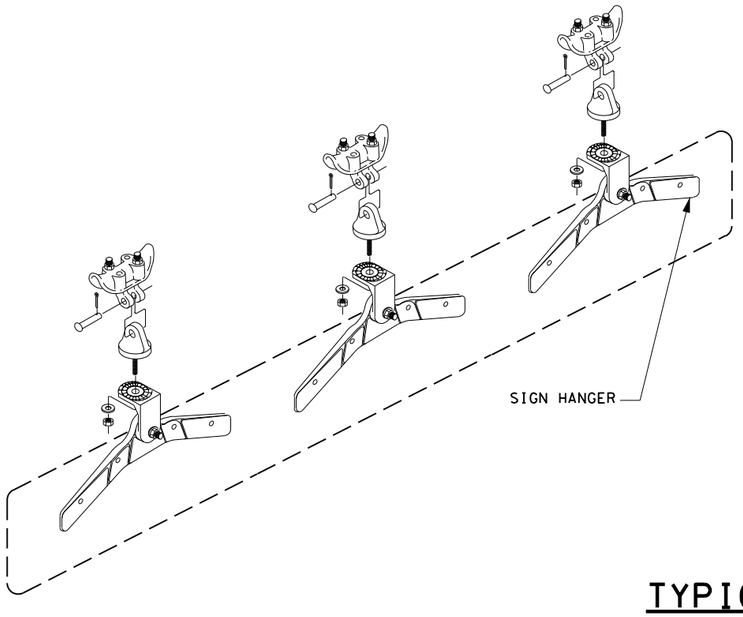
TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

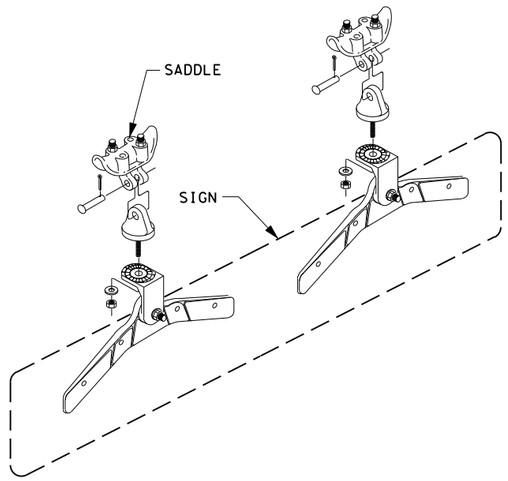
MA-D-12

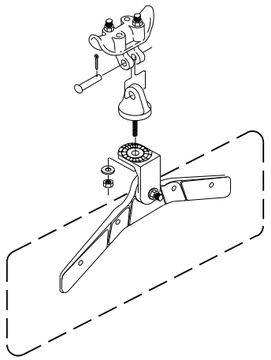
DN: MS	CK: JSY	DW: FDN	CK: CAL

REVISIONS
8-99
1-12

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		185

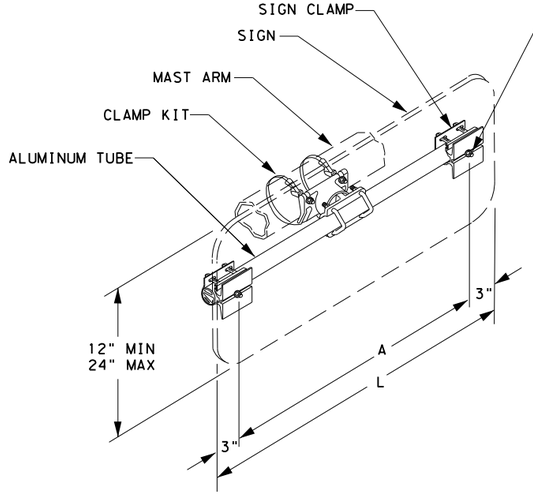


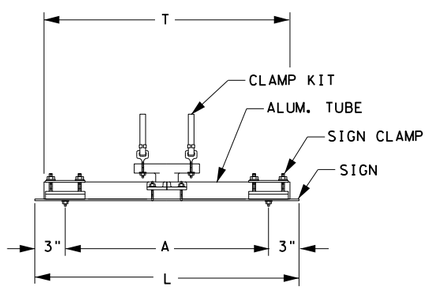


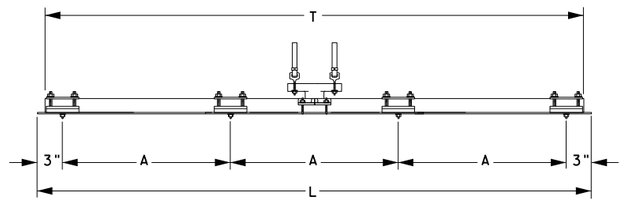


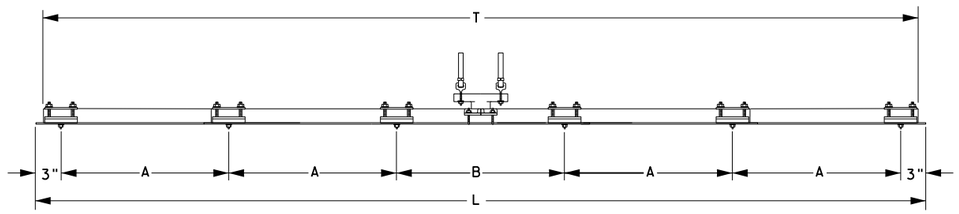
1. USE PELCO PARTS OR APPROVED EQUAL.
2. FURNISH HARDWARE FOR A COMPLETE INSTALLATION.
3. ATTACH THE 90 LB SPAN WIRE CLAMPS (SADDLES) TO TETHERS (SWAY CABLES).
4. FURNISH 1 ADJUSTABLE FREE SWINGING SIGN HANGER PER STREET NAME SIGN SMALLER THAN 3 FT. - 0 IN. SIGNS 3 FT - 0 IN. TO 6 FT.- 0 IN. REQUIRE 2 HANGERS. SIGNS LARGER THAN 6 FT. - 0 IN. REQUIRE 3 HANGERS.

TYPICAL SPAN WIRE SIGN HANGER DETAILS









SIGNS (1'-6" to 3'-0" Long)

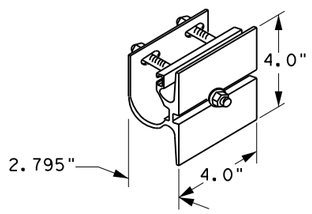
SIGN LENGTH (L)	TUBE LENGTH (T)	A
1'-6"	16"	12"
2'-0"	22"	18"
2'-6"	28"	24"
3'-0"	34"	30"

SIGNS (3'-6" to 8'-0" Long)

SIGN LENGTH (L)	TUBE LENGTH (T)	A
3'-6"	40"	12"
4'-0"	46"	14"
4'-6"	52"	16"
5'-0"	58"	18"
5'-6"	64"	20"
6'-0"	70"	22"
6'-6"	76"	24"
7'-0"	82"	26"
7'-6"	88"	28"
8'-0"	94"	30"

SIGNS (8'-6" to 10'-0" Long)

SIGN LENGTH (L)	TUBE LENGTH (T)	A	B
8'-6"	100"	19"	20"
9'-0"	106"	20"	22"
9'-6"	112"	21"	24"
10'-0"	118"	22"	26"



SIGN CLAMP DETAIL

GUSSETED TUBE CROSS SECTION

TYPICAL MAST ARM SIGN MOUNT DETAILS

FILE: Overhead-Sign-mount-det-sp04.dgn

Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS
OVERHEAD STREET NAME SIGN MOUNTING DETAILS

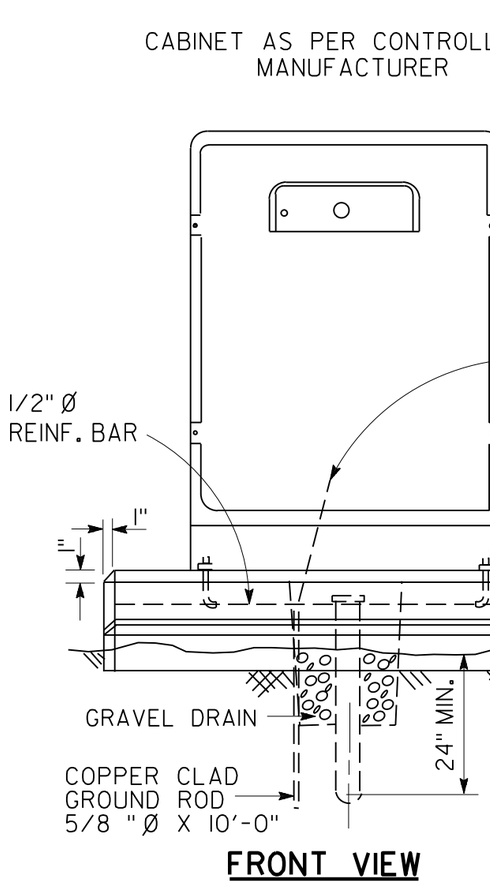
OSNS/MD

DN:	CK:	DW:	CK:

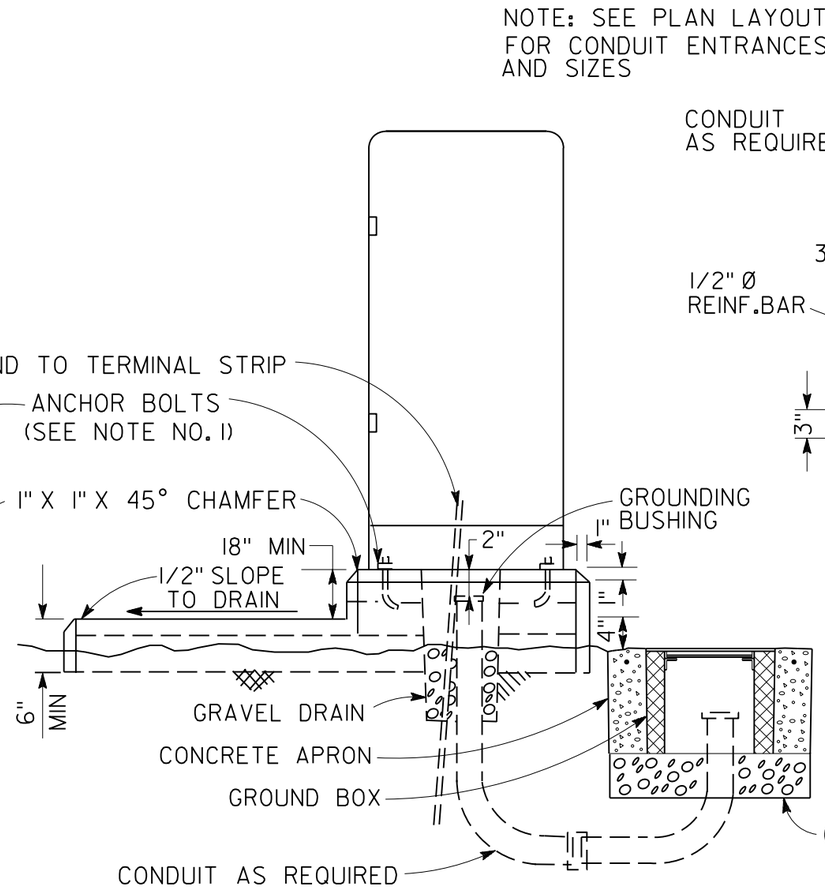
DIST	FED REG	PROJECT NO.	SHEET
HOU	6	C-111-9-42	186

COUNTY	CONTROL	SECT	JOB	HIGHWAY
BRAZORIA	0111	09	042	BS 288B

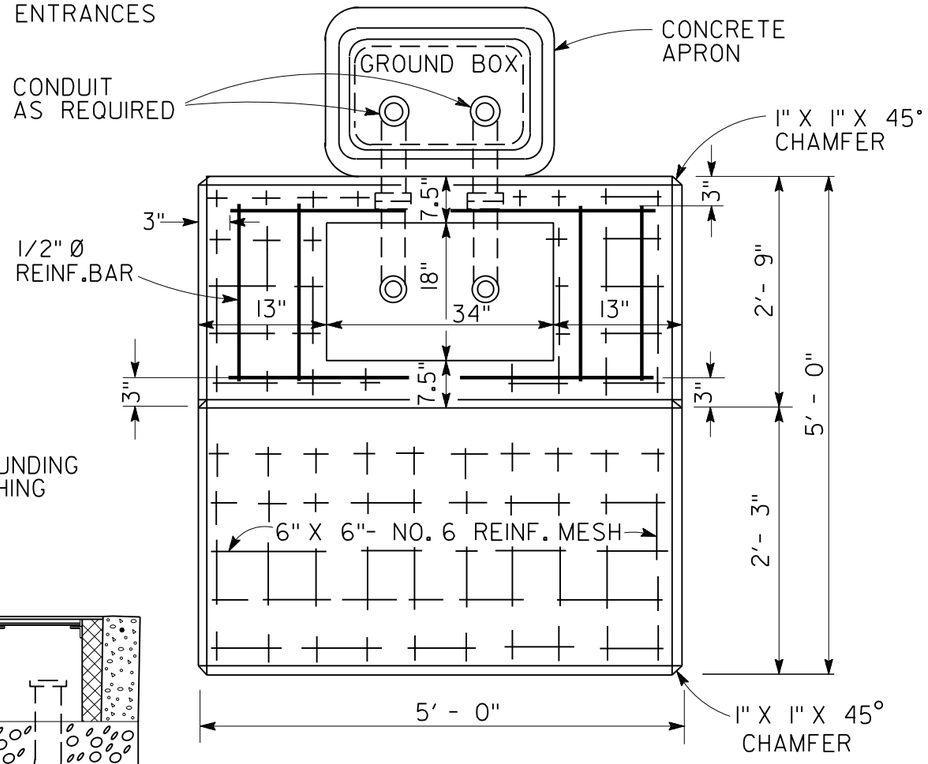
STD-M12



FRONT VIEW



SIDE VIEW



TOP VIEW
(LESS CABINET)

NOTES:

1. CABINET MANUFACTURER TO PROVIDE DETAILS OF ANCHOR BOLT LOCATION.
2. MODIFY DIMENSIONS FOR CONCRETE BASE TO FIT EQUIPMENT FURNISHED, IF NECESSARY.
3. PROVIDE GRAVEL DRAIN FOR CONTROLLER AND ALL GROUND BOXES.
4. FURNISH CLASS "B" OR CLASS "C" CONCRETE.
5. SET CONTROLLER FOUNDATION LEVEL WITH THE PAVEMENT SURFACE OR AS APPROVED BY THE ENGINEER.
6. FURNISH AT NO COST TO THE DEPARTMENT ANY ADDITIONAL CONCRETE WHICH MAY BE NECESSARY TO STABILIZE THE FOUNDATION AT UNUSUAL LOCATIONS.
7. PLACE REINFORCING BARS AS DIRECTED.
8. UPON INSTALLING THE CONTROLLER CABINET, APPLY A SILICON-BASED CAULKING COMPOUND AROUND THE BASE OF THE CONTROLLER CABINET.

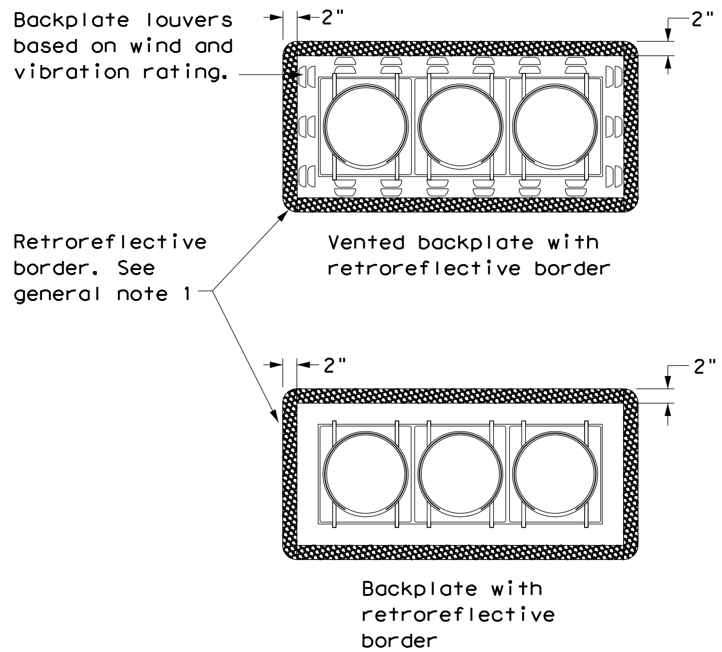
Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS CONTROLLER FOUNDATION DETAIL

SD/SCFD

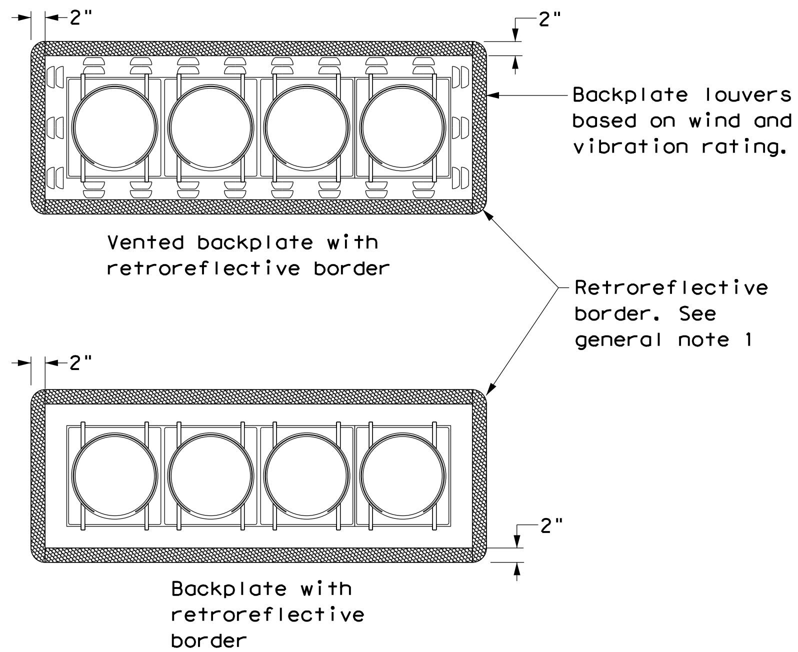
FILE:	DN:	CK:	DW:	CK:
© TxDOT 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 08-04 03-07	HOU	6	C-111-9-42	187
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	BRAZORIA	0111	09 042	BS 288B

STD-M1



THREE-SECTION HEAD

HORIZONTAL OR VERTICAL

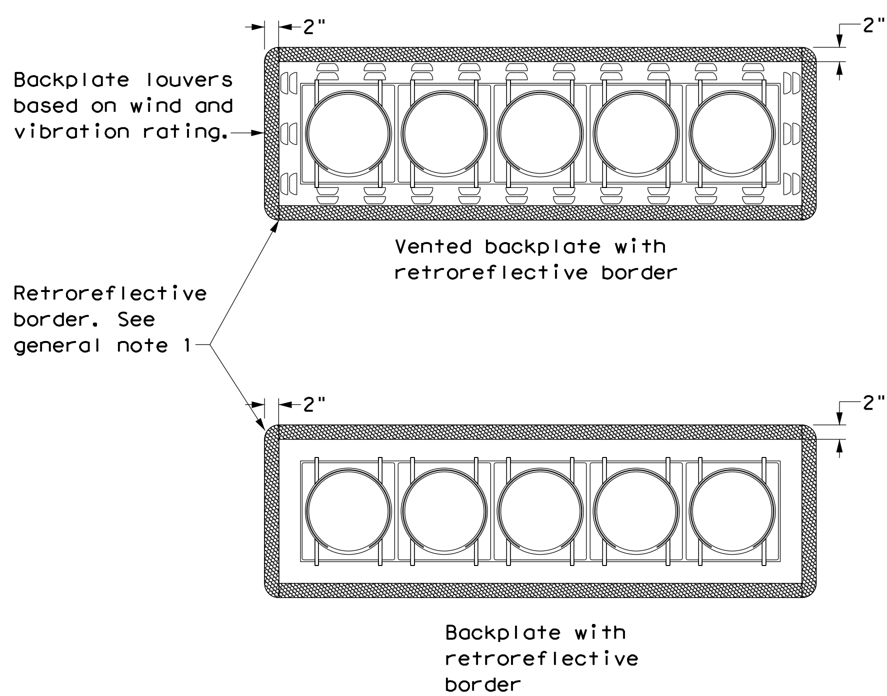


FOUR-SECTION HEAD

HORIZONTAL OR VERTICAL

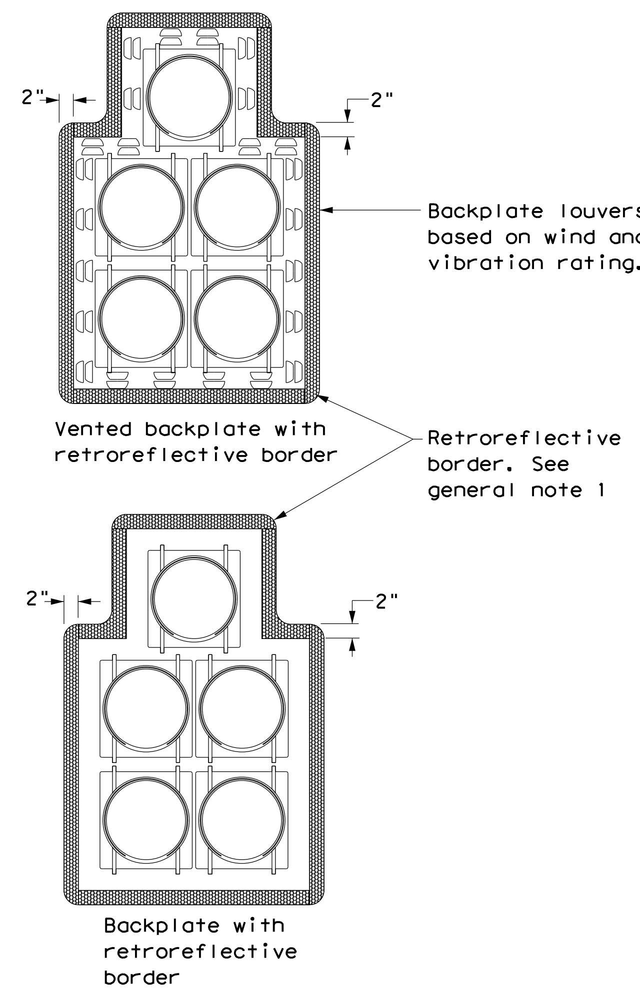
GENERAL NOTES:

1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatability must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
   - Pole mounted
   - Overhead mounted
   - Span wire mounted
   - Mast arm mounted
   - Vertical signal heads
   - Horizontal signal heads
   - Clustered signal heads
   - Pedestrian hybrid beacons



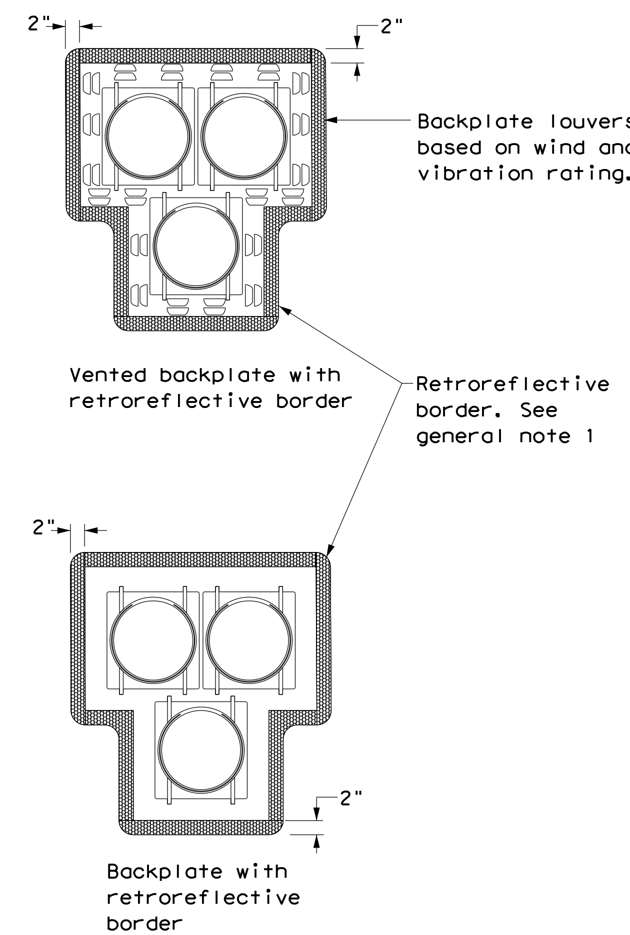
FIVE-SECTION HEAD

HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD

CLUSTER



PEDESTRIAN HYBRID BEACON

Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC SIGNAL HEAD WITH BACKPLATE

TS-BP-20

FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	188

134

DATE: 9/22/2022 6:02:03 PM
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DATE: 9/22/2022 10:53:50 AM
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FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft ④, ⑤, ⑥			ANCHOR BOLT DESIGN ①				FOUNDATION DESIGN LOAD ②		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
24-A	24"	4- #5	#2 at 12"	5.7	5.3	4.5	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 ½"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 ¾"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #9	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11.9	2 ¼"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

NOTES:

① Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

② Foundation Design Loads are the allowable moments and shears at the base of the structure.

③ Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

④ Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

⑤ If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

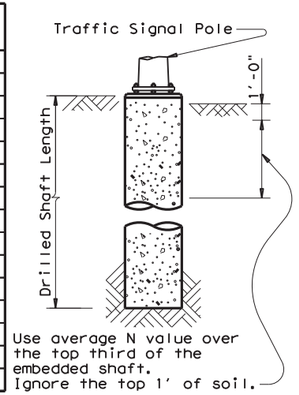
⑥ Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

FOUNDATION SUMMARY TABLE ③

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH ⑥ (FEET)				
				24-A	30-A	36-A	36-B	42-A
BS SH 288 B AT VARIOUS								
TECHNOLOGY DR								
POLE B	10	36B	1				16	
POLE C	10	36B	1				16	
DRIVEWAY								
POLE A	10	36A	1			14		
POLE C	10	36B	1				16	
TOTAL DRILLED SHAFT LENGTHS						14	48	

FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
			44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' x24'	40' X 36'
					44' x 36'



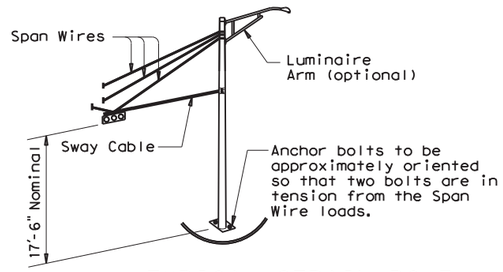
Use average N value over the top third of the embedded shaft. Ignore the top 1' of soil.

ANCHOR BOLT & TEMPLATE SIZES

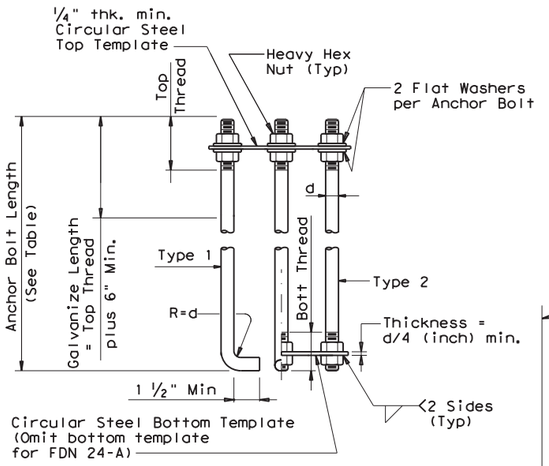
BOLT DIA IN.	⑦ BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3'-4"	6"	4"	17"	10"	7"
1 ¾"	3'-10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-9"	9"	5 ½"	23"	13 ¾"	9 ¼"

⑦ Min dimensions given, longer bolts are acceptable.

EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



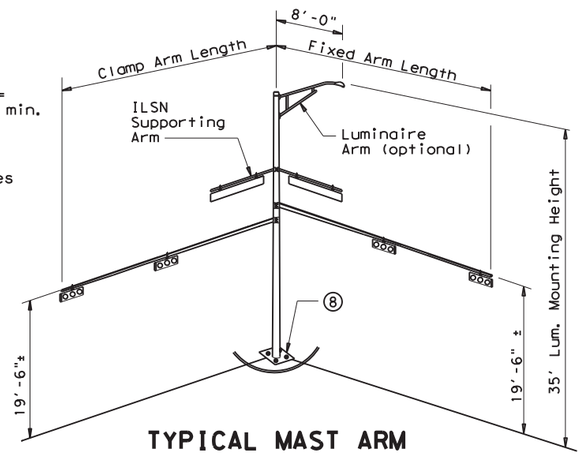
TYPICAL STRAIN POLE ASSEMBLY



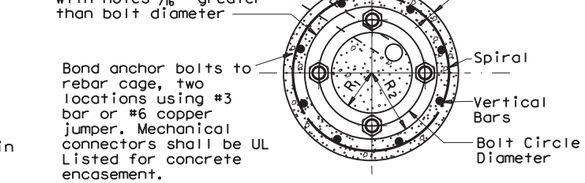
HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

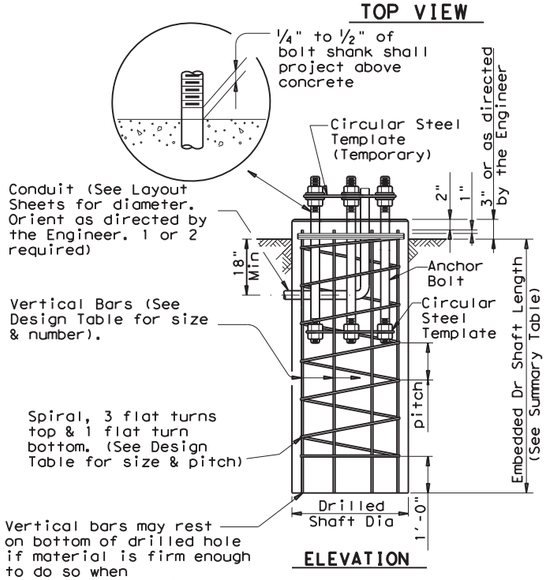
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



TYPICAL MAST ARM ASSEMBLY



TOP VIEW



ELEVATION

FOUNDATION DETAILS

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".

BS SH 288-B AT VARIOUS

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED PROFESSIONAL ENGINEER
P.E.

09/29/2022

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

REVISIONS	DN: MS	CK: JSY	DW: MAO/MMF	CK: JSY/TEB
5-96 11-98 1-12	CONT	SECT	JOB	HIGHWAY
	0111	09	042	BS 288 B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		189

DATE: 9/22/2022 10:58:41 AM
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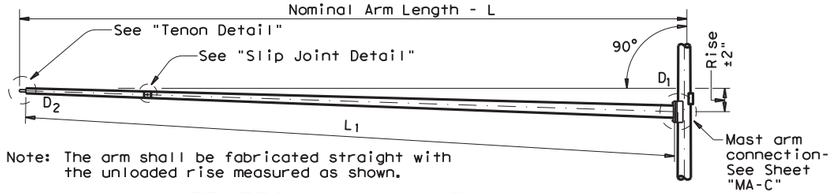
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
24	12.0	9.3	8.6	7.8	.239	13.0	10.0	9.2	8.3	.239	36-A
28	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
32	13.0	10.3	9.6	8.8	.239	14.0	11.0	10.2	9.3	.239	36-A
36	13.5	10.8	10.1	9.3	.239	15.0	12.0	11.2	10.3	.239	36-A
40	14.0	11.3	10.6	9.8	.239	16.0	13.0	12.2	11.3	.239	36-B
44	14.5	11.8	11.1	10.3	.239	16.5	13.5	12.7	11.8	.239	36-B

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	① thk	Rise	L_1	D_1	② D_2	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

D_B = Pole Base O.D.
D_{19} = Pole Top O.D. with no Luminaire and no ILSN
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.

② D_2 may be increased by up to 1" for polygonal arms.



Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

TRAFFIC SIGNAL ARM

(Fixed Mount)

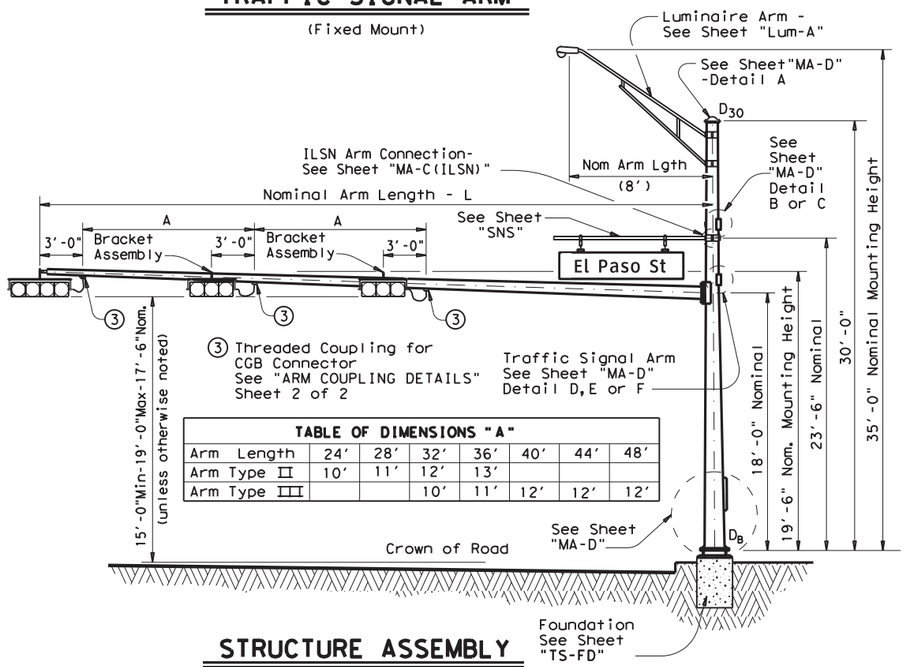


TABLE OF DIMENSIONS "A"

Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	12'	12'	12'

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30' Poles With Luminaire		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-100		20S-100		20-100	
24	24L-100		24S-100		24-100	
28	28L-100		28S-100		28-100	1
32	32L-100		32S-100		32-100	
36	36L-100		36S-100		36-100	
40	40L-100	1	40S-100		40-100	
44	44L-100	2	44S-100		44-100	

Traffic Signal Arms (1 per pole) Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100					
24	24I-100		24II-100			
28	28I-100		28II-100	1		
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	1
44					44III-100	2

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	3

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 ½"	3'-4"	
1 ¾"	3'-10"	1
2"	4'-3"	3

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

SHEET 1 OF 2

09/29/2022

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(100 MPH WIND ZONE)

SMA-100(1)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
11-99
1-12

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288 B

DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	190

123A

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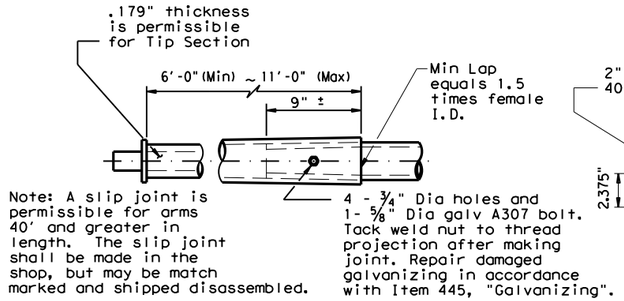
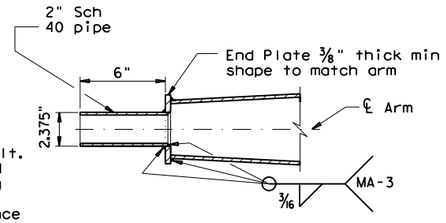


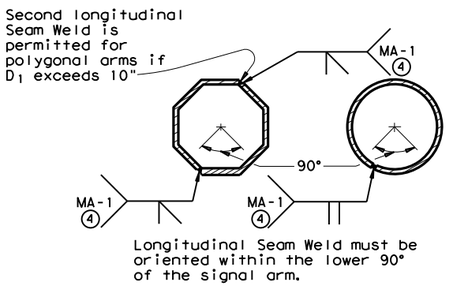
SLIP JOINT DETAIL



TENON DETAIL

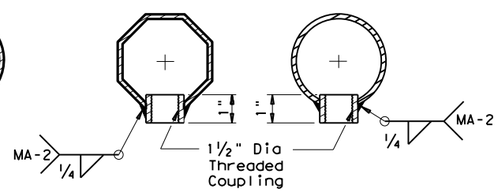
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

④ 60% Min. penetration
100% pemetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 100 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(100 MPH WIND ZONE)

SMA-100(2)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
1-12

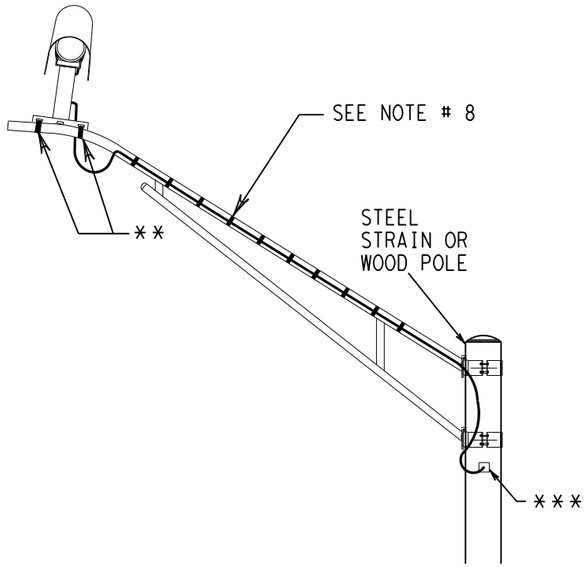
CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288B

DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	191

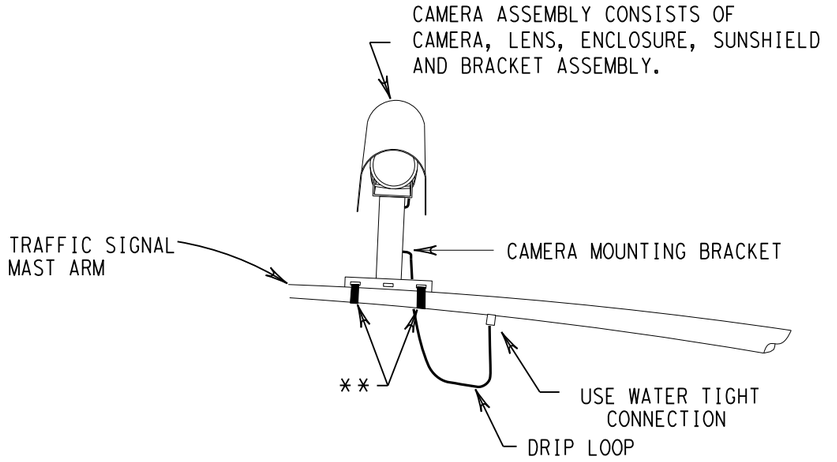
123B

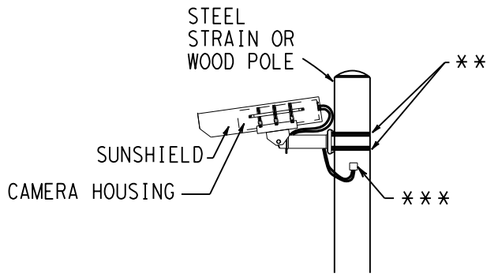
NOTES FOR VIDEO DETECTION:

1. INSTALL VIDEO DETECTION PROCESSOR UNIT INSIDE CONTROLLER CABINET.
2. INSTALL VIDEO DETECTION CAMERA & BRACKET AS DETAILED OR AS DIRECTED BY THE VIDEO DETECTION SUPPLIER.
3. MOUNT CAMERAS AS FAR OVER THE ROADWAY AS POSSIBLE.
4. USE ¾ IN. STAINLESS STEEL BANDING MATERIAL TO INSTALL CAMERA MOUNTS.
5. AIM CAMERA SO THAT HORIZON IS NOT VISIBLE IN THE FIELD OF VIEW.
6. INSTALL CAMERA ENCLOSURE ASSEMBLY SO THAT IT CAN ROTATE AFTER INSTALLATION TO PROVIDE PROPER ALIGNMENT.
7. PROVIDE WATER TIGHT CABLE ENTRY AND EXIT POINTS IN THE MAST ARM AND/OR POLES.
8. FOR VIVDS COAX AND POWER CABLES ATTACHED TO LUMINAIRE ARM, PROVIDE A METAL CABLE STRAP (ALUMINUM OR STAINLESS STEEL), 3/4-IN MINIMUM WIDTH AND TWO WRAPS AT 8 IN. MAXIMUM SPACING.

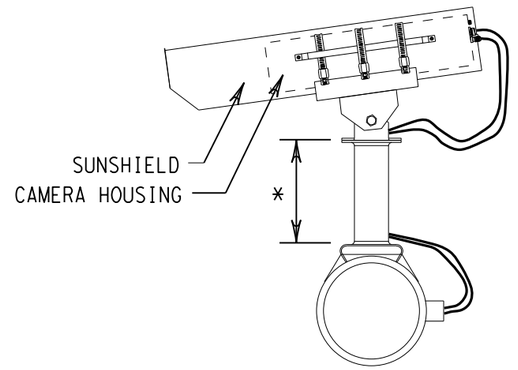


LUMINAIRE ARM MOUNT





POLE MOUNT

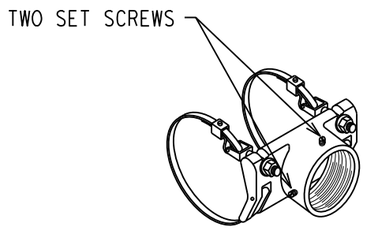


SIDE VIEW

* 4 FT. PIPE EXTENSION WHEN MOUNTED ON TRAFFIC SIGNAL MAST ARM.

** ¾ IN. (MIN) STAINLESS STEEL BANDING 2 PLACES MIN.

*** ENTRY INTO STEEL POLE OR CONDUIT WEATHERHEAD ON WOOD POLE



BAND MOUNT BRACKET DETAIL

Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS VIVDS CAMERA MOUNTING DETAILS

VC/MD

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6	C-111-9-42	192
02/2004 03/16/2006 09/2010	COUNTY		CONTROL SECT JOB	HIGHWAY
	BRAZORIA		0111 09 042	BS 288B

STD-M13

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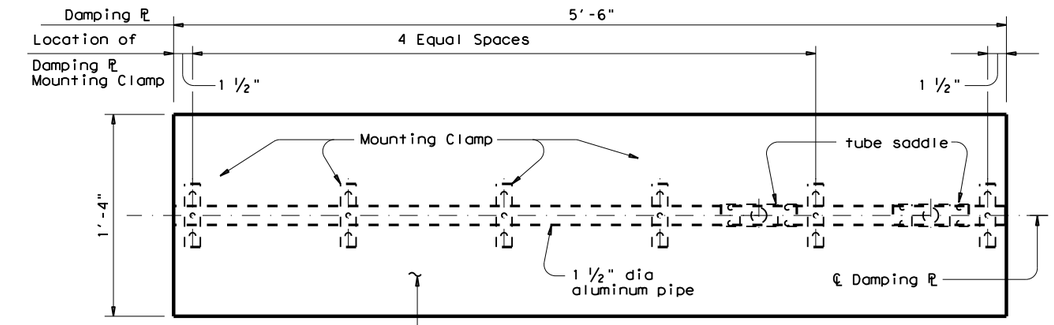
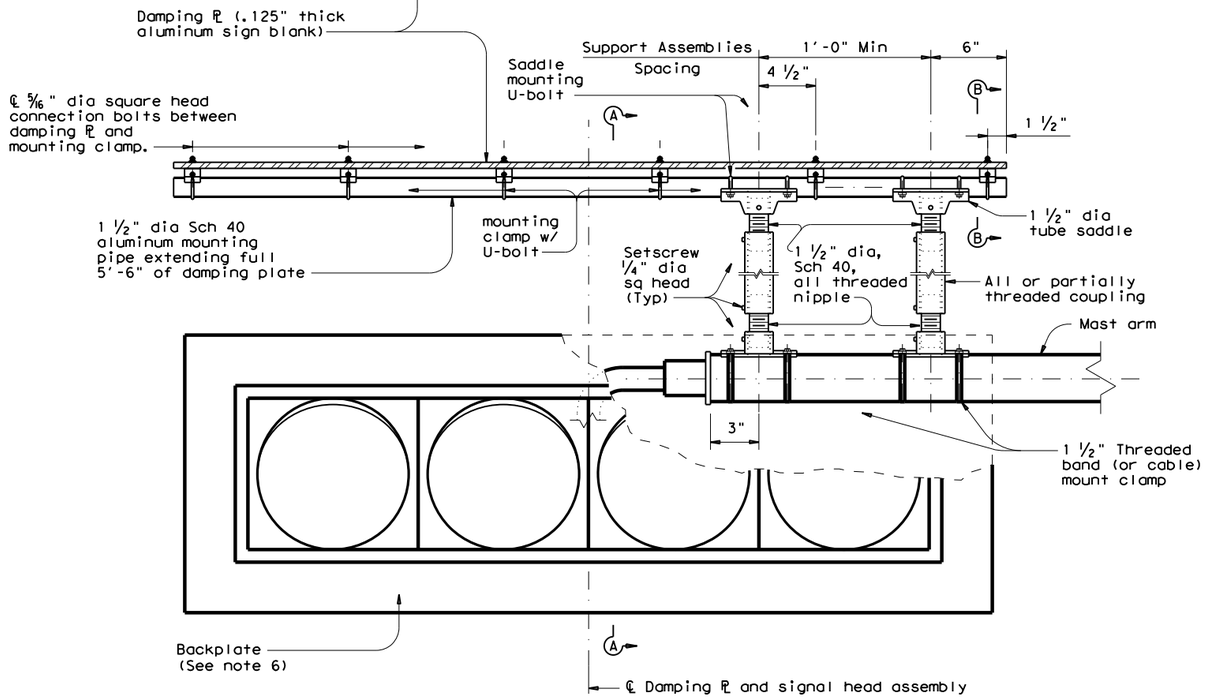


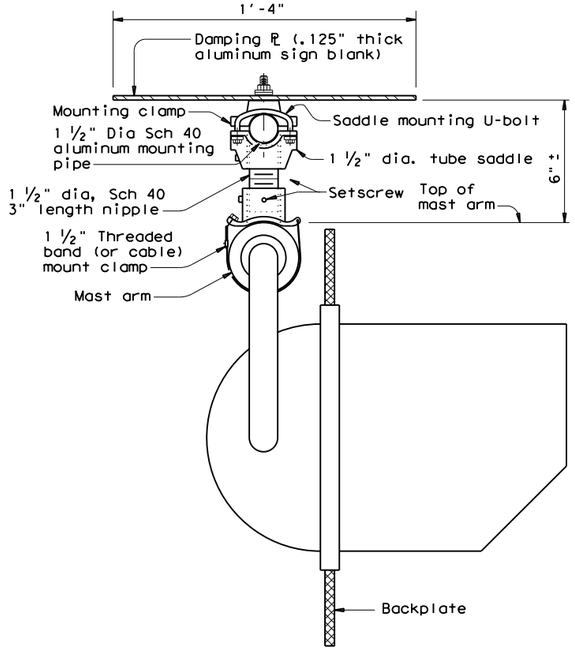
PLAN



ELEVATION

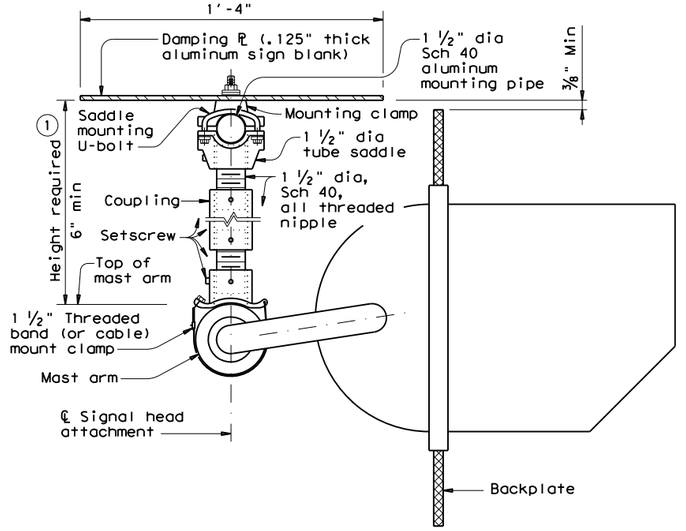
DAMPING PLATE MOUNTING DETAILS

(Showing alternate placement of signal head)



SECTION A-A

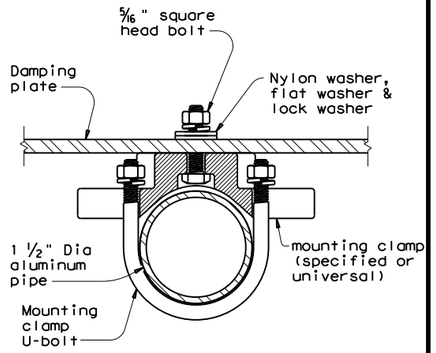
(Showing standard placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)



SECTION A-A

(Showing alternate placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)

① Recommended supporting assemblies to achieve required height for horizontal section heads			
Height required	One nipple each length	Two nipples each length plus	One coupling each length
6"-6 ¾"	3"	-	-
7"-8 ½"	4"	-	-
9"-10 ½"	6"	-	-
11"-15 ½"	-	4"	5"
16"-24"	-	6"	10"



SECTION B-B

(Showing damping plate attachment)

GENERAL NOTES:

1. In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.
2. Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies will conform to Standard sheet SMD(GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.
3. Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate) and bottom of damping plate will be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.
4. Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".
5. Contractor will verify applicable field dimensions before the installation.
6. Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.

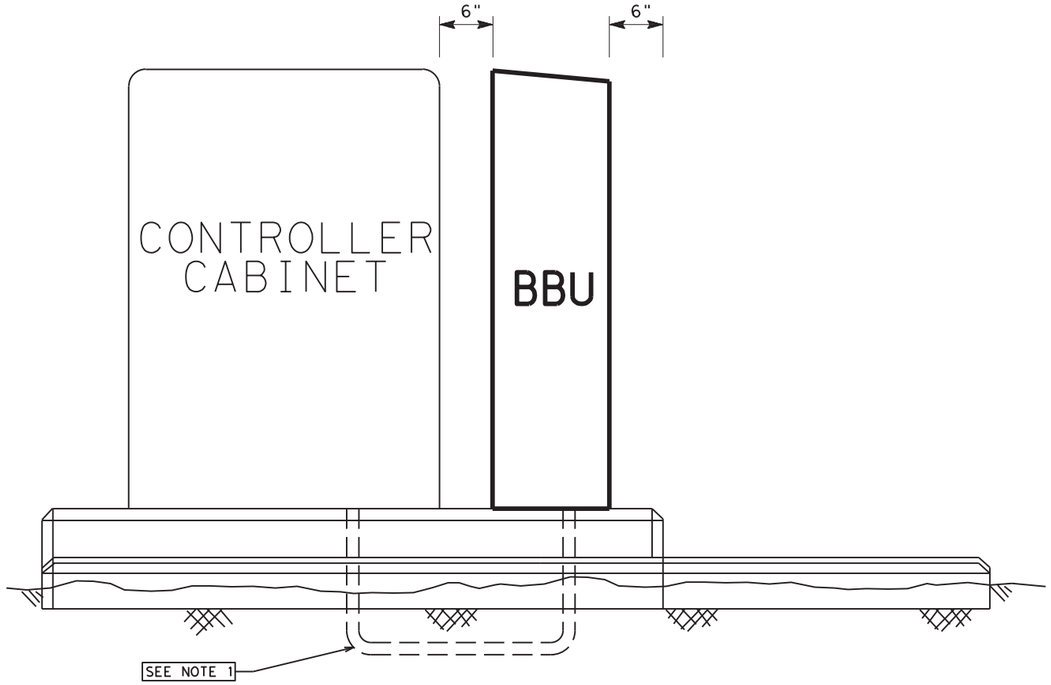
Texas Department of Transportation

Traffic Safety Division Standard

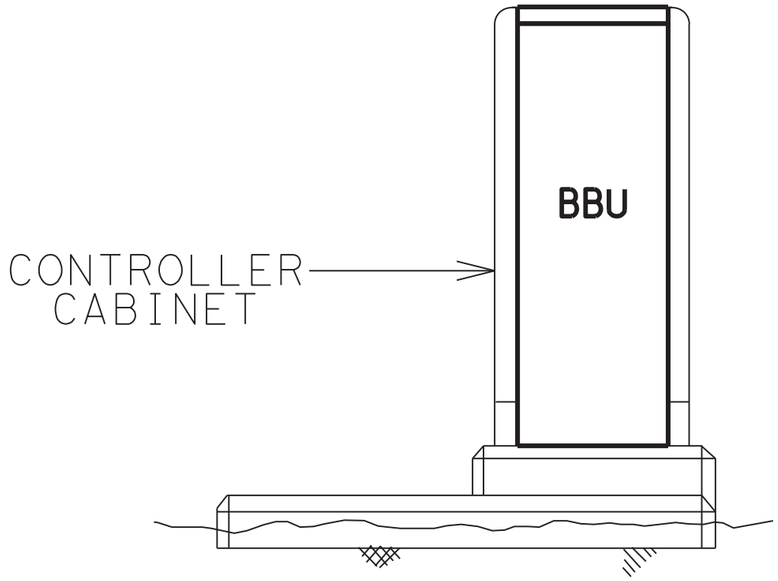
MAST ARM DAMPING PLATE DETAILS

MA-DPD-20

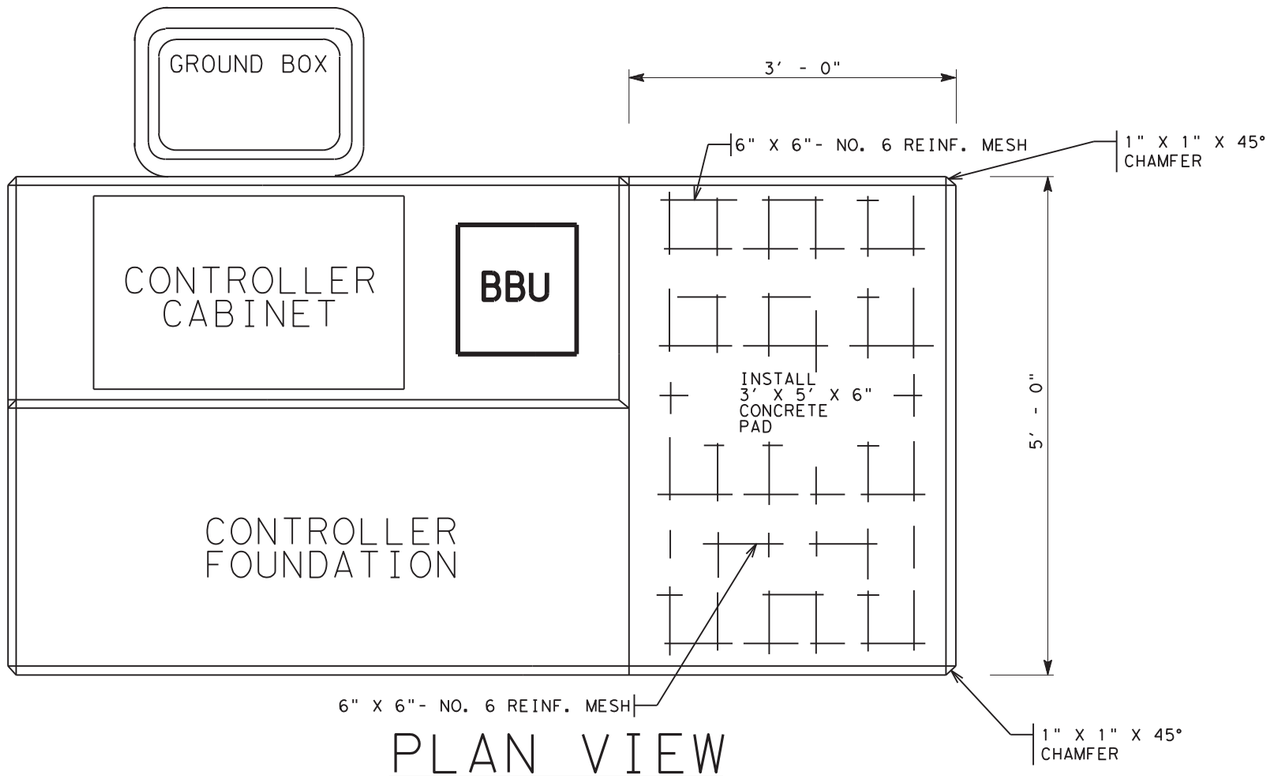
FILE: ma-dpd-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
6-20	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		193



ELEVATION VIEW



SIDE VIEW



PLAN VIEW

NOTES:

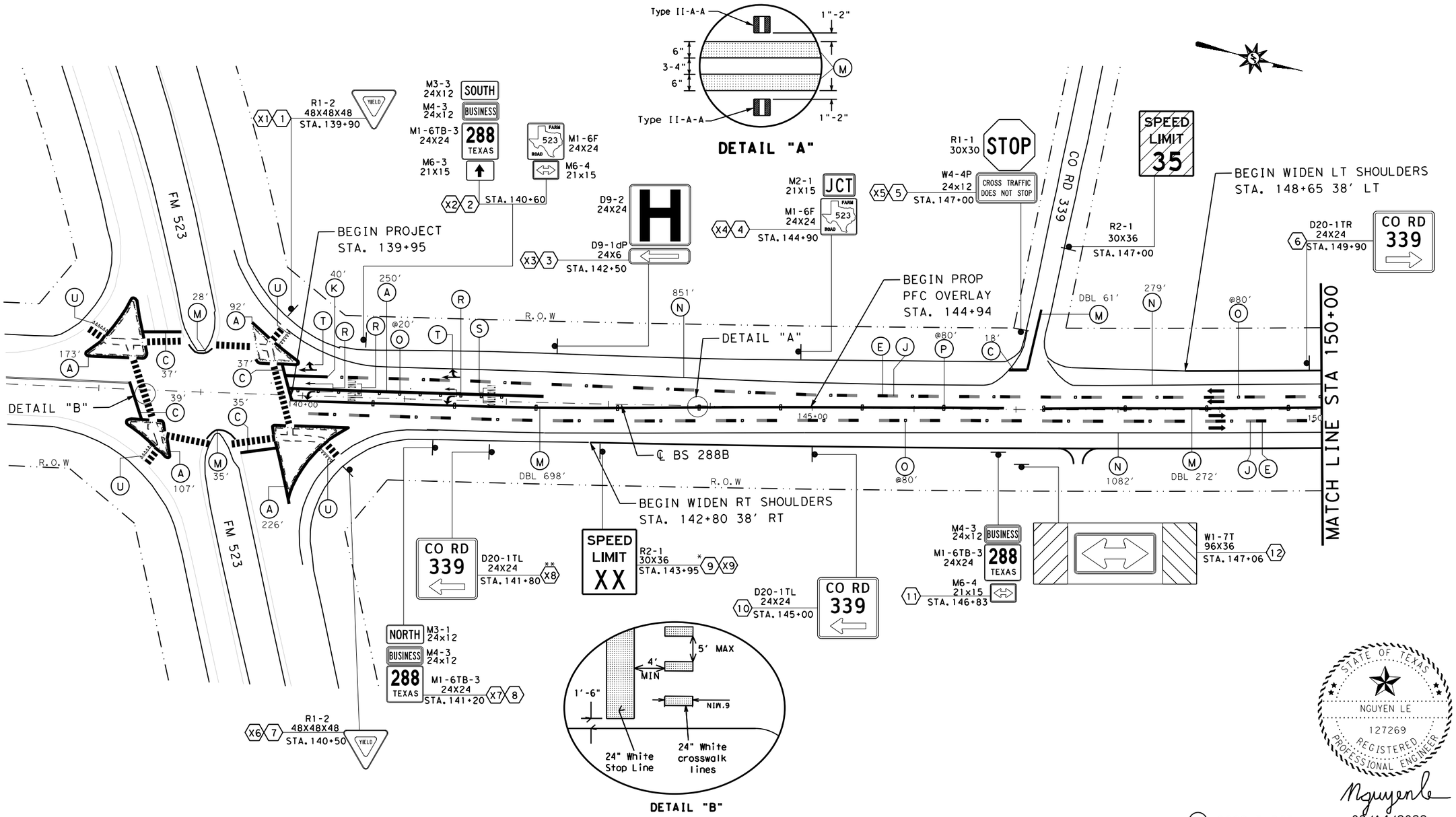
1. INSTALL 1 1/2 " PVC CONDUIT WITH FIVE #6 AWG CONDUCTORS, TWO #18 AWG CONDUCTORS AND ONE CAT 5 CABLE WITH CONNECTOR BETWEEN THE TWO CABINETS.
2. EXTEND THE CONCRETE CONTROLLER PAD (REFER TO SD/SCFD, 6" SLAB) UNDER THE BBU AS SHOWN BELOW.
3. THE ABOVE WORK PERFORMED AND MATERIALS FURNISHED WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO THE BBU ASSEMBLY.
4. FURNISH CLASS "B" CONCRETE FOR FOUNDATION.

09/29/2022

TEXAS DEPARTMENT OF TRANSPORTATION
HOUSTON DISTRICT

SIGNAL DETAILS/STANDARDS INSTALLATION OF BBU EXTERNAL BATTERY CABINET (SIDE MOUNT)

SCALE	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY
N.T.S.	6	TEXAS	011109042			BS 288B
REVISIONS	STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
5-14-14	HOU	BRAZORIA	0111	09	042	194



NOTE:
* THE SPEED LIMIT SIGNS WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY.
** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED
PROFESSIONAL ENGINEER
09/14/2022

TEXAS DEPARTMENT OF TRANSPORTATION

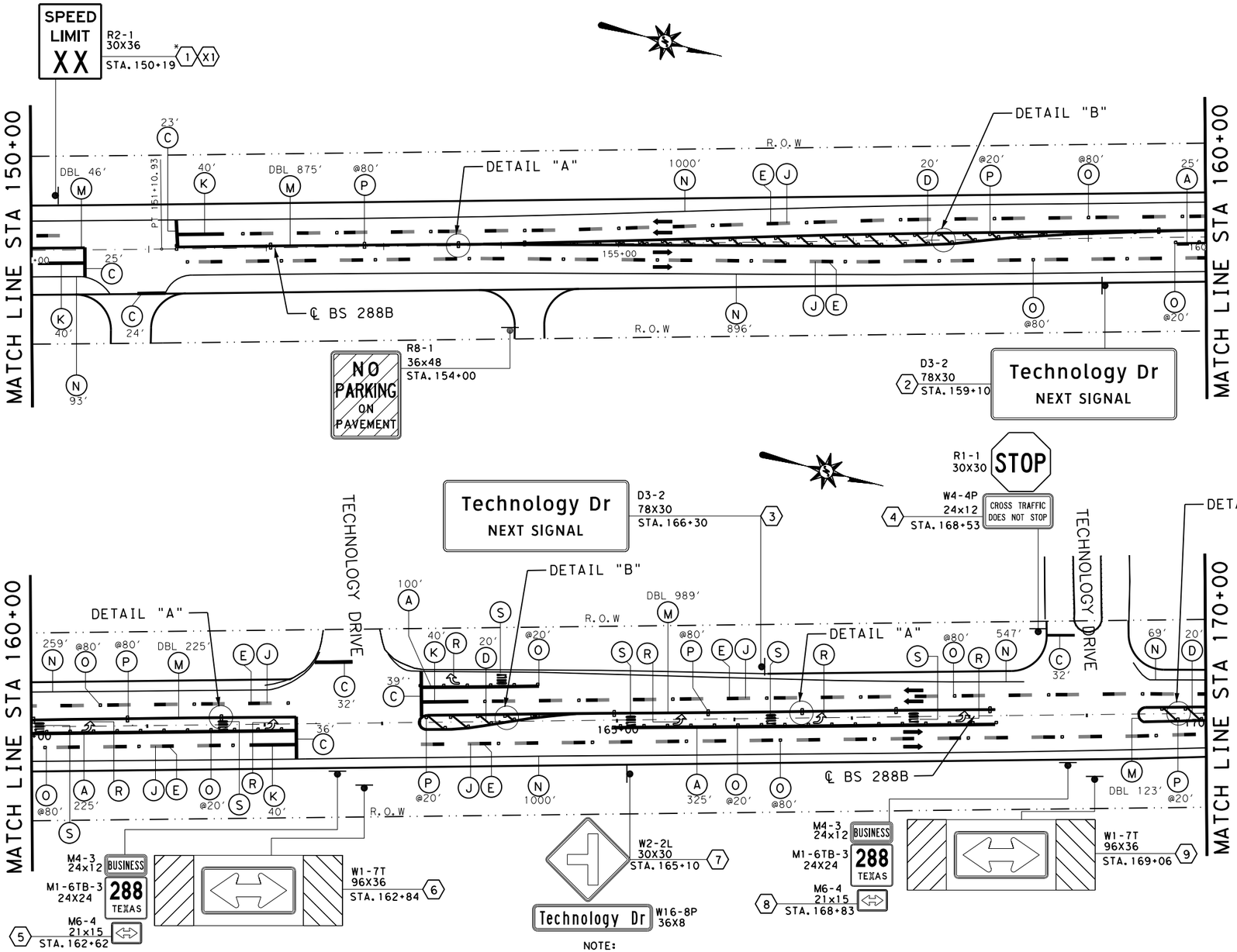
SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100'

SHEET 01 OF 18

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		197
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA	0111	09	042	BS 288B

DATE: $DATE$
FILE: $FILE$



NOTE:
* THE SPEED LIMIT SIGNS WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY.
** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED PROFESSIONAL ENGINEER
09/14/2022

TEXAS DEPARTMENT OF TRANSPORTATION

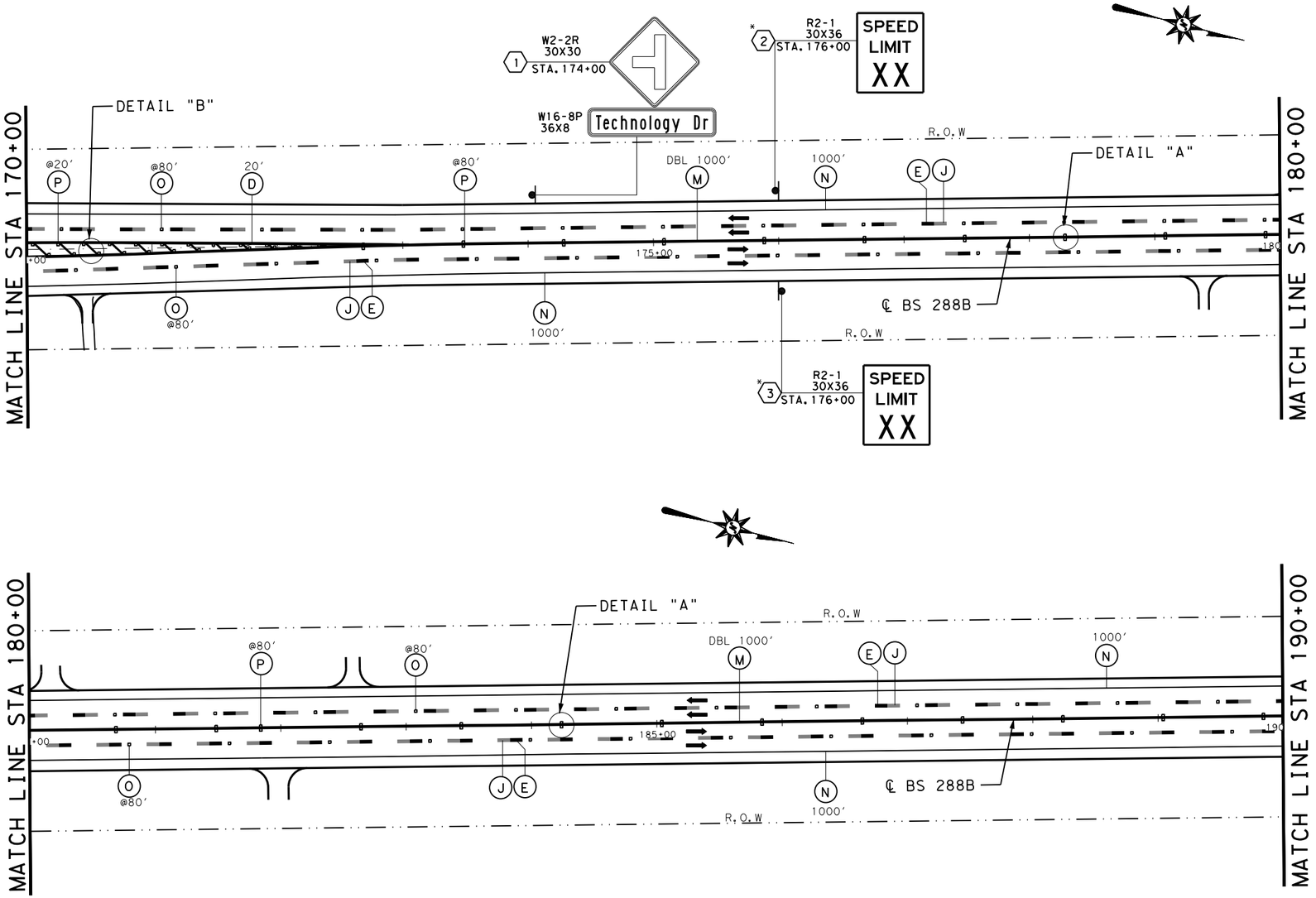
SIGNING & PAVEMENT MARKING LAYOUT BS 288B

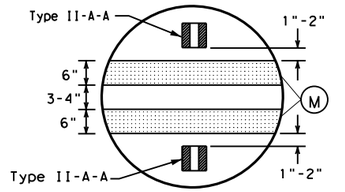
SCALE: 1" : 100'

SHEET 02 OF 18

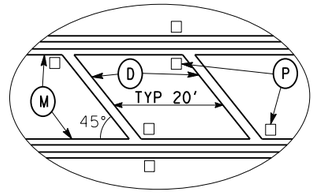
ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		198
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA	0111	09	042	BS 288B

DATE: $DATE$
FILE: $FILE$





DETAIL "A"



DETAIL "B"

NOTE:
* THE SPEED LIMIT SIGNS WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY.
** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED
PROFESSIONAL ENGINEER
Nguyen Le
09/14/2022

TEXAS DEPARTMENT OF TRANSPORTATION

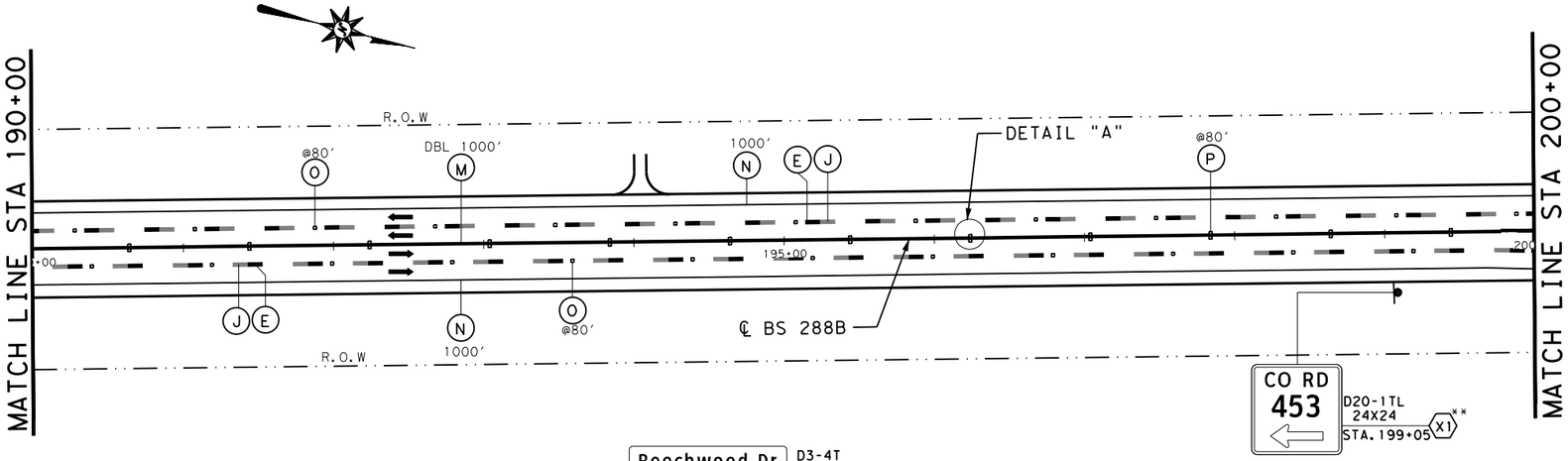
SIGNING & PAVEMENT MARKING LAYOUT BS 288B

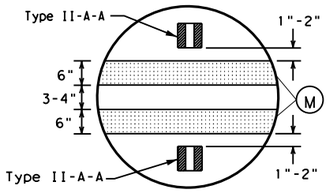
SCALE: 1" : 100'

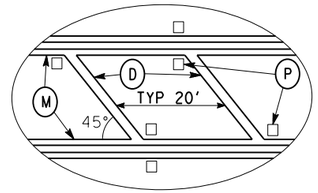
SHEET 03 OF 18

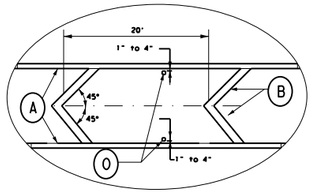
ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		199
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA	0111	09	042	BS 288B

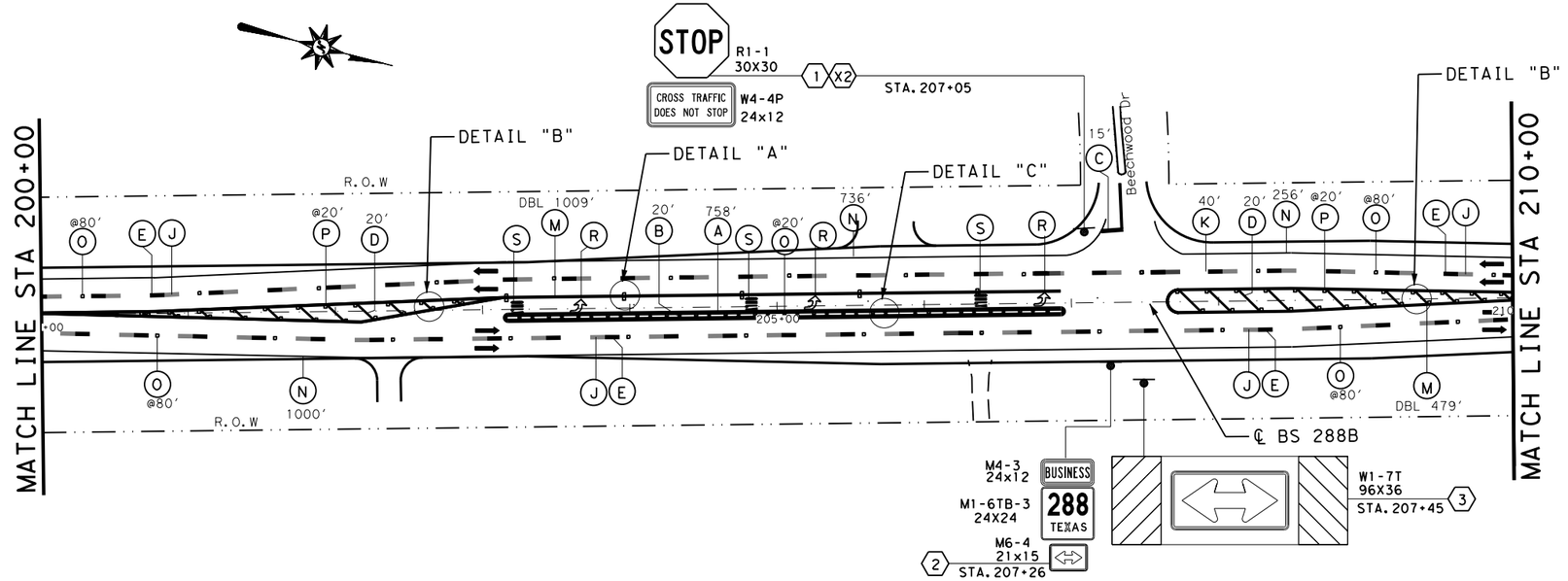
DATE: $DATE$
FILE: $FILE$











NOTE:
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** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

DATE: $DATE$
FILE: $FILE$

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED PROFESSIONAL ENGINEER
09/14/2022

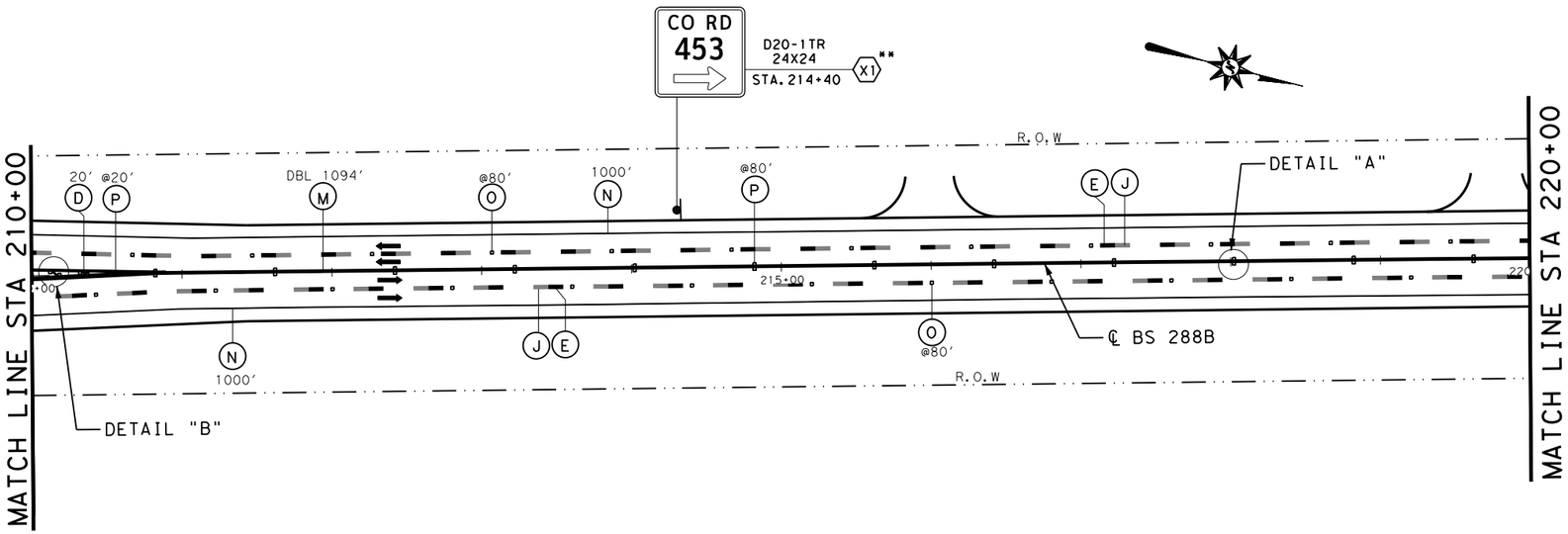
TEXAS DEPARTMENT OF TRANSPORTATION

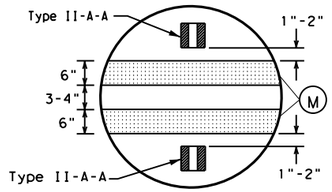
SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100'

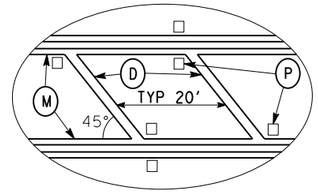
SHEET 04 OF 18

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		200
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA	0111	09	042	BS 288B

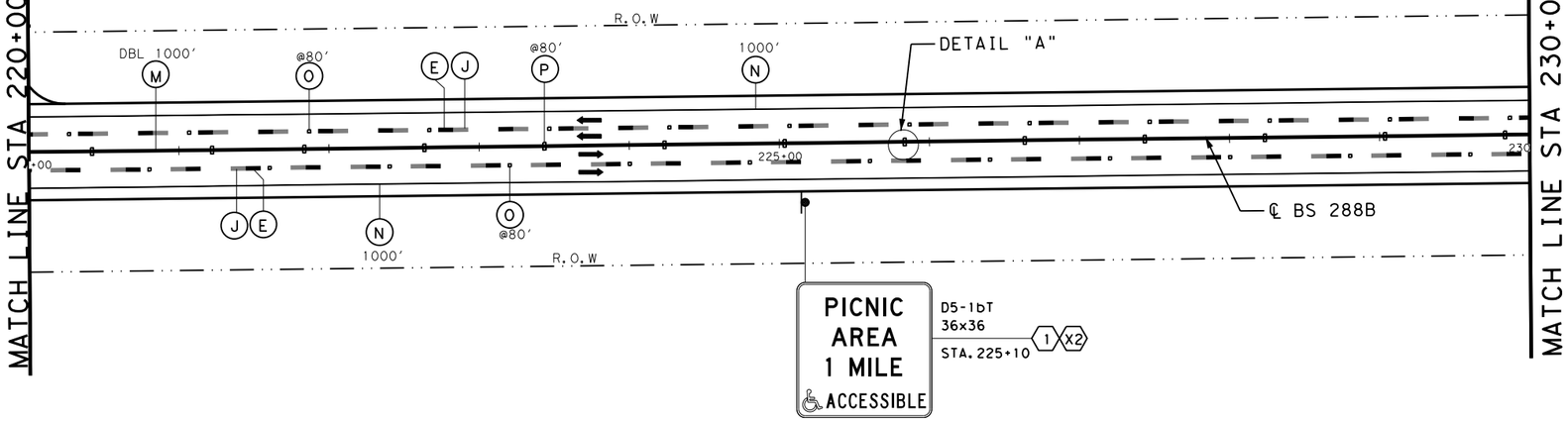




DETAIL "A"



DETAIL "B"



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** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
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- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

DATE: $DATE$
FILE: $FILE$

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED
PROFESSIONAL ENGINEER

09/14/2022

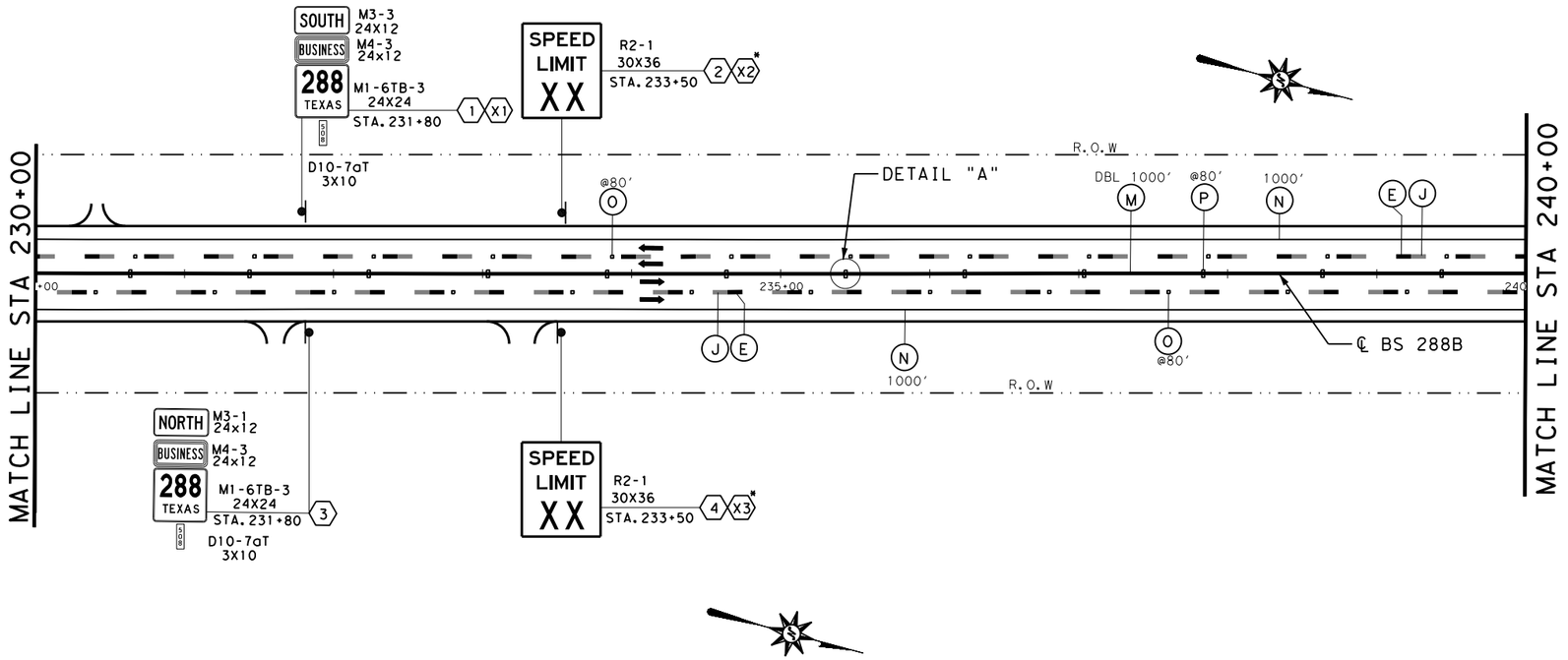
TEXAS DEPARTMENT OF TRANSPORTATION

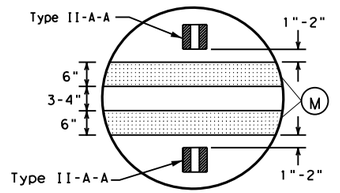
SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100'

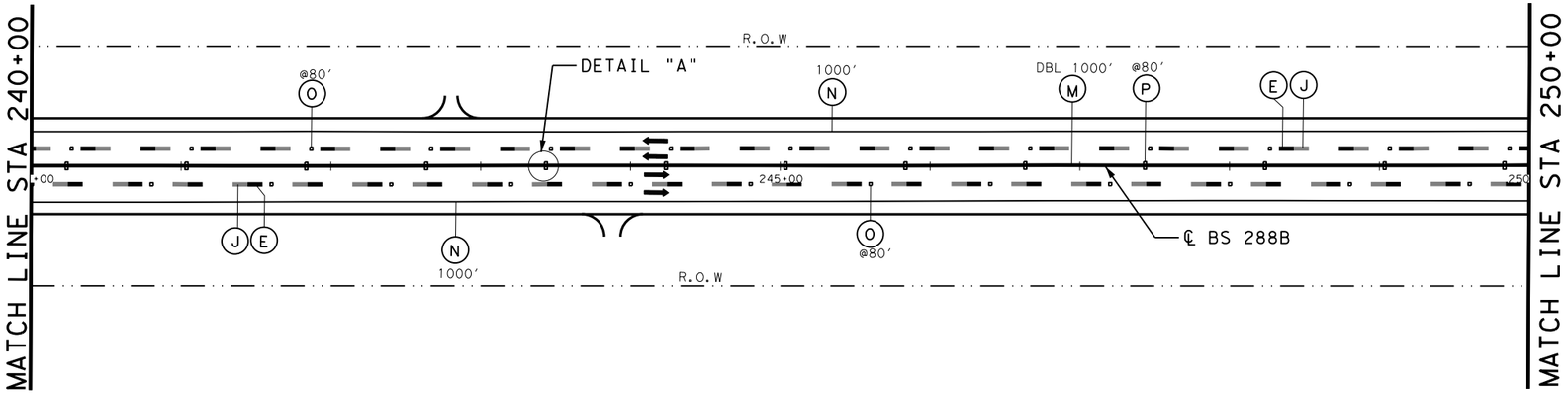
SHEET 05 OF 18

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		201
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA	0111	09	042	BS 288B





DETAIL "A"



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LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
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- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
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- (O) REFL PAV MRKR TY-I-C
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- (R) PREFAB PAV MRK TY C (W)(ARROW)
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- DIRECTION OF TRAVEL
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STATE OF TEXAS
NGUYEN LE
127269
REGISTERED PROFESSIONAL ENGINEER
09/14/2022

TEXAS DEPARTMENT OF TRANSPORTATION

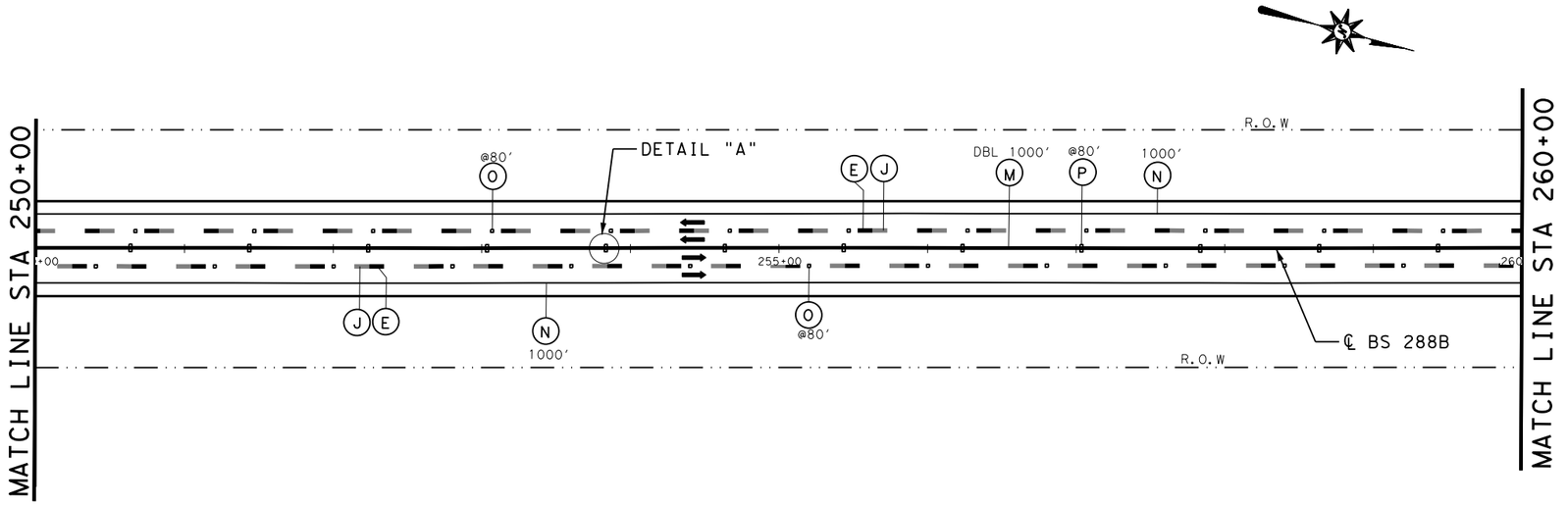
SIGNING & PAVEMENT MARKING LAYOUT BS 288B

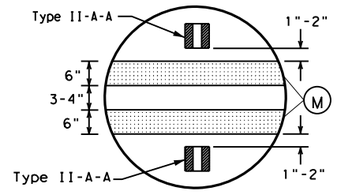
SCALE: 1" : 100'

SHEET 06 OF 18

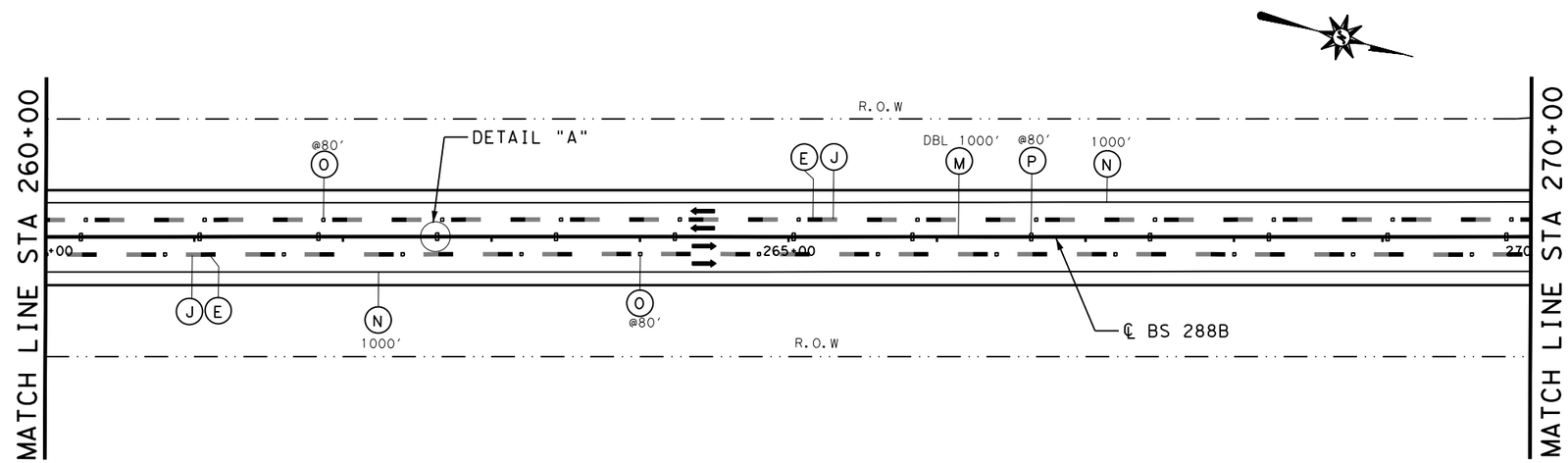
ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.: CK.: DW.: CK.: REVISIONS	HOU	6				202
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA		0111	09	042	BS 288B

DATE: $DATE$
FILE: $FILE$





DETAIL "A"



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STATE OF TEXAS
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09/14/2022

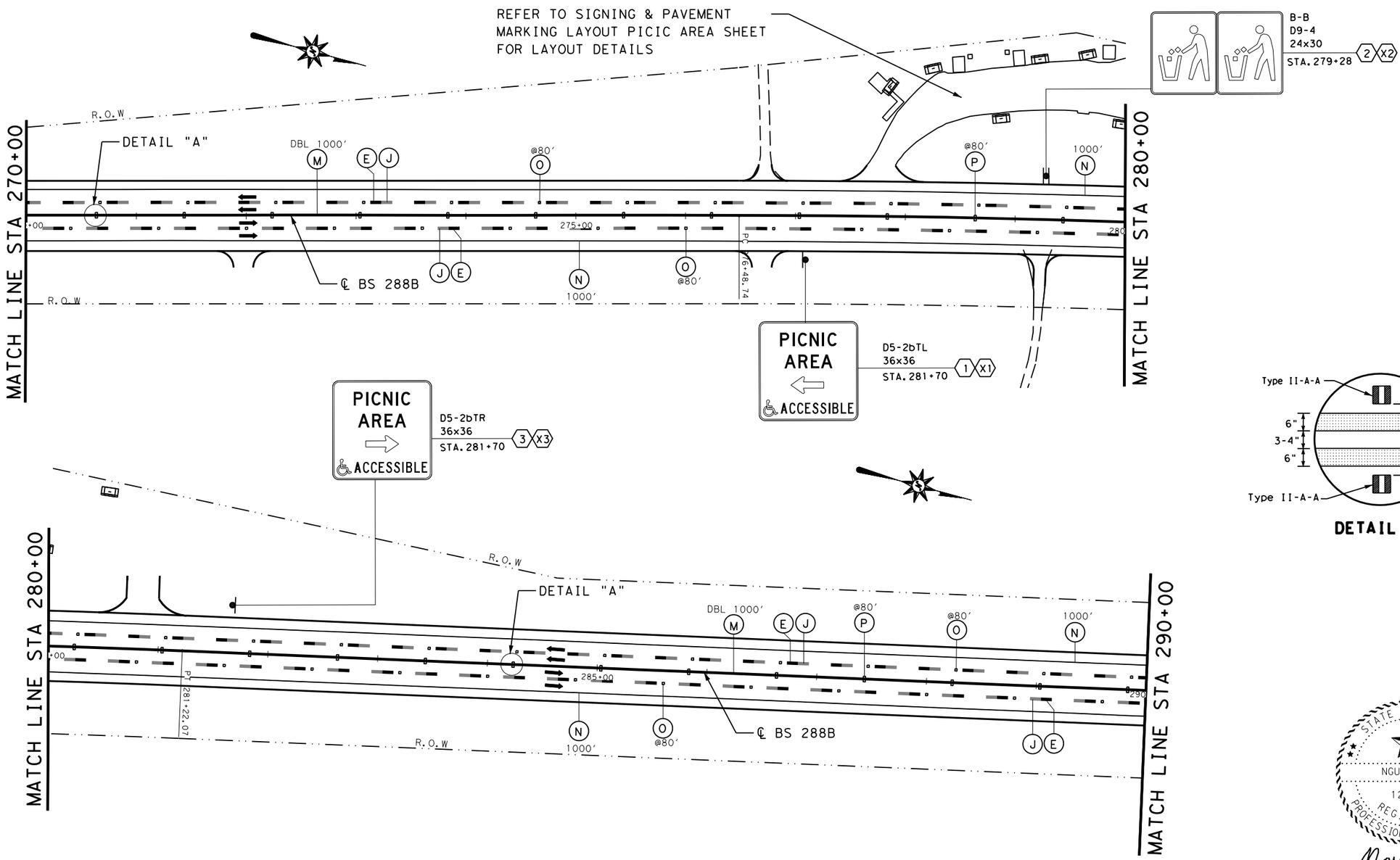
TEXAS DEPARTMENT OF TRANSPORTATION

SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100'

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		203
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA	0111	09	042	BS 288B

DATE: $DATE$
FILE: $FILE$



DETAIL "A"

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED
PROFESSIONAL ENGINEER
09/14/2022

NOTE:
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** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
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- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
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- (O) REFL PAV MRKR TY-I-C
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- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- R- REPLACE SIGN PANEL
- X- REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

DATE: $DATE$
FILE: $FILE$

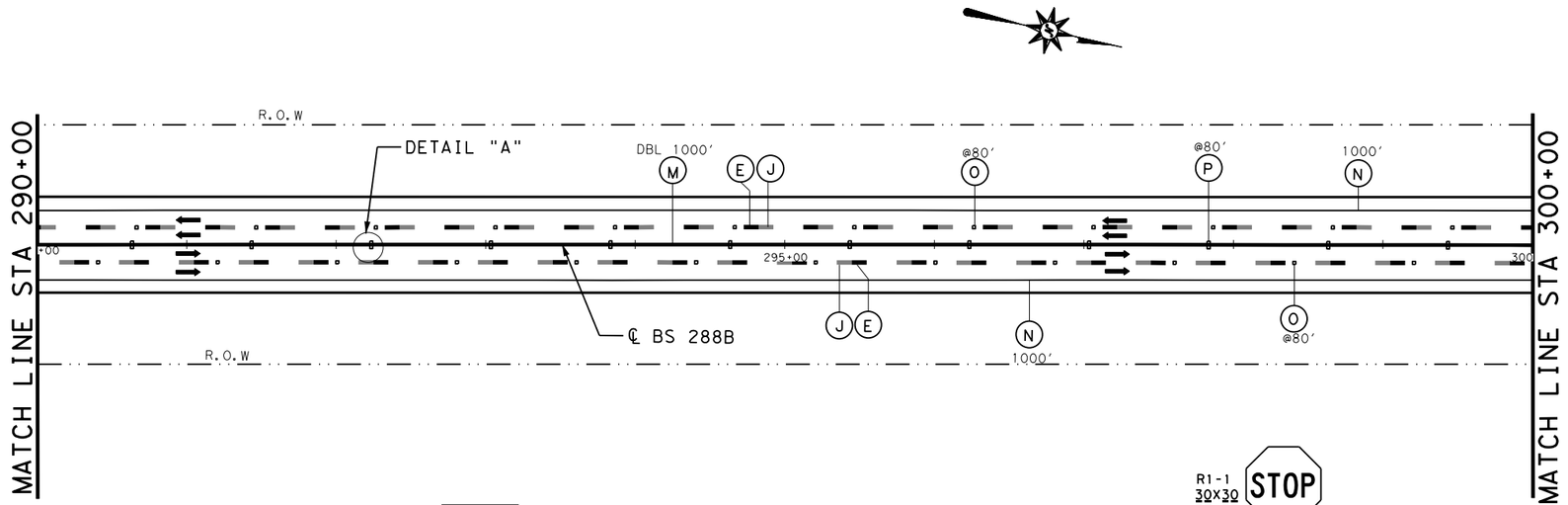
TEXAS DEPARTMENT OF TRANSPORTATION

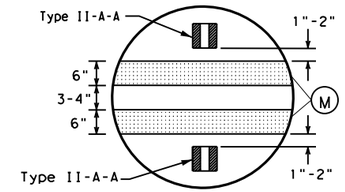
SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100'

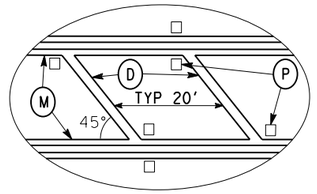
SHEET 08 OF 18

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO				SHEET
REVISIONS	HOU	6					204
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY	
	BRAZORIA		0111	09	042	BS 288B	

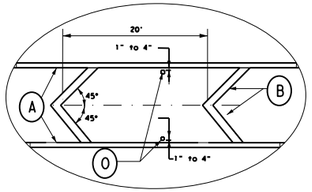




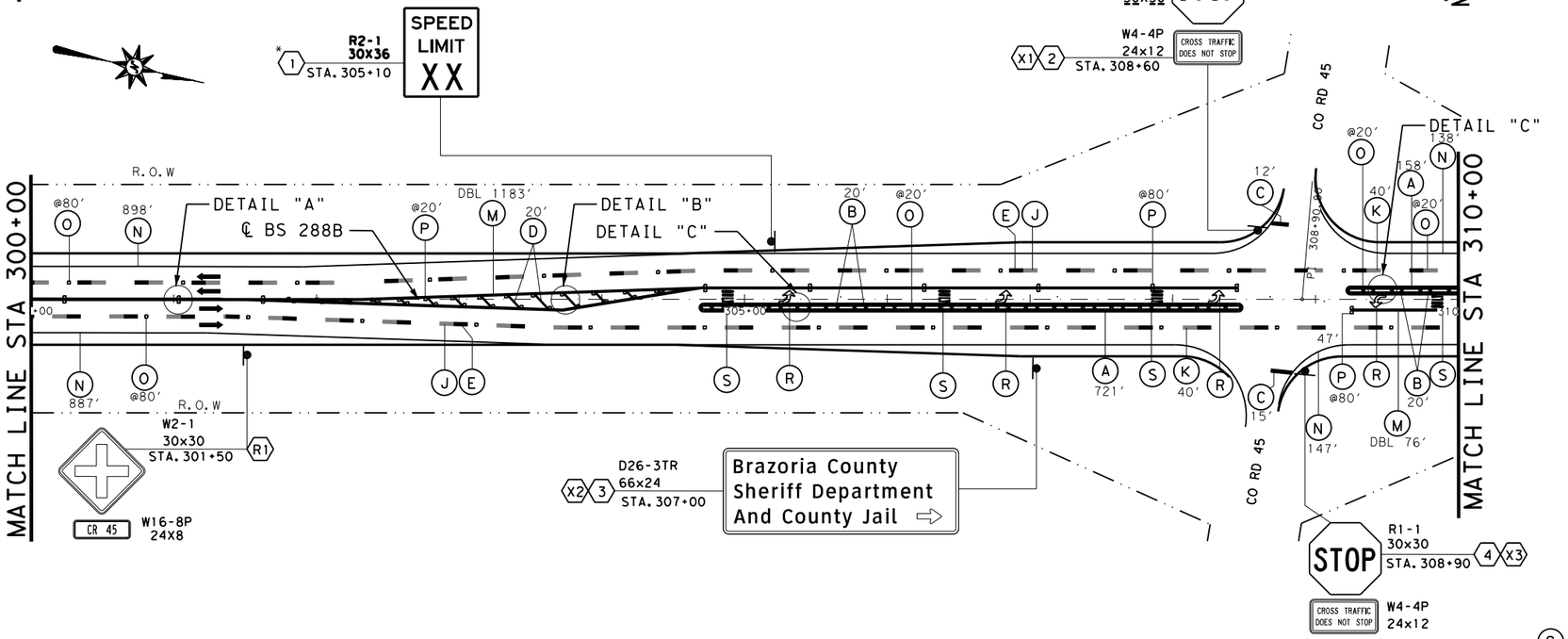
DETAIL "A"



DETAIL "B"



DETAIL "C"



NOTE:
* THE SPEED LIMIT SIGNS WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY.
** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

09/14/2022

DATE: $DATE$
FILE: $FILE$

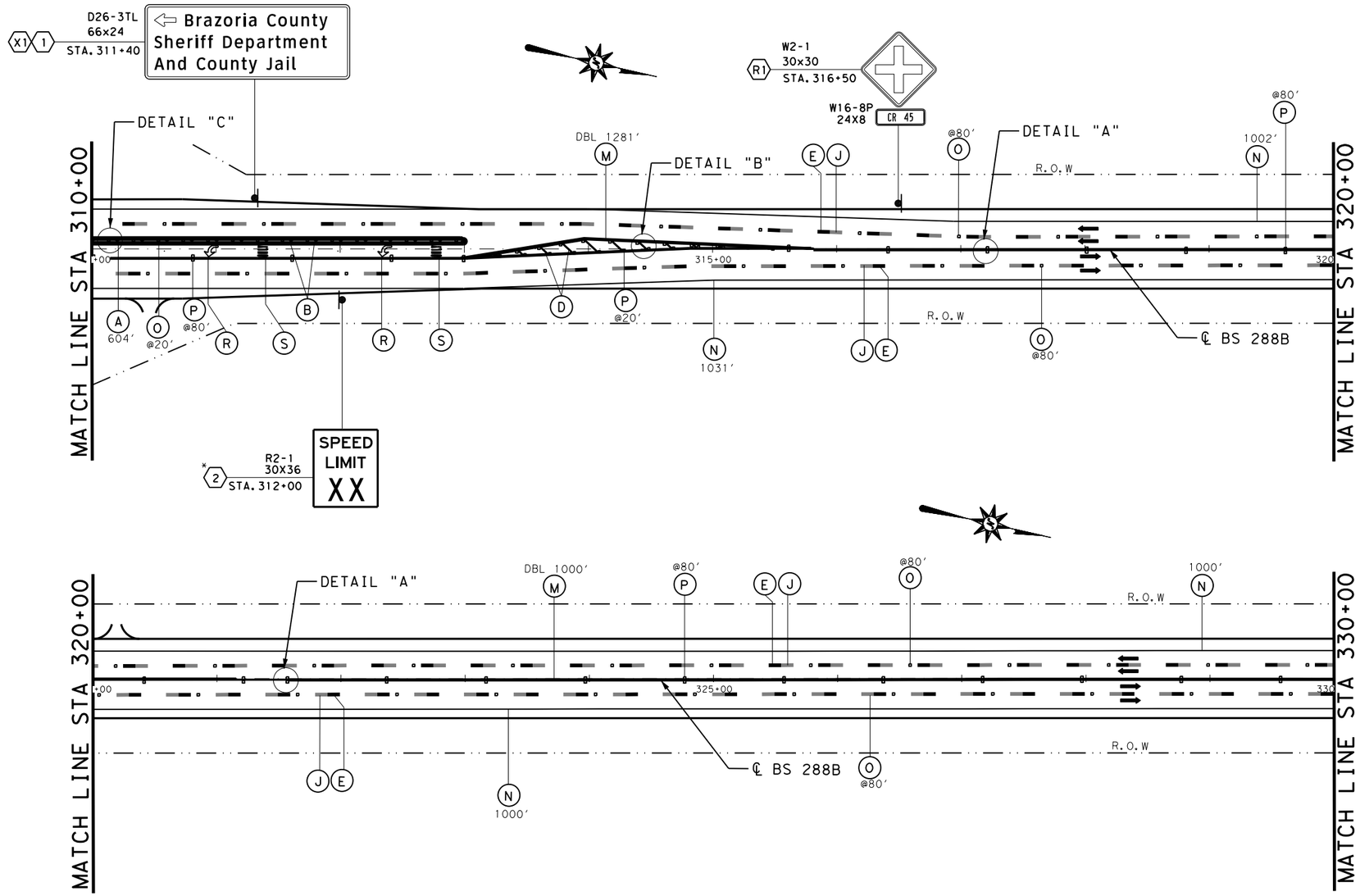
TEXAS DEPARTMENT OF TRANSPORTATION

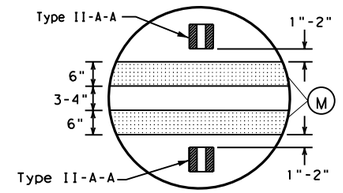
SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100'

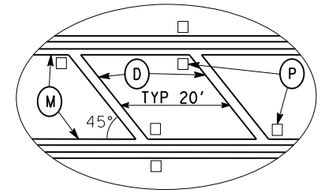
SHEET 09 OF 18

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
REVISIONS	HOU	6				205
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA		0111	09	042	BS 288B

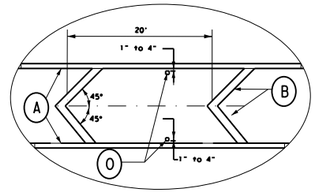




DETAIL "A"



DETAIL "B"



DETAIL "C"

LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

NOTE:
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** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED PROFESSIONAL ENGINEER
09/14/2022

DATE: $DATE$
FILE: $FILE$

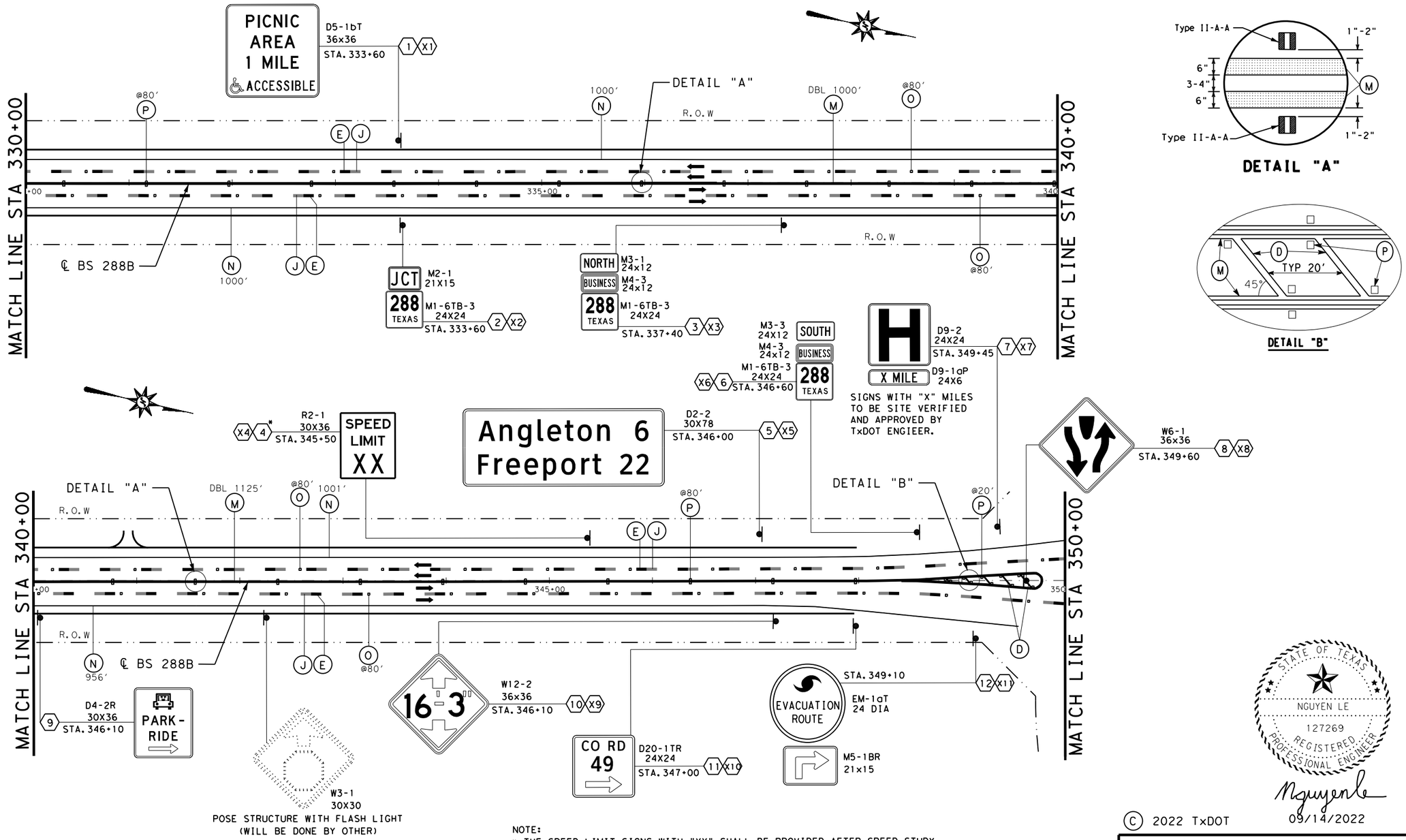
TEXAS DEPARTMENT OF TRANSPORTATION

SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100'

SHEET 10 OF 18

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
REVISIONS	HOU	6				206
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA		0111	09	042	BS 288B



NOTE:
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** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED PROFESSIONAL ENGINEER
09/14/2022

TEXAS DEPARTMENT OF TRANSPORTATION

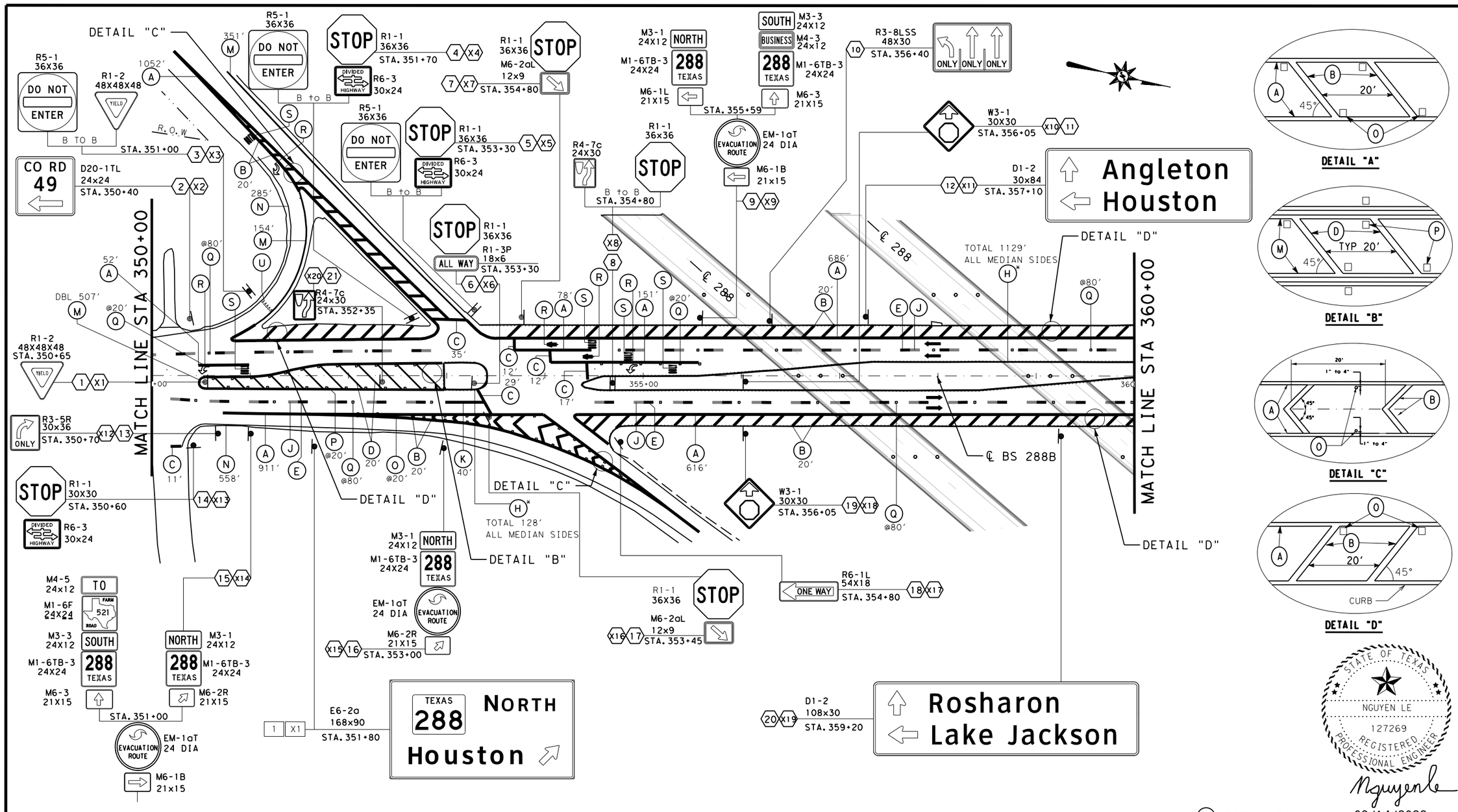
SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100'

SHEET 11 OF 18

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		207
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA	0111	09	042	BS 288B

DATE: $DATE$
FILE: $FILE$



LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN
- PROPOSED LARGE SIGN
- [X-] REMOVE LARGE SIGN

NOTE:
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** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED PROFESSIONAL ENGINEER
09/14/2022

TEXAS DEPARTMENT OF TRANSPORTATION

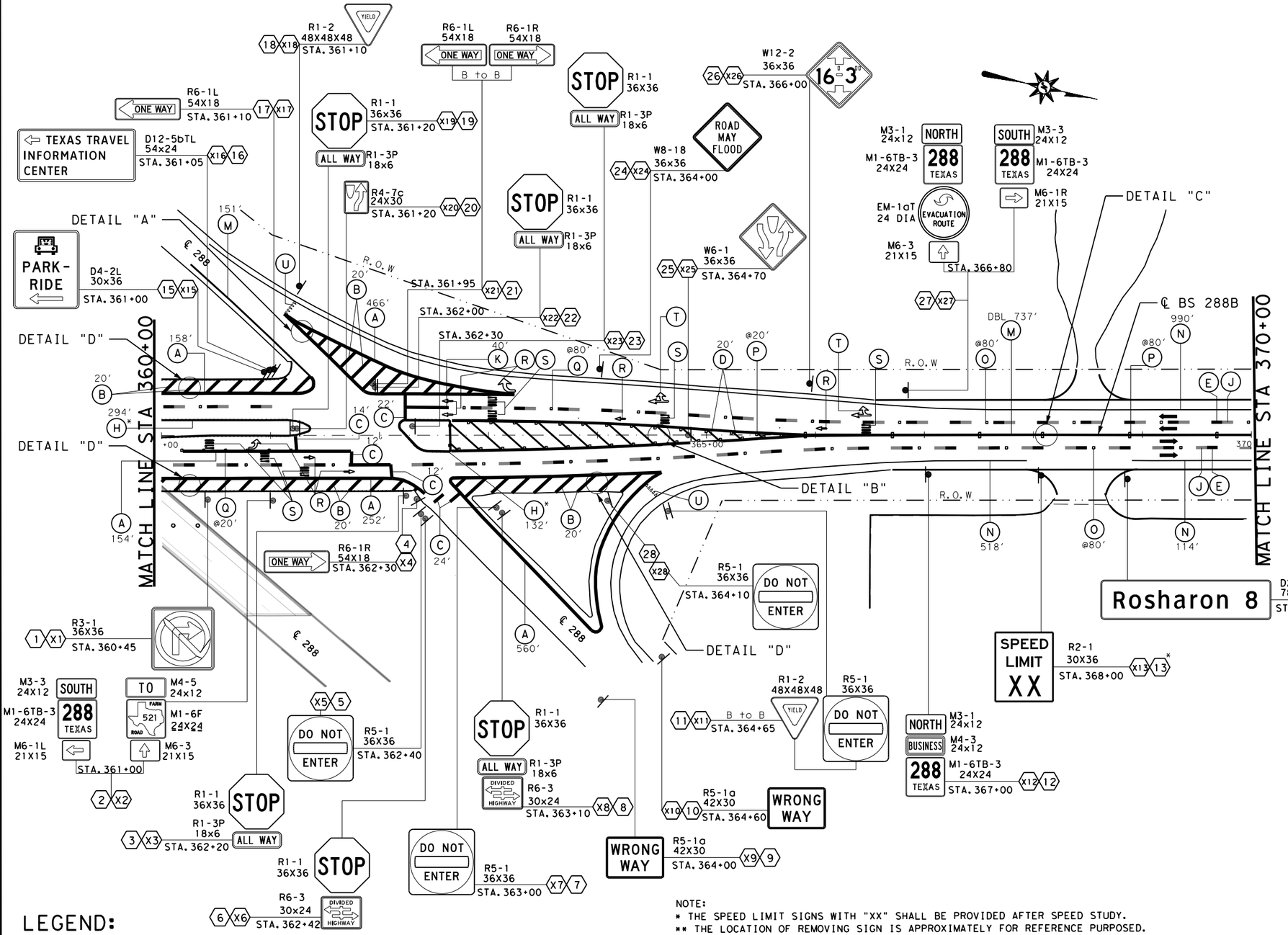
SIGNING & PAVEMENT MARKING LAYOUT BS 288B

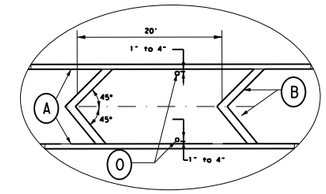
SCALE: 1" : 100'

SHEET 12 OF 18

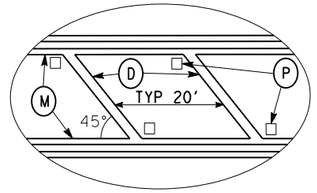
ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		208
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA	0111	09	042	BS 288B

DATE: $DATE$
FILE: $FILE$

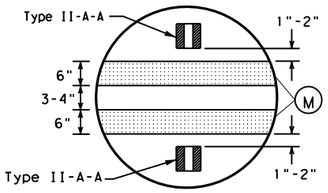




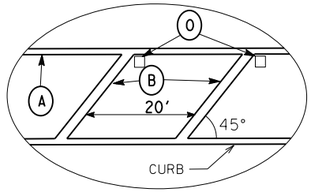
DETAIL "A"



DETAIL "B"



DETAIL "C"



DETAIL "D"

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED PROFESSIONAL ENGINEER

09/14/2022

NOTE:
* THE SPEED LIMIT SIGNS WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY.
** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

DATE: $DATE$
FILE: $FILE$

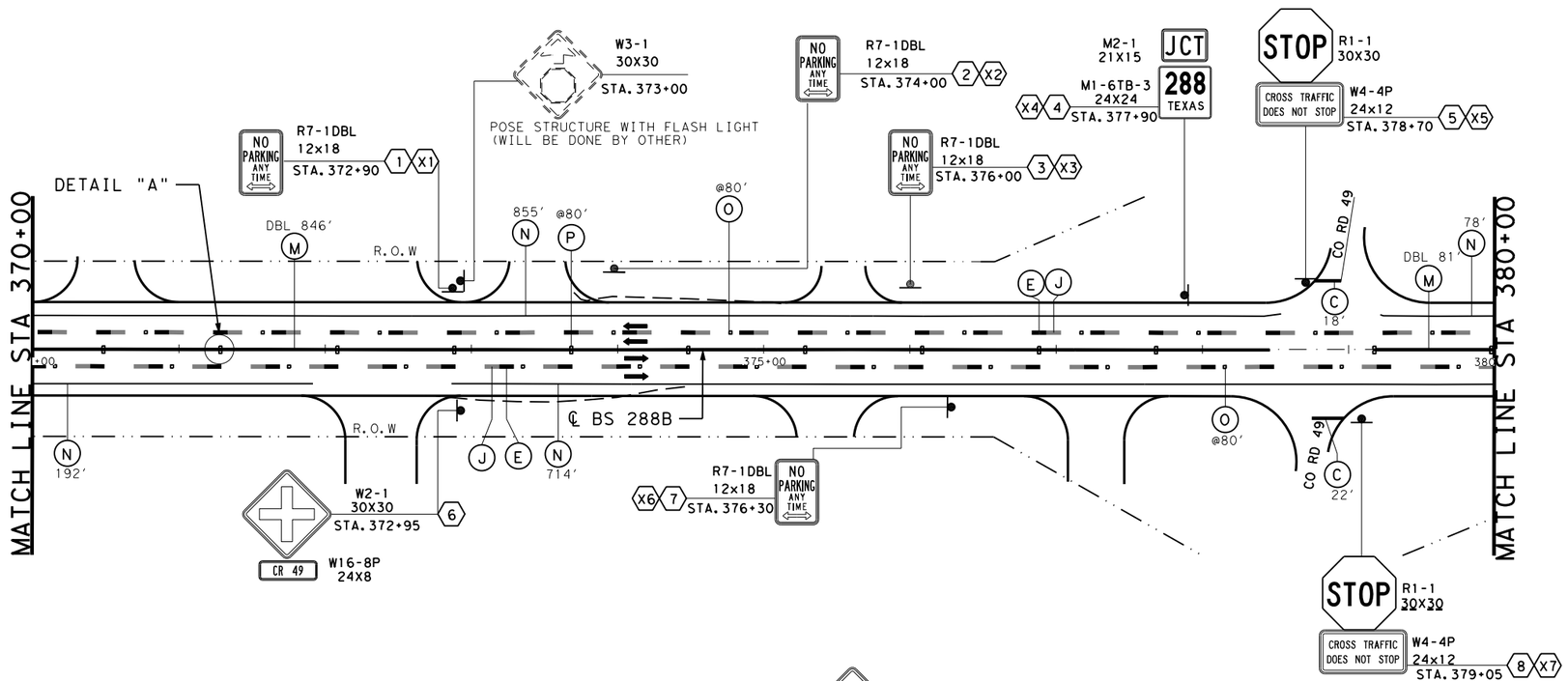
TEXAS DEPARTMENT OF TRANSPORTATION

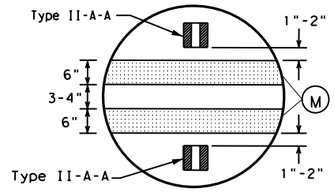
SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100'

SHEET 13 OF 18

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		209
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA	0111	09	042	BS 288B





DETAIL "A"

NOTE:
* THE SPEED LIMIT SIGNS WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY.
** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

DATE: $DATE$
FILE: $FILE$

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED
PROFESSIONAL ENGINEER
09/14/2022

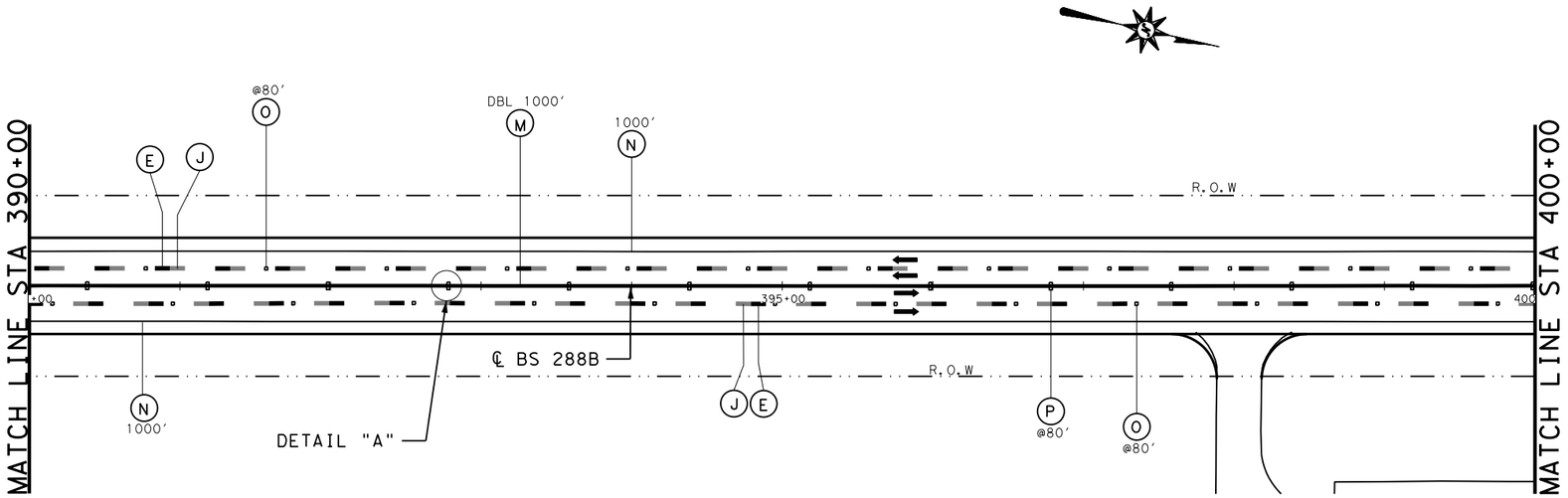
TEXAS DEPARTMENT OF TRANSPORTATION

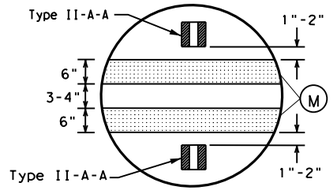
SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100'

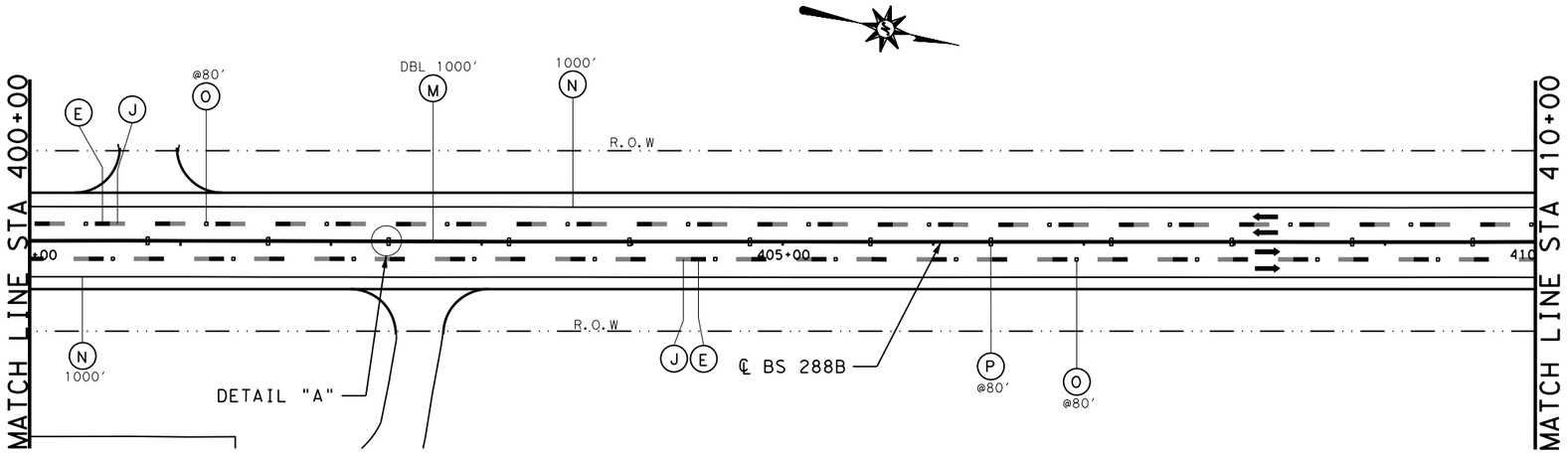
SHEET 14 OF 18

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		210
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA	0111	09	042	BS 288B





DETAIL "A"



LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

NOTE:
* THE SPEED LIMIT SIGNS WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY.
** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

DATE: $DATE$
FILE: $FILE$

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED
PROFESSIONAL ENGINEER

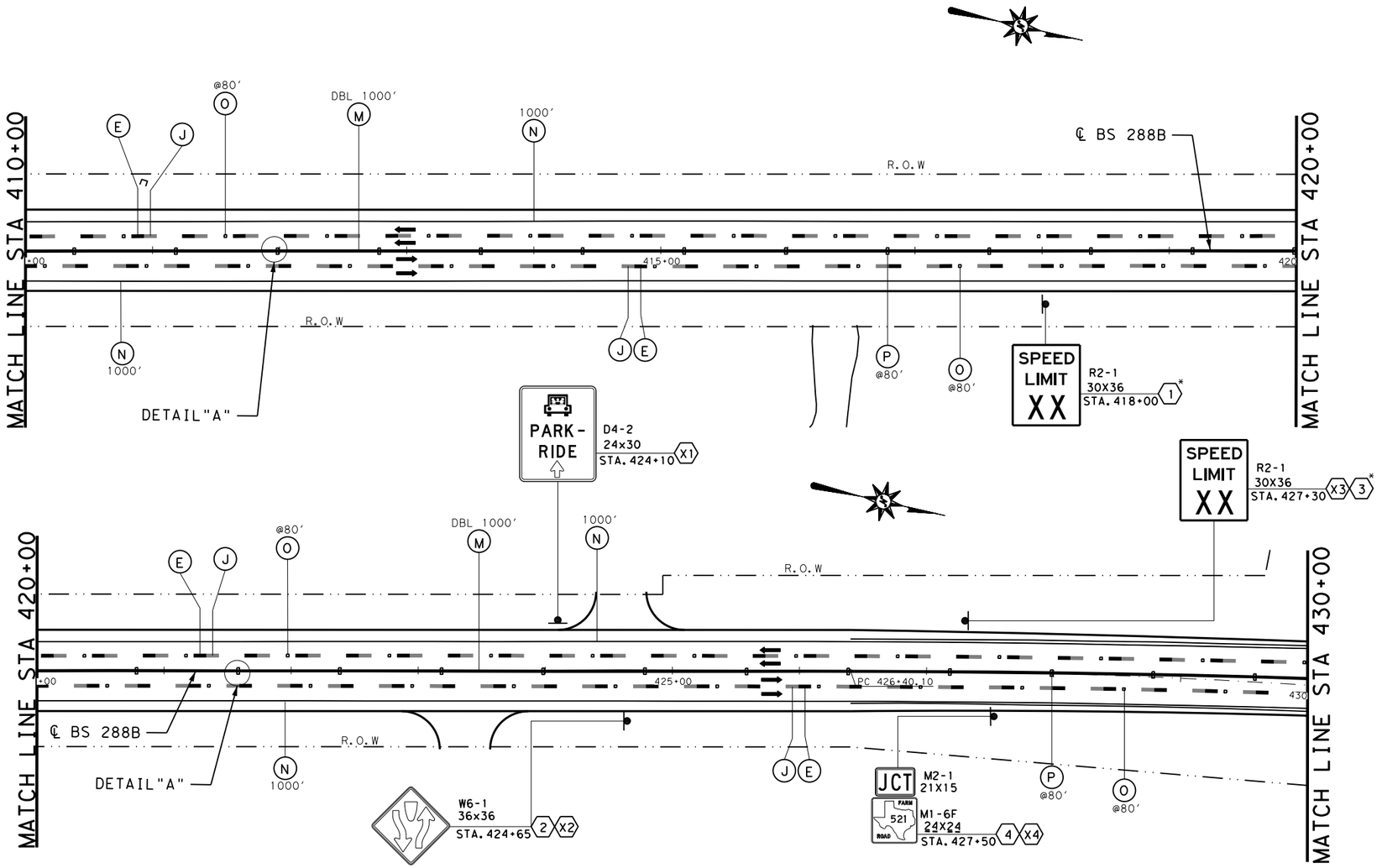
09/14/2022

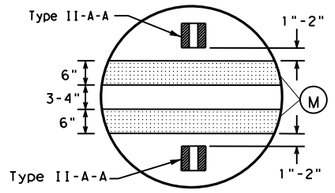
TEXAS DEPARTMENT OF TRANSPORTATION

SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100'

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		211
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA	0111	09	042	BS 288B





DETAIL "A"

LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- R- REPLACE SIGN PANEL
- X- REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

NOTE:
* THE SPEED LIMIT SIGNS WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY.
** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

DATE: $DATE$
FILE: $FILE$

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED PROFESSIONAL ENGINEER

Nguyenle
09/14/2022

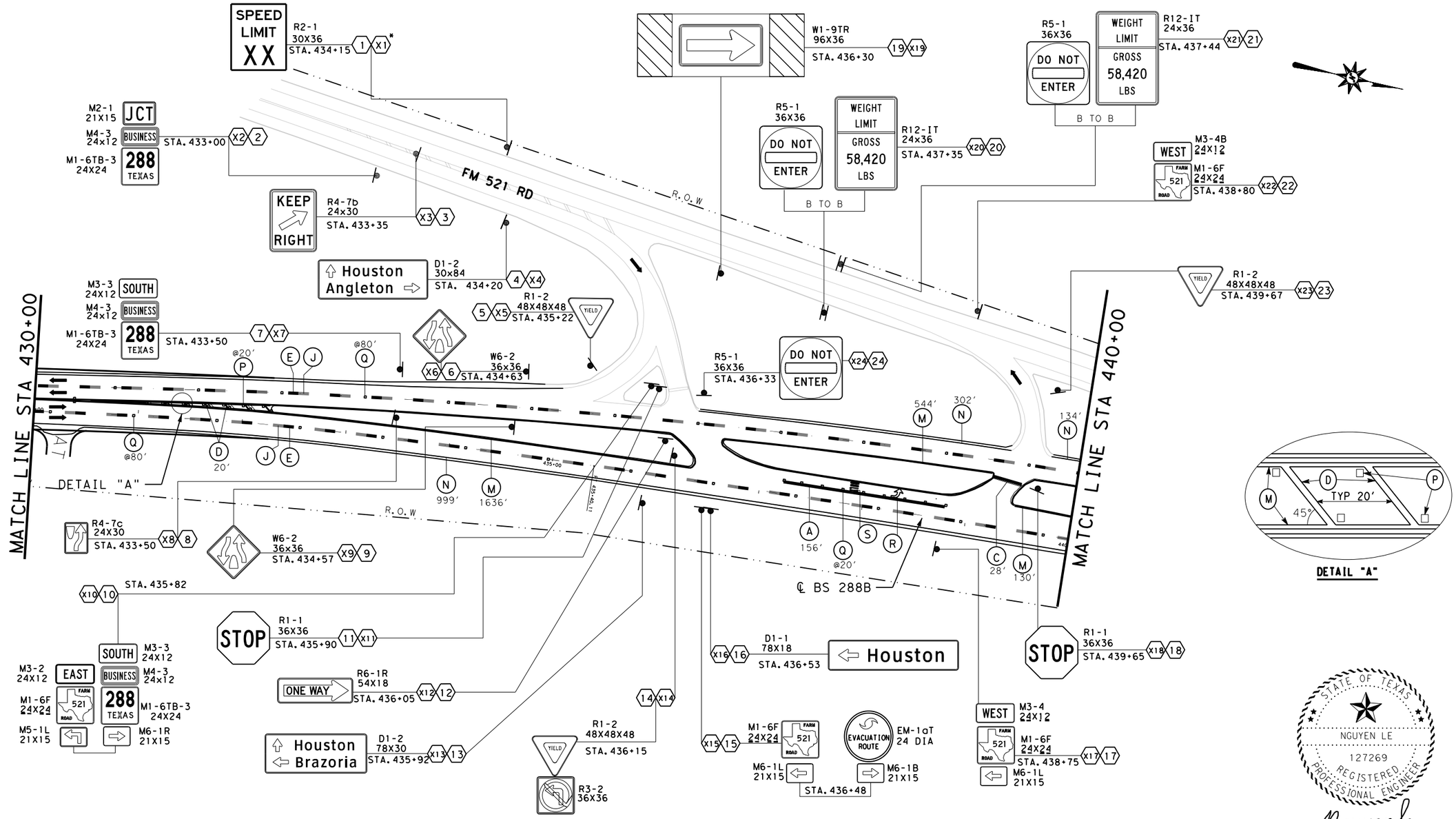
TEXAS DEPARTMENT OF TRANSPORTATION

SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100'

SHEET 16 OF 18

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
REVISIONS	HOU	6		212
	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA	0111	09	042	BS 288B



NOTE:
* THE SPEED LIMIT SIGNS WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY.
** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED PROFESSIONAL ENGINEER
09/14/2022

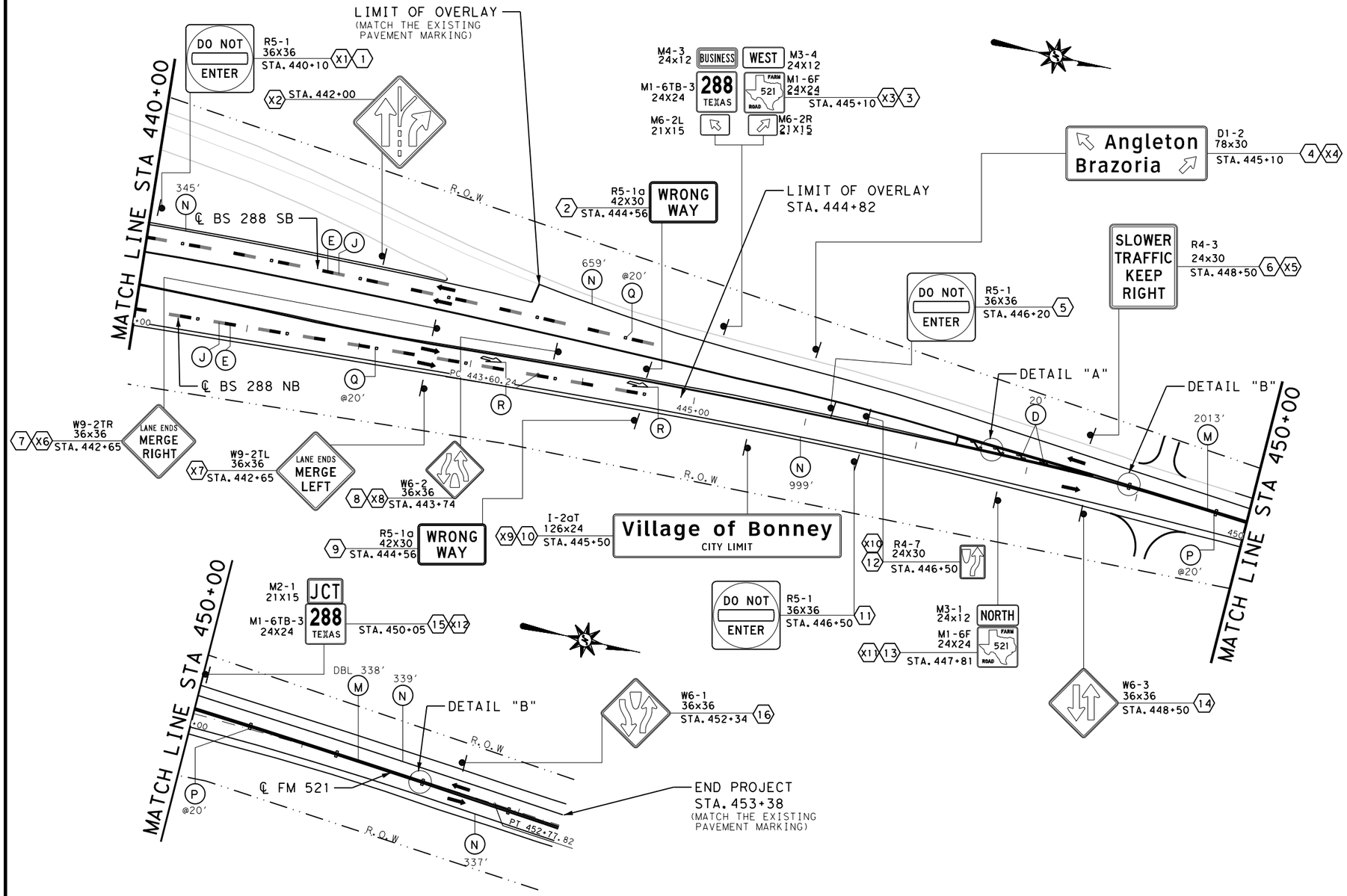
DATE: $DATE$
FILE: $FILE$

TEXAS DEPARTMENT OF TRANSPORTATION

SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100′ SHEET 17 OF 18

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
DN.: - REVISIONS	HOU	6		213
CK.: -	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DR.: -	BRAZORIA	0111	09	042	BS 288B
CK.: -					



LEGEND:

- (A) REFL PAV MRK TY I (W)(8")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(12")(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)(12")(SLD)(100MIL)
- (E) REFL PV MRK TY I (BLACK)(6")(SHADOW)(100MIL)
- (F) REFL PAV MRK TY II (W)(12")(SLD)
- (G) REFL PAV MRK TY II (W)(18")(SLD)
- (H) REFL PAV MRK TY II (Y)(12")(SLD)
- (I) REFL PAV MRK TY II (Y)(18")(SLD)
- (J) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (L) RE PM W/RET REQ TY I (Y)(6")(BRK)(100MIL)
- (M) REF PROF PAV MRK TY I (Y)(6")(SLD)(100MIL)
- (N) REF PROF PAV MRK TY I (W)(6")(SLD)(100MIL)
- (O) REFL PAV MRKR TY-I-C
- (P) REFL PAV MRKR TY-II-A-A
- (Q) REFL PAV MRKR TY-II-CR
- (R) PREFAB PAV MRK TY C (W)(ARROW)
- (S) PREFAB PAV MRK TY C (W)(WORD)
- (T) PREFAB PAV MRK TY C (W)(DBL ARROW)
- (U) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REPLACE SIGN PANEL
- (X-) REMOVE SM RD SN SUP & AM
- EXISTING SMALL SIGN

NOTE:
* THE SPEED LIMIT SIGNS WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY.
** THE LOCATION OF REMOVING SIGN IS APPROXIMATELY FOR REFERENCE PURPOSED.

DATE: $DATE$
FILE: $FILE$

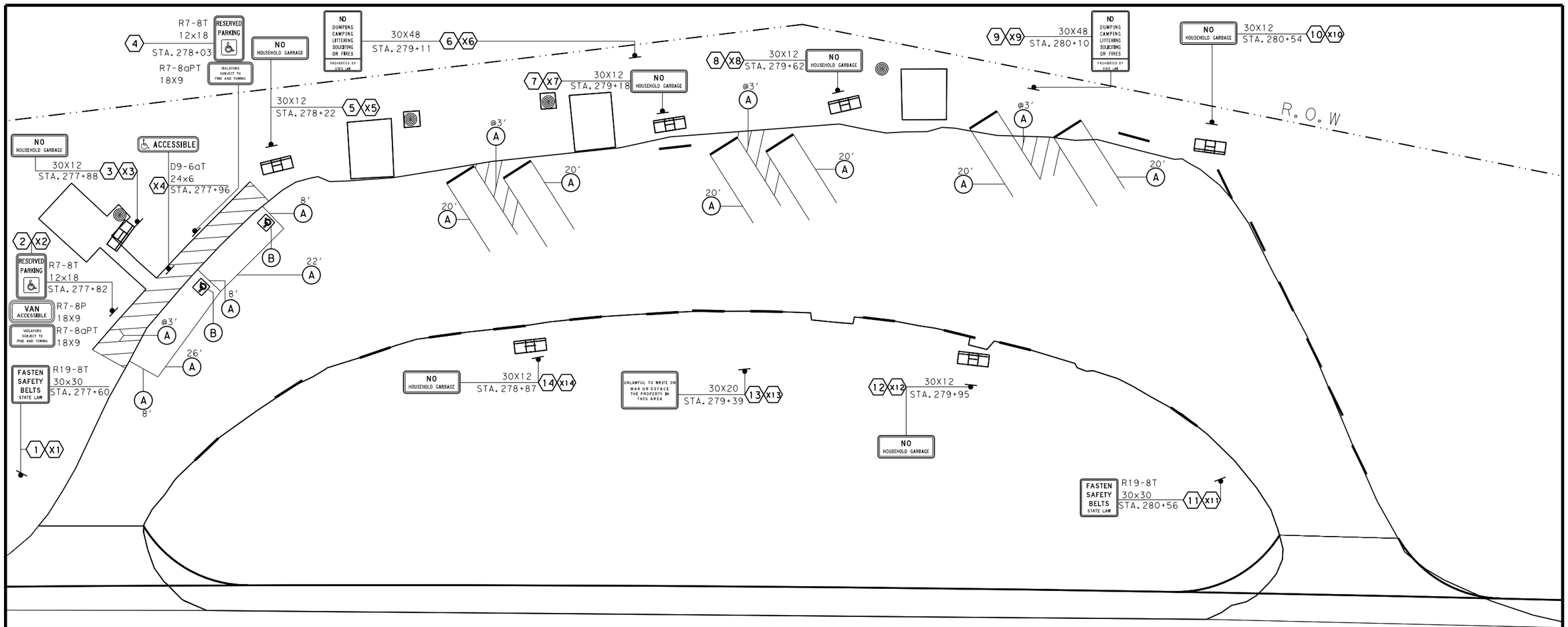
TEXAS DEPARTMENT OF TRANSPORTATION

SIGNING & PAVEMENT MARKING LAYOUT BS 288B

SCALE: 1" : 100'

SHEET 18 OF 18

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
REVISIONS	HOU	6				214
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA		0111	09	042	BS 288B



LEGEND:

- (A) PREFAB PAV MRK TY C (W) (4") (SLD)
- (B) PRE PM TY C (ACC PRK)(BLU)(SYMBL ONLY)
- ⬡ PROPOSED SMALL SIGN
- (X-) REMOVE SM RD SN SUP & AM

STATE OF TEXAS
NGUYEN LE
127269
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Nguyen Le
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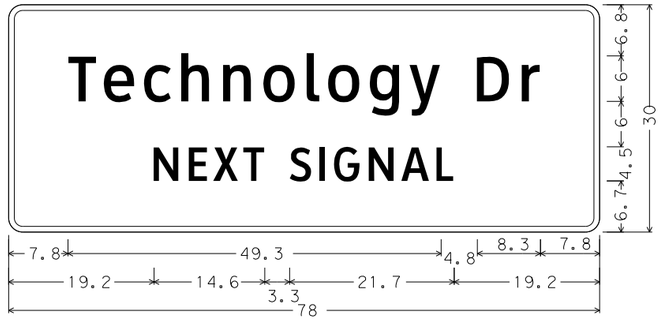
TEXAS DEPARTMENT OF TRANSPORTATION

SIGNING & PAVEMENT MARKING LAYOUT PICNIC AREA

SCALE: 1" : 400' SHEET 1 OF 1

ORIGINAL DRAWING DATE: MARCH, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
DN.: - REVISIONS	HOU	6		215
CK.: -	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DN.: -	BRAZORIA	0111	09	042	BS 288
CK.: -					

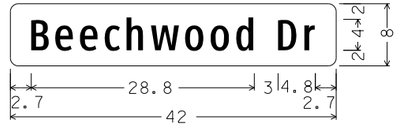
DATE: $DATE$
FILE: $FILE$



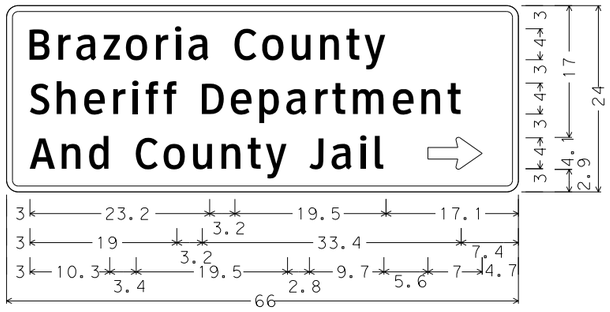
D3-2 78x30;
1.9" Radius, 0.8" Border, White on, Green;
"Technology Dr", ClearviewHwy-3-W; "NEXT SIGNAL", ClearviewHwy-3-W;
SHEET 02 OF 18 SIGN #2, #3

W16-8P 24x8;
1.5" Radius, 0.4" Border, 0.4" Indent, Black on Yellow;
"CR 45", B;
SHEET 09 OF 18 SIGN #R1
SHEET 10 OF 18 SIGN #R1

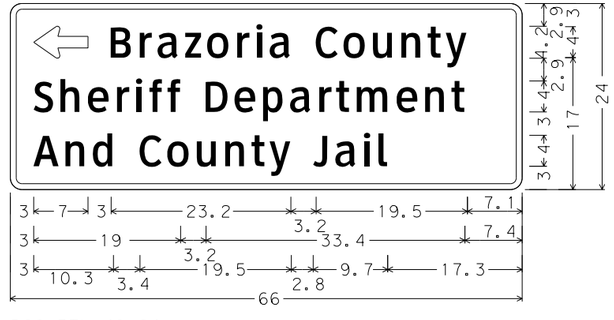
W16-8P 36x8;
1.5" Radius, 0.4" Border, 0.4" Indent, Black on Yellow;
"Technology Dr", B;
SHEET 02 OF 18 SIGN #5
SHEET 03 OF 18 SIGN #1



D3-4T;
1.0" Radius, No border, Green;
"Beechwood Dr" White, ClearviewHwy-2-W specified length;
SHEET 04 OF 18 SIGN #1



D26-4TR_42x30;
1.5" Radius, 0.8" Border, White on, Green;
"Brazoria County", ClearviewHwy-3-W;
"Sheriff Department", ClearviewHwy-3-W;
"And County Jail", ClearviewHwy-3-W;
Standard Arrow Custom 7.0" X 4.1" 0';
SHEET 09 OF 18 SIGN #3



D26-3TL_48x24;
1.5" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 7.0" X 4.1" 180';
"Brazoria County", ClearviewHwy-3-W;
"Sheriff Department", ClearviewHwy-3-W;
"And County Jail", ClearviewHwy-3-W;
SHEET 10 OF 18 SIGN #1

D2-2 8in;

1.9" Radius, 0.8" Border, White on, Green;
"Angleton", ClearviewHwy-3-W; "6", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
"Freeport", ClearviewHwy-3-W; "22", ClearviewHwy-3-W;
SHEET 11 OF 18 SIGN #5

STATE OF TEXAS
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TEXAS DEPARTMENT OF TRANSPORTATION

SMALL SIGNS DETAILS (BS 288B, ETC.)

SCALE: N.S.T

SHEET 1 OF 5

ORIGINAL DRAWING DATE: SEPT, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO	SHEET
DN.I.- REVISIONS	HOU	6		216
CK.I.-	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DN.I.-	BRAZORIA	0111	09	042	BS 288B
CK.I.-					

3.0" Radius, 1.5" Border, White on, Green;
State Highway 288 M1-6T3; "N "ClearviewHwy-5-W-R "ORTH",
ClearviewHwy-5-W; "H"ClearviewHwy-5-W " "ClearviewHwy-5-W-R "ouston", ClearviewHwy-5-W;
Standard Arrow Custom 23.4" X 14.1" 45';
SHEET 12 OF 18 SIGN #1

STATE OF TEXAS
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09/14/2022

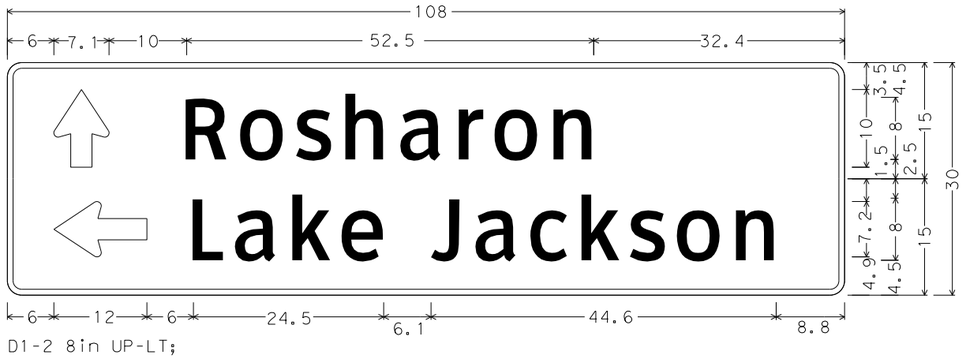
TEXAS DEPARTMENT OF TRANSPORTATION

SMALL SIGNS DETAILS (BS 288B, ETC.)

SCALE: N.S.T

SHEET 2 OF 5

ORIGINAL DRAWING DATE: SEPT, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO				SHEET
DN.: - CK.: - DN.: - CK.: - REVISIONS	HOU	6					217
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY	
	BRAZORIA		0111	09	042	BS 288B	

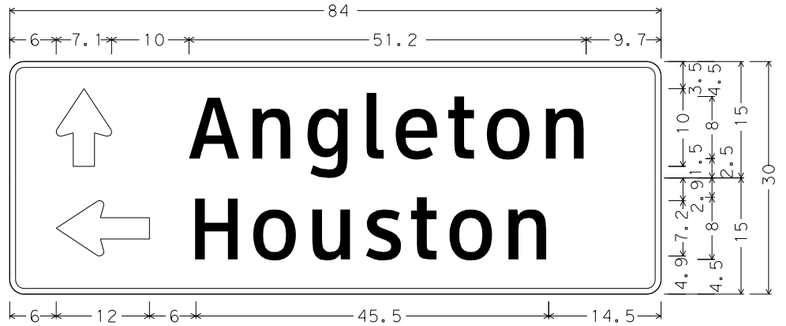


D1-2 8in UP-LT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 10.0" X 7.1" 90′; "Rosharon", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180′; "Lake Jackson", ClearviewHwy-3-W;

SHEET 12 OF 18 SIGN #20

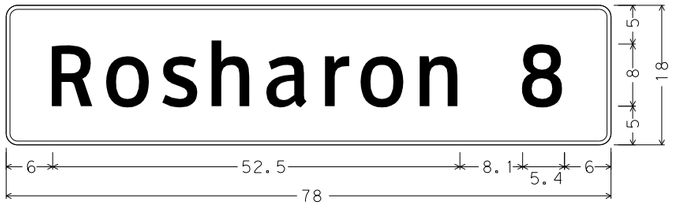


D1-2 8in UP-LT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 10.0" X 7.1" 90′; "Angleton", ClearviewHwy-3-W;

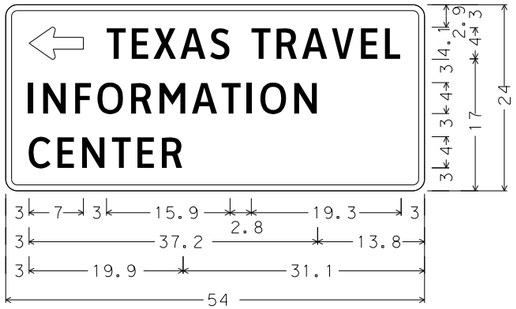
1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180′; "Houston", ClearviewHwy-3-W;

SHEET 12 OF 18 SIGN #12



D2-1 8in;
1.5" Radius, 0.5" Border, White on, Green;
"Rosharon", ClearviewHwy-3-W; "8", ClearviewHwy-3-W;

SHEET 13 OF 18 SIGN #14

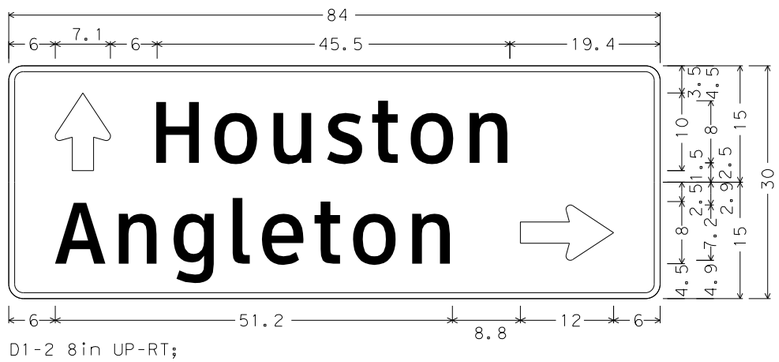


D12-5bTL_54x24;
1.5" Radius, 0.8" Border, White on, Blue;
Standard Arrow Custom 7.0" X 4.1" 180′;
"TEXAS TRAVEL", ClearviewHwy-3-W specified length;
"INFORMATION", ClearviewHwy-3-W;
"CENTER", ClearviewHwy-3-W;

SHEET 13 OF 18 SIGN #16

W16-8P 24x8;
1.5" Radius, 0.4" Border, 0.4" Indent, Black on Yellow;
"CR 49", B;

SHEET 14 OF 18 SIGN #6, #9



D1-2 8in UP-RT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 10.0" X 7.1" 90′; "Houston", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
"Angleton", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0′;

SHEET 17 OF 18 SIGN #4

09/14/2022

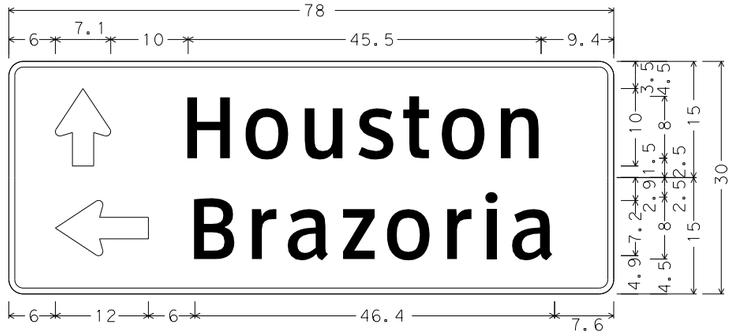
TEXAS DEPARTMENT OF TRANSPORTATION

SMALL SIGNS DETAILS (BS 288B, ETC.)

SCALE: N.T.S.; T400′

SHEET 3 OF 5

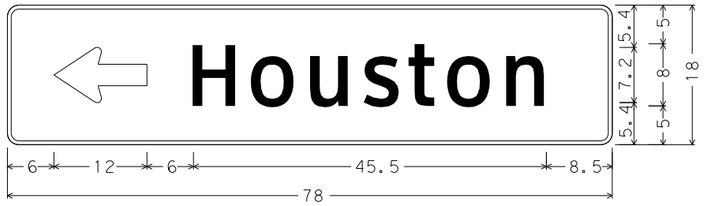
ORIGINAL DRAWING DATE: SEPT, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.: - REVISIONS	HOU	6				218
CK.: -	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DR.: -	BRAZORIA		0111	09	042	BS 288B
CK.: -						



D1-2 8in UP-LT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 10.0" X 7.1" 90′; "Houston", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180′; "Brazoria", ClearviewHwy-3-W;
SHEET 17 OF 18 SIGN #13

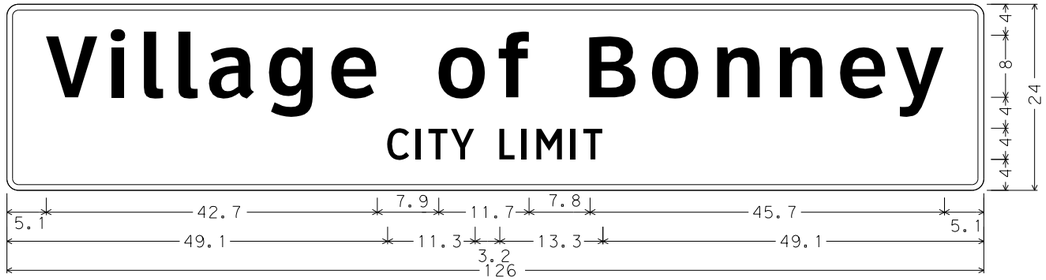


D1-1 8in LT;
1.5" Radius, 0.5" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180′; "Houston", ClearviewHwy-3-W;
SHEET 17 OF 18 SIGN #16

D1-2 8in 45LT-45RT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 135′; "Angleton", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
"Brazoria", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 45′;
SHEET 18 OF 18 SIGN #4



I-2aT 8in;
1.5" Radius, 0.8" Border, White on, Green;
"Village of Bonney", ClearviewHwy-5-W-R; "CITY LIMIT", ClearviewHwy-3-W;
SHEET 18 OF 18 SIGN #10

STATE OF TEXAS
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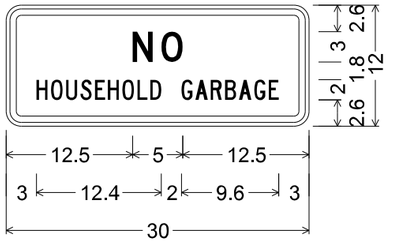
TEXAS DEPARTMENT OF TRANSPORTATION

SMALL SIGNS DETAILS (BS 288B, ETC.)

SCALE: N.S.T

SHEET 4 OF 5

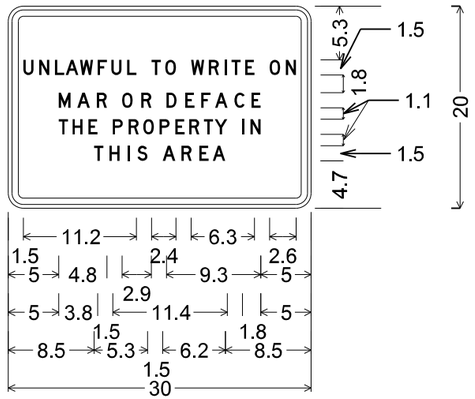
ORIGINAL DRAWING DATE: SEPT, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
REVISIONS	HOU	6				219
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA		0111	09	042	BS 288B



30X12

1.5" Radius, 0.6" Border, 0.4" Indent, Black on White;
"NO", D specified length;
"HOUSEHOLD GARBAGE", C specified length;

SIGNING AND PAVEMENT MARKING LAYOUT PICNIC AREA SIGN #3; #5; #7; #8; #10; #12; #14



30X20

1.5" Radius, 0.6" Border, 0.4" Indent, Black on White;
"UNLAWFUL TO WRITE ON", D specified length;
"MAR OR DEFACE", D specified length;
"THE PROPERTY IN", D specified length;
"THIS AREA", D specified length;

SIGNING AND PAVEMENT MARKING LAYOUT PICNIC AREA SIGN #13

30X48

1.5" Radius, 0.6" Border, 0.4" Indent, Black on White;
"NO", D specified length;
"DUMPING", C specified length;
"CAMPING", C specified length;
"LITTERING", C specified length;
"SOLICITING", C specified length;
"OR FIRES", C specified length;
"PROHIBITED BY", C specified length;
"STATE LAW", C specified length;

SIGNING AND PAVEMENT MARKING LAYOUT PICNIC AREA SIGN #9

STATE OF TEXAS
NGUYEN LE
127269
REGISTERED PROFESSIONAL ENGINEER

09/14/2022

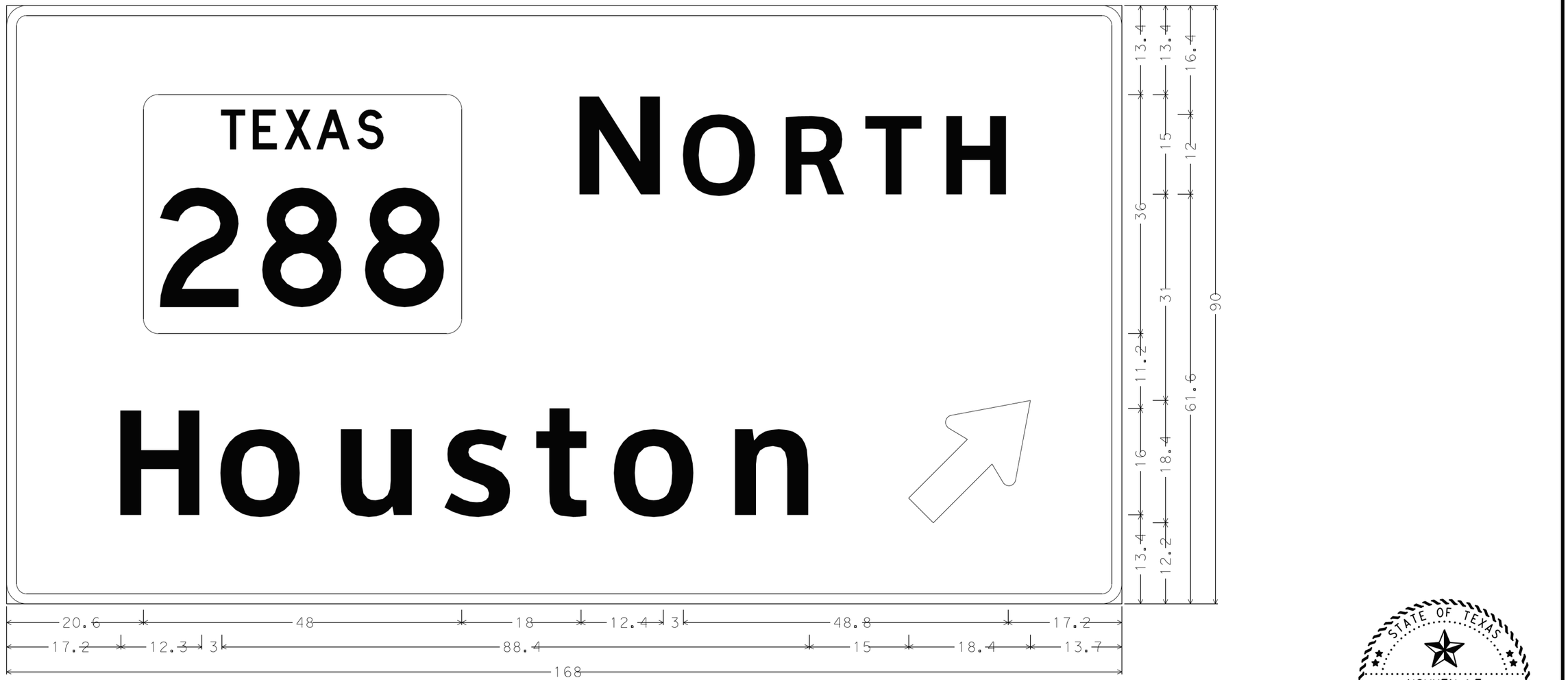
TEXAS DEPARTMENT OF TRANSPORTATION

SMALL SIGNS DETAILS (BS 288B, ETC.)

SCALE: N.S.T

SHEET 5 OF 5

ORIGINAL DRAWING DATE: SEPT, 2022	STATE DISTRICT	FEDERAL REGION	PROJECT NO				SHEET
DN.: - CK.: - DW.: - CK.: - REVISIONS	HOU	6					220
	COUNTY		CONTROL	SECTION	JOB		HIGHWAY
	BRAZORIA		0111	09	042		BS 288B



3.0" Radius, 1.5" Border, White on, Green;
State Highway 288 M1-6T3; "N "ClearviewHwy-5-W-R "ORTH", ClearviewHwy-5-W;
"H"ClearviewHwy-5-W " "ClearviewHwy-5-W-R "ouston", ClearviewHwy-5-W;
Standard Arrow Custom 23.4" X 14.1" 45';
SHEET 12 OF 18 SIGN #1

STATE OF TEXAS
NGUYEN LE
127269
LICENSED
PROFESSIONAL ENGINEER
Nguyen Le
05/13/2022

TEXAS DEPARTMENT OF TRANSPORTATION

LARGE SIGNS DETAILS (BS 288B, ETC.)

SCALE: N.S.T

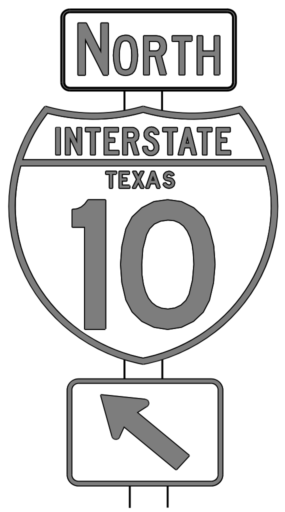
SHEET 1 OF 1

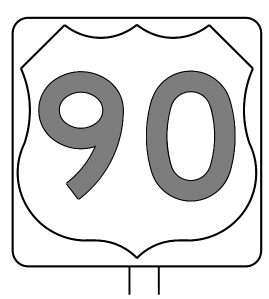
ORIGINAL DRAWING DATE: APRIL, 2021	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.E- REVISIONS	HOU	6				221
CK.E-	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
	BRAZORIA		0111	09	042	BS 288B

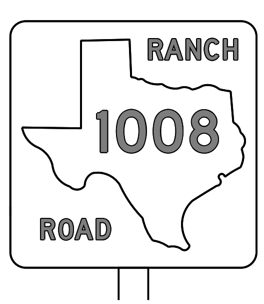
6/30/2022
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111090421\4 - Design\Plan Set\1. General\Signing & Pavement\LARGE SIGN DETAILS

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

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



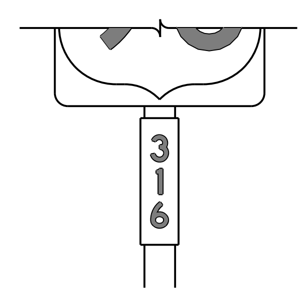


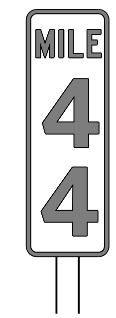


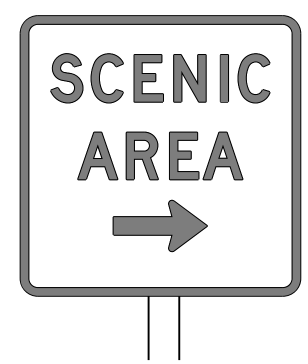
TYPICAL EXAMPLES

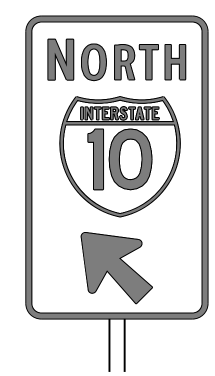
REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

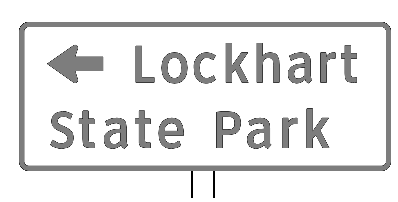
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING

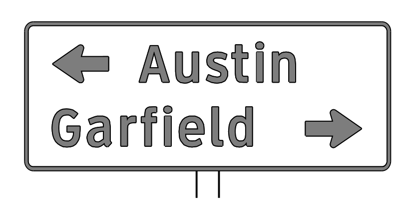












TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

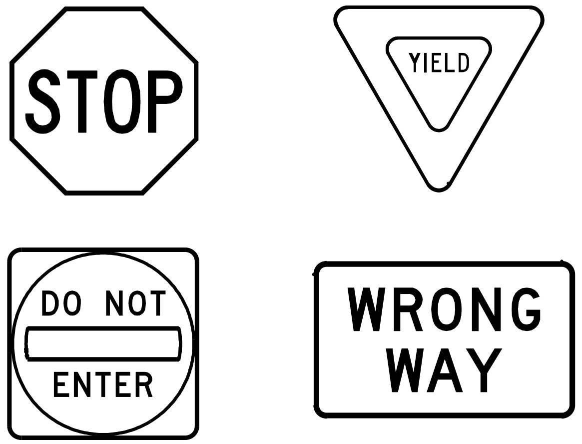
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
12-03 7-13 9-08	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	222

3

DATE: 9/22/2022 5:35:56 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\...

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



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

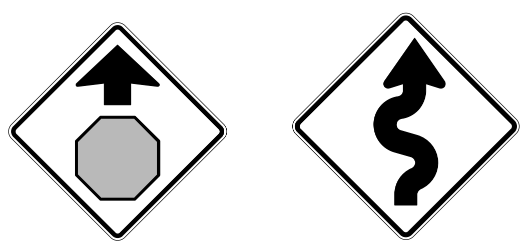
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

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

TYPICAL EXAMPLES

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

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

Texas Department of Transportation
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

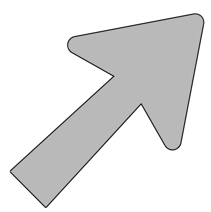
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT 0111	SECT 09	JOB 042	HIGHWAY BS 288B
REVISIONS 12-03 7-13 9-08	DIST HOU	COUNTY BRAZORIA		SHEET NO. 223

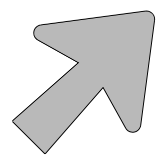
DATE: 9/22/2022 5:36:04 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\...

ARROW DETAILS

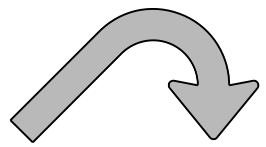
for Large Ground-Mounted and Overhead Guide Signs



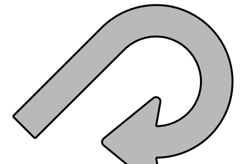
Type A



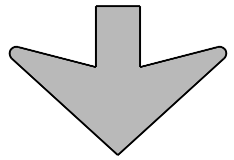
Type B



E-3



E-4



Down Arrow

TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

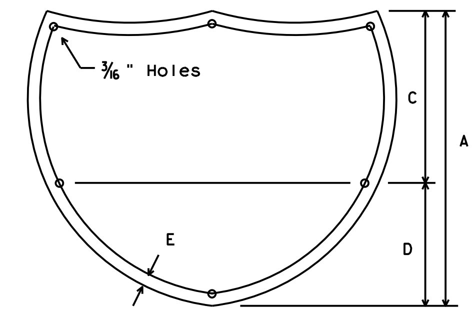
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

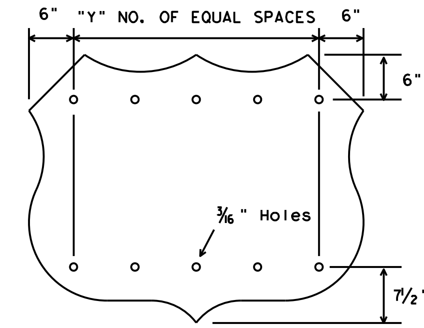
http://www.txdot.gov/

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



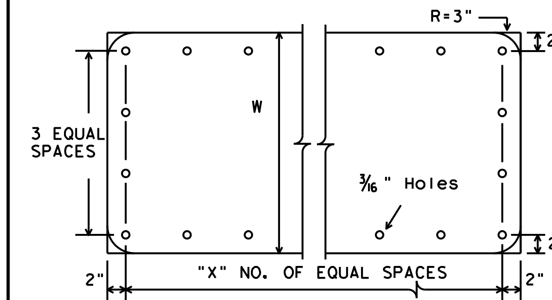
INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1½
48	28	20	1¾



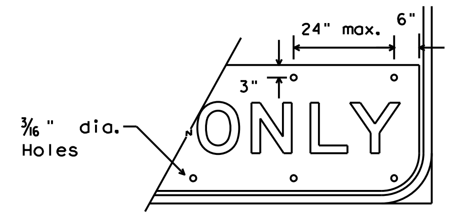
U.S. ROUTE MARKERS

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



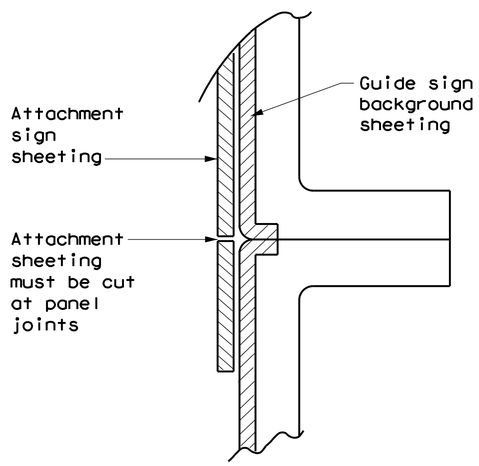
STATE ROUTE MARKERS

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

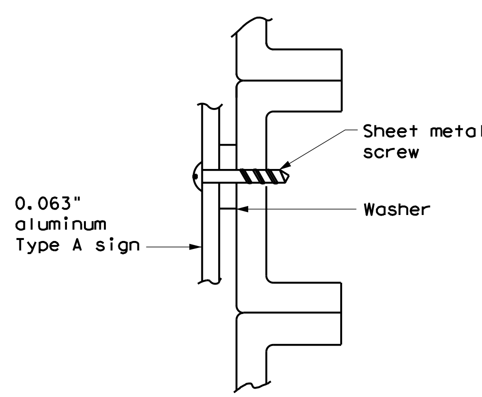


EXIT ONLY PANEL

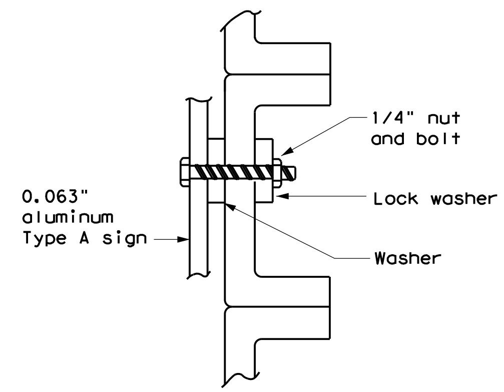
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

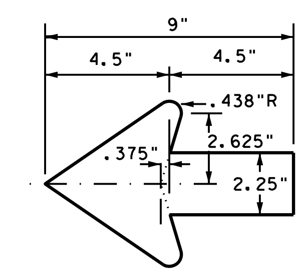
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

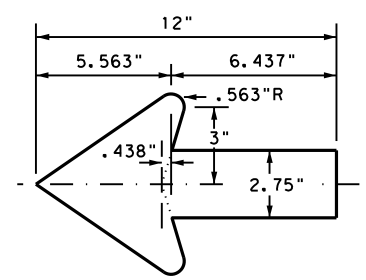
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-03 7-13 9-08	0111	09	042	BS 288B
	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	224

DATE: 9/22/2022 5:36:12 PM

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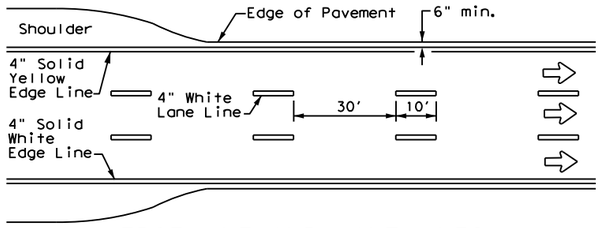
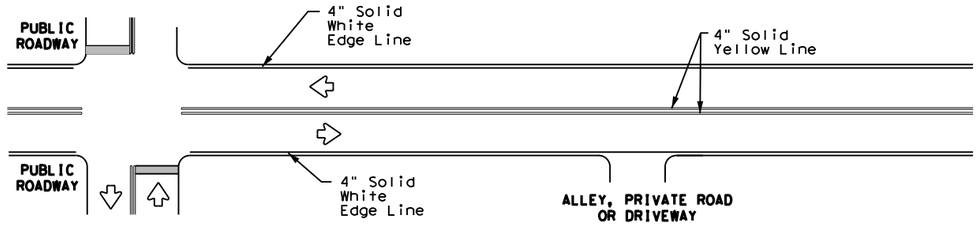
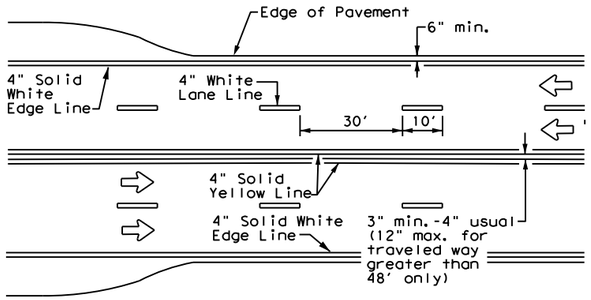


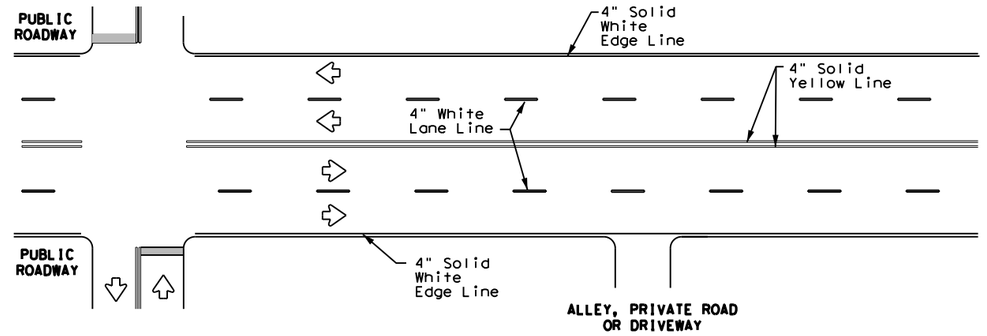
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



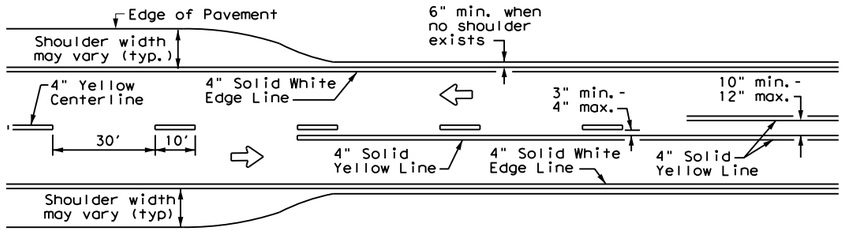
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



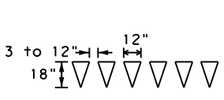
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



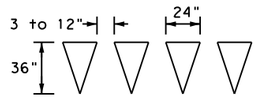
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

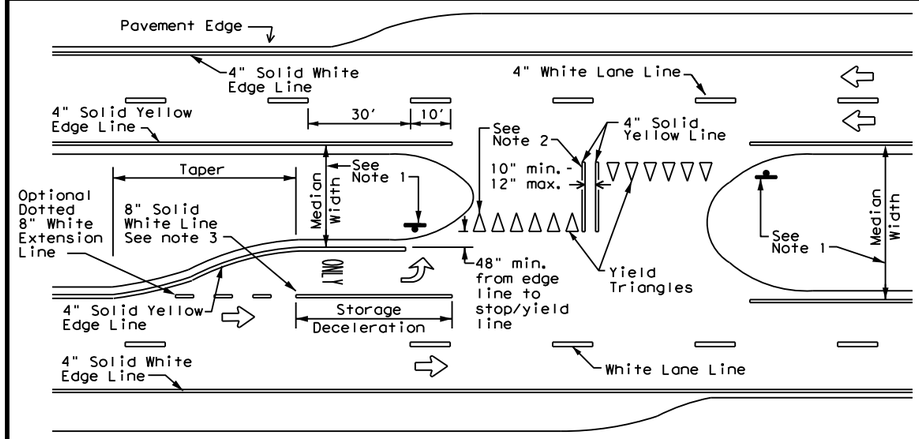


For posted speed on road being marked equal to or less than 40 MPH.



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

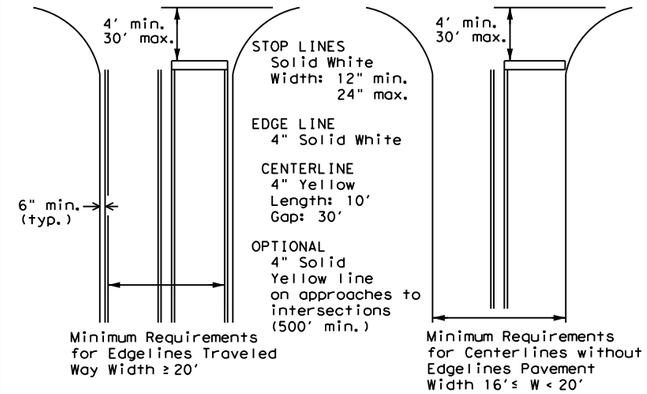
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling 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

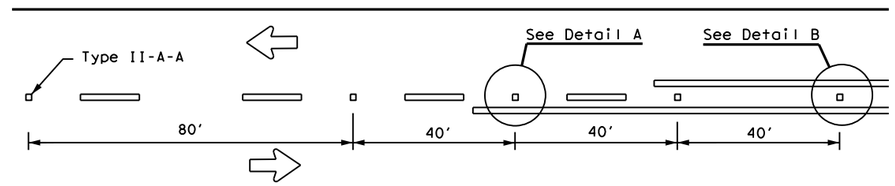
REVISIONS: 8-95 2-12; 5-00 8-16; 8-00 7-20; 3-03

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288B
DIST	COUNTY		SHEET NO.
12	BRAZORIA		225

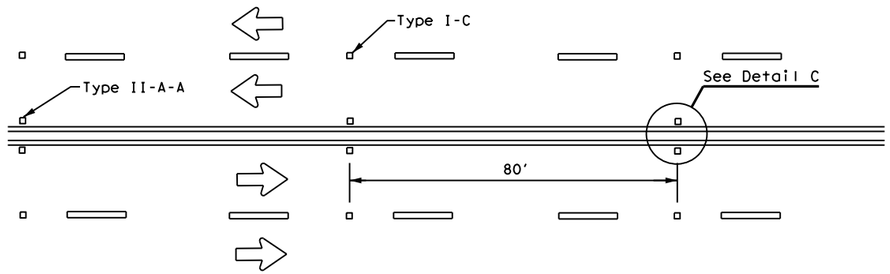
DATE:
FILE:

STD N-5a

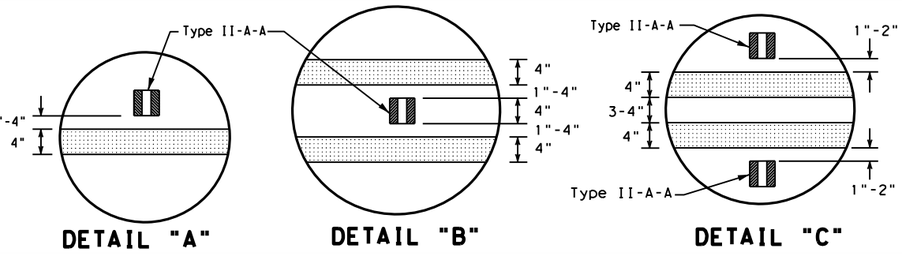
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



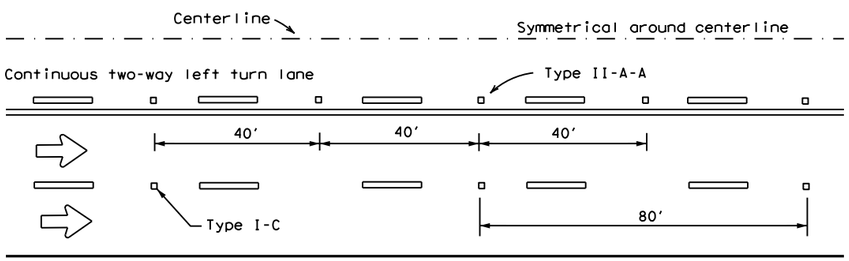
CENTERLINE FOR ALL TWO LANE ROADWAYS



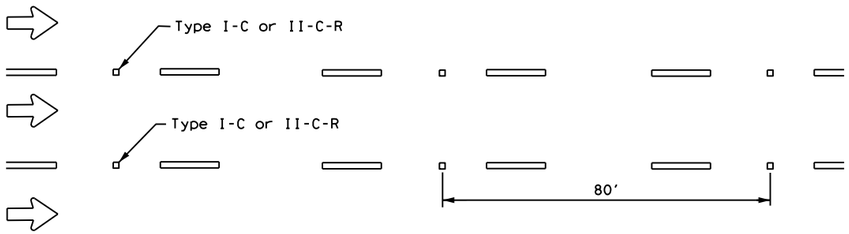
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

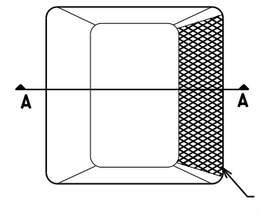


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

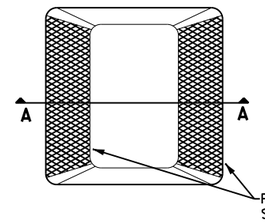
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

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

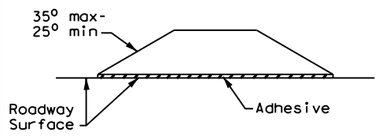
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

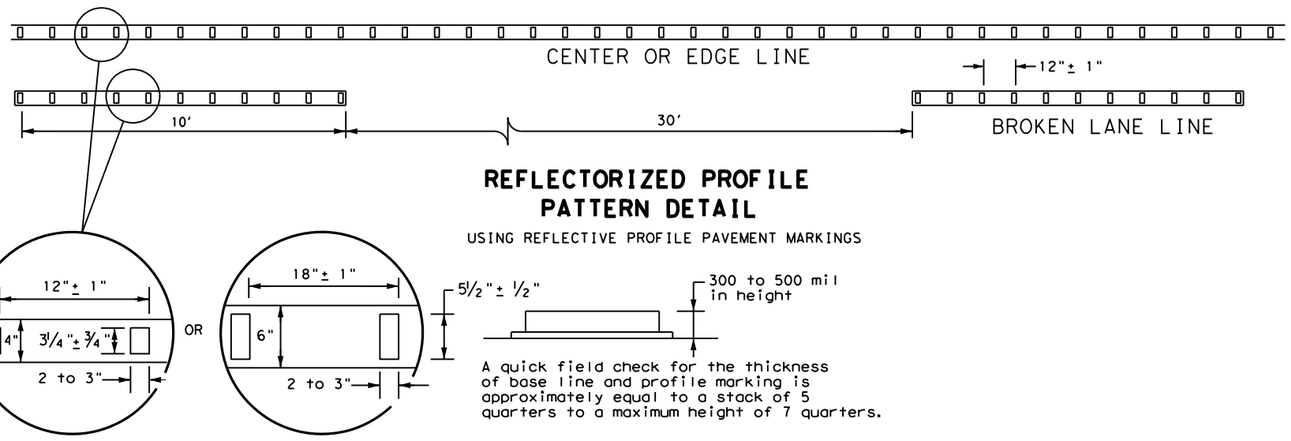


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

NOTE

Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		226

22B

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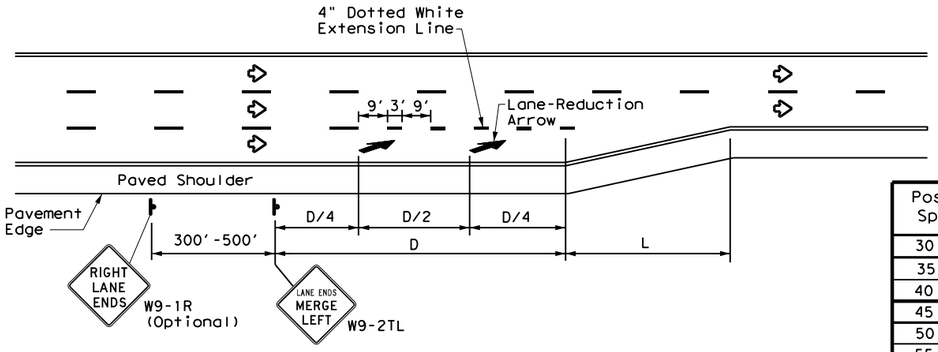
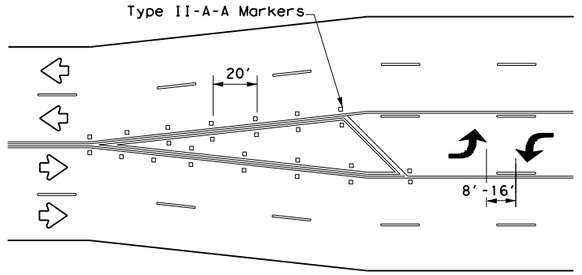


LANE REDUCTION

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

NOTES

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



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

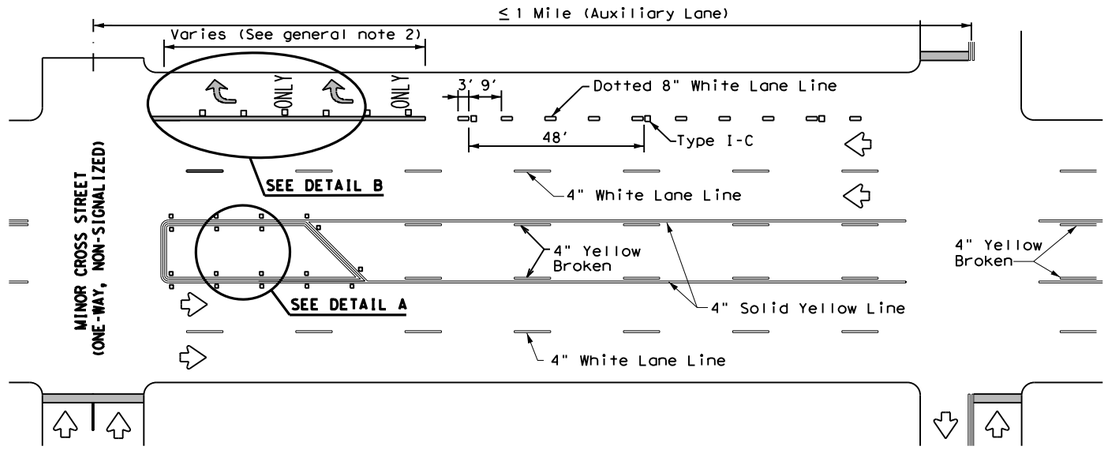
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

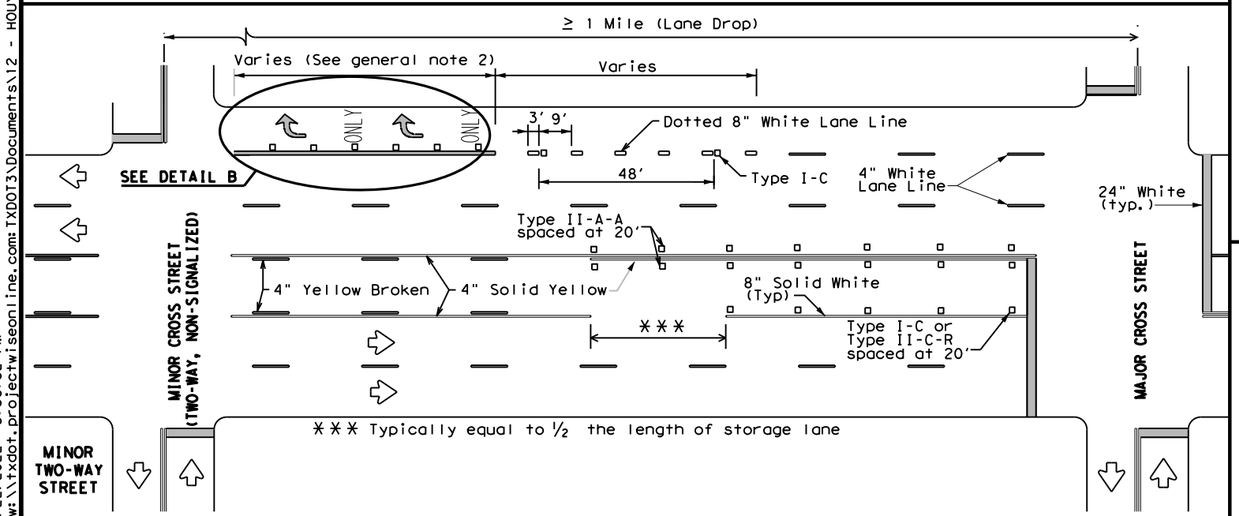
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn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

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

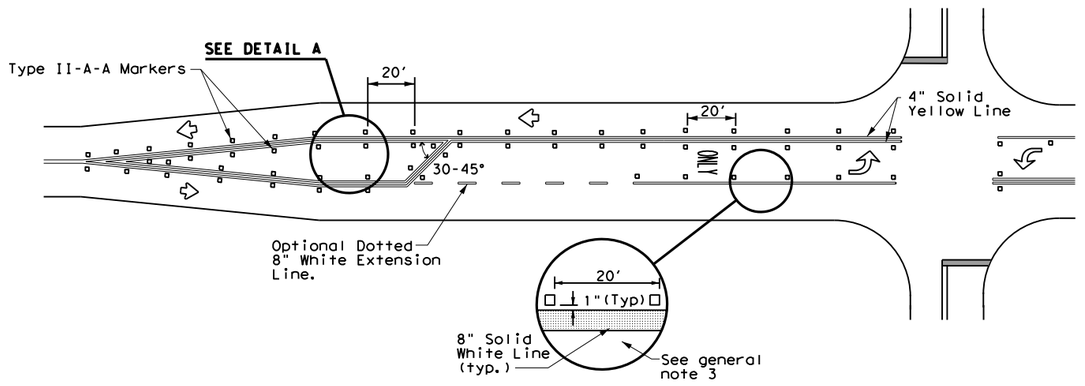
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



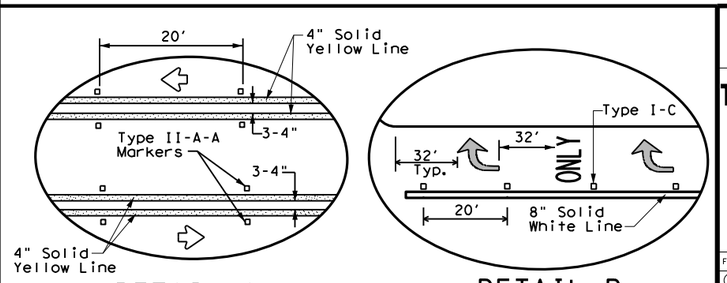
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



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



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	HOU	BRAZORIA		227
3-03 6-20				

22C

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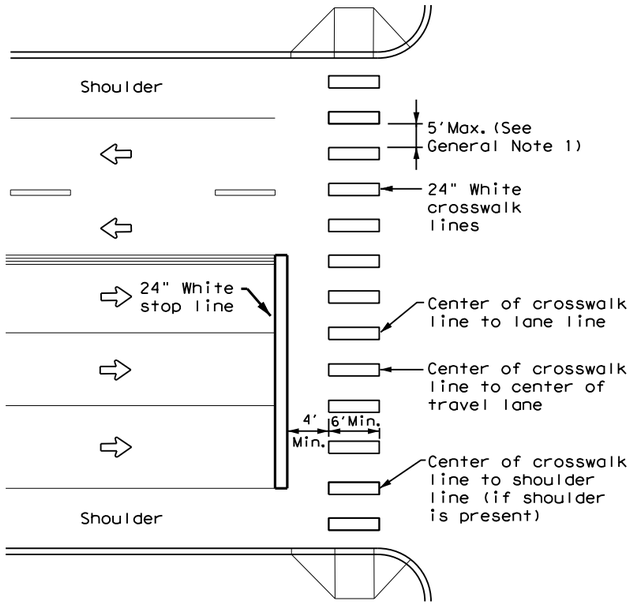


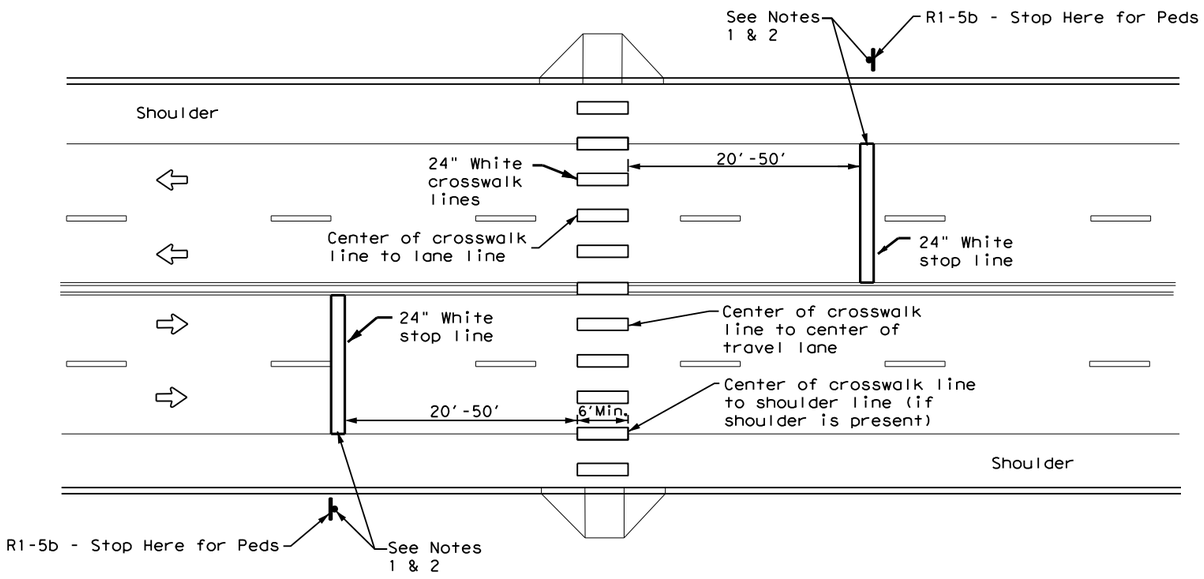
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

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

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



UNSIGNALIZED MID BLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with "Stop Here for Pedestrians" signs at unsignalized mid block cross walks.
2. Use stop bars with "Stop Here on Red" signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22

FILE: pm4-22.dgn	DN:	CK:	DW:	CK:
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 3-22	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		228

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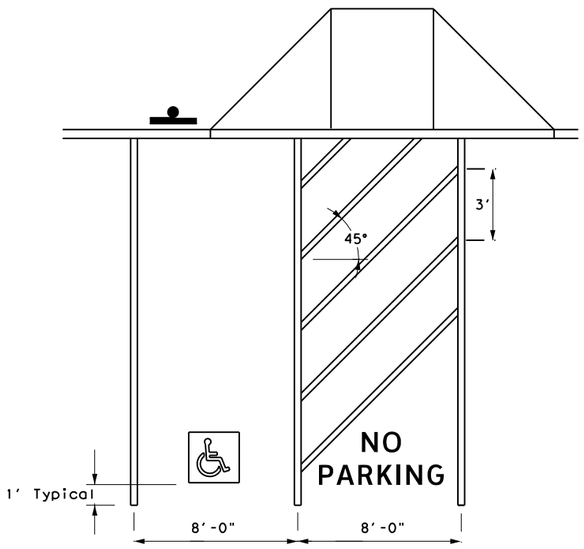
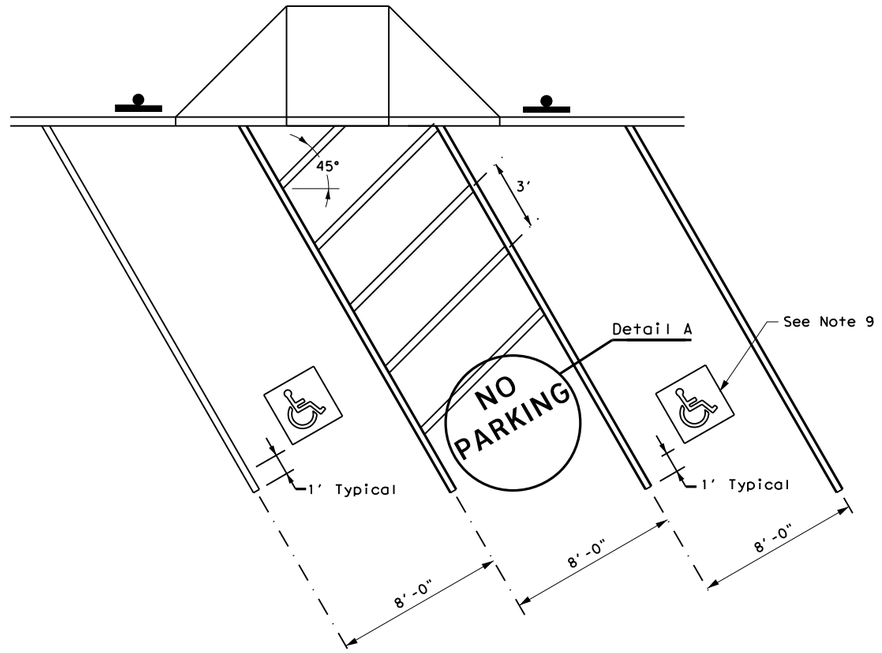
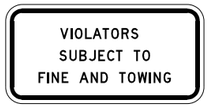




PERPENDICULAR OR ANGLED ACCESSIBLE PARKING SPACE DIMENSIONS

R7-8T

R7-8P



R7-8aPT

ACCESSIBLE PARKING SIGNS

Detail A

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

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
SIGN FACE MATERIALS	DMS-8300

GENERAL NOTES:

1. All paved accessible parking space limit lines shall be 4" solid white lines.

2. Paved accessible parking spaces must include a white International Symbol of Accessibility applied conspicuously on the surface in a color that contrasts the pavement. A blue background with white border may supplement the symbol for additional contrast.

3. The words "NO PARKING" must be applied on any access aisle adjacent to the parking space. The words must be white, applied:
   a) in all capital letters.
   b) centered within each access aisle adjacent to the parking space.

4. RESERVED PARKING (R7-8T) sign including the International Symbol of Accessibility.
   a) shall be REQUIRED for each accessible parking space.
   b) shall NOT be placed between two accessible parking spaces.
   c) shall NOT be placed in a location that restricts movement of wheelchairs within the adjacent sidewalk.
   d) shall have a mounting height of 7 feet to the bottom of the sign.

5. A sign identifying the consequences of parking illegally in a paved accessible parking space. Must:
   a) at a minimum state "VIOLATORS SUBJECT TO FINE AND TOWING" (Plaque)(R7-8aPT).
   b) be mounted on a pole, post, wall or freestanding board.
   c) be no more than eight inches (8") below sign R7-8T a sign required by the Texas Accessibility Standards, 502.6.
   d) be installed so that the bottom edge of the sign is no lower than 48 inches and no higher than 80 inches above the ground level.

6. Signs identifying van parking spaces shall contain the designation "VAN ACCESSIBLE" (R7-8P) Signs shall be 60 inches minimum above the ground level measured to the bottom of the sign.

7. Perpendicular or angled parking spaces shall be 8 feet wide minimum with an access aisle 8 feet minimum wide (van accessible). Two parking spaces are permitted to share a common access aisle.

8. Access aisles shall be at street level, extend the full length of the parking space they serve, follow ADA surface requirements, and marked to discourage parking in the access aisle. Curb ramps shall connect the access aisle to the adjacent pedestrian access route. Curb ramps shall not be located within the access aisle.

9. International Symbol of Accessibility Parking Space Marking and sign details can be found in The Standard Highway Sign Designs for Texas (SHSD) at the following website. http://www.txdot.gov/

Texas Department of Transportation

Traffic Safety Division Standard

PAVEMENT MARKINGS AND SIGNING FOR ACCESSIBLE PARKING

PM(AP)-21

FILE: pm(ap)-21	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		229

22F

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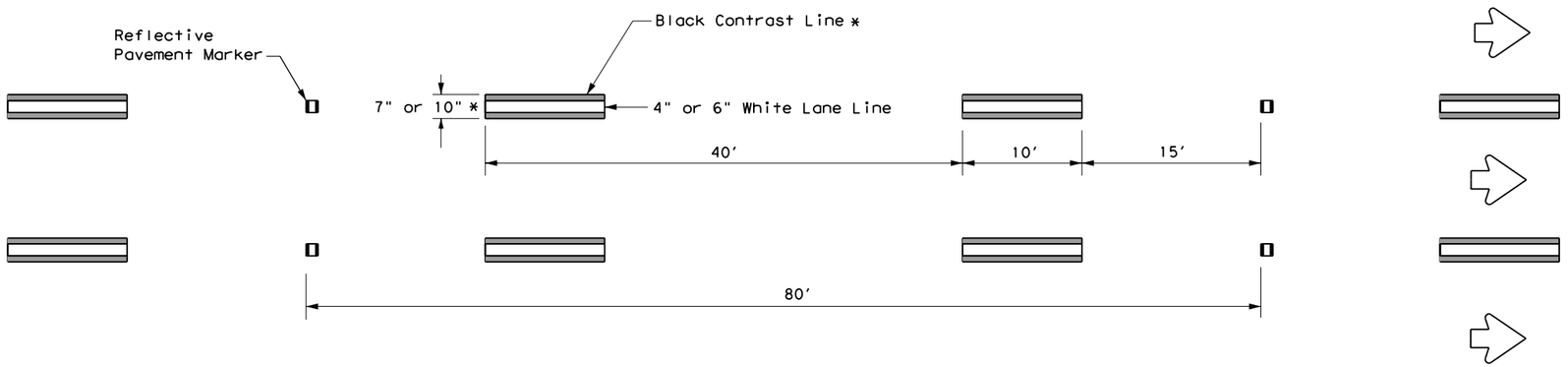
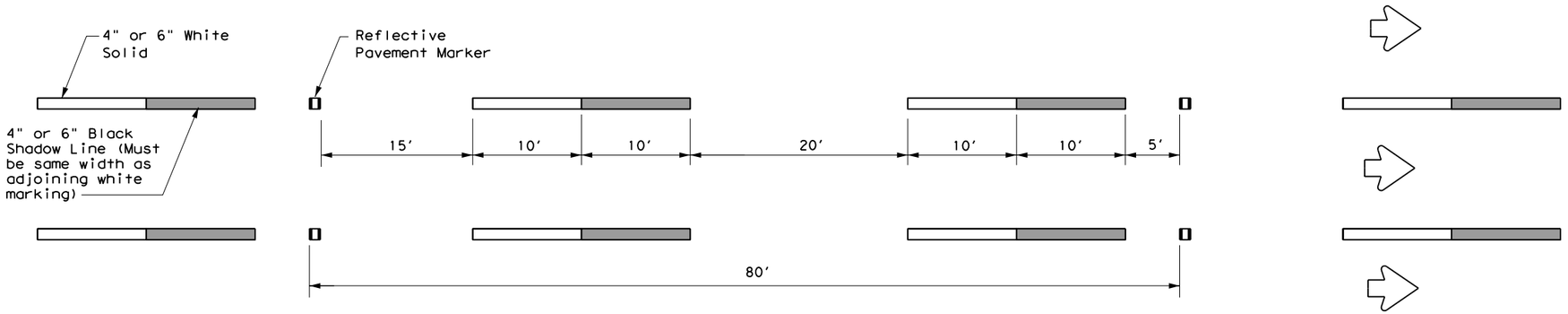


CONTRAST LANE LINE DESIGN

* See contrast line dimensions table for width of black line.

CONTRAST LINE DIMENSIONS		
White	Black (per side)	Total Width
4"	1.5"	7"
6"	2"	10"



SHADOW LANE LINE DESIGN

GENERAL NOTES

1. Contrast and Shadow markings may only be used on concrete pavements.
2. Contrast and Shadow markings shall not be used on edge lines.
3. Contrast lane lines shall be permanent prefabricated pavement markings meeting DMS 8240.
4. Shadow lane line designs shall be a liquid markings system approved by TxDOT.
5. All raised reflective pavement markers placed in broken lines shall be placed in line with and midway between the white stripes.
6. See PM(2) for raised reflective pavement markings installation details.

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

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

Texas Department of Transportation

Traffic Operations Division Standard

CONTRAST AND SHADOW PAVEMENT MARKINGS

CPM(1)-14

FILE: CPM(1)14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		230

22N

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)

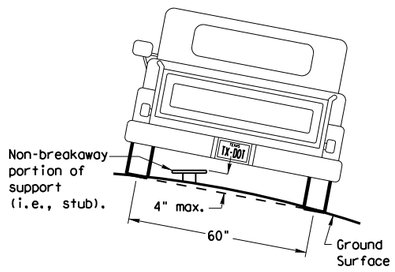
Anchor Type

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))

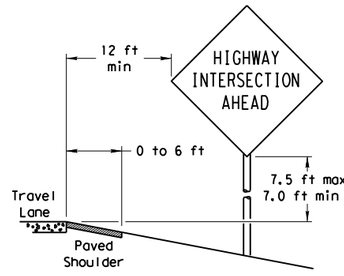
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

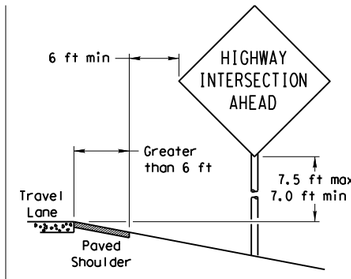
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

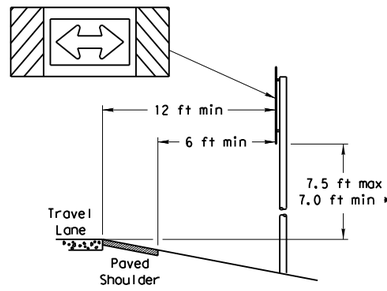
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



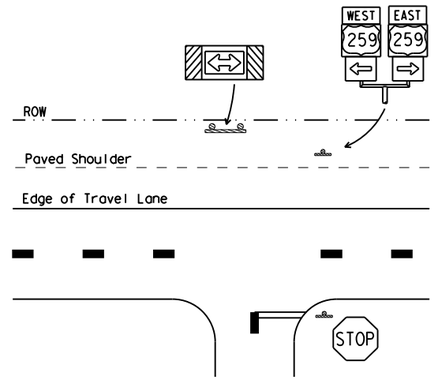
GREATER THAN 6 FT. WIDE

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.

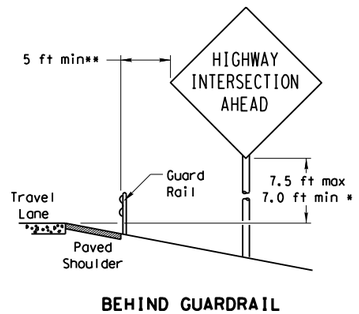
T-INTERSECTION



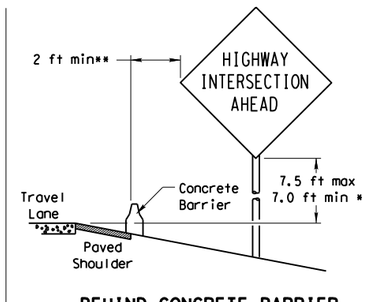
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

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

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

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

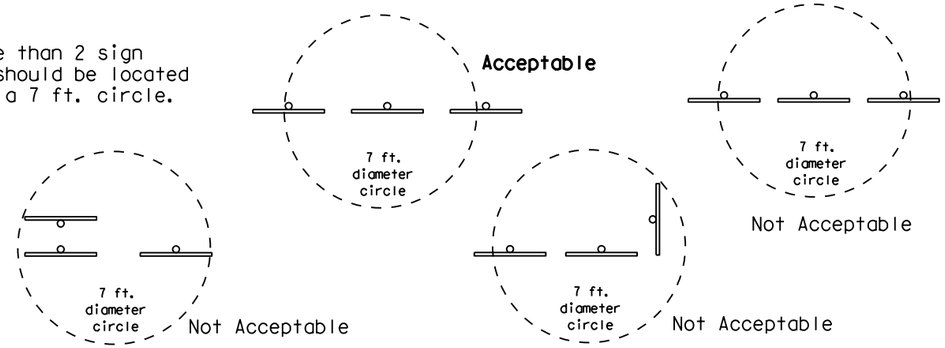
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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

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

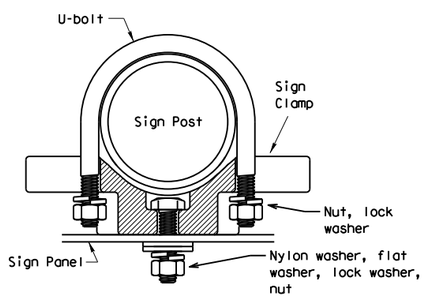
The website address is:
http://www.txdot.gov/publications/traffic.htm

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

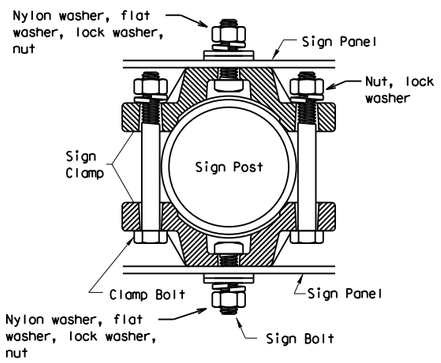


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

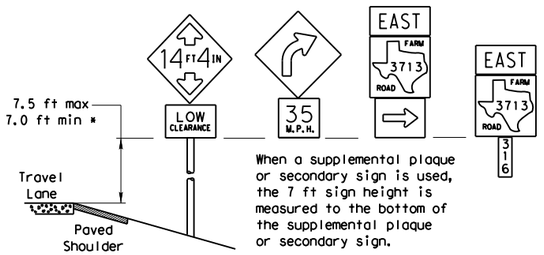
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



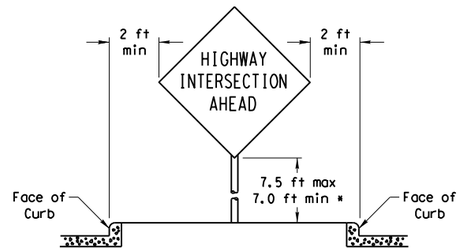
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



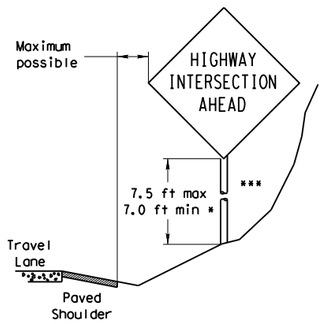
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

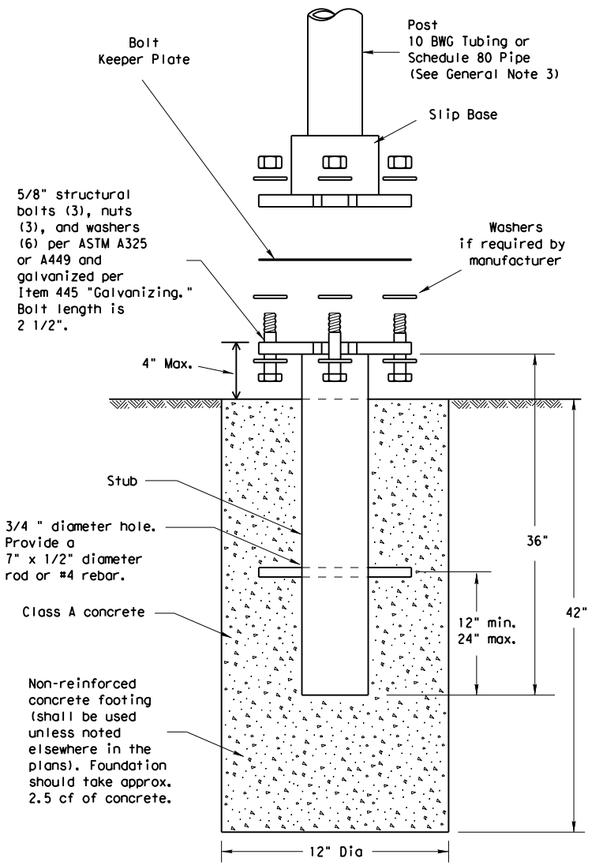
REVISIONS
9-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288B
DIST	COUNTY		SHEET NO.
12	BRAZORIA		231

DATE:
FILE:

DATE: 9/22/2022 5:36:53 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\01110904Z\4 - Design\Plan Set\3. Roadway Standards*Hibo\SMD (SLIP-1)-08.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

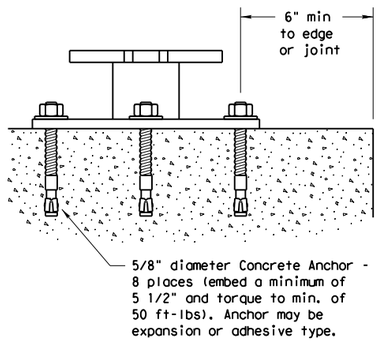
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288B

DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	232

DATE: 9/22/2022 5:37:00 PM
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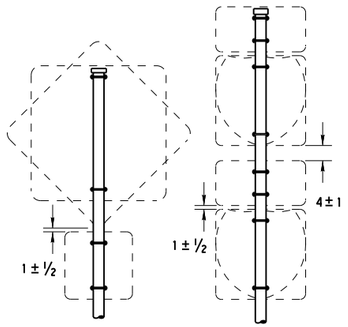
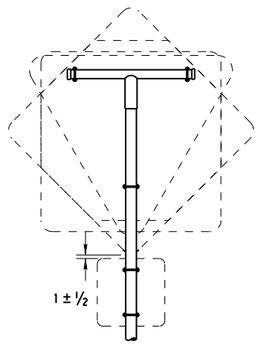


SM RD SGN ASSM TY XXXXX(1)XX(P)



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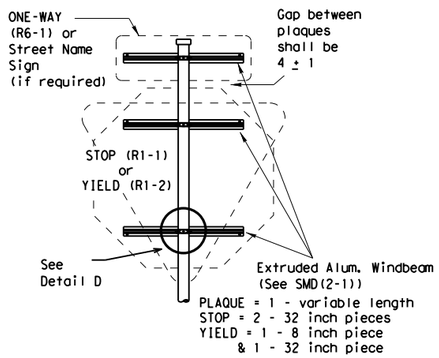
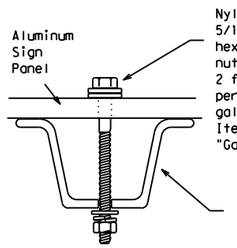
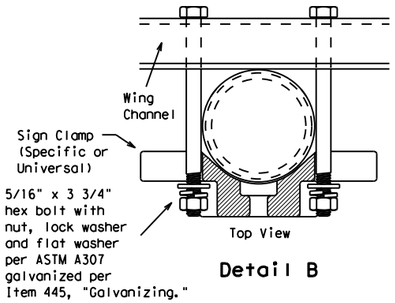


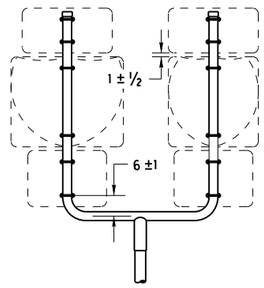
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Detail A



Detail B



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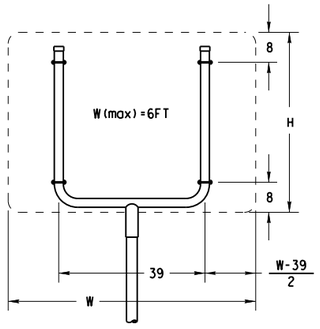

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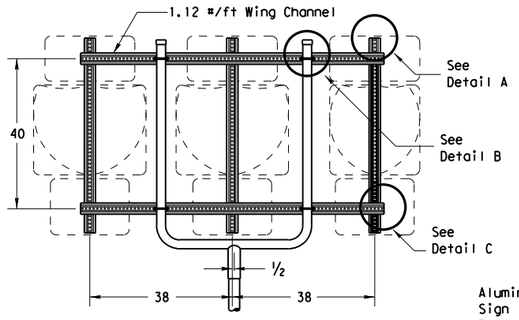
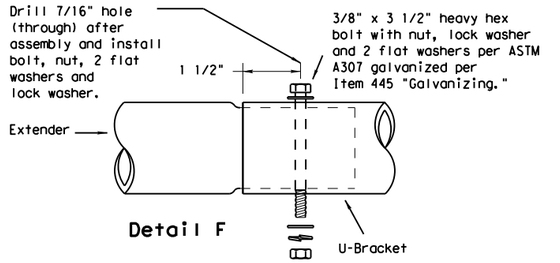
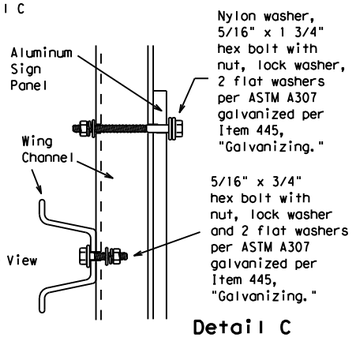


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

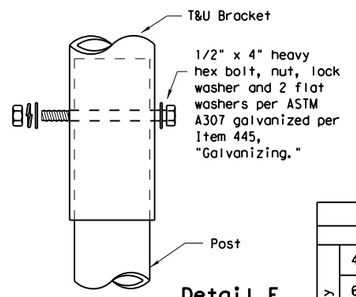


Detail F

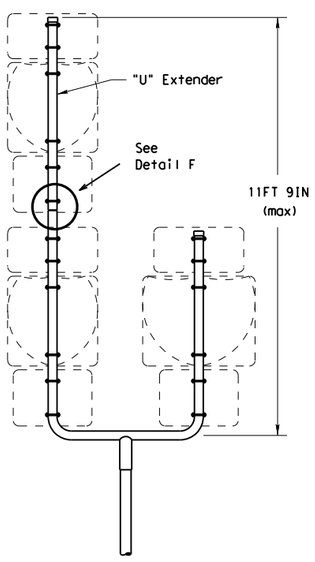
Splices shall only be allowed behind the sign substrate.



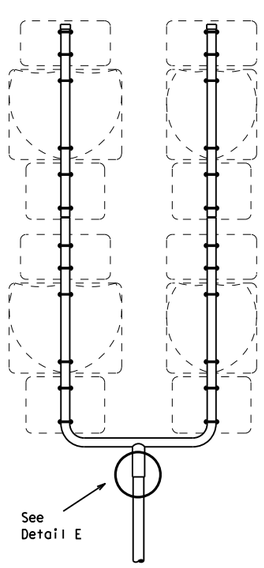
Detail C



Detail E



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



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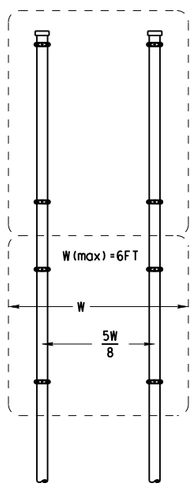
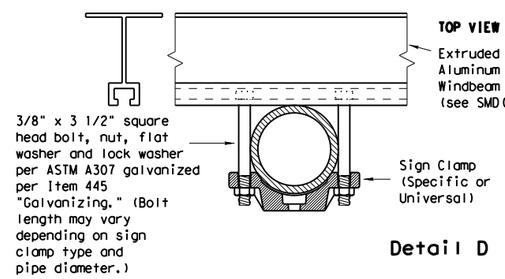
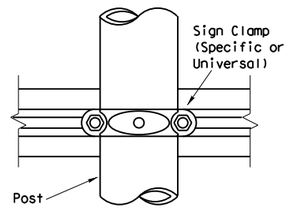


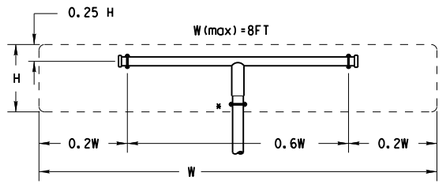
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

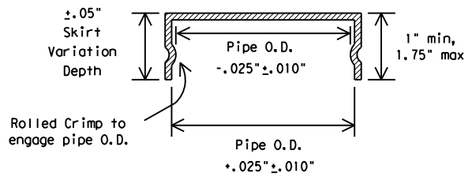




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



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

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

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

GENERAL NOTES:

1.

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

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

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288B

DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	233

9-08 REVISIONS

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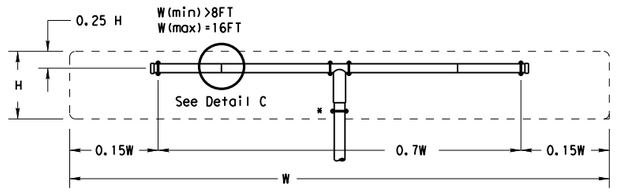
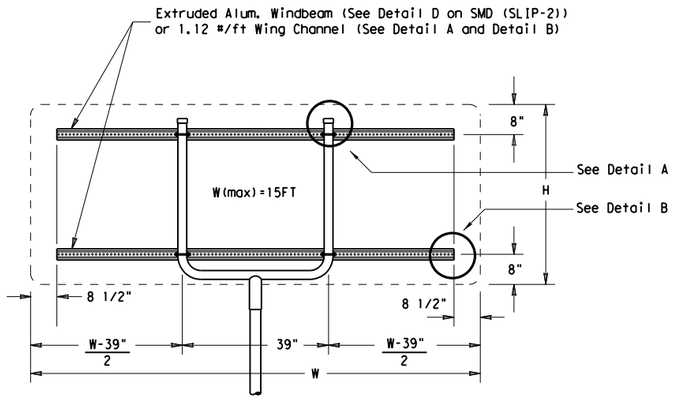


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



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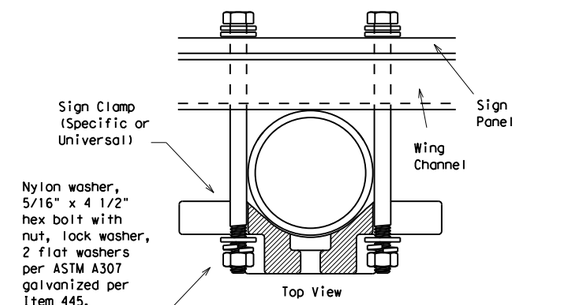
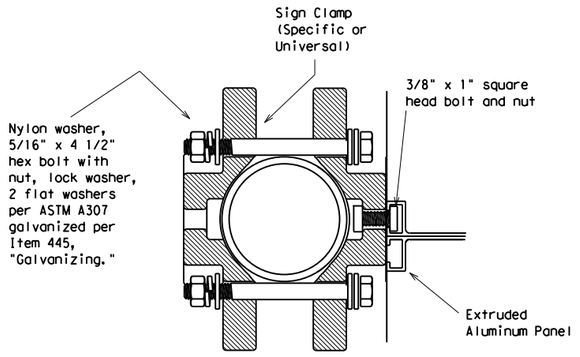
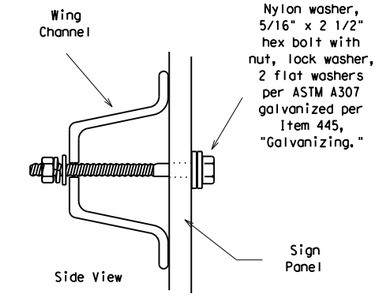


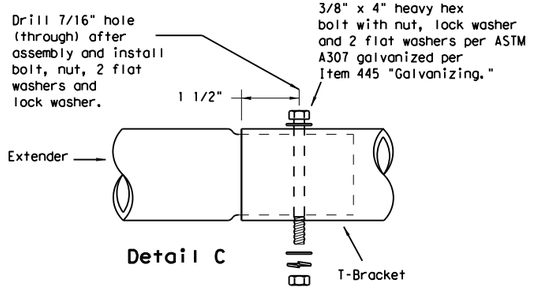
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

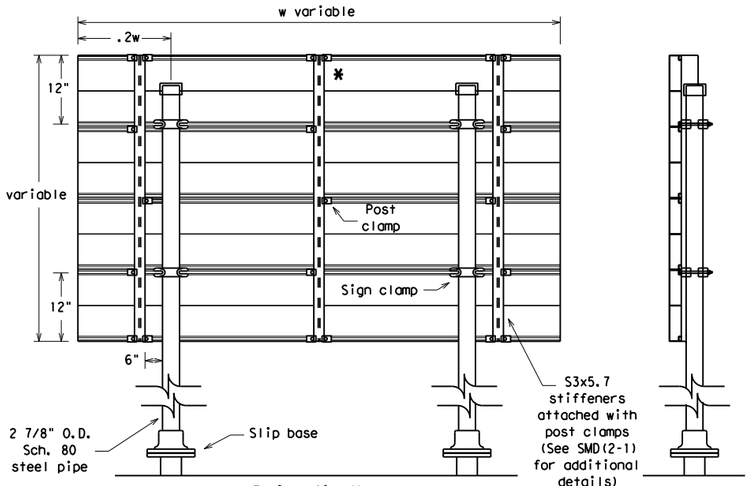


Detail B



Detail C

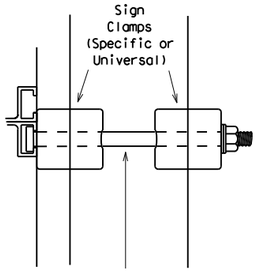
Splices shall only be allowed behind the sign substrate.



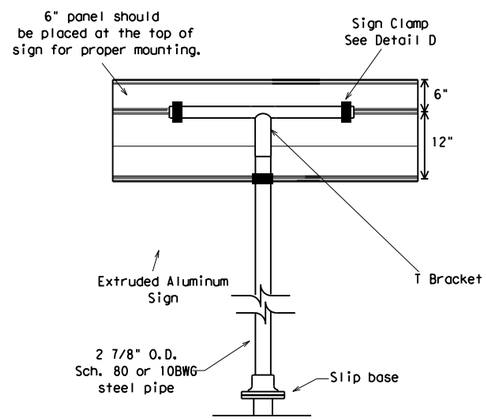
Typical Sign Mount

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

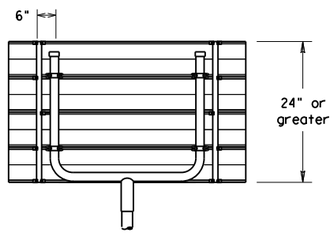
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



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:

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. 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

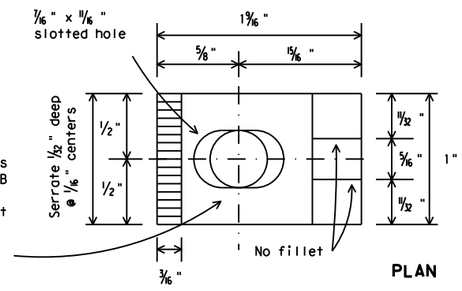
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

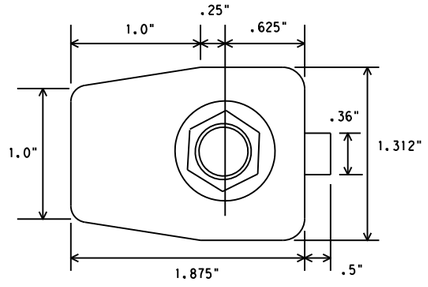
REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		234

DATE: 9/22/2022 5:37:12 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111090424 - Design\Plan Set\3. Roadway\Standards*Hiba\SMD (2-1)-08.dgn

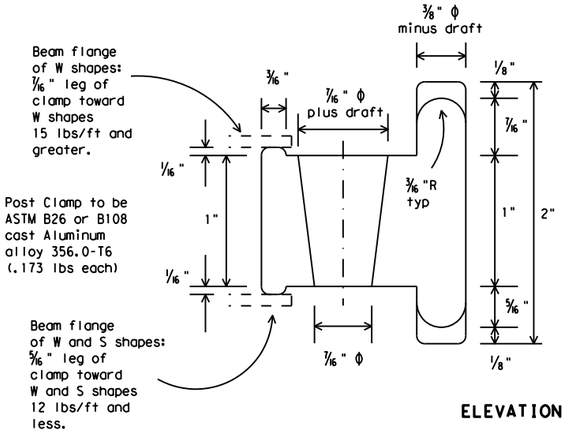
NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.



PLAN

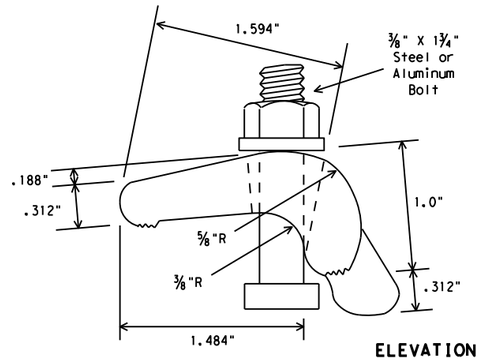


PLAN



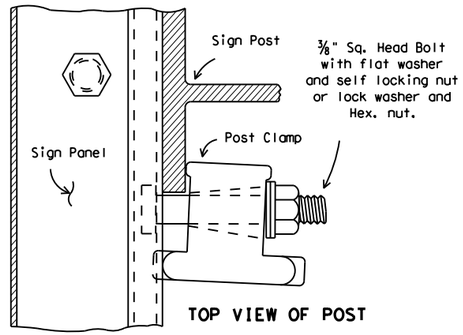
ELEVATION

POST CLAMP DETAIL

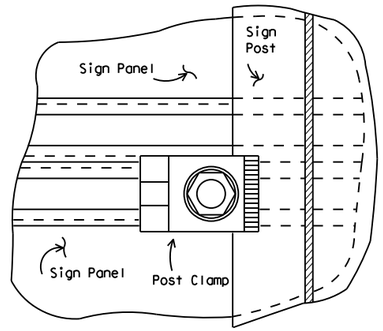


ELEVATION

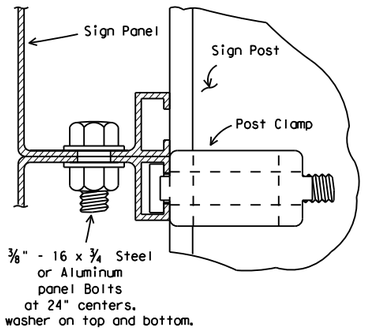
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST



TOP VIEW OF CLAMP



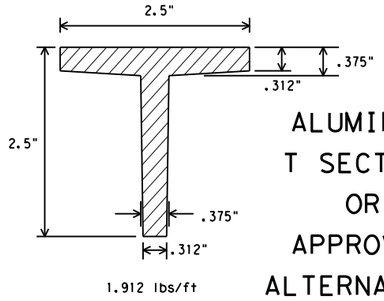
SIDE VIEW OF PANELS

CONNECTION DETAILS

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
4. For fiberglass substrate connection details, see manufacturer's recommendations.

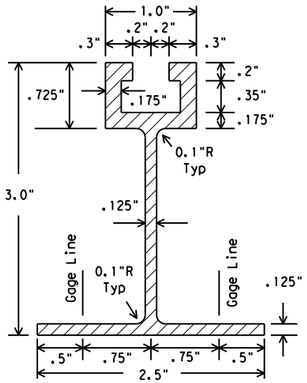


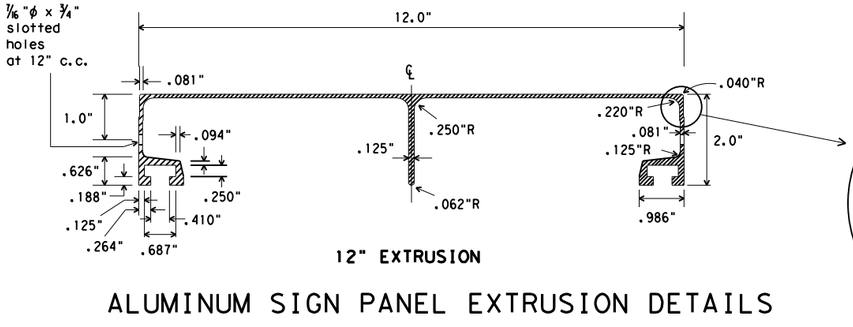
1.912 lbs/ft

ALUMINUM T SECTION OR APPROVED ALTERNATIVE

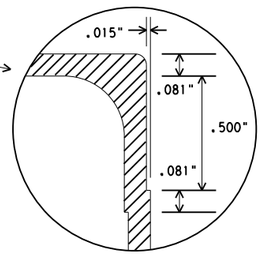
WINDBEAM CROSS SECTION

Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative

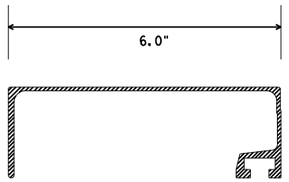




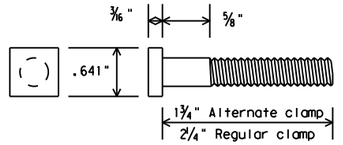
12" EXTRUSION



ALUMINUM SIGN PANEL EXTRUSION DETAILS



6" EXTRUSION



POST CLAMP BOLT DETAIL

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		235

DATE: 9/22/2022 5:37:18 PM
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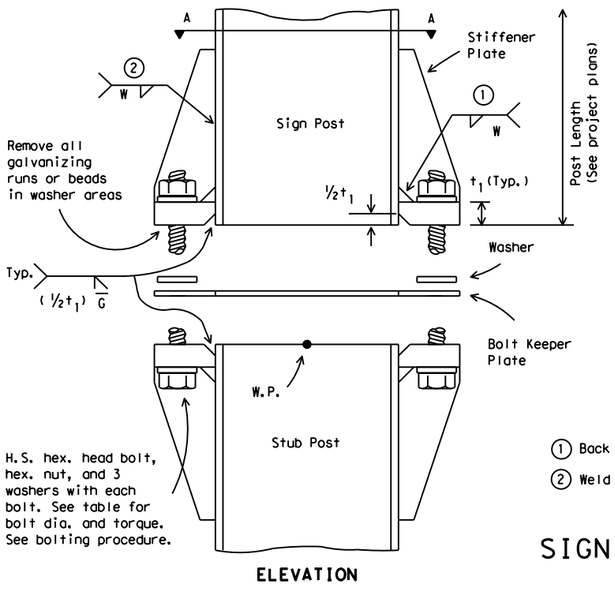
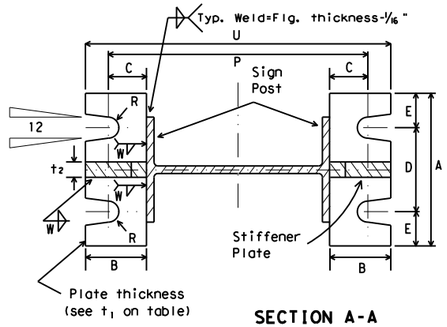
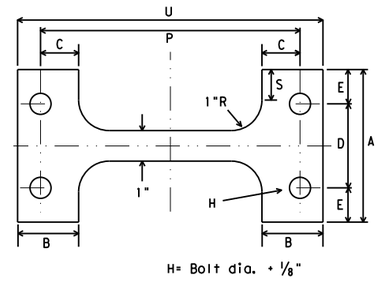


ELEVATION

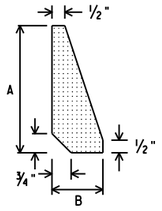


SECTION A-A



H= Bolt dia. + ⅛"

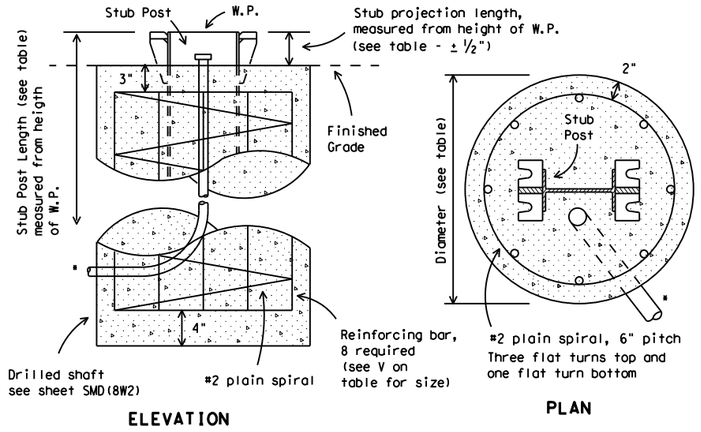
BOLT KEEPER PLATE
30 Ga galv. sheet steel



STIFFENER PLATE DETAIL

Steel Plate (thickness = t_2)

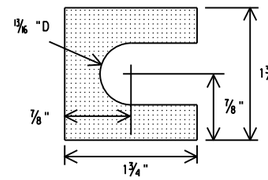
(See table for dimensions)



ELEVATION PLAN

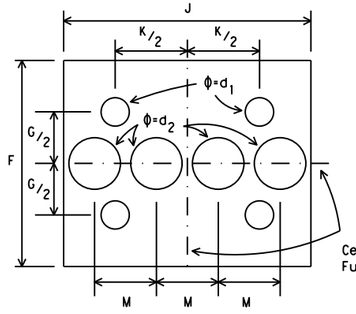
FOUNDATION DETAIL

*Note: For signs with electrical apparatus, see ED(10) for conduit required in founation.



SHIM DETAIL

Furnish two .012"+ thick and two .032"+ thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.



PERFORATED FUSE PLATE DETAIL

Use H.S. hex head bolts, hex head nut and bevel or flat washer (where req'd) under nut. All holes shall be drilled, sub-punched and reamed. All plate cuts shall preferably be saw cuts. However, flame cutting will be permitted provided all edges are ground. Metal projecting beyond the plane of the plate face will not be permitted. Steel fuse plates shall conform to the requirements of ASTM A36. ASTM A572 Grade 50 or ASTM A588 may be substituted for A36 at the option of the fabricator. Mill test reports shall be submitted for Fuse Plates. Steel used shall have an ultimate tensile strength not to exceed 80 KSI. For alternative Fuse Plate contact Traffic Operations Division.

SIGN POST AND STUB POST

(For W Shapes)

① Back up weld to be made before installing stiffener plate

② Weld W may be continued across clips to seal joint

BOLTING PROCEDURE FOR ASSEMBLY OF BASE CONNECTION:

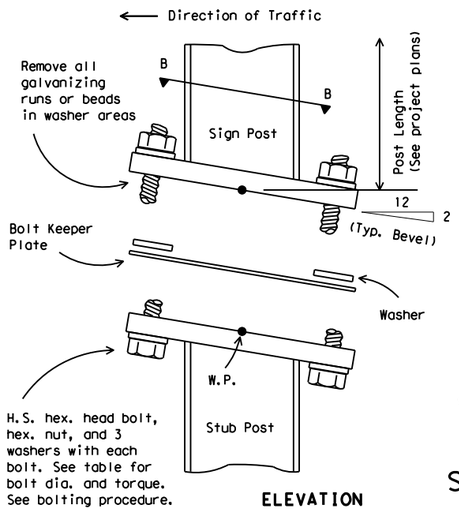
1. Assemble sign post, BOLT KEEPER PLATE and stub post with bolts and three flat washers per bolt as shown.
2. Shim as required to plumb post.
3. Tighten all bolts the maximum possible with a 12 to 15 inch wrench to clean bolt threads and to bed washers and shims.
4. Loosen each bolt in sequence and retighten bolts in a systematic order to the prescribed torque. Do not overtighten.
5. To prevent nut loosening, burr threads of bolt at junction with nut using a center punch.

Dimensions / Post Size	Base Connection Data Table: Bolt Size & Torque	A	B	C	D	E	t_1	t_2	W	R
W6x9	⅝"ϕ x 2¾" 440-450 inch pounds 36-38 foot pounds	5"	2"	1¼"	2¾"	1⅛"	¾"	½"	¼"	11/32"
W6x12										
W6x15										
W8x18										
W8x21	¾"ϕ x 3½" 740-750 inch pounds 62-63 foot pounds	6"	2¼"	1⅜"	3½"	1¼"	1"	¾"	5/16"	13/32"
W10x22										
W10x26										
W12x26										
S3x5.7	½"ϕ x 2½" 440-450 inch pounds 36-38 foot pounds	See Detail Below								
S4x7.7										

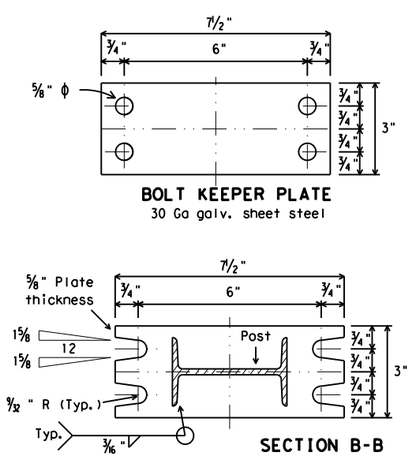
Perforated Fuse Plate Data Table											
F	G	J	K	M	d_1	d_2	t_3	Bolt Dia.	Wt. (ea.) (lbs.)	Bolt length
4¼"	2"	4"	2¼"	1"	9/16"	¾"	¼"	½"	1.01	1½"
5"	2½"	6"	3½"	1½"	11/16"	1¼"	⅜"	⅝"	2.51	2¼"
5"	2½"	5¼"	2¾"	1¼"	11/16"	1 1/16"	⅜"	⅝"	2.26	2¼"
5½"	2½"	5¼"	2¾"	1¼"	13/16"	1"	½"	¾"	3.35	2¼"
6"	3"	5¾"	2¾"	1⅜"	13/16"	1⅛"	½"	¾"	4.03	2¼"
6"	3"	6½"	3½"	1⅝"	13/16"	1 5/16"	½"	¾"	4.47	2¼"
3¾"	1½"	2⅝"	1½"	⅝"	9/16"	⅜"	¼"	½"	0.60	1½"

Bolt Keeper Data			Foundation Data			
P	S	U	Stub length	Stub projection	Dr. Shaft diameter	Bar V Size
8⅜"	1"	9⅞"	2'-0"	3"	24"	#5
8½"		10"	2'-0"	3"		#5
8½"		10"	2'-6"	3"		#6
10⅝"		12⅛"	2'-6"	3"		#7
11"	1½"	12¾"	3'-0"	2½"		#8
12⅞"		14⅝"	3'-0"	2½"		#9
13⅛"		14⅞"	3'-0"	2½"		#10
15"		16¾"	3'-0"	2½"		#11
See Detail Below			3'-3½"	3½"	12"	Non-reinforced ③

③ Foundation design shall be Type G Mount, see SMD (TY G).

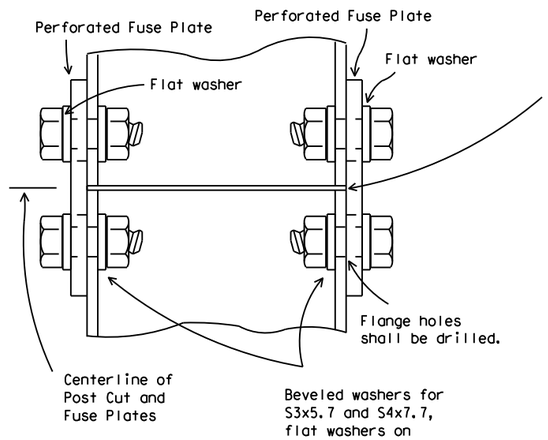


ELEVATION



SIGN POST AND STUB POST

(For S4x7.7 and S3x5.7)



DETAIL "A"

Parts shall be saw cut either before galvanizing and the galvanized cut cleaned of zinc build-up, or saw cut after galvanizing and the cut surface repaired per Item 445, "Galvanizing."

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- LARGE ROADSIDE SIGNS FOUNDATION & STUB

SMD(2-2)-08

REVISIONS
4-98
9-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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0111	09	042	BS 288B
DIST	COUNTY		SHEET NO.
HOU	BRAZORIA		236

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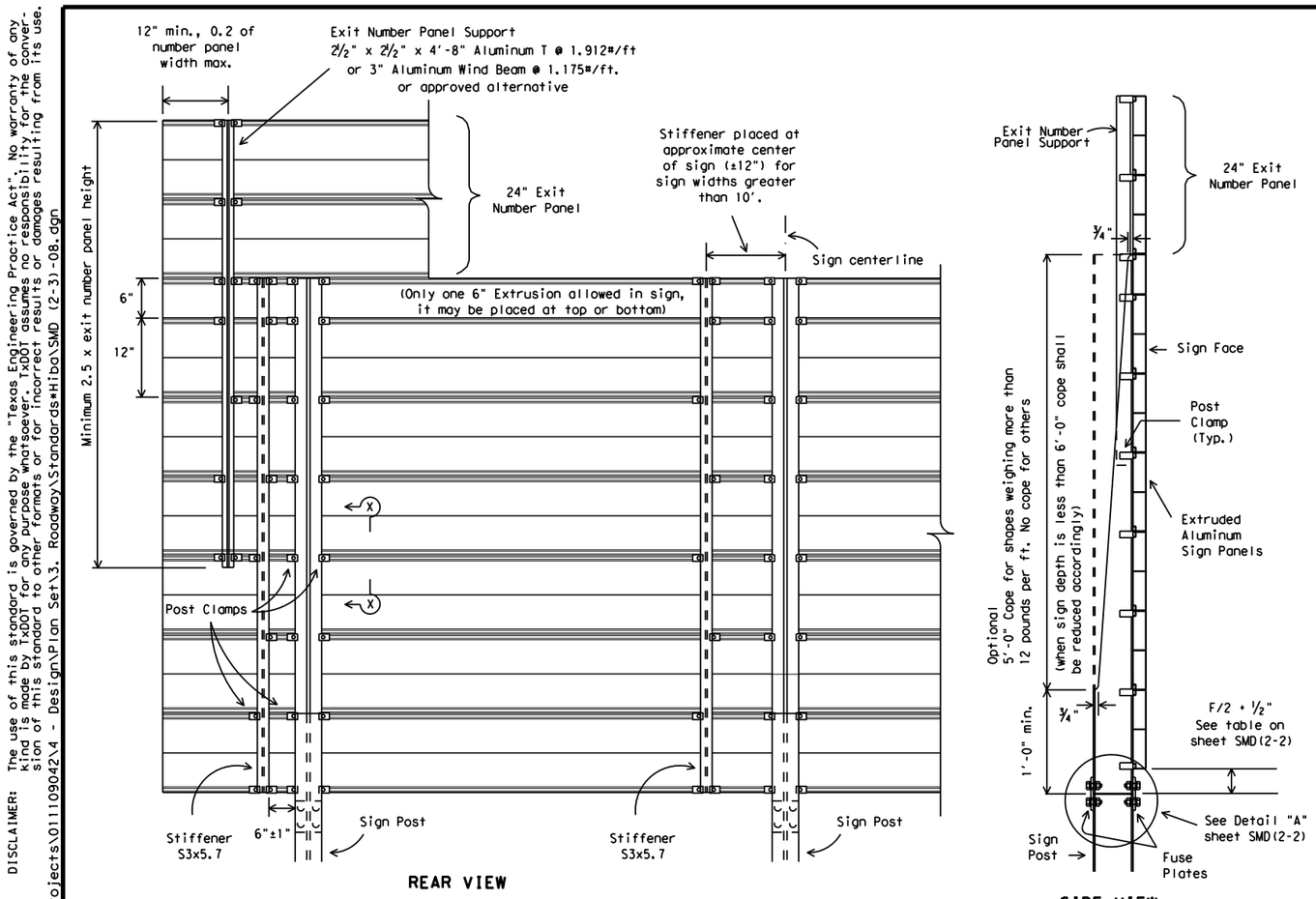
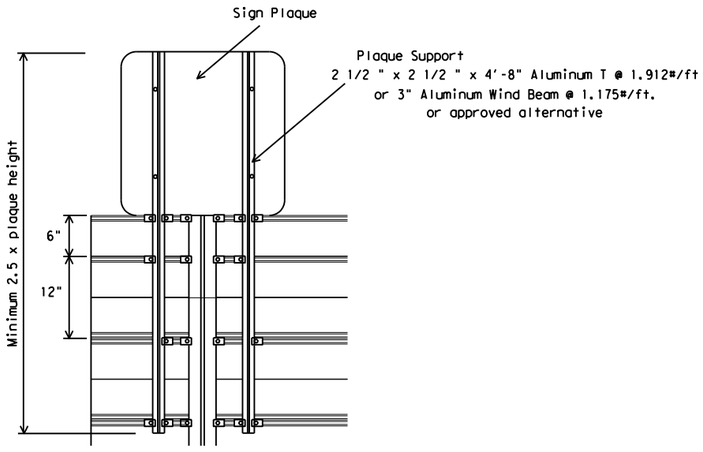
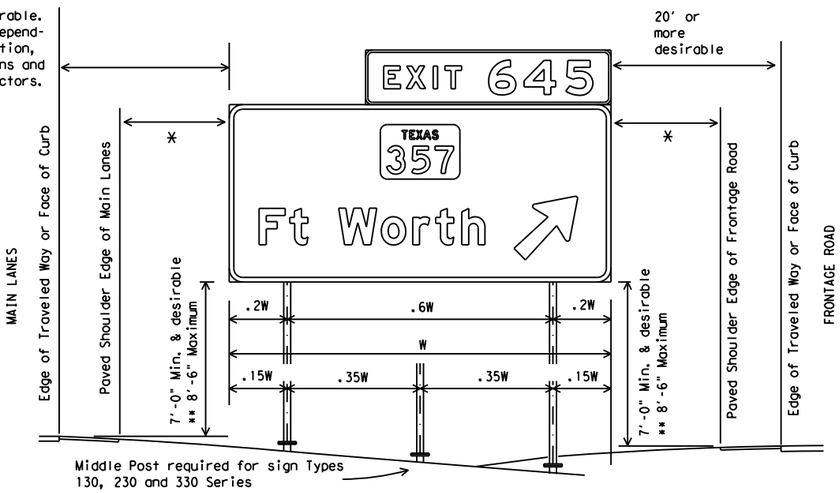


ALUMINUM PARENT SIGN & EXIT NUMBER PANEL MOUNTING DETAILS



SIGN PLAQUE MOUNTING DETAIL TO ALUMINUM PARENT SIGN

30' or more desirable. May be reduced depending on cross section, viewing conditions and other related factors.



TYPICAL SIGN INSTALLATION AND LOCATION

LATERAL CLEARANCE NOTES:

Lateral clearances of signs mounted on median side of main lanes are the same as shown above where space will permit.

Where a sign is to be located behind guardrail, an allowable minimum clearance of five feet may be used, measured from the face of the guardrail to the near edge of sign.

⁎ - 6' minimum and desirable may be used only in areas of limited lateral clearance and when approved by the Engineer.

POST SPACING NOTES:

Post spacing on a two post sign may vary a maximum of plus or minus 10% of total sign width to fit field conditions.

Post spacing on a three post sign may vary a maximum of plus or minus 5% of total sign width to fit field conditions.

SIGN HEIGHT NOTES:

** The 8' 6" maximum may be exceeded when placing signs on extreme slopes. In these conditions, a 7' minimum from natural ground to bottom of sign must be maintained.

DEPARTMENTAL MATERIAL SPECIFICATIONS

ALUMINUM SIGN BLANKS	DMS-7110
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Exit number panel shall be mounted to the right hand side of the parent sign for right exits and to the left hand side for left exits. The number panel shall be mounted with two uprights so its right edge is even with the right edge of the parent sign or vice-versa for left hand exits.
2. Exit number panel support shall be symmetrical about number panel centerline.
3. Exit number panel support shall be ASTM A36 structural steel galvanized after fabrication, or ASTM B221 aluminum alloy 6061-T6 or approved alternative.
4. All bolts, nuts and washers shall be galvanized per ASTM Designation: B695 Class 50, or A153 Class C or D.
5. Posts, parent sign panels, and exit number panels shall comply with notes on sheets SMD(2-1) and SMD(2-2).
6. Signs (such as exit number panels) attached above a parent sign shall be made of the same type material as the parent sign. General Service and Routing signs may be fabricated from flat sheet aluminum.
7. Exit number panel support and other connection hardware required to fasten exit number panel to parent sign shall be subsidiary to "Aluminum Signs" or "Fiberglass Signs."
8. For fiberglass sign installation details, see manufacturer's recommendations.

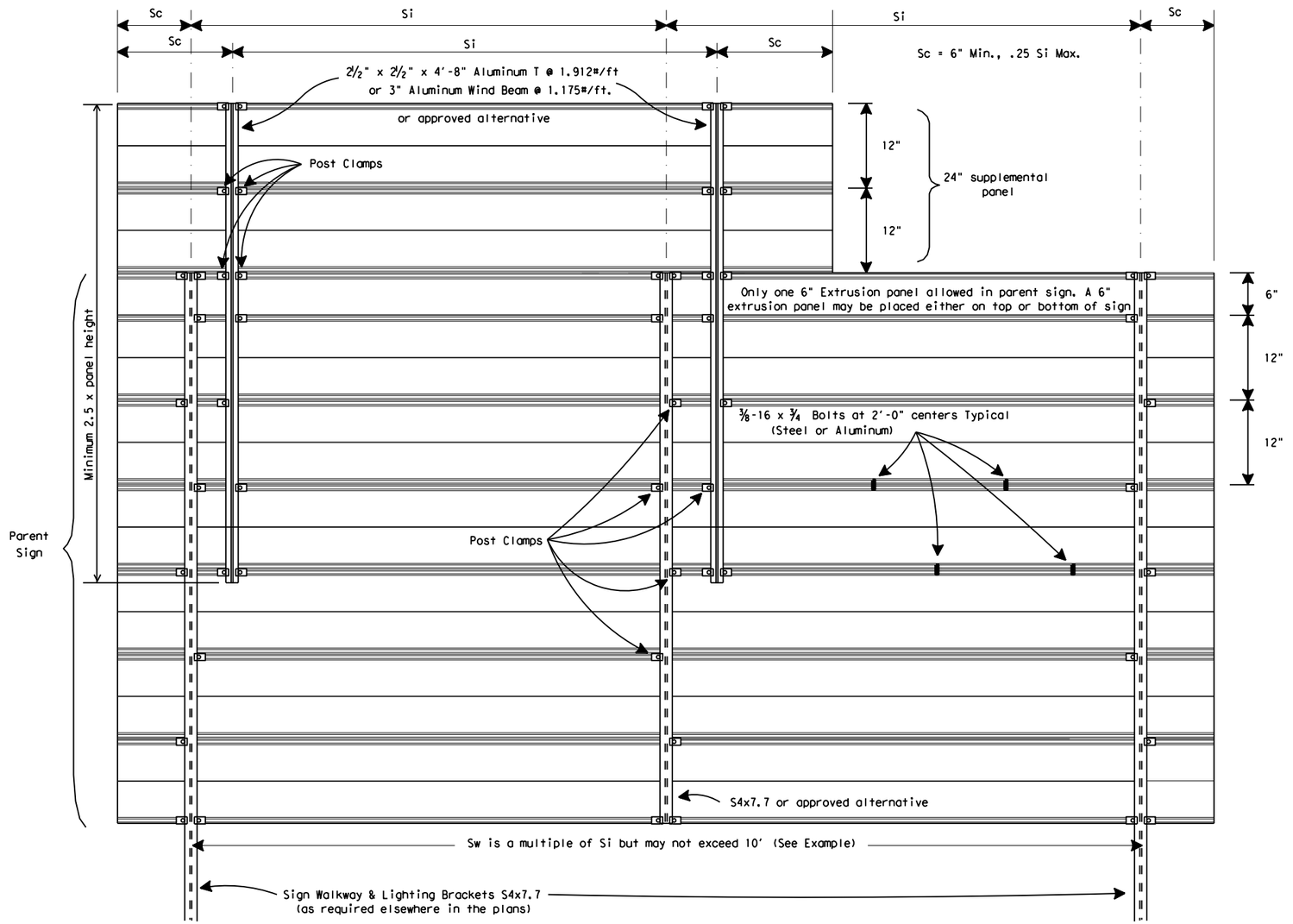
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS-LARGE ROADSIDE SIGNS

SMD(2-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		237

DATE: 9/22/2022 5:37:30 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111090424 - Design\Plan Set\3. Roadway\Standards*Hibo\SMD (2-4)-08.dgn

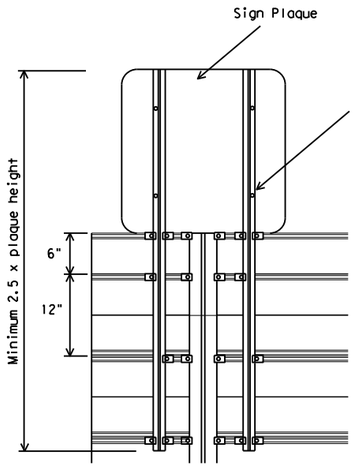


REAR VIEW

EXAMPLES (FOR DETERMINING Si and Sw)

NO.	ZONE	"d"	EXIT PANEL	WALKWAY	Si	Sw	COMMENT
1	1	15.0	YES	YES	4.5	9.0	Sw=2x(Si)
2	2	14.0	YES	NO	7.5	7.5	Sw = Si
3	1	15.0	NO	NO	8.5	8.5	Sw = Si
4	3	14.0	NO	YES	10.0	10.0	Sw = Si

Values shown for Si are maximum values. Si may be varied for different sign lengths and Truss mounting conditions. Sw should not exceed two times Si(Max.) or 10 feet.



SIGN PLAQUE MOUNTING DETAIL

MAXIMUM SIGN SUPPORT SPACING "Si" (FEET)

"d" Deepest Sign in Group (Ft.)	EXTRUDED ALUMINUM SIGN PANELS															
	WITH EXIT NUMBER PANELS								WITHOUT EXIT NUMBER PANELS							
	WITH WALKWAYS				WITHOUT WALKWAYS				WITH WALKWAYS				WITHOUT WALKWAYS			
	WIND ZONE				WIND ZONE				WIND ZONE				WIND ZONE			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
15	4.5	7	8	10	5	7	8	10	7	8	9	10	8.5	10	10	10
14	6	7.5	9.5	10	6	7.5	9.5	10	8	9	10	10	10	10	10	10
13	7.5	9	10	10	7.5	9	10	10	9	10	10	10	10	10	10	10
12	8.5	10	10	10	8.5	10	10	10	10	10	10	10	10	10	10	10
11 or less	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

For fiberglass sign installations, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- OVERHEAD SIGNS EXTRUDED ALUMINUM

SMD(2-4)-08

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		238

DATE: 9/22/2022 5:37:35 PM
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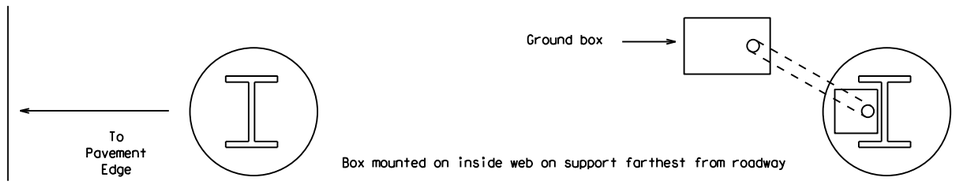
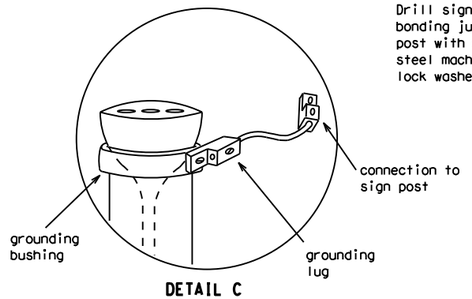


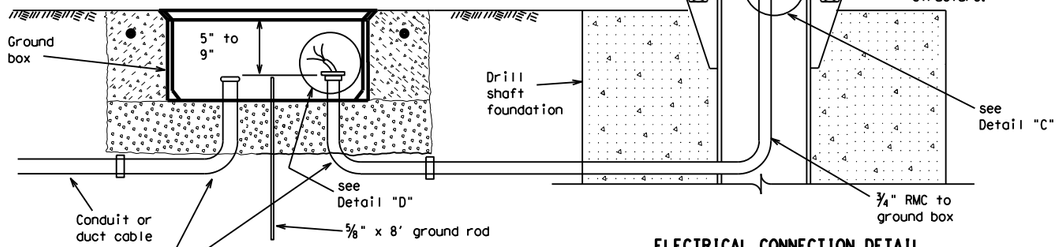
PLAN VIEW



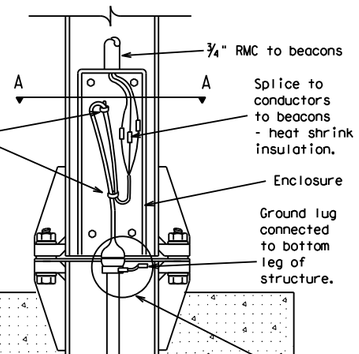
DETAIL C

Drill sign post - structure leg, terminate bonding jumper with listed connector to post with a 10-24 (3/16") min. stainless steel machine screw, nut, flat washer and lock washer made wrench tight.

2 Pull connector down tight against conduit then clamp in ground box. See Detail "D"

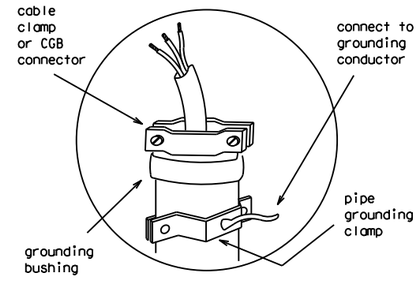


Use RMC Ells, provide grounding bushings. Terminate bonding jumper to ground rod and equipment grounding conductors.



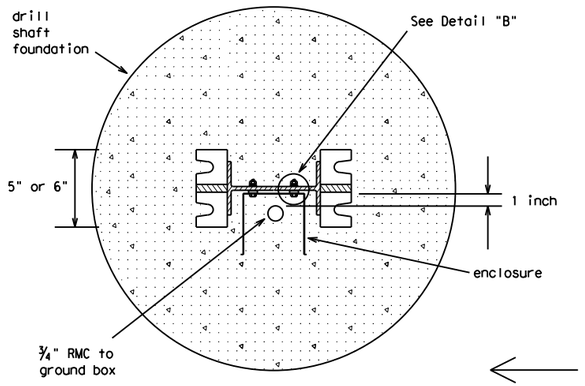
ELECTRICAL CONNECTION DETAIL

Enclosure cover not shown for clarity
Detail shows channel greater than 4 inches.
Less than 4 inches similar, see Detail A.



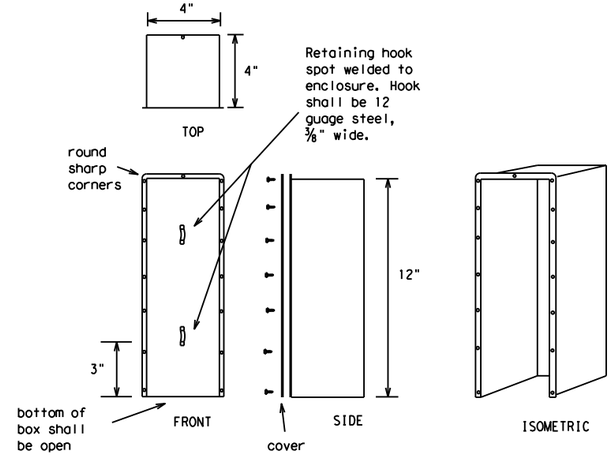
DETAIL D

Pull cable so opposite end connector is tight against conduit end, clamp cable at top of conduit as shown.



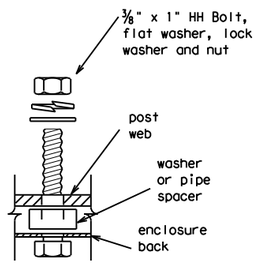
SECTION A-A

Stub-post connection
conduit, bolts and enclosure
(cover not shown)



ENCLOSURE

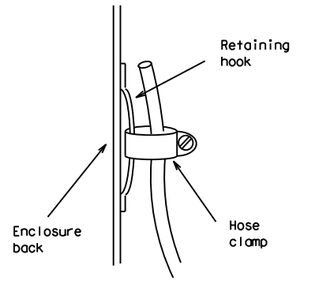
make from 12 gauge
galvanized sheet metal



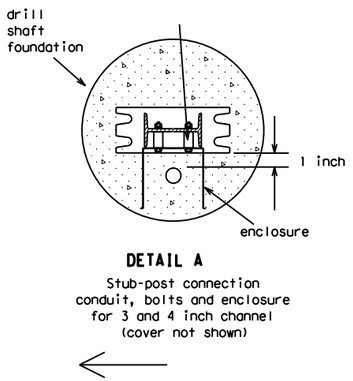
DETAIL B

enclosure connection
(4 places)

(use 2 inch bolt for
3 and 4 inch channels)



DETAIL E



DETAIL A

Stub-post connection
conduit, bolts and enclosure
for 3 and 4 inch channel
(cover not shown)

direction of
traffic

NOTES:

1. Breakaway connector shall be rated for 300 VAC, 30 amps and shall be waterproof. Connector shall be a three pole (two line conductors and neutral) polarized elastomer connector made from thermosetting synthetic polymer which remains fexible over the temperature range of -40 degrees C to 90 degrees C. The pins on the connector shall be overmolded 1 1/4" from the face of the connector toward the tips of the pins with the same material used in the construction of the connector body. This overmolding of the pins shall provide a non-conductive double taper which prevents the intrusion of water into the connection when the connectors are fully engaged. The pin receptors shall have current carrying barrels recessed 1 1/2" from the face of the connector and surrounded by beryllium copper spring sleeves. The plug/receptacle combination shall be listed by an approved testing facility (UL or Factory Mutual) as suitable for outdoor use and shall have passed a rain test and a watertight (immersion) test as approved by the Engineer.
2. The female connector shall be integrally molded to a 13' length of type SO cord containing three number 10 or number 8 AWG conductors. The male connector shall be integrally molded to a 20" length of Type SO cord containing three number 10 or number 8 AWG conductors. Cord conductors shall have colored insulation, two black and one white, or shall be taped or painted to be two black and one white. Tape or paint marking shall cover entire exposed length. The contractor shall make a brochure submittal on cord connectors. Breakaway connector and cord shall not be paid for separately, but shall be subsidiary to the various items.
3. The contractor shall install in-line waterproof fuseholders for each line conductor in the ground box. Fuses shall be fast-acting 5 amp (Bussman KTK5, Gould ATM5, Littlefuse KLK5 or equal).
1 4. Conduit shall convert to 3/4" liquidtight flexible metalic conduit below the fuse plate or knee joint and shall revert to 3/4" RMC above the fuse plate or knee joint. The length of liquidtight flexible metal conduit shall not exceed 6".
5. Ground rod clamp shall be Blackburn GG 5/8H, Weaver W5.8 or equal.
6. Ground rod to be driven to a depth to leave between 2 to 4 inches of rod above the gravel placed under the ground box. See ED(2) standard sheet for ground box details.

11-01 Revision

1 Liquidtight conduit size corrected.
2 Editing of minor notes.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- LARGE ROADSIDE SIGNS ELECTRICAL CONNECTION

SMD(2-6)-01

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

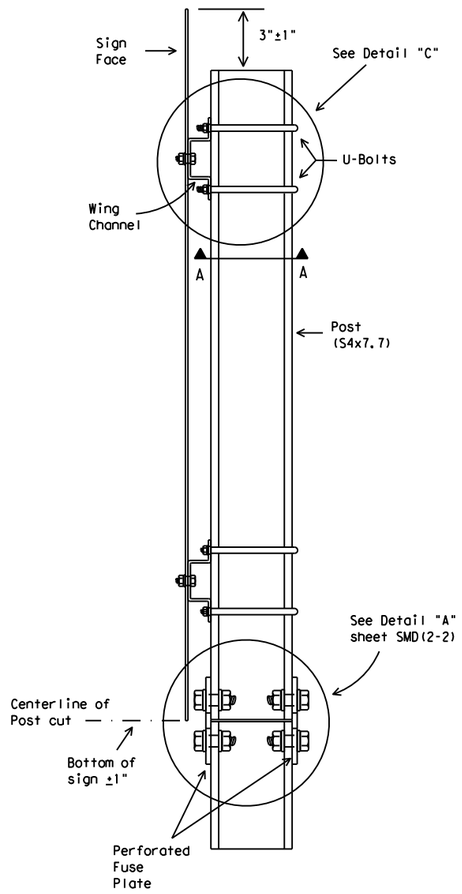
REVISIONS
11-98
11-01

CONT	SECT	JOB	HIGHWAY
0111	09	042	BS 288B

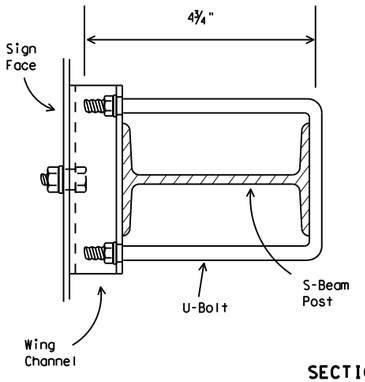
DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	239

DATE: 9/22/2022 5:37:41 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111090424 - Design\Plan Set\3. Roadway\Standards*Hiba\SMD (TY G)-08.dgn

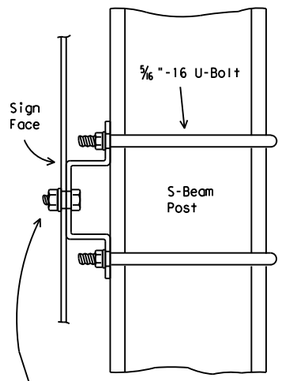
WING CHANNEL CLAMP DETAIL FOR TYPE G MOUNT



SIDE VIEW

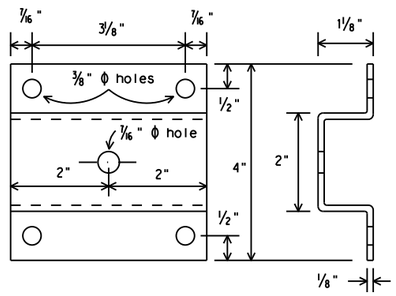


SECTION A-A



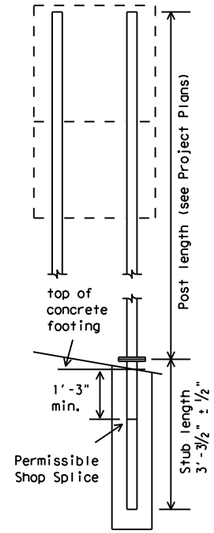
Galvanized steel or aluminum self-locking hex. head nut. 3/8 " - 16 x 3/4 " hex. head bolt for sheet metal. 3/8 " - 16 x 1 1/4 " hex. head bolt for plywood. 3/8 " galvanized medium washer.

DETAIL "C"

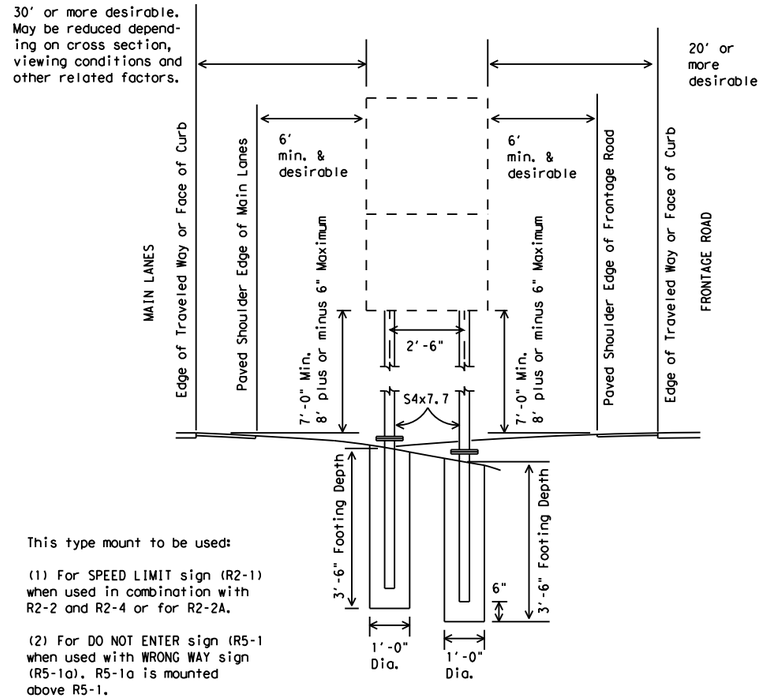


WING CHANNEL

Wing channel, 4" width x 1⅛" depth x ⅛" thickness, shall be aluminum (ASTM B221 6061-T6 or B308 6061-T6), galvanized steel (ASTM A36) or stainless steel (ASTM A167 type 304, No. 2B finish).



The weight of one S4x7.7 post is equal to 112.2 lbs. plus 7.7 lbs./ft x (post length in feet minus 10 ft). The weight of 112.2 lbs. includes 10 feet of post length, post foundation stub, related connection plates, friction fuse plate, and all high strength bolts, nuts and washers.



This type mount to be used:

(1) For SPEED LIMIT sign (R2-1) when used in combination with R2-2 and R2-4 or for R2-2A.

(2) For DO NOT ENTER sign (R5-1 when used with WRONG WAY sign (R5-1a). R5-1a is mounted above R5-1.

DEPARTMENTAL MATERIAL SPECIFICATIONS
SIGN HARDWARE DMS-7120

GENERAL NOTES:

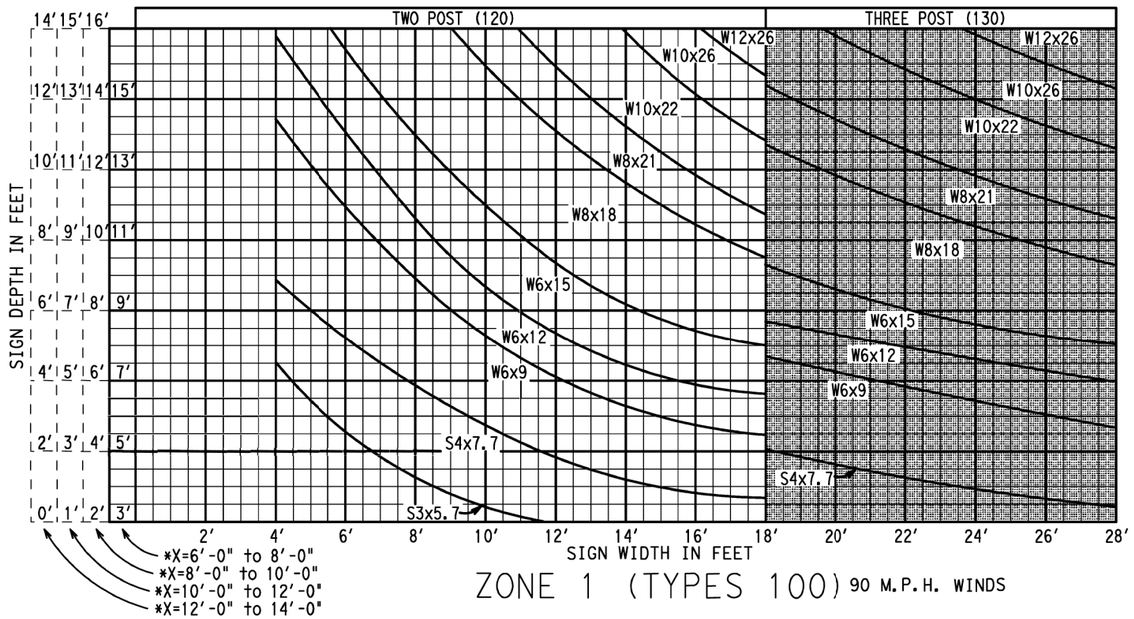
1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "Low-Alloy Steel" for non-bridge structures per Item 442, "Metal For Structures."
4. Parts shall be saw cut either before galvanizing and the galvanized cut cleaned of zinc build-up, or saw cut after galvanizing and the cut surface repaired per Item 445, "Galvanizing." (Cut surface will not be treated until plate is installed and all bolts fully tightened.)

Texas Department of Transportation
Traffic Operations Division

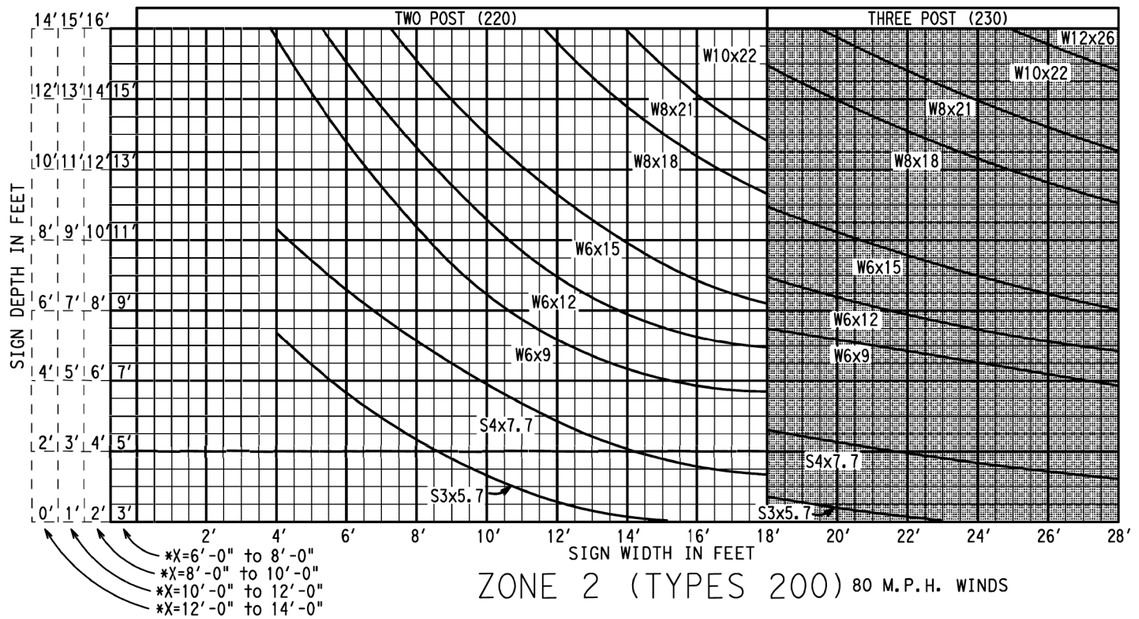
SIGN MOUNTING DETAILS, TYPE G SUPPORT

SMD(TY G)-08

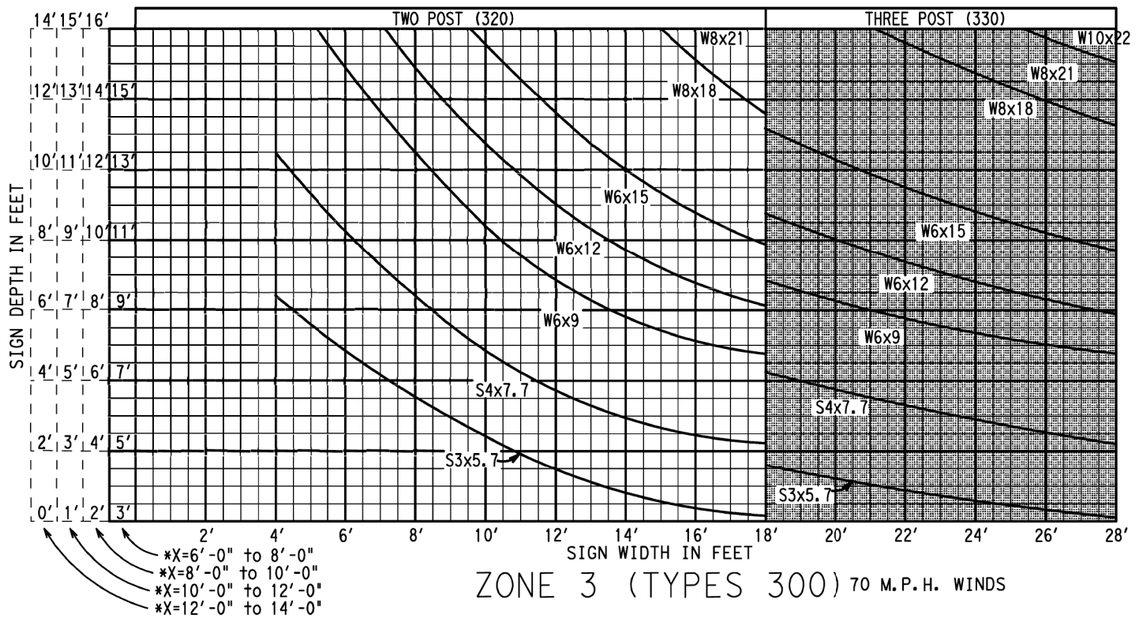
REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
1-97	CONT	SECT	JOB	HIGHWAY
9-08	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		240



ZONE 1 (TYPES 100) 90 M.P.H. WINDS



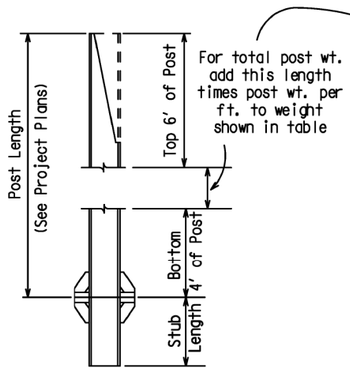
ZONE 2 (TYPES 200) 80 M.P.H. WINDS



ZONE 3 (TYPES 300) 70 M.P.H. WINDS

* NOTE: "X" EQUALS THE AVERAGE HEIGHT FROM THE GROUND LINE TO THE BOTTOM EDGE OF THE SIGN.

SHADED AREA DENOTES 3 POST SUPPORTS



POST WEIGHT DATA

POST SIZE	WEIGHT OF ONE POST (#)	WEIGHT OF TWO POSTS (#)	WEIGHT OF THREE POSTS (#)
W6x9*	123.2	246.4	369.6
W6x12*	160.3	320.6	480.9
W6x15*	167.8	335.6	503.4
W8x18*	201.8	403.6	605.4
W8x21*	254.7	509.4	764.1
W10x22*	266.0	532.0	798.0
W10x26*	308.0	616.0	924.0
W12x26*	308.6	617.2	925.8
S3x5.7*	85.9	171.8	257.7
S4x7.7*	112.2	224.4	336.6

*LAST FIGURES=POST WT. PER FT.

Weight Data is the weight of items shown for one, two or three posts - (includes top 6' of post, bottom 4' of post, post foundation stub, related base connection plates and stiffeners, friction fuse plate and all high strength bolts, nuts and washers).

SIGN TYPE

SIGN TYPE 1 3 0

- 1 — Wind Design Zone
- 3 — Series No.
- 0 — No. of Posts

0 Aluminum/Fiberglass
1 Aluminum
2 Fiberglass

Note: Footings for S3x5.7 and S4x7.7 post sizes shall be non-reinforced with Class A concrete, while footing for all other post sizes shall be reinforced with Class C concrete.

Texas Department of Transportation
Traffic Operations Division

LARGE ROADSIDE SIGN SUPPORTS
POST SELECTION
WORKSHEET
SMD(8W1)-08

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

REVISIONS
1-82
5-01
9-08

COUNT	SECT	JOB	HIGHWAY
0111	09	042	BS 288B

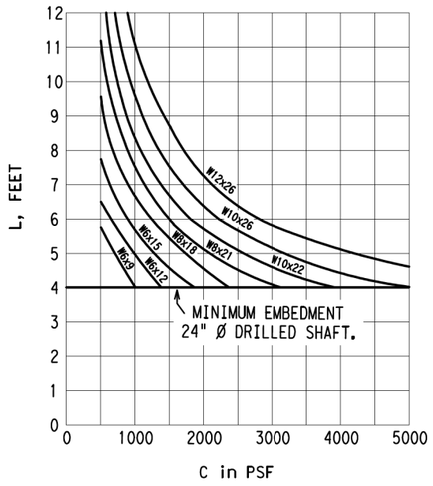
DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	241

29A

DATE:
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\01109042\4 - Design\Plan Set\3. Roadway\Standards*Hiba\SMD (8 W1).dgn

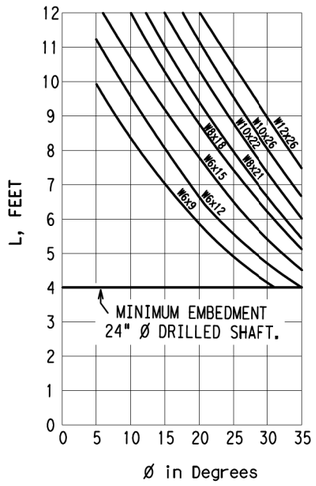
DATE:
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111090042\4 - Design\Plan Set\3. Roadway\Standards*Hiba\SMD (8 W2).dgn

I



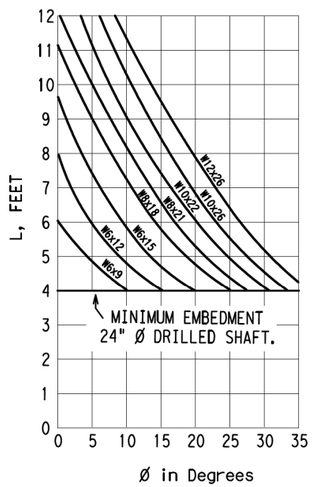
Ø = 0 Degrees

II



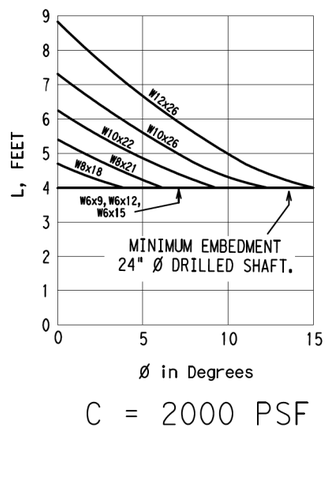
C = 0 PSF

III



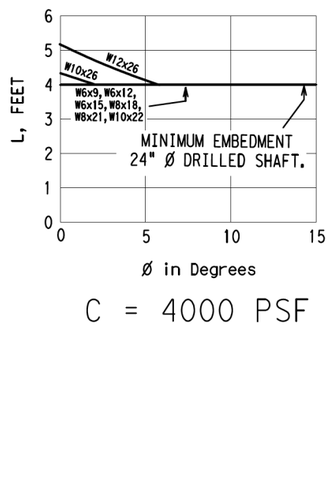
C = 500 PSF

IV



C = 2000 PSF

V



C = 4000 PSF

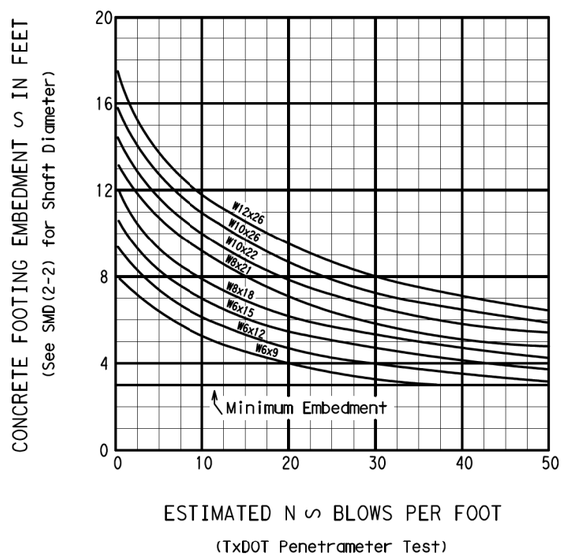
DRILLED CONCRETE FOOTING DEPTH CHART
(COHFRIC DESIGN)

NOTE: THESE CHARTS MAY BE USED AS AN ALTERNATE TO THE CHART BELOW, PROVIDED THAT SOIL COHESION AND INTERNAL FRICTION (COHFRIC) DATA ARE AVAILABLE.

LEGEND:

L = Required embedment of concrete drilled shaft, in feet
C = Cohesive shear strength of soil, in psf
Ø = Angle of internal friction of soil, in degrees

For values of C and Ø which are intermediate to those on the charts, embedments may be determined by straight - line interpolation.



DRILLED CONCRETE FOOTING DEPTH CHART
(TxDOT PENETROMETER DESIGN)

NOTE: ESTIMATED N SHOULD BE BASED AT APPROXIMATELY THE UPPER ONE-THIRD POINT OF THE DRILLED CONCRETE FOOTING BELOW THE GROUND LINE

Note:
1. Curves shown on this sheet are applicable for reinforced concrete footings only.

Texas Department of Transportation
Traffic Operations Division

LARGE ROADSIDE SIGN SUPPORTS FOUNDATION WORKSHEET
SMD(8W2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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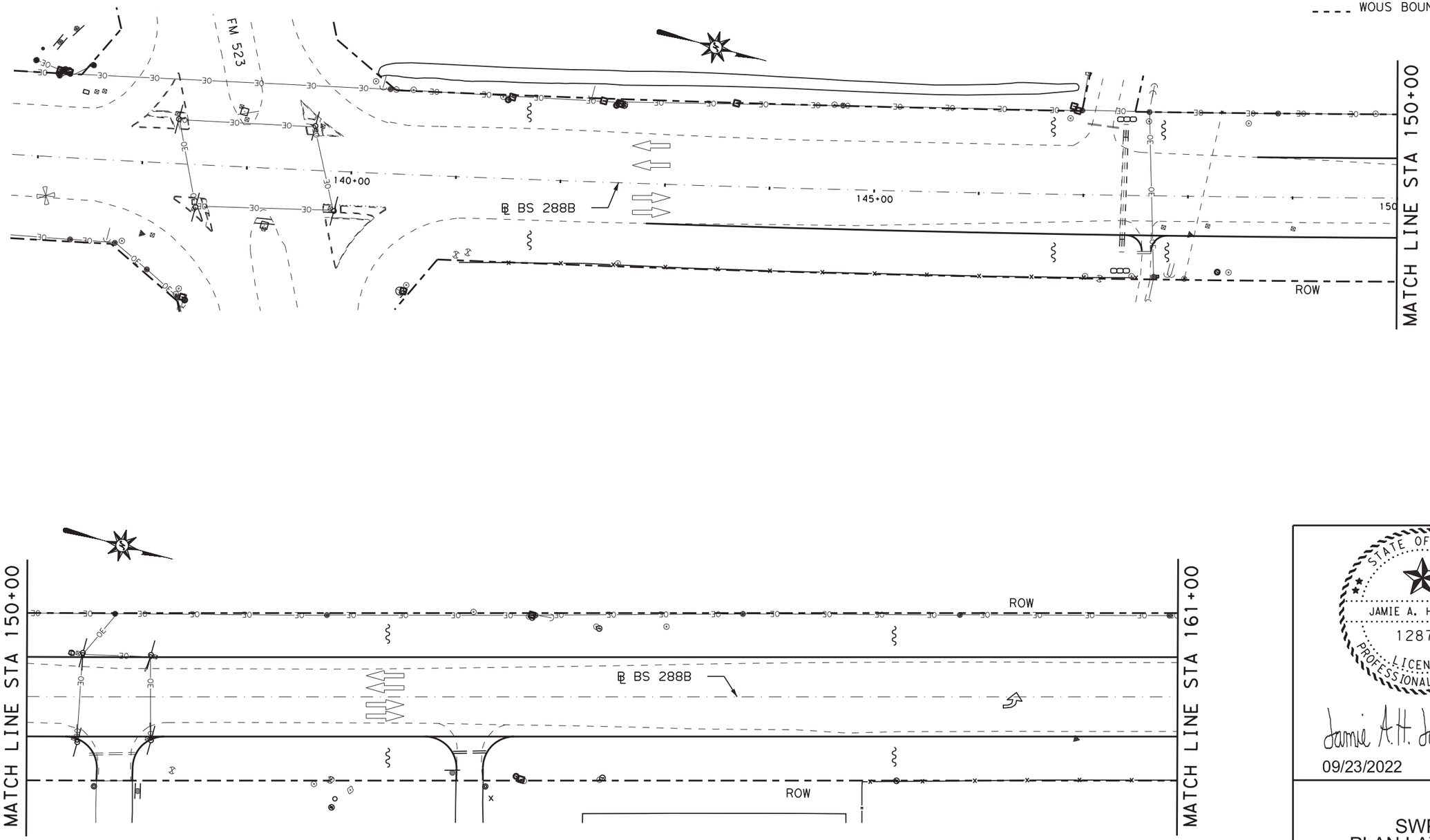
4-78	0111	09	042	BS 288B
9-08	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		242



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DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		243

SCALE 1"=100'
SHEET 1 OF 13

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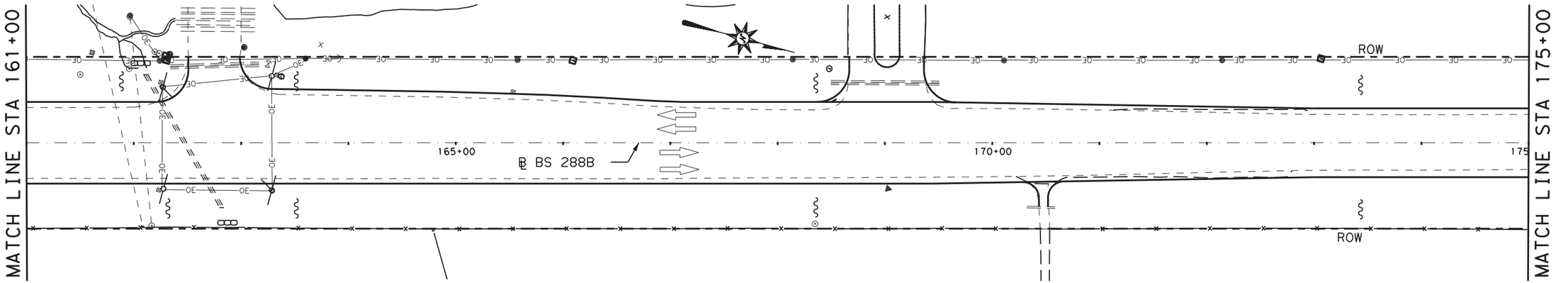
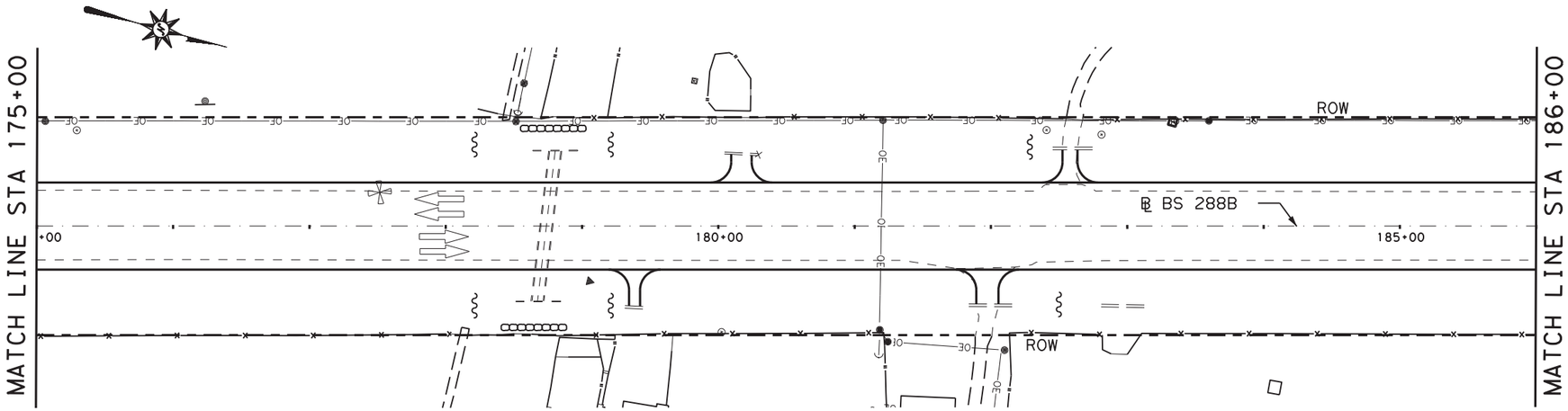
LEGEND:

PROP ROCK FILTER DAM
PROP SILT FENCE
WOUS BOUNDARY





SCALE 1"=100'
SHEET 2 OF 13

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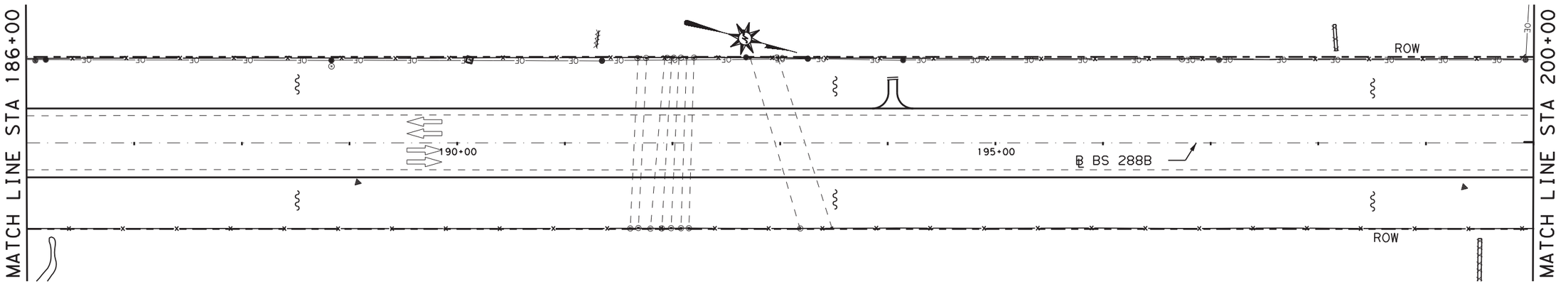
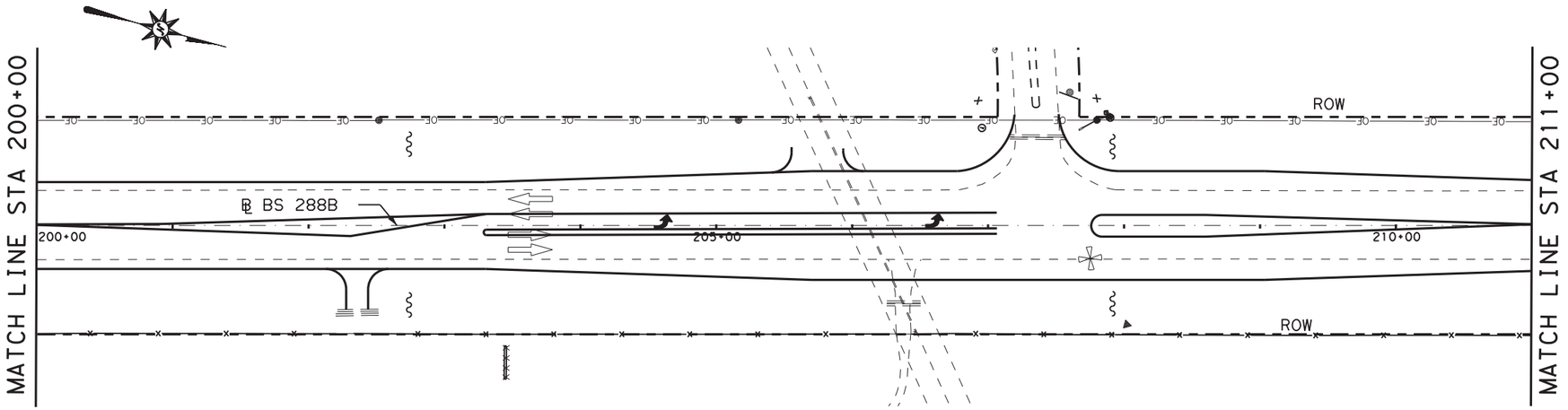
PROP SILT FENCE
WOUS BOUNDARY





SCALE 1"=100'
SHEET 3 OF 13

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LEGEND:

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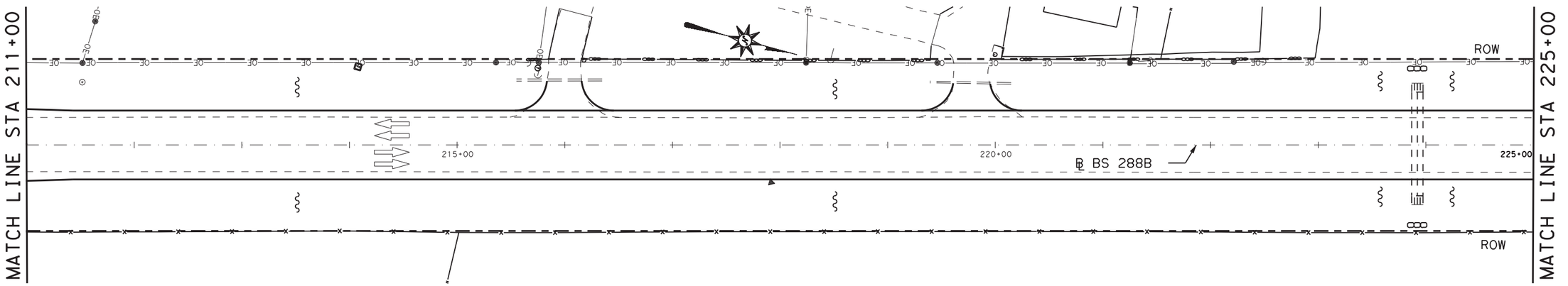
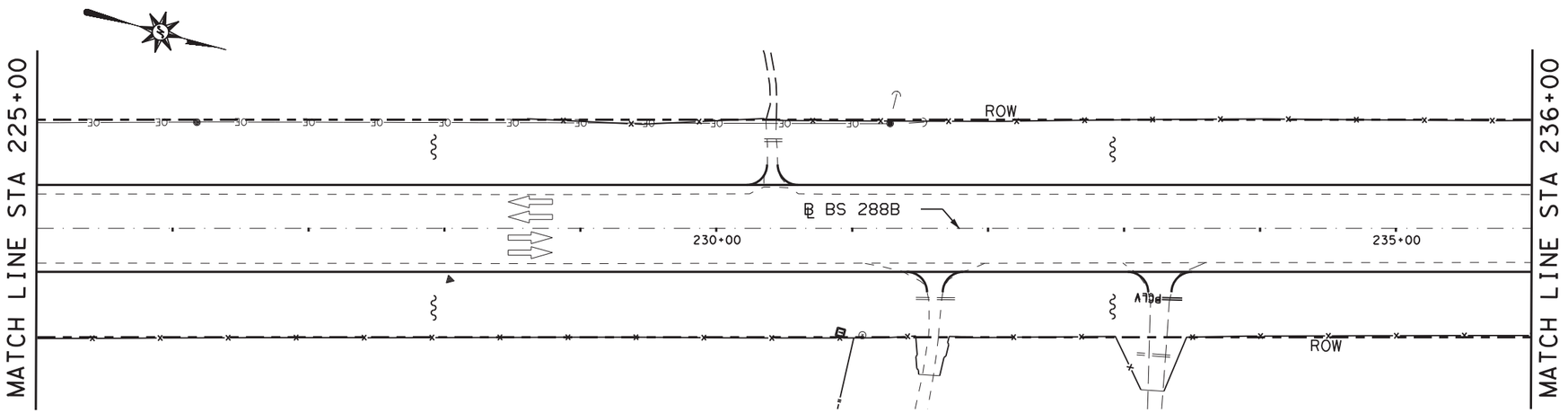
PROP SILT FENCE
WOUS BOUNDARY





SCALE 1"=100'
SHEET 4 OF 13

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LEGEND:

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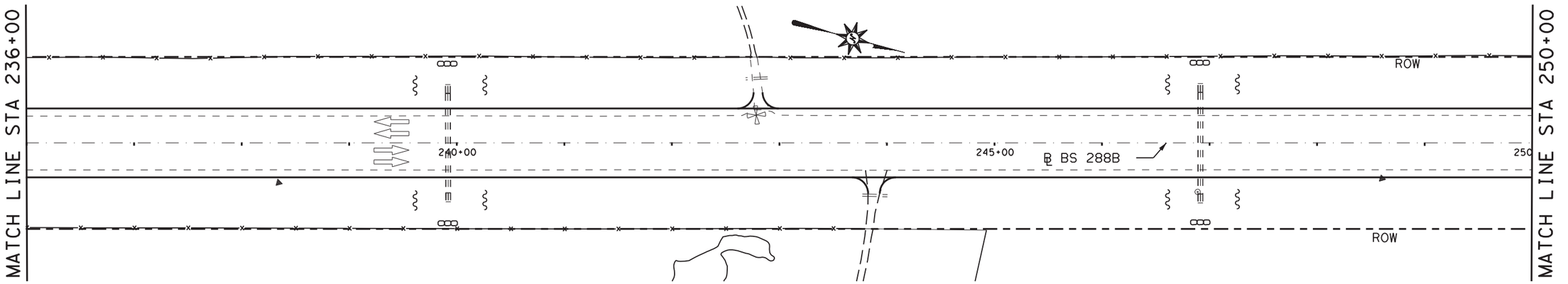
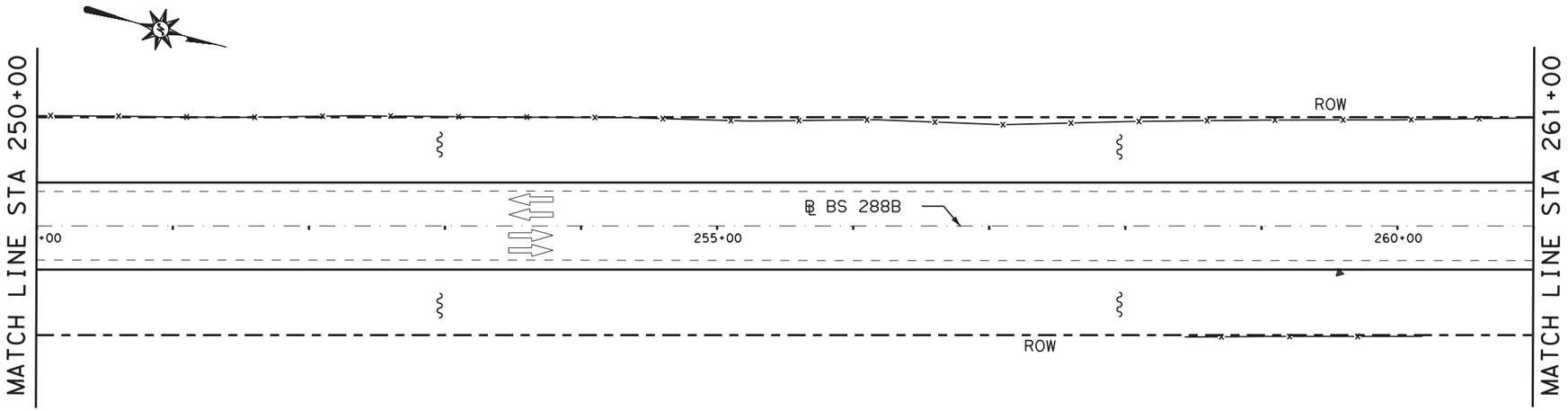
PROP SILT FENCE
WOUS BOUNDARY





SCALE 1"=100'
SHEET 5 OF 13

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LEGEND:

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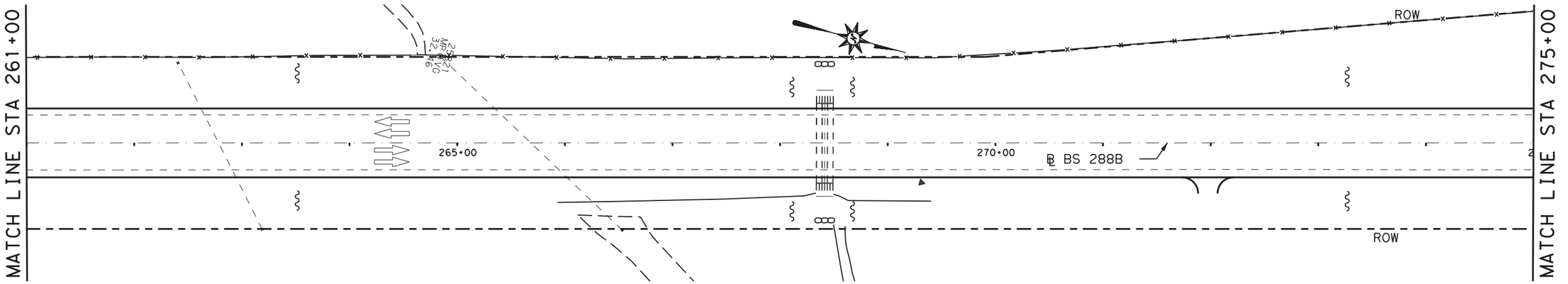
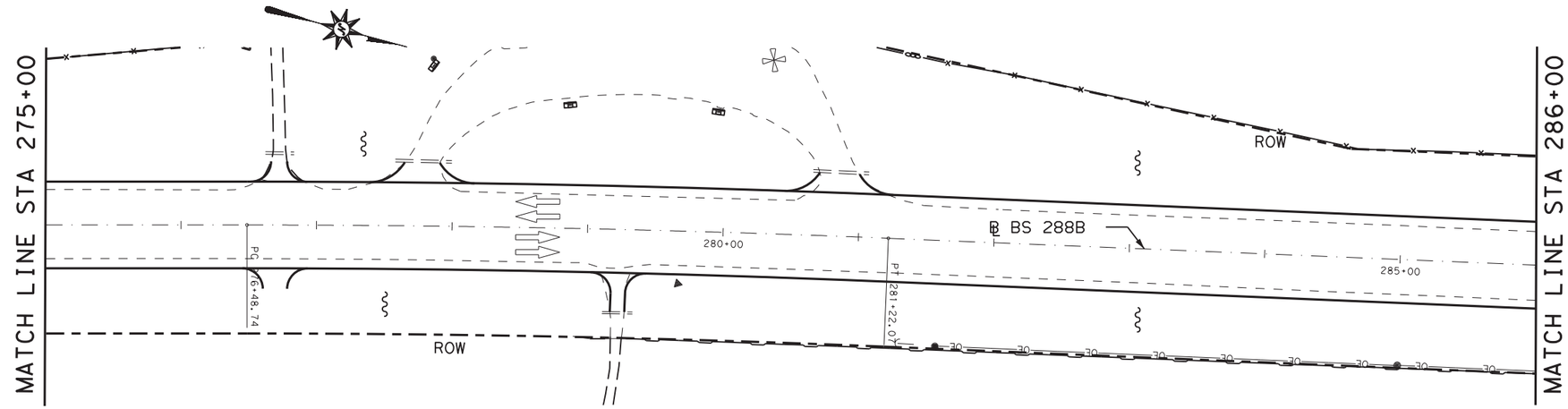
PROP SILT FENCE
WOUS BOUNDARY





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SCALE 1"=100'
SHEET 6 OF 13

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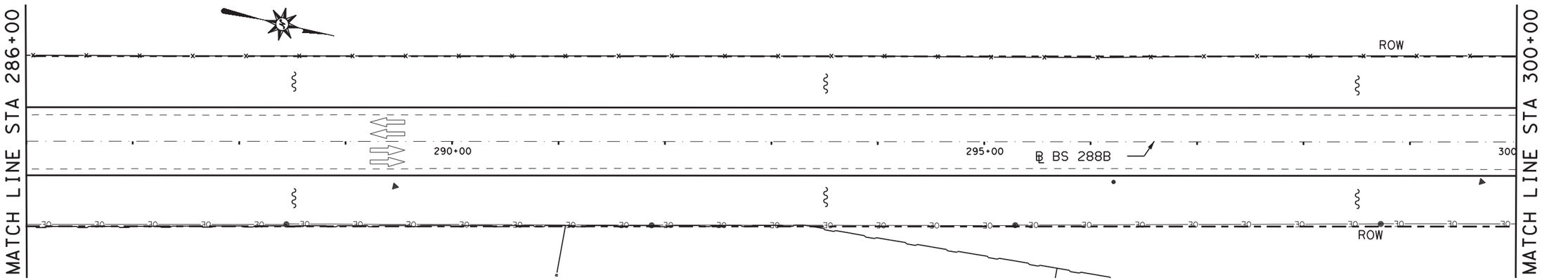
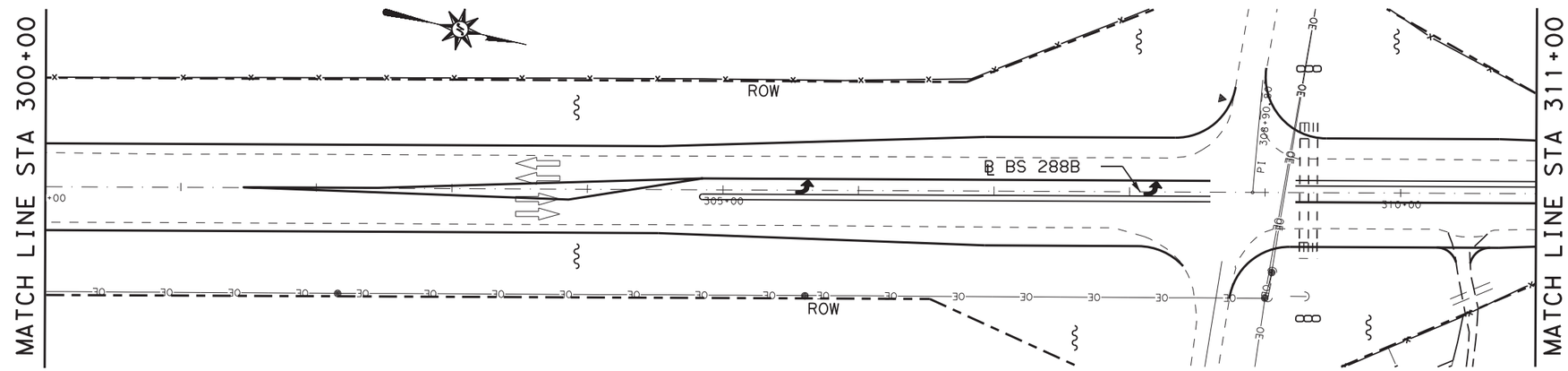
LEGEND:

PROP ROCK FILTER DAM
PROP SILT FENCE
WOUS BOUNDARY





SCALE 1"=100'
SHEET 7 OF 13

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DIST.	COUNTY		SHEET NO.
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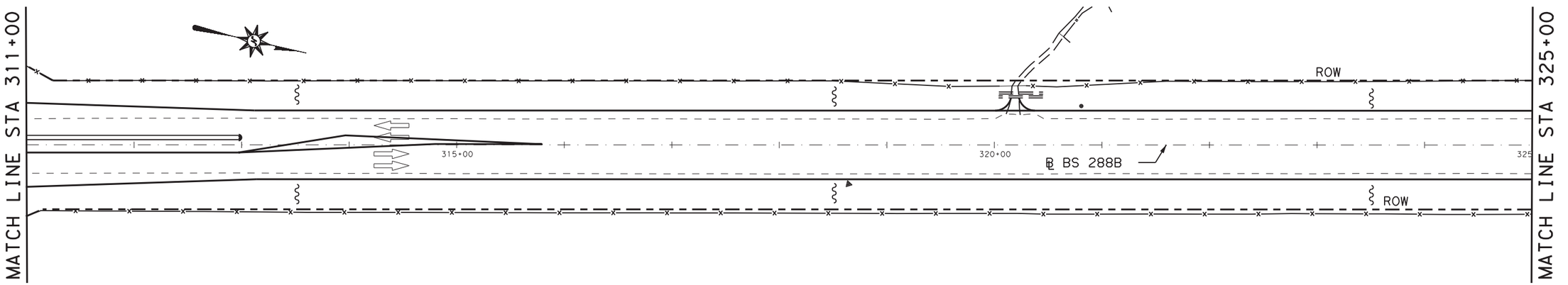
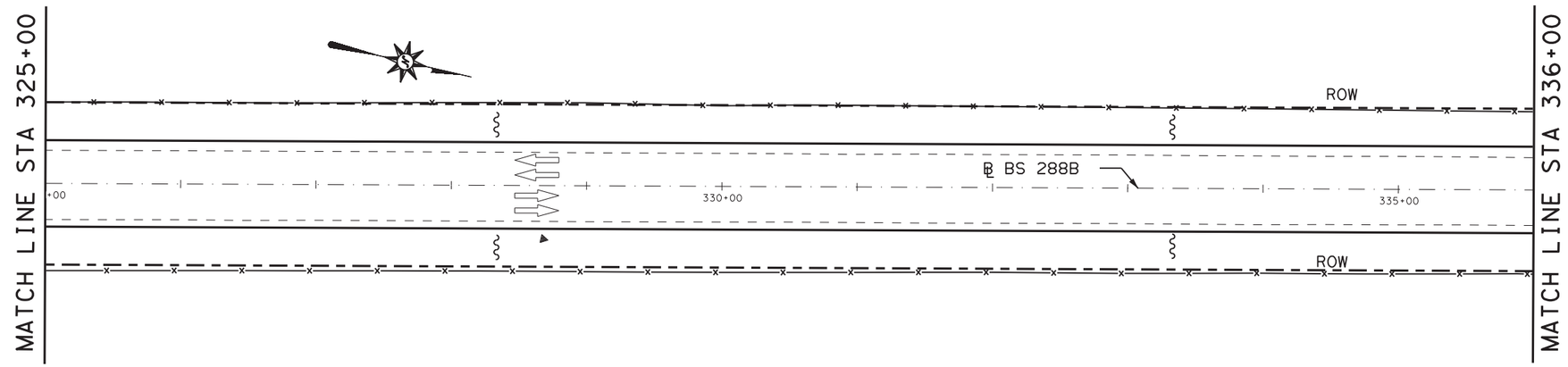
LEGEND:

PROP ROCK FILTER DAM
PROP SILT FENCE
WOUS BOUNDARY





SCALE 1"=100'
SHEET 8 OF 13

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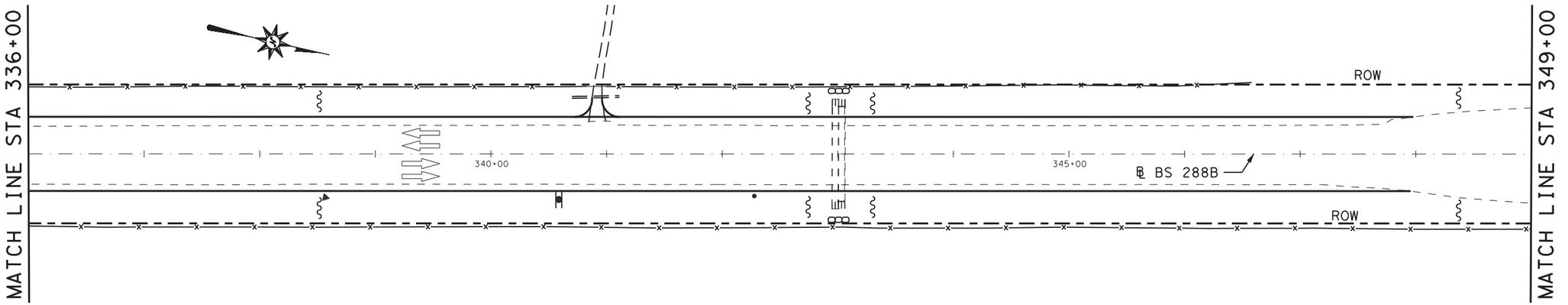
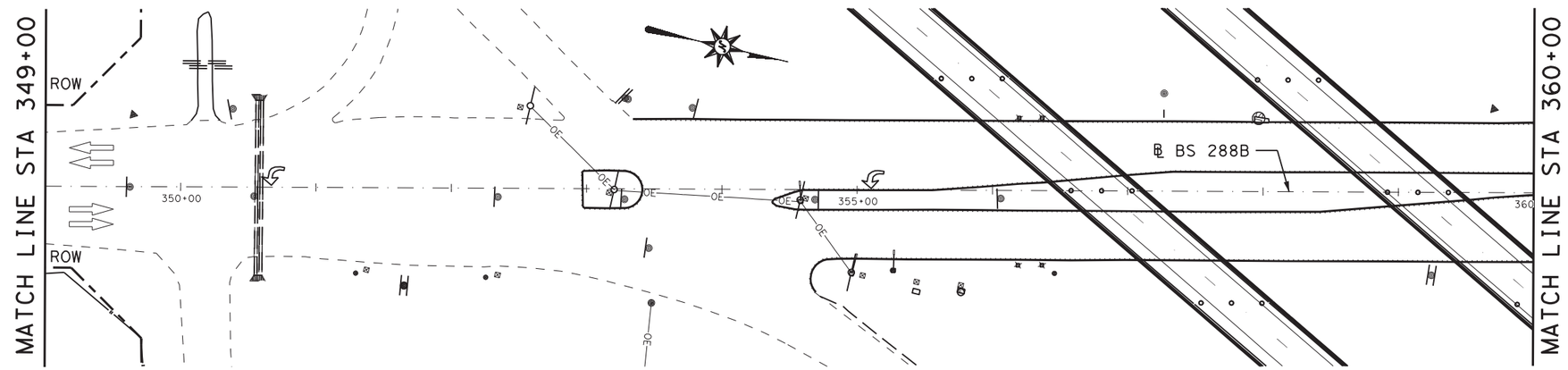
LEGEND:

PROP ROCK FILTER DAM
PROP SILT FENCE
WOUS BOUNDARY





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0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
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SCALE 1"=100'
SHEET 9 OF 13

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LEGEND:

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PROP SILT FENCE
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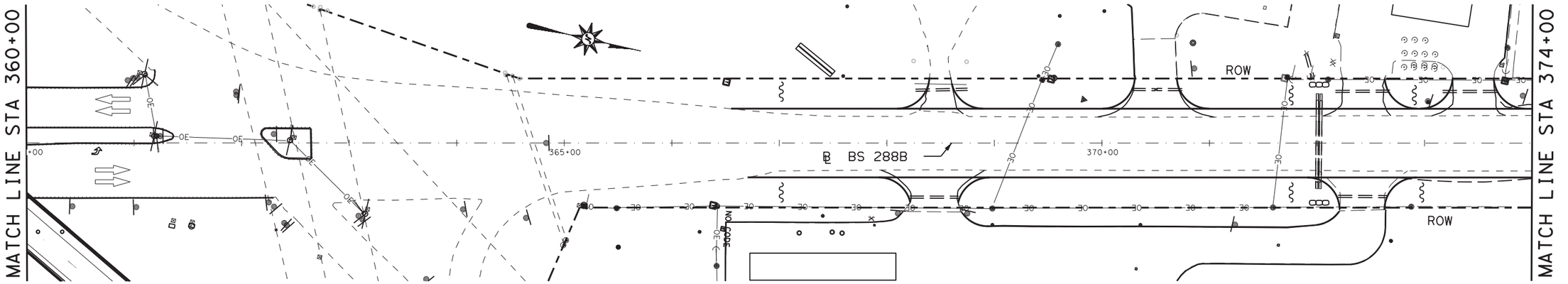

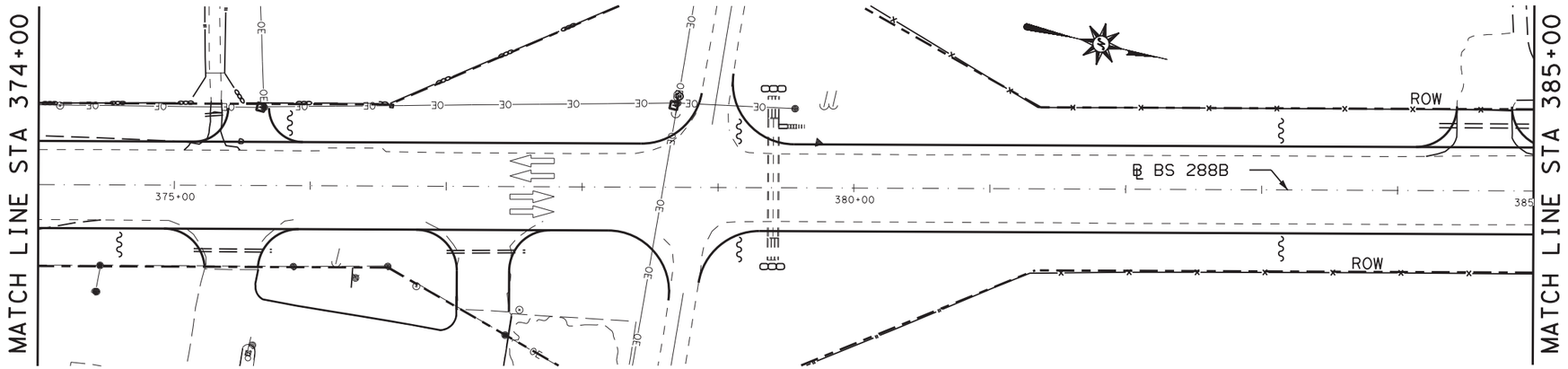

SCALE 1"=100'
SHEET 10 OF 13

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CONT.	SECT.	JOB	HIGHWAY NO.
0111	09	042	BS 288B
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		252

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LEGEND:

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PROP SILT FENCE
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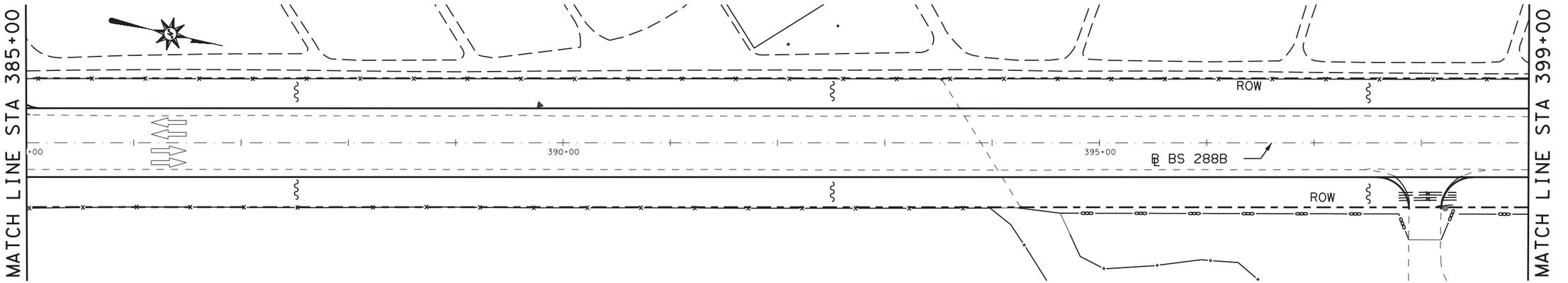

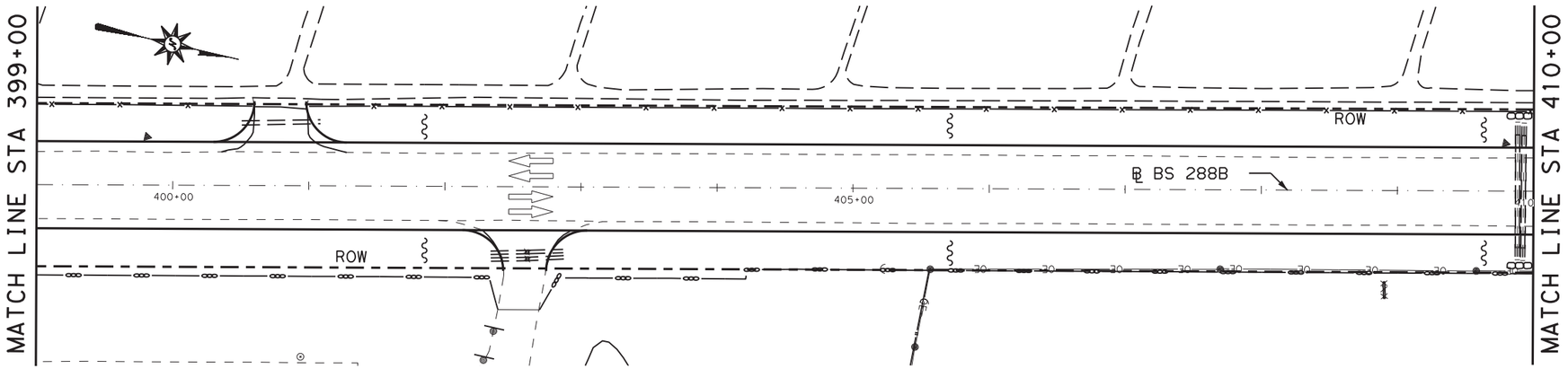

SCALE 1"=100'
SHEET 11 OF 13

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HOU	BRAZORIA		253

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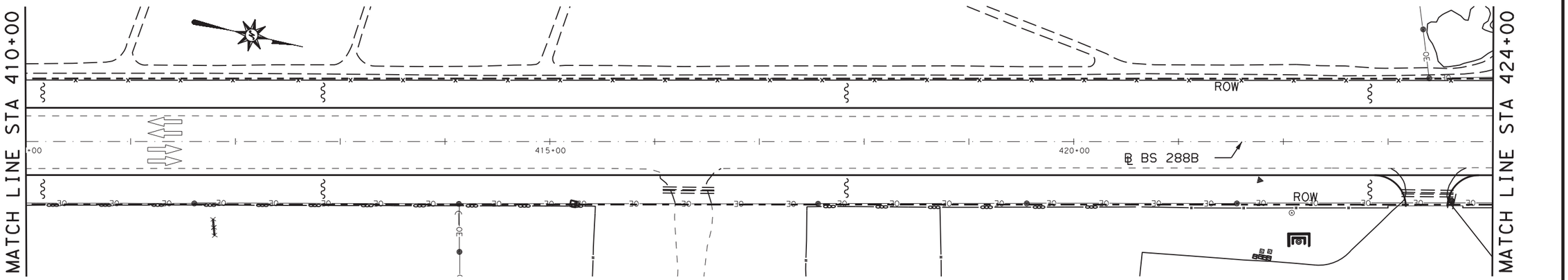

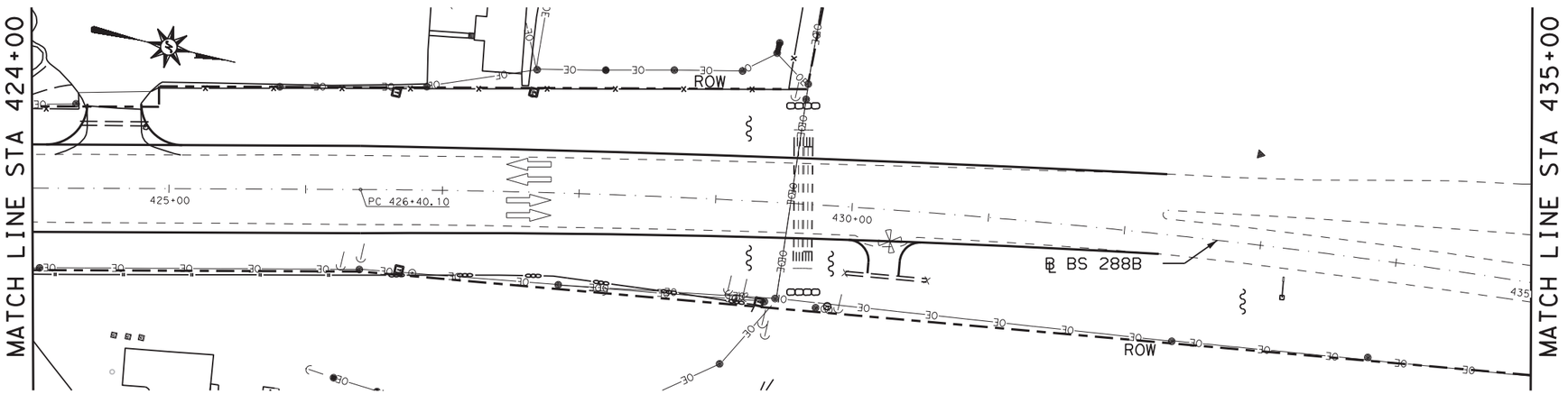

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DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		254

SCALE 1"=100'
SHEET 12 OF 13

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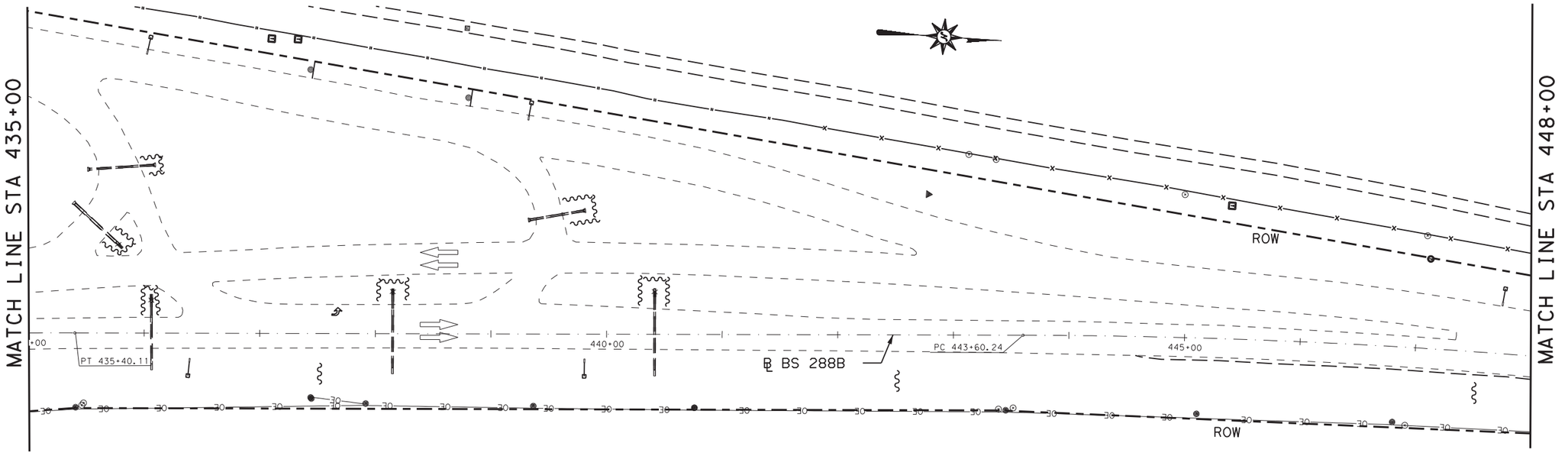
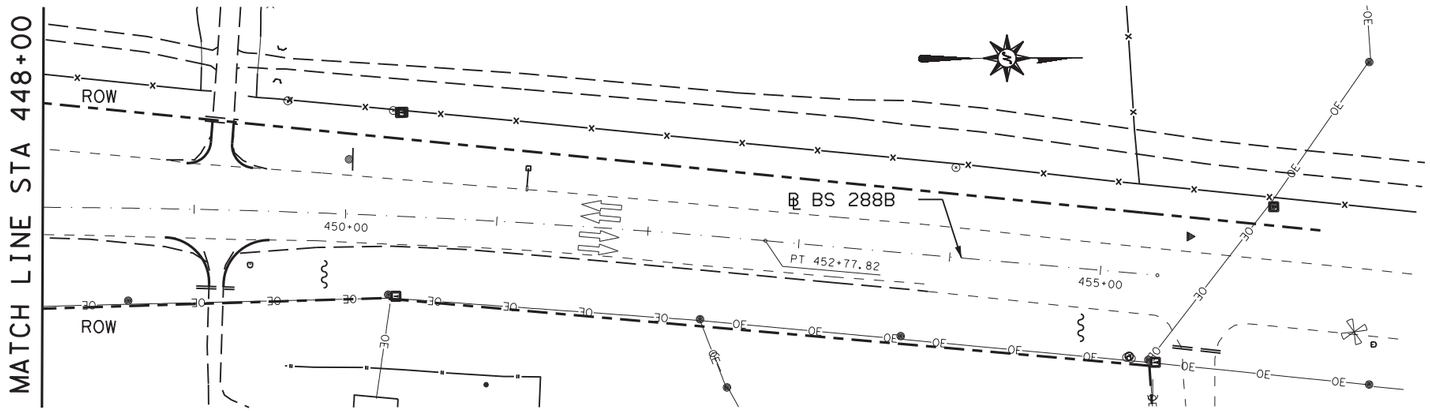
LEGEND:

PROP ROCK FILTER DAM

PROP SILT FENCE

WOUS BOUNDARY





SCALE 1"=100'
SHEET 13 OF 13

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GENERAL TREE PROTECTION NOTES:

1. Protect and ensure the continued good health of existing trees identified on the plans or directed by the Engineer. Protective measures include providing, installing, maintaining and removing protective fences, bound wood planking, compost, berm pruning, boring, and watering.
2. Install tree protection before any heavy equipment arrives on the site and remains in place for the duration of the project.

PROTECTIVE FENCE

1. Critical Root Zone (CRZ)= 1 foot radius per 1 caliper inch of trunk diameter.
2. Place protective fence at the edge of the critical root zone of trees to be protected. Use 4 feet high orange plastic mesh or approved equivalent supported on steel T-posts. Use steel T-posts minimum of 6 feet long, spaced at intervals sufficient to keep fence pulled tight. Stretch smooth galvanized wire from post to post across the top of fence and draw tight. Attach plastic mesh to posts and top wire with aluminum tie wire or nylon ties.
3. No excavation, grading, filling, soil compaction, parking, or equipment storage is allowed within the fenced area.
4. When a construction zone overlaps the root zone due to lack of space, place fence within 2 feet of construction zone.
5. Install protective compost filter berm at base of protective fence as shown in detail and described in these notes under "Root Zone Protection". Compost filter berm functions as a protective filter from runoff associated with construction activities such as: concrete wash, erosion, fill, chemicals, cement and lime work and other activities.

VEGETATIVE WATERING FOR TREE PROTECTION

1. Water trees at a rate of 30 gallons per week for every week during construction activities. Watering is paid for separately under Item 168-6001 Vegetative Watering.

TRUNK PROTECTION

1. Where protective fence is located closer than 6 feet from a tree trunk from any direction, protect the tree trunk with bound wood planking. Wood planks may be construction grade lumber a minimum of 1 inch by 6 inch nominal. Band planks together with rope, band, or strap of sufficient gauge and quality to keep protective planking in place around tree trunk for the duration of the project. Install wood planks of sufficient length to protect the trunk to a height of 10 feet, or the height of the lowest major branching, whichever is less. Do not use nails, screws or other damaging attachment methods.

ROOT ZONE PROTECTION

1. Cover entire area of critical root zone with 4" depth of erosion control compost. Erosion control compost is paid for separately under Item 161-6009 Erosion Control Compost. See standard specification for compost requirements.
2. Install protective compost filter berm at base of protective fence along entire edge of critical root zone as shown on detail this sheet. Dimensions of compost filter berm are 1 foot tall, and 2 feet wide at base. Use erosion control compost for berm paid for under Item 161-6009 Erosion Control Compost. Maintain berm throughout project.
3. Vehicular traffic, stockpiling or storage of materials, parking of equipment and refueling equipment is prohibited in protected areas.

BORING, TRENCHING, GRADING, AND PRUNING

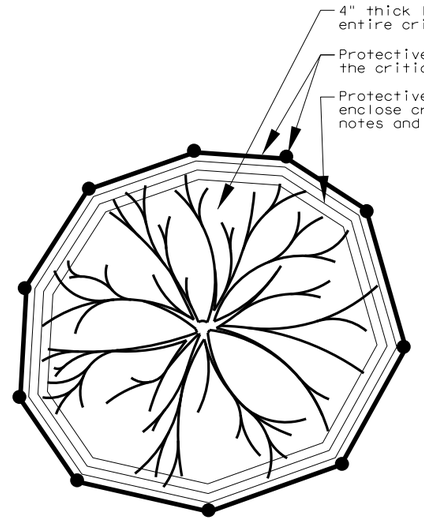
1. Where shown in plans, underground utilities crossing under protected areas will be bored beneath critical root zones. Avoid boring directly beneath root flare. Bore depth is 4 feet below existing grade.
2. No trenching, excavating, filling, or compaction is allowed within the critical root zone except as specifically identified in the plans and approved by the Engineer.
3. When existing grade must be cut within the critical root zone, contact the Engineer prior to beginning work. Before grading or excavation work, saw cut roots to the depth of the proposed disturbance along the edge of the proposed disturbance before excavation is begun.
4. Prune flush with soil any roots exposed by construction. Backfill root areas with good quality topsoil as soon as possible. If exposed root areas are not to be backfilled within two days, then cover with a minimum of six inches of erosion control compost. Erosion compost is paid for separately under Item 161-6009 Erosion Control Compost.
5. When grading within the critical root zone, use hand or small equipment and alter grade no more than two inches. No soil disturbance is allowed on the root flare under any circumstances.
6. Perform any pruning to provide clearance for structures, vehicular traffic, and construction equipment before construction damage might occur. Prune any limb damage within two hours of occurrence and according with ANSI A300-1995 standard.

MAINTENANCE OF TREE PROTECTION MATERIALS

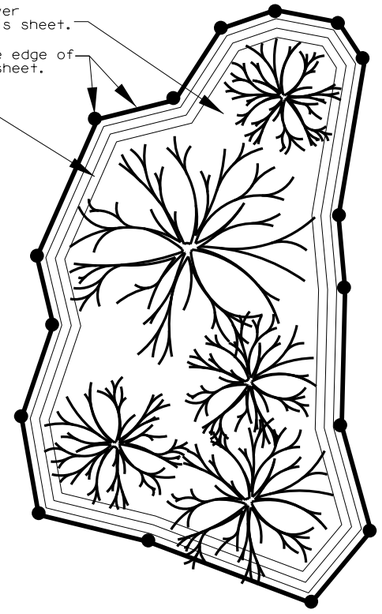
1. Maintain all tree protection materials throughout entire length of project. Repair damaged or affected tree protection materials. Additional erosion control compost may be required during the project and will be paid for separately.

REMOVAL OF TREE PROTECTION MATERIALS

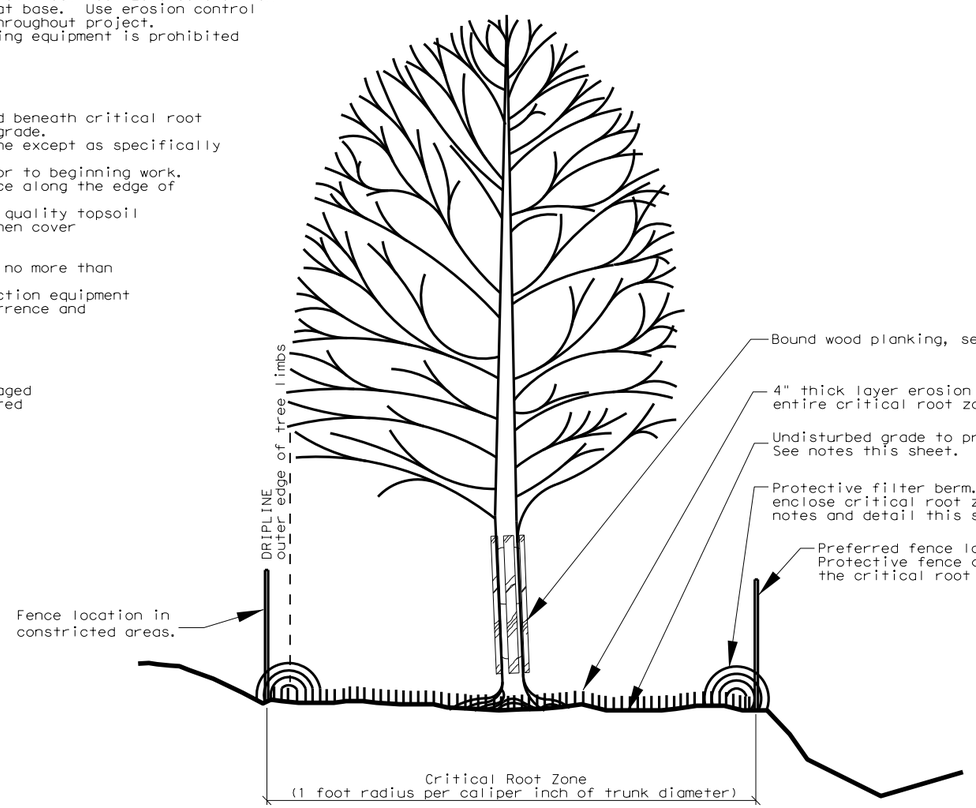
1. Remove and dispose of all protective fencing and trunk protection at end of project.



PLAN VIEW OF INDIVIDUAL TREE AND PROTECTIVE FENCE



PLAN VIEW OF TREE GROUP AND PROTECTIVE FENCE



TYPICAL TREE PROTECTION

REQUIRED ITEMS:

- Item 1004-6001 Tree Protection EA
- Item 1004-6002 Tree Protection AC
- Item 161-6009 Erosion Control Compost CY
- Item 168-6001 Vegetative Watering MG

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HOUSTON DISTRICT

TREE PROTECTION
SHEET 1 OF 1

Details not to scale

FILE:	FED DIV	STATE	PROJECT NUMBER			SHEET
	6	TEXAS	C-111-9-42			BS 288B
REVISED: FEB 2015 FOR 2014 SPECS	DIST	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	12	BRAZORIA	0111	09	042	256

STD K-3

SITE DESCRIPTION

PROJECT LIMITS: BS 288B: FROM FM 523 TO FM 521

PROJECT DESCRIPTION: PROJECT IS TO CONSTRUCT THE WIDENING THE EXISTING 4 -LANE HIGHWAY TO ADD 8 FT SHOULDERS FROM FM 523 TO FM 521. PROJECT INCLUDES PAVEMENT REPAIR, OCST, 1.5 IN OVERLAY AND PAVEMENT MARKINGS.

MAJOR SOIL DISTURBING ACTIVITIES: GRADING, TEMPORARY WIDENING, EXTENSION OF STRUCTURES, PERMANENT NEW CONSTRUCTION OF WIDENED RURAL HIGHWAY

TOTAL PROJECT AREA: 75.20 AC

TOTAL AREA TO BE DISTURBED: 39.22 AC

WEIGHTED RUNOFF COEFFICIENT:
(AFTER CONSTRUCTION): 0.67

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

THIS PROJECT CONSISTS OF LAKE CHARLES CLAY AND BERNARD-EDNA COMPLEX.
IT HAS 95% VEGETATION COVERAGE IN GOOD CONDITION

NAME OF RECEIVING WATERS:

WATERS COLLECT IN DITCHES AND EXISTING OUTFALL CHANNELS THEN INTRACOASTAL WATERWAY THEN EVENTUALLY GULF OF MEXICO

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

___ TEMPORARY SEEDING
_X_ PERMANENT PLANTING, SODDING, OR SEEDING
_X_ MULCHING
___ SOIL RETENTION BLANKET
___ BUFFER ZONES
___ 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:

N/A

STORM WATER MANAGEMENT:

ANY DEVICES REQUIRED TO MINIMIZE RUNOFF IN THE EVENT OF A STORM WILL BE PLACED IN POSITION BEFORE CONSTRUCTION BEGINS. THE STORM WATER DRAINAGE WILL BE PROVIDED BY THE EXISTING SYSTEMS ALREADY IN PLACE. WATER WITHIN THE RIGHT OF WAY WILL BE CARRIED BY DITCHES WHERE IT WILL OUTFALL INTO THE RECEIVING WATERS.

THERE WILL BE NO DEVICES INSTALLED DURING THE CONSTRUCTION PROCESS TO CONTROL STORM WATER DISCHARGES THAT WILL REMAIN AFTER CONSTRUCTION OPERATIONS HAVE COMPLETED.

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
___ LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
___ EXCESS DIRT ON ROAD REMOVED DAILY
___ 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
JAMIE A. H. JONES
128752
LICENSED PROFESSIONAL ENGINEER

Jamie A.H. Jones

09/23/2022

Texas Department of Transportation
Houston District

TxDOT STORM WATER POLLUTION PREVENTION PLAN

SWP3

FILE: STDG1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
©TxDOT JANUARY 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6	C 111-9-42	257
9/2010 INSPECTION NOTE	COUNTY		CONTROL	SECT	JOB	HIGHWAY
9/2013 INSPECTION NOTE	BRAZORIA		0111	09	042	BS 288B
11/2013 SW3P TO SWP3						
05/2015 2014 SPECS						

STD G-1

I. STORMWATER POLLUTION PREVENTION

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506. Refer to Storm Water Pollution Prevention Plan (SWP3) Houston District standard plan.

No Additional Comments

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS

United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.

☒ No United States Army Corps (USACE) Permit Required

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set. The USACE general conditions are in the "General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) with a Pre-Construction Notification (PCN). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set. The USACE general conditions are in the "General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Individual Permit (IP). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set.

☐ Work would be authorized by the United States Army Corps of Engineers (USACE) permit. The project specific permit issued by the USACE will be provided to the contractor.

United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.

☒ No United States Coast Guard (USCG) Coordination Required

☐ United States Coast Guard (USCG) Permit

☐ United States Coast Guard (USCG) Exemption

No Additional Comments

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the area and contact the Engineer immediately.

No Additional Comments

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.

No Additional Comments

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS

If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to September 30). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document "Avoiding Migratory Birds and Handling Potential Violations" found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

No Additional Comments

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor's degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

No Additional Comments

VII. OTHER ENVIRONMENTAL ISSUES

Comments:

DATE: Apr 04, 2018
FILE:

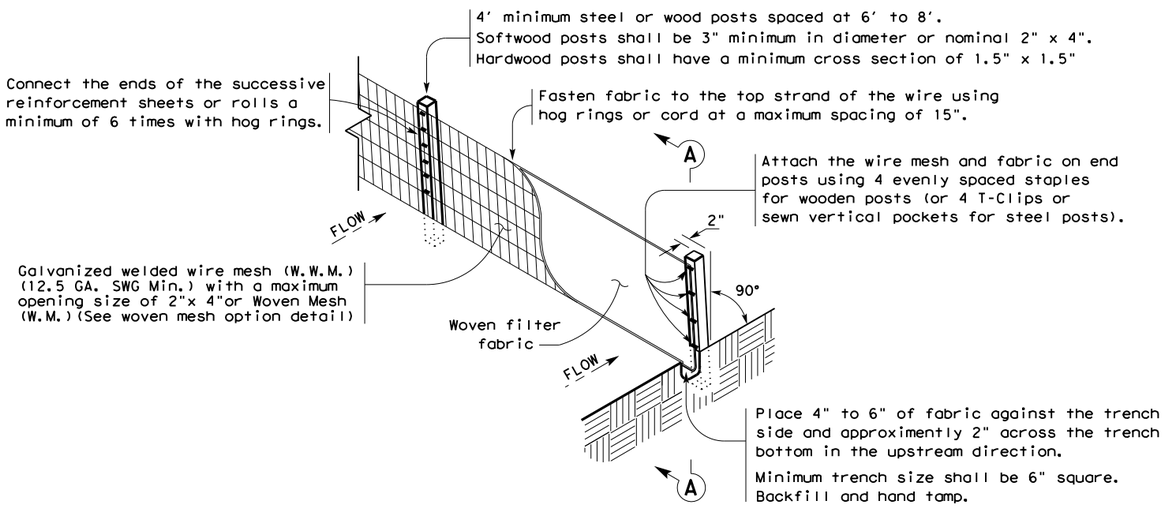
Version 2.0

Texas Department of Transportation | TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

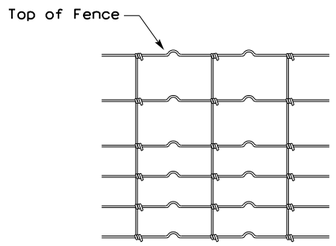
EPIC

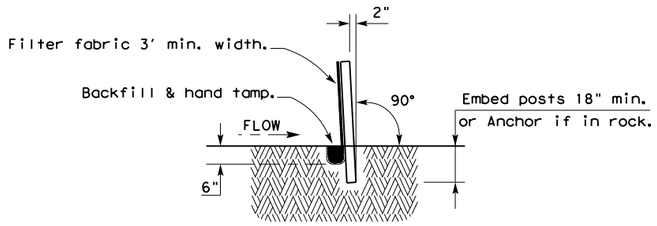
FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
UPDATED section V. text and added definition (10/17)	DIST	COUNTY		SHEET NO.
	Hou	Brazoria		258



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.

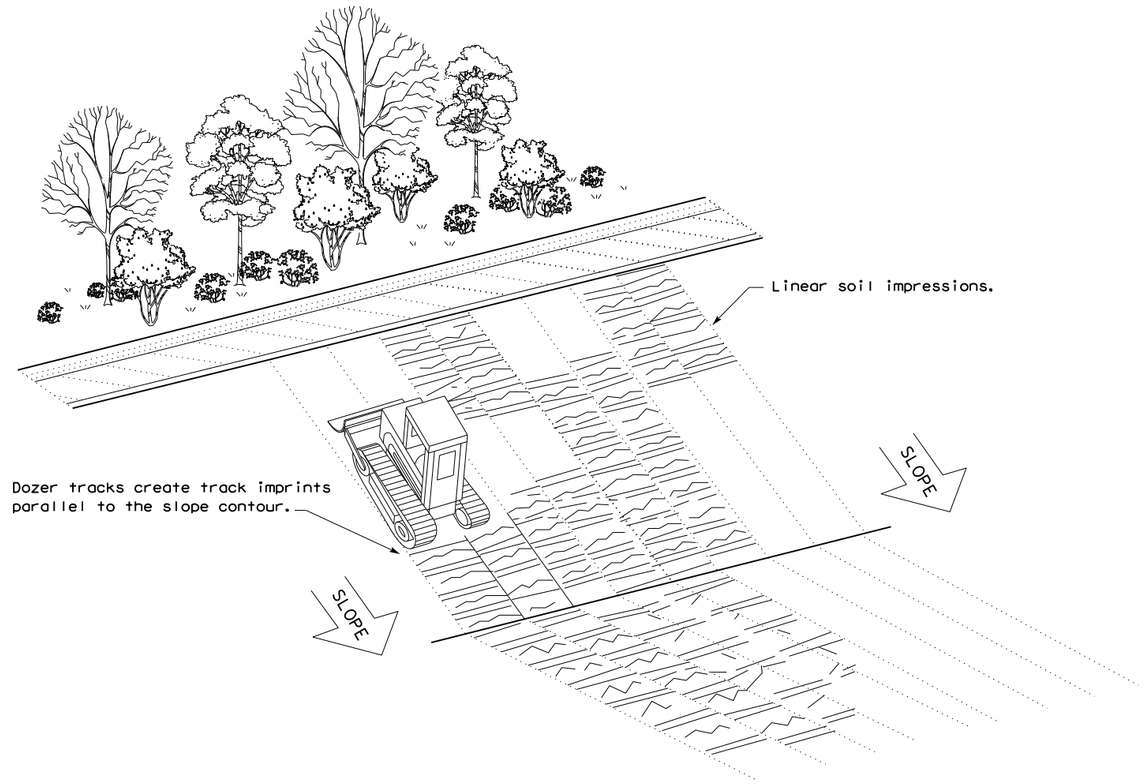
LEGEND

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	0111	09	042		BS 288B		
	DIST	COUNTY					SHEET NO.
	HOU	BRAZORIA					259

9/13/2022
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111090424 - Design\Plan Set\3. Roadway\Standards_Hiba\EC (1)-16.dgn

DATE: 9/23/2022
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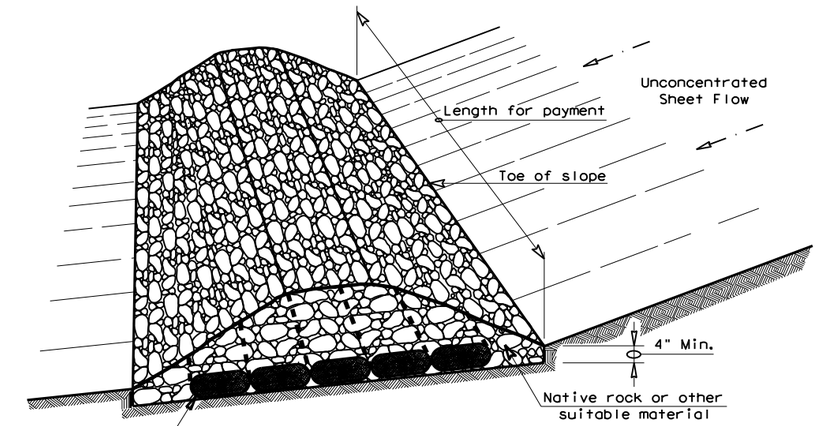
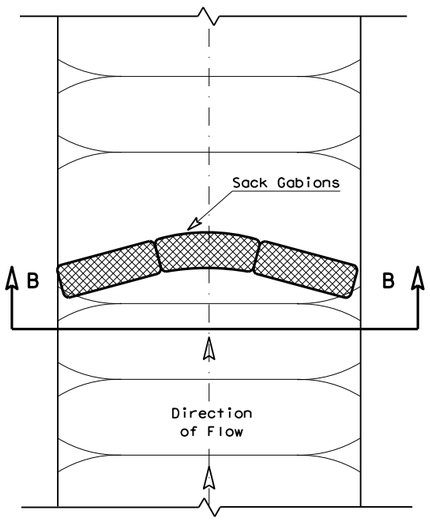
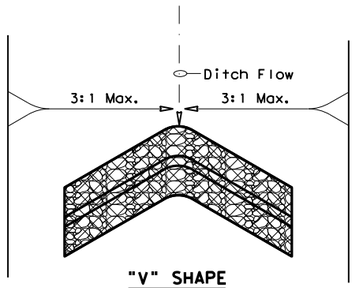


FILTER DAM AT TOE OF SLOPE

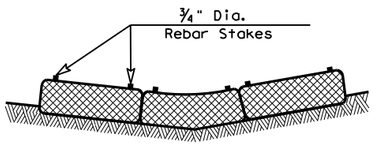
RFD1



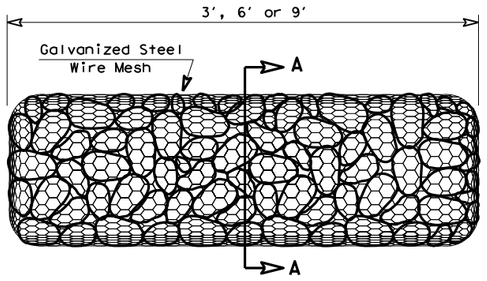
PLAN VIEW



"V" SHAPE
PLAN VIEW

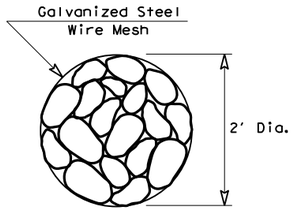


SECTION B-B

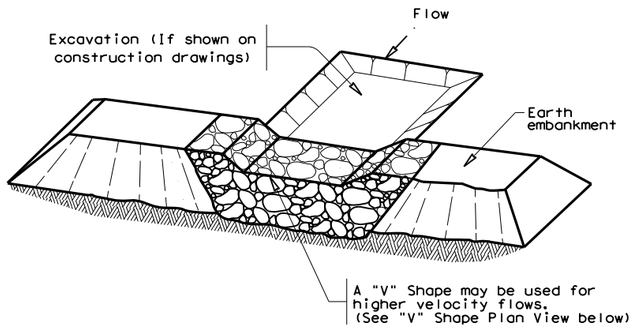


TYPE 4 (SACK GABIONS)

RFD4

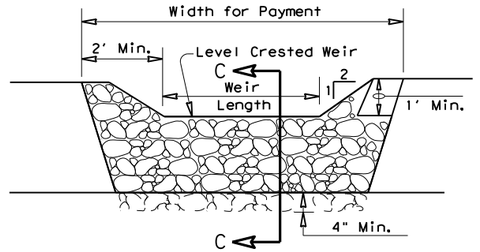


SECTION A-A

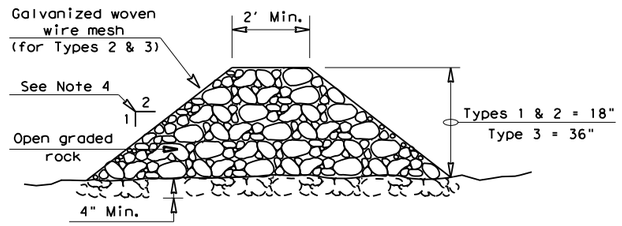


FILTER DAM AT SEDIMENT TRAP

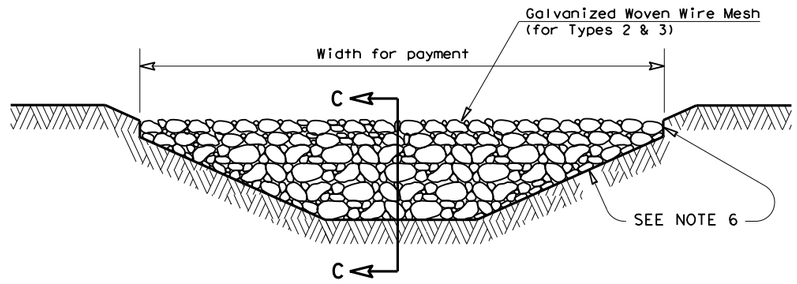
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation — Design Division Standard

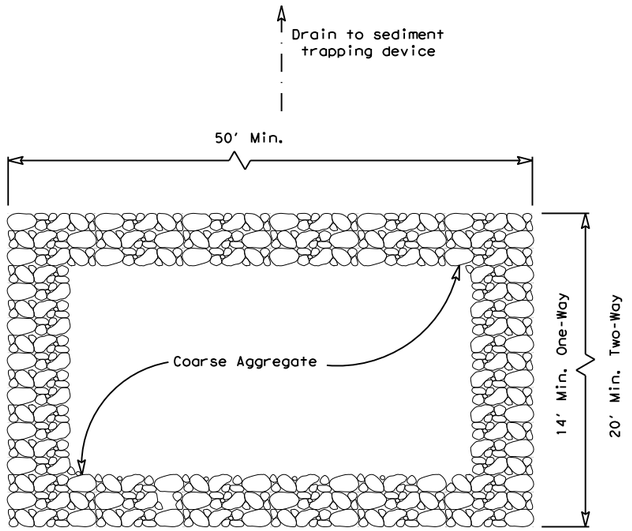
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

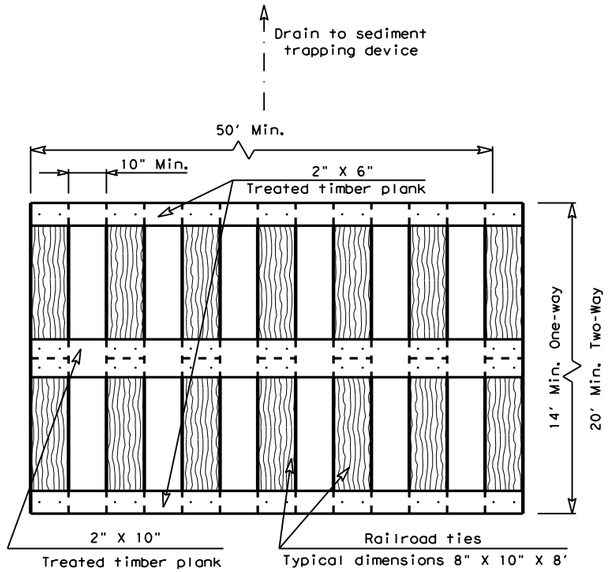
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		260

DATE: 9/23/2022
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0111109042\4 - Design\Plan Set\3. Roadway\Standards_Hiba\EC (3)-16.dgn



PLAN VIEW



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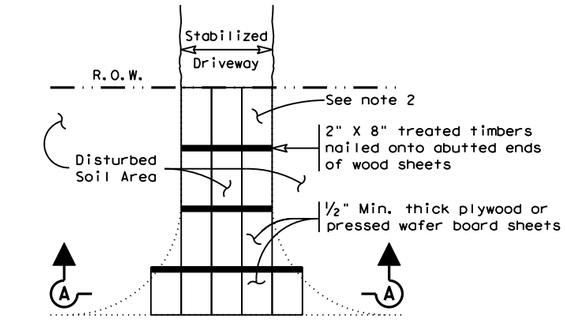

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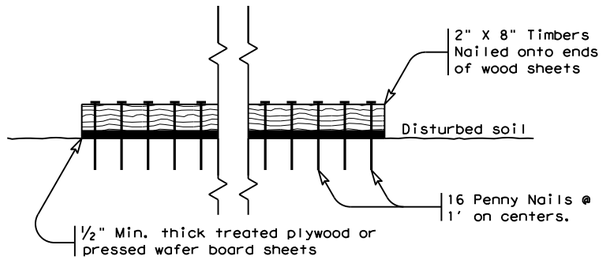
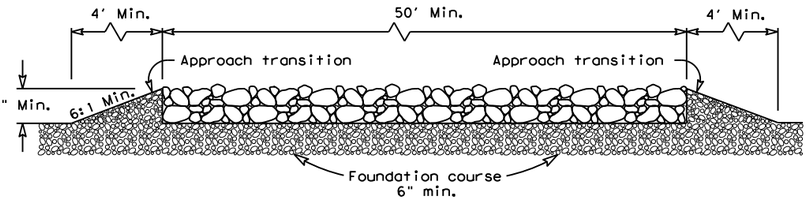


SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

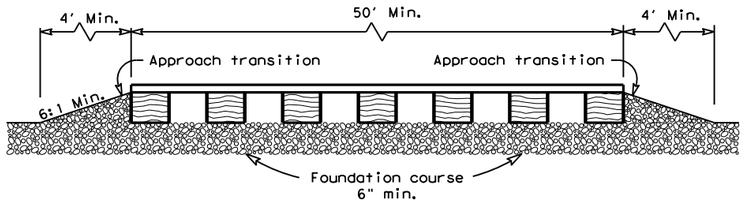
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	09	042	BS 288B
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		261

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				262
	ORIGINAL:	DIST	COUNTY	CONTROL	SECT	JOB	HIGHWAY
		12	BRAZORIA	0111	09	042	BS 288B

STD K-1