

STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

DESIGN SPEED = 60 MPH
 ADT (YR 2022) = 12,200 VPD
 ADT (YR 2042) = 15,100 VPD

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	C 111-3-63		1
STATE	DIST.	COUNTY	
TEXAS	HOU	FORT BEND	
CONT.	SECT.	JOB	HIGHWAY NO.
0111	03	063	FM 521

INDEX OF SHEETS

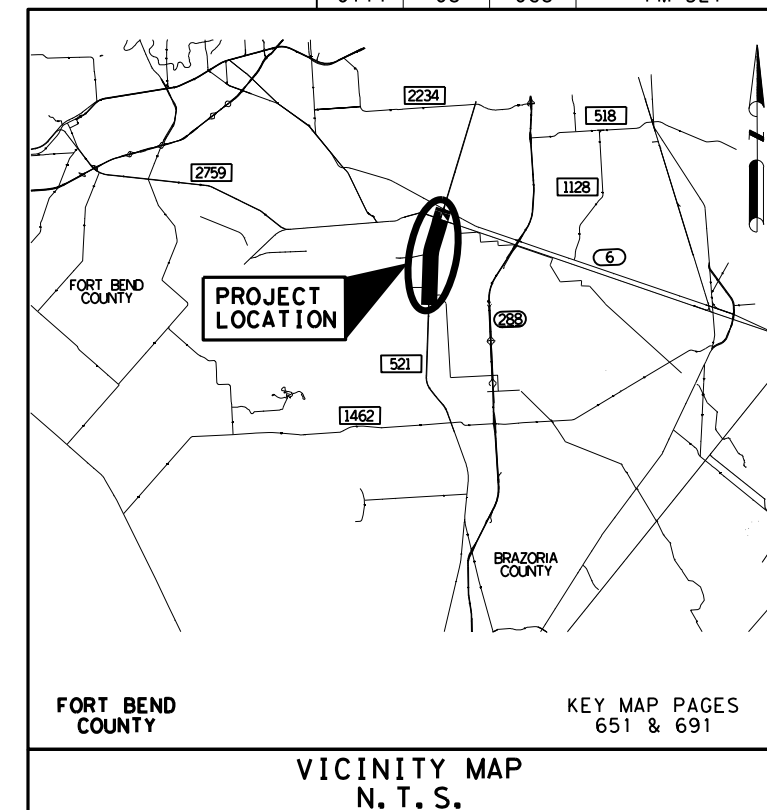
SEE SHEET 2 FOR INDEX OF SHEETS

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

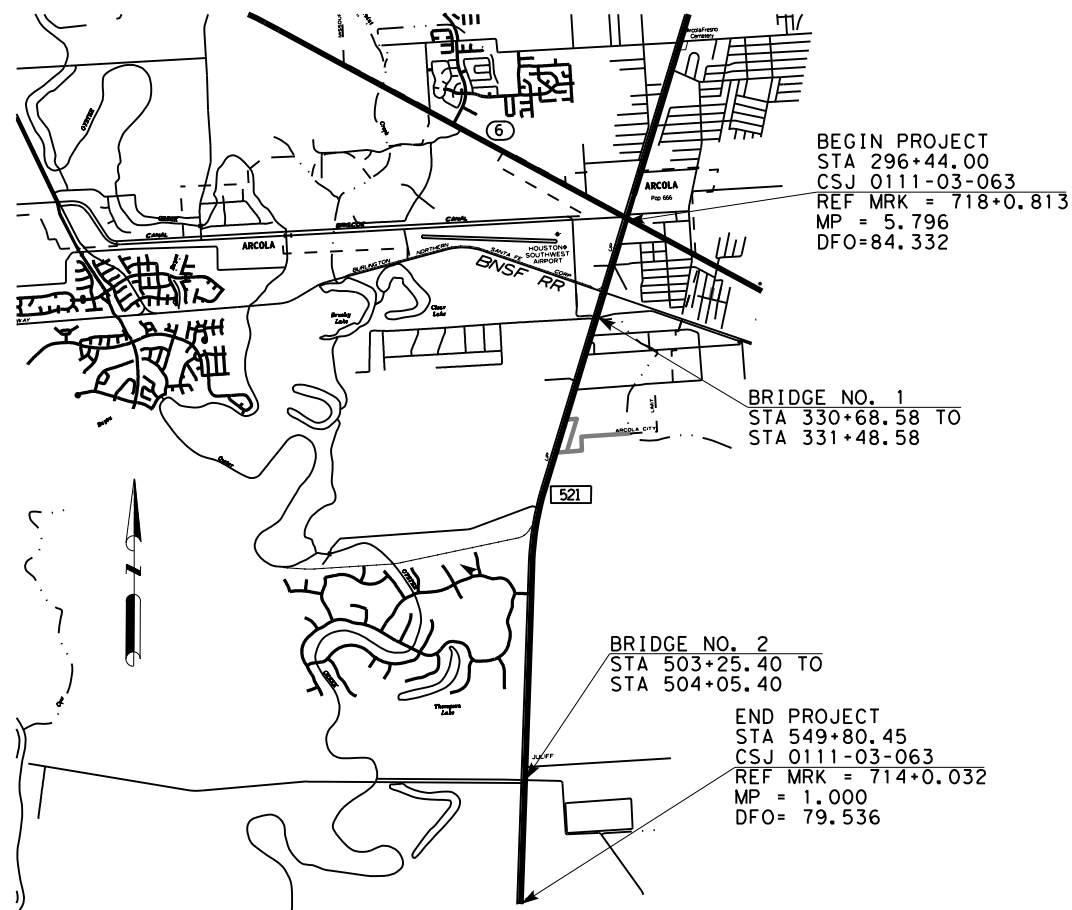
FORT BEND COUNTY
 FM 521
 LIMITS: SH 6 TO BRAZORIA COUNTY LINE
 PROJECT: C 111-3-63
 CONTROL 0111-03-063

FOR THE CONSTRUCTION OF MISCELLANEOUS WORK CONSISTING OF
 OF BASE REPAIR, 1.5" PLANING, 1.5" ACP OVERLAY, RUMBLE STRIPS,
 SIGNING AND PAVEMENT MARKINGS

CSJ	ROADWAY LENGTH	BRIDGE LENGTH	TOTAL LENGTH
0111-03-063	25,146.82 FT / 4.762 MI	160.00 FT / 0.030 MI	25,306.82 FT / 4.792 MI



FUNCTIONAL CLASSIFICATION:
 URBAN MINOR ARTERIAL - SH 6 TO JULIFF-MANVEL RD
 RURAL MAJOR COLLECTOR - JULIFF-MANVEL RD TO BRAZORIA COUNTY LINE



PROJECT LAYOUT MAP
N. T. S.

EXCEPTIONS: STA 321+25.88 TO STA 321+45.89 (AT BNSF RR)
 EQUATIONS: STA 426+45.66 BK = STA 426+55.28 AH
 RR CROSSING: STA 320+85.86 TO STA 321+85.92 (BNSF RR)

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

COUNTY: FORT BEND
 HWY. NO.: FM 521
 DATE ACCEPTED: _____
 PROJ. NO.: C 111-3-63
 LETTING DATE: _____



SUBMITTED FOR LETTING: 12/13/2021

DocuSigned by:
Carlos M. Zepeda, Jr., P.E.
 AREA ENGINEER
 999EB2AF5ACE472...

APPROVED FOR LETTING: 12/31/2021

DocuSigned by:
James Kolk, P.E.
 FOR DISTRICT ENGINEER

SHEET NO. DESCRIPTION

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- 2 INDEX OF SHEETS
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SHEET NO. DESCRIPTION

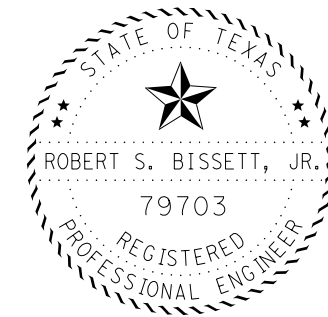
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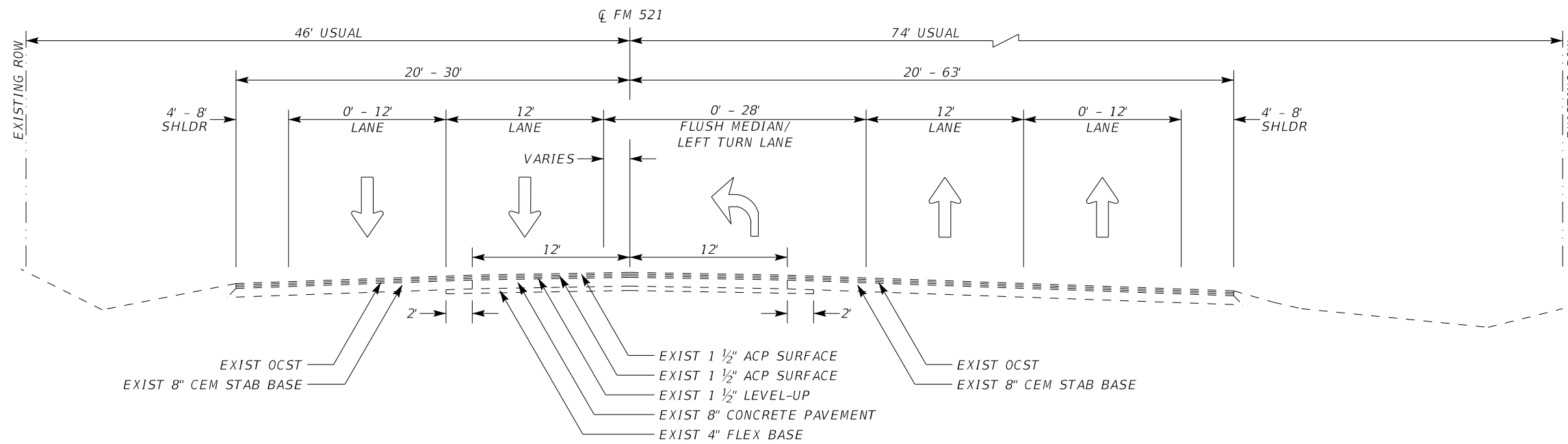
* THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Robert S. Bissett, Jr. P.E. 01/26/22
DATE

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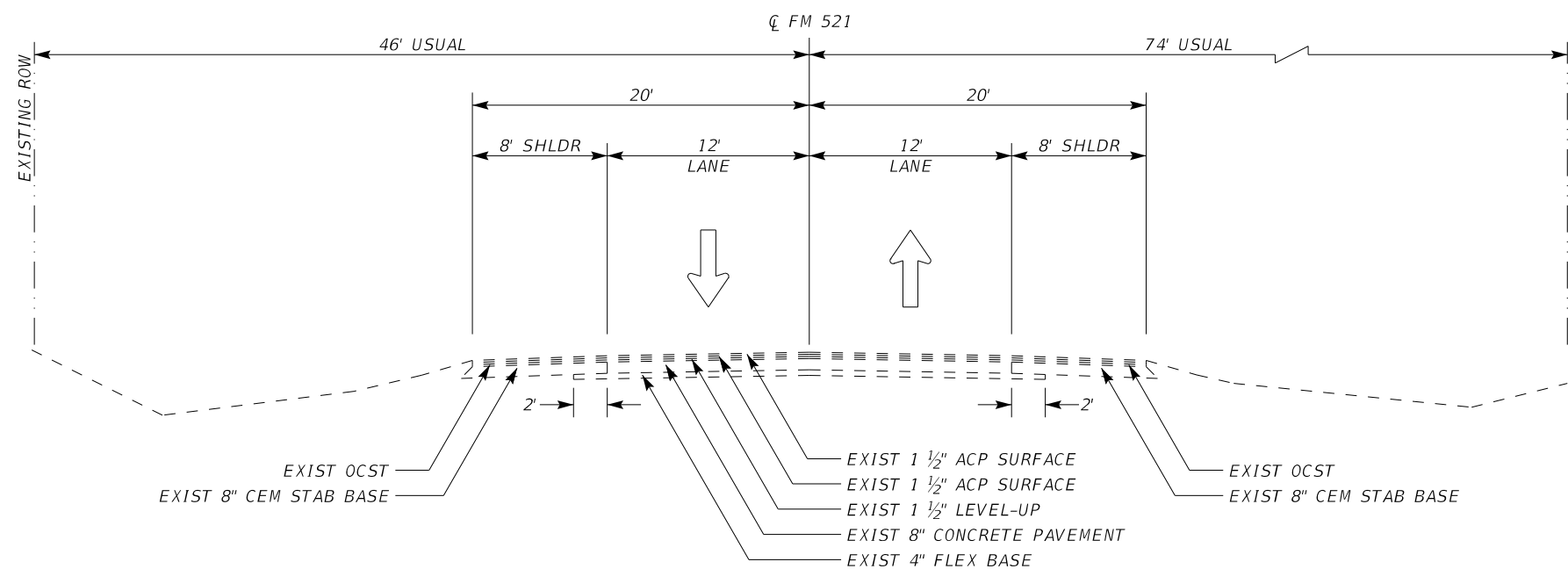
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	0111	03	063	FM 521
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		2



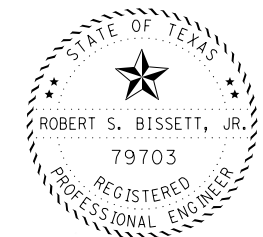
NOTES:

1. SEE "ROADWAY LAYOUT" SHEETS FOR STATION CALLOUTS FOR LANE TAPERS.

EXISTING TYPICAL SECTION
 STA 296+44.00 TO STA 319+19.00



EXISTING TYPICAL SECTION
 STA 319+19.00 TO STA 325+94.00
 STA 339+60.00 TO STA 379+75.00
 STA 452+21.84 TO STA 454+10.00
 STA 493+16.00 TO STA 549+80.45



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 09/13/21

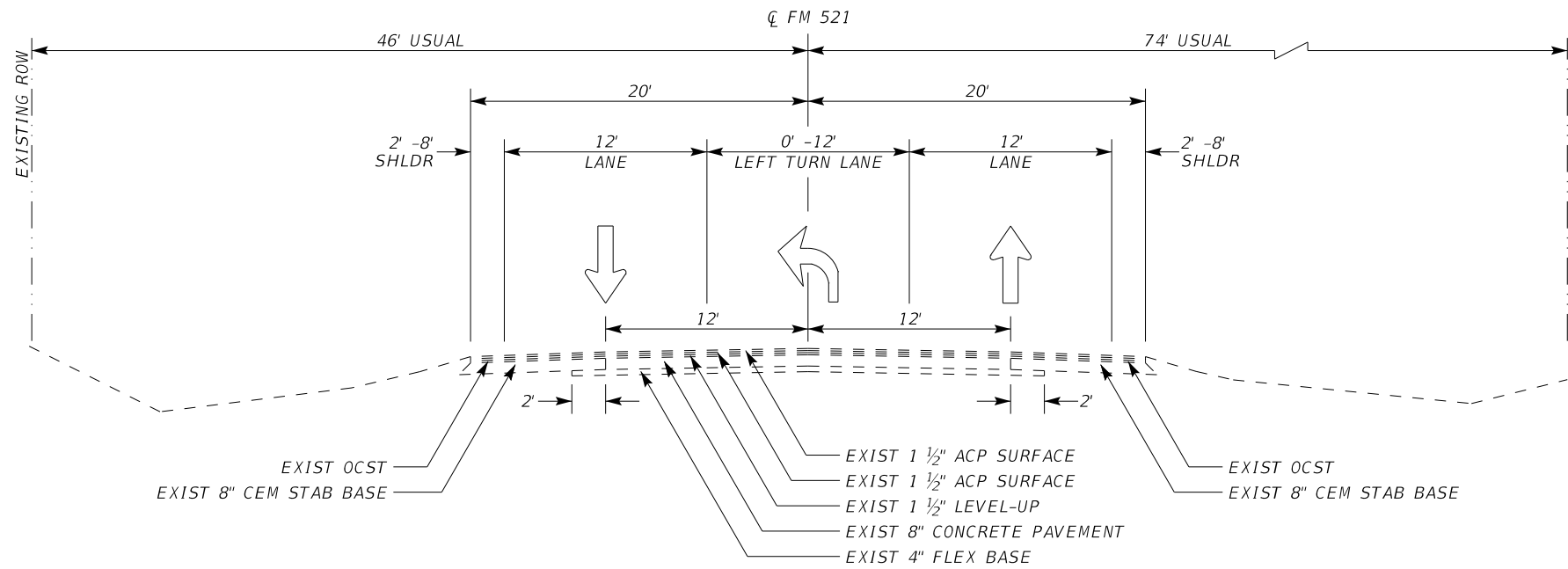
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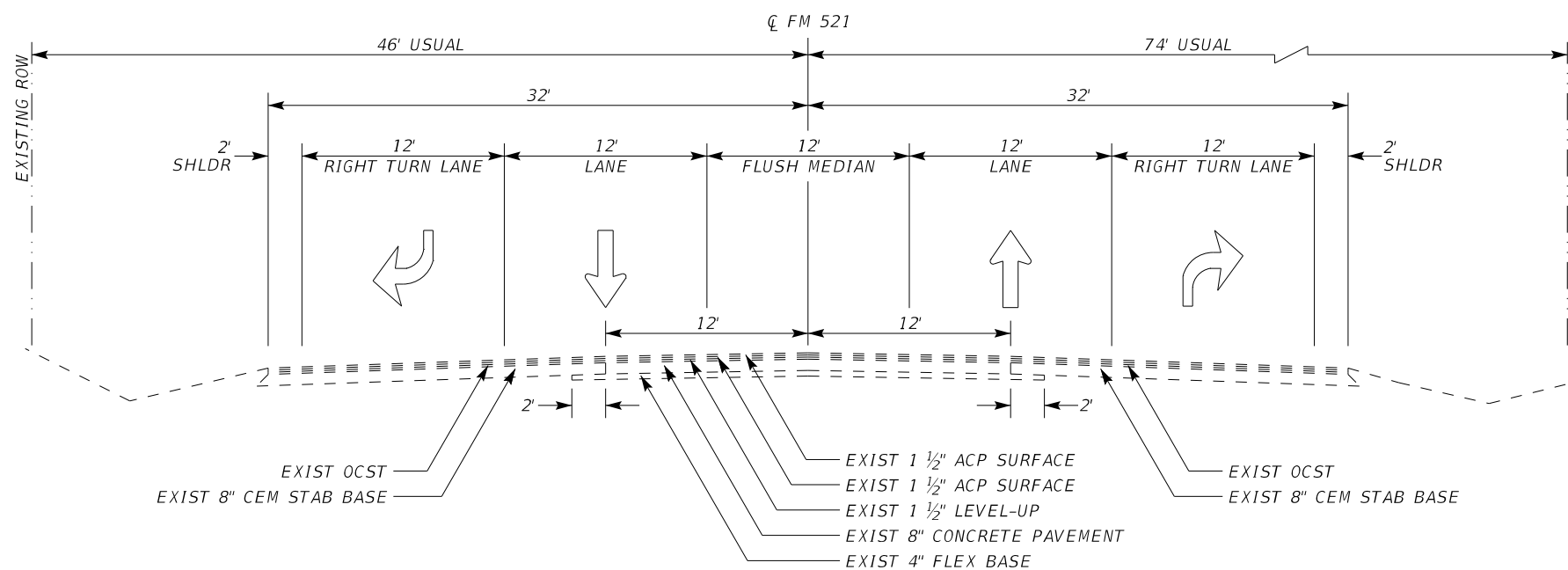
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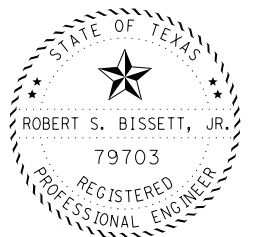
EXISTING TYPICAL SECTION
STA 379+75.00 TO STA 391+47.00



EXISTING TYPICAL SECTION
STA 391+47.00 TO STA 398+40.00

NOTES:

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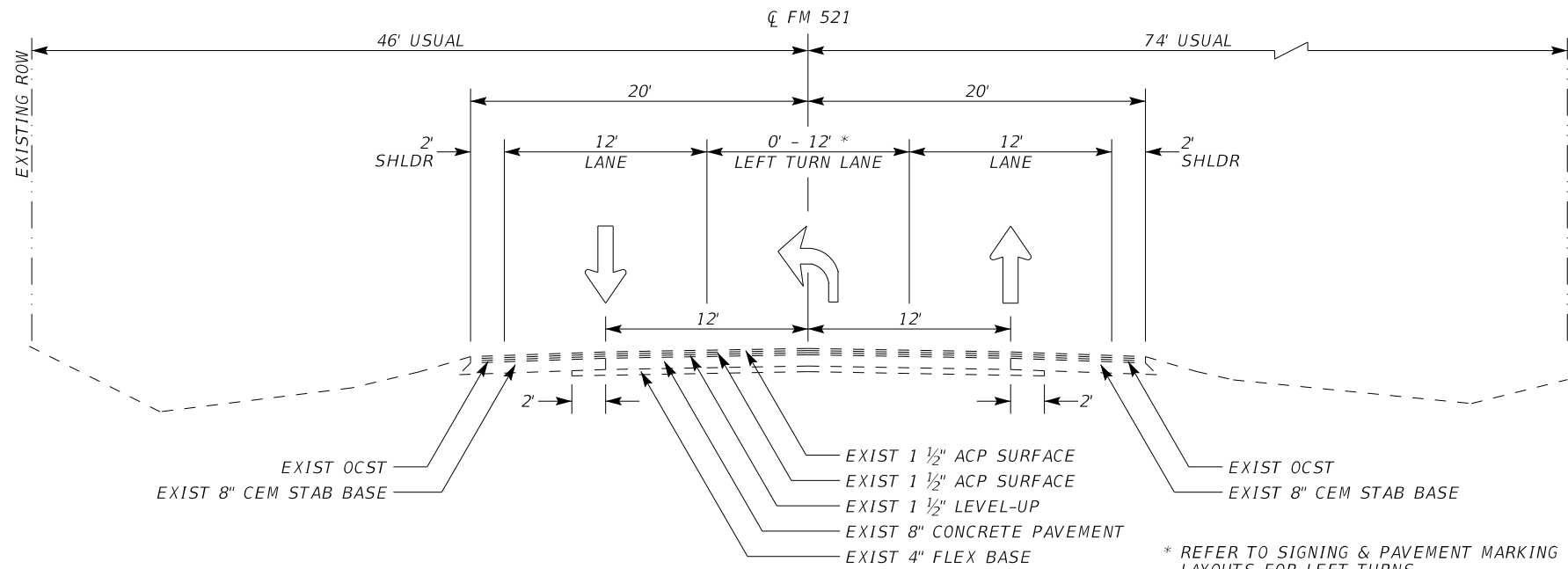
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SHEET 2 OF 7

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
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HOU FORT BEND			4

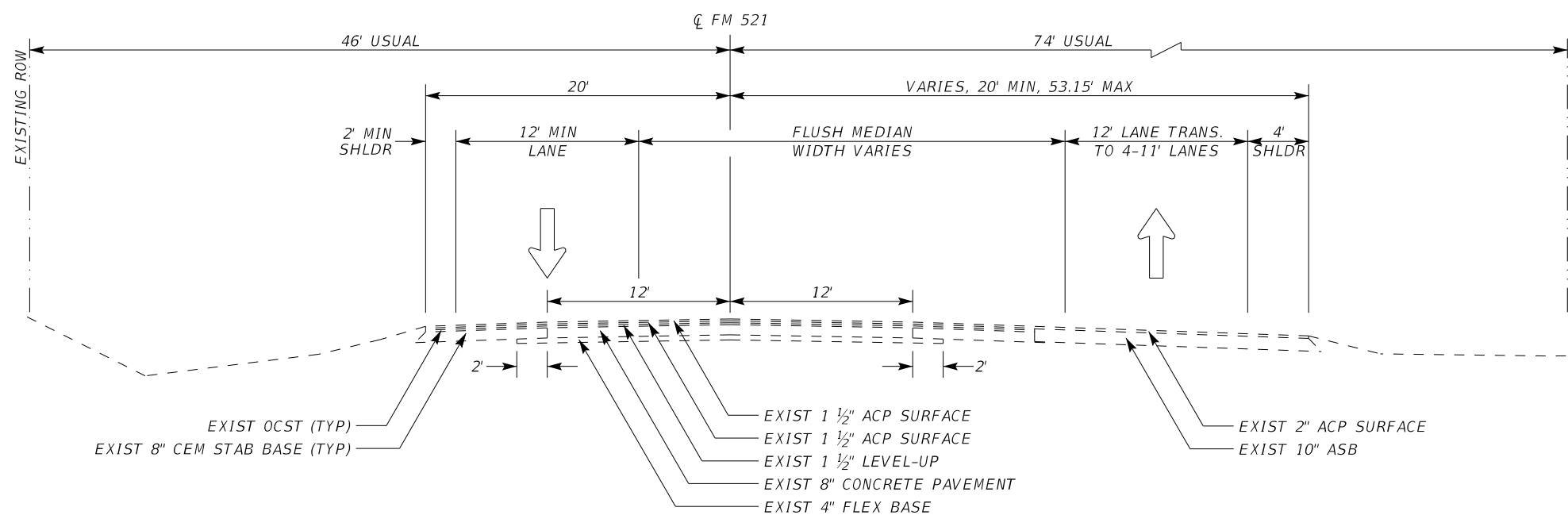


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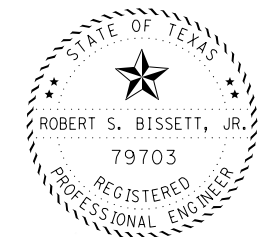
1. SEE "ROADWAY LAYOUT" SHEETS FOR STATION CALLOUTS FOR LANE TAPERS.

* REFER TO SIGNING & PAVEMENT MARKING LAYOUTS FOR LEFT TURNS

EXISTING TYPICAL SECTION
 STA 325+94.00 TO STA 339+60.00
 STA 398+40.00 TO STA 422+00.37
 STA 454+10.00 TO STA 462+65.00



EXISTING TYPICAL SECTION
 STA 422+00.37 TO STA 426+45.66
 STA EQ: STA 426+45.66 BK = STA 426+55.28 AH
 STA 426+55.28 TO STA 430+59.20



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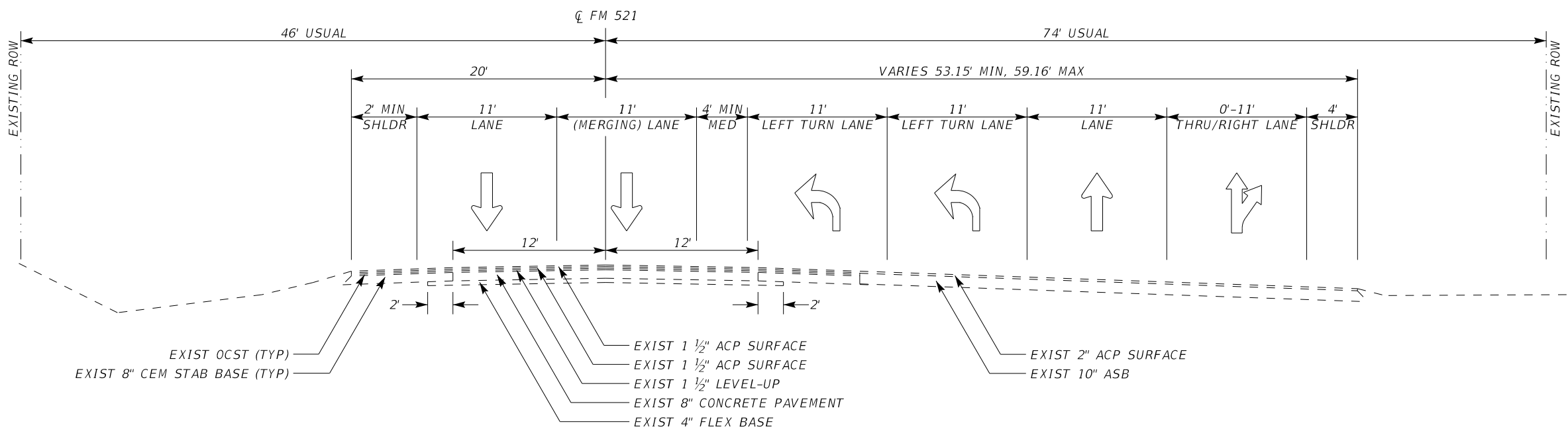
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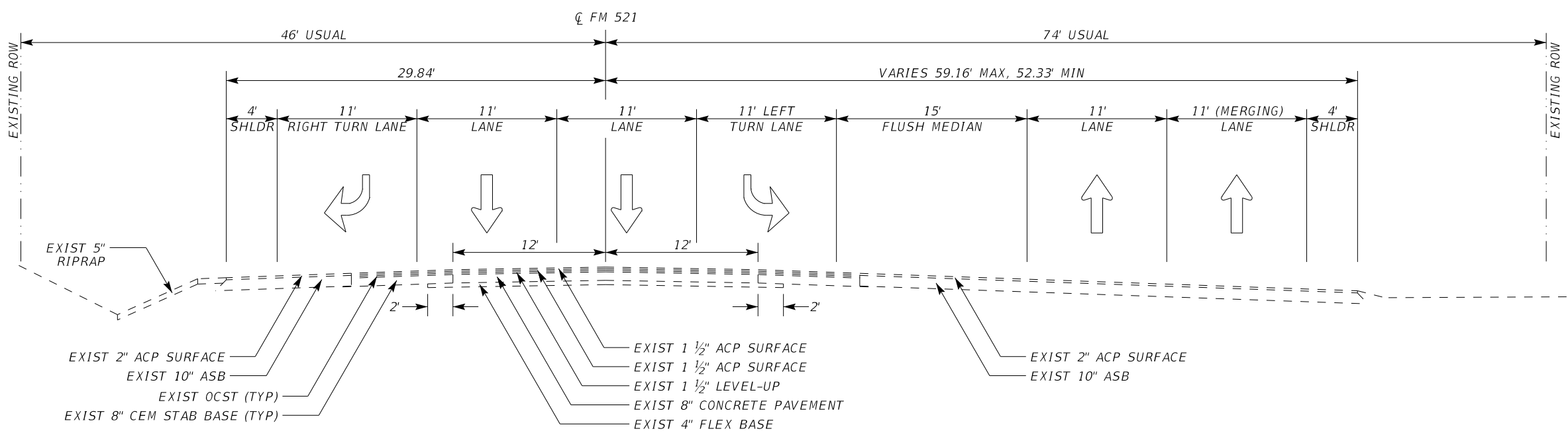
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CONT	SECT	JOB	HIGHWAY
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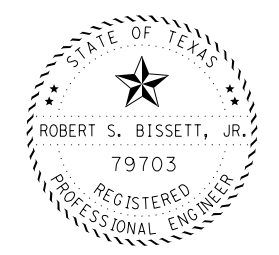


EXISTING TYPICAL SECTION
STA 430+59.20 TO STA 436+48.28

NOTES:
1. SEE "ROADWAY LAYOUT" SHEETS FOR STATION CALLOUTS FOR LANE TAPERS.

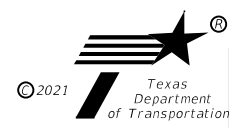


EXISTING TYPICAL SECTION
STA 436+48.28 TO STA 442+63.04



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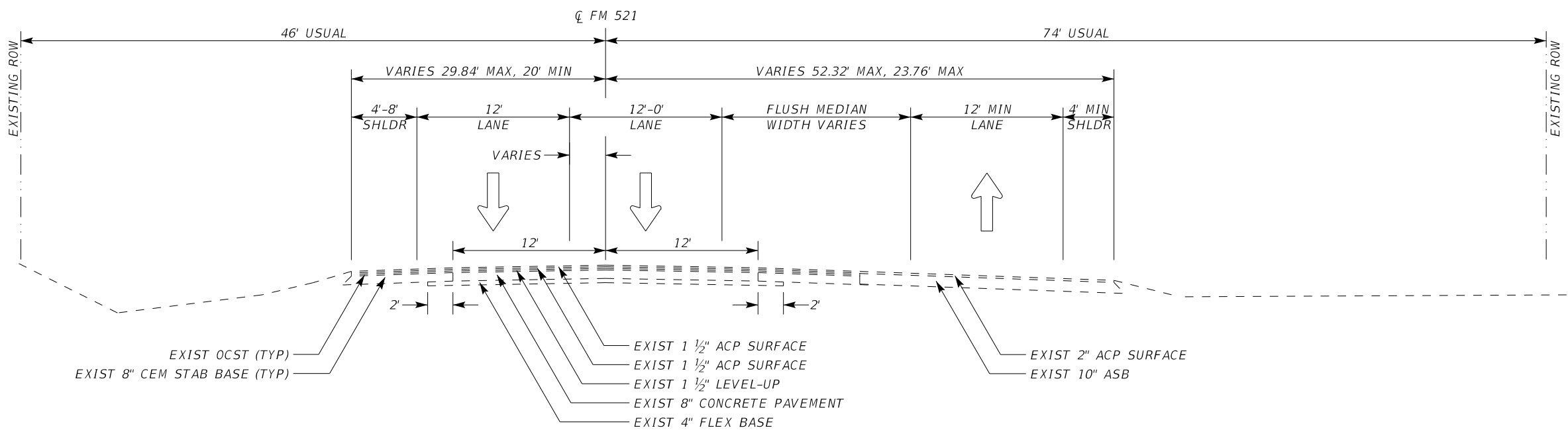
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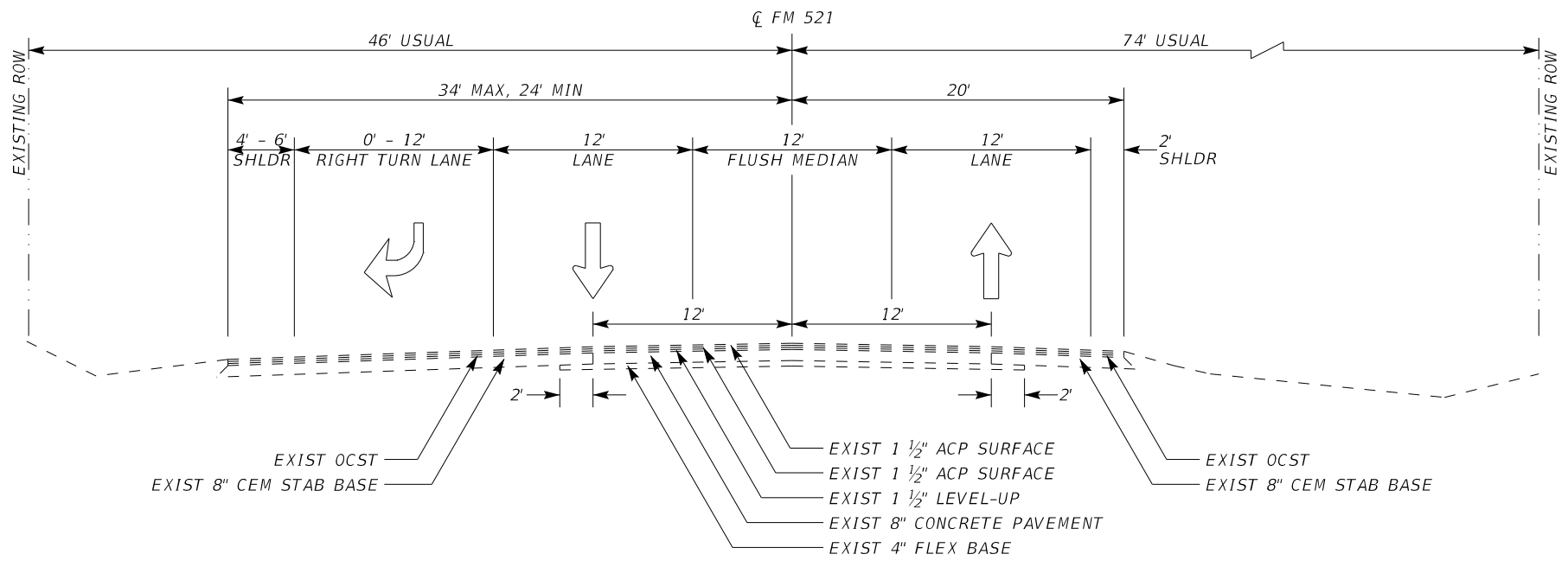
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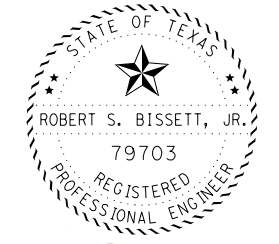


EXISTING TYPICAL SECTION
 STA 442+63.04 TO STA 452+21.84



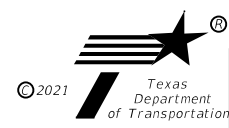
EXISTING TYPICAL SECTION
 STA 462+65.00 TO STA 466+35.00

NOTES:
 1. SEE "ROADWAY LAYOUT" SHEETS FOR STATION CALLOUTS FOR LANE TAPERS.



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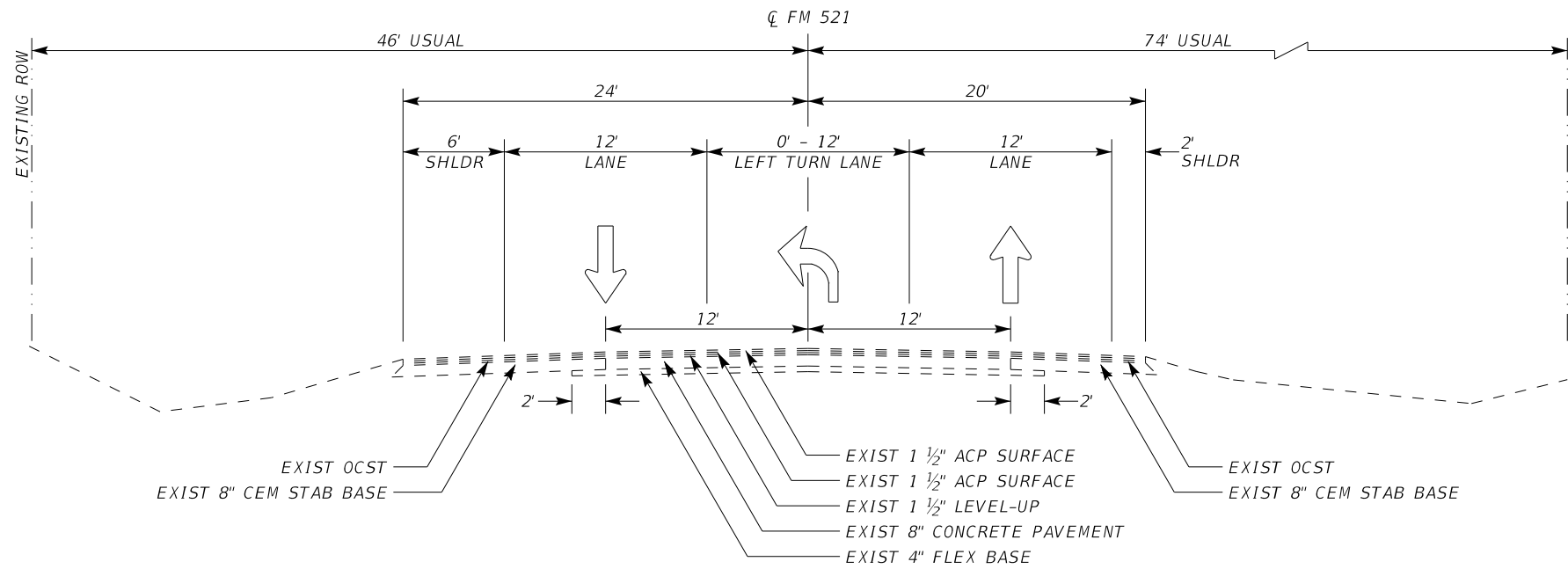
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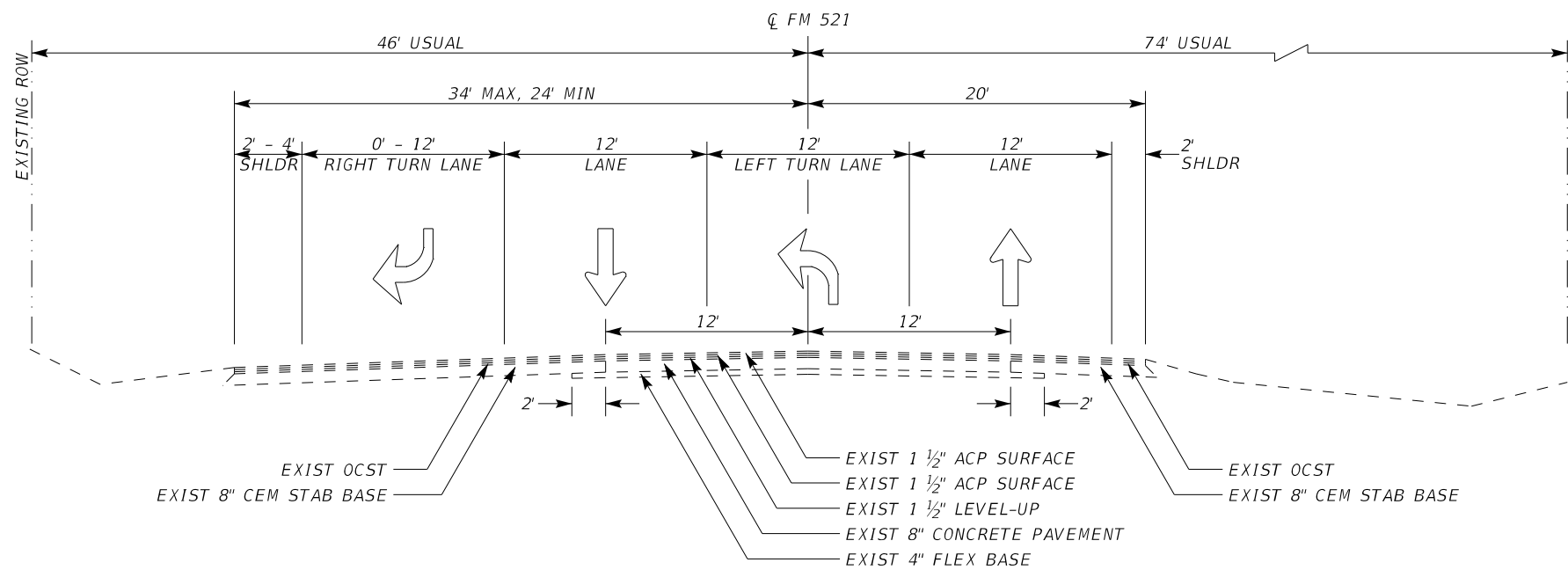
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CONT	SECT	JOB	HIGHWAY
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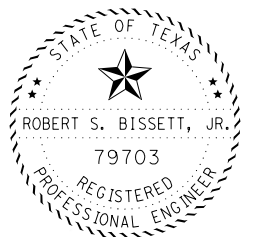
EXISTING TYPICAL SECTION
STA 466+35.00 TO STA 469+85.00



EXISTING TYPICAL SECTION
STA 469+85.00 TO STA 474+73.00

NOTES:

1. SEE "ROADWAY LAYOUT" SHEETS FOR STATION CALLOUTS FOR LANE TAPERS.



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09/13/21

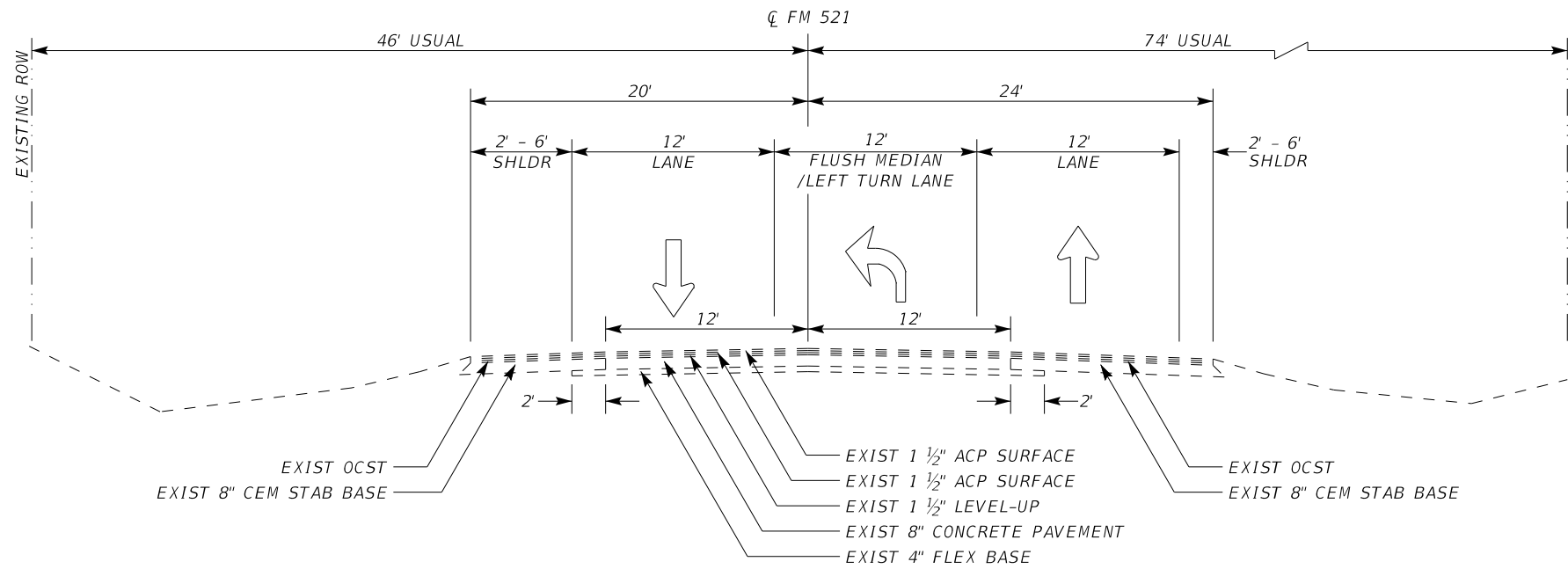
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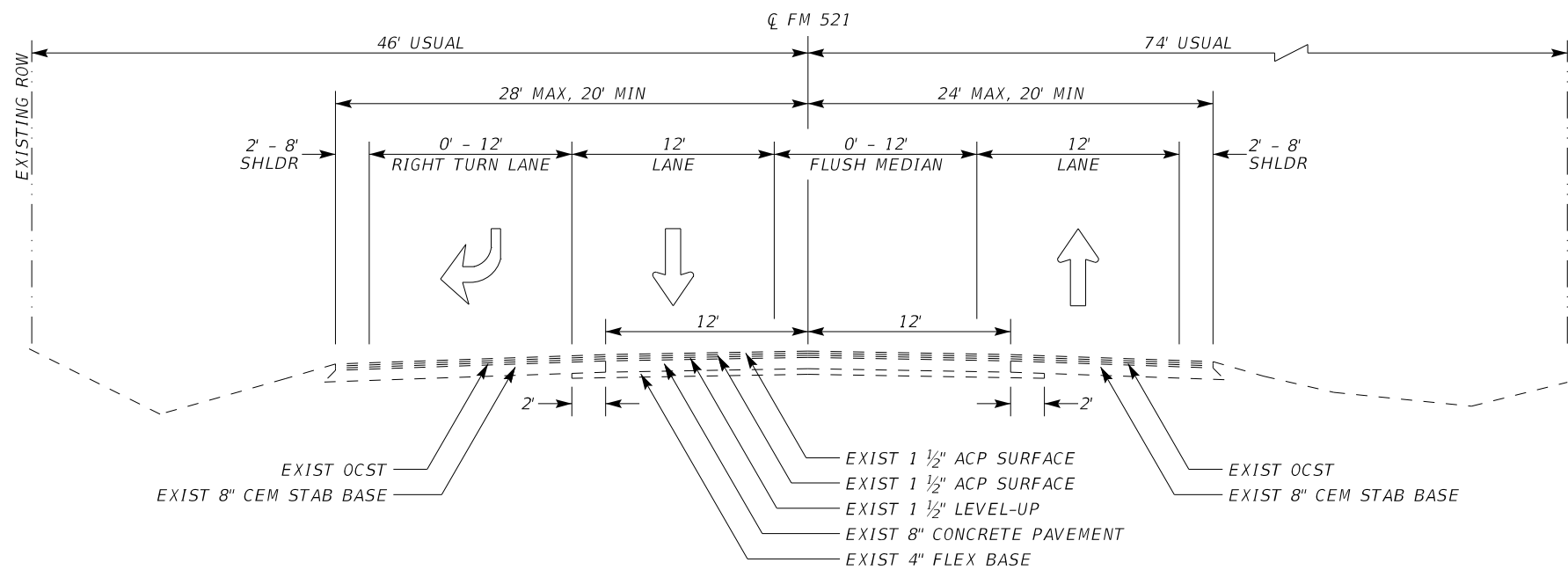
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CONT	SECT	JOB	HIGHWAY
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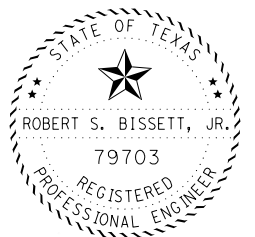
EXISTING TYPICAL SECTION
STA 474+73.00 TO STA 486+75.00



EXISTING TYPICAL SECTION
STA 486+75.00 TO STA 493+16.00

NOTES:

1. SEE "ROADWAY LAYOUT" SHEETS FOR STATION CALLOUTS FOR LANE TAPERS.



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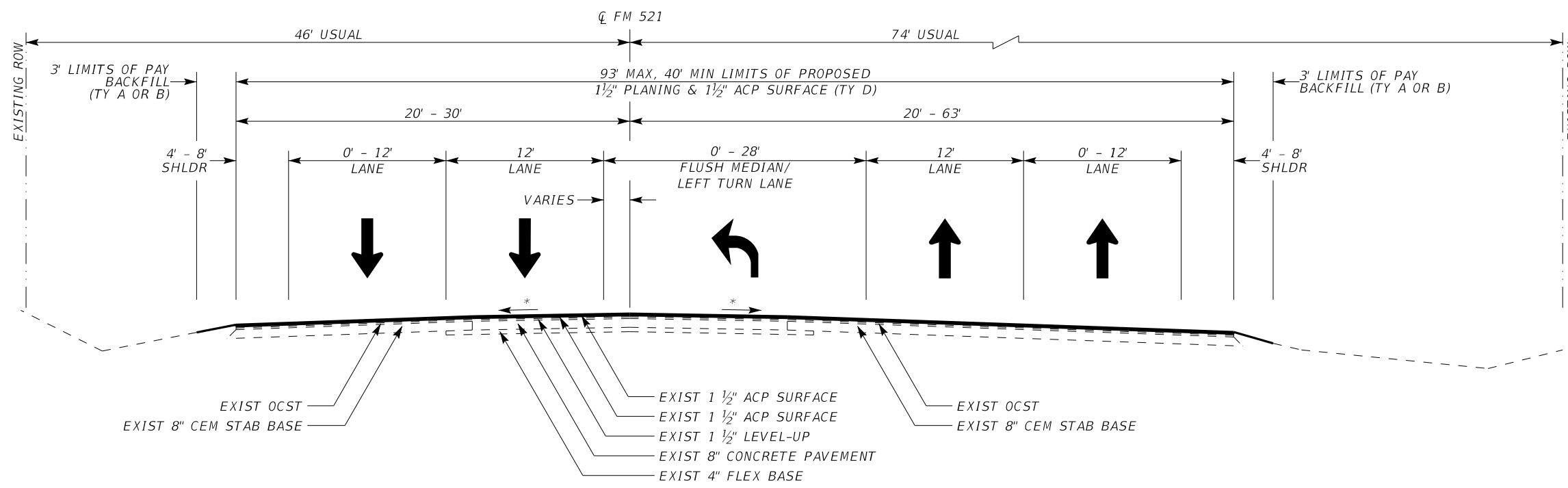
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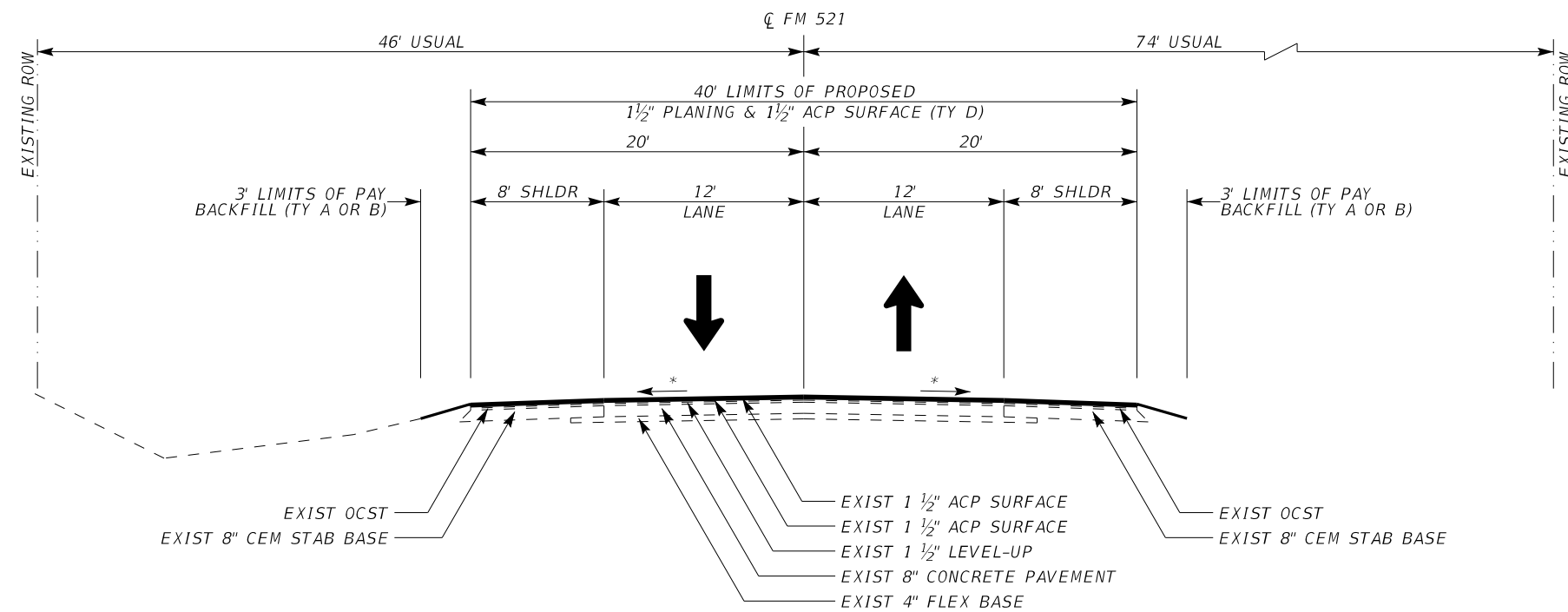
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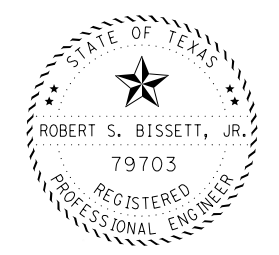


- NOTES:**
1. SURFACE TEST TYPE B, PAY ADJUSTMENT SCHEDULE 3.
 2. SEE "SIGNING & PAVEMENT MARKING LAYOUT" SHEETS FOR LIMITS OF MILLED EDGELINE & CENTERLINE RUMBLE STRIPS.
 3. SEE "ROADWAY LAYOUT" SHEETS FOR STATION CALLOUTS FOR LANE TAPERS.
- * MATCH EXISTING SLOPE

PROPOSED TYPICAL SECTION
 STA 296+44.00 TO STA 319+19.00

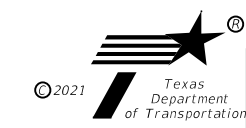


PROPOSED TYPICAL SECTION
 STA 319+19.00 TO STA 325+94.00
 (STA 325+88.00 TO STA 325+94.00 PAVEMENT MARKINGS ONLY)
 STA 339+60.00 TO STA 379+75.00
 STA 452+21.84 TO STA 454+10.00
 STA 493+16.00 TO STA 549+80.45



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 09/29/21

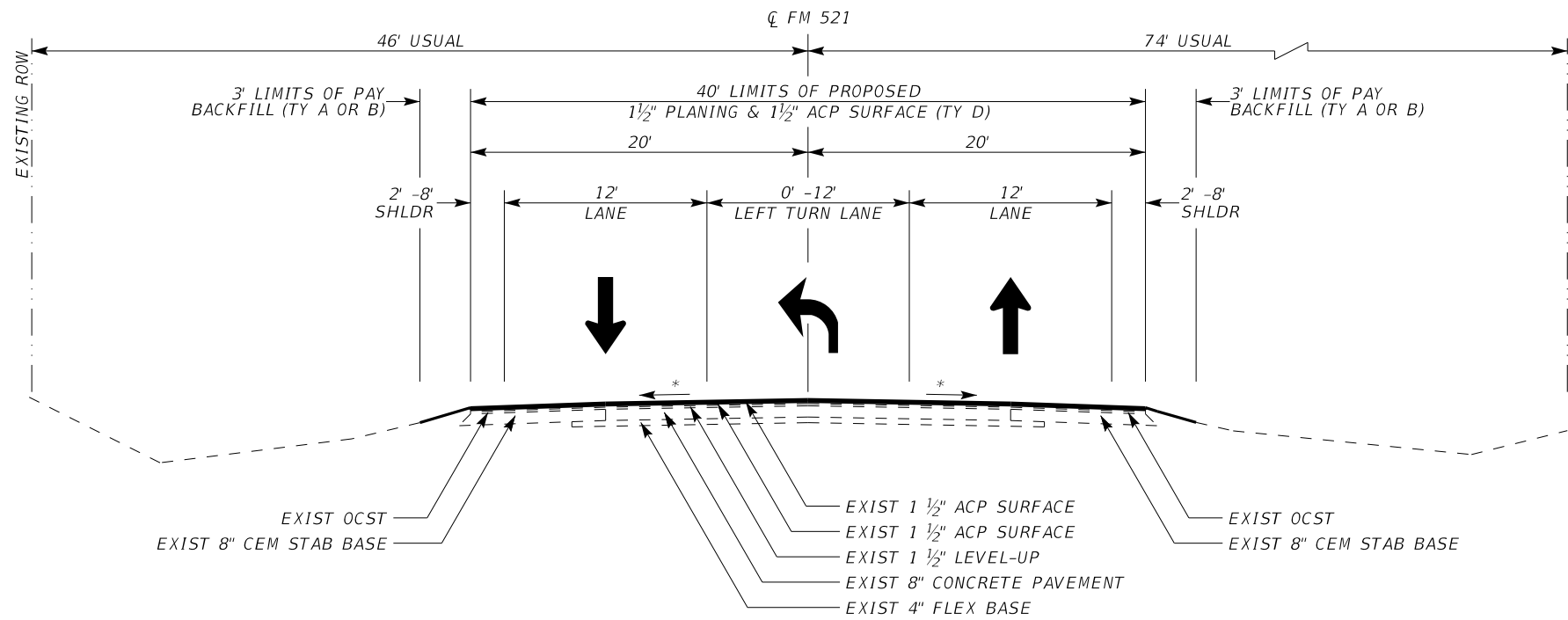
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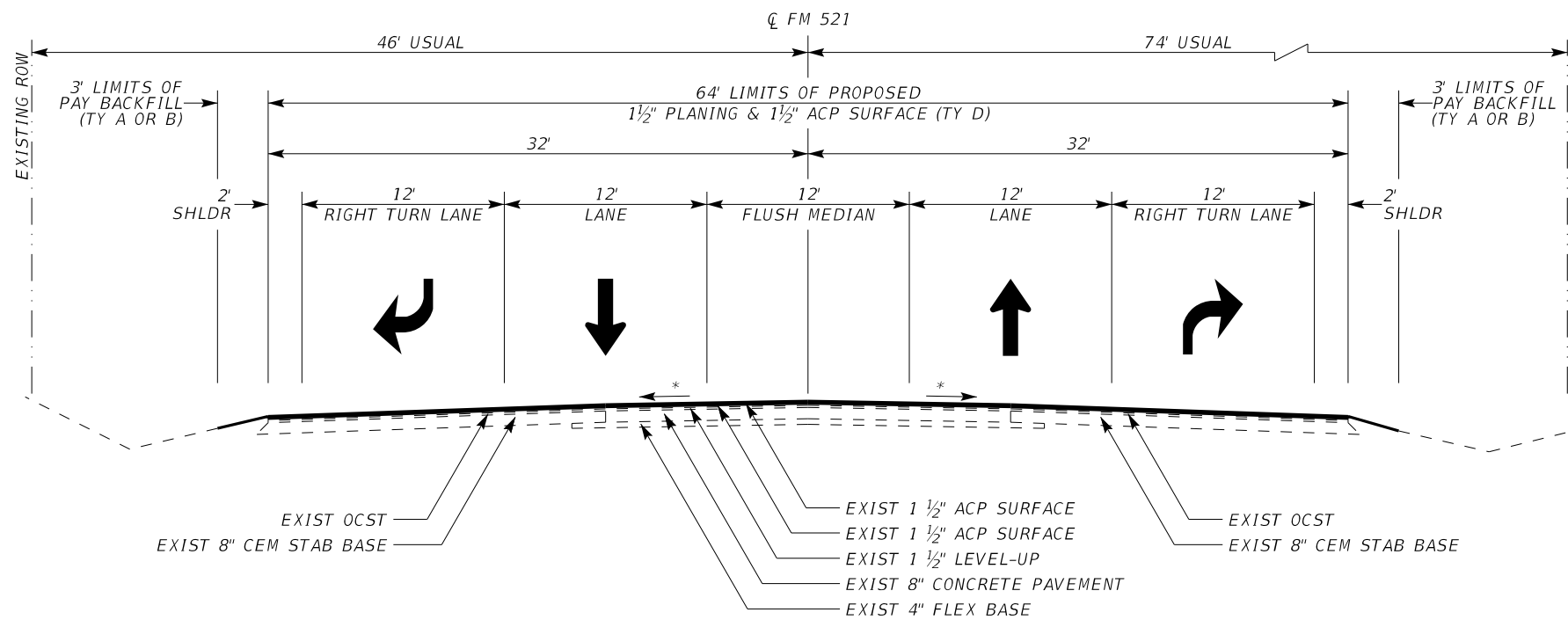
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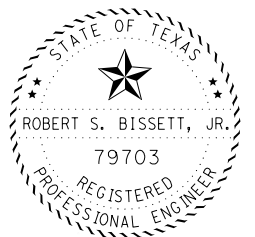
PROPOSED TYPICAL SECTION
STA 379+75.00 TO STA 391+47.00



PROPOSED TYPICAL SECTION
STA 391+47.00 TO STA 398+40.00

NOTES:

1. SURFACE TEST TYPE B, PAY ADJUSTMENT SCHEDULE 3.
 2. SEE "SIGNING & PAVEMENT MARKING LAYOUT" SHEETS FOR LIMITS OF MILLED EDGELINE & CENTERLINE RUMBLE STRIPS.
 3. SEE "ROADWAY LAYOUT" SHEETS FOR STATION CALLOUTS FOR LANE TAPERS.
- * MATCH EXISTING SLOPE



Robert S. Bissett, Jr.

09/13/21

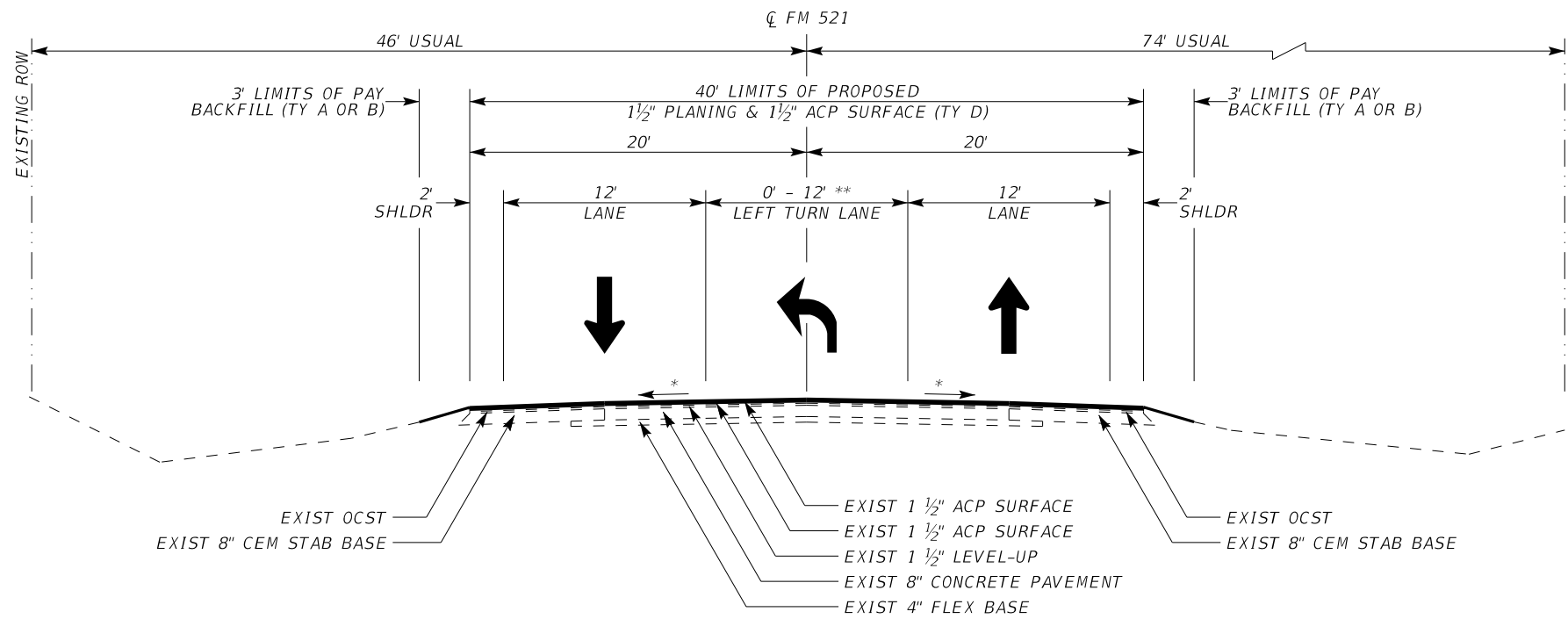
PROPOSED TYPICAL SECTIONS



SCALE: 1"=10'H, 1"=10'V

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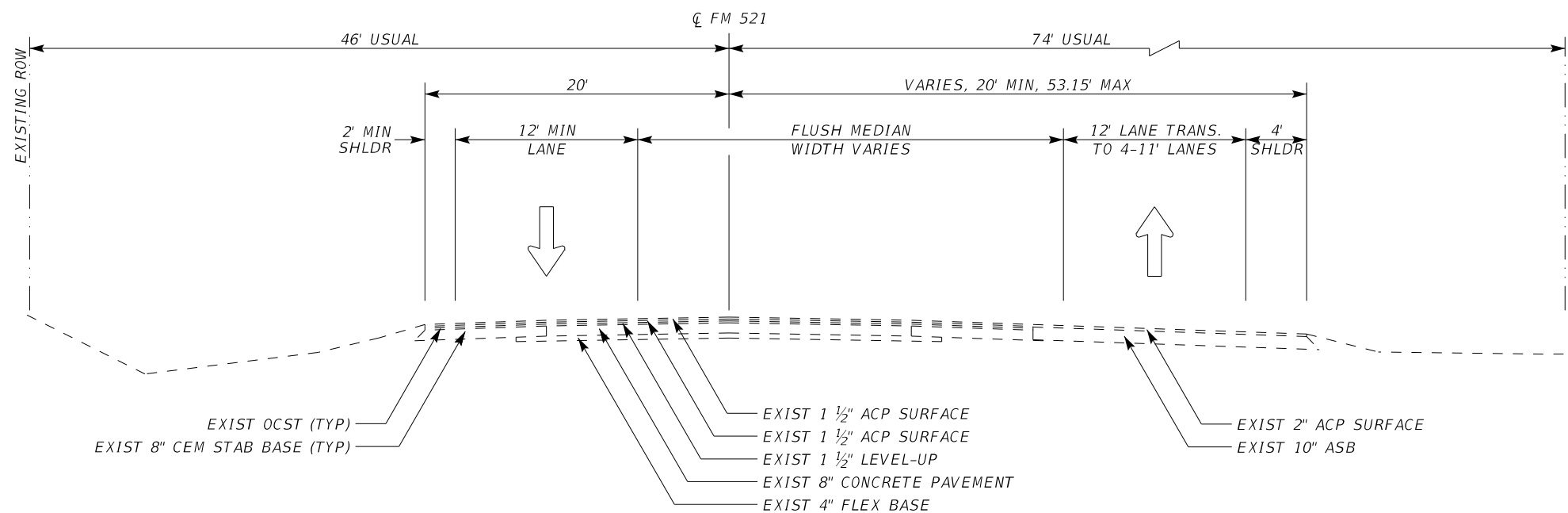


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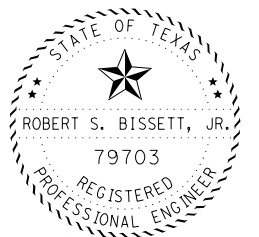
1. SURFACE TEST TYPE B, PAY ADJUSTMENT SCHEDULE 3.
 2. SEE "SIGNING & PAVEMENT MARKING LAYOUT" SHEETS FOR LIMITS OF MILLED EDGELINE & CENTERLINE RUMBLE STRIPS.
 3. SEE "ROADWAY LAYOUT" SHEETS FOR STATION CALLOUTS FOR LANE TAPERS.
- * MATCH EXISTING SLOPE

** REFER TO SIGNING & PAVEMENT MARKING LAYOUTS FOR LEFT TURNS

PROPOSED TYPICAL SECTION
 (STA 325+94.00 TO STA 339+20.00 PAVEMENT MARKINGS ONLY)
 STA 339+20.00 TO STA 339+60.00
 STA 398+40.00 TO STA 422+00.37
 STA 454+10.00 TO STA STA 462+65.00



PROPOSED TYPICAL SECTION
 STA 422+00.37 TO STA 426+45.66
 STA EQ: STA 426+45.66 BK = STA 426+55.28 AH
 STA 426+55.28 TO STA 430+59.20



Robert S. Bissett, Jr.
 09/13/21

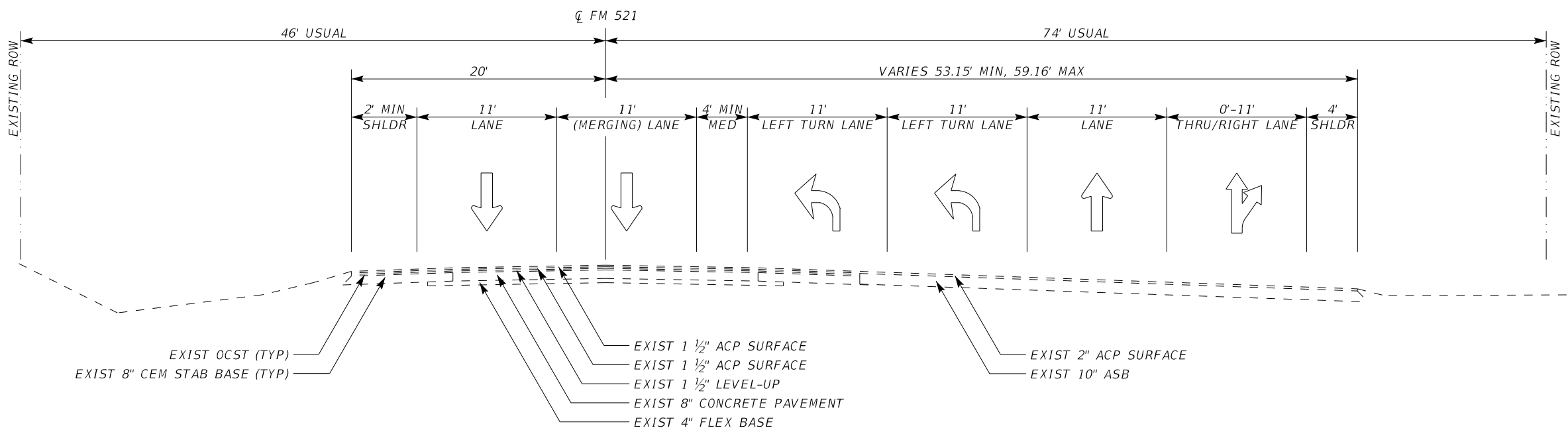
PROPOSED TYPICAL SECTIONS



SCALE: 1"=10'H, 1"=10'V

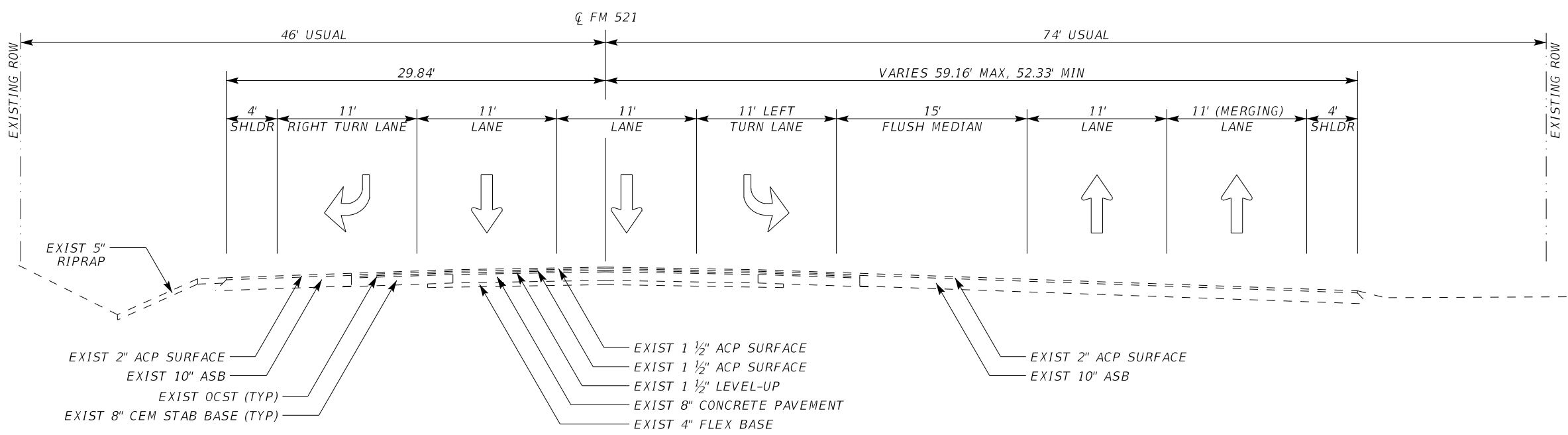
SHEET 3 OF 7

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	12

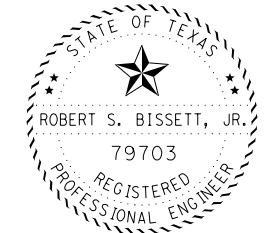


- NOTES:**
1. SEE "SIGNING & PAVEMENT MARKING LAYOUT" SHEETS FOR LIMITS OF MILLED EDGELINE & CENTERLINE RUMBLE STRIPS.
 2. SEE "ROADWAY LAYOUT" SHEETS FOR STATION CALLOUTS FOR LANE TAPERS.

PROPOSED TYPICAL SECTION
 STA 430+59.20 TO STA 436+48.28
 PAVEMENT MARKINGS ONLY

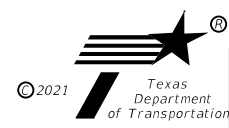


PROPOSED TYPICAL SECTION
 STA 436+48.28 TO STA 442+63.04
 PAVEMENT MARKINGS ONLY



Robert S. Bissett, Jr.
 09/24/21

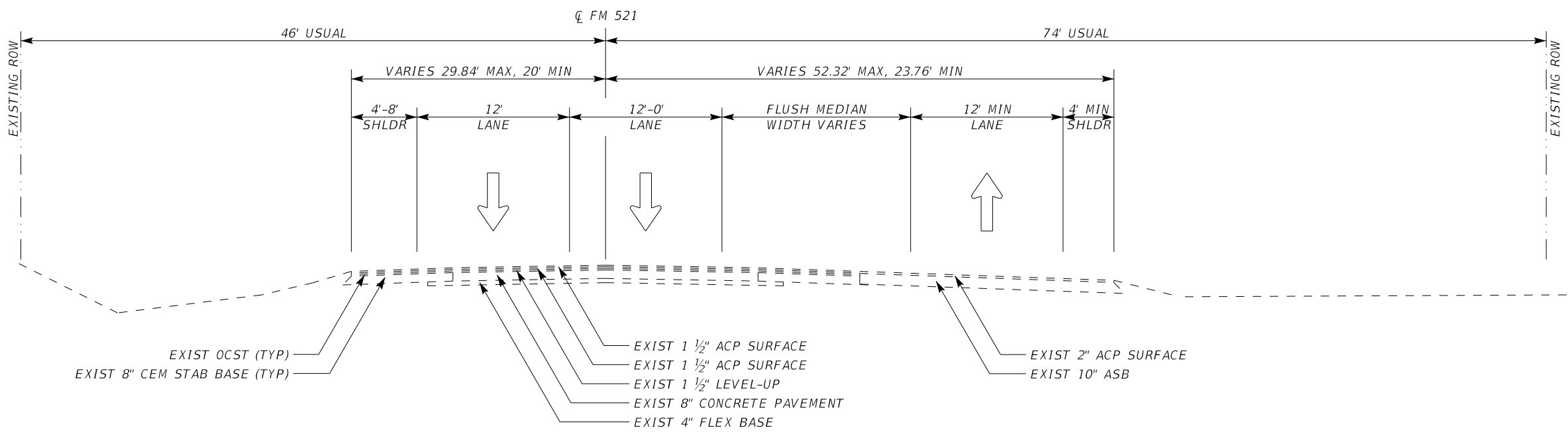
PROPOSED TYPICAL SECTIONS



SCALE: 1"=10'H, 1"=10'V

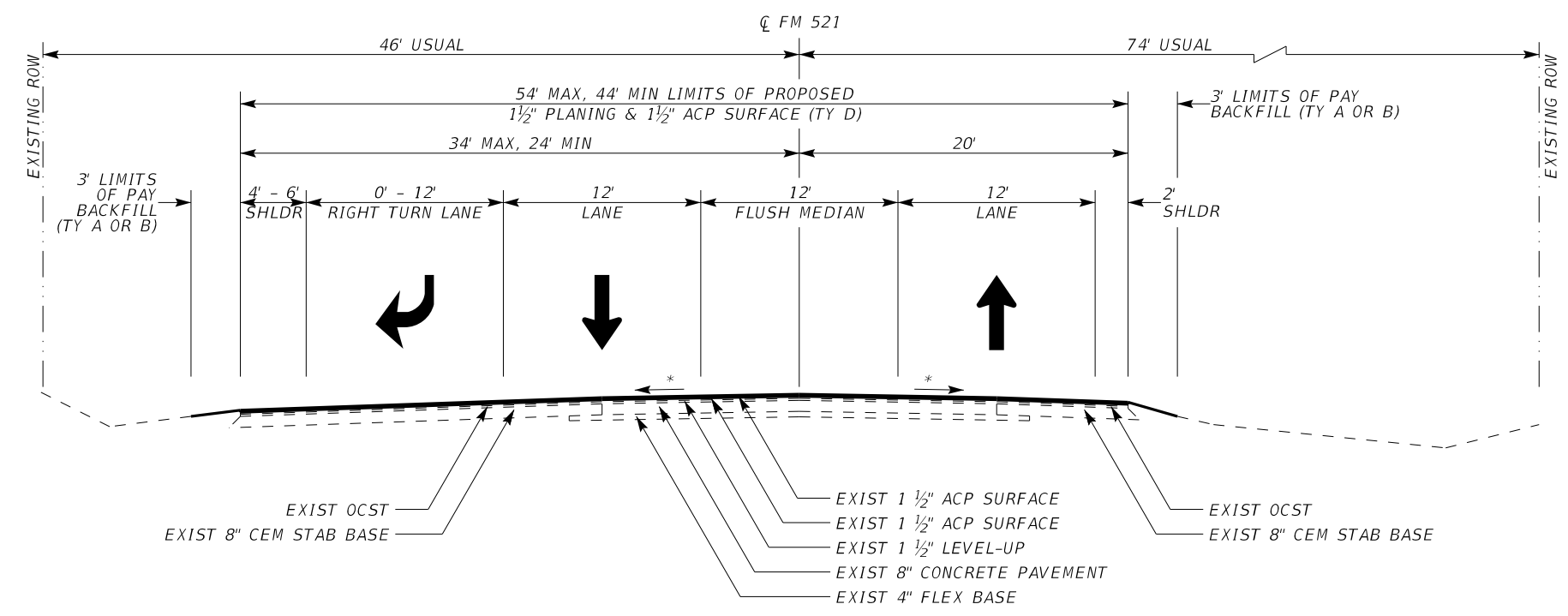
SHEET 4 OF 7

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			13



- NOTES:**
1. SURFACE TEST TYPE B, PAY ADJUSTMENT SCHEDULE 3.
 2. SEE "SIGNING & PAVEMENT MARKING LAYOUT" SHEETS FOR LIMITS OF MILLED EDGELINE & CENTERLINE RUMBLE STRIPS.
 3. SEE "ROADWAY LAYOUT" SHEETS FOR STATION CALLOUTS FOR LANE TAPERS.
- * MATCH EXISTING SLOPE

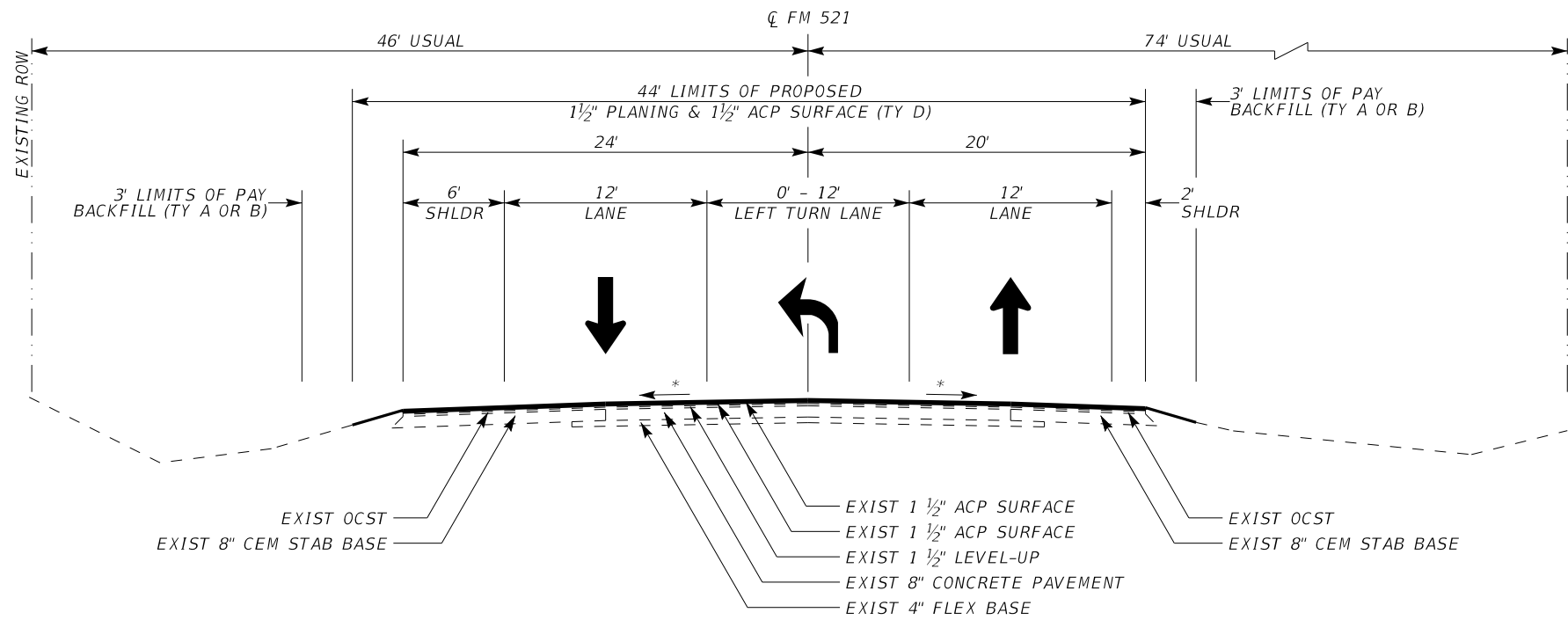
PROPOSED TYPICAL SECTION
 STA 442+63.04 TO STA 452+21.84
 PAVEMENT MARKINGS ONLY



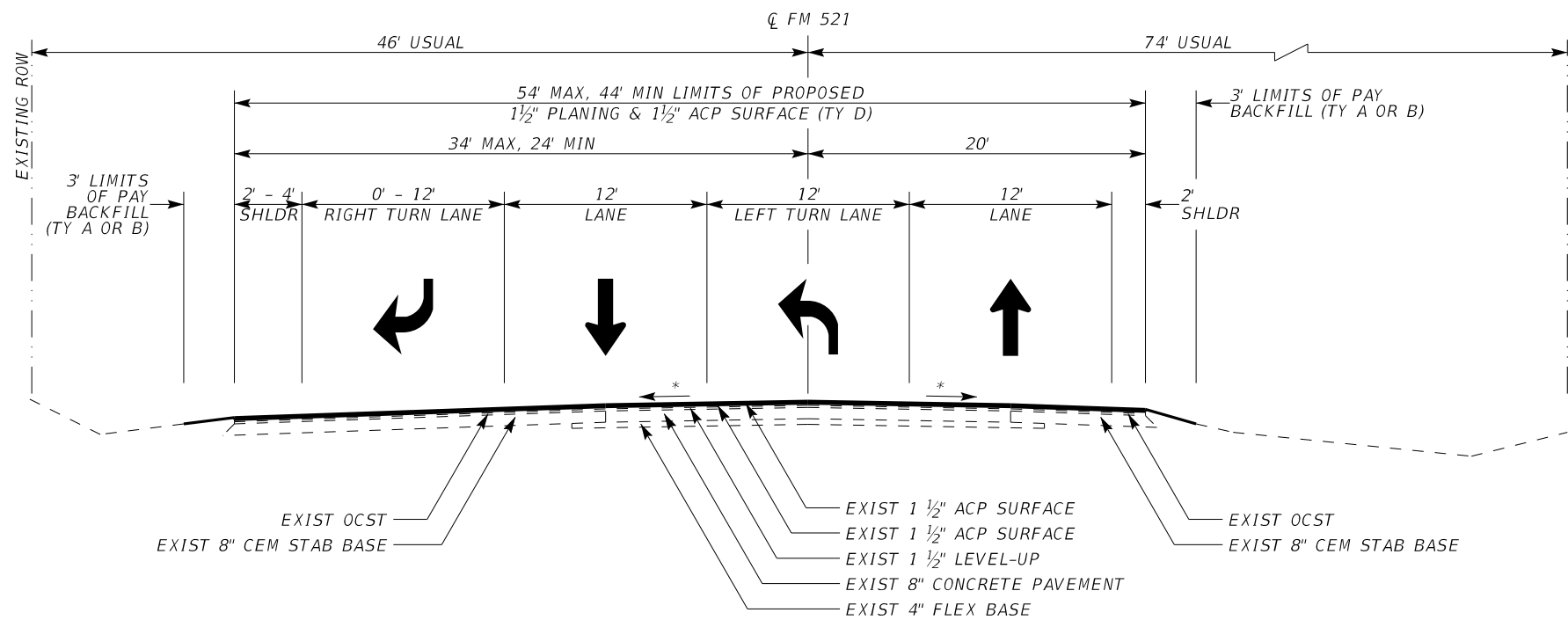
PROPOSED TYPICAL SECTION
 STA 462+65.00 TO STA 466+35.00

STATE OF TEXAS
 ROBERT S. BISSETT, JR.
 79703
 REGISTERED PROFESSIONAL ENGINEER
Robert S. Bissett, Jr.
 09/29/21

PROPOSED TYPICAL SECTIONS



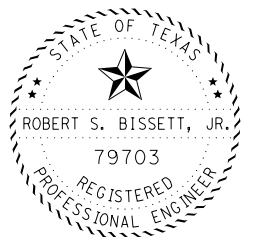
PROPOSED TYPICAL SECTION
STA 466+35.00 TO STA 469+85.00



PROPOSED TYPICAL SECTION
STA 469+85.00 TO STA 474+73.00

NOTES:

1. SURFACE TEST TYPE B, PAY ADJUSTMENT SCHEDULE 3.
 2. SEE "SIGNING & PAVEMENT MARKING LAYOUT" SHEETS FOR LIMITS OF MILLED EDGELINE & CENTERLINE RUMBLE STRIPS.
 3. SEE "ROADWAY LAYOUT" SHEETS FOR STATION CALLOUTS FOR LANE TAPERS.
- * MATCH EXISTING SLOPE



Robert S. Bissett, Jr.
09/13/21

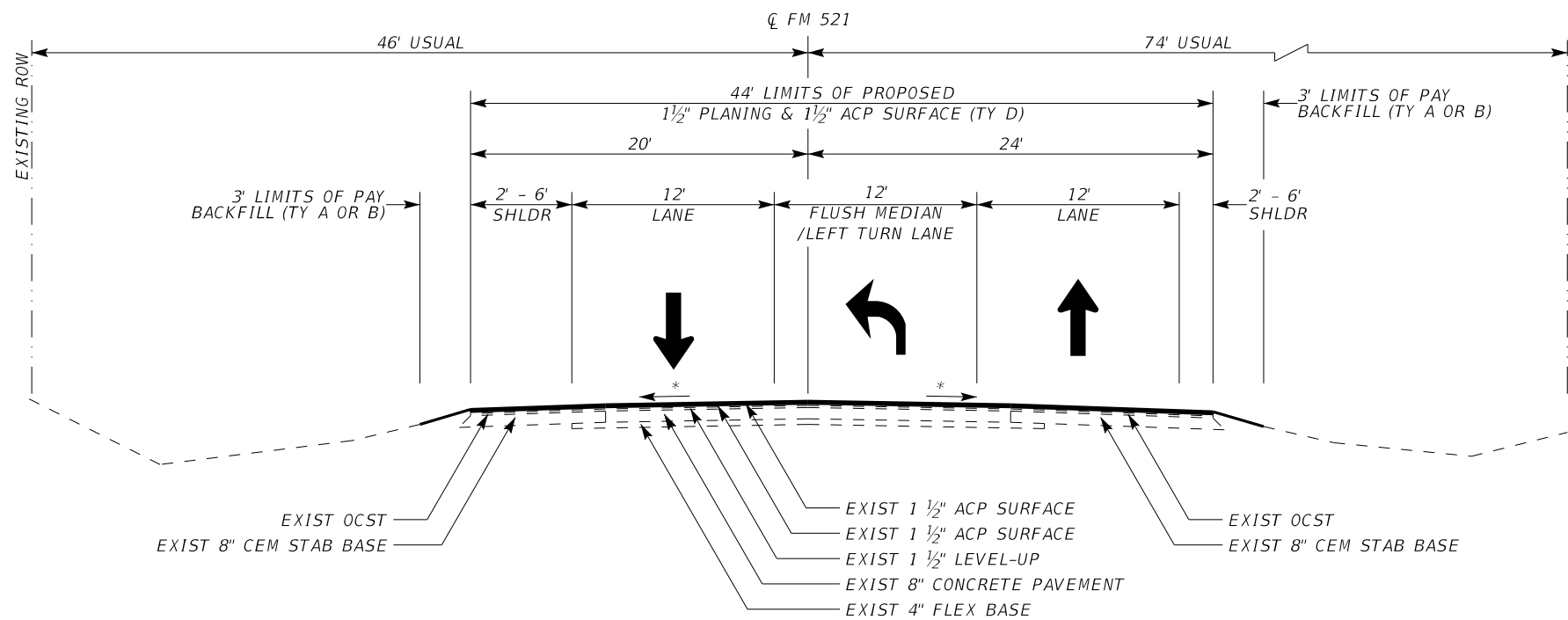
PROPOSED TYPICAL SECTIONS



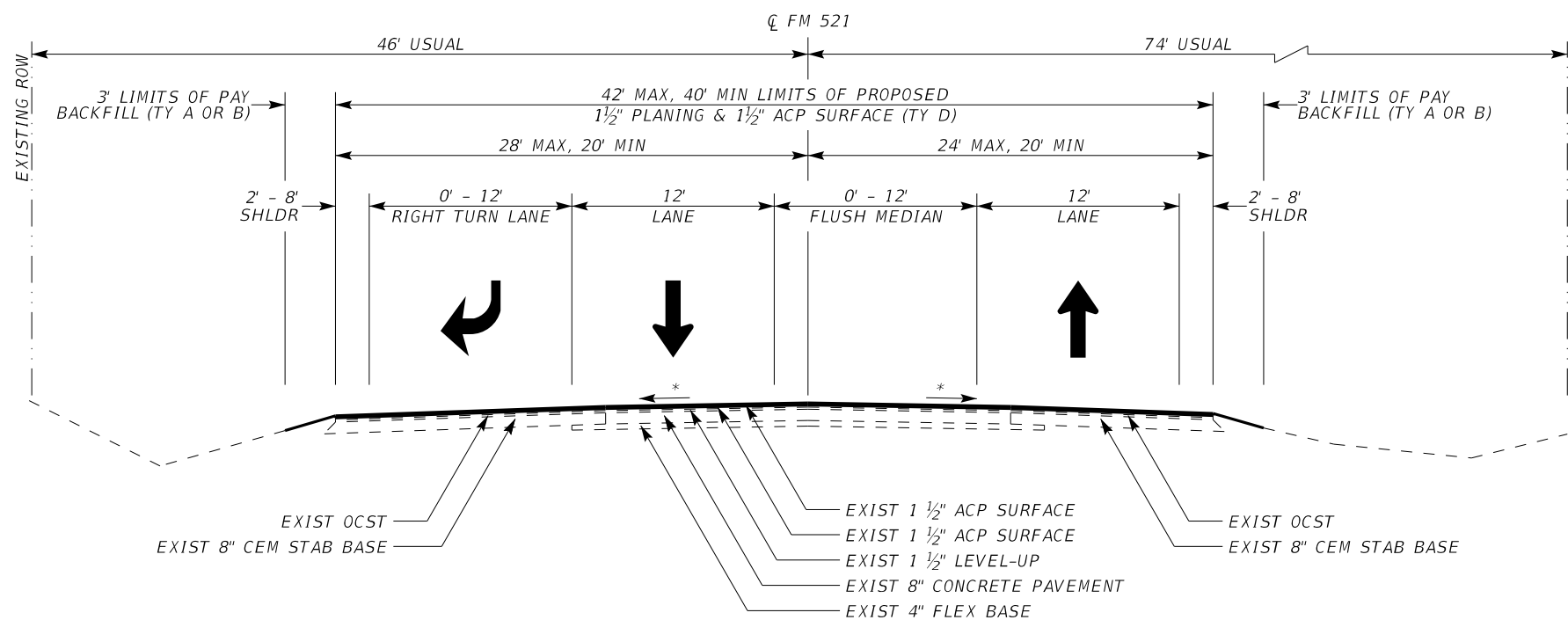
SHEET 6 OF 7

SCALE: 1"=10'H, 1"=10'V

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	15



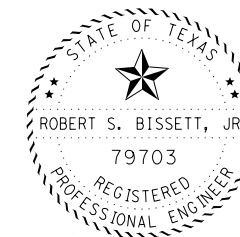
PROPOSED TYPICAL SECTION
STA 474+73.00 TO STA 486+75.00



PROPOSED TYPICAL SECTION
STA 486+75.00 TO STA 493+16.00

NOTES:

1. SURFACE TEST TYPE B, PAY ADJUSTMENT SCHEDULE 3.
 2. SEE "SIGNING & PAVEMENT MARKING LAYOUT" SHEETS FOR LIMITS OF MILLED EDGELINE & CENTERLINE RUMBLE STRIPS.
 3. SEE "ROADWAY LAYOUT" SHEETS FOR STATION CALLOUTS FOR LANE TAPERS.
- * MATCH EXISTING SLOPE



Robert S. Bissett, Jr.

09/13/21

PROPOSED TYPICAL SECTIONS

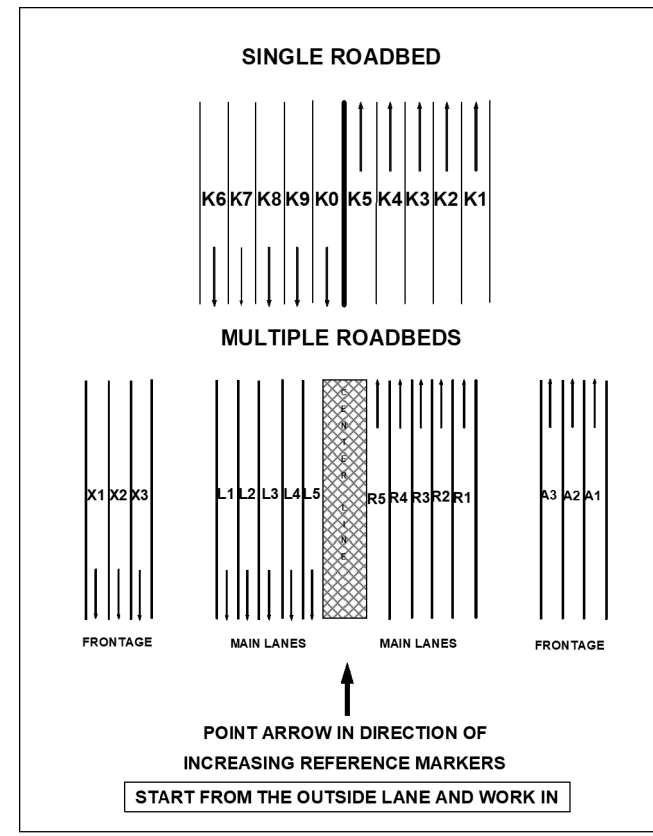


SHEET 7 OF 7

SCALE: 1"=10'H, 1"=10'V

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	16

	M	R								P					
	S	D								Y					
F	E	B	REFERENCE MARKERS							P	IRI(IN/MI)				
Y	C	D							E	TEST					
	HIGHWAY		BEGIN	END	LEN		MM/DD/YYYY	LEFT	RIGHT	SI	COMMENTS				
2020	04	FM0521	K6 0714 + 0.032	0714 + 0.126	0.1	08	9/29/2019	78	86	4.0					
2020	04	FM0521	K6 0714 + 0.126	0714 + 0.226	0.1	08	9/29/2019	71	74	4.2					
2020	04	FM0521	K6 0714 + 0.226	0714 + 0.326	0.1	08	9/29/2019	58	58	4.6					
2020	04	FM0521	K6 0714 + 0.326	0714 + 0.426	0.1	08	9/29/2019	71	65	4.3					
2020	04	FM0521	K6 0714 + 0.426	0714 + 0.526	0.1	08	9/29/2019	91	74	4.0					
2020	04	FM0521	K6 0714 + 0.526	0714 + 0.626	0.1	08	9/29/2019	105	94	3.7					
2020	04	FM0521	K6 0714 + 0.626	0714 + 0.726	0.1	08	9/29/2019	100	122	3.5					
2020	04	FM0521	K6 0714 + 0.726	0714 + 0.826	0.1	08	9/29/2019	71	60	4.4					
2020	04	FM0521	K6 0714 + 0.826	0714 + 0.926	0.1	08	9/29/2019	123	112	3.4					
2020	04	FM0521	K6 0714 + 0.926	0714 + 1.026	0.1	08	9/29/2019	79	81	4.1					
2020	04	FM0521	K6 0714 + 1.026	0714 + 1.126	0.1	08	9/29/2019	70	69	4.3					
2020	04	FM0521	K6 0714 + 1.126	0714 + 1.226	0.1	08	9/29/2019	123	166	2.9					
2020	04	FM0521	K6 0714 + 1.226	0714 + 1.326	0.1	08	9/29/2019	83	164	3.3					
2020	04	FM0521	K6 0714 + 1.326	0714 + 1.426	0.1	08	9/29/2019	85	93	3.9					
2020	04	FM0521	K6 0714 + 1.426	0714 + 1.526	0.1	08	9/29/2019	59	73	4.4					
2020	04	FM0521	K6 0714 + 1.526	0714 + 1.626	0.1	08	9/29/2019	45	60	4.7					
2020	04	FM0521	K6 0714 + 1.626	0714 + 1.726	0.1	08	9/29/2019	66	91	4.1					
2020	04	FM0521	K6 0714 + 1.726	0714 + 1.826	0.1	08	9/29/2019	68	106	3.9					
2020	04	FM0521	K6 0714 + 1.826	0714 + 1.926	0.1	08	9/29/2019	63	64	4.4					
2020	04	FM0521	K6 0716 + 1.926	716 + 0.041	0.1	08	9/29/2019	79	63	4.2					
2020	04	FM0521	K6 0716 + 0.041	0716 + 0.141	0.1	08	9/29/2019	66	77	4.2					
2020	04	FM0521	K6 0716 + 0.141	0716 + 0.241	0.1	08	9/29/2019	62	104	4.0					
2020	04	FM0521	K6 0716 + 0.241	0716 + 0.341	0.1	08	9/29/2019	70	119	3.8					
2020	04	FM0521	K6 0716 + 0.341	0716 + 0.441	0.1	08	9/29/2019	53	103	4.1					
2020	04	FM0521	K6 0716 + 0.441	0716 + 0.541	0.1	08	9/29/2019	94	109	3.6					
2020	04	FM0521	K6 0716 + 0.541	0716 + 0.641	0.1	08	9/29/2019	85	123	3.6					
2020	04	FM0521	K6 0716 + 0.641	0716 + 0.741	0.1	08	9/29/2019	51	69	4.5					
2020	04	FM0521	K6 0716 + 0.741	0716 + 0.841	0.1	08	9/29/2019	76	88	4.0					
2020	04	FM0521	K6 0716 + 0.841	0716 + 0.941	0.1	08	9/29/2019	59	151	3.6					
2020	04	FM0521	K6 0716 + 0.941	0716 + 1.041	0.1	08	9/29/2019	60	74	4.3					
2020	04	FM0521	K6 0716 + 1.041	0716 + 1.141	0.1	08	9/29/2019	78	117	3.7					
2020	04	FM0521	K6 0716 + 1.141	0716 + 1.241	0.1	08	9/29/2019	54	60	4.6					
2020	04	FM0521	K6 0716 + 1.241	0716 + 1.341	0.1	08	9/29/2019	65	53	4.5					
2020	04	FM0521	K6 0716 + 1.341	0716 + 1.441	0.1	08	9/29/2019	77	70	4.2					
2020	04	FM0521	K6 0716 + 1.441	0716 + 1.541	0.1	08	9/29/2019	86	59	4.2					
2020	04	FM0521	K6 0716 + 1.541	0716 + 1.641	0.1	08	9/29/2019	60	49	4.7					
2020	04	FM0521	K6 0716 + 1.641	0716 + 1.741	0.1	08	9/29/2019	75	63	4.3					
2020	04	FM0521	K6 0716 + 1.741	0716 + 1.841	0.1	08	9/29/2019	98	84	3.8					
2020	04	FM0521	K6 0716 + 1.841	0716 + 1.941	0.1	08	9/29/2019	86	73	4.1					
2020	04	FM0521	K6 716 + 1.941	718 + 0.017	0.1	08	10/7/2019	50	43	4.9					
2020	04	FM0521	K6 0718 + 0.017	0718 + 0.117	0.1	08	9/29/2019	93	108	3.7					
2020	04	FM0521	K6 0718 + 0.117	0718 + 0.217	0.1	08	9/29/2019	173	224	2.3					
2020	04	FM0521	K6 0718 + 0.217	0718 + 0.317	0.1	08	9/29/2019	123	102	3.4					
2020	04	FM0521	K6 0718 + 0.317	0718 + 0.417	0.1	08	9/29/2019	184	162	2.6					
2020	04	FM0521	K6 0718 + 0.417	0718 + 0.517	0.1	08	9/29/2019	69	91	4.1					
2020	04	FM0521	K6 0718 + 0.517	0718 + 0.617	0.1	08	9/29/2019	80	74	4.1					
2020	04	FM0521	K6 0718 + 0.617	0718 + 0.717	0.1	08	9/29/2019	70	65	4.3					
2020	04	FM0521	K6 0718 + 0.717	0718 + 0.817	0.1	08	9/29/2019	116	114	3.4					



Pavement Types

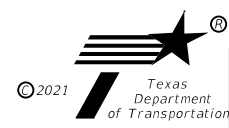
Code

- 01
- 02
- 03
- 04
- 05
- 06
- 07
- 08
- 09
- 10

Description

- Continuously Reinforced Concrete Pavement
- Jointed Reinforced Concrete Pavement
- Jointed Plain Concrete Pavement
- Thick Asphaltic Concrete Pavement (greater than 5-1/2")
- Intermediate Thickness Asphaltic Concrete Pavement (2-1/2" to 5-1/2")
- Thin Surfaced Flexible Base Pavement (less than 2-1/2")
- Asphalt Surfacing with Heavily Stabilized Base
- Overlaid and/or Widened Old Concrete Pavement
- Overlaid and/or Widened Old Flexible Pavement
- Thin Surfaced Flexible Base Pavement (Surface Treatment-Seal Coat Combination)

**INTERNATIONAL
ROUGHNESS INDEX
DATA**



CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		17

General Notes:

General:

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

*Carlos M Zepeda Jr at Carlos.Zepeda@txdot.gov
Daniel Dvorak at Daniel.Dvorak@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.

The following standard detail sheets are modified:

Modified Standards

*TCP(1-2)-18(MOD)
TCP(2-2)-18(MOD)*

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

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

Grade street intersections and median openings for surface drainage.

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

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

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

Stencil the National Bridge Inventory (NBI) number on each existing bridge shown on these plans.

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.

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

Remove existing raised pavement markings. This work is subsidiary to various bid items.

The removal of newspaper boxes is subsidiary to the various bid items.

General: Site Management

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

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

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

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

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

Tricycle Type

Wayne Series 900
Elgin White Wing
Elgin Pelican

Truck Type - 4 Wheel

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

General: Traffic Control and Construction

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

General: Utilities

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

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

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

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.

Item 5: Control of Work

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	Y	Y	Y	B	SD

	reqd.)					
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:

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

Key to Reviewing Party

A - Area Office	
Area Office	Email Address
Brazoria Area Office	HOU-BRZAShpDrwgs@txdot.gov
Fort Bend Area Office	HOU-FBAShpDrwgs@txdot.gov
Galveston Area Office	HOU-GALVAShpDrwgs@txdot.gov
Montgomery Area Office	HOU-MONTAShpDrwgs@txdot.gov
North Harris Area Office	HOU-NHAShpDrwgs@txdot.gov
Southeast Area Office	HOU-SEHAShpDrwgs@txdot.gov
Traffic Systems Construction Office	HOU-TSCShpDrwgs@txdot.gov
West/Central Harris Area Office	HOU-WWCHAOShpDrwgs@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.

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.

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

No significant traffic generator events have been identified.

Item 8: Prosecution and Progress

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

Working days will be computed and charged based on a *standard* workweek in accordance with Section 8.3.1.4

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 60 days. The Engineer and the Contractor may mutually agree, in writing, to decrease this maximum number of days.

The Lane Closure Assessment Fee is \$ 300.00. 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."

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 134: Backfilling Pavement Edges

Quantity by station includes both sides of the roadway.

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.

Blade back any sod and/or loose material prior to placement of the ACP overlay and shoulder up material. This work is subsidiary to Item 134.

Item 204: Sprinkling

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

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

Item 210: Rolling

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

Item 247: Flexible Base

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

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

Furnish one type of the base material unless otherwise authorized.

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

Sandstone aggregate is not permitted.

Item 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.

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

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

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

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

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

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

Dilution of tack coat is not allowed.

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

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

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

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.

Items 496: Removing Structures

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

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

Item 502: Barricades, Signs, and Traffic Handling

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

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

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."

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.

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.

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	Engineer Approval	5:00 AM - 9:00 AM 3:00 PM – 7:00 PM
Tuesday	9:00 AM- 3:00 PM	Engineer Approval	5:00 AM - 9:00 AM 3:00 PM – 7:00 PM
Wednesday	9:00 AM- 3:00 PM	Engineer Approval	5:00 AM - 9:00 AM 3:00 PM – 7:00 PM
Thursday	9:00 AM- 3:00 PM	Engineer Approval	5:00 AM - 9:00 AM 3:00 PM – 7:00 PM
Friday	9:00 AM- 3:00 PM	Engineer Approval	5:00 AM - 9:00 AM 3:00 PM – 7:00 PM
Saturday	Not Allowed	Not Allowed	Not Allowed
Sunday	Not Allowed	Not Allowed	Not Allowed

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.

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 504: Field Office and Laboratory

Furnish one Type A structure for the laboratory. Ensure the windows for the structure have burglar bars.

Furnish a Type D structure for the asphalt mix control laboratory for the Engineer’s exclusive use. In addition to the requirements of this Item, “Field Office and Laboratory,” ensure this structure has a minimum height of 8 ft. Also ensure it has a minimum of 400 sq. ft. of gross floor area suitable for permanently located asphalt plants or 200 sq. ft. for temporarily located asphalt plants serving one project. Partition the floor area into a minimum of 2 interconnected rooms, and provide each room with an exterior door and a minimum of 2 windows. Construct the floor of sufficient strength to support the testing equipment and with an impervious covering.

Adequately air condition the Type D structure and furnish it with a minimum of one desk, 3 chairs, one file cabinet, a telephone, and one built-in equipment-storage cabinet suitable for storing nuclear equipment. Ensure the cabinet is a minimum of 3 ft. wide by 2 ft. deep by 3 ft. high and has a secure lock. Provide the structure with a 240-volt electrical service entrance. Use a licensed electrician to determine the service size and service entrance conductors. Provide a minimum service of four 120-volt circuits with 20 amp breakers, and a maximum of 2 grounded convenience outlets per circuit and a minimum of two 220-volt ovens with vents to the outside. Provide a structure with a minimum of 2 convenience outlets per wall and a utility sink with an adequate, clean potable water supply for testing. Do not use space heaters to heat the structure. Use support blocks for the portable structures, tie them down, and securely attach them to the ground.

In addition, provide the following: One exterior door opening 48-inches minimum width. If steps are required to gain access to the facility’s 48-inch door provide a landing dock with minimum dimensions of 60 inches wide by 60 inches deep. The strong floor and landing of the facility shall support the weight of all equipment and personnel providing a stable, essentially zero deflection during testing operations, acceptable to the Engineer. This facility will be required with plant produced asphalt concrete pavement.

No direct payment will be made for Engineer field labs. All construction, maintenance, utilities, custodial services, security, and permits necessary to establish and maintain readiness of this facility will be the responsibility of the Contractor. This building/facility is required by the standard specifications and is considered a standard part of any asphalt concrete pavement plant producing materials for TxDOT projects.

The SuperPave Gyratory Compactor will be furnished to the Engineer under the asphalt concrete pavement Item(s) of work.

Determine the asphalt content by the ignition method and meet the requirements of Section 504.2.2.4.1, “Asphalt Content by Ignition Method” except provide a NEMA 6-50R (204/240 volt, 50 A) outlet within 2.25 ft. of the ignition oven location.

If an asphalt mix plant is located at the project site, provide a Type D structure with the dimensions of a Type C structure, at the project site to perform the asphalt mix quality control tests.

If a commercial source is used for the asphalt mix, provide a Type D structure with the dimensions of a Type C structure, at the commercial source site to perform the asphalt mix quality control tests.

Equip each lab with a first aid kit and at least a 20 lb. ABC type fire extinguisher. Also equip the labs with an eye wash station. Provide equipment that meets the minimum OSHA requirements.

The above requirements are subsidiary to the various bid items.

Assume ownership of temporary chain link security fences.

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

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

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

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

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

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 540: Metal Beam Guard Fence

Painting the timber posts is not required.

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

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

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

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

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

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

Item 542: Removing Metal Beam Guard Fence

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

Item 585: Ride Quality for Pavement Surfaces

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

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

For asphalt mainlanes, use Surface Test Type B and Pay Adjustment Schedule 3.

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

Item 636: Signs

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

Item 644: Small Roadside Sign Assemblies

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

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

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

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

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."

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

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

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

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

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 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.

County: Fort Bend

County: Fort Bend

Sheet 18H

Highway: FM 521

Control: 0111-03-063

Highway: FM 521

Control: 0111-03-063

Basis of Estimate

Item	Description	Limit and Rate	Unit
134	Backfilling Pavement Edges <ul style="list-style-type: none">Asphalt Emulsion	0.25 Gal. / Sq. Yd.	STA
247	Flexible Base <ul style="list-style-type: none">Crushed Stone	138 Lb. / Cu. Ft.	TON
3076	Dense-Graded Hot Mix Asphalt <ul style="list-style-type: none">AsphaltAggregate Tack Coat <ul style="list-style-type: none">Applied on new HMAApplied on Existing HMAApplied on Milled HMA	110 Lb. / Sq. Yd.-In. 6 % by weight 94 % by weight 0.06 Gal. / Sq. Yd. 0.09 Gal. / Sq. Yd. 0.11 Gal. / Sq. Yd.	TON



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0111-03-063

DISTRICT Houston
HIGHWAY FM 521

COUNTY Fort Bend

CONTROL SECTION JOB				0111-03-063		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00125802			
COUNTY				Fort Bend			
HIGHWAY				FM 521			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	104-6054	REMOVING CONCRETE(MOW STRIP)	LF	510.000		510.000	
	134-6004	BACKFILL (TY A OR B)	STA	251.610		251.610	
	247-6056	FL BS (CMP IN PLC)(TY D GR 4)(FNAL POS)	CY	9.000		9.000	
	351-6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	SY	5,000.000		5,000.000	
	354-6041	PLANE ASPH CONC PAV (1.5")	SY	107,730.000		107,730.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	98.000		98.000	
	450-6018	RAIL (TY T631)	LF	350.000		350.000	
	496-6099	REMOVE STR (RAIL)	LF	387.500		387.500	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	4.000		4.000	
	533-6003	RUMBLE STRIPS (SHOULDER) ASPHALT	LF	25,213.000		25,213.000	
	533-6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	20,015.000		20,015.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	1,250.000		1,250.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1.000		1.000	
	540-6033	MTL BM GD FEN (LONG SPAN SYSTEM)	EA	2.000		2.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	900.000		900.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	1.000		1.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	11.000		11.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	10.000		10.000	
	560-6011	MAILBOX INSTALL-S (TWW-POST) TY 4	EA	36.000		36.000	
	560-6012	MAILBOX INSTALL-D (TWW-POST) TY 4	EA	3.000		3.000	
	560-6013	MAILBOX INSTALL-M (TWW-POST) TY 4	EA	2.000		2.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	38.000		38.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	16.000		16.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	11.000		11.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	2.000		2.000	
	644-6036	IN SM RD SN SUP&AM TYS80(1)SA(U-BM)	EA	1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	58.000		58.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA	20.000		20.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	31.000		31.000	
	662-6001	WK ZN PAV MRK NON-REMOV (W)4"(BRK)	LF	960.000		960.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	41,719.000		41,719.000	
	662-6005	WK ZN PAV MRK NON-REMOV (W)6"(BRK)	LF	960.000		960.000	
	662-6008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF	41,719.000		41,719.000	
	662-6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF	11,024.000		11,024.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	710.000		710.000	
	662-6017	WK ZN PAV MRK NON-REMOV (W)(ARROW)	EA	72.000		72.000	

DISTRICT	COUNTY	CCSJ	SHEET
Houston	Fort Bend	0111-03-063	19



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0111-03-063

DISTRICT Houston
HIGHWAY FM 521

COUNTY Fort Bend

CONTROL SECTION JOB				0111-03-063		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00125802			
COUNTY				Fort Bend			
HIGHWAY				FM 521			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	662-6023	WK ZN PAV MRK NON-REMOV (W)(RR XING)	EA	4.000		4.000	
	662-6029	WK ZN PAV MRK NON-REMOV(W)(WORD)	EA	68.000		68.000	
	662-6032	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	LF	2,450.000		2,450.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	31,326.000		31,326.000	
	662-6035	WK ZN PAV MRK NON-REMOV (Y)6"(BRK)	LF	2,450.000		2,450.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF	31,326.000		31,326.000	
	662-6041	WK ZN PAV MRK NON-REMOV (Y)24"(SLD)	LF	188.000		188.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	7,746.000		7,746.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	567.000		567.000	
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	50.000		50.000	
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	44.000		44.000	
	666-6093	REFL PAV MRK TY I (W)(RR XING)(100MIL)	EA	2.000		2.000	
	666-6147	REFL PAV MRK TY I (Y)24"(SLD)(100MIL)	LF	94.000		94.000	
	666-6162	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	LF	1,350.000		1,350.000	
	666-6225	PAVEMENT SEALER 6"	LF	1,350.000		1,350.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	1,350.000		1,350.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	80.000		80.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	2,450.000		2,450.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	46,535.000		46,535.000	
	666-6343	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	LF	50,298.000		50,298.000	
	672-6007	REFL PAV MRKR TY I-C	EA	445.000		445.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	2,352.000		2,352.000	
	3076-6041	D-GR HMA TY-D SAC-A PG70-22	TON	9,016.430		9,016.430	
	3076-6066	TACK COAT	GAL	12,206.000		12,206.000	
	6185-6002	TMA (STATIONARY)	DAY	30.000		30.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	121.000		121.000	
	12	RAILROAD FLAGGING: RAILROAD FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

SUMMARY OF TRAFFIC CONTROL QUANTITIES

ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT SHEETS	0662 WK ZN PAV MRK NON-REMOV										6185-6002	6185-6005
	-6001 (W) 4" (BRK)	-6004 (W) 4" (SLD)	-6012 (W) 8" (SLD)	-6016 (W) 24" (SLD)	-6017 (W) (ARROW)	-6023 (W) (RR XING)	-6029 (W) (WORD)	-6032 (Y) 4" (BRK)	-6034 (Y) 4" (SLD)	-6041 (Y) 24" (SLD)	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	LF	LF	LF	LF	EA	EA	EA	LF	LF	LF	DAY	DAY
1	900	3,728	370	31	4		2		6,120			
2	60	2,137		78			2		2,136			
3		3,999		40				450	110			
4		4,394		23				500	454			
5		4,280	1,987	151	11		11		5,781	94		
6		3,736	1,070	12	7		7	120	4,394			
7												
8		3,289	840		6		6		4,335			
9		4,307	1,157		7		7		6,266			
10		4,488	88	20	1		1	470	804			
11		4,400						550				
12		2,961						360	926			
TOTAL	960	41,719	5,512	355	36	2	34	2,450	31,326	94	30	121

SUMMARY OF TRAFFIC CONTROL QUANTITIES

SHEET 1 OF 1



CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		20

SUMMARY OF ROADWAY QUANTITIES

ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT SHEETS	0104-6054	0134-6004	0247-6056 ①	0351-6002 ②	0354-6041	0432-6045
	REMOVING CONCRETE (MOW STRIP) LF	BACKFILL (TY A OR B) STA	FL BS (CMP IN PLC) (TY D GR 4) (FNAL POS) CY	FLEXIBLE PAVEMENT STRUCTURE REPAIR (6") SY	PLANE ASPH CONC PAV (1.5") SY	RIPRAP (MOW STRIP) (4 IN) CY
1		18.56	3		15,149	
2		21.12			5,466	33
3		22.00			9,160	
4		22.00	1		9,914	
5		22.00			12,541	
6		22.00	1		8,629	
7		22.00				
8	510	22.00			8,408	40
9		22.00	3		11,812	
10		21.12			10,293	25
11		22.00			9,778	
12		14.81	1		6,580	
TOTAL	510	251.61	9	5,000	107,730	98

① THIS QUANTITY IS FOR GRAVEL, DIRT AND GRASS DRIVEWAYS IF NEEDED.

② LOCATIONS OF BASE REPAIR HAVE NOT BEEN SHOWN ON THE LAYOUTS BUT WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.

**SUMMARY OF
ROADWAY
QUANTITIES**

SHEET 1 OF 3



CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		21

SUMMARY OF ROADWAY QUANTITIES

ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT SHEETS	0450-6018	0496-6099	0540-6001	0540-6016	0540-6033	0542-6001	0542-6002	0544-6001
	RAIL (TY 631)	REMOVE STR (RAIL)	MTL W-BEAM GD FEN (TIM POST)	DOWNSTREAM TERMINAL ANCHOR SYSTEM	MTL BM GD FEN (LONG SPAN SYSTEM)	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (INSTALL)
	LF	LF	LF	EA	EA	LF	EA	EA
1								
2	175	175	475			312.5		4
3								
4								
5								
6								
7								
8			437.5		2	375		4
9								
10	175	212.5	337.5	1		212.5	1	3
11								
12								
TOTAL	350	387.5	1,250.0	1	2	900	1	11

SUMMARY OF
ROADWAY
QUANTITIES

SHEET 2 OF 3



CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		22

SUMMARY OF ROADWAY QUANTITIES

ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT SHEETS	0544-6003	0560-6011	0560-6012	0560-6013	3076-6041	3076-6041①	3076-6066	3076-6066①
	GUARDRAIL END TREATMENT (REMOVE) EA	MAILBOX INSTALL-D (TWW-POST) TY 4 EA	MAILBOX INSTALL-M (TWW-POST) TY 4 EA	MAILBOX INSTALL-S (TWW-POST) TY 4 EA	D-GR HMA TY-D SAC-A PG70-22 TON	D-GR HMA TY-D SAC-A PG70-22 TON	TACK COAT GAL	TACK COAT GAL
1		5			1,249.80	16.13	1,667	44
2	3	3			450.95	6.44	602	18
3		3			755.70	13.41	1,008	36
4		9			817.91	19.80	1,091	53
5		1	1		1,034.64	8.50	1,380	23
6		1			711.90	11.18	950	30
7						0.79		3
8	4	1		1	693.66	2.03	925	6
9		1			974.49	2.31	1,300	7
10	3	2		1	849.18	15.89	1,133	43
11		7	1		806.69	10.89	1,076	30
12		3	1		542.85	21.29	724	57
TOTAL	10	36	3	2	8,887.77	128.66	11,856	350

① THIS QUANTITY IS FOR ASPHALT DRIVEWAYS IF NEEDED.

SUMMARY OF
ROADWAY
QUANTITIES

SHEET 3 OF 3



CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		23

SUMMARY OF PAVEMENT MARKING QUANTITIES

ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT SHEETS	0533-6003	0533-6004	0644-6076	0658-6047	0658-6061	0662 WK ZN PAV MRK NON-REMOV				
	RUMBLE STRIPS (EDGELINE) ASPHALT	RUMBLE STRIPS (CENTERLINE) ASPHALT	REMOVE SM RD SN SUP&AM	INSTL OM ASSM (OM-2Y)(WC) GND	INSTL DEL ASSM (D-SW)SZ 1 (BRF)GF2	-6005 (W) 6" (BRK)	-6008 (W) 6" (SLD)	-6012 (W) 8" (SLD)	-6016 (W) 24" (SLD)	-6017 (W) (ARROW)
	LF	LF	EA	EA	EA	LF	LF	LF	LF	EA
1	285		12			900	3,728	370	31	4
2	2,149	1,900	6	2	7	60	2,137		78	
3	3,720	1,640	7				3,999		40	
4	4,200	2,000	1				4,394		23	
5	90	1,266	9	2			4,280	1,987	151	11
6		2,027	3	4			3,736	1,070	12	7
7	607	1,989	4	2						
8	1,991	2,005	1	4	12		3,289	840		6
9	995	1,746	3				4,307	1,157		7
10	3,815	1,761	7	2	12		4,488	88	20	1
11	4,400	2,200	1				4,400			
12	2,961	1,481	4	4			2,961			
TOTAL	25,213	20,015	58	20	31	960	41,719	5,512	355	36

SUMMARY OF
PAVEMENT MARKING
QUANTITIES

SHEET 1 OF 3



CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		24

SUMMARY OF PAVEMENT MARKING QUANTITIES

ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT SHEETS	0662 WK ZN PAV MRK NON-REMOV					0666 REFL PAV MRK TY I				
	-6023 (W) (RR XING)	-6029 (W) (WORD)	-6035 (Y) 6" (BRK)	-6037 (Y) 6" (SLD)	-6041 (Y) 24" (SLD)	-6036 (W) 8" (SLD) (100MIL)	-6048 (W) 24" (SLD) (100MIL)	-6054 (W) (ARROW) (100MIL)	-6078 (W) (WORD) (100MIL)	-6093 (W) (RR XING) (100MIL)
	EA	EA	LF	LF	LF	LF	LF	EA	EA	EA
1		2		6,120		370	31	4	2	
2	2			2,136		290	156	2	2	2
3			450	110			57			
4			500	454			23			
5		11		5,781	94	1,987	151	11	11	
6		7	120	4,394		1,070	12	7	7	
7						1,944	117	12	8	
8		6		4,335		840		6	6	
9		7		6,266		1,157		7	7	
10		1	470	804		88	20	1	1	
11			550							
12			360	926						
TOTAL	2	34	2,450	31,326	94	7,746	567	50	44	2

SUMMARY OF
PAVEMENT MARKING
QUANTITIES

SHEET 2 OF 3



CONT	SECT	JOB	HIGHWAY
0523	02	050	FM 362
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		25

SUMMARY OF PAVEMENT MARKING QUANTITIES

ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT SHEETS	0666 REFL PAV MRK TY I		0666-6225	0666 RE PM W/RET REQ TY I				0666-6343	0672 REFL PAV MRKR	
	-6147 (Y) 24" (SLD) (100MIL)	-6162 (BLACK) 6" (SHADOW) (100MIL)	PAVEMENT SEALER 6"	-6306 (W) 6" (BRK) (100MIL)	-6309 (W) 6" (SLD) (100MIL)	-6318 (Y) 6" (BRK) (100MIL)	-6321 (Y) 6" (SLD) (100MIL)	REF PROF PAV MRK TY I (W)6" (SLD) (100MIL)	-6007 TY I-C	-6009 TY II-A-A
	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA
1		900	900	900			6,120	3,728	63	305
2		60	60	60			5,228	4,393	18	187
3						450	773	4,443		64
4						500	454	4,394		49
5	94						5,781	4,280	101	286
6						120	5,595	4,335	54	280
7		390	390	390	80		8,298	4,236	119	415
8							6,290	4,333	27	327
9							6,266	4,307	59	316
10						470	804	4,488	4	62
11						550		4,400		27
12						360	926	2,961		34
TOTAL	94	1,350	1,350	1,350	80	2,450	46,535	50,298	445	2,352

SUMMARY OF
PAVEMENT MARKING
QUANTITIES

SHEET 3 OF 3



CONT	SECT	JOB	HIGHWAY
0523	02	050	FM 362
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		26

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.

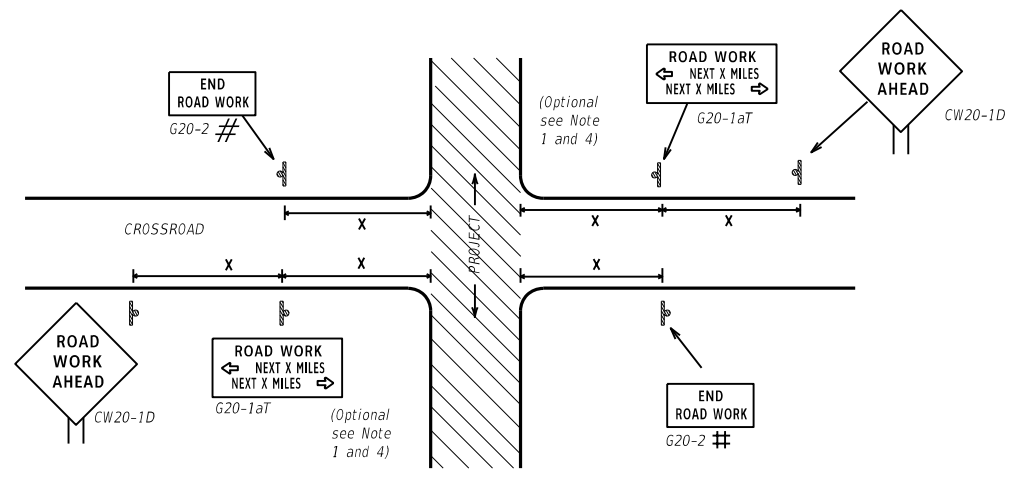
COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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).

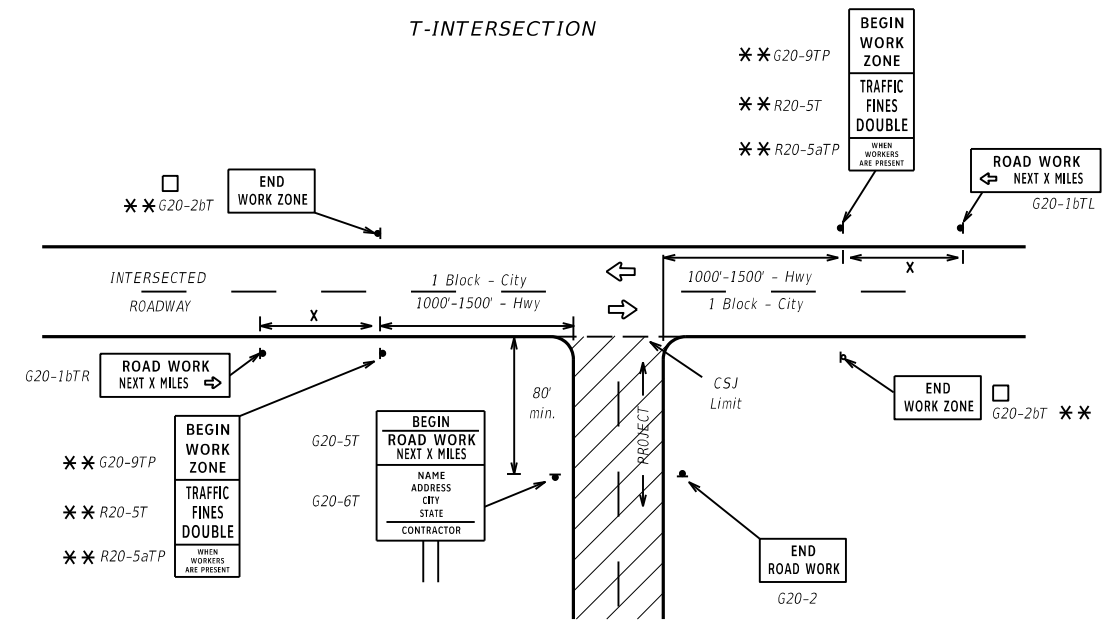
THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS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

SHEET 1 OF 12

 Texas Department of Transportation		Traffic Safety Division Standard	
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS			
BC(1)-21			
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
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- # May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)
- The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D) sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
 - The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
 - Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
 - The "ROAD WORK NEXT X MILES"(G20-1aT) sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
 - Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
 - When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.



CSJ LIMITS AT T-INTERSECTION

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

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING

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

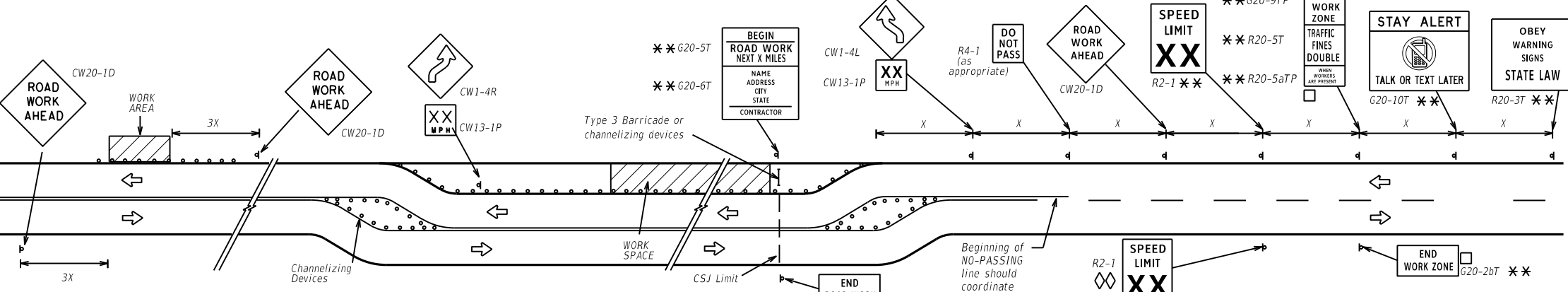
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

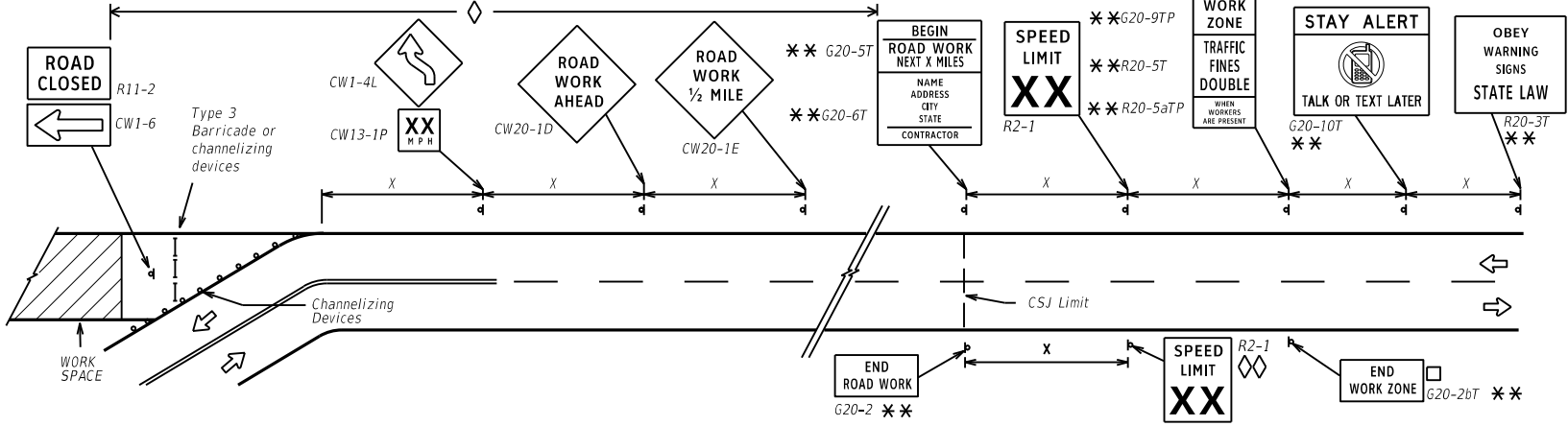
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



NOTES

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

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

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

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

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

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

SHEET 2 OF 12



BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

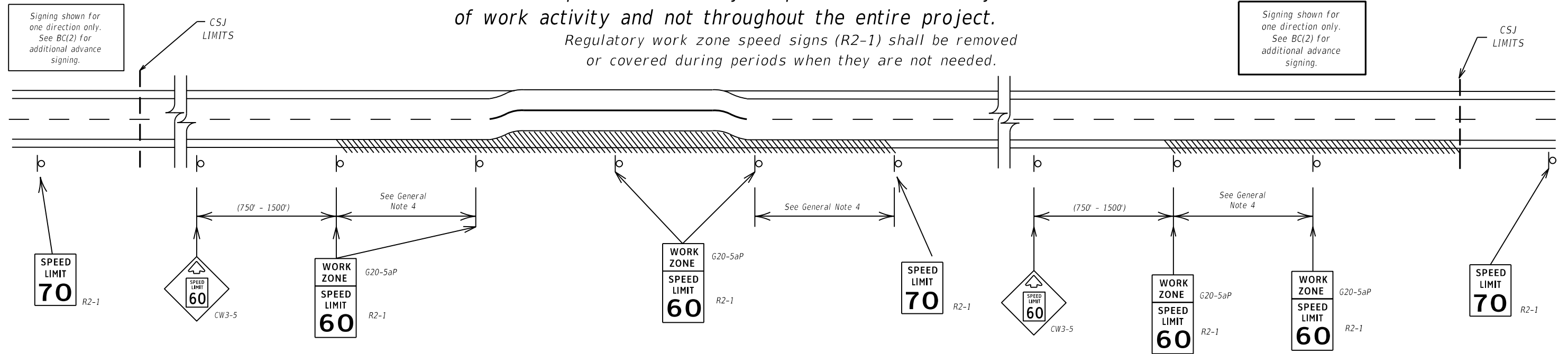
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
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TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- other conditions readily apparent to the driver

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

SHEET 3 OF 12

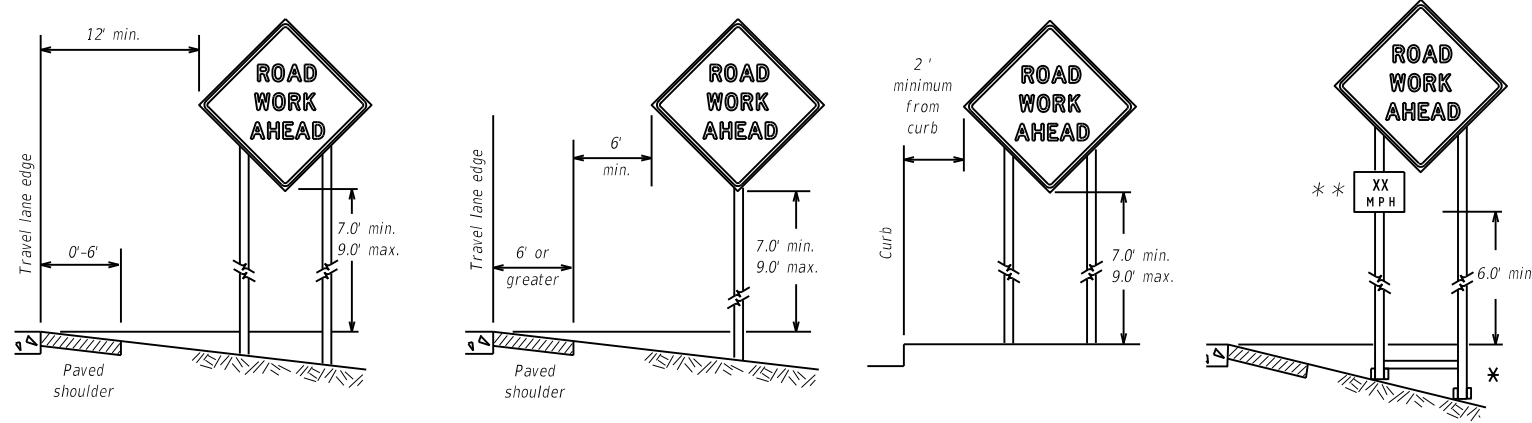


BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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		HOU	FORT BEND		32

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.

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

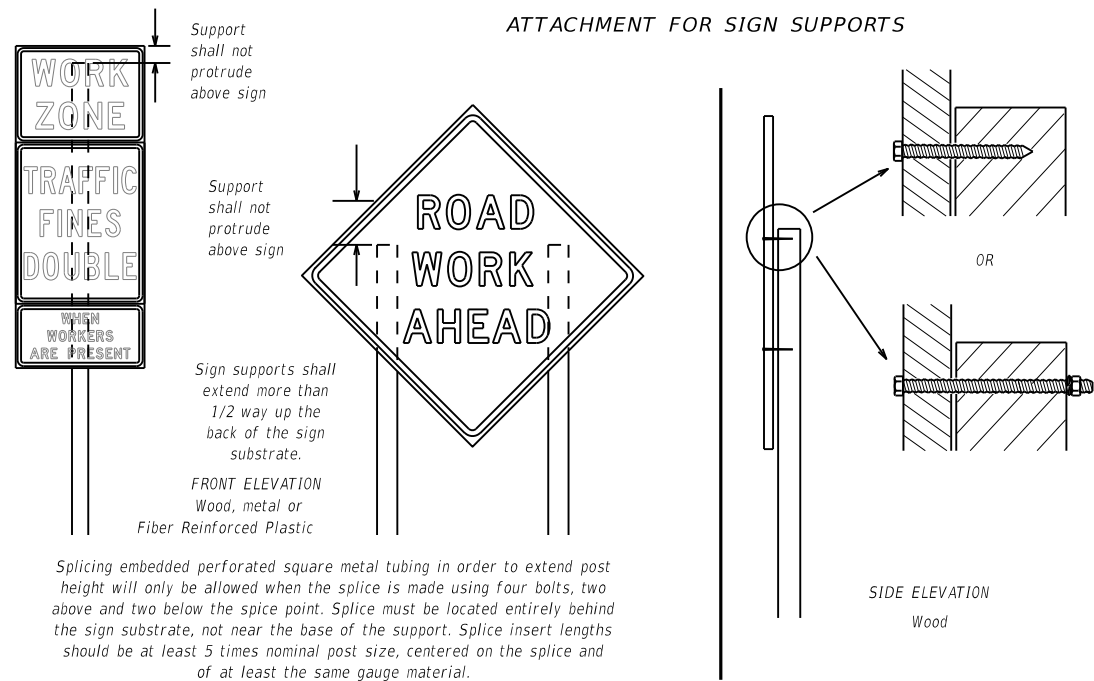
SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

ATTACHMENT FOR SIGN SUPPORTS

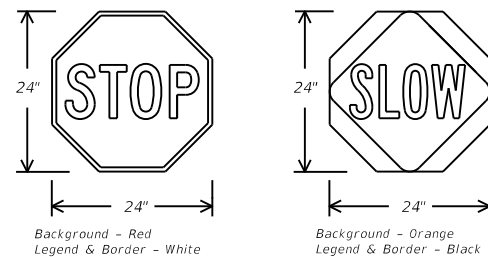


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

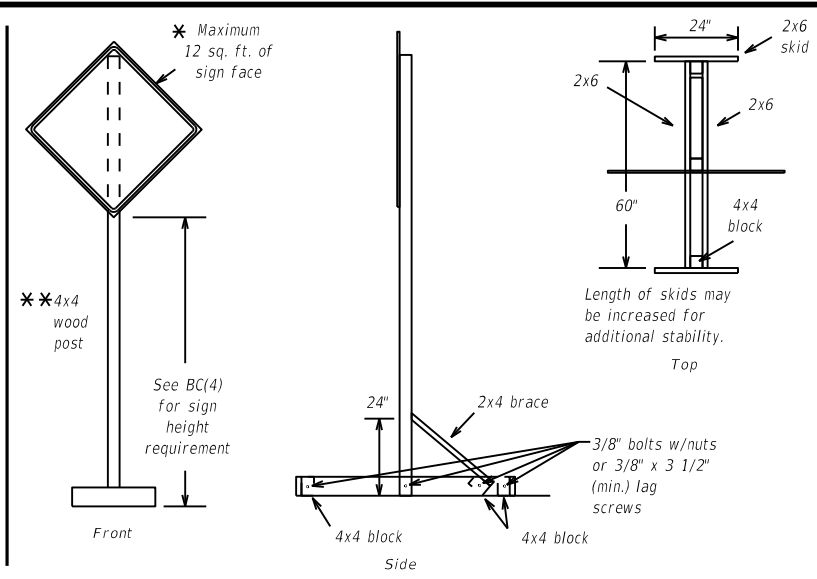
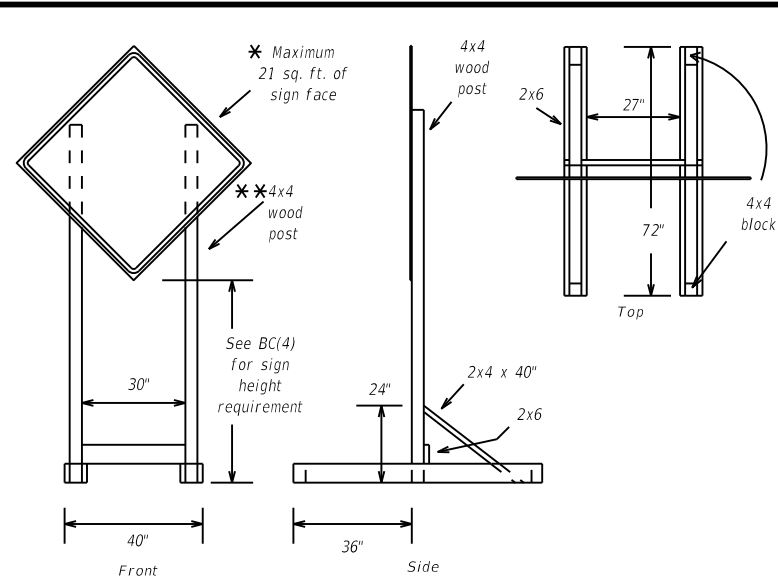
- Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service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



BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

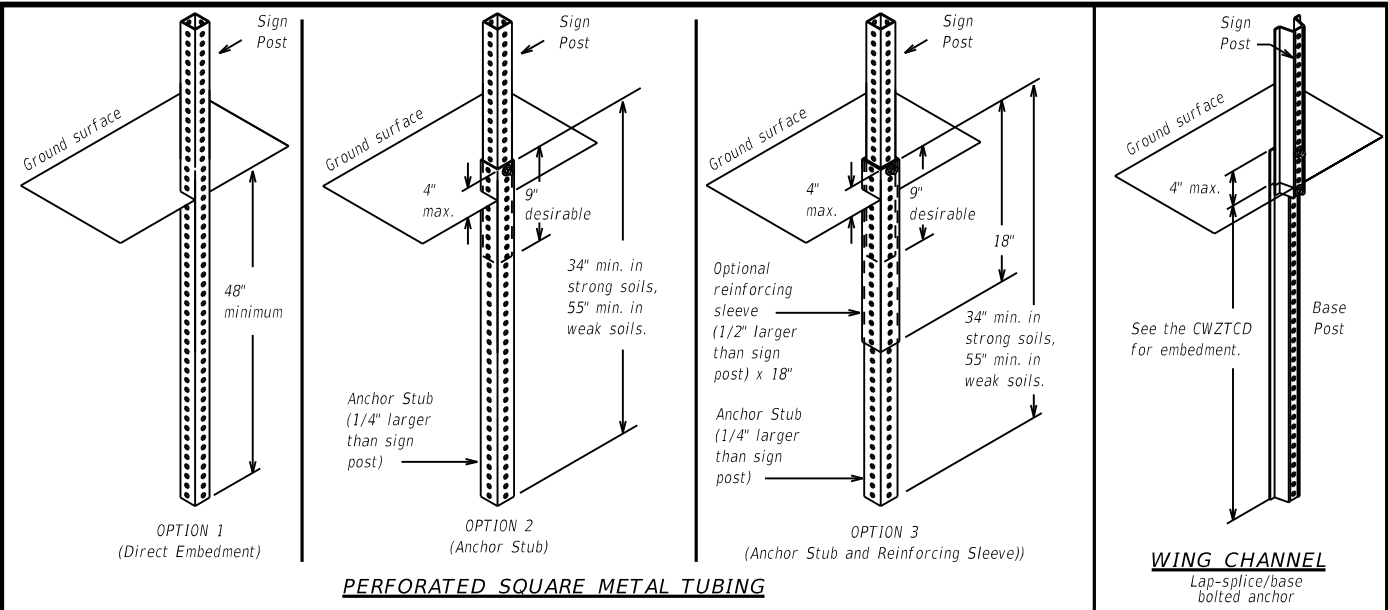
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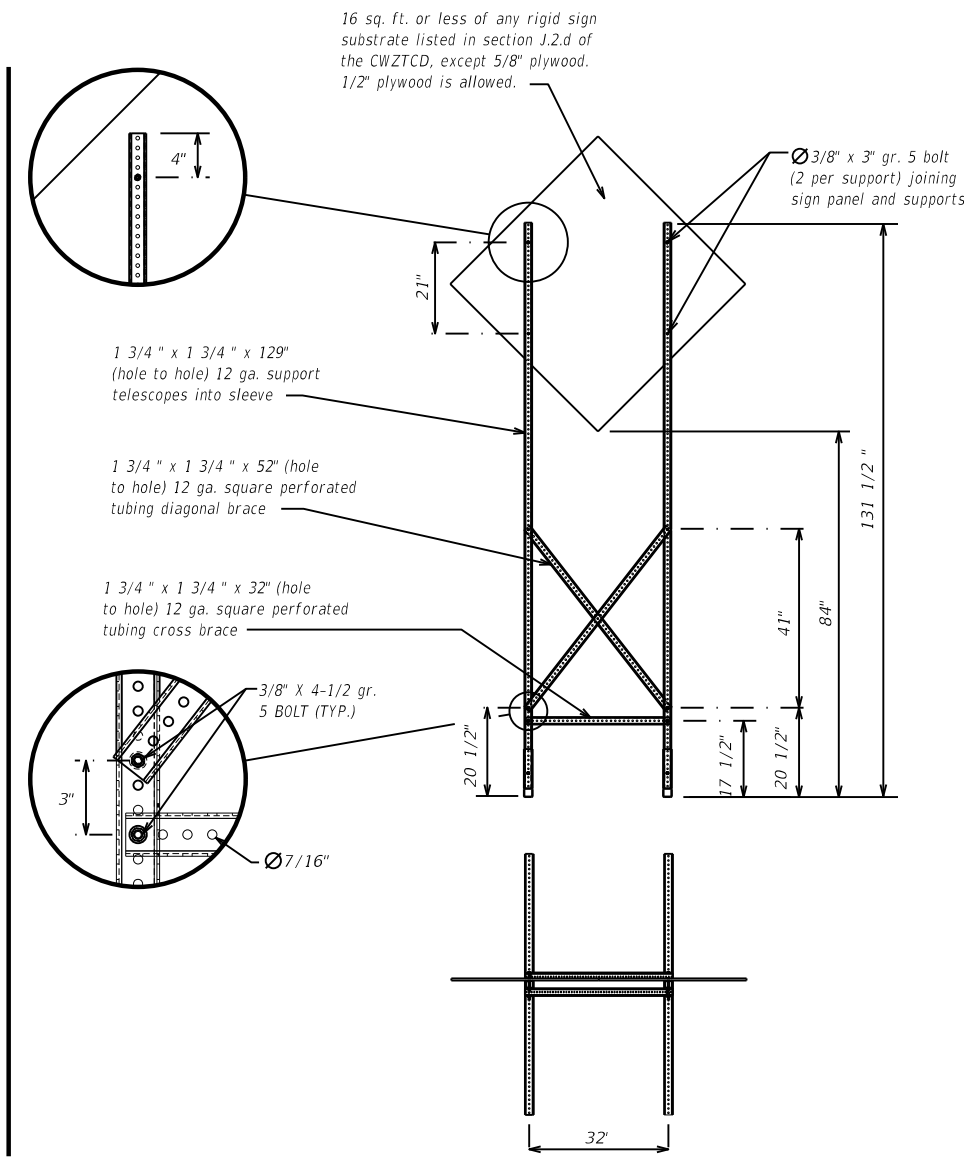
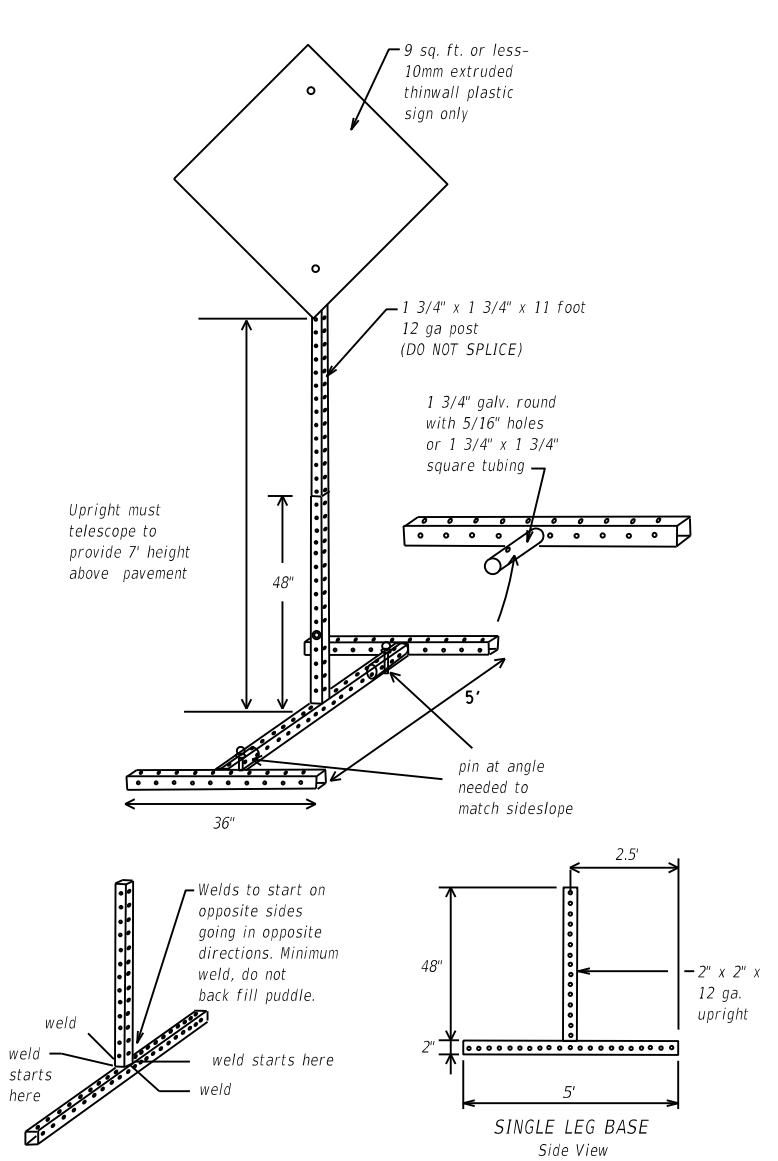
SKID MOUNTED WOOD SIGN SUPPORTS

* 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.

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
- Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
- The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.

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

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

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
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH
USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXXX TO XXXXXXX	RIGHT LANE EXIT
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION
EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY
REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE
USE OTHER ROUTES	WATCH FOR WORKERS		
STAY IN LANE *			

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

SHEET 6 OF 12

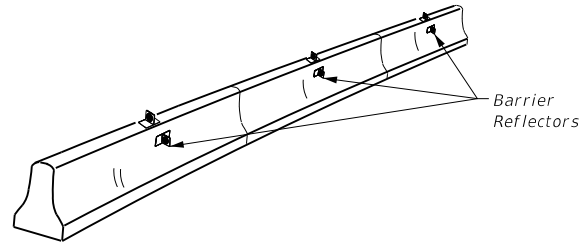


BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

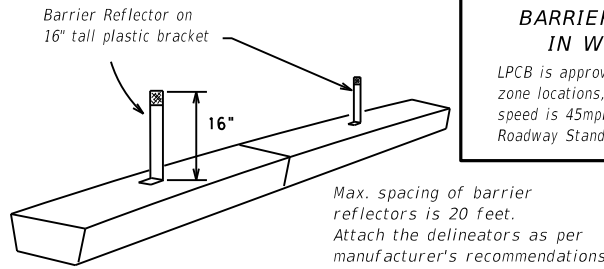
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REVISIONS									
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material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



CONCRETE TRAFFIC BARRIER (CTB)

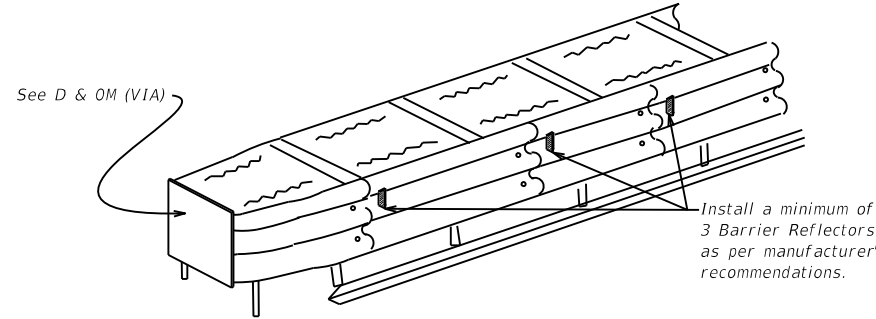
- Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector.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



LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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



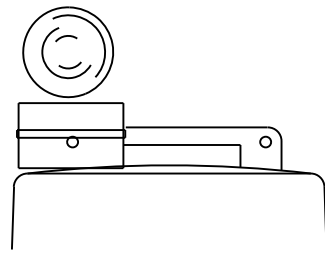
DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS



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

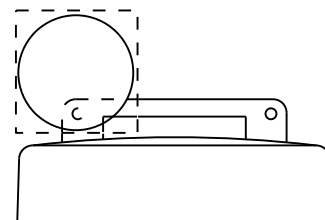
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B₁ or C₁ Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
- When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

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

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

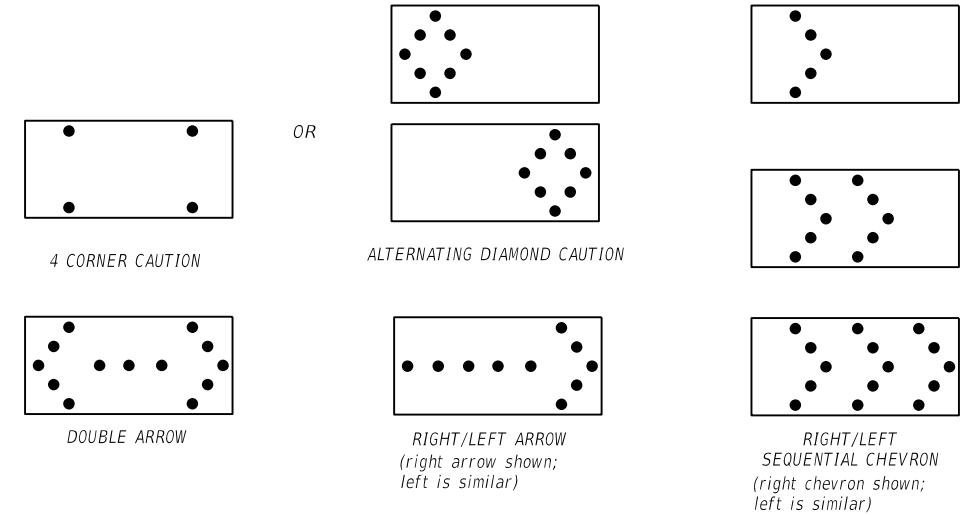
- A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
- The warning reflector shall be yellow in color and shall be manufactured using a sign substrate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



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

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

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



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

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

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

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

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



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

BC(7)-21

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9-07	8-14								
7-13	5-21	DIST	COUNTY		SHEET NO.				
		HOU	FORT BEND		36				

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

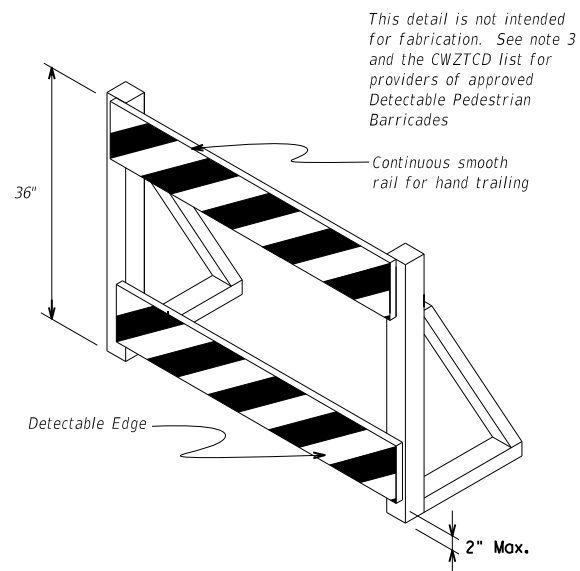
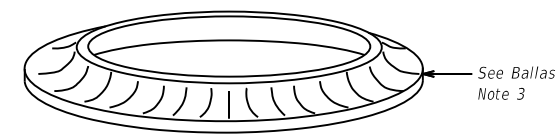
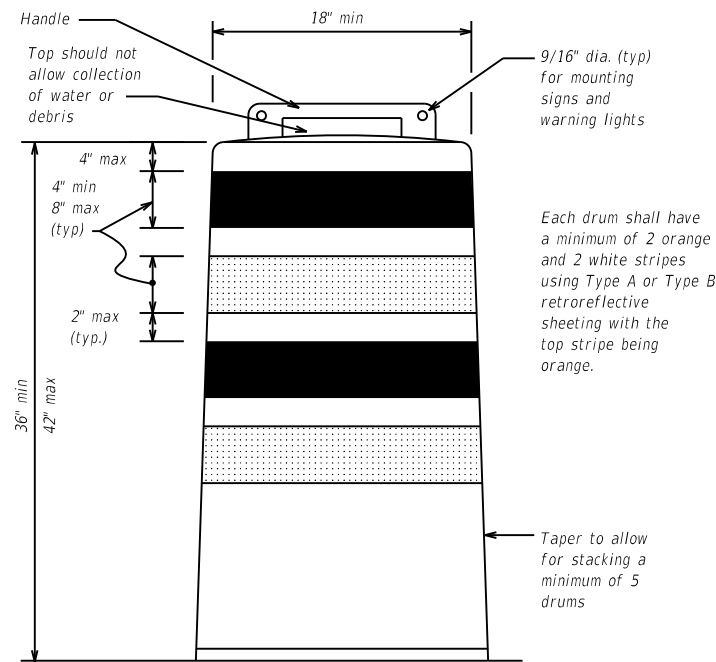
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

RETROREFLECTIVE SHEETING

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

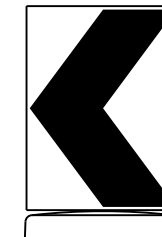
BALLAST

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

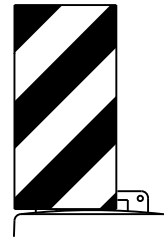


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

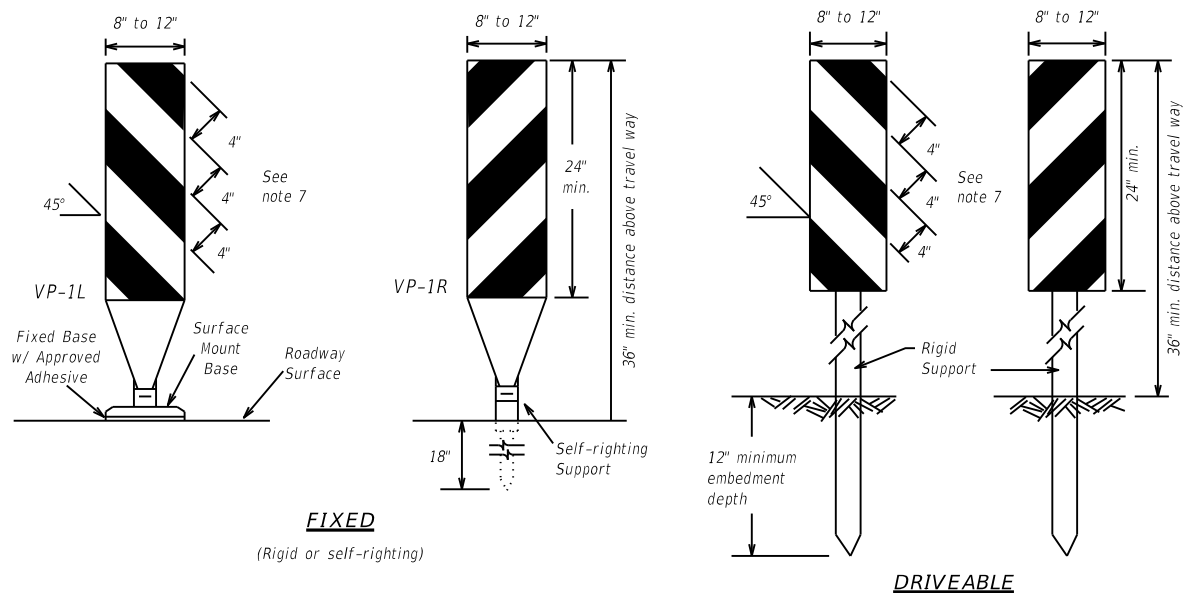
SHEET 8 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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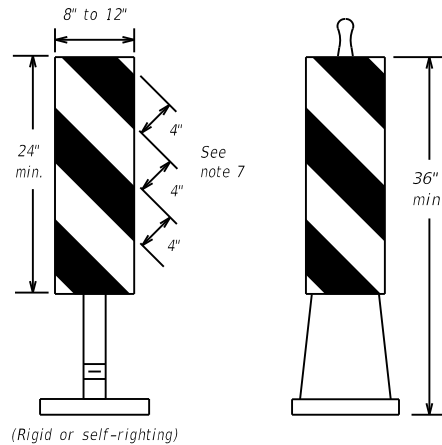
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©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
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4-03	8-14	DIST	COUNTY	SHEET NO.					
9-07	5-21	HOU	FORT BEND	37					
7-13									



FIXED
(Rigid or self-righting)

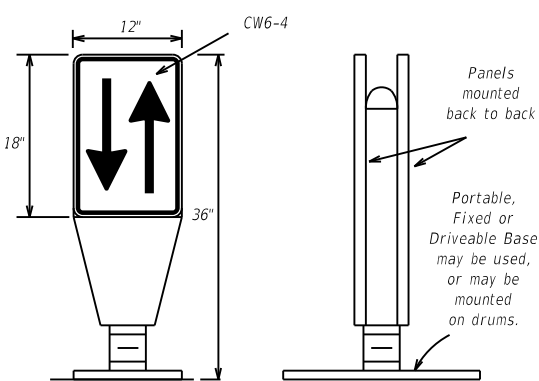
DRIVEABLE

1. Vertical Panels (VPs) 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.



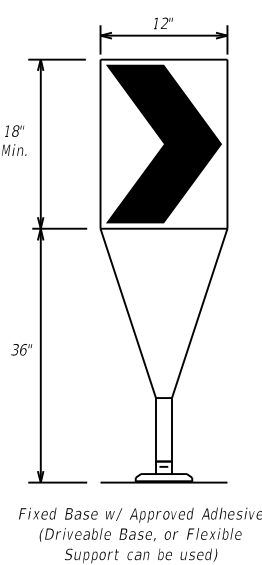
PORTABLE
(Rigid or self-righting)

VERTICAL PANELS (VPs)



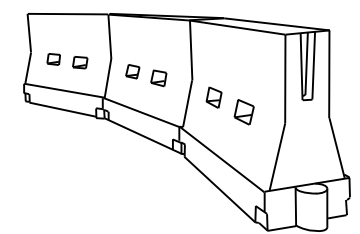
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

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



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

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

GENERAL NOTES

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

Posted Speed	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	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

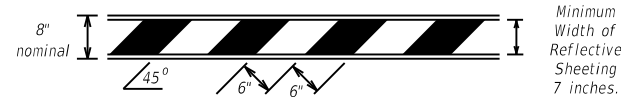
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7-13	5-21	HOU	FORT BEND	38					

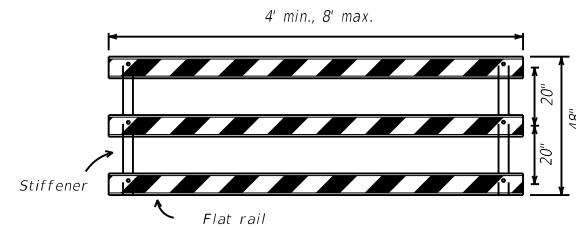
TYPE 3 BARRICADES

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.

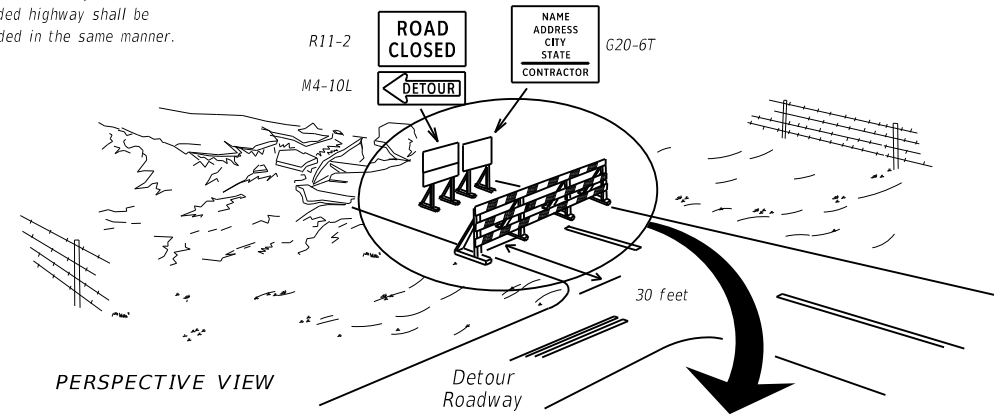


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



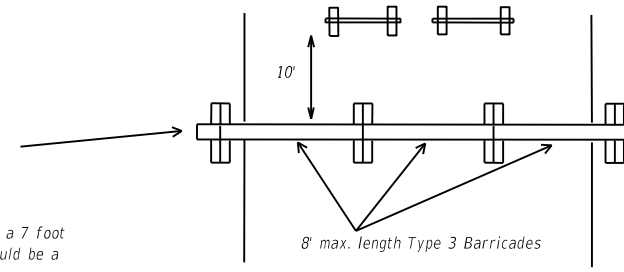
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

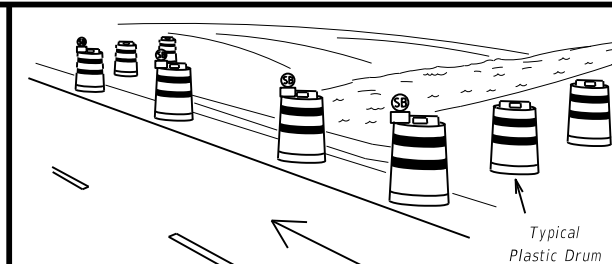
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



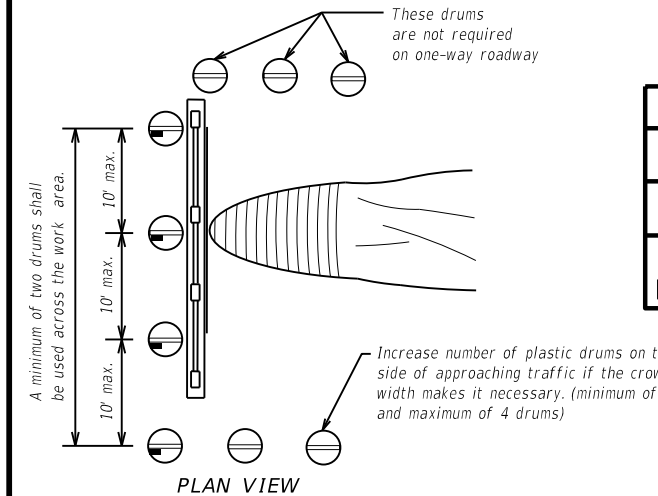
PLAN VIEW

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

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

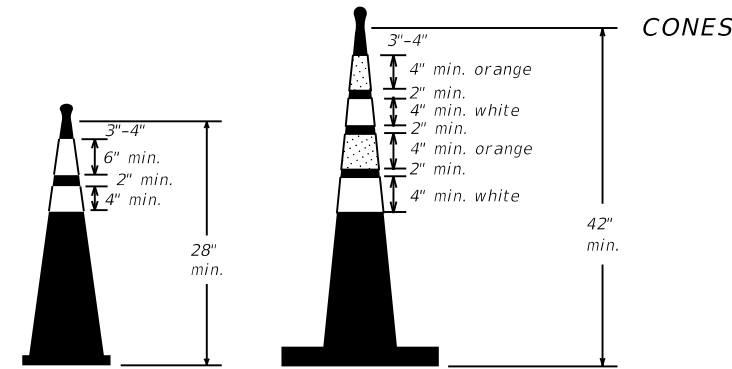


PLAN VIEW

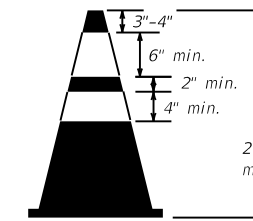
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

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

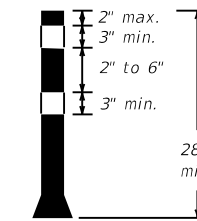
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
	Steady burn warning light or yellow warning reflector



Two-Piece cones



One-Piece cones

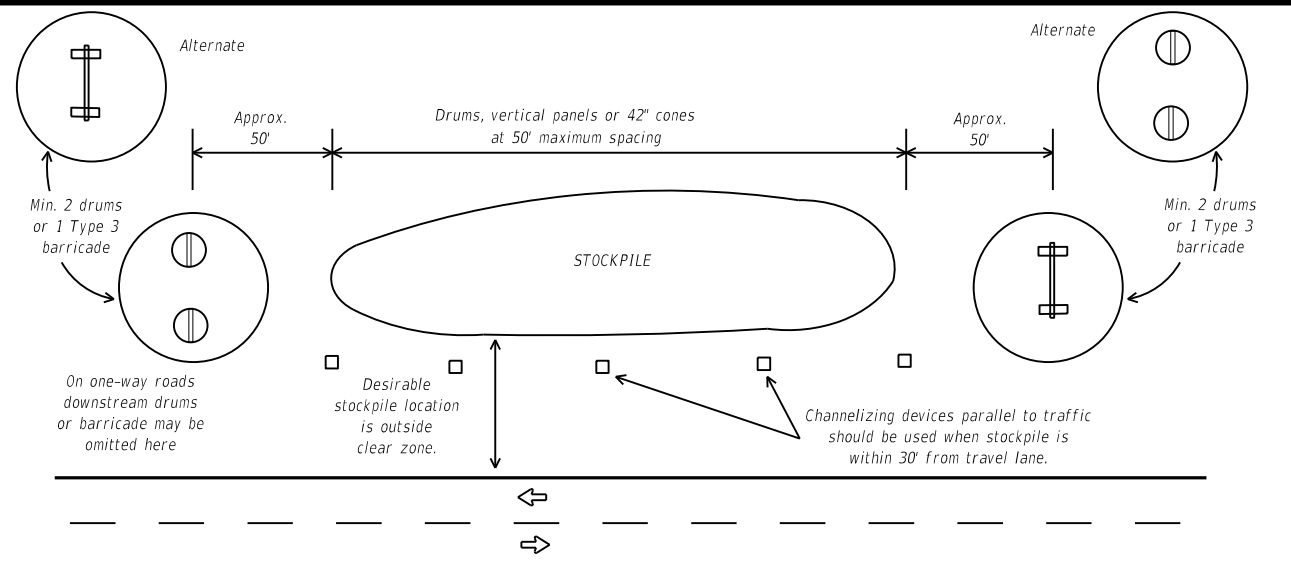


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	HOU	FORT BEND	39	

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.

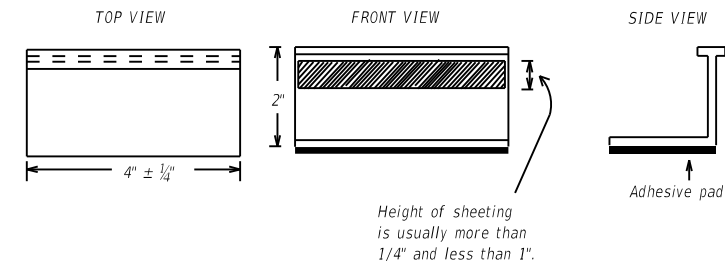
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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).

SHEET 11 OF 12

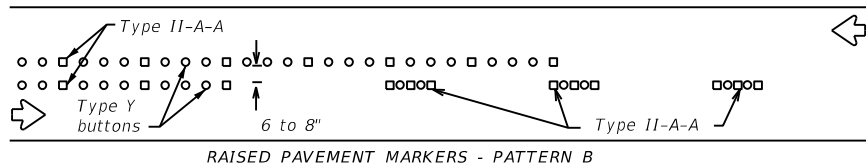
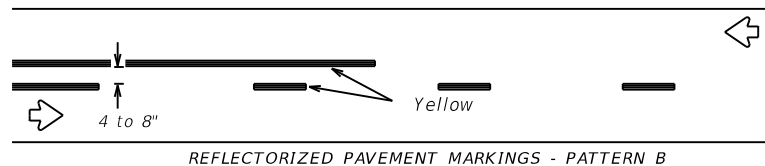
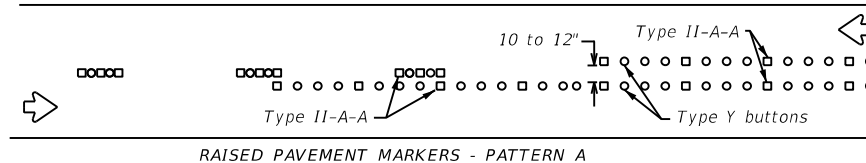
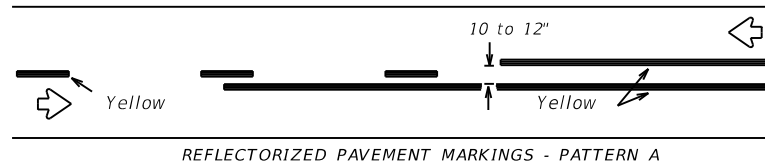


BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

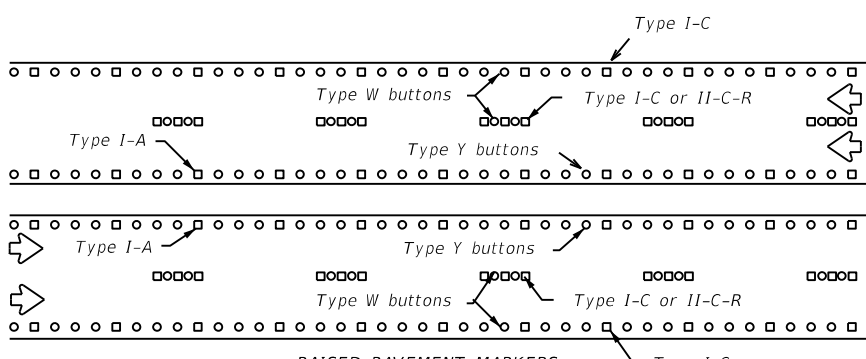
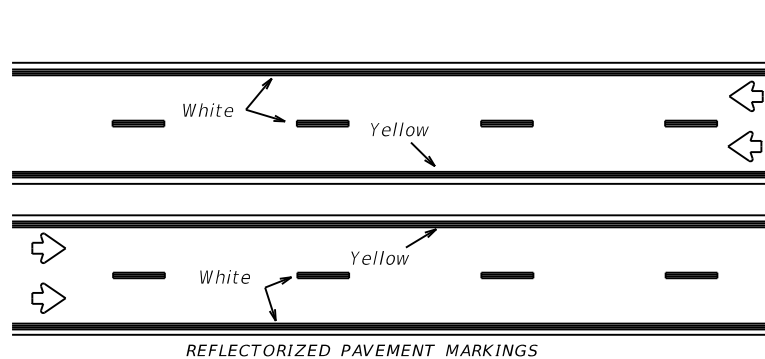
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS		0111	03	063
2-98	9-07	5-21		FM 521
1-02	7-13			
11-02	8-14			
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	40	

PAVEMENT MARKING PATTERNS



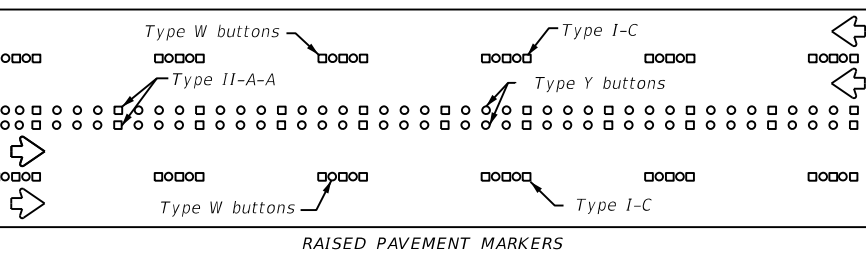
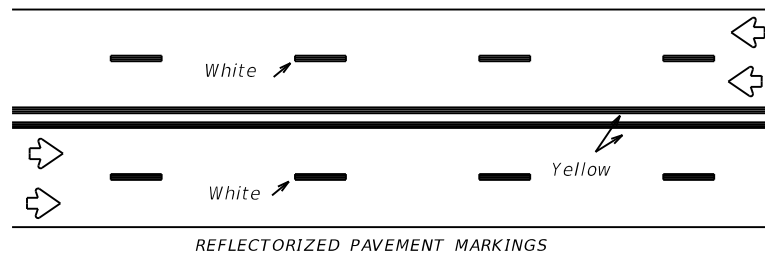
Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectORIZED pavement markings.

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



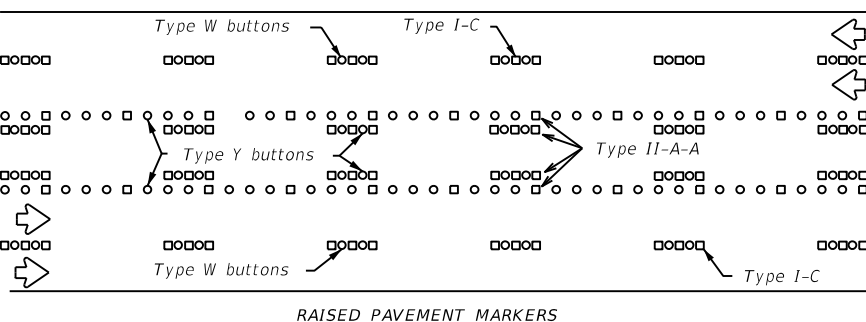
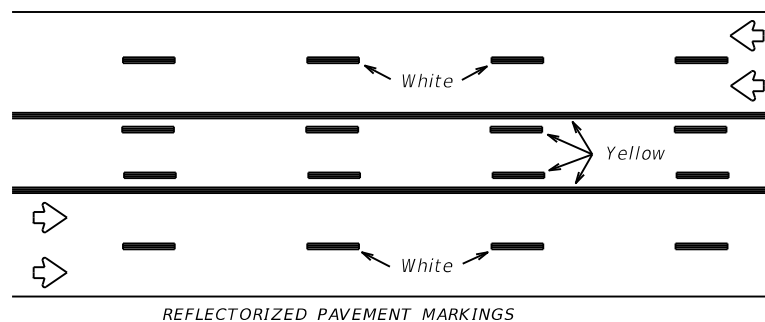
Prefabricated markings may be substituted for reflectORIZED pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



Prefabricated markings may be substituted for reflectORIZED pavement markings.

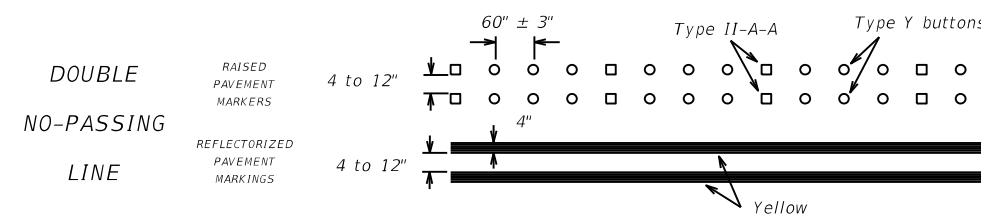
LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



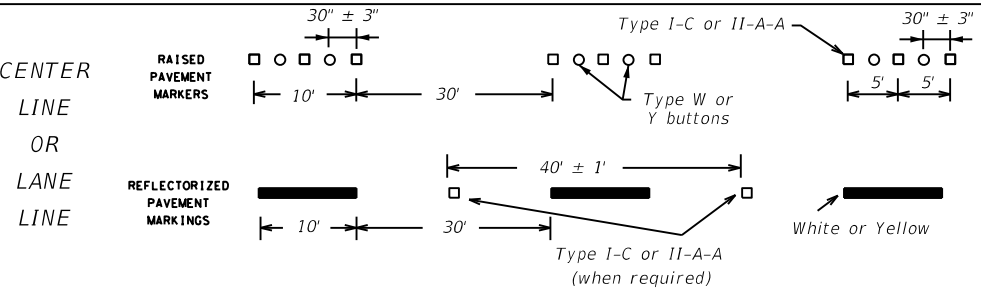
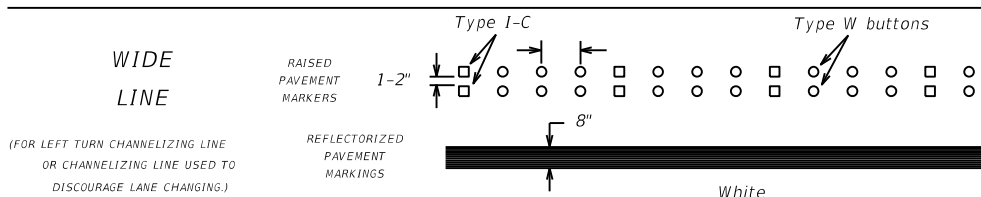
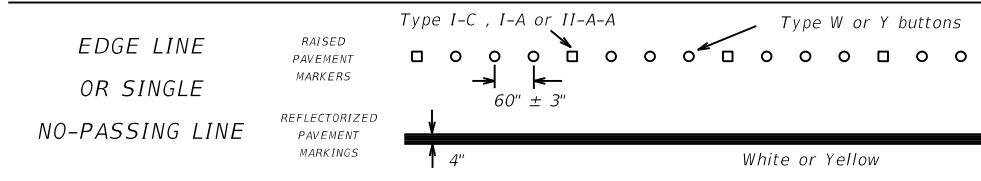
Prefabricated markings may be substituted for reflectORIZED pavement markings.

TWO-WAY LEFT TURN LANE

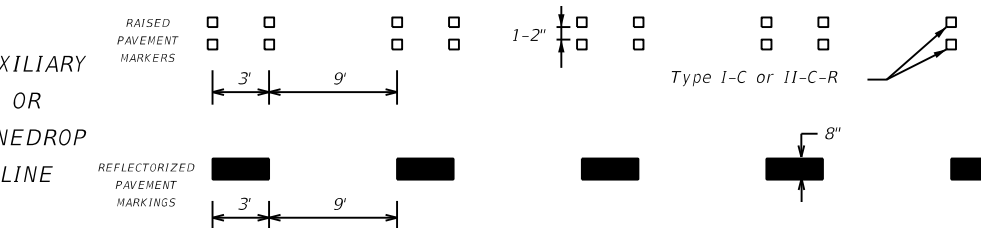
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



SOLID LINES

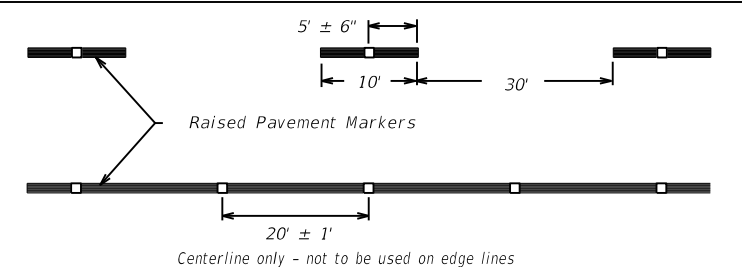


BROKEN LINES



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



SHEET 12 OF 12

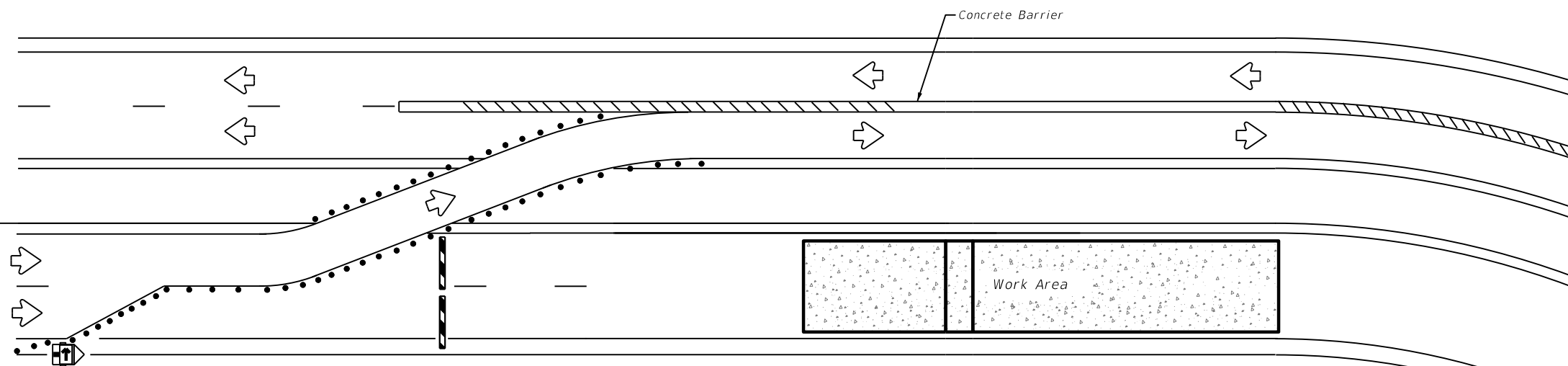


BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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."

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
1-97 9-07 5-21	DIST	COUNTY	SHEET NO.	
2-98 7-13	HOU	FORT BEND	41	
11-02 8-14				



NOTES:

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

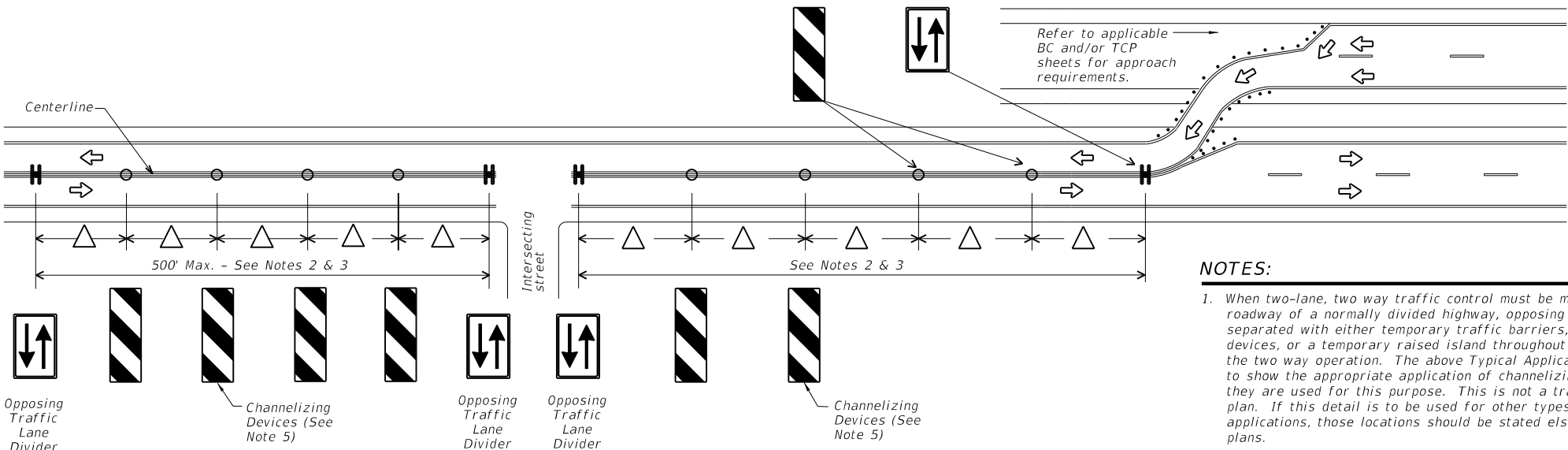
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

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

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

Only pre-qualified products shall be used. A copy of the Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:

<http://www.txdot.gov/business/resources/producer-list.html>



NOTES:

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

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

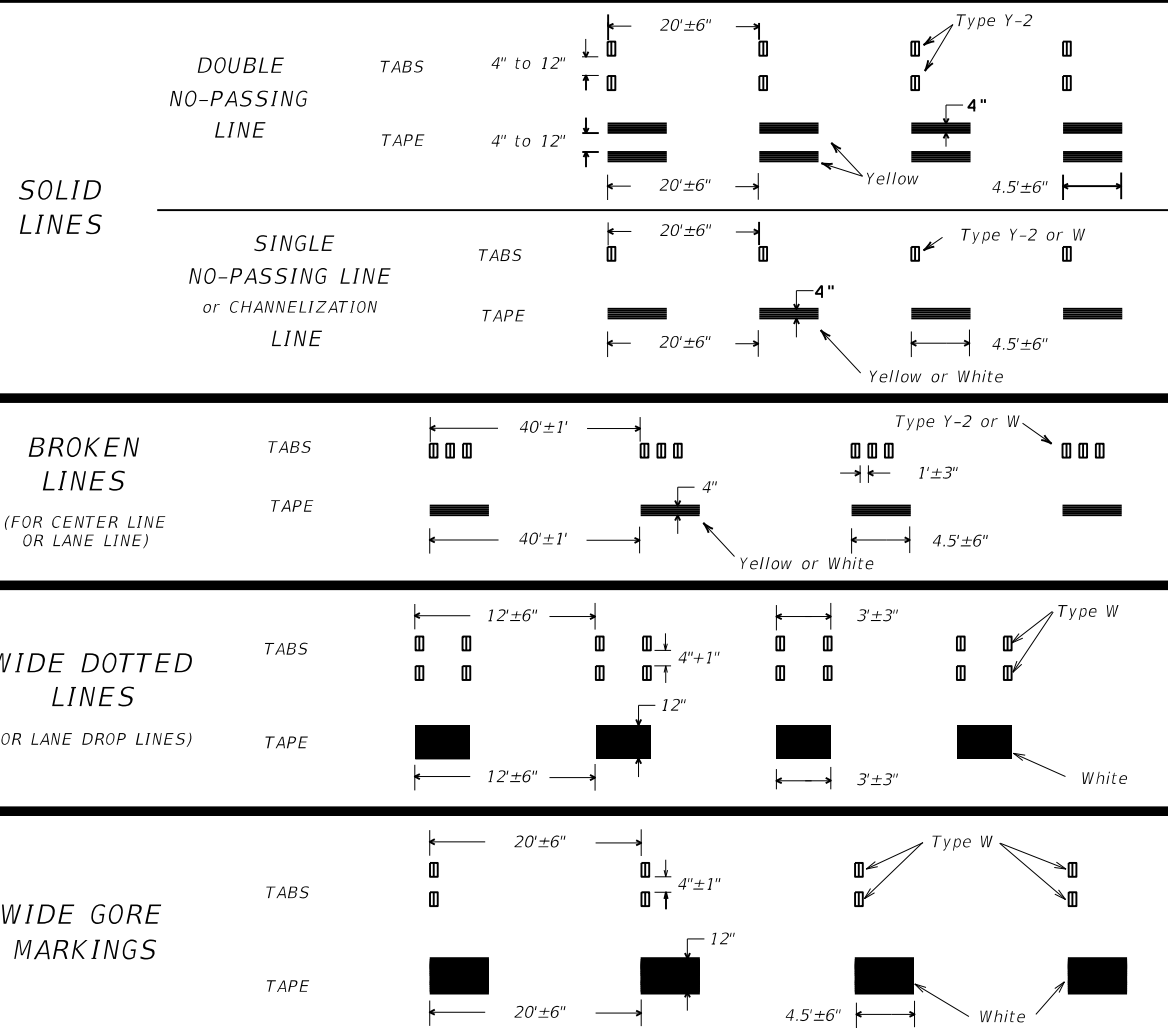


**TRAFFIC CONTROL PLAN
TYPICAL DETAILS**

WZ(TD)-17

FILE: wztld-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
4-98 2-17	DIST	COUNTY	SHEET NO.	
3-03	HOU	FORT BEND	42	
7-13				

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



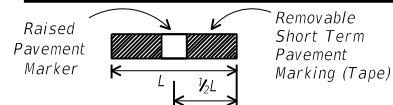
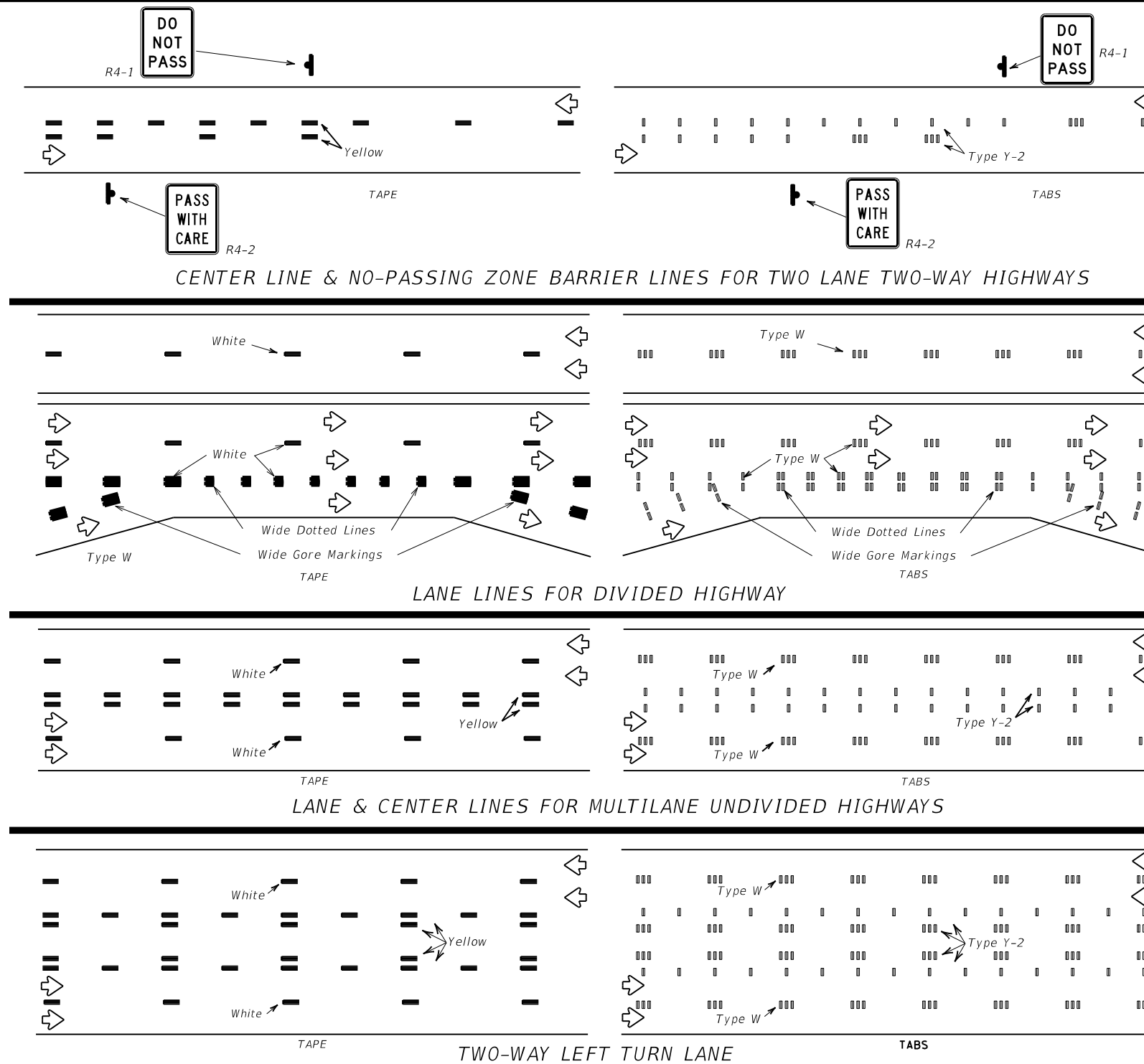
NOTES:

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

TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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



WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

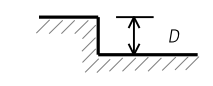
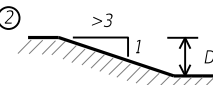
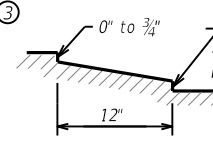
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©TxDOT	April 1992	CONT:	0111	SECT:	03	JOB:	063	HIGHWAY:	FM 521
REVISIONS		DIST:	HOU	COUNTY:	FORT BEND	SHEET NO.:	43		
1-97									
3-03									
7-13									

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

- 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.
- 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.
- 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.
- Signs shall be spaced at the distances recommended as per BC standards.
- 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."
- 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.
- Short term markings shall not be used to simulate edge lines.
- All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition.

Edge Condition	Edge Height (D)	* Warning Devices
① 	Less than or equal to: 1 1/4" (maximum-planing) 1 1/2" (typical-overlay)	Sign: CW8-11
② 	Less than or equal to 3"	Sign: CW8-11
③ 	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.

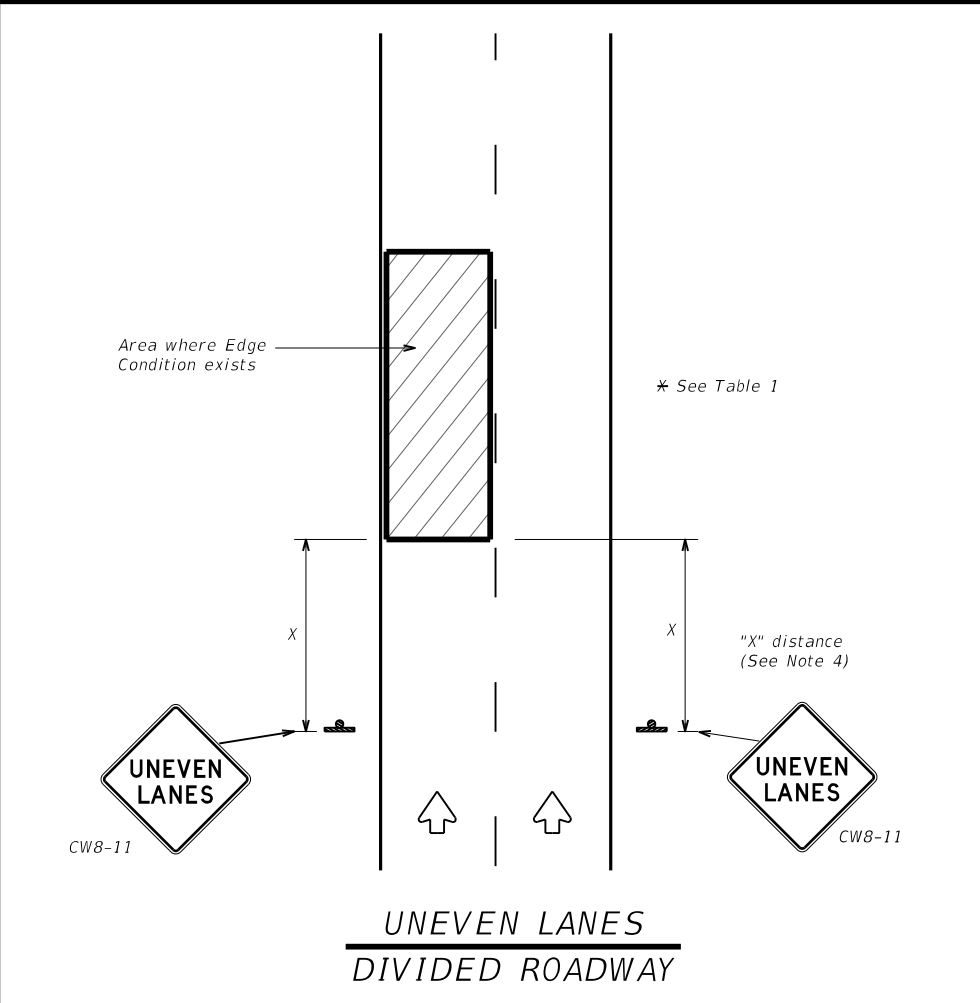
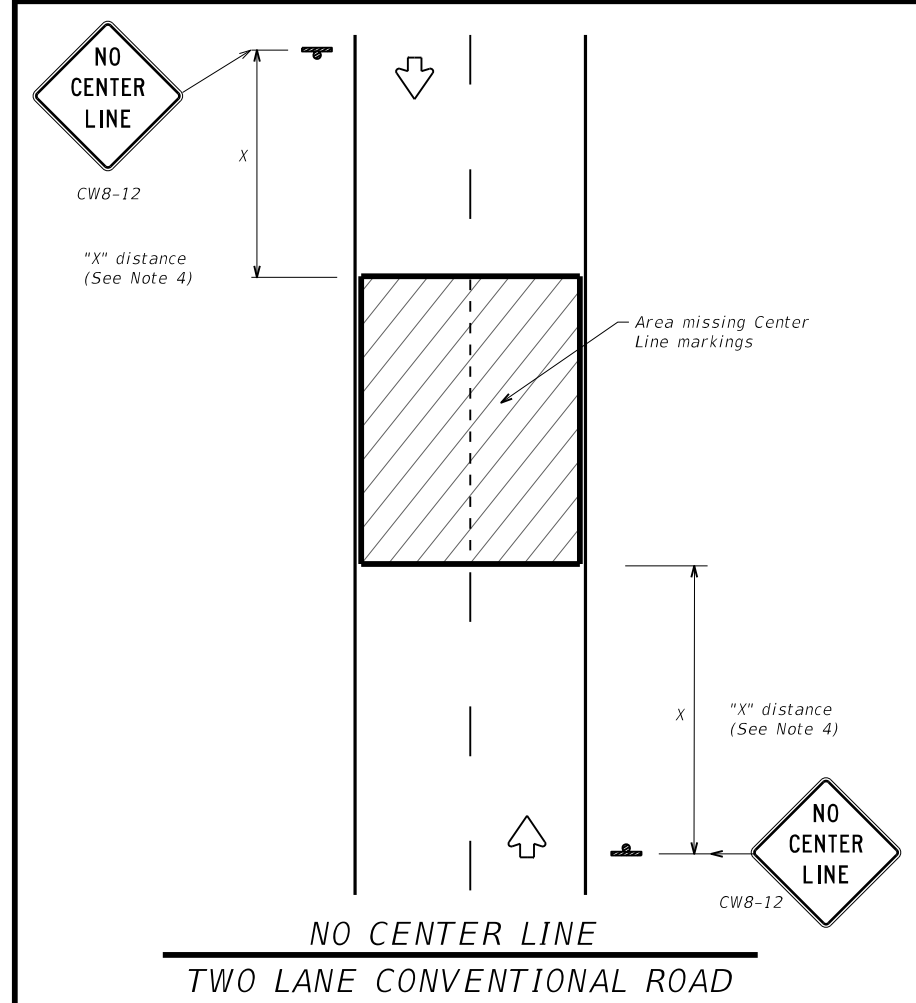
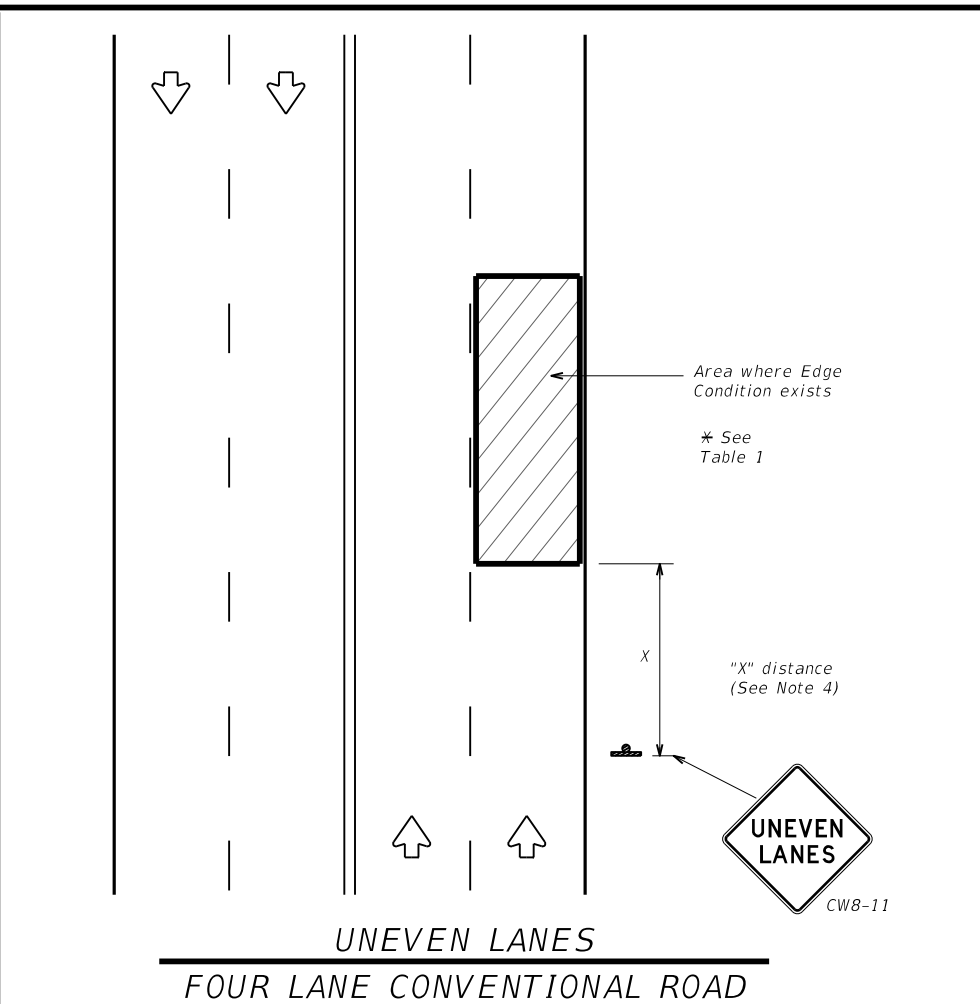
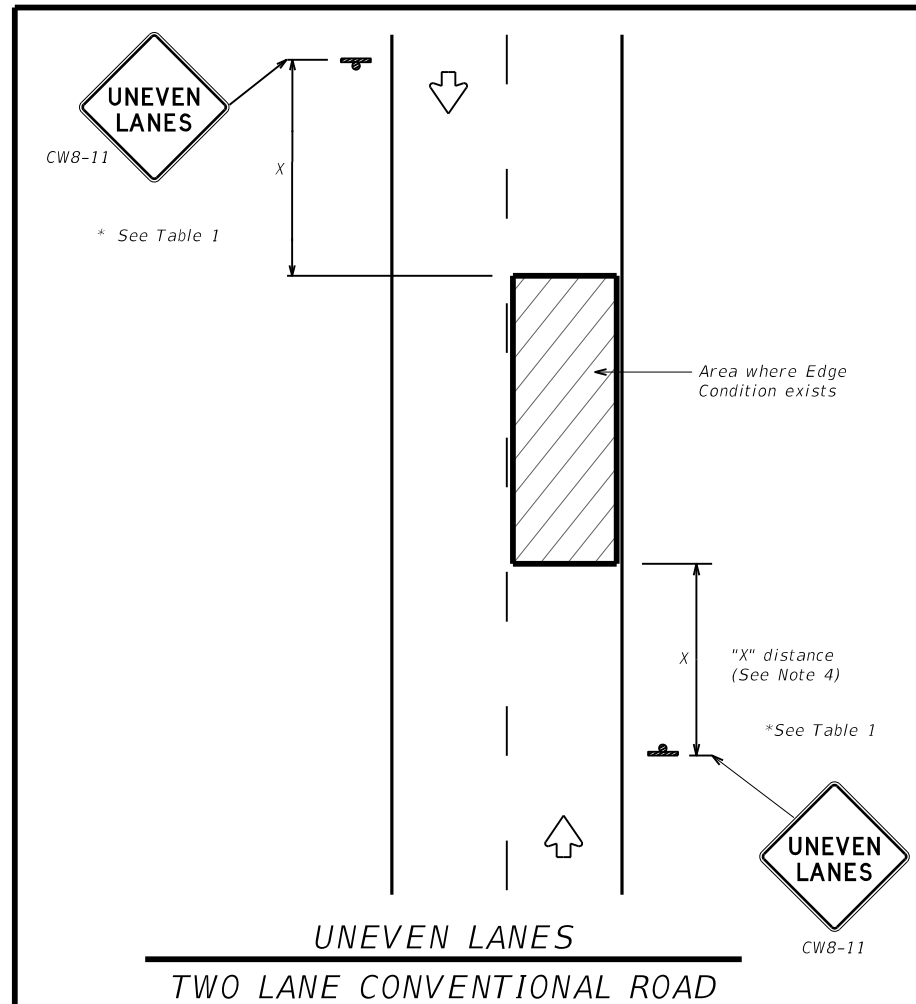
MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"

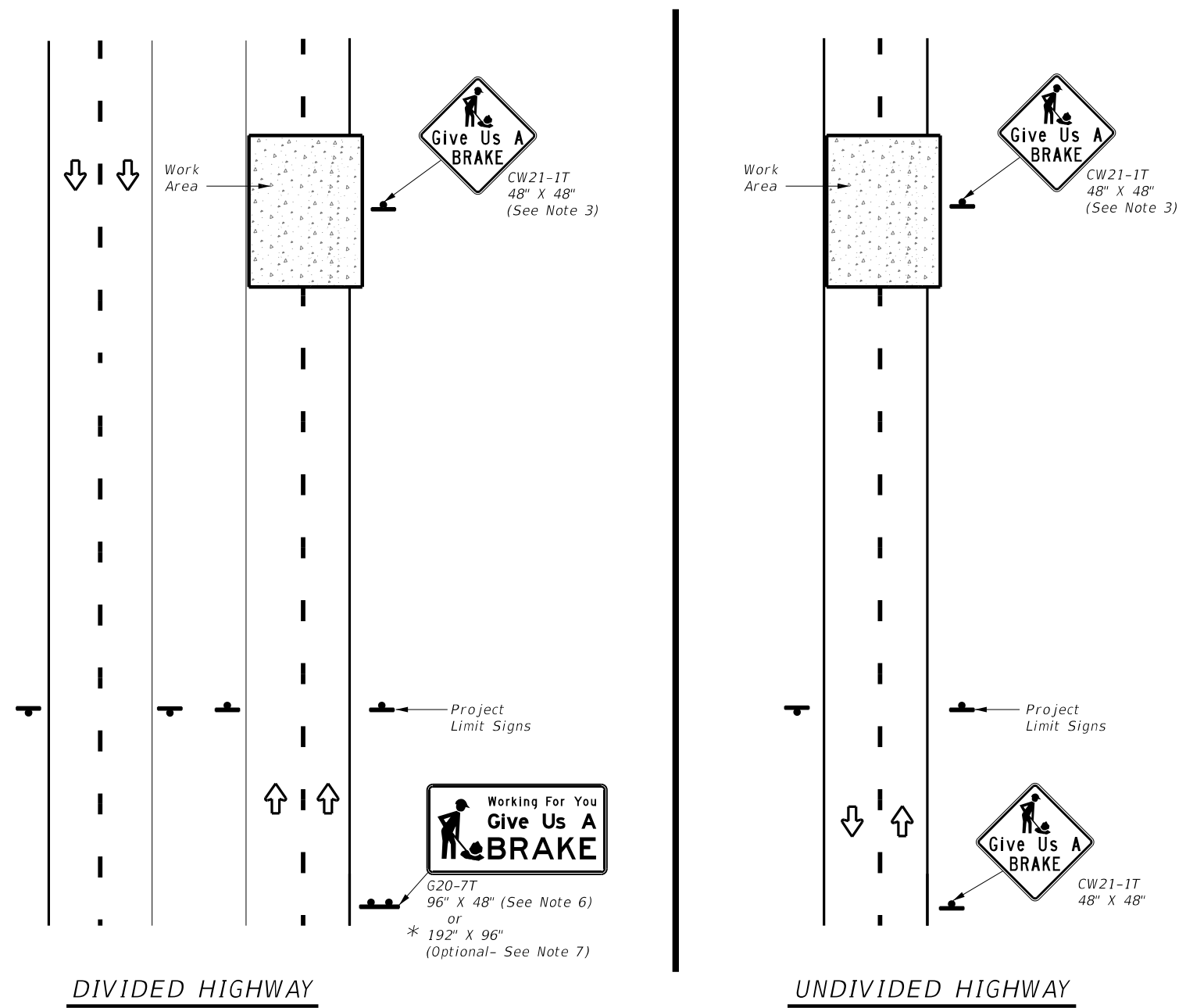


SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
8-95 2-98 7-13	DIST	COUNTY	SHEET NO.	
1-97 3-03	HOU	FORT BEND	44	





SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

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

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

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

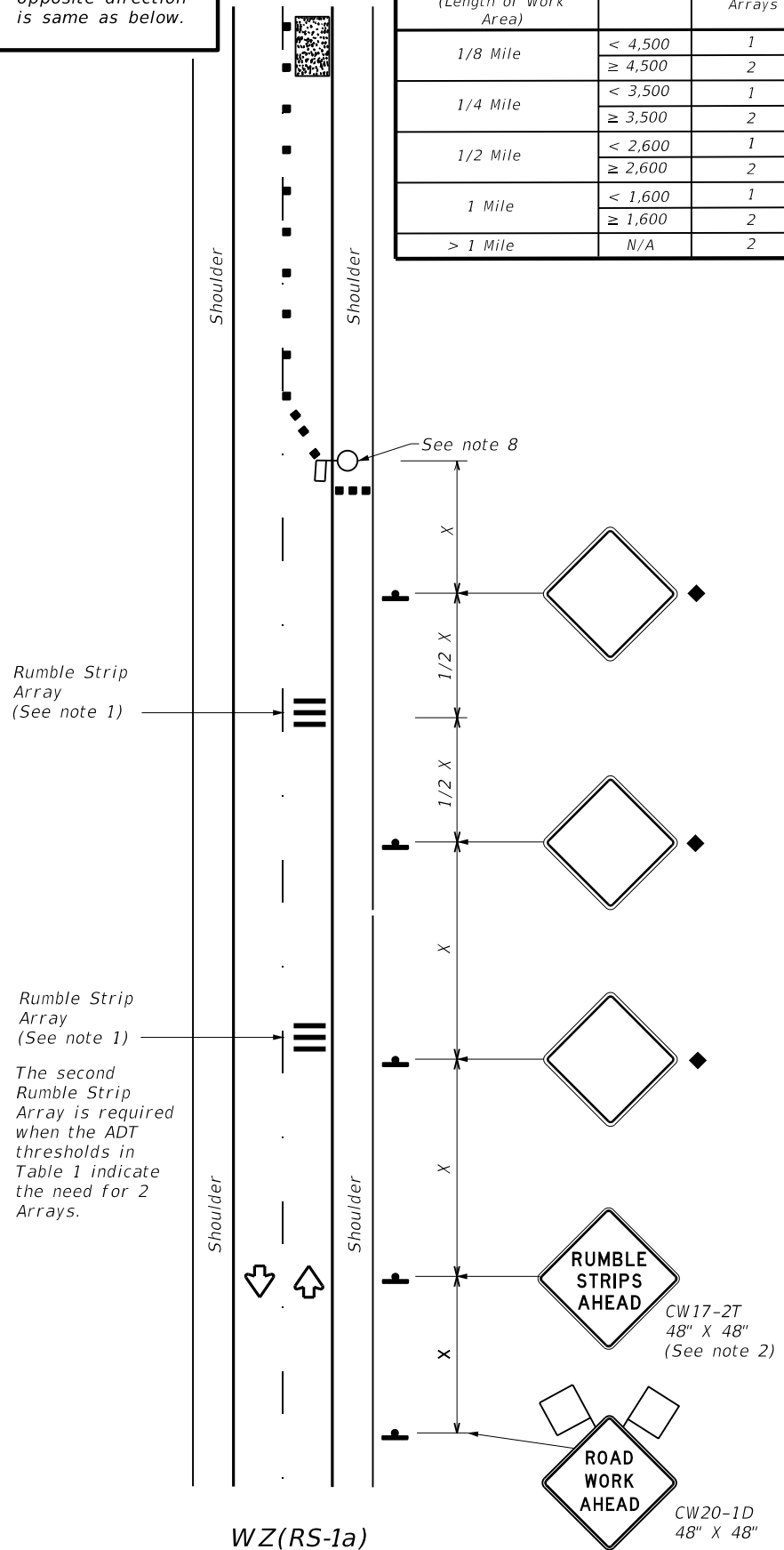
GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
 Item 636 - Aluminum Signs
 Item 647 - Large Roadside Sign Supports and Assemblies.
 Item 416 - Drilled Shaft Foundations
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

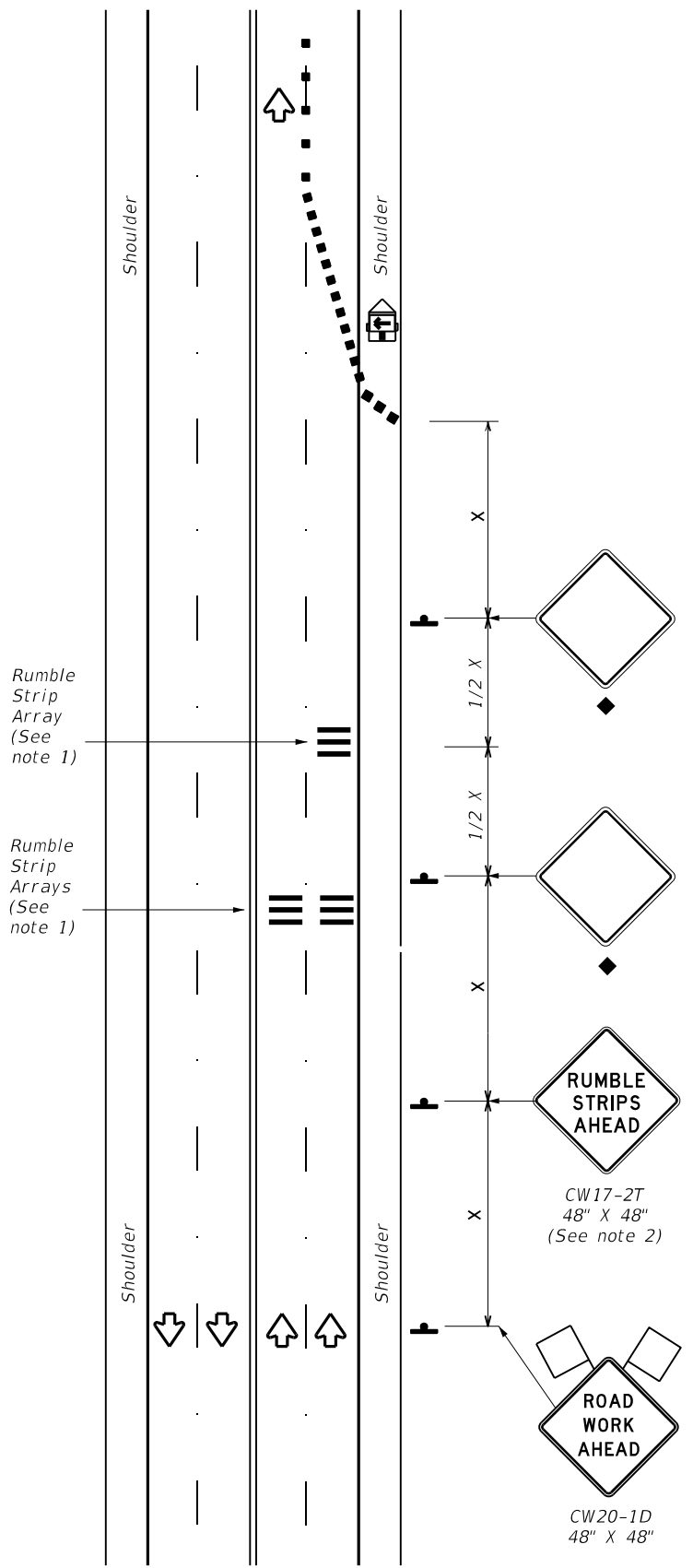
				Traffic Operations Division Standard	
<p>WORK ZONE "GIVE US A BRAKE" SIGNS</p> <p>WZ(BRK)-13</p>					
FILE:	wzbrk-13.dgn	DN:	TxDOT	CK:	TxDOT
©TxDOT	August 1995	CONT:	0111	SECT:	03
REVISIONS		JOB:	063	HIGHWAY:	FM 521
6-96	5-98 7-13	DIST:	COUNTY:		SHEET NO.
8-96	3-03	HOU	FORT BEND		45

Warning sign and rumble strip sequence in opposite direction is same as below.

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

- 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.
- 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.
- Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
- Remove Temporary Rumble Strips before removing the advanced warning signs.
- Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
- Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
- This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
- The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
- Replace defective Temporary Rumble Strips as directed by the Engineer.
- Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

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

	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 **			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)

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.

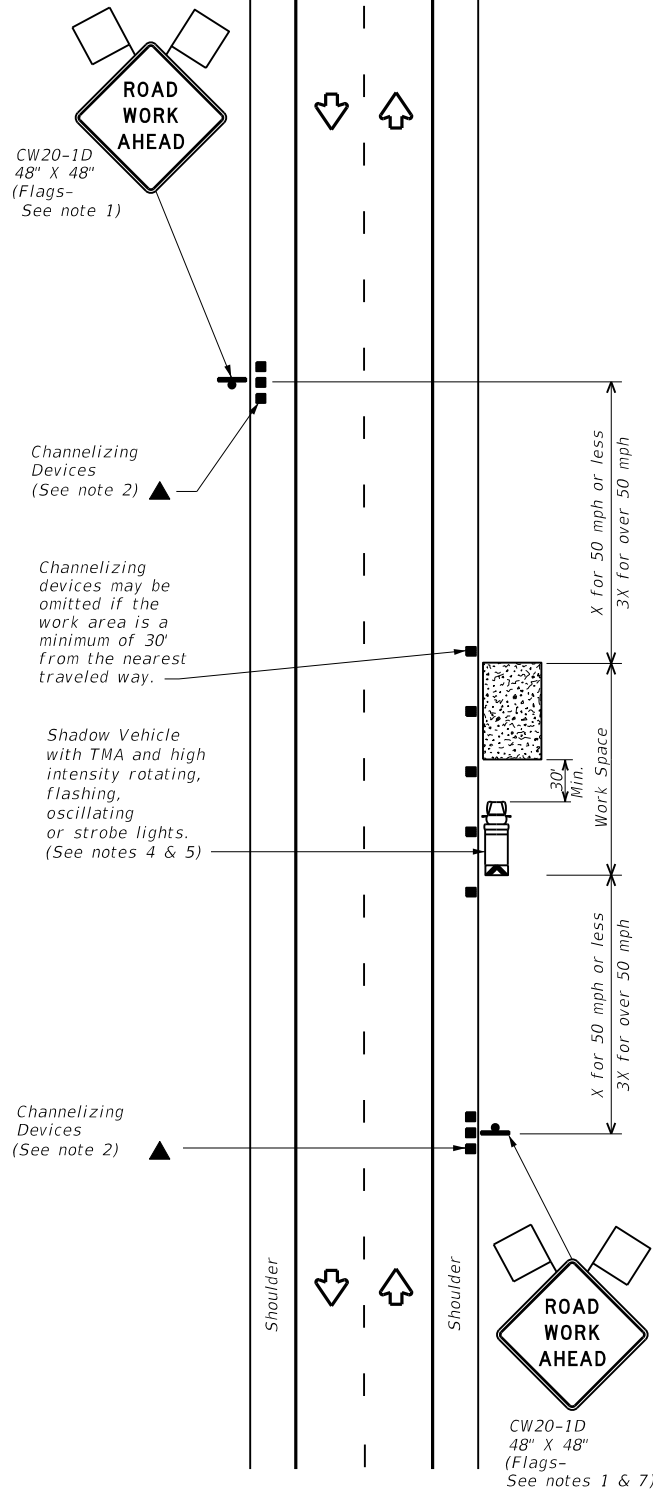
* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

Texas Department of Transportation
 Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

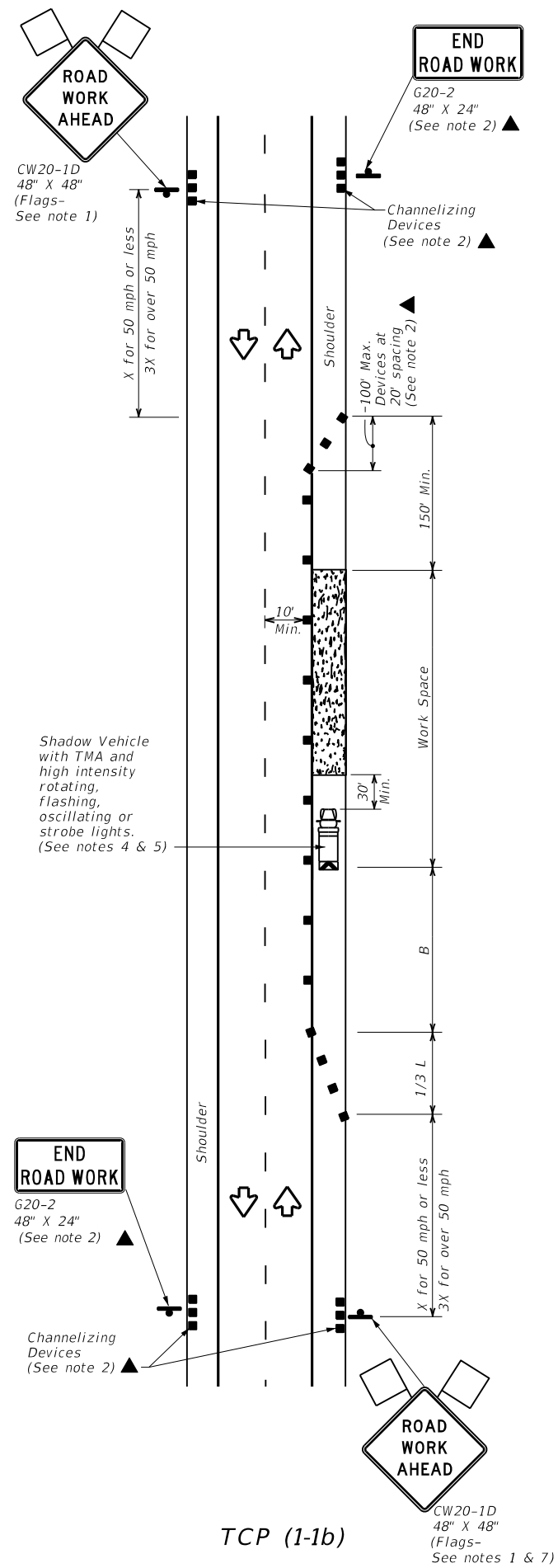
WZ(RS)-22

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©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
2-14 1-22	DIST	COUNTY	SHEET NO.	
4-16	HOU	FORT BEND	46	



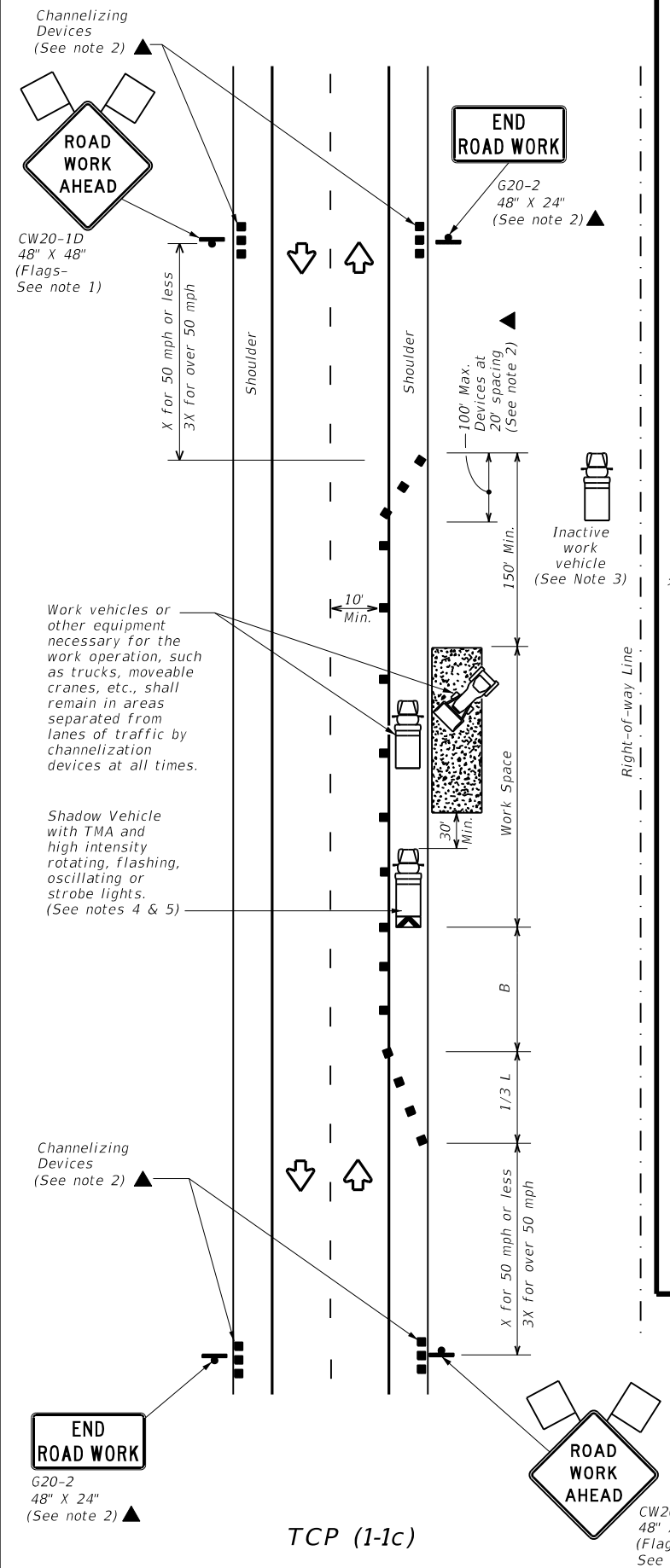
TCP (1-1a)

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			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)

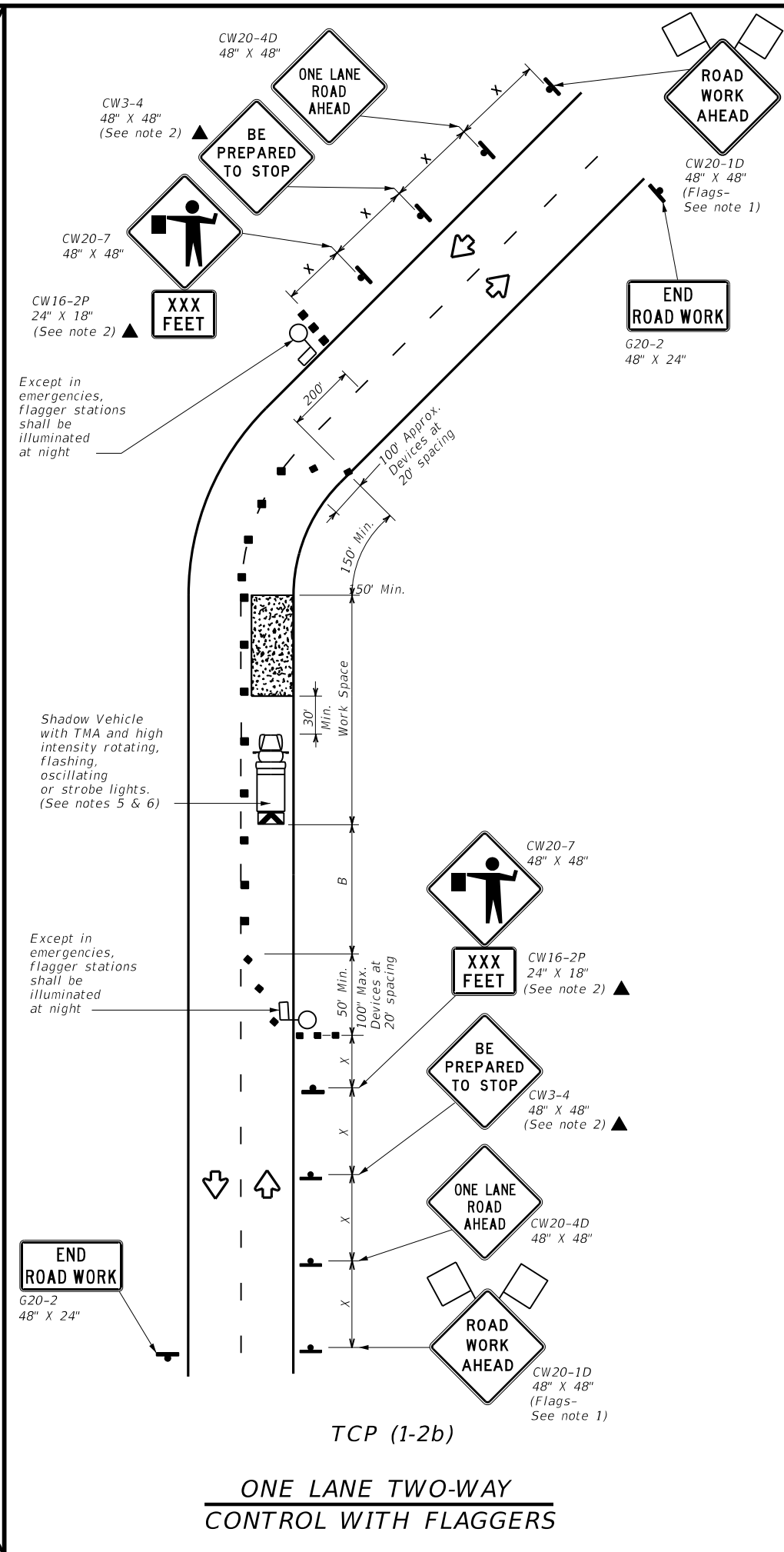
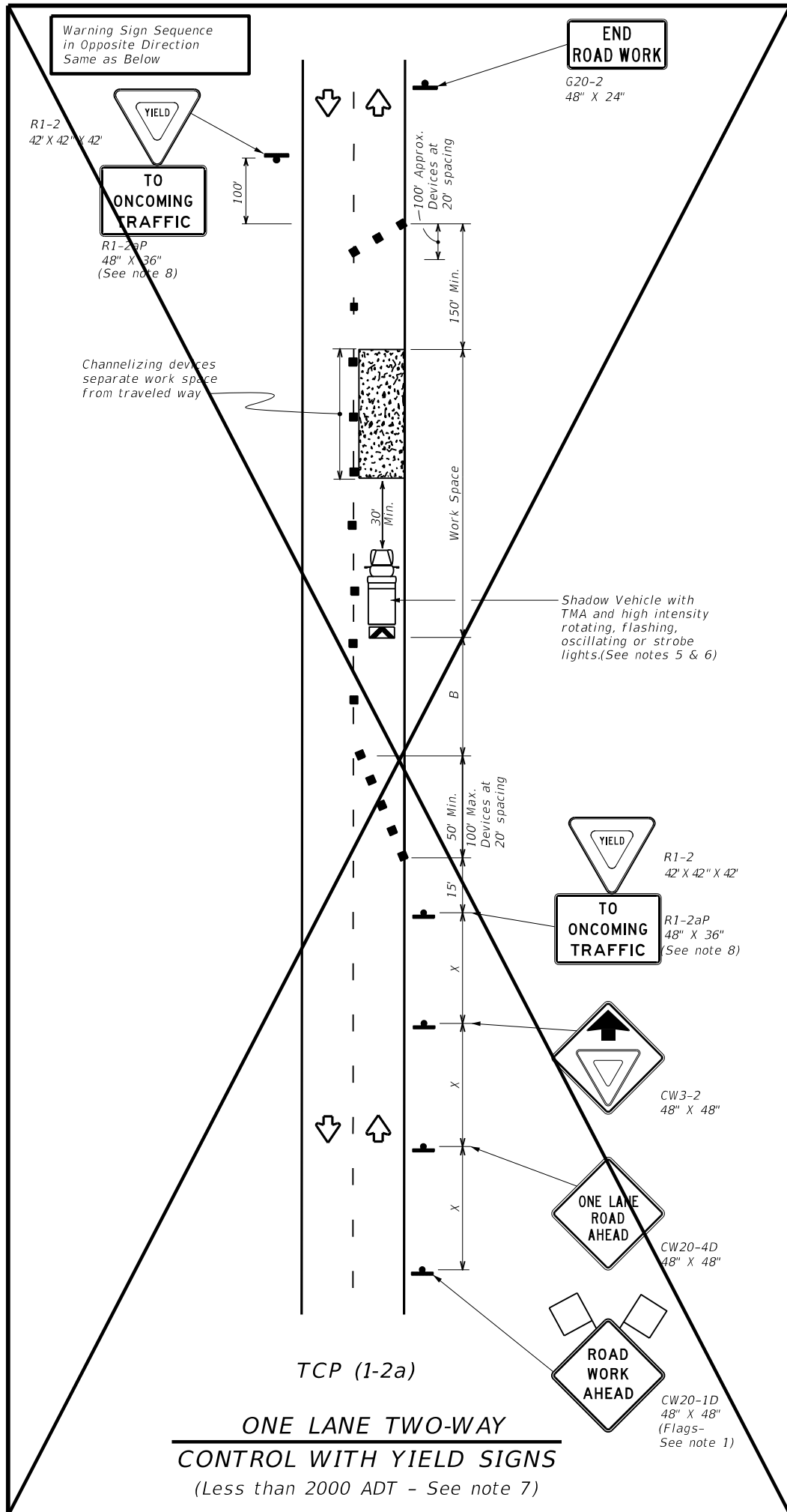
TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

- GENERAL NOTES**
- Flags attached to signs where shown are REQUIRED.
 - 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.
 - Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
 - 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.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
 - See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
 - CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

**TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK**

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONV	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 2-12	HOU	FORT BEND	47	
1-97 2-18				



LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		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'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=W S	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

- Flags attached to signs where shown are REQUIRED.
 - 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.
 - 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.
 - Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
 - 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.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
- TCP (1-2a)**
- R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work spaces should be no longer than one half city block. In rural areas on roadways with less than 2000 ADT, work spaces should be no longer than 400 feet.
 - R1-2 "YIELD" sign with R1-2aP "TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 foot minimum mounting height.
- TCP (1-2b)**
- Flaggers should use two-way radios or other methods of communication to control traffic.
 - Length of work space should be based on the ability of flaggers to communicate.
 - 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).
 - Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
 - Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

STATE OF TEXAS
 REGISTERED PROFESSIONAL ENGINEER
 ROBERT S. BISSETT, JR.
 79703
 Robert S. Bissett, Jr.
 09/13/21

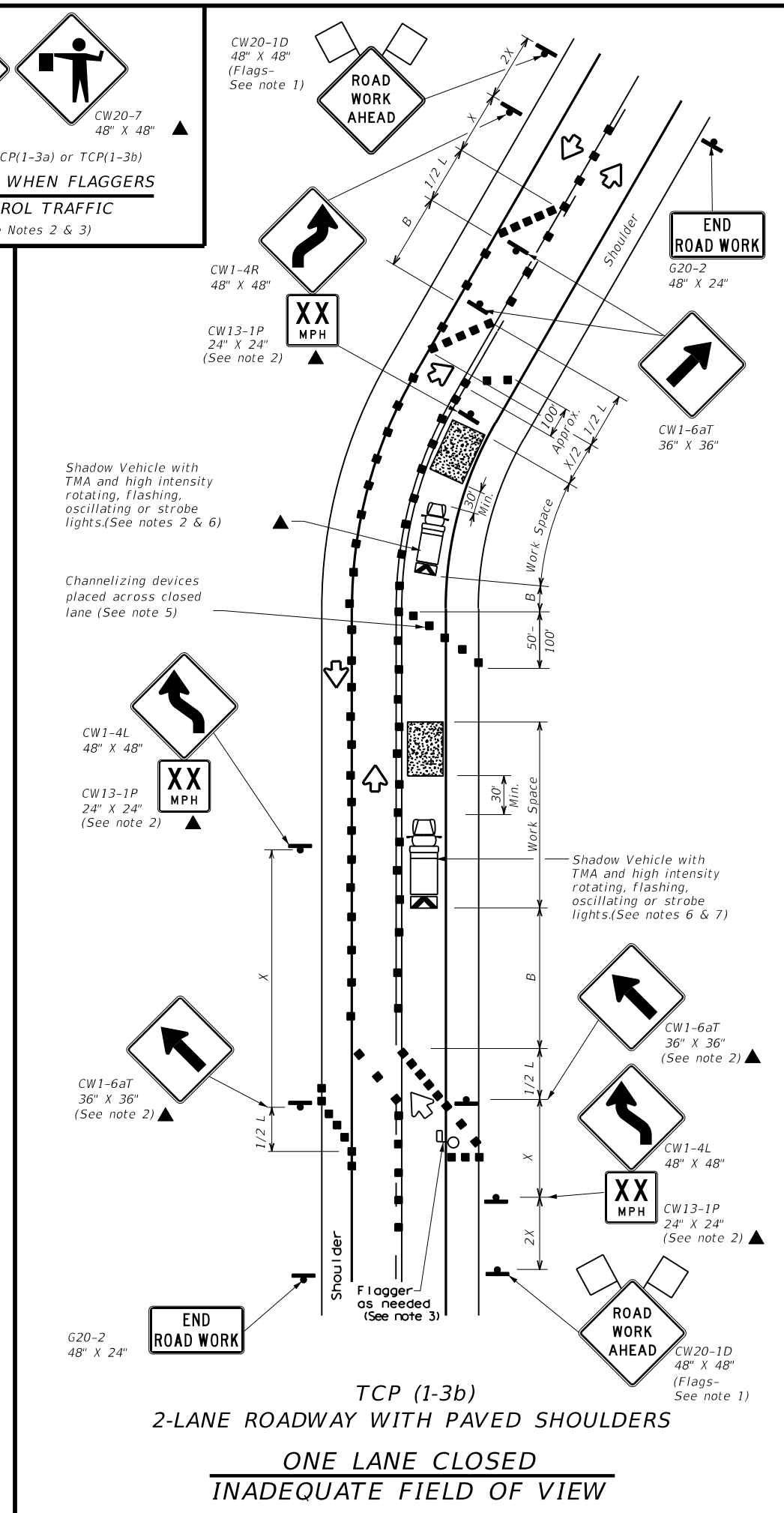
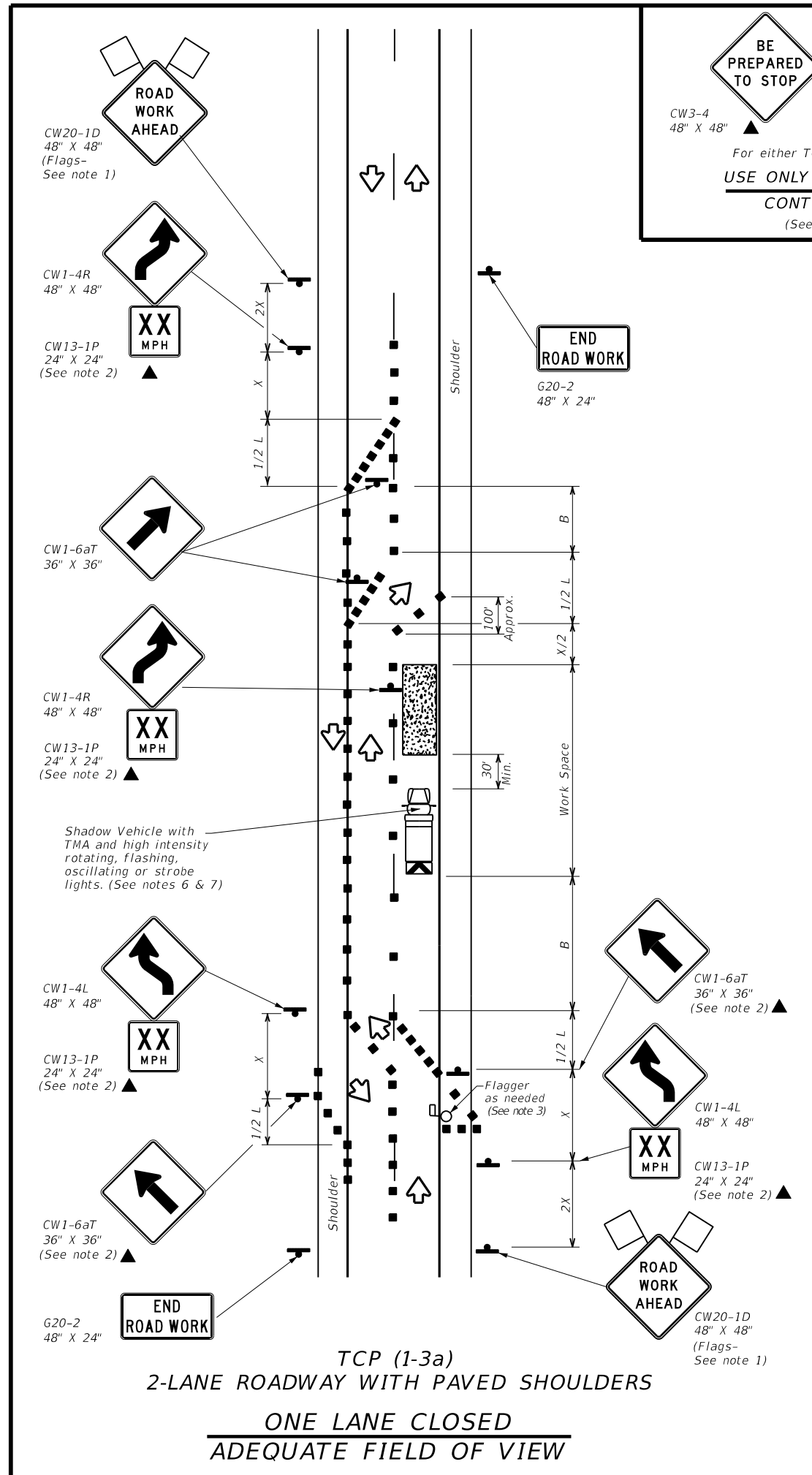
Texas Department of Transportation
 Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(1-2)-18 (MOD)

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©TxDOT December 1985	CONTRACT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
4-90 4-98	DIST	COUNTY	SHEET NO.	
2-94 2-12	HOU	FORT BEND	48	
1-97 2-18				

152



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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			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**
- Flags attached to signs where shown are REQUIRED.
 - 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.
 - Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
 - DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
 - When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
 - 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.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
 - 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 speed 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 area of conflicting markings not the entire work zone.

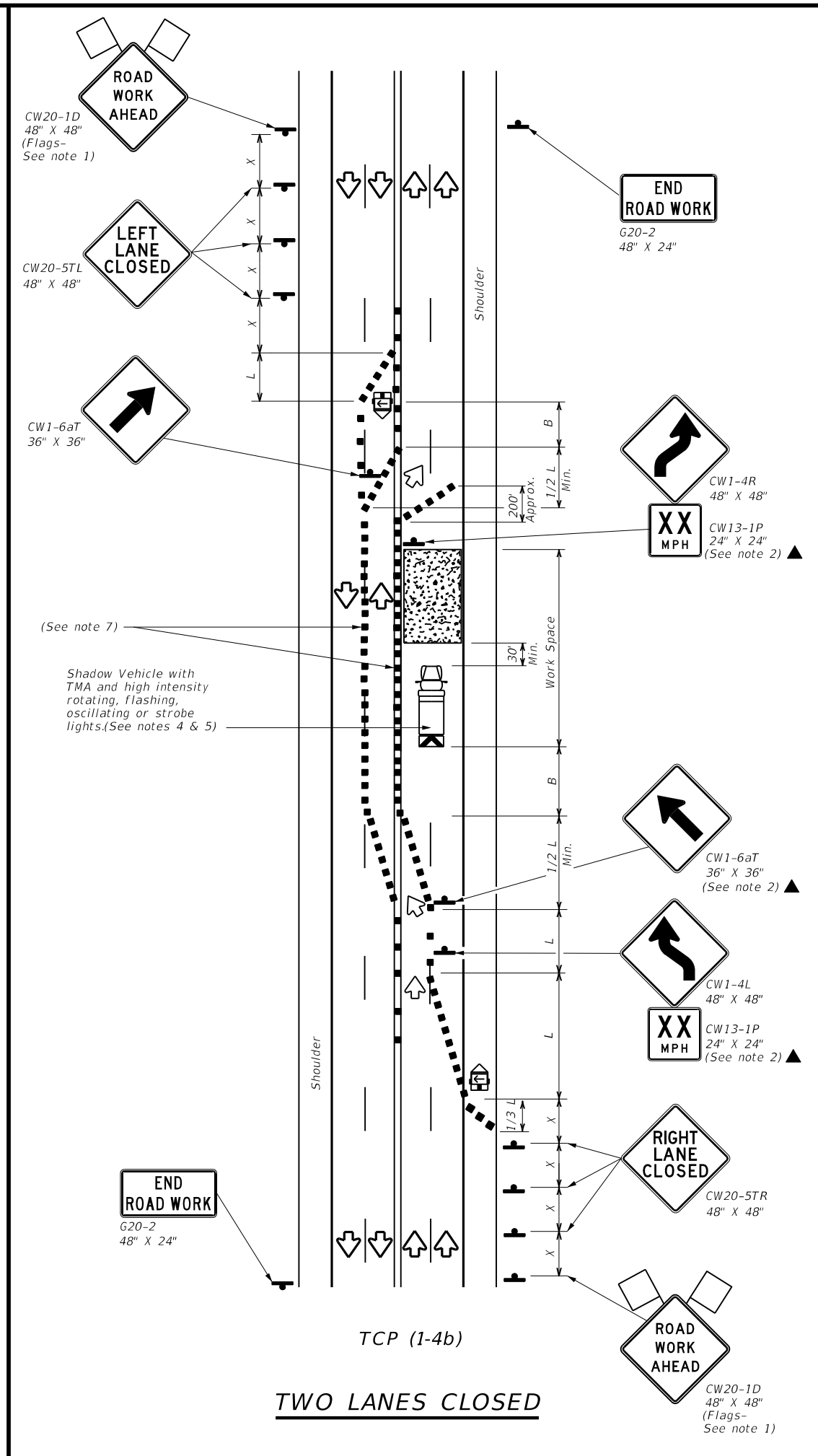
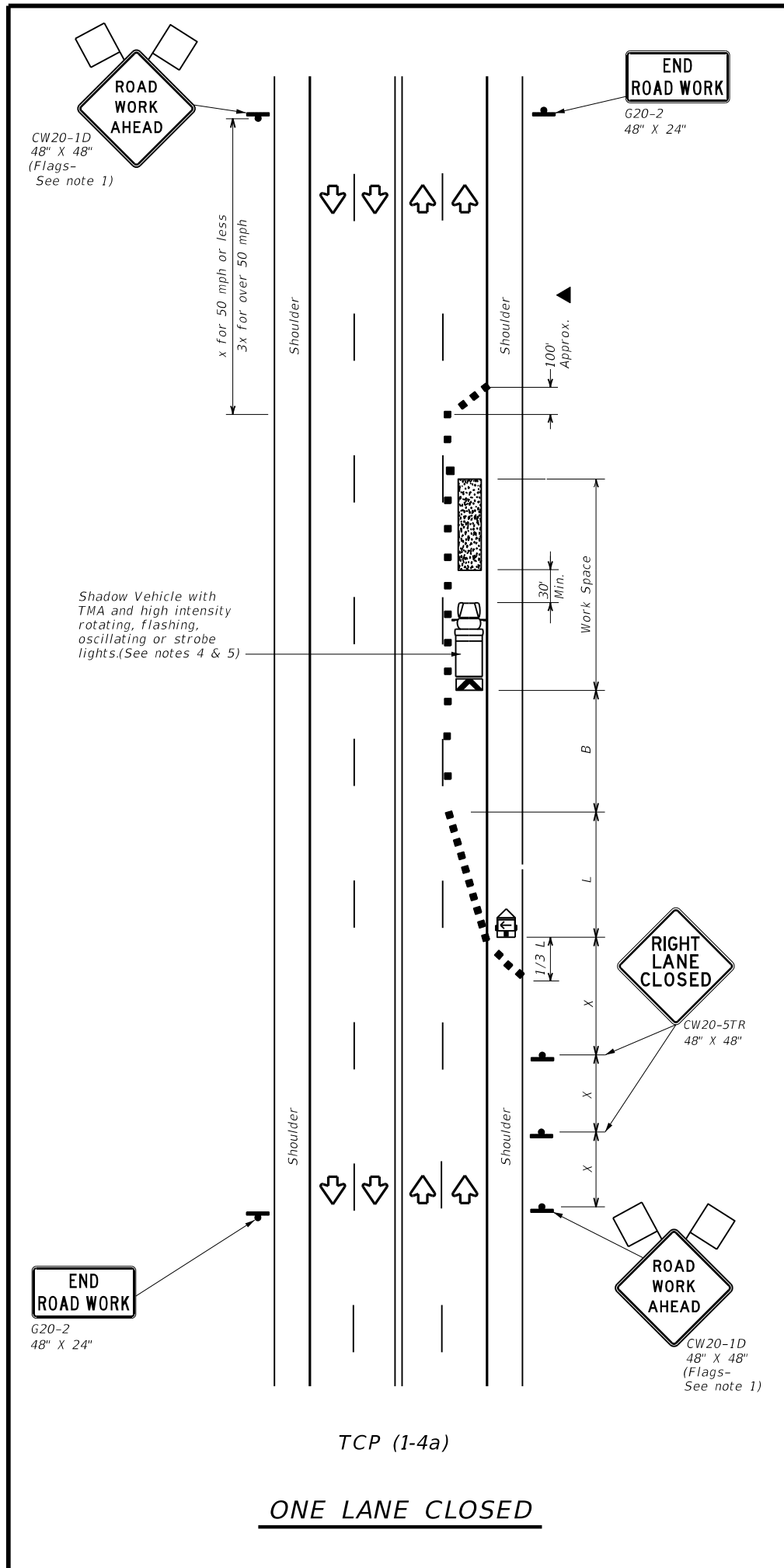
Texas Department of Transportation Traffic Operations Division Standard

TRAFFIC CONTROL PLAN

TRAFFIC SHIFTS ON TWO LANE ROADS

TCP(1-3)-18

FILE: tcp1-3-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONV	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 2-12	HOU	FORT BEND	49	
1-97 2-18				



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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			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**
- Flags attached to signs where shown are REQUIRED.
 - 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.
 - The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
 - 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.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

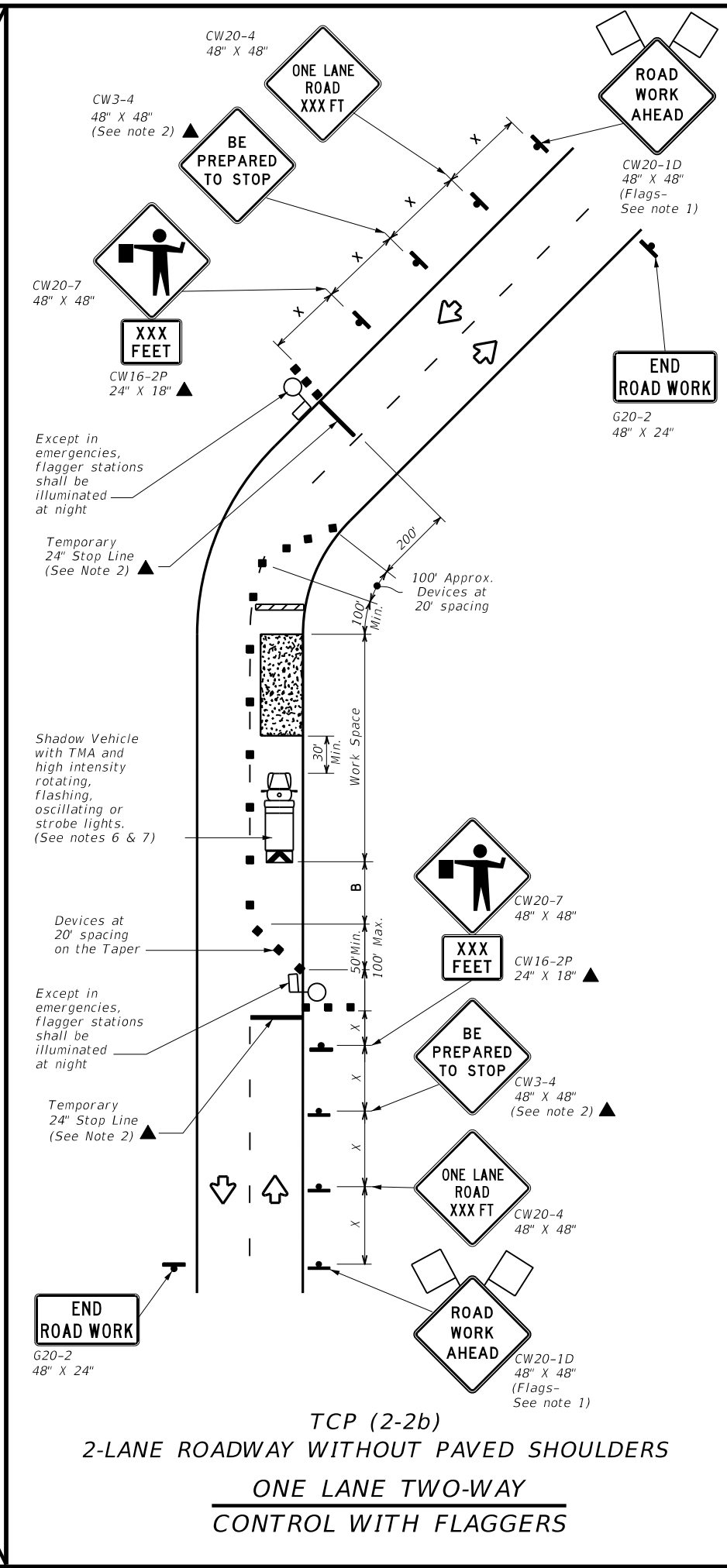
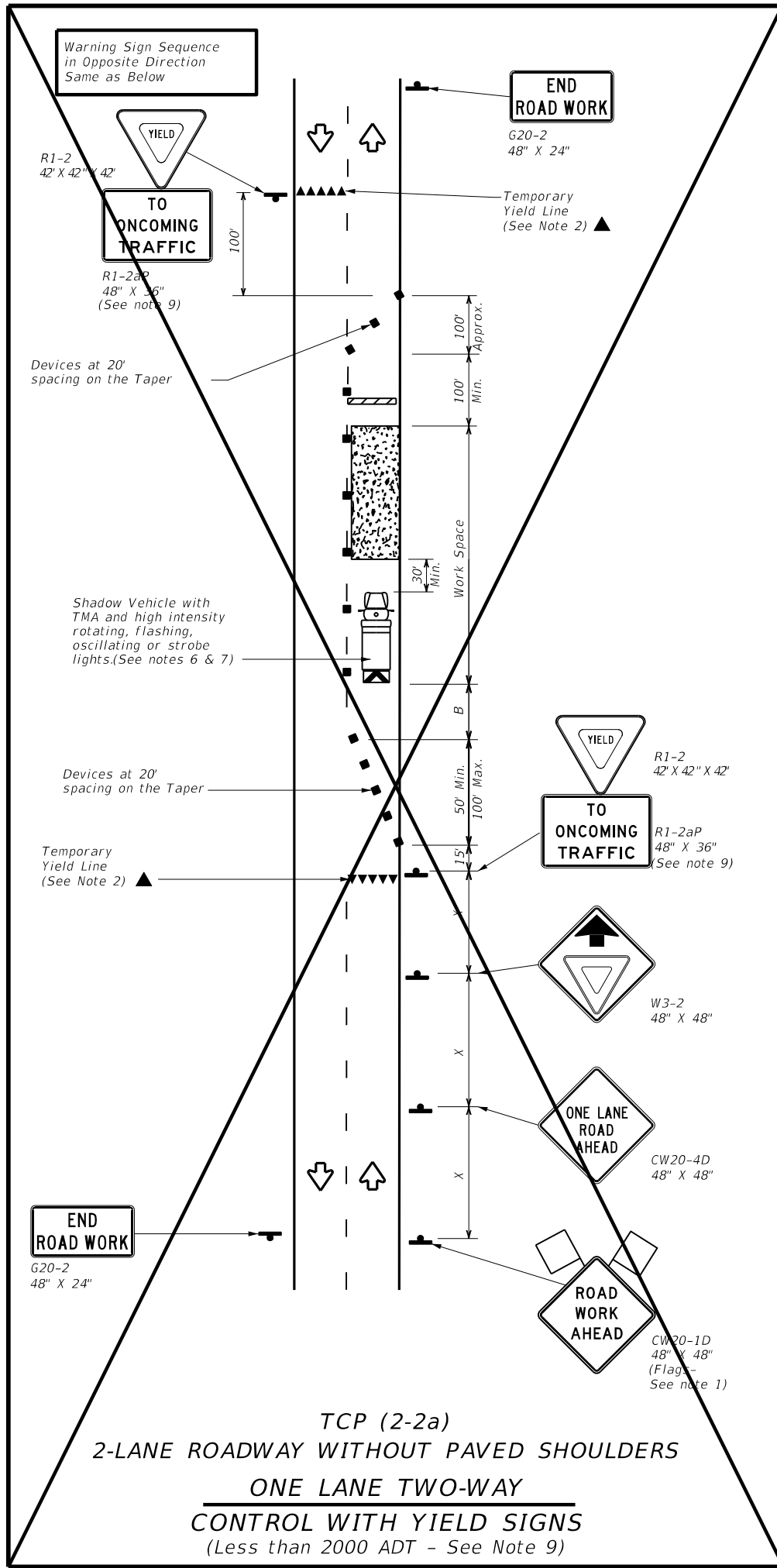
TCP (1-4a)

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.

		Traffic Operations Division Standard	
TRAFFIC CONTROL PLAN			
LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS			
TCP(1-4)-18			
FILE: tcp1-4-18.dgn	DN:	CK:	DW:
©TxDOT December 1985	CONV	SECT	JOB
REVISIONS	0111	03	063
2-94 4-98			FM 521
8-95 2-12	DIST	COUNTY	SHEET NO.
1-97 2-18	HOU	FORT BEND	50



LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	L = 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**
- Flags attached to signs where shown, are REQUIRED.
 - 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.
 - The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
 - Flaggers should use two-way radios or other methods of communication to control traffic.
 - Length of work space should be based on the ability of flaggers to communicate.
 - 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.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
- TCP (2-2a)**
- The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
 - The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.
- TCP (2-2b)**
- Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
 - If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
 - Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

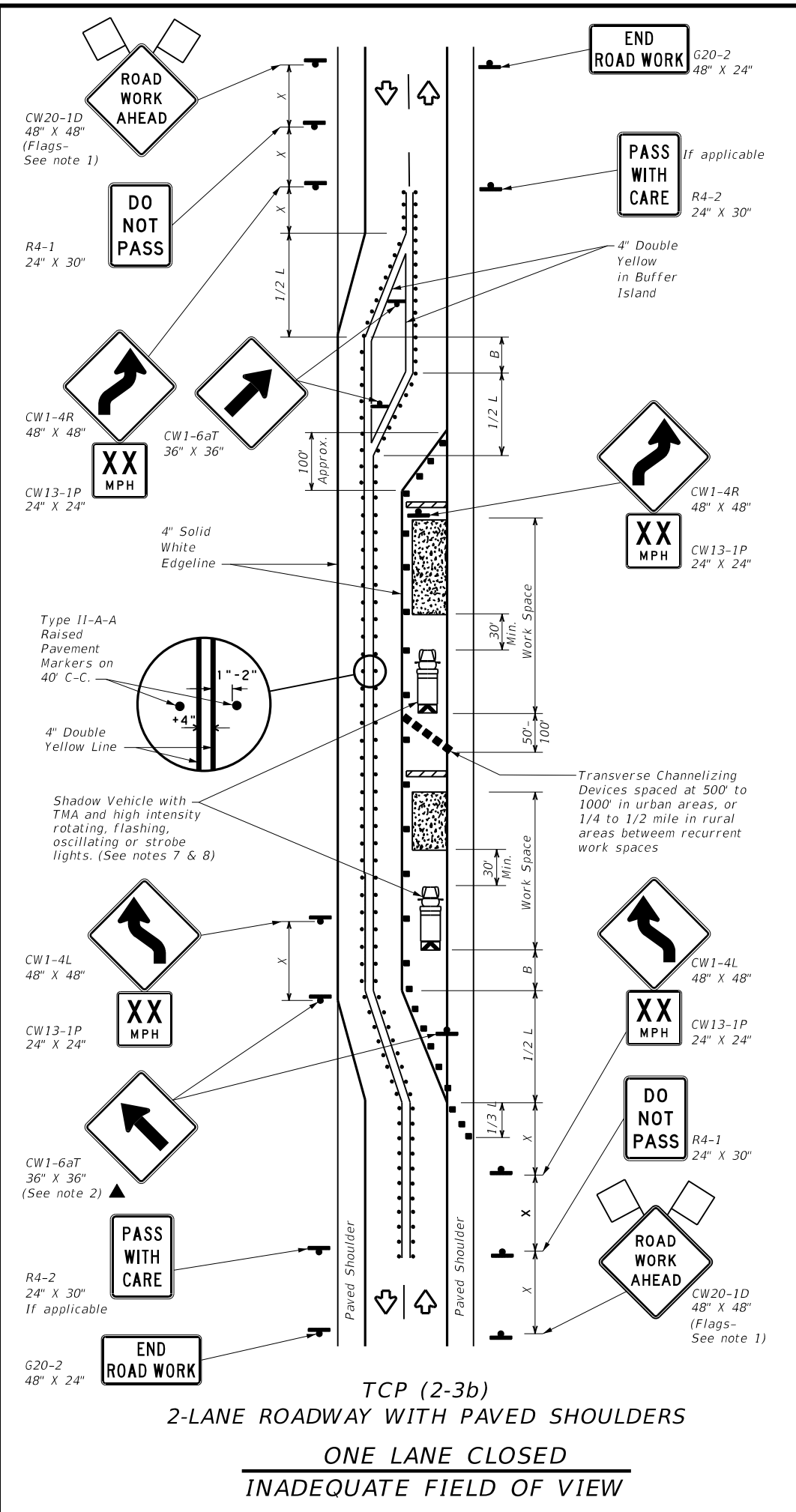
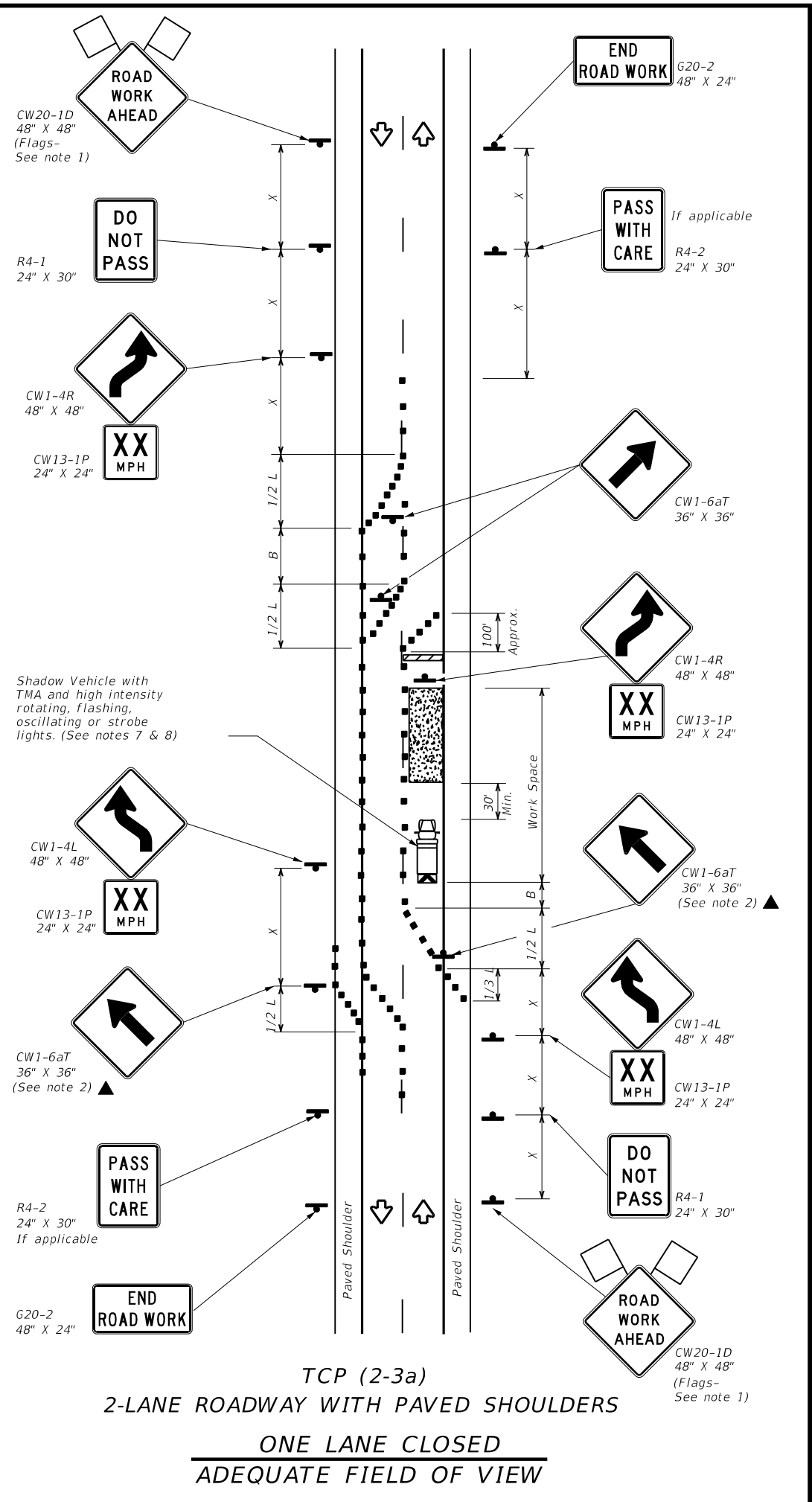
STATE OF TEXAS
 REGISTERED PROFESSIONAL ENGINEER
 ROBERT S. BISSETT, JR.
 79703
 Robert S. Bissett, Jr.
 09/13/21

Texas Department of Transportation
 Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18 (MOD)

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT	December 1985	CONV	SECT	HIGHWAY
REVISIONS	0111	03	063	FM 521
8-95 3-03				
1-97 2-12				
4-98 2-18				
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	52	



LEGEND

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Raised Pavement Markers Ty II-AA
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			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

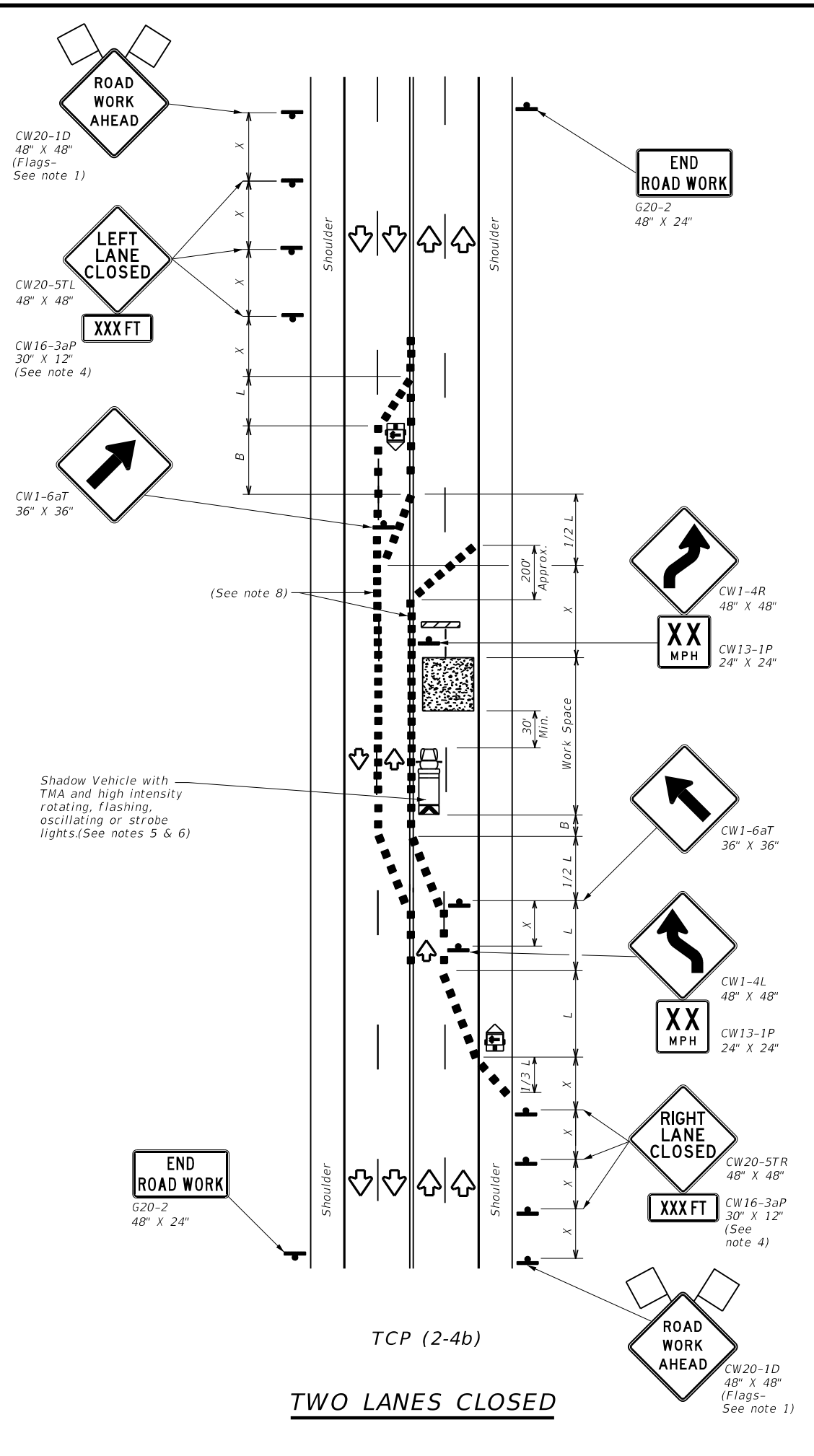
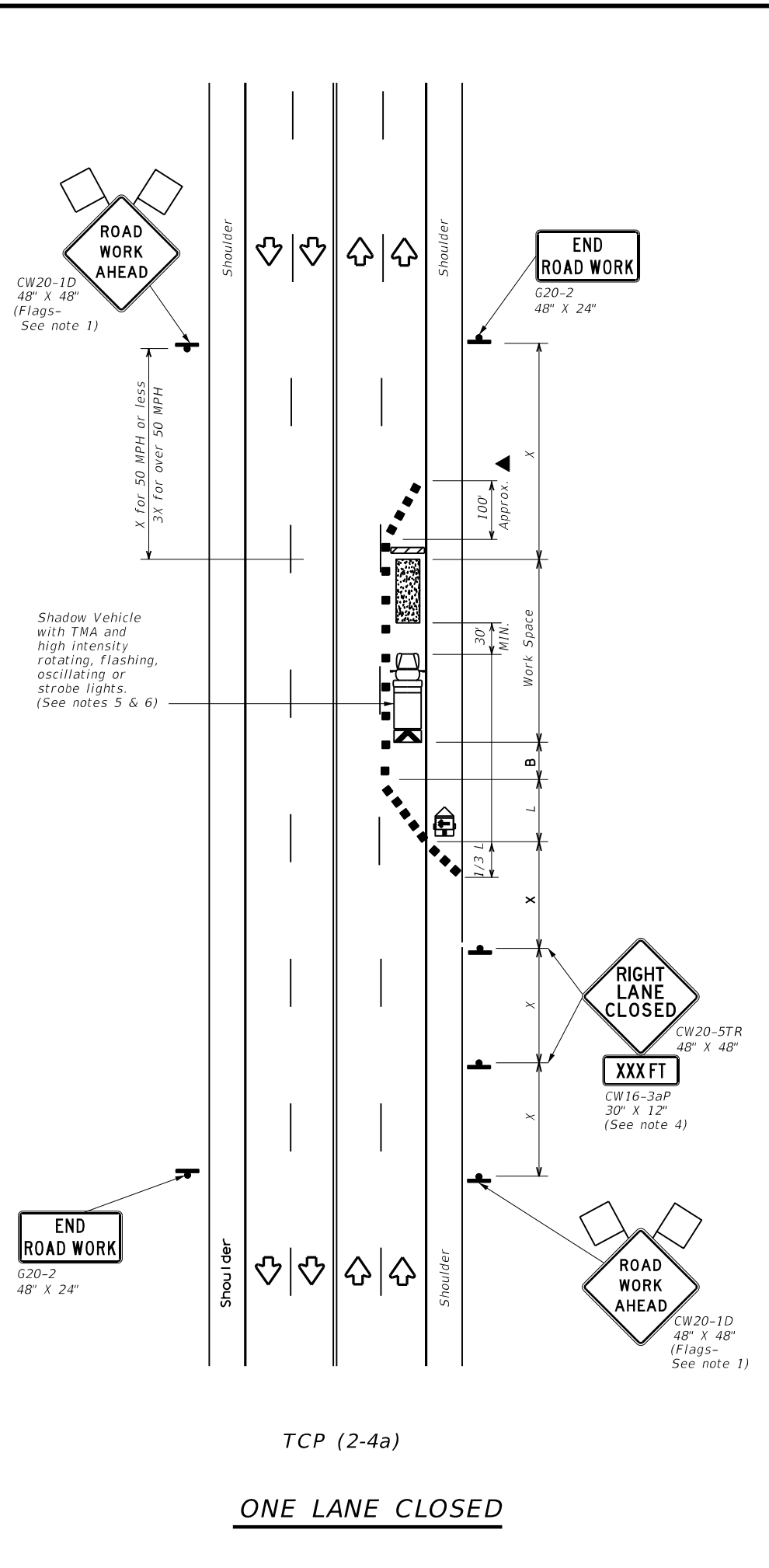
	MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
				✓	✓

- GENERAL NOTES**
- Flags attached to signs where shown, are REQUIRED.
 - 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.
 - When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
 - Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
 - The R4-1 "DO NOT PASS," R4-2 "PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
 - Conflicting pavement marking shall be removed for long term projects.
 - 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.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
- TCP (2-3a)**
- Conflicting pavement markings shall be removed for long-term projects. 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 device spacing is intended for the area of the conflicting markings, not the entire work zone.

Texas Department of Transportation Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON TWO-LANE ROADS
TCP(2-3)-18

FILE: tcp(2-3)-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONV	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
8-95 3-03	DIST	COUNTY	SHEET NO.	
1-97 2-12	HOU	FORT BEND	53	
4-98 2-18				



LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			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

- Flags attached to signs where shown, are REQUIRED.
- 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.
- The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
- 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.
- 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.
- 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)

- 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)

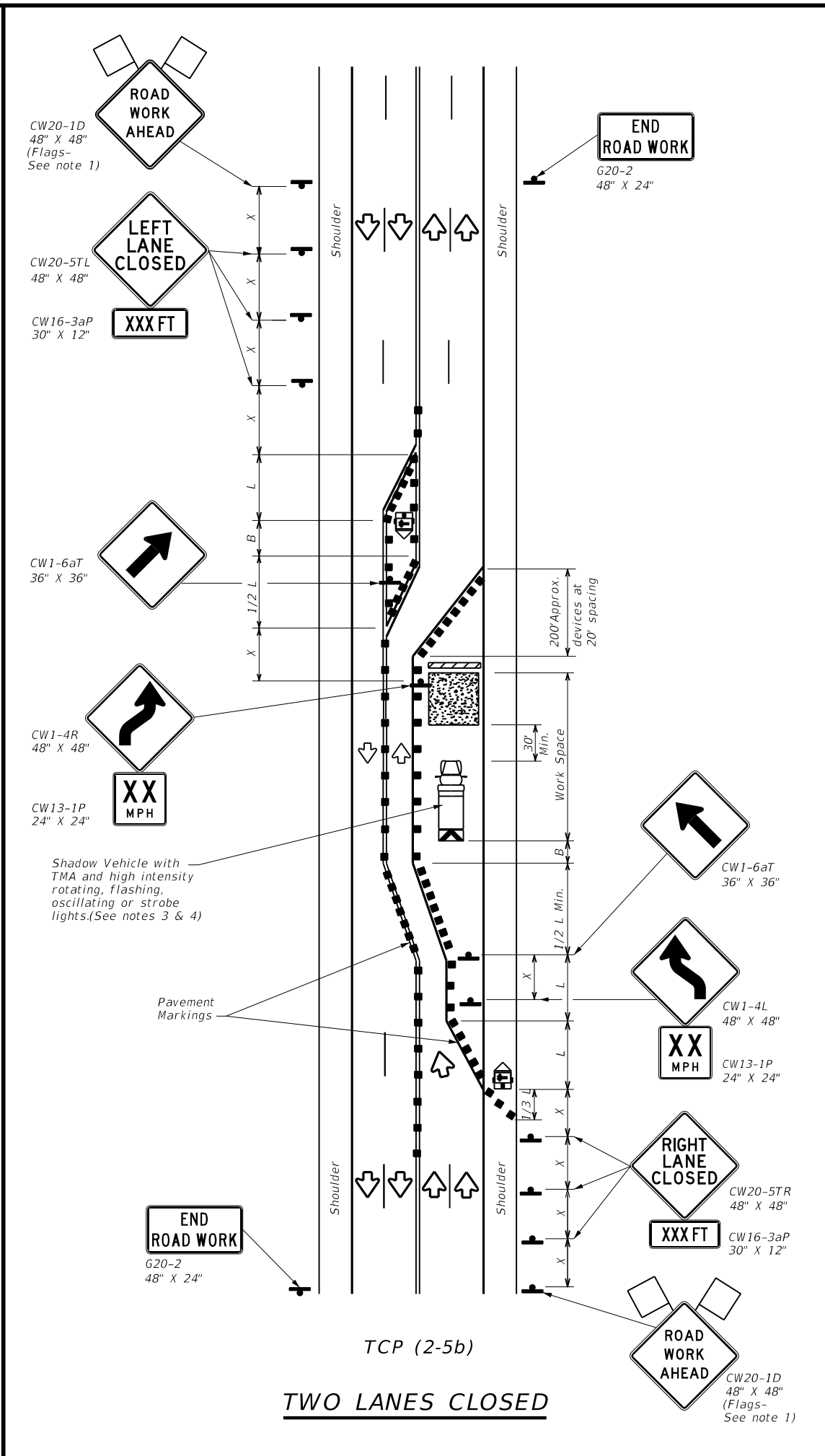
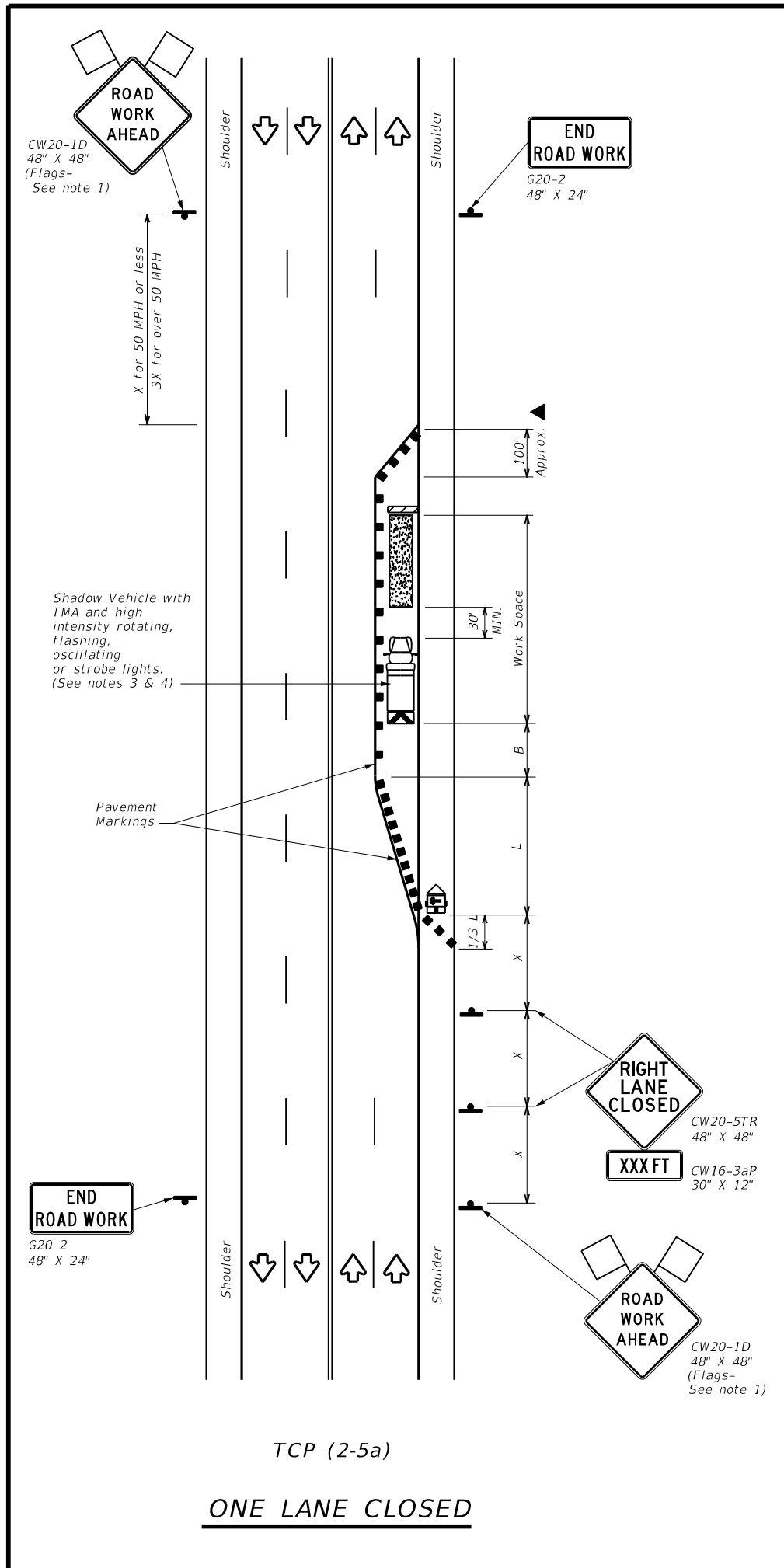
- For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing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

Texas Department of Transportation Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS
TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONV	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
8-95 3-03	DIST	COUNTY	SHEET NO.	
1-97 2-12	HOU	FORT BEND	54	
4-98 2-18				

164



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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			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**
- Flags attached to signs where shown, are REQUIRED.
 - 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.
 - 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.
 - 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.
 - The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.
- TCP (2-5a)**
- If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic, with the arrow board placed in the closed lane near the end of the merging taper.
- TCP (2-5b)**
- Conflicting pavement markings shall be removed for long-term projects.

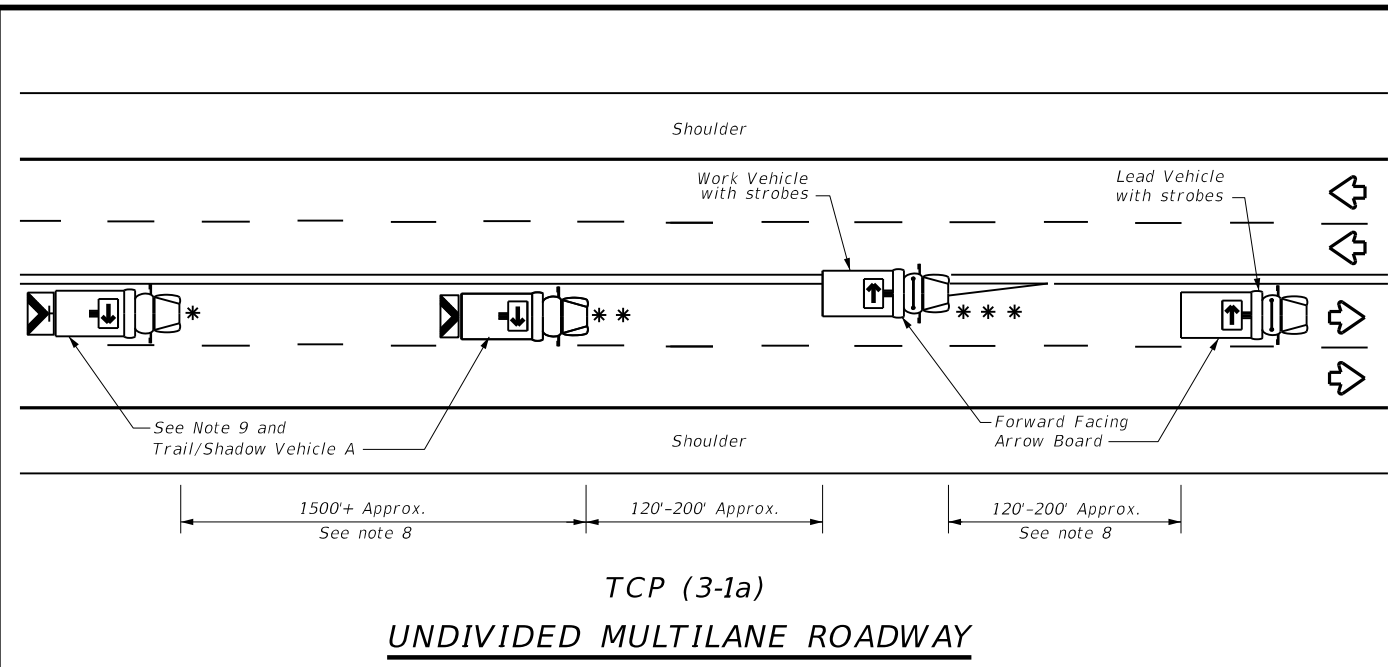
		Traffic Operations Division Standard	
TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.			
TCP(2-5)-18			
FILE: tcp2-5-18.dgn	DN:	CK:	DW:
©TxDOT December 1985	CONV	SECT	JOB
REVISIONS	0111	03	063
8-95 2-12	DIST	COUNTY	SHEET NO.
1-97 3-03	HOU	FORT BEND	55
4-98 2-18			

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)

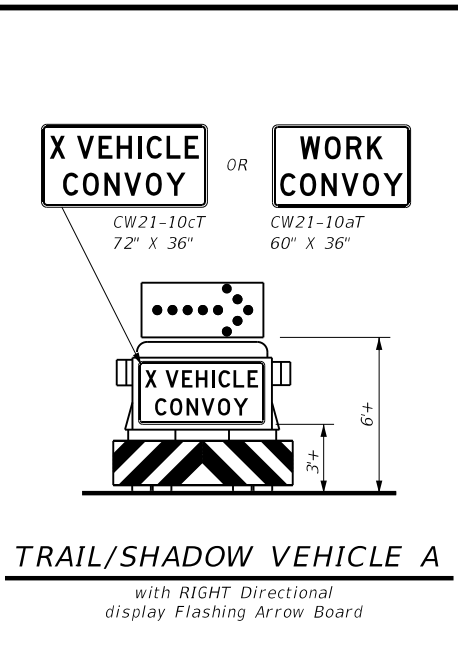
TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
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GENERAL NOTES

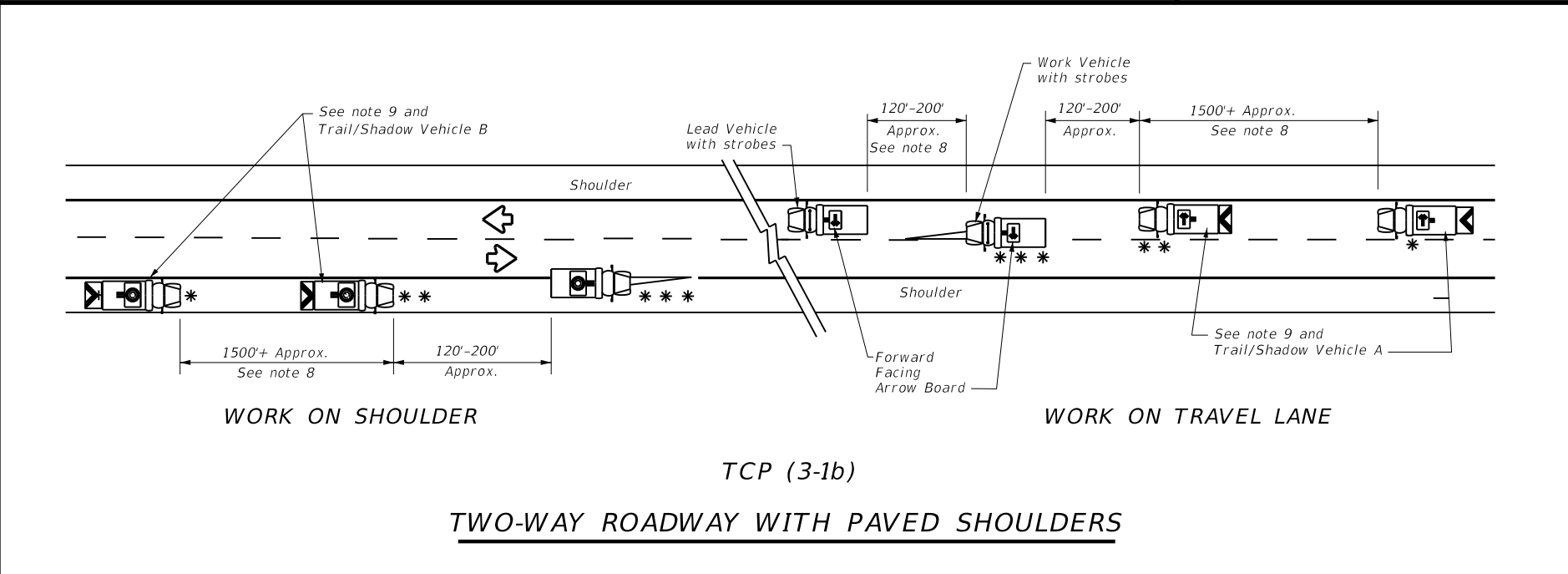
1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic 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.



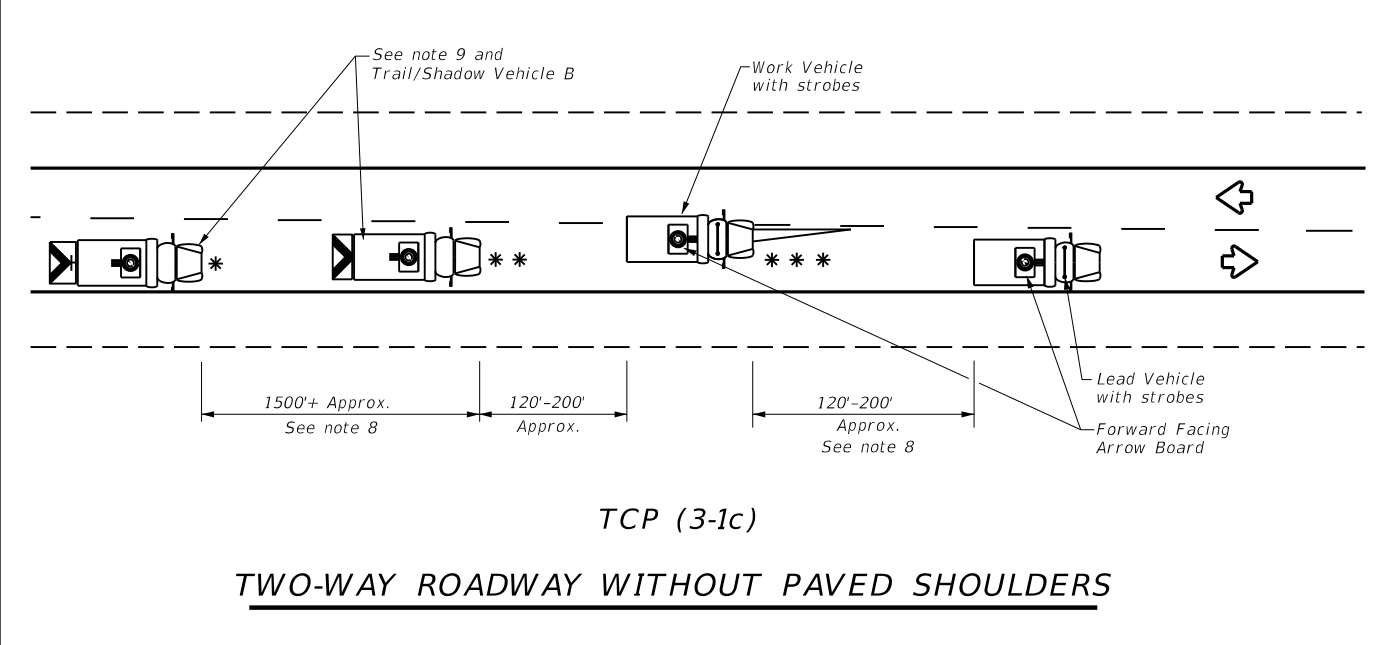
TCP (3-1a)
UNDIVIDED MULTILANE ROADWAY



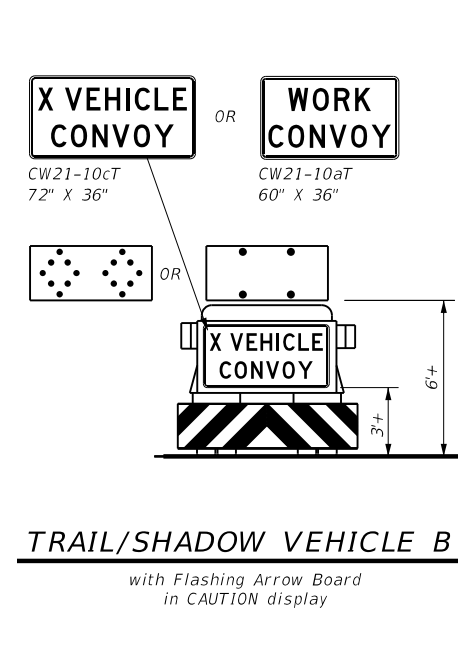
TRAIL/SHADOW VEHICLE A
with RIGHT Directional display Flashing Arrow Board



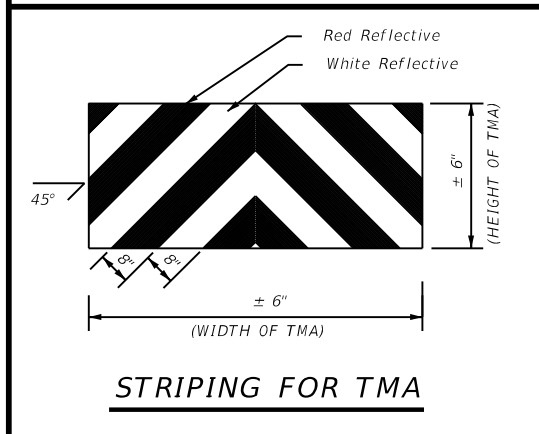
TCP (3-1b)
TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)
TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B
with Flashing Arrow Board in CAUTION display



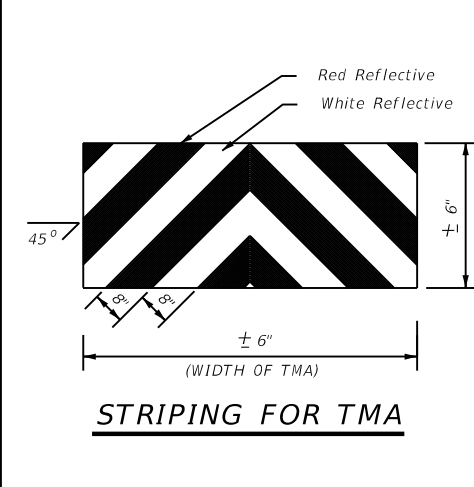
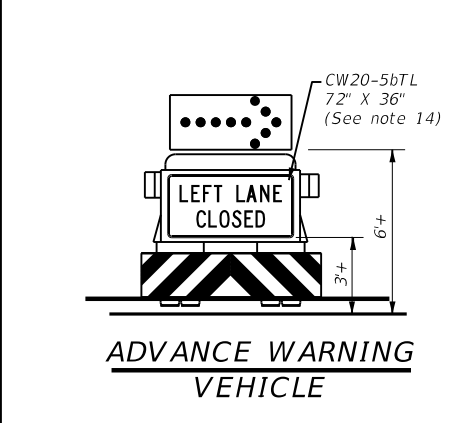
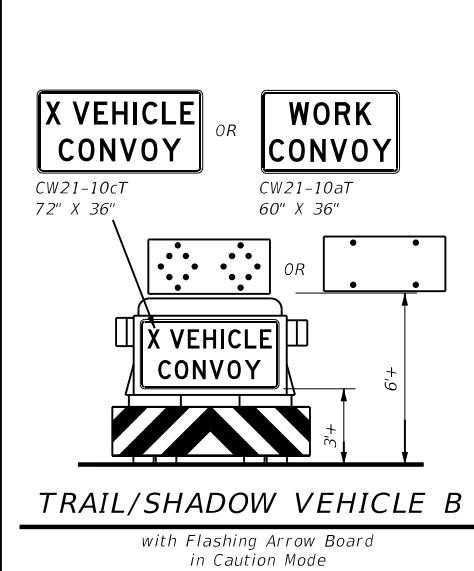
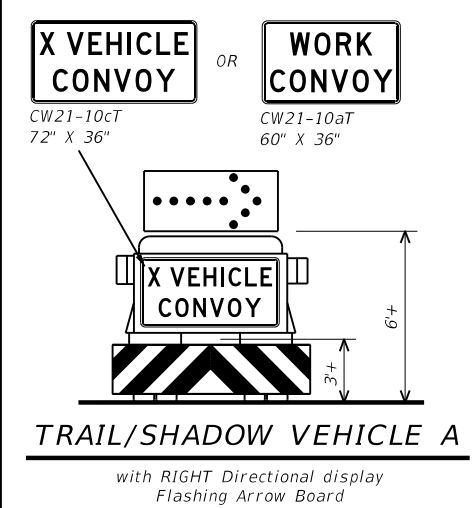
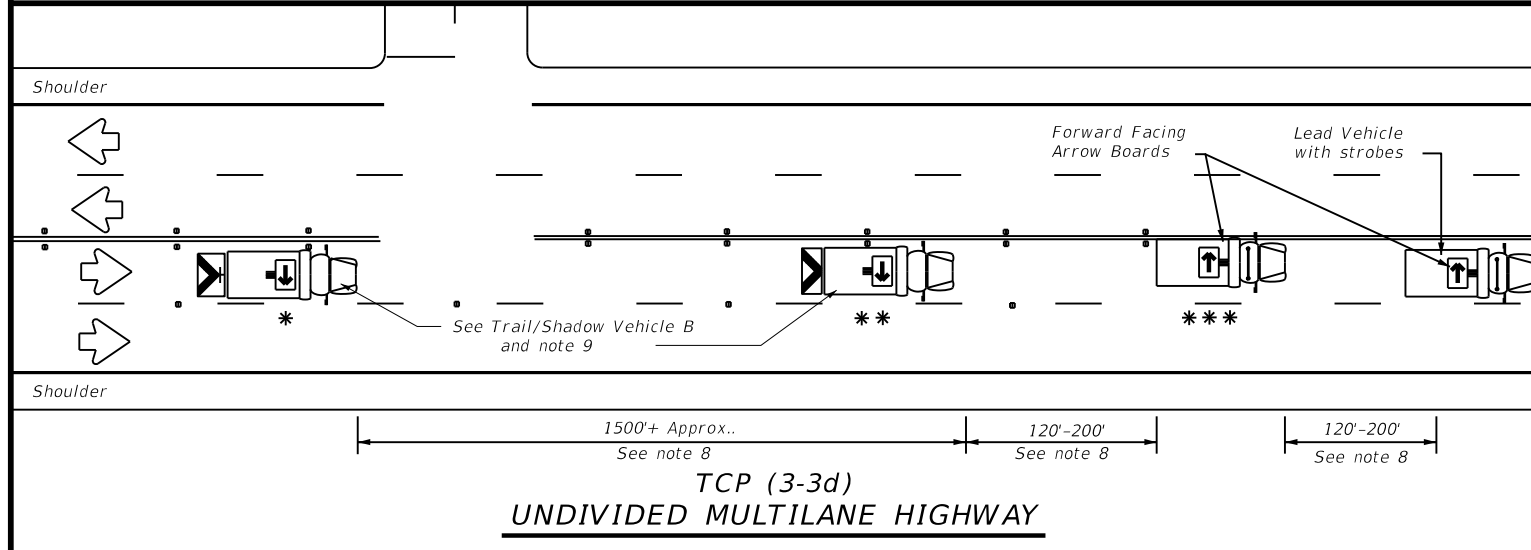
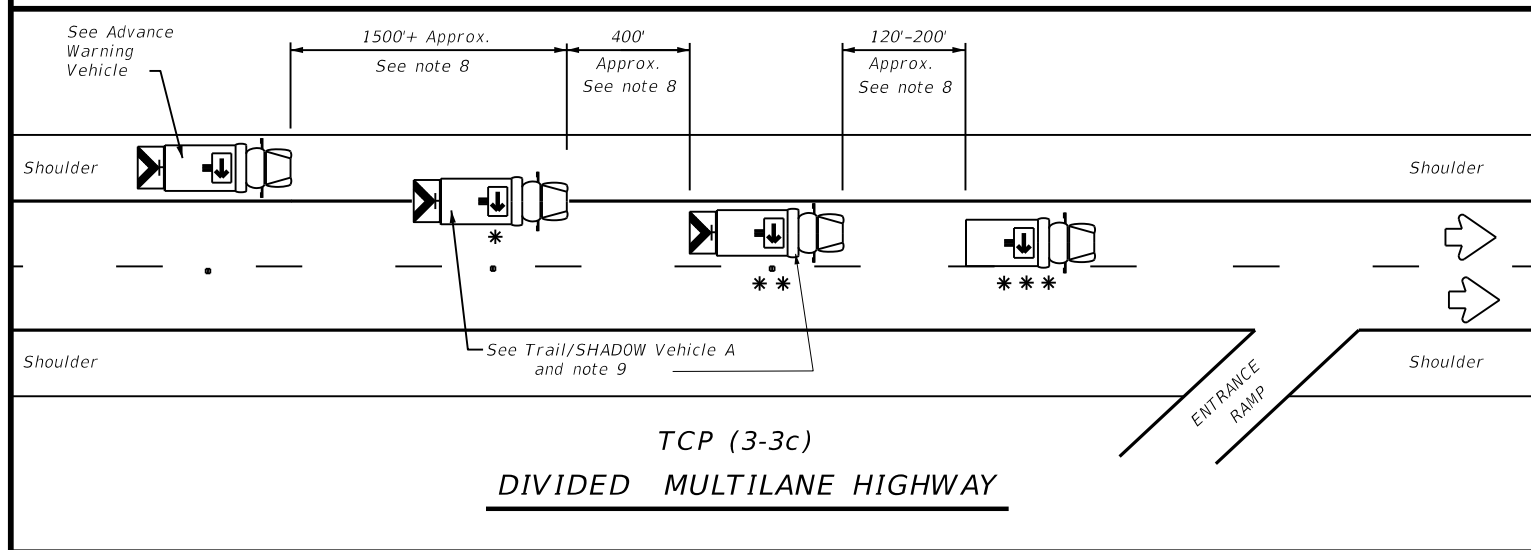
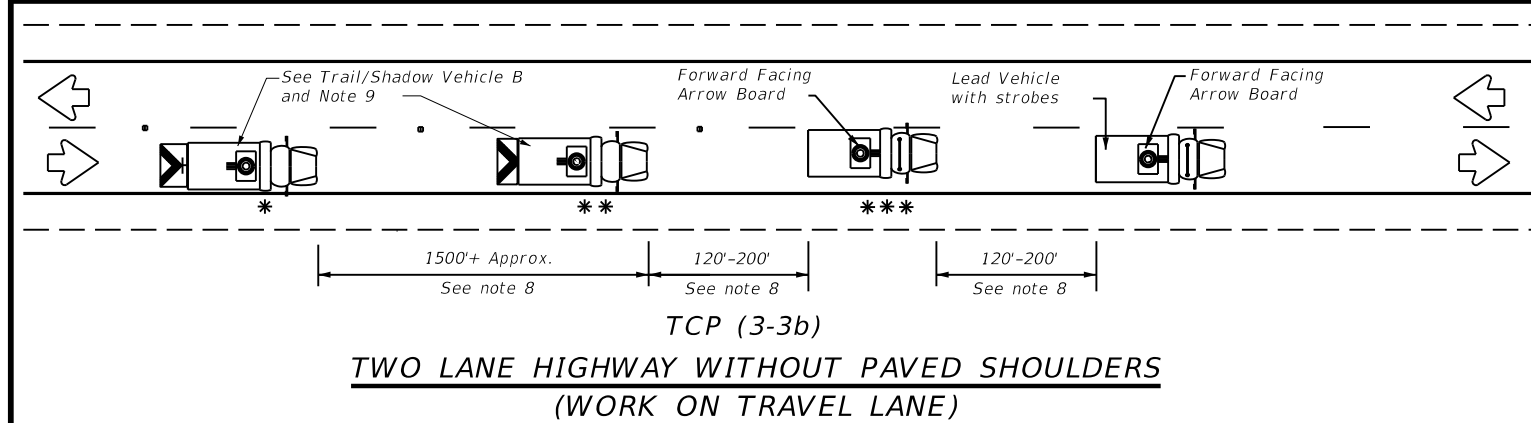
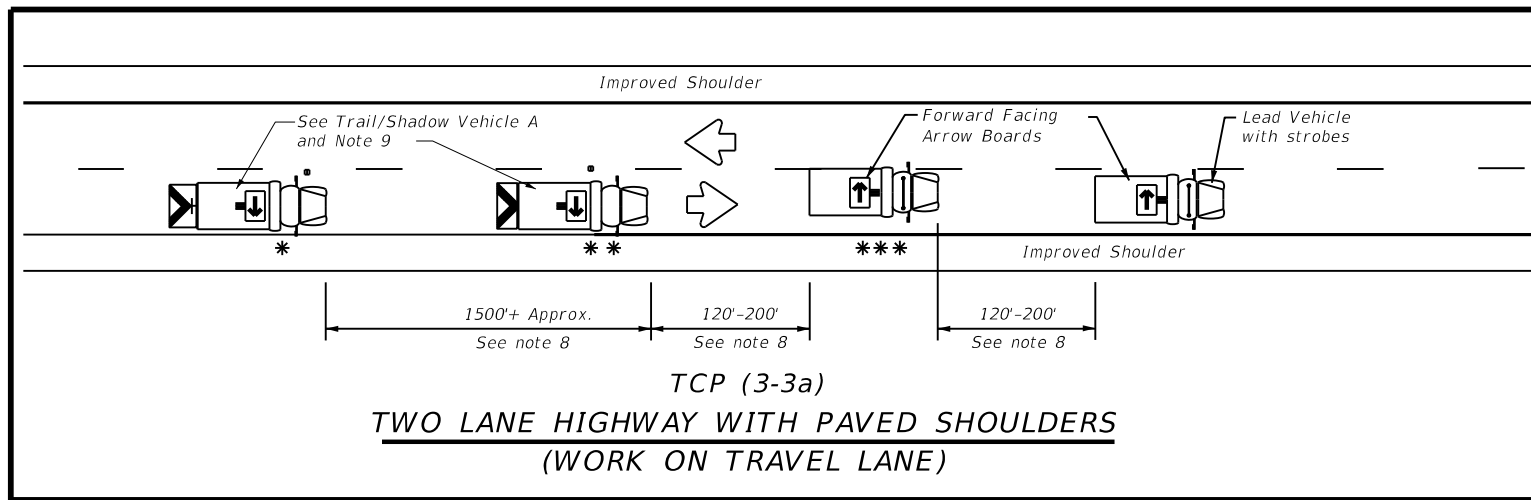
STRIPING FOR TMA

Texas Department of Transportation
Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN
MOBILE OPERATIONS
UNDIVIDED HIGHWAYS**

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 7-13	HOU	FORT BEND	56	
1-97				



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

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

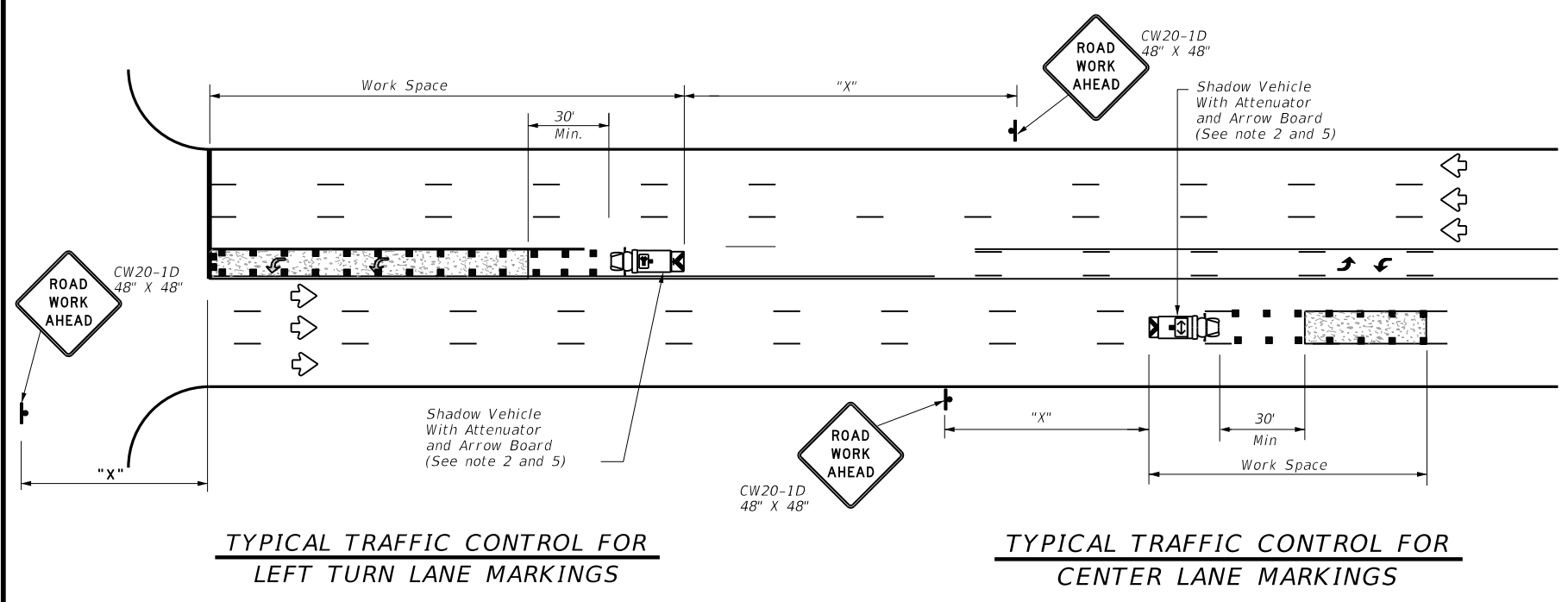
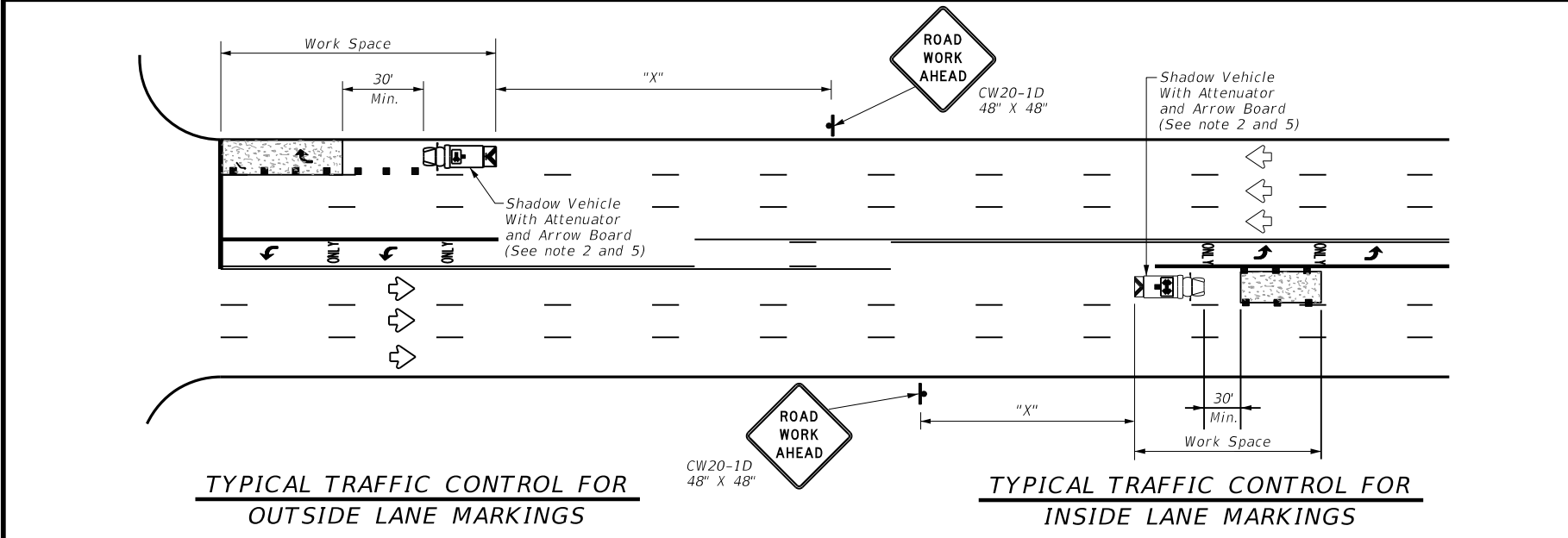
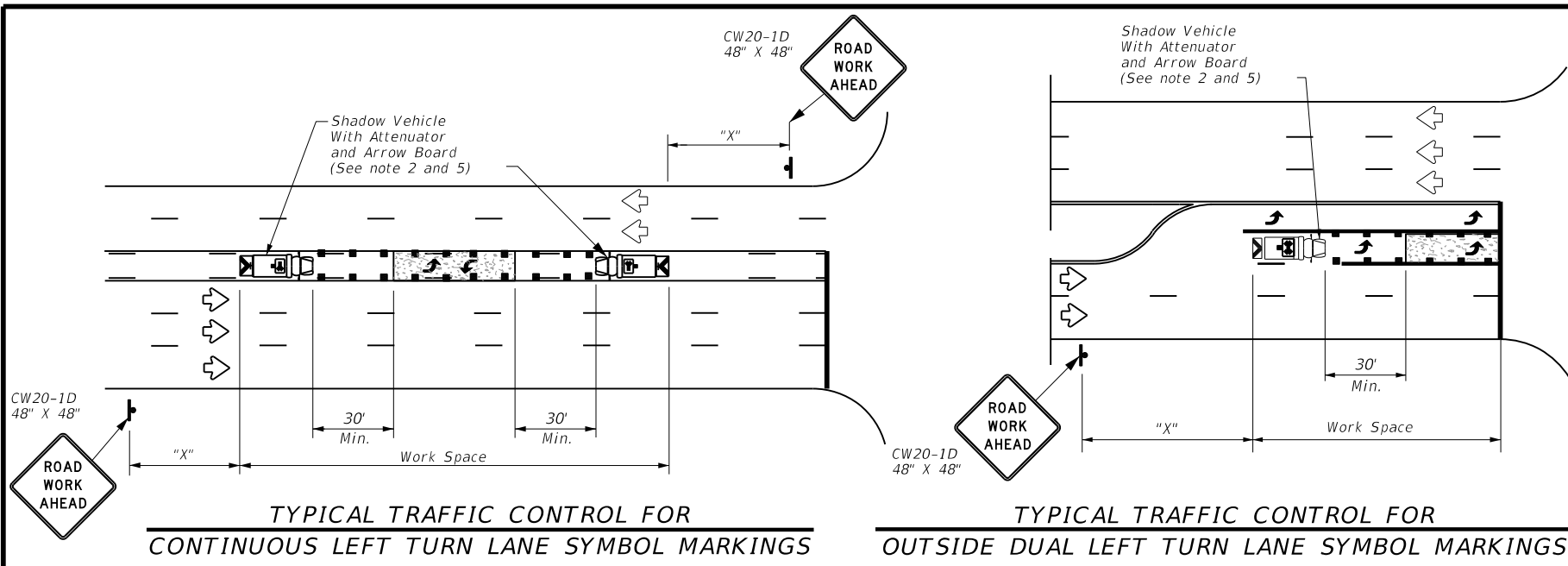
GENERAL NOTES

- 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.
- 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.
- The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
- 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.
- 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.
- Each vehicle shall have two-way radio communication capability.
- When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
- 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.
- 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.
- 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.
- A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
- For divided highways with three or four lanes in each direction, use TCP(3-2).
- Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
- The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
- On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.

Texas Department of Transportation
Traffic Operations Division Standard

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

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 7-13	HOU	FORT BEND	57	
1-97 7-14				



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	Channelizing Devices

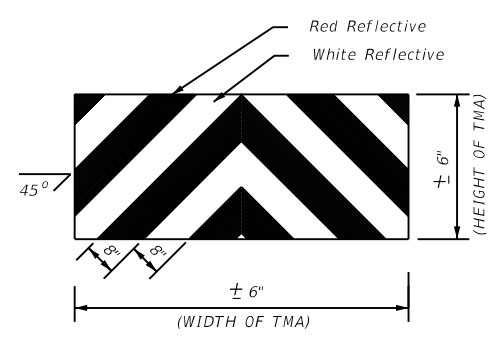
Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS ² / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	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. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.
2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.
3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.

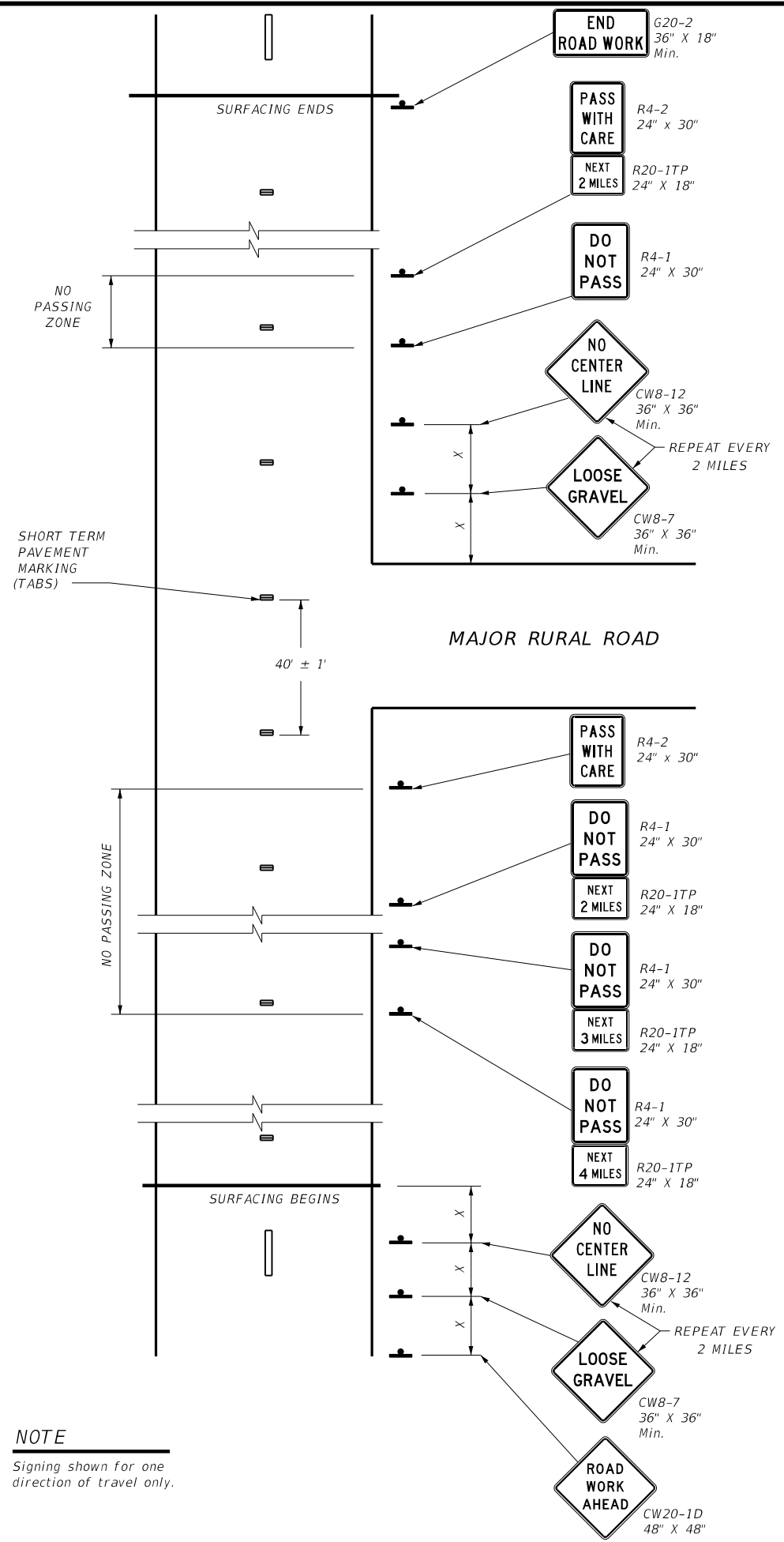


Texas Department of Transportation Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS

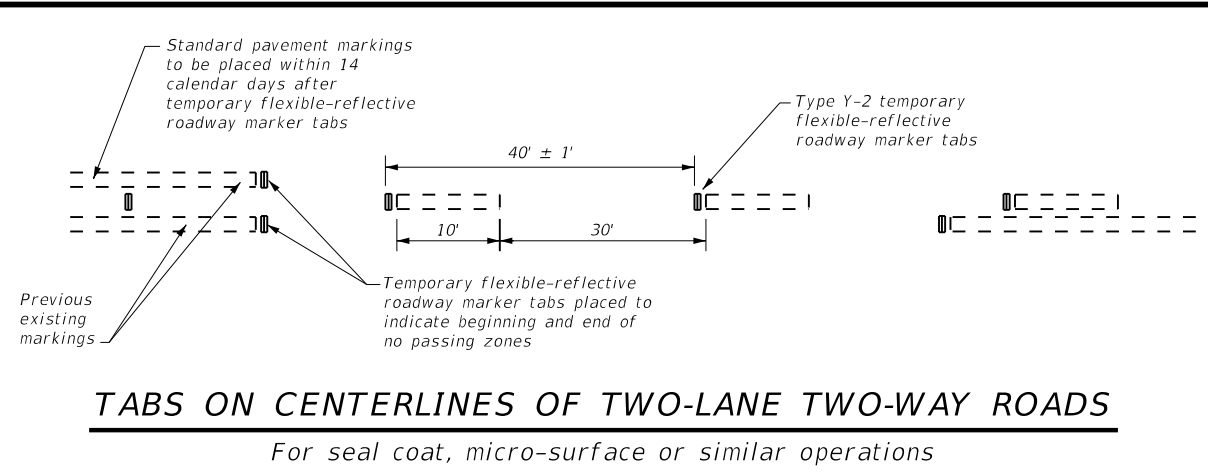
TCP(3-4)-13

FILE: tcp3-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July, 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	58	



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

- 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

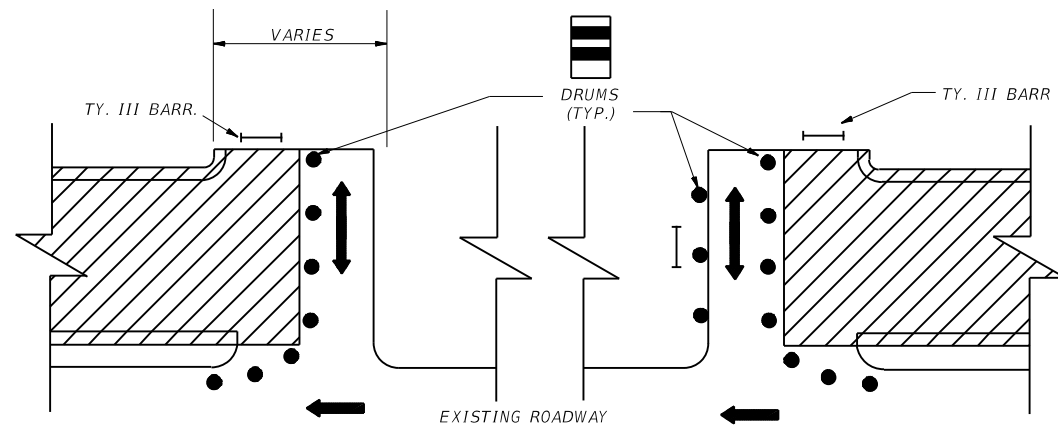
1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be 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.



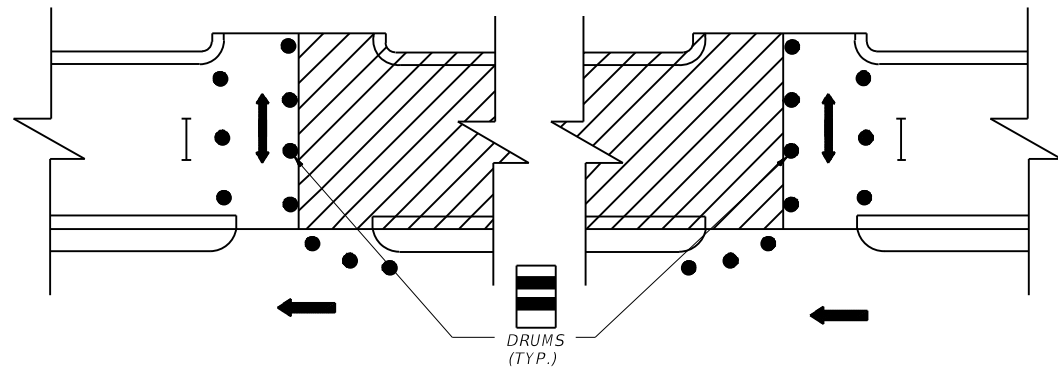
TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

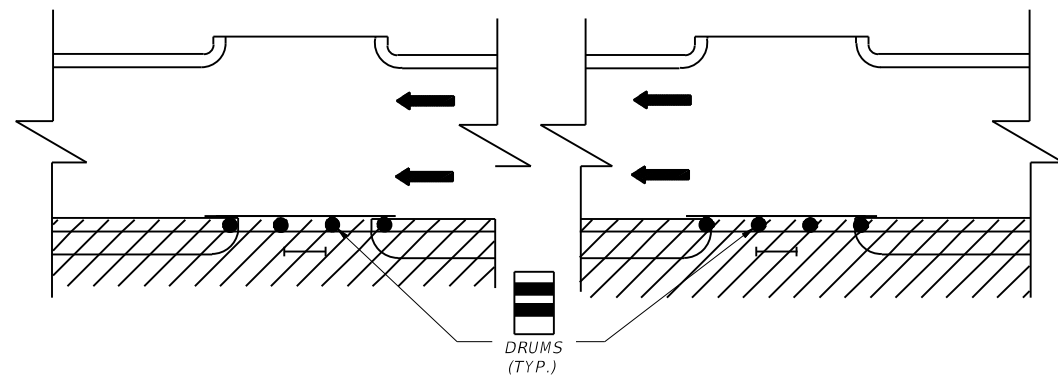
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©TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
4-92 4-98	DIST	COUNTY	SHEET NO.	
1-97 7-13	HOU	FORT BEND	59	



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

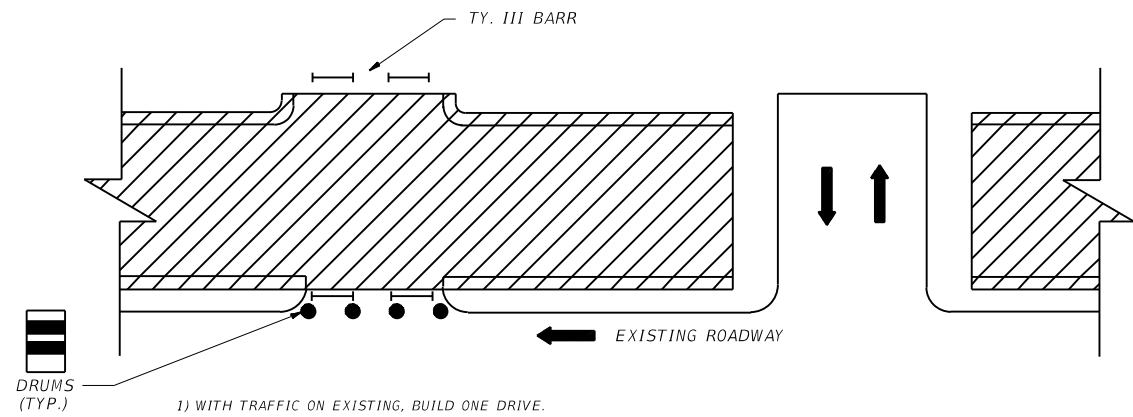


- 2) BUILD OTHER HALF OF DRIVE

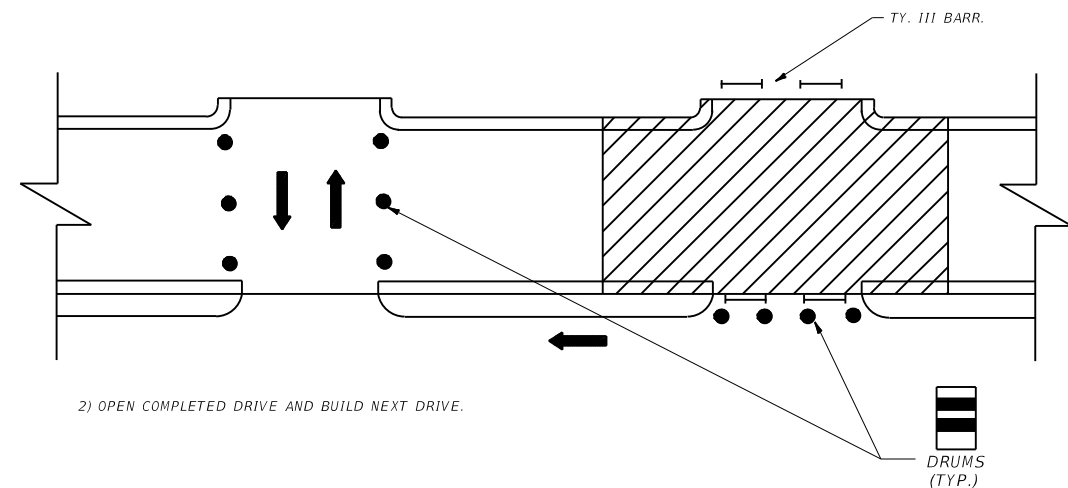


- 3) OPEN DRIVE
- 4) AFTER TRAFFIC MOVES TO NEW ROADWAY, BUILD REMAINING CURB.

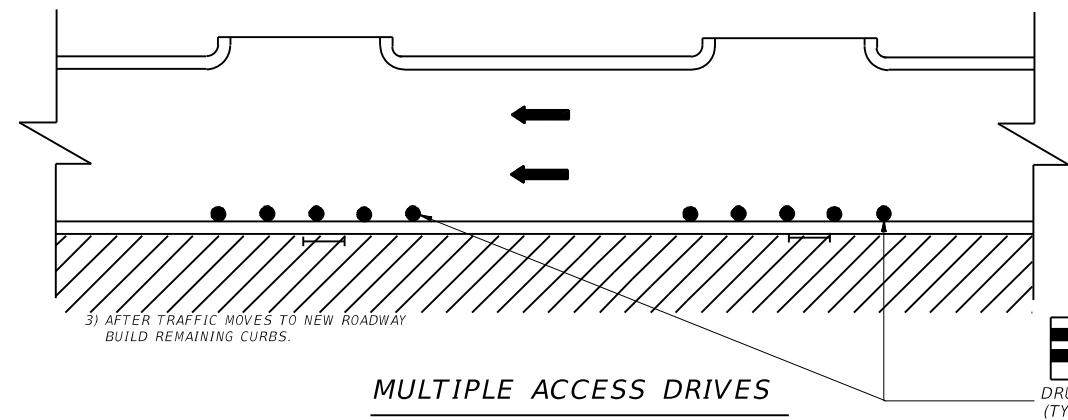
SINGLE ACCESS DRIVES



- 1) WITH TRAFFIC ON EXISTING, BUILD ONE DRIVE.



- 2) OPEN COMPLETED DRIVE AND BUILD NEXT DRIVE.



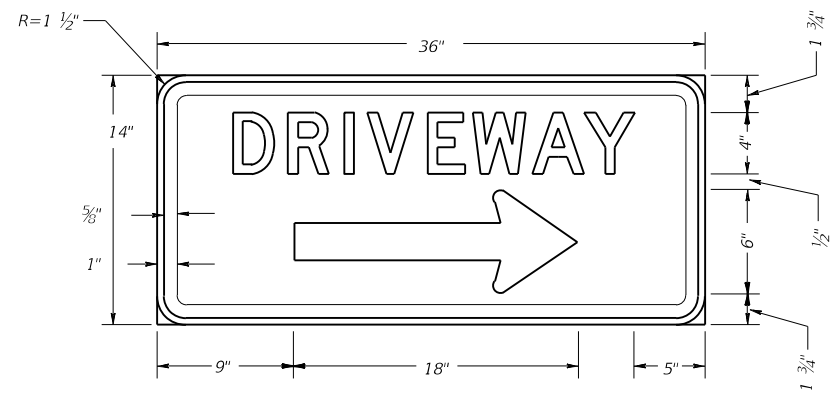
- 3) AFTER TRAFFIC MOVES TO NEW ROADWAY BUILD REMAINING CURBS.

MULTIPLE ACCESS DRIVES

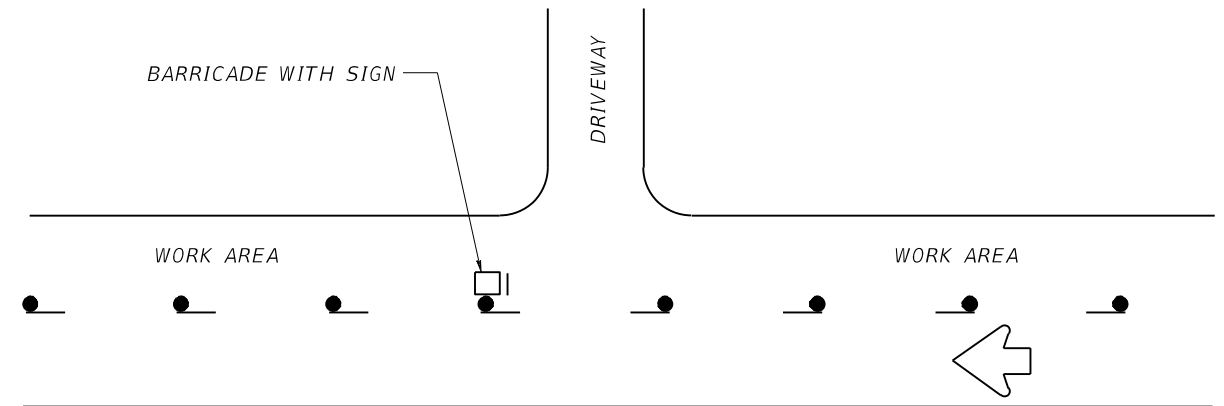
**CONSTRUCTION SEQUENCE
FOR MISCELLANEOUS DRIVES**

CSMD TC8010-2020

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©TxDOT 2020	CONT	SECT	JOB	HIGHWAY
	0111	03	063	FM 521
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	60	



LETTERS: WHITE
 BORDER: WHITE
 BACKGROUND: BLUE



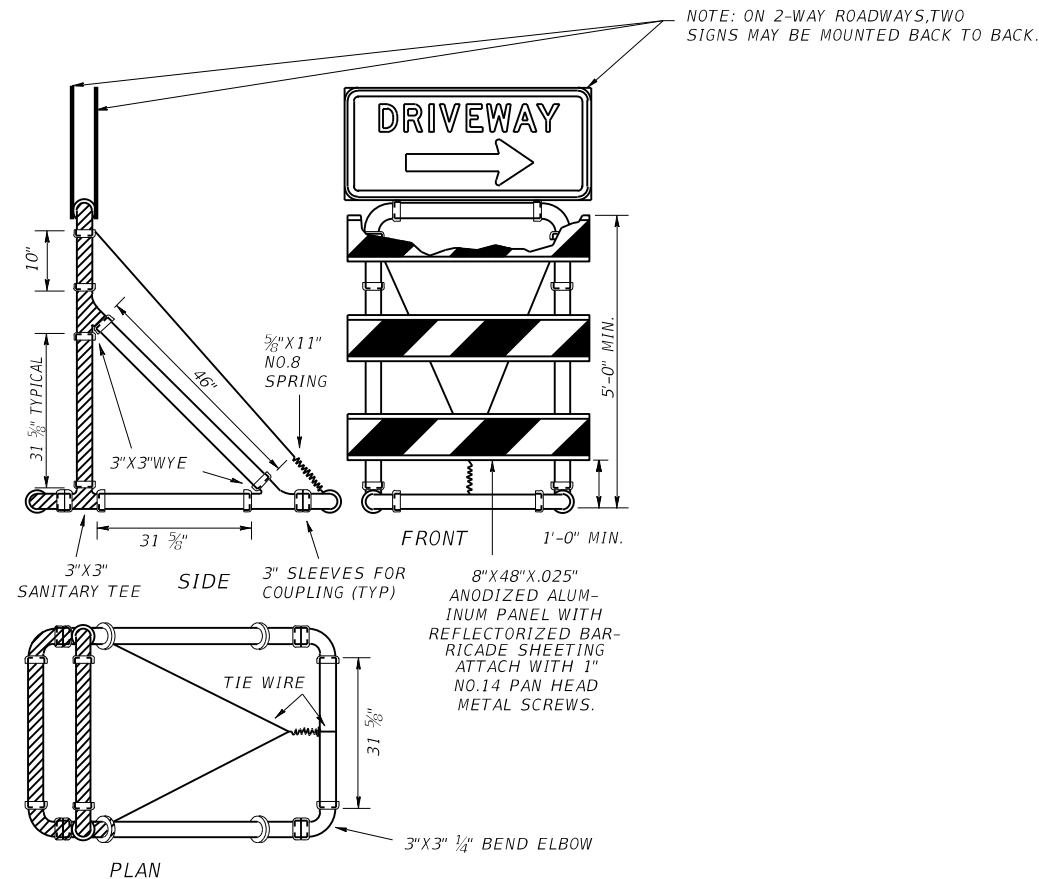
TYPICAL LOCATION OF DRIVEWAY SIGN

**TYPE III PVC BARRICADES
 TYPICAL DESIGN DETAILS**

MAY BE USED AT THE OPTION OF THE CONTRACTOR.

NOTES:

1. ALL PIPE SHALL BE POLYVINYL CHLORIDE (PVC) PRESSURE RATED PIPE SDR 21 OR SDR 26 ASTM D2241.
2. JOINT FITTINGS MAY BE PVC-ASTM D2665 OR ACRYLONITRILE BUTADIENE STYRENE (ABS) ASTM D2661 (DRAINAGE WASTE AND VENT).
3. ALL PIPE AND FITTINGS SHALL BE WHITE.
4. ALL JOINTS SHALL BE FREE TO SEPARATE UPON VEHICLE IMPACT.
5. CROSS HATCHED CONDUIT TO BE TIED TOGETHER WITH ROPE THREADED INTO PIPE INTERIOR. USE 3/16" NO. 6 SOLID BRAIDED NYLON OR EQUIVALENT.
6. A FIXED FRANGIBLE PAVEMENT CONNECTION IS PREFERRED. SAND BAGS MAY BE SUBSTITUTED.



CONSTRUCTION SIGN NOTES

MATERIALS

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

SIGN SHEETING

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

TYPE C SHEETING SHALL BE USED FOR THIS APPLICATION.

SIGN LETTERS

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

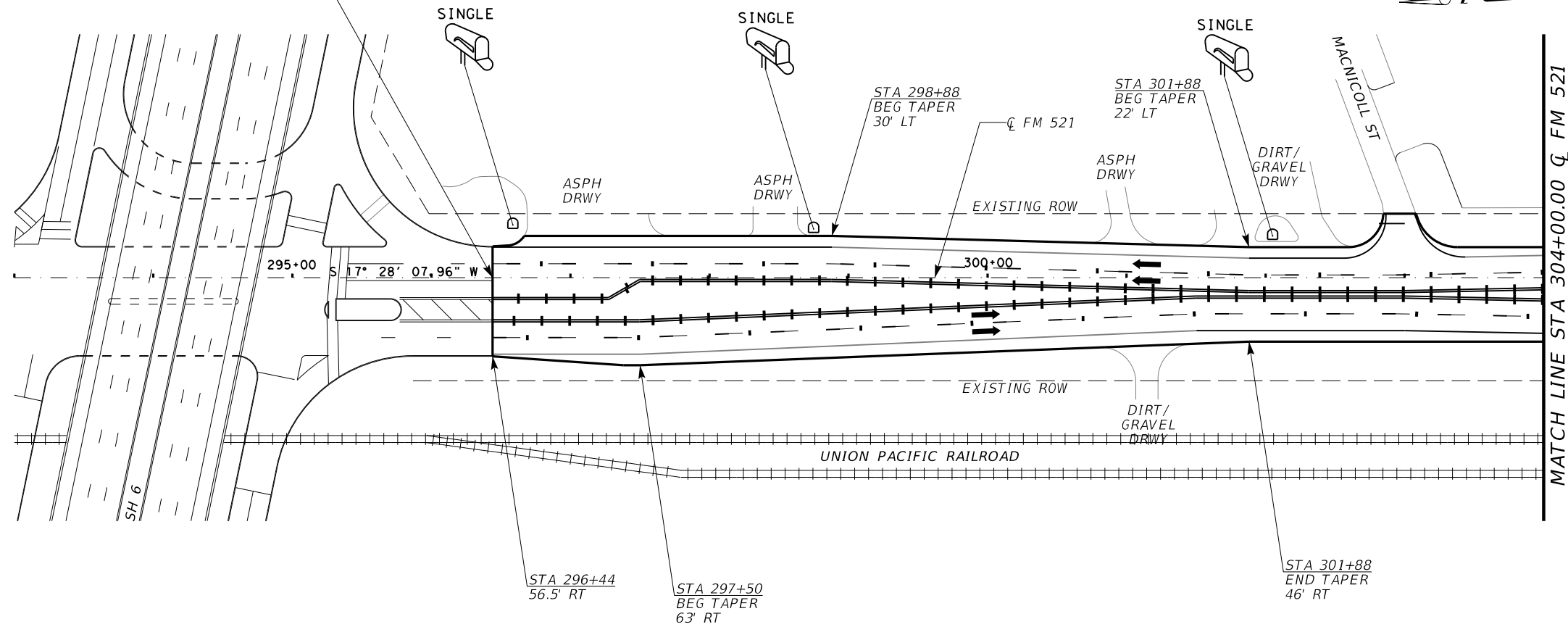


DRIVEWAY SIGNING

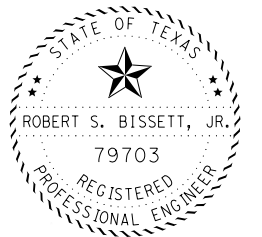
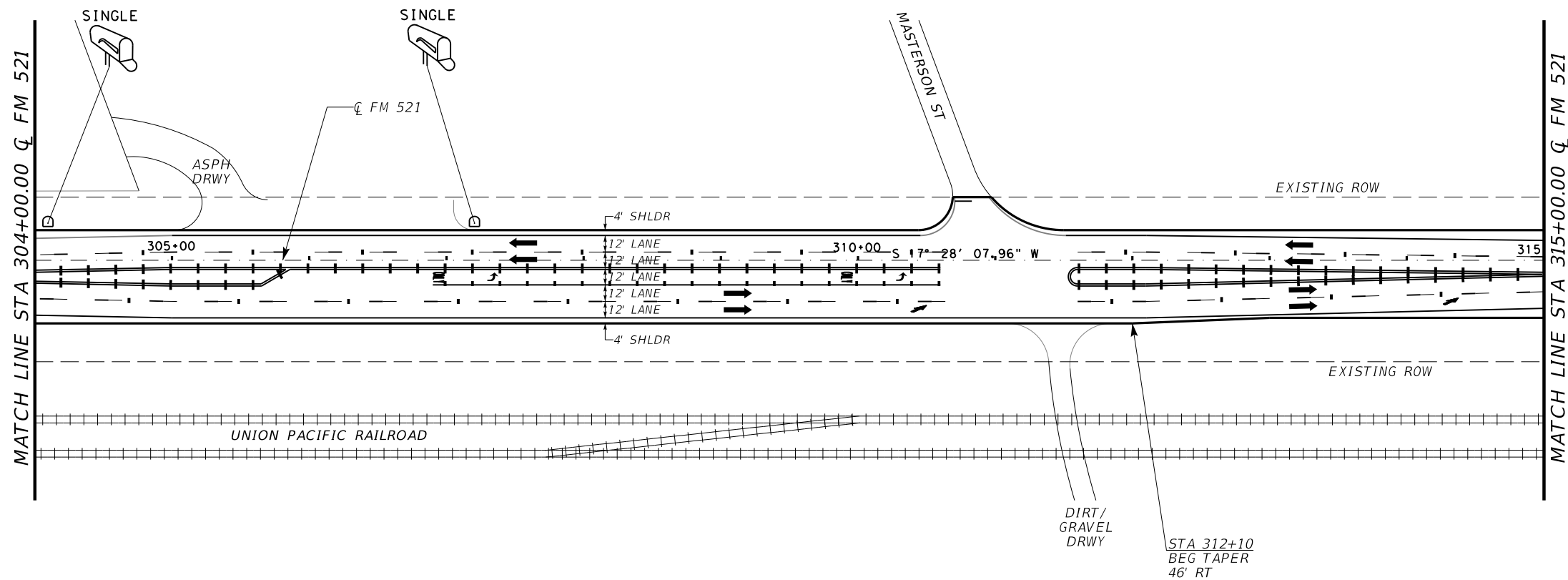
DS TC8020-04

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©TxDOT 2004	CONT	SECT	JOB	HIGHWAY
	0111	03	063	FM 521
	DIST COUNTY		SHEET NO.	
	HOU FORT BEND		61	

BEG PROJECT STA 296+44.00
 BEG PROP 1 1/2" PLANING &
 1 1/2" ACP OVERLAY



- LEGEND**
- ← TRAFFIC DIRECTION
 - LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY
 - Ⓜ MAILBOX - S/D/M (TWW-POST) TY 4



Robert S. Bissett, Jr.
 10/29/21
 ROADWAY LAYOUT

BEGIN OF PROJECT
 TO
 STA 315+00.00

SHEET 1 OF 12

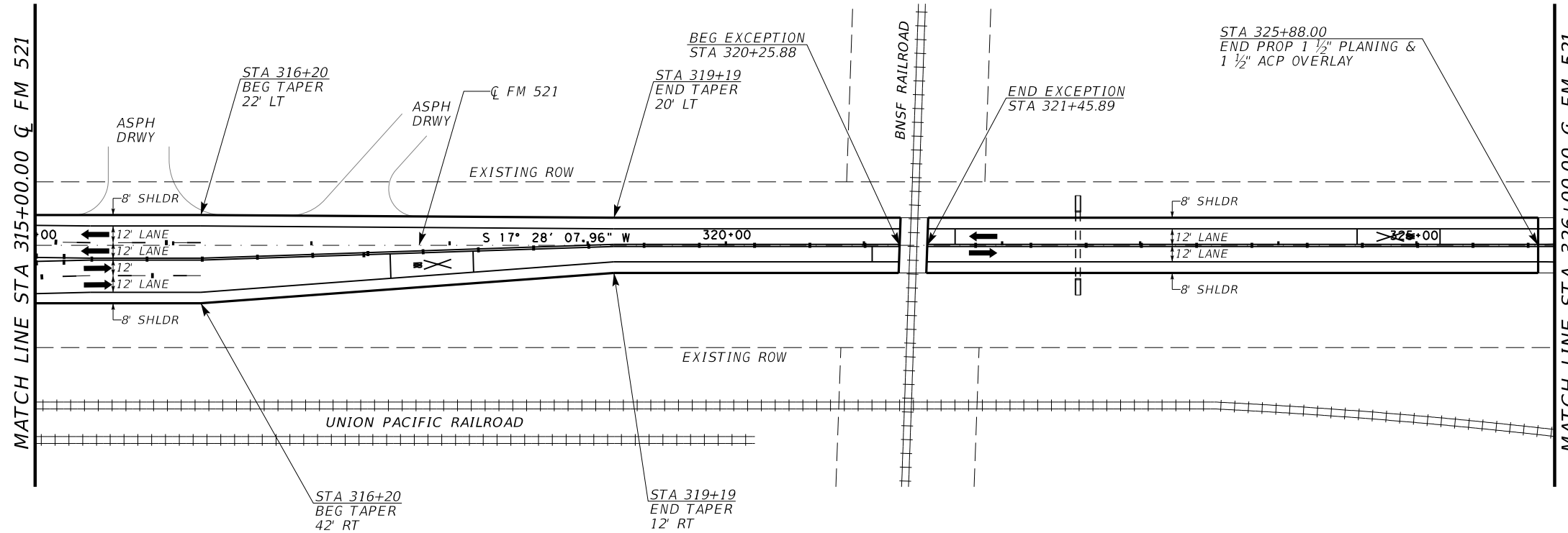


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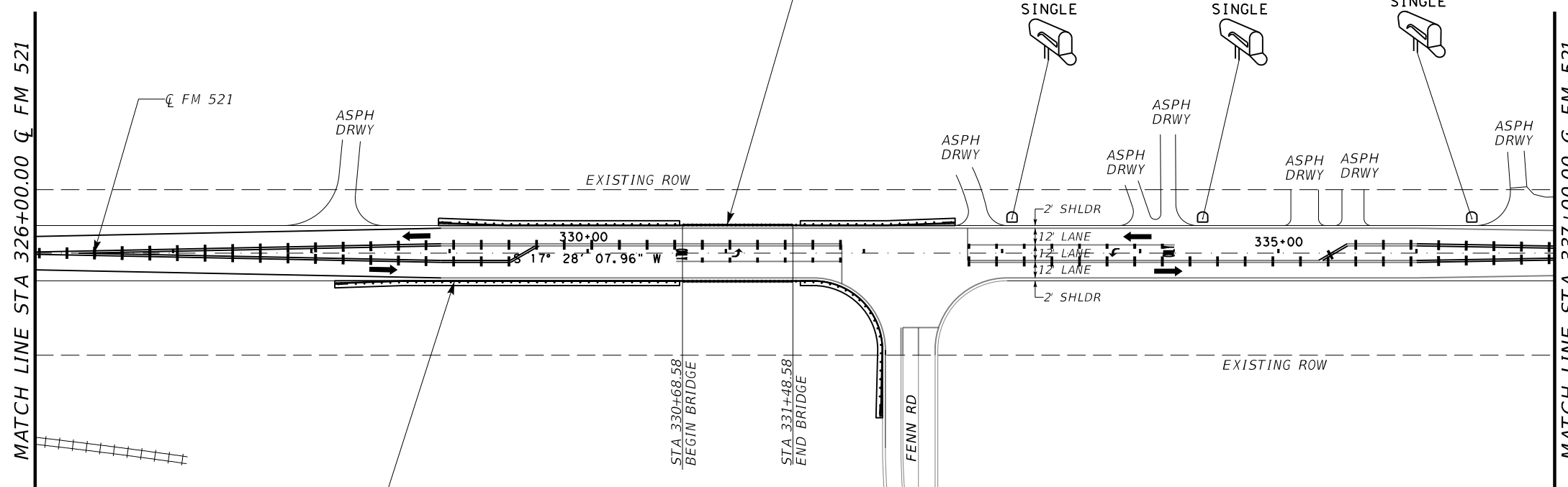
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0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	62

LEGEND

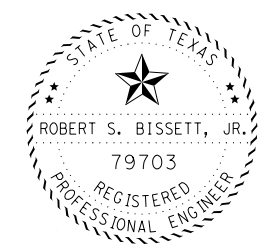
- ← TRAFFIC DIRECTION
- ▭ LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY
- Ⓜ MAILBOX - S/D/M (TWW-POST) TY 4



- 1) REMOVE EXIST 162.5 LF MBGF, 87.5 LF T2 RAIL & 2 SGT'S
- 2) PROP 125 LF MBGF (STA 329+41.50 TO STA 330+66.50), 1 SGT & 4" RIPRAP MOW STRIP (8 CY)
- 3) PROP 87.5 LF T631 RAIL (STA 330+66.50 TO STA 331+54.00)
- 4) PROP 137.5 LF MBGF (STA 331+54.00 TO STA 332+16.50), 1 SGT & 4" RIPRAP MOW STRIP (6 CY)



- 1) REMOVE - 1 SGT, 150 LF MBGF, 87.5 T2 RAIL
- 2) PROP 200 LF MBGF STA (STA 328+91.5 TO STA 330+66.5), 1 SGT & 4" RIPRAP MOW STRIP (12 CY)
- 3) PROP 87.5 LF T631 RAIL (STA 330+66.50 TO STA 331+54)
- 4) PROP 87.5 LF MBGF (50' R) & 1 SGT & 4" RIPRAP MOW STRIP (7 CY)

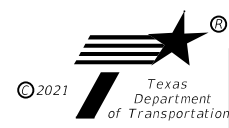


Robert S. Bissett, Jr.
10/29/21

ROADWAY LAYOUT

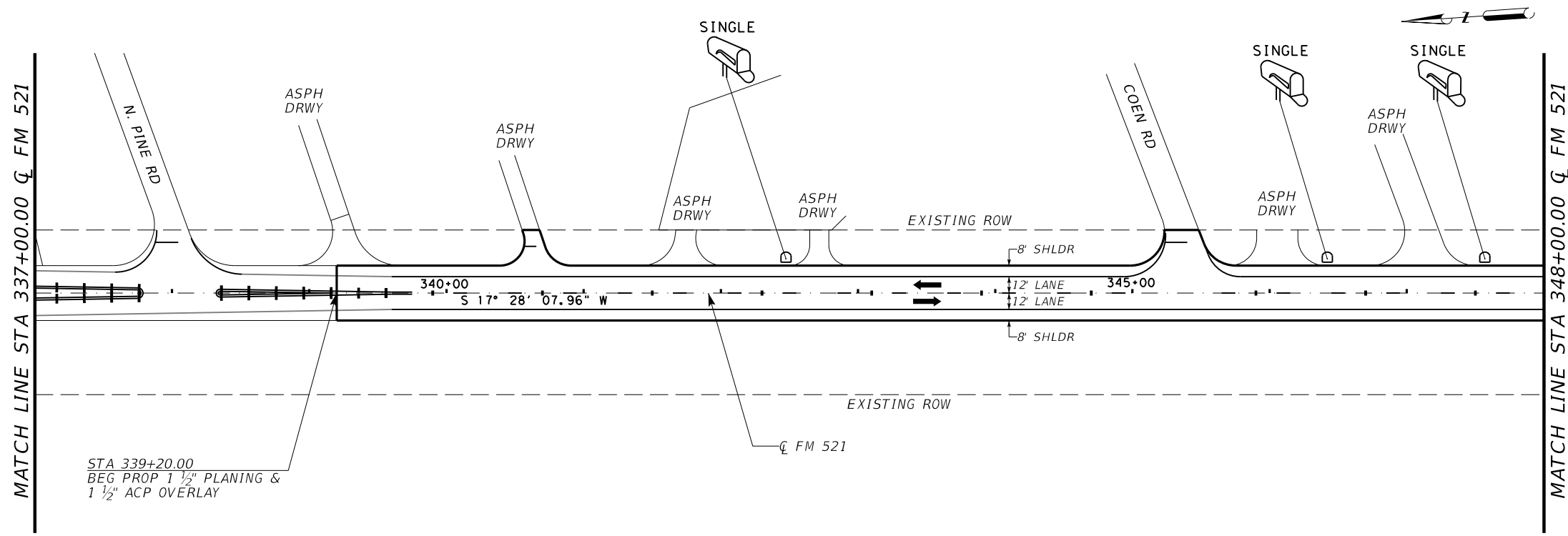
STA 315+00.00
TO
STA 337+00.00

SHEET 2 OF 12

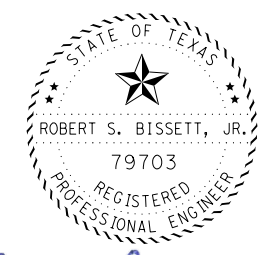
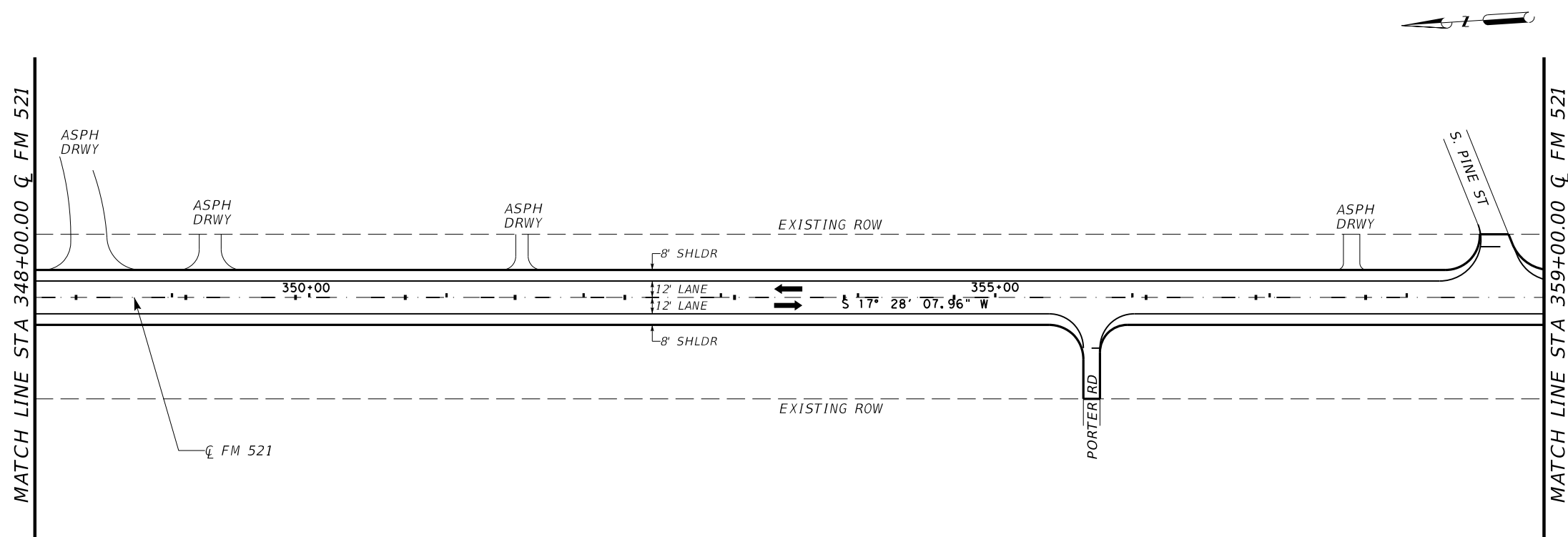


SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	63



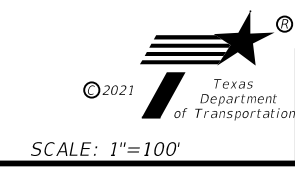
- LEGEND**
- ← TRAFFIC DIRECTION
 - ▭ LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY
 - Ⓜ MAILBOX - S/D/M (TWW-POST) TY 4



Robert S. Bissett, Jr.
 09/13/21
 ROADWAY LAYOUT

STA 337+00.00
 TO
 STA 359+00.00

SHEET 3 OF 12

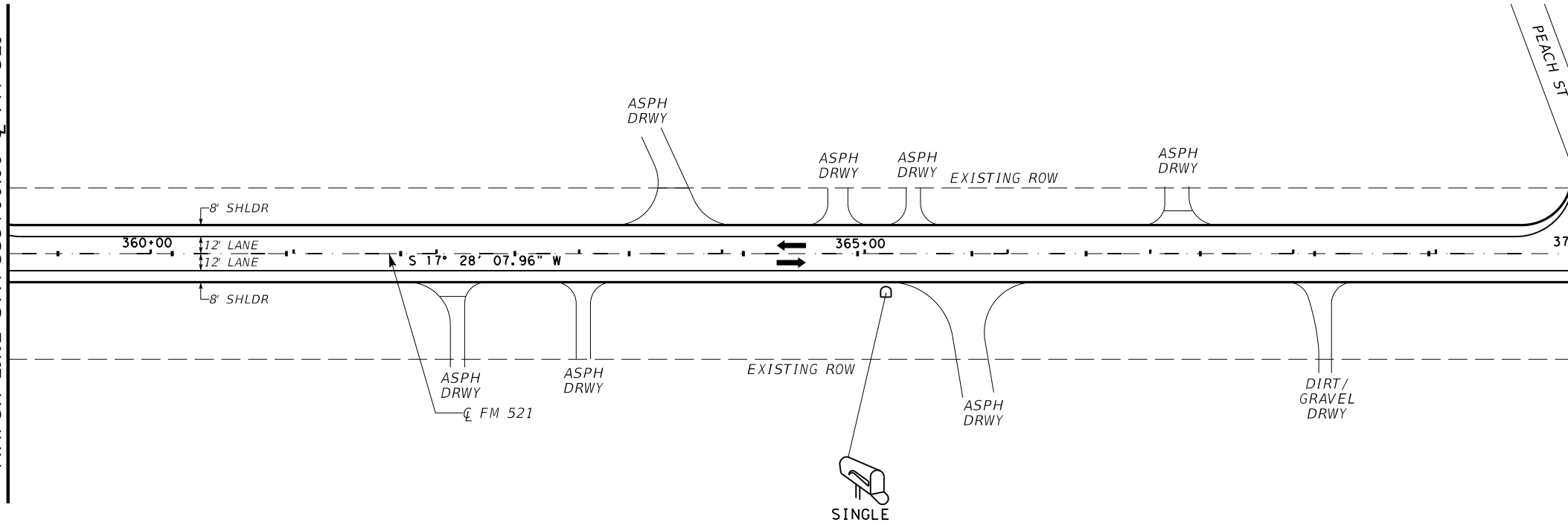


CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			64

LEGEND

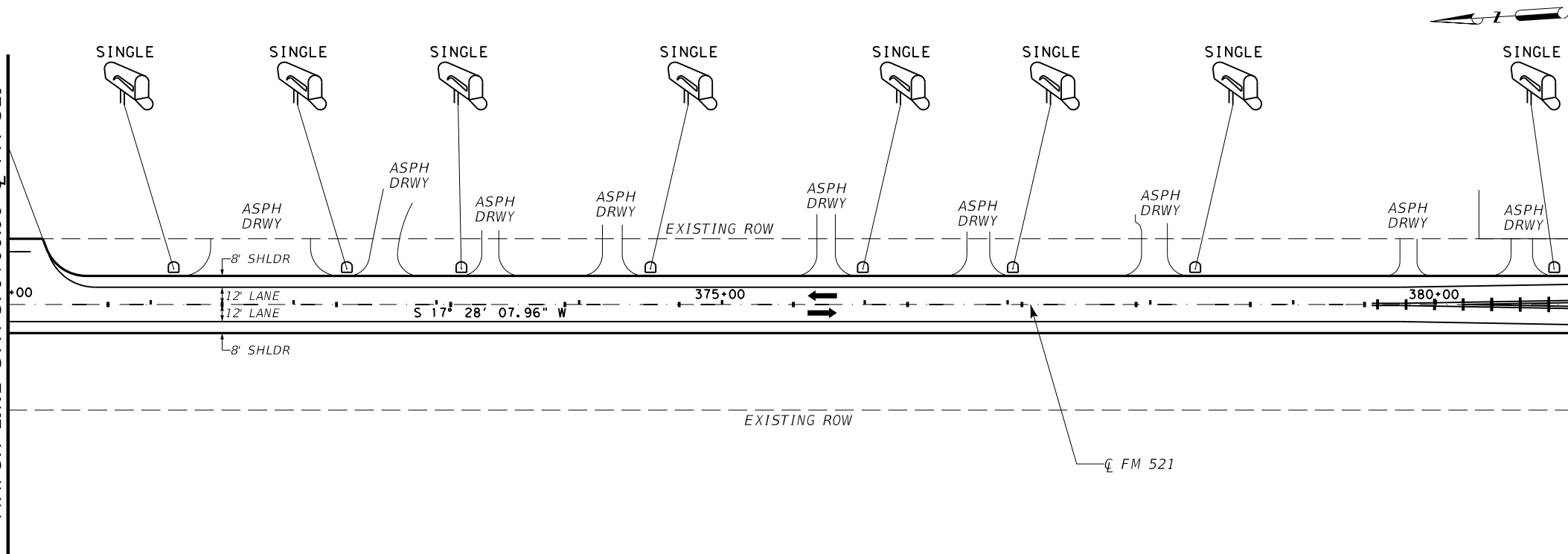
- ← TRAFFIC DIRECTION
- ▭ LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY
- Ⓜ MAILBOX - S/D/M (TWW-POST) TY 4

MATCH LINE STA 359+00.00 Q FM 521

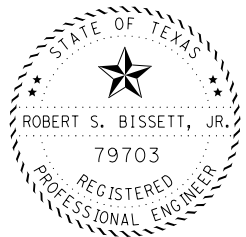


MATCH LINE STA 370+00.00 Q FM 521

MATCH LINE STA 370+00.00 Q FM 521



MATCH LINE STA 381+00.00 Q FM 521



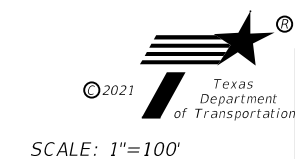
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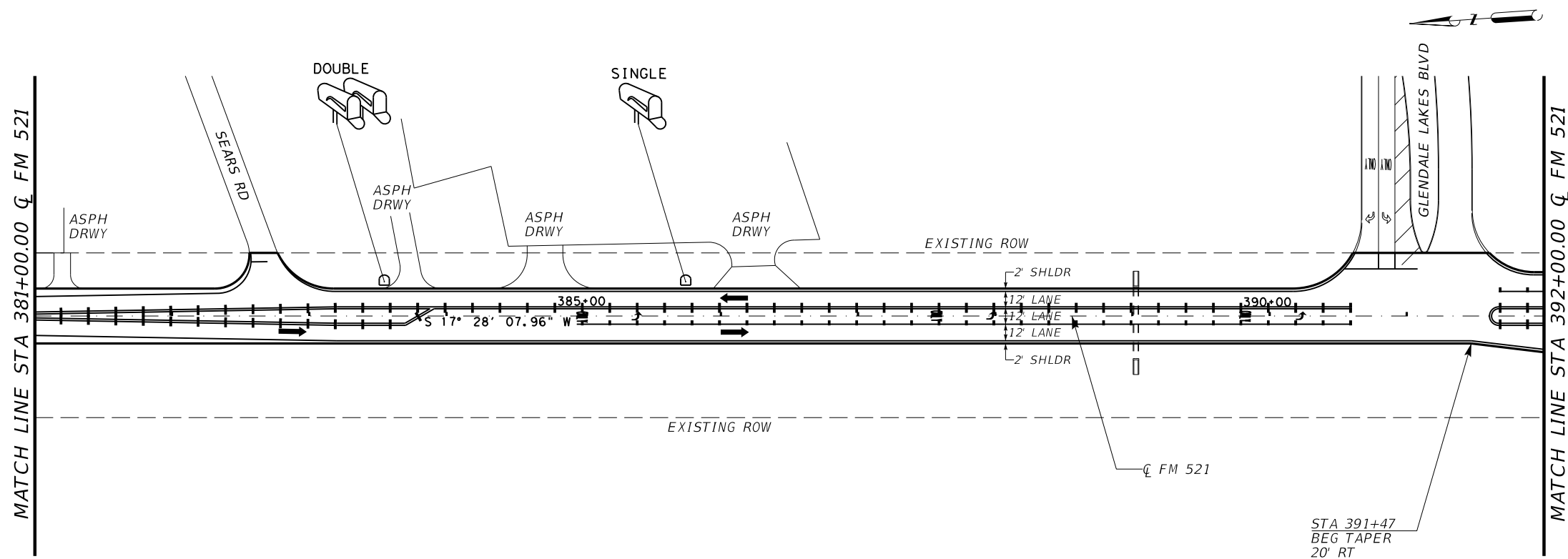
ROADWAY LAYOUT

STA 359+00.00
TO
STA 381+00.00

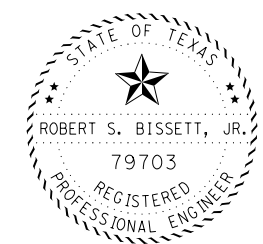
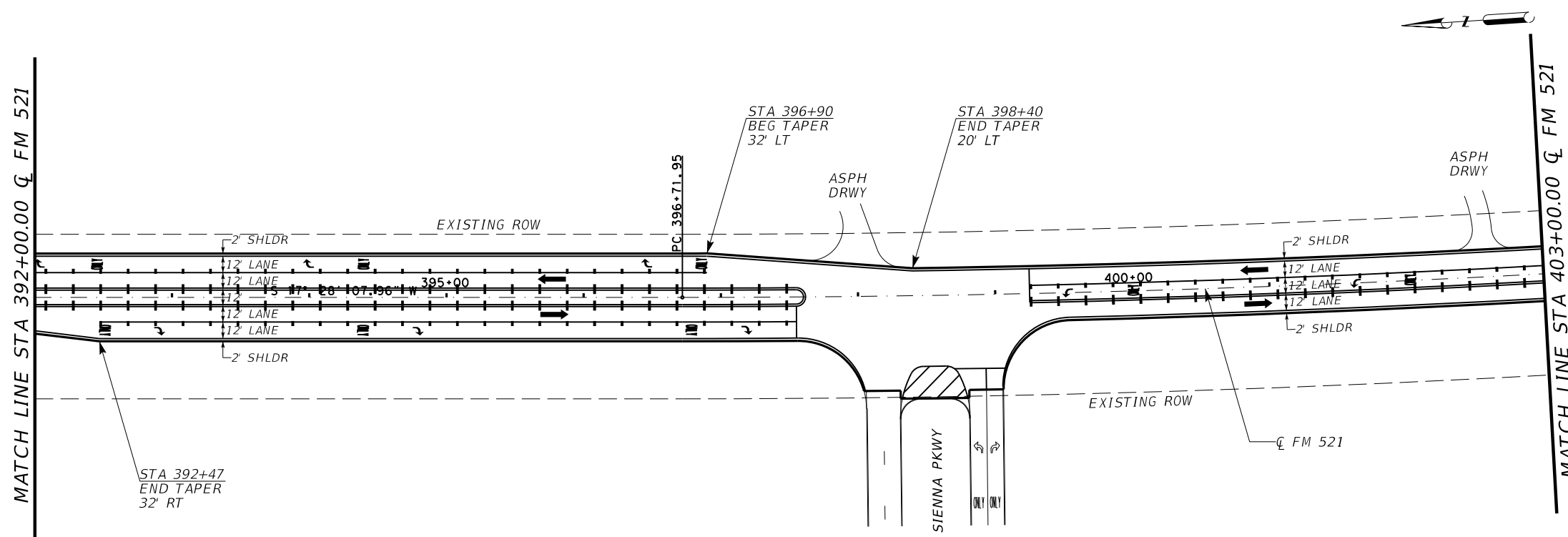
SHEET 4 OF 12



CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			65



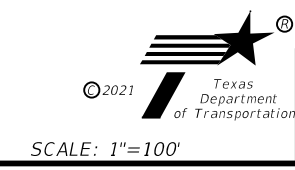
- LEGEND**
- ← TRAFFIC DIRECTION
 - LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY
 - Ⓜ MAILBOX - S/D/M (TWW-POST) TY 4



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 ROADWAY LAYOUT

STA 381+00.00
 TO
 STA 403+00.00

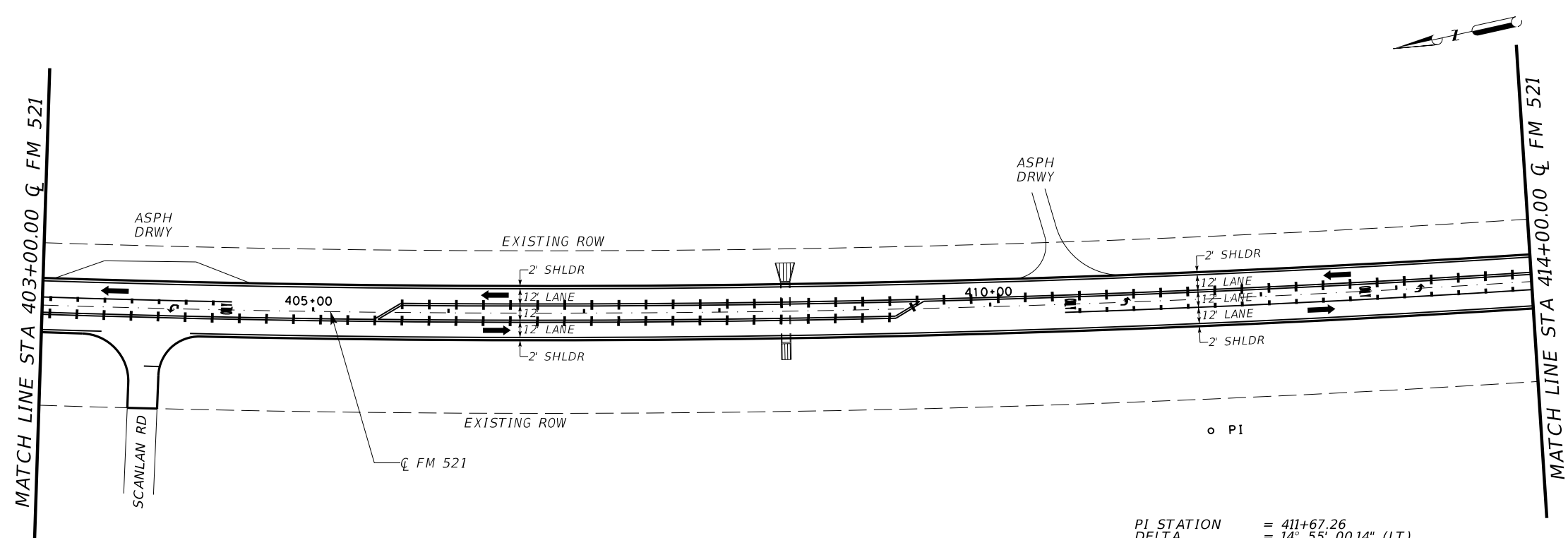
SHEET 5 OF 12



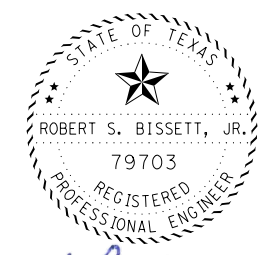
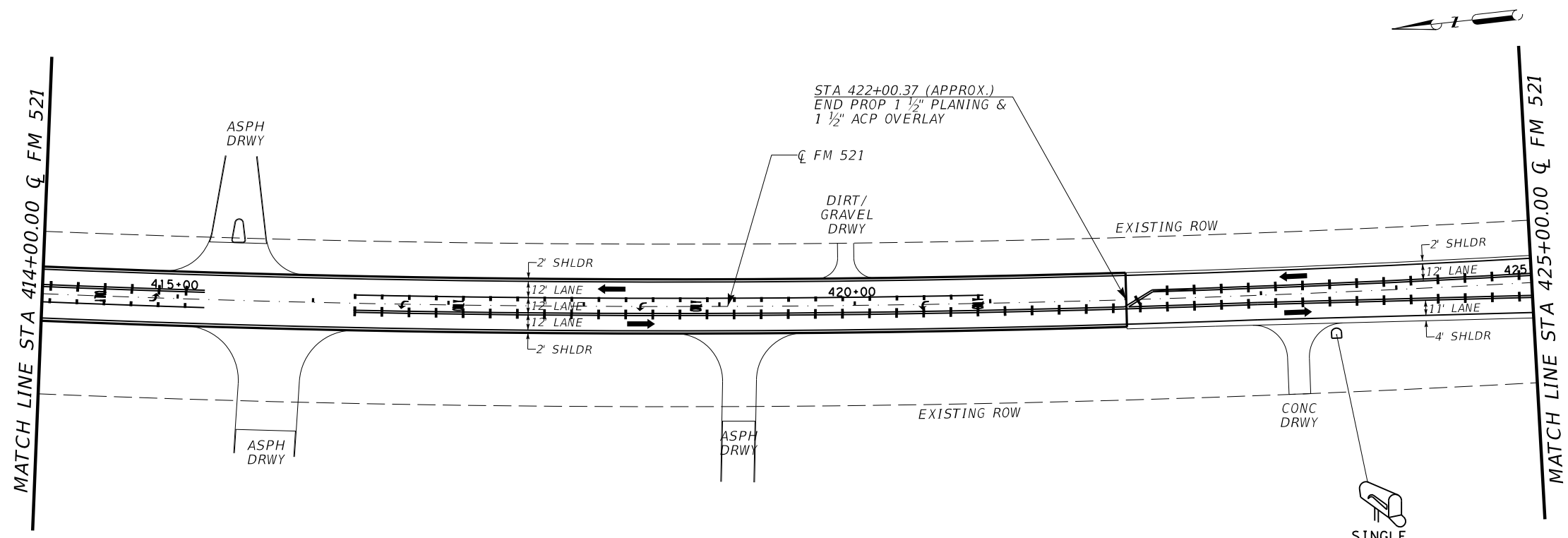
CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			66

LEGEND

- ← TRAFFIC DIRECTION
- ▭ LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY
- Ⓜ MAILBOX - S/D/M (TWW-POST) TY 4



PI STATION = 411+67.26
 DELTA = 14° 55' 00.14" (LT)
 DEGREE OF CURVE = 0° 30' 05.83"
 TANGENT = 1,495.31
 LENGTH = 2,973.71
 RADIUS = 11,422.16
 PC STATION = 396+71.95
 PT STATION = 426+45.66

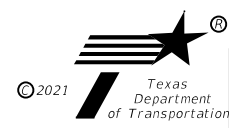


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ROADWAY LAYOUT

STA 403+00.00
TO
STA 425+00.00

SHEET 6 OF 12

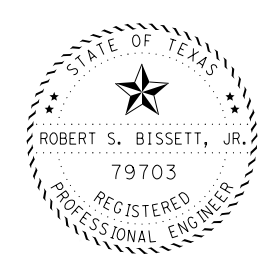
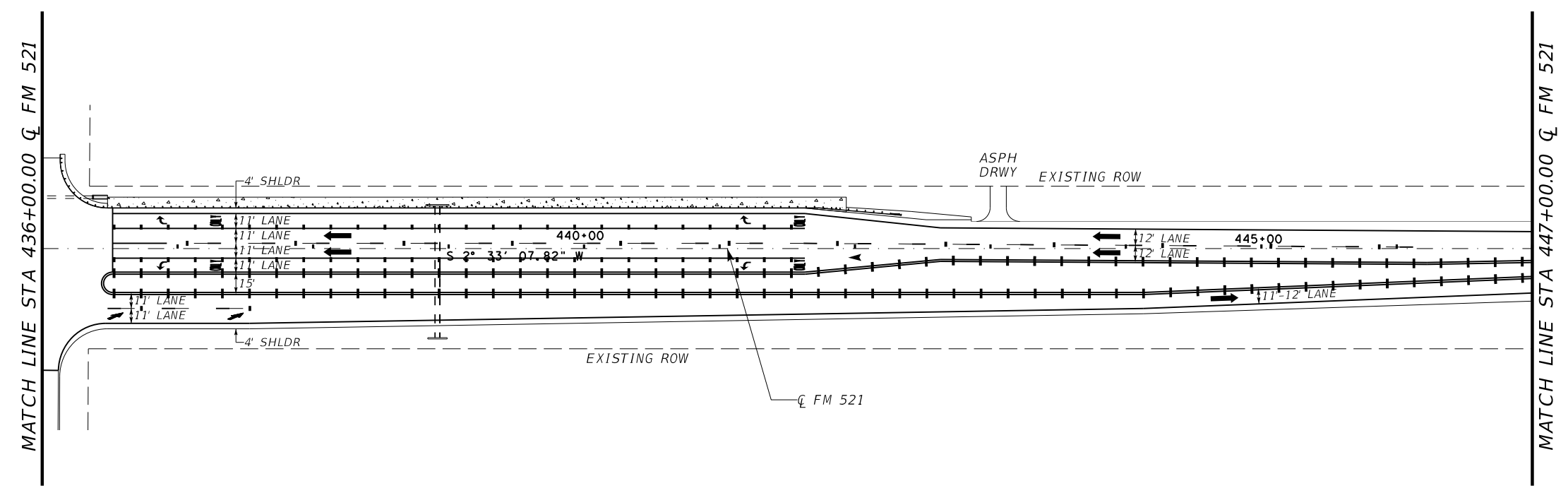
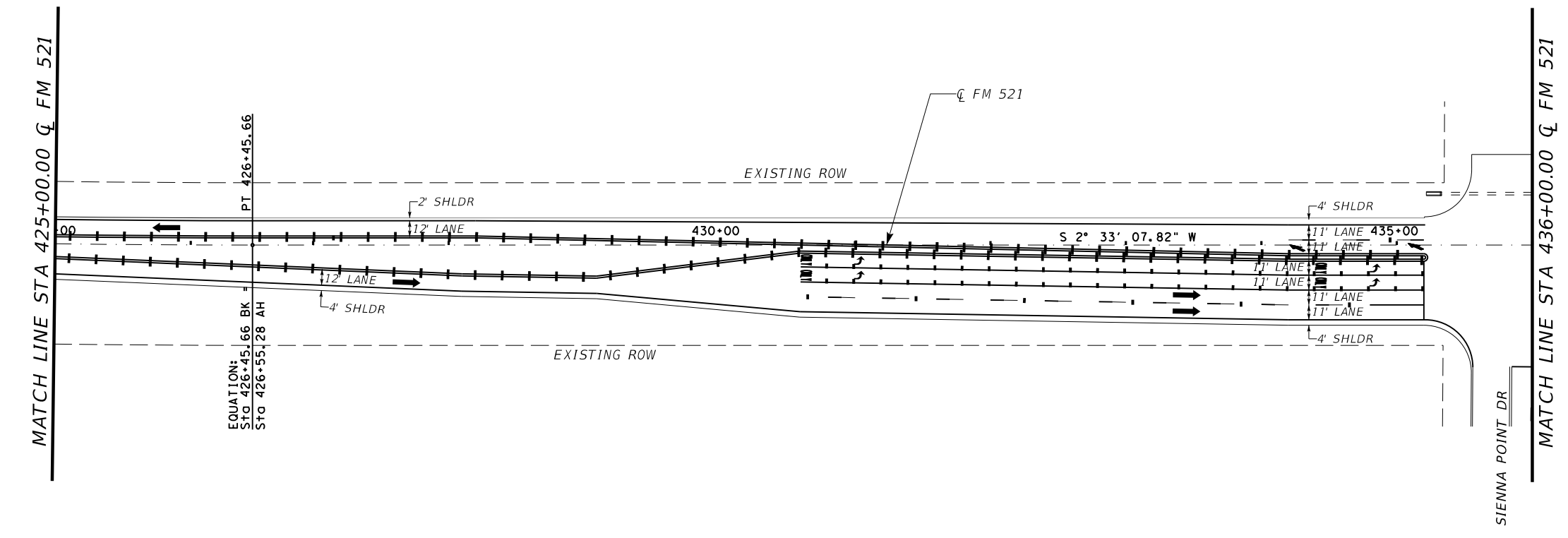


SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			67



- LEGEND**
- TRAFFIC DIRECTION
 - LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY
 - MAILBOX - S/D/M (TWW-POST) TY 4

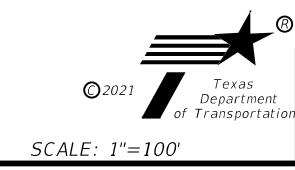


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ROADWAY LAYOUT

STA 425+00.00
TO
STA 447+00.00

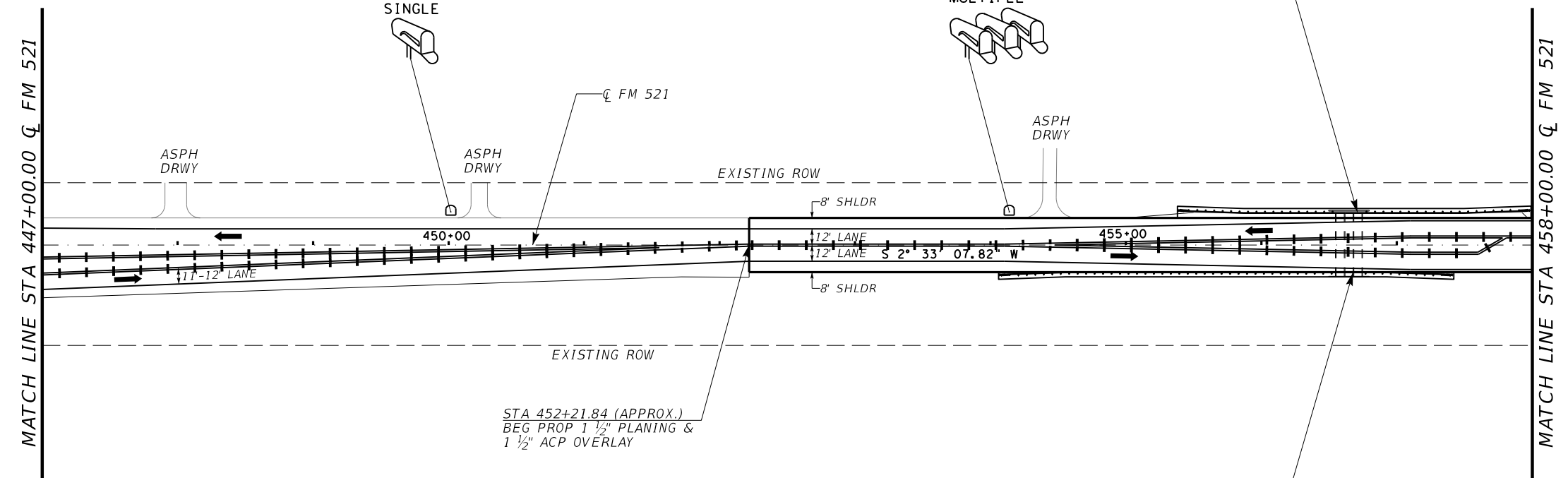
SHEET 7 OF 12



CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			68

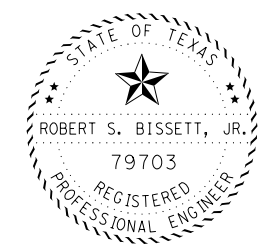
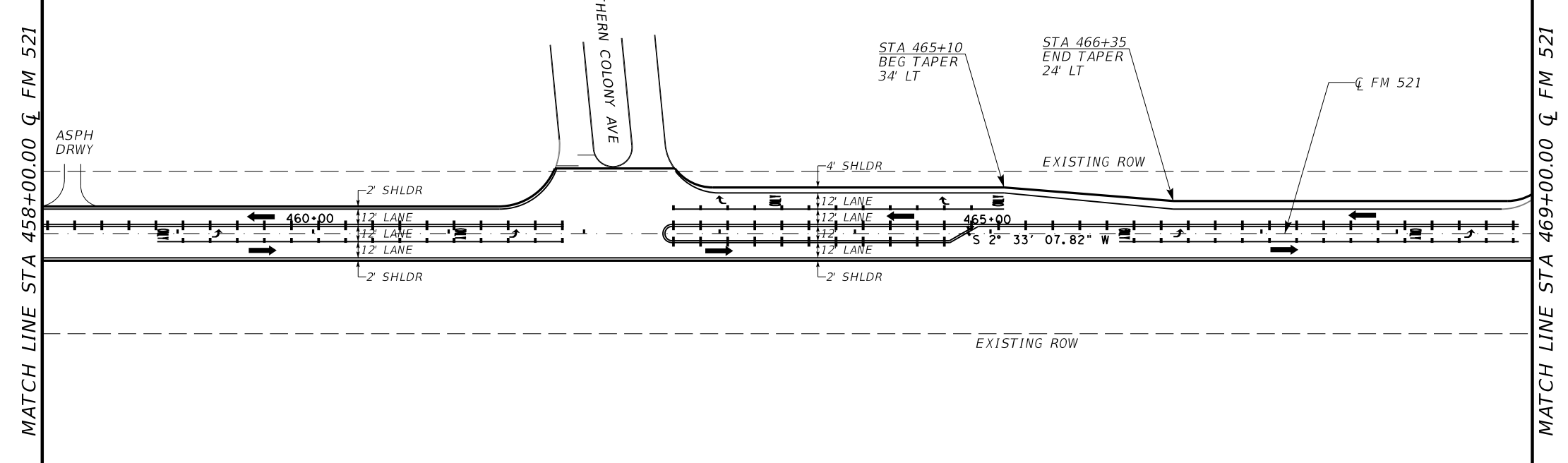
- 1) REMOVE - 175 LF MBGF, 2 SGT'S & 245 LF MOW STRIP
- 2) PROP 187.50 LF MBGF (STA 455+87.00 TO STA 456+37.00) & 1 SGT
- 3) PROP 1 LONG SPAN MBGF (STA 456+37.00 TO STA 456+87.00)
- 4) PROP 62.5 LF MBGF (STA 456+87.00 TO STA 457+49.50) & 1 SGT
- 5) 4" RIPRAP MOW STRIP (24 CY)

- LEGEND**
- ← TRAFFIC DIRECTION
 - LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY
 - Ⓜ MAILBOX - S/D/M (TWW-POST) TY 4



- 1) REMOVE - 200 LF MBGF, 2 SGT'S & 265 LF MOW STRIP
- 2) PROP 187.50 LF MBGF (STA 454+55.00 TO STA 456+42.50) & 1 SGT
- 3) PROP 1 LONG SPAN MBGF (STA 456+42.50 TO STA 456+92.50)
- 5) 4" RIPRAP MOW STRIP (16 CY)

STA 452+21.84 (APPROX.)
 BEG PROP 1 1/2" PLANING &
 1 1/2" ACP OVERLAY

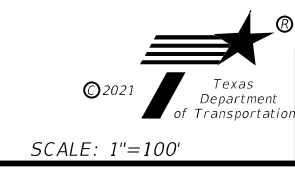


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ROADWAY LAYOUT

STA 447+00.00
 TO
 STA 469+00.00

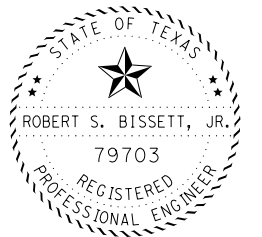
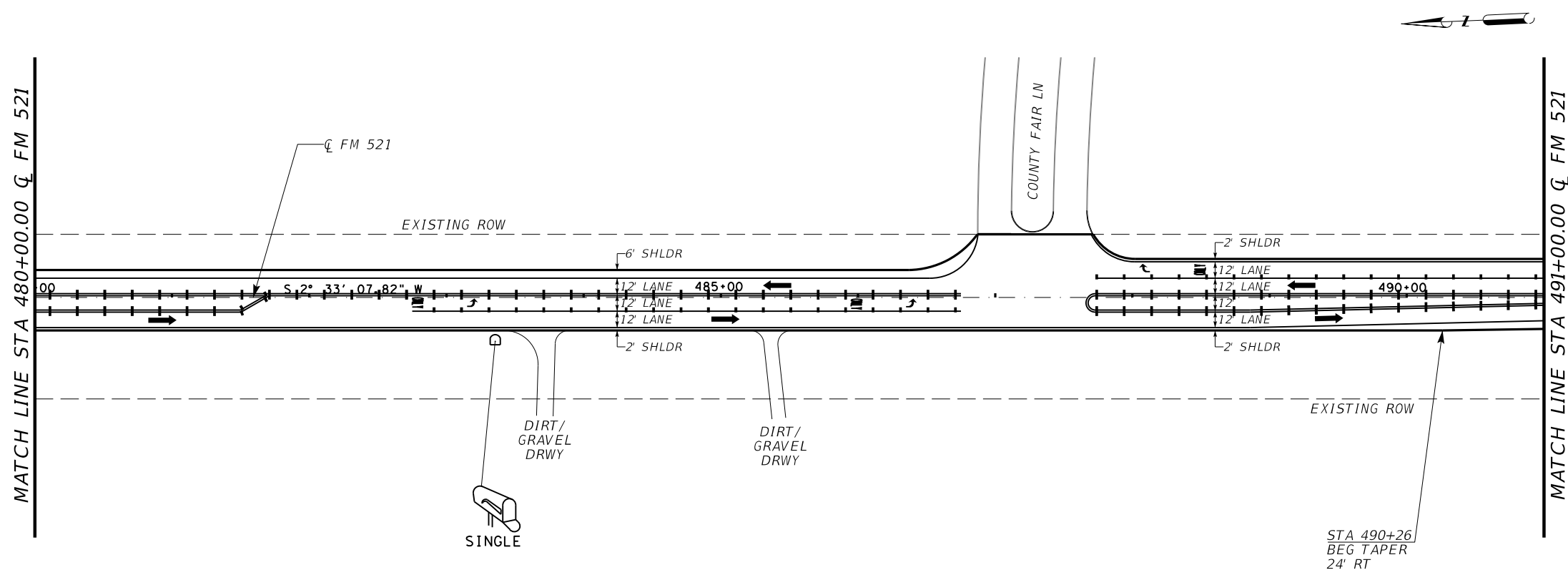
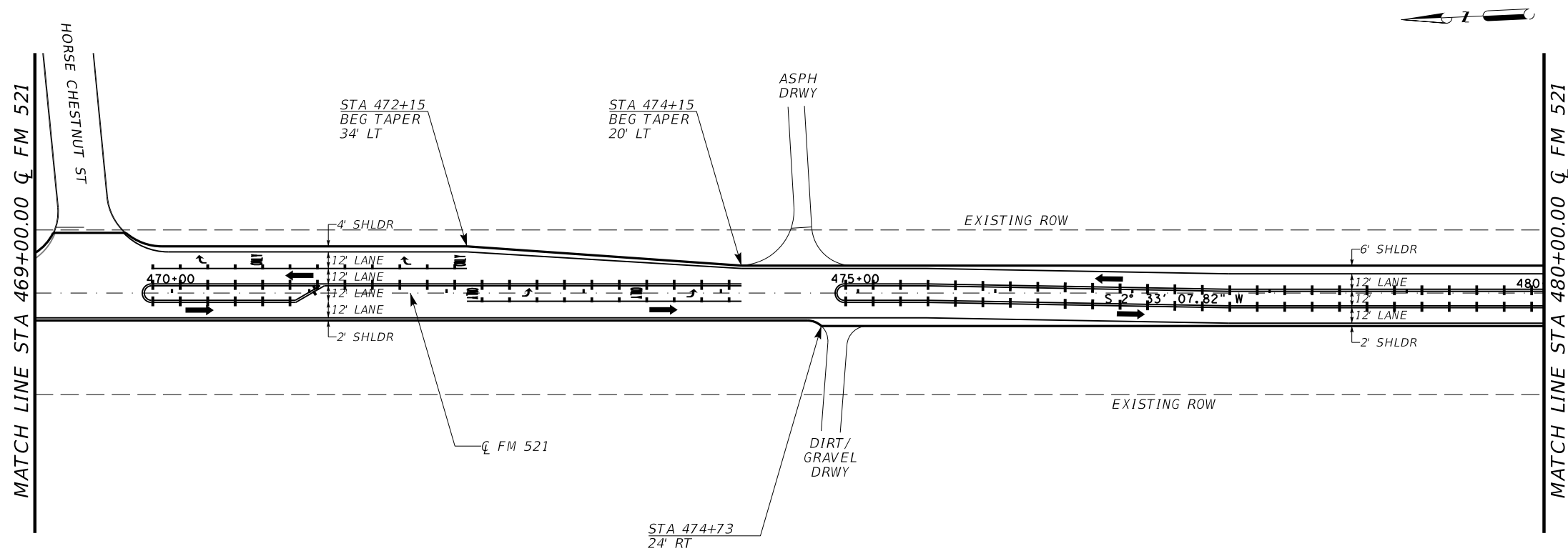
SHEET 8 OF 12



CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			69

LEGEND

- ← TRAFFIC DIRECTION
- ▭ LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY
- ☐ MAILBOX - S/D/M (TWW-POST) TY 4



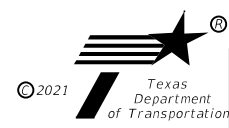
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ROADWAY LAYOUT

STA 469+00.00
TO
STA 491+00.00




SHEET 9 OF 12

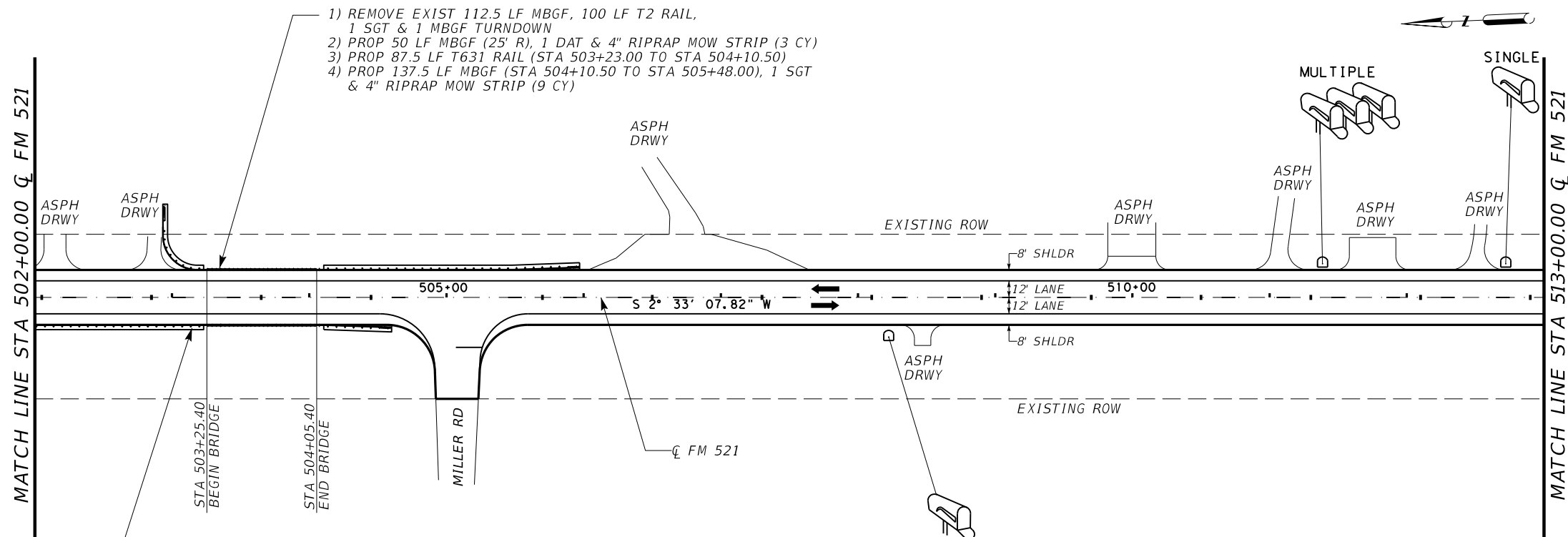
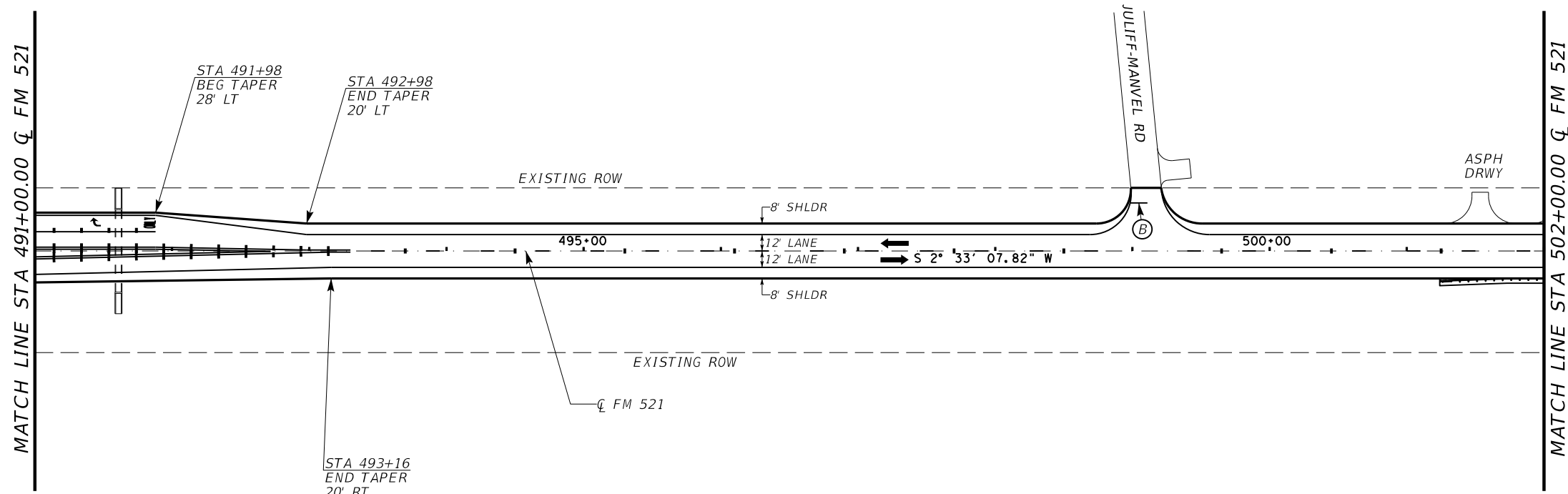


SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			70

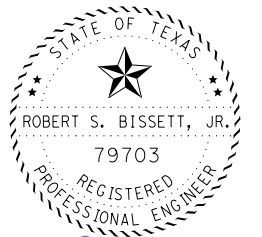
LEGEND

-  TRAFFIC DIRECTION
-  LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY
-  MAILBOX - S/D/M (TWW-POST) TY 4



- 1) REMOVE EXIST 112.5 LF MBGF, 100 LF T2 RAIL, 1 SGT & 1 MBGF TURNDOWN
- 2) PROP 50 LF MBGF (25' R), 1 DAT & 4" RIPRAP MOW STRIP (3 CY)
- 3) PROP 87.5 LF T631 RAIL (STA 503+23.00 TO STA 504+10.50)
- 4) PROP 137.5 LF MBGF (STA 504+10.50 TO STA 505+48.00), 1 SGT & 4" RIPRAP MOW STRIP (9 CY)

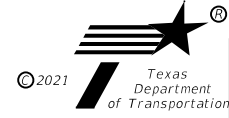
- 1) REMOVE - 100 LF MBGF, 112.5 LF T2 RAIL & 2 SGT'S
- 2) PROP 150 LF MBGF STA (STA 501+73.00 TO STA 503+23.00), 1 SGT & 4" RIPRAP MOW STRIP (10 CY)
- 3) PROP 87.5 LF T631 RAIL (STA 503+23.00 TO STA 504+10.50)
- 4) PROP 1 SGT & 4" RIPRAP MOW STRIP (3 CY)



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 ROADWAY LAYOUT

STA 491+00.00
 TO
 STA 513+00.00

SHEET 10 OF 12

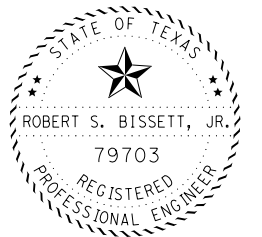
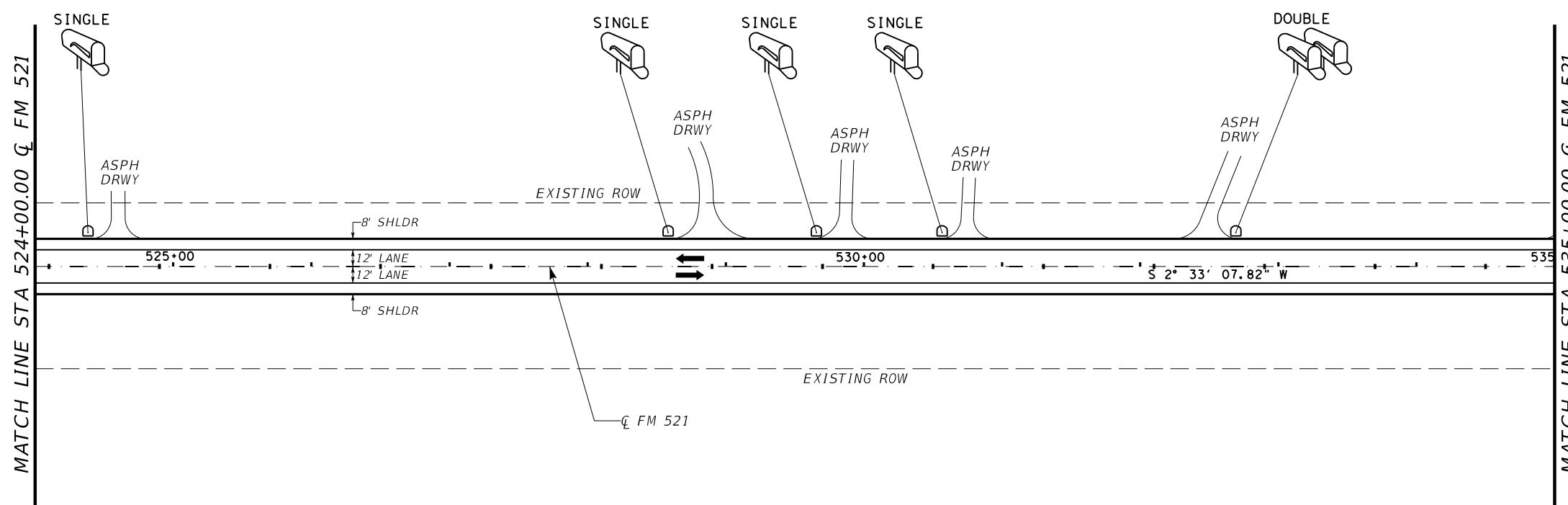
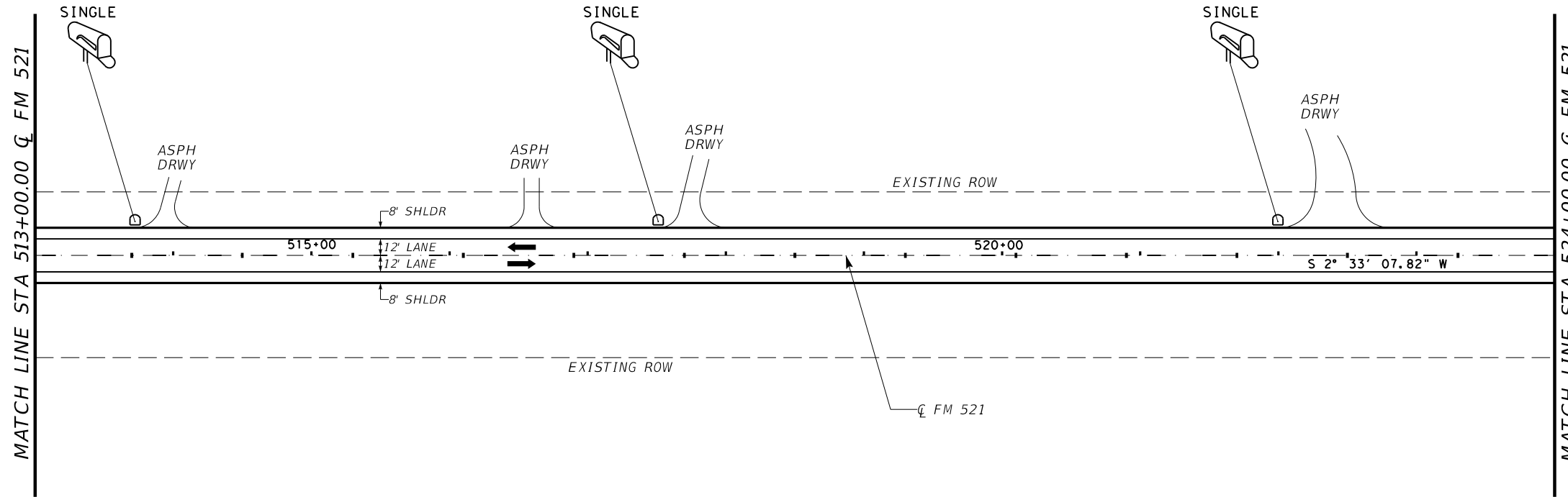


SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	71

LEGEND

- ← TRAFFIC DIRECTION
- ▭ LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY
- Ⓜ MAILBOX - S/D/M (TWW-POST) TY 4



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ROADWAY LAYOUT

STA 513+00.00
TO
STA 535+00.00

SHEET 11 OF 12

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SCALE: 1"=100'

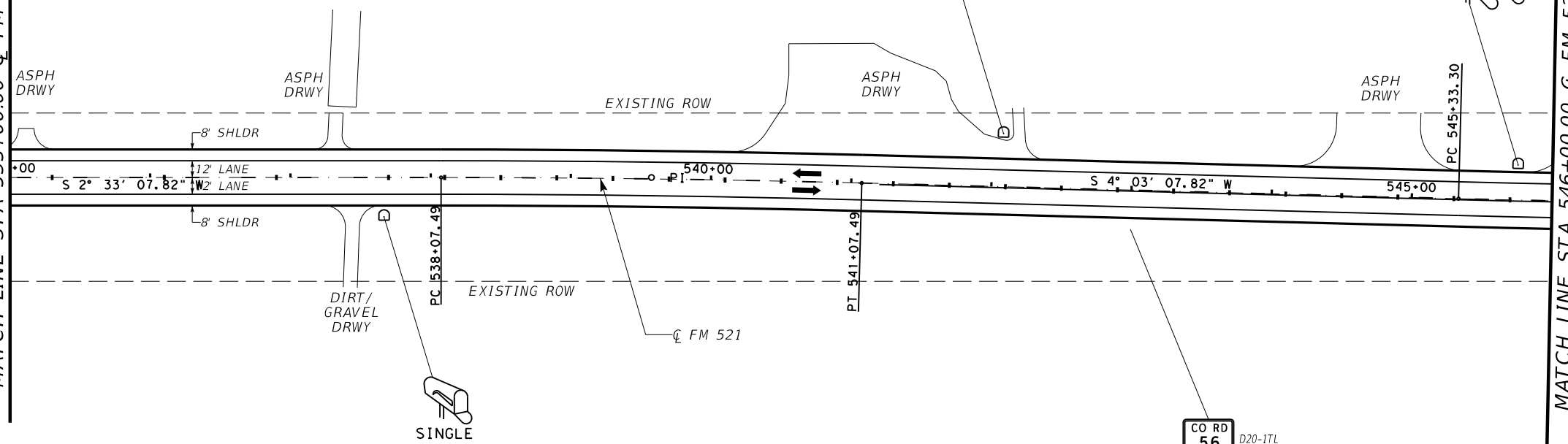
CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			72

PI STATION = 539+57.50
 DELTA = 1° 30' 00.00" (RT)
 DEGREE OF CURVE = 0° 30' 00.00"
 TANGENT = 150.01
 LENGTH = 300.00
 RADIUS = 11,459.16
 PC STATION = 538+07.49
 PT STATION = 541+07.49

LEGEND

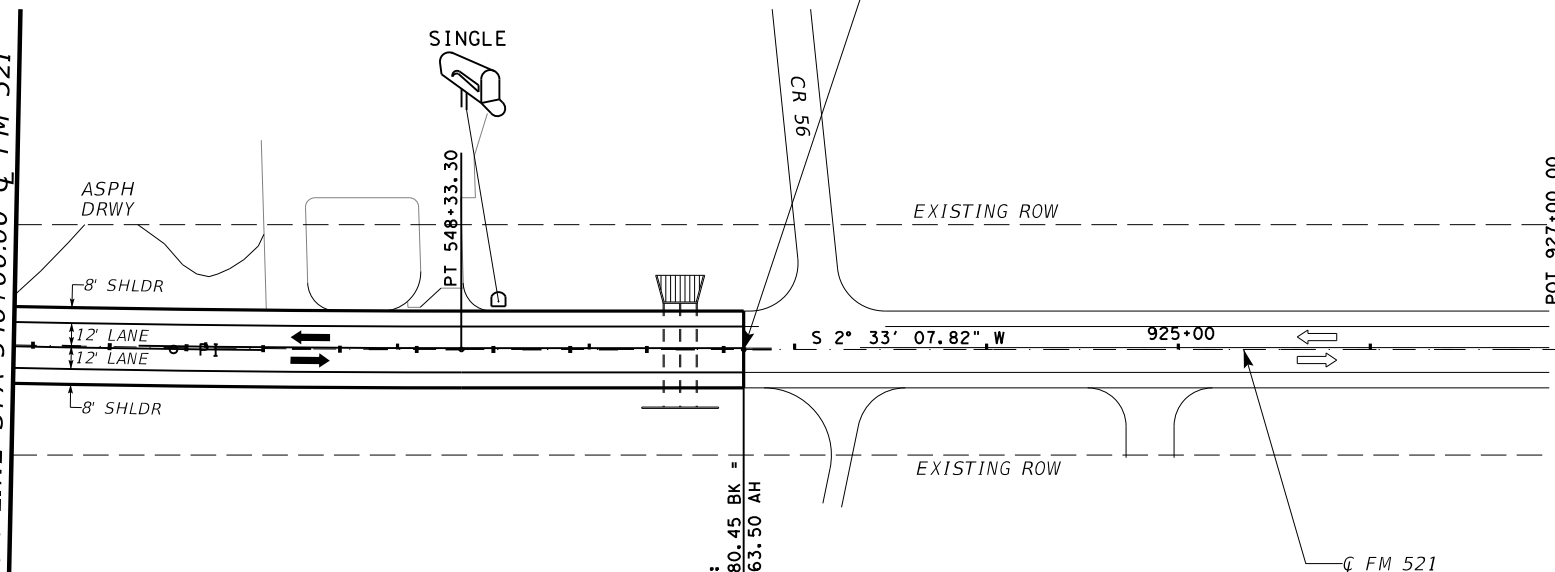
- ← TRAFFIC DIRECTION
- ▭ LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY
- Ⓜ MAILBOX - S/D/M (TWW-POST) TY 4

MATCH LINE STA 535+00.00 Q FM 521



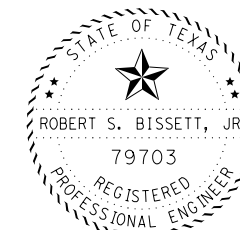
END PROJECT STA 549+80.45
 END PROP 1 1/2" PLANING &
 1 1/2" ACP OVERLAY

MATCH LINE STA 546+00.00 Q FM 521



PI STATION = 546+83.31
 DELTA = 1° 30' 00.00" (LT)
 DEGREE OF CURVE = 0° 30' 00.00"
 TANGENT = 150.01
 LENGTH = 300.00
 RADIUS = 11,459.16
 PC STATION = 545+33.30
 PT STATION = 548+33.30

EQUATION:
 Sta 549+80.45 BK =
 Sta 922+63.50 AH



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ROADWAY LAYOUT

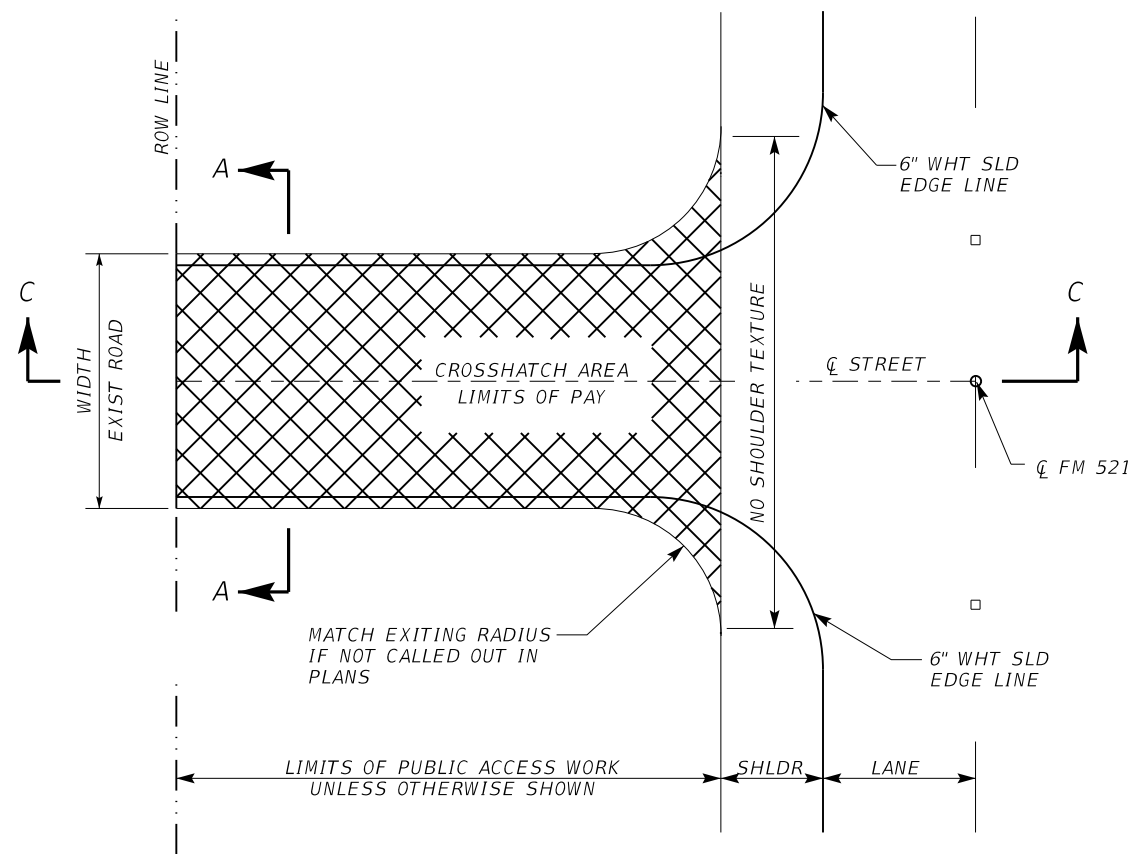
STA 535+00.00
 TO
 STA 557+00.00

SHEET 12 OF 12

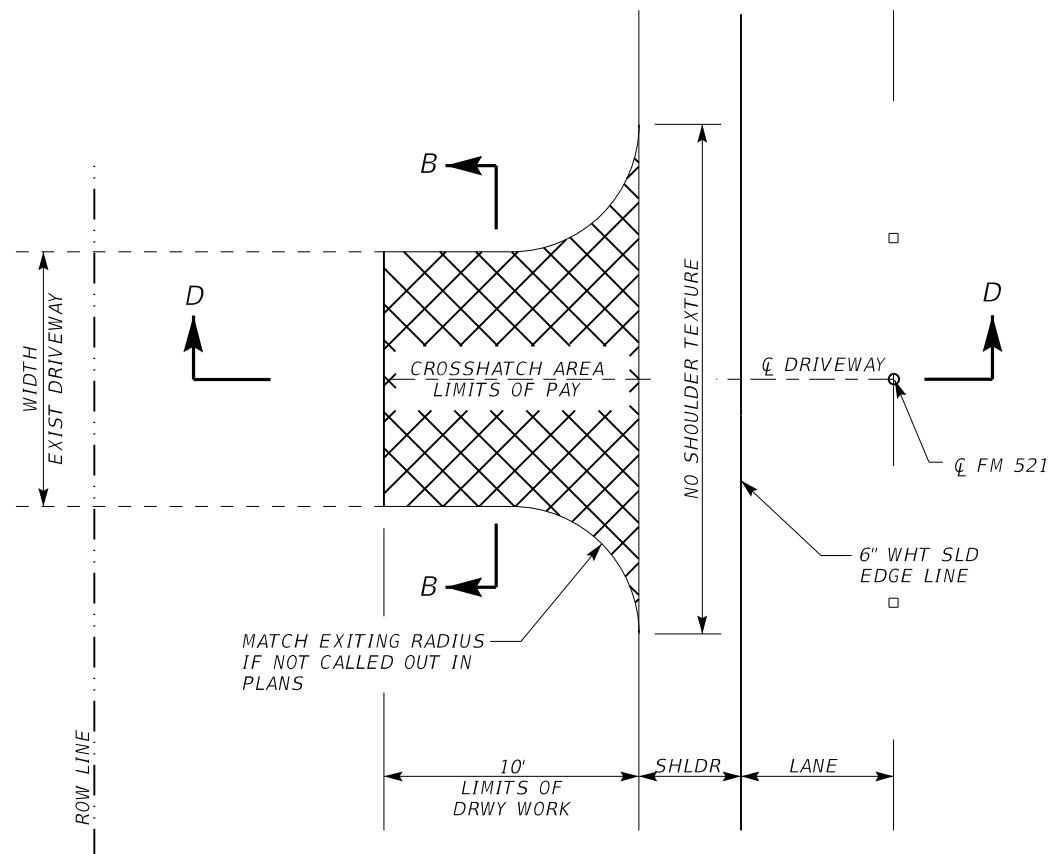


SCALE: 1"=100'

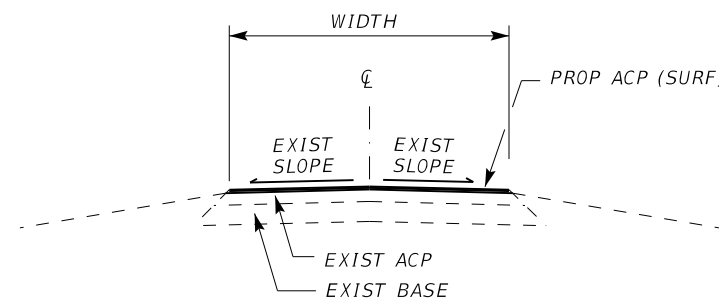
CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			73



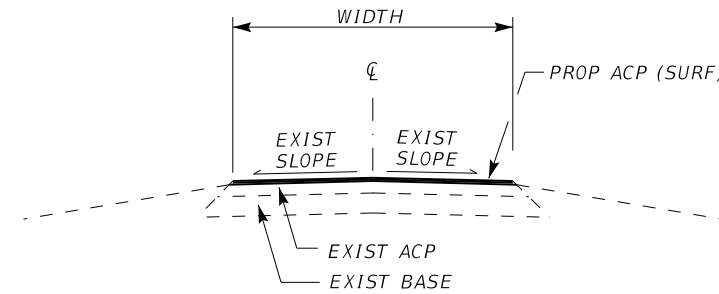
PLAN
PUBLIC ACCESS DRIVEWAYS
OR INTERSECTING STREETS



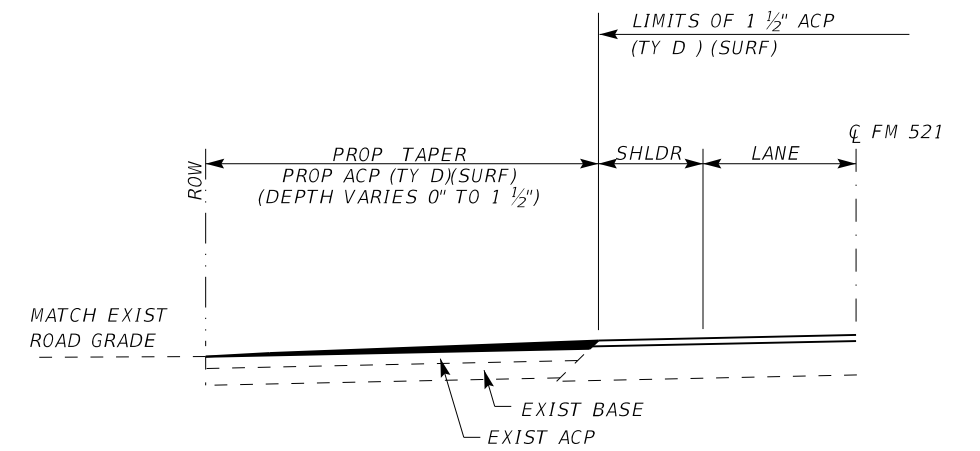
PLAN
PRIVATE DRIVEWAYS



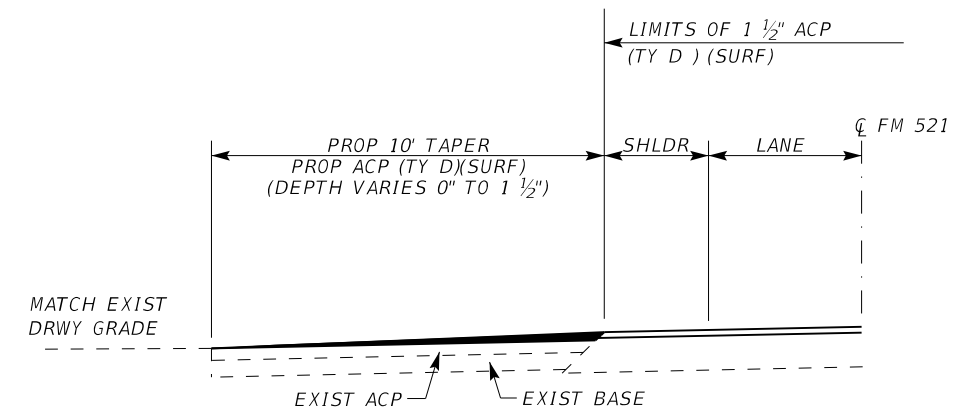
SECTION A-A
EXIST ACP STREET



SECTION B-B
EXIST ACP DRIVEWAY



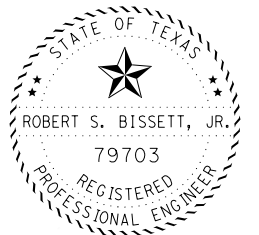
SECTION C-C



SECTION D-D

NOTES:

1. A PUBLIC ACCESS DRIVEWAY INCLUDES ALL APPROACHES TO A STATE HIGHWAY FROM COUNTY OR CITY MAINTAINED ROADS AND STREETS, AND APPROACHES TO SCHOOLS, CHURCHES, CEMETERIES AND OTHER PUBLIC PLACES OR BUILDINGS OF A LIKE CHARACTER.
2. AT EXISTING DIRT/GRAVEL DRIVEWAYS, PLACE FLEXIBLE BASE AT A 6:1 TAPER TO SHOULDER UP THE ROADWAY EDGE WHERE INSUFFICIENT MATERIAL EXISTS AS DIRECTED. THIS WORK SHALL BE PAID FOR UNDER ITEM 247.



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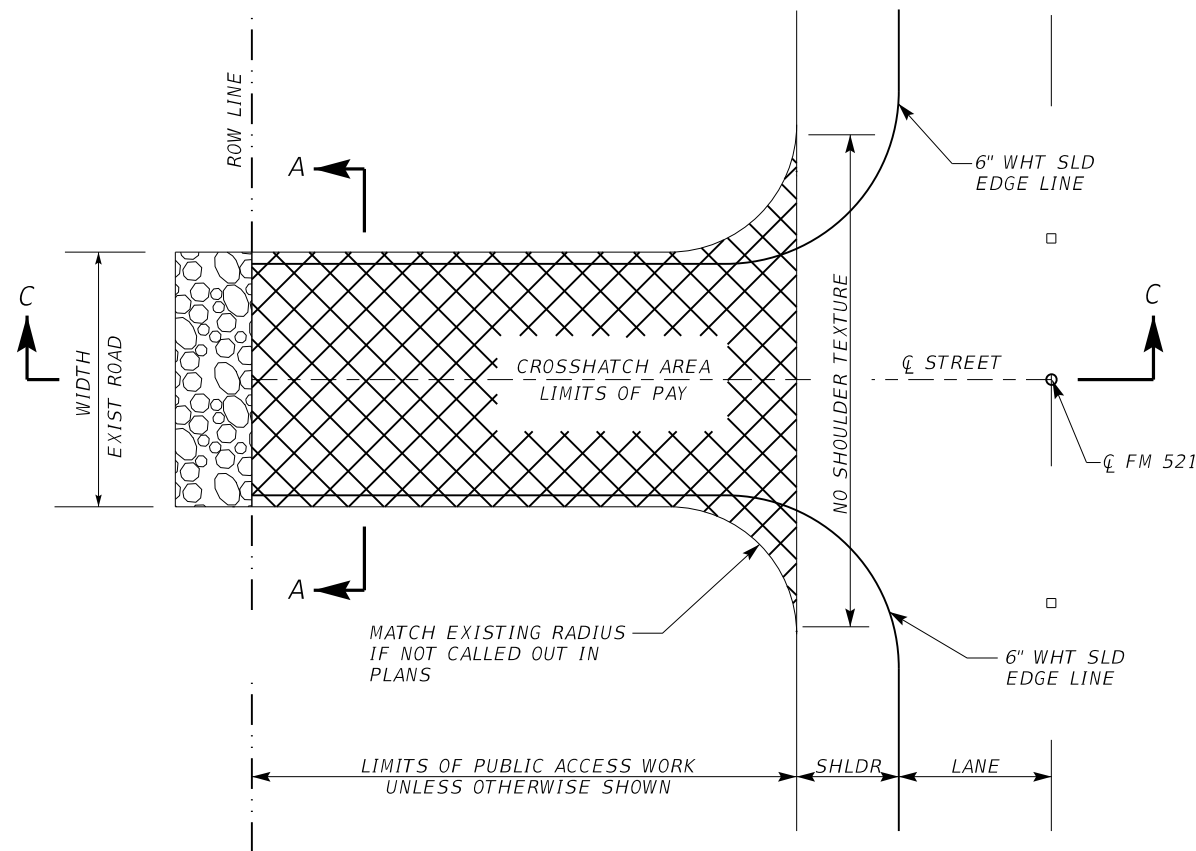
**ROADWAY & DRIVEWAY
DETAILS**

SHEET 1 OF 2

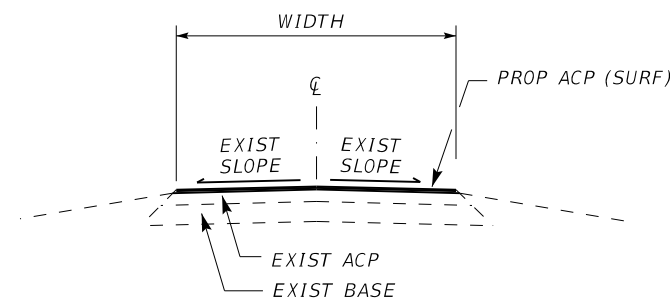


CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			74

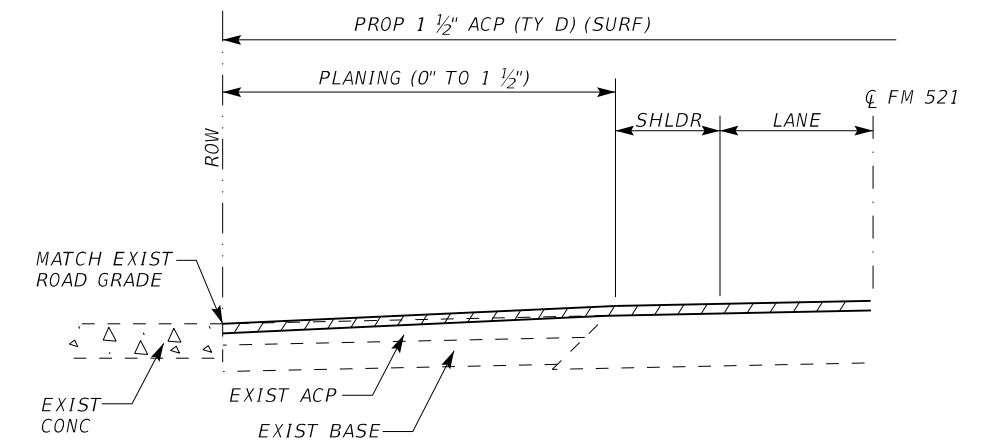
N.T.S.



PLAN
PUBLIC ACCESS DRIVEWAYS
OR INTERSECTING STREETS



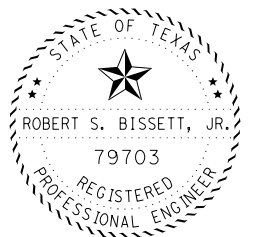
SECTION A-A
EXIST ACP STREET



SECTION C-C

NOTES:

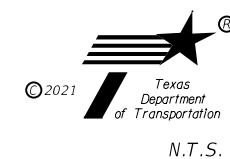
1. FOR USE AT PUBLIC ACCESS DRIVEWAYS OR INTERSECTING STREETS WHEN PAVEMENT OUTSIDE OF RIGHT-OF-WAY IS CONCRETE WITH ACP TAPER WITHIN THE RIGHT-OF-WAY.
2. A PUBLIC ACCESS DRIVEWAY INCLUDES ALL APPROACHES TO A STATE HIGHWAY FROM COUNTY OR CITY MAINTAINED ROADS AND STREETS, AND APPROACHES TO SCHOOLS, CHURCHES, CEMETERIES AND OTHER PUBLIC PLACES OR BUILDINGS OF A LIKE CHARACTER.
3. AT EXISTING DIRT/GRAVEL DRIVEWAYS, PLACE FLEXIBLE BASE AT A 6:1 TAPER TO SHOULDER UP THE ROADWAY EDGE WHERE INSUFFICIENT MATERIAL EXISTS AS DIRECTED. THIS WORK SHALL BE PAID FOR UNDER ITEM 247.



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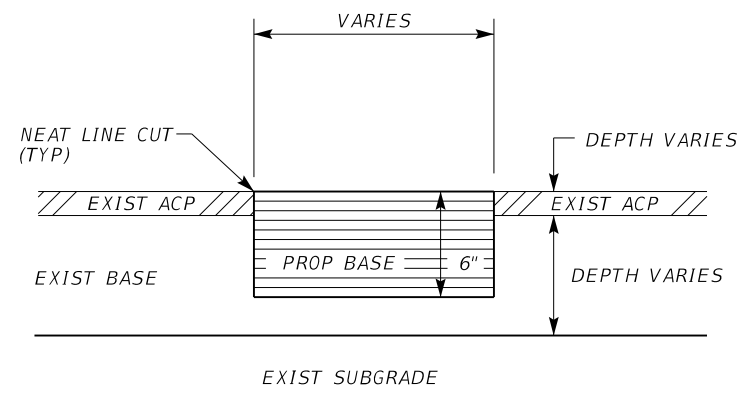
**ROADWAY/DRIVEWAY
DETAILS**

SHEET 2 OF 2



CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		75

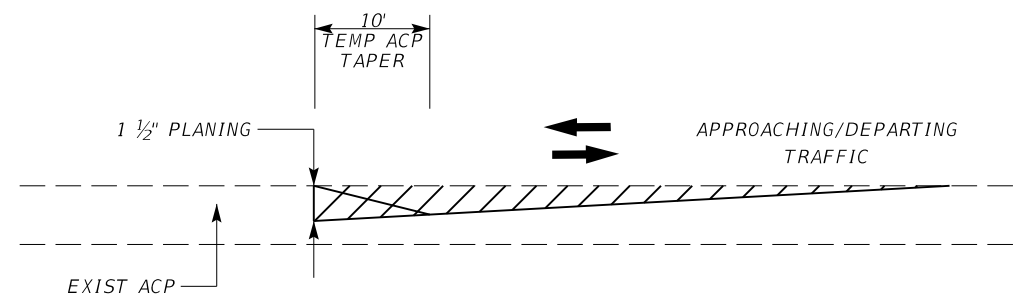
N.T.S.



FULL DEPTH BASE REPAIR DETAIL
ITEM 351

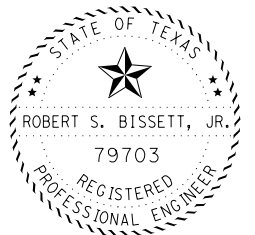
NOTES:

1. THE BASE WILL MEET THE MIX REQUIREMENTS OF ITEM 3076-6003 D-GR HMA TY-B PG64-22 (EXEMPT).
2. NEAT LINE CUT IS SUBSIDIARY TO PAY ITEM 351.



TEMPORARY PAVEMENT TRANSITION DETAIL

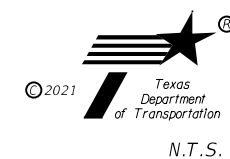
PLACE A TEMPORARY ACP TAPER AT ALL LOCATIONS WHERE A DROPOFF EXISTS AT THE END OF DAY AS DIRECTED BY THE ENGINEER. REMOVE TAPER PRIOR TO THE ACP OVERLAY. THE PLACEMENT AND REMOVAL OF THE TAPER IS CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.



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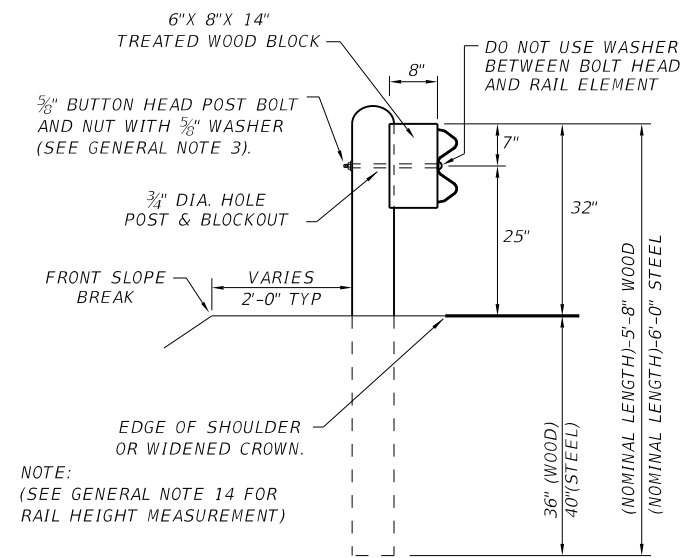
12/30/21

**MISCELLANEOUS
DETAILS**



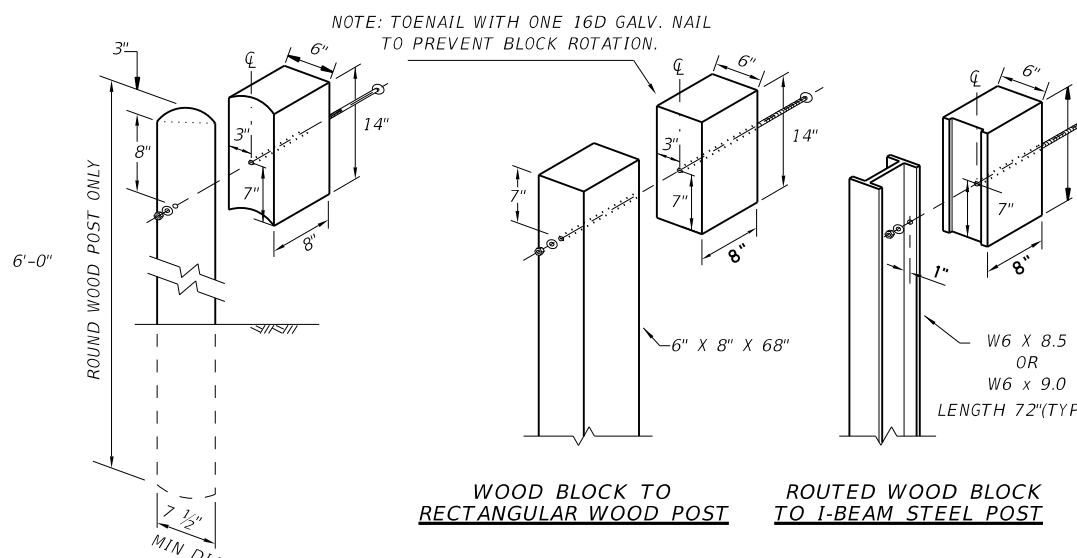
CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST			SHEET NO.
HOU			76

N.T.S.



TYPICAL POST PLACEMENT

NOTE:
(SEE GENERAL NOTE 14 FOR
RAIL HEIGHT MEASUREMENT)

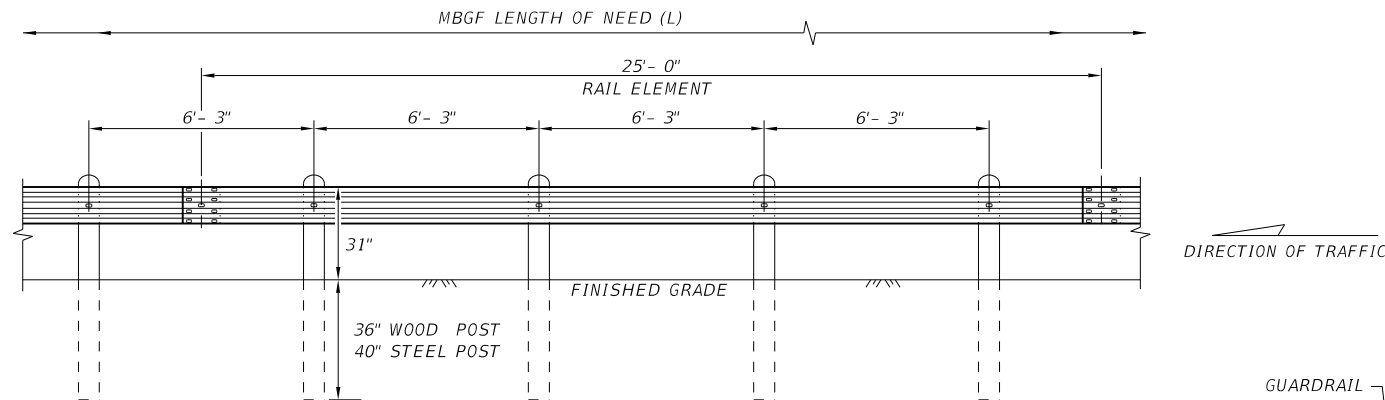


WOOD BLOCK TO ROUND WOOD POST

WOOD BLOCK TO RECTANGULAR WOOD POST

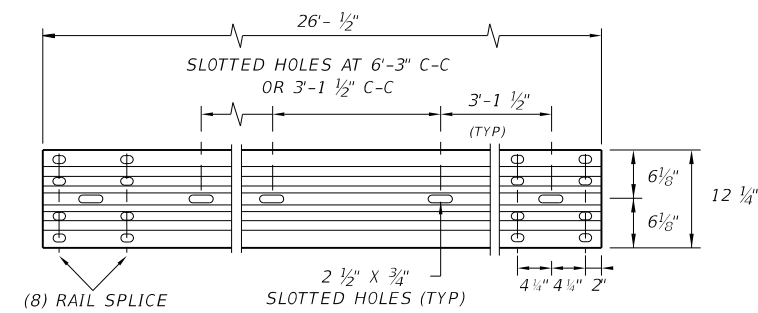
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION MID-SPAN RAIL SPLICE

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



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

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

NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECESSED NUT.

SPLICE BOLT LENGTH

FBB01 = 1 1/4"

FBB02 = 2"

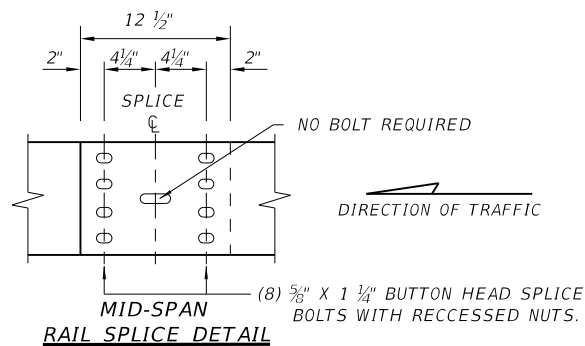
POST & BLOCK LENGTH

FBB03 = 10"

FBB04 = 18"

BUTTON HEAD BOLT

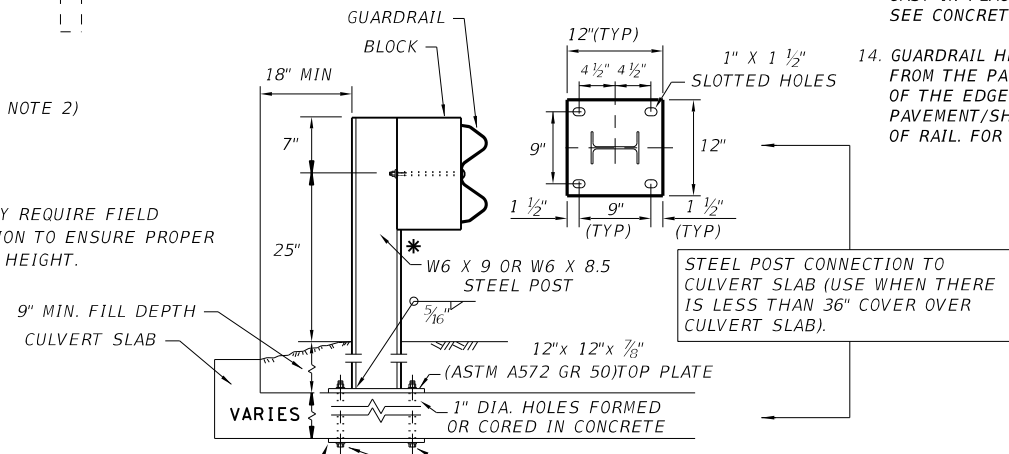
NOTE: SEE GENERAL NOTE 3 FOR
SPLICE & POST BOLT DETAILS.



MID-SPAN RAIL SPLICE DETAIL

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

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



LOW FILL CULVERT POST

12" X 12" X 1/4"(ASTM A36) STEEL BOTTOM
PLATE WITH 1" DIA. HOLES REQUIRED WITH
BOLT-THROUGH INSTALLATION.

NOTE: TWO INSTALLATION OPTIONS.

1. **BOLT-THROUGH OPTION:** REQUIRES A 6" MIN. SLAB THICKNESS.
5/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED
WASHER EACH AND HEAVY HEX NUTS.
NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

2. **EPOXY ANCHOR OPTION:** THIS OPTION MAY ONLY BE USED IF THE CULVERT
SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 5/8" DIA.
ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED
WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY
ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE
REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED
IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH
OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED
ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING
EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

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

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

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

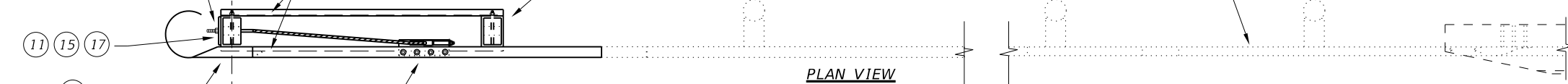
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METAL BEAM GUARD FENCE TL-3 MASH COMPLIANT GF(31)-19					
FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0111	03	063	FM 521	
	DIST	COUNTY		SHEET NO.	
	HOU	FORT BEND		77	

BREAKAWAY CABLE TERMINAL (BCT) CABLE ANCHOR ASSEMBLY WITH CABLE BRACKET, BEARING PLATE AND STANDARD HARDWARE.

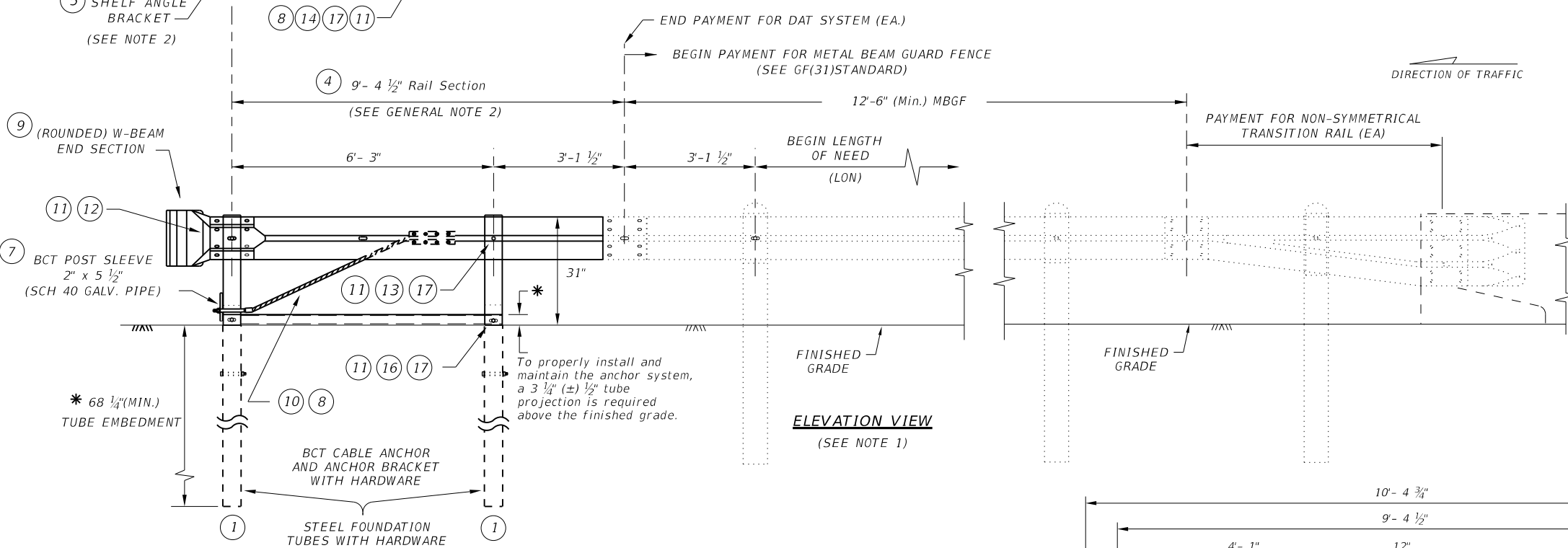
C3 X 5 X 80" (3) GROUND STRUTS

7 1/4" x 5 1/4" x 46" (2) DAT TERMINAL POST

NON-SYMMETRICAL TRANSITION RAIL SECTION (SEE APPLICABLE TRANSITION STANDARD)



PLAN VIEW



ELEVATION VIEW (SEE NOTE 1)

GENERAL NOTES

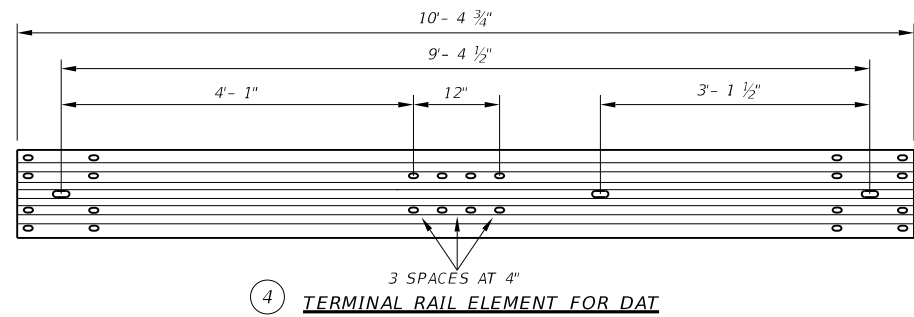
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

MOW STRIP INSTALLATION

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

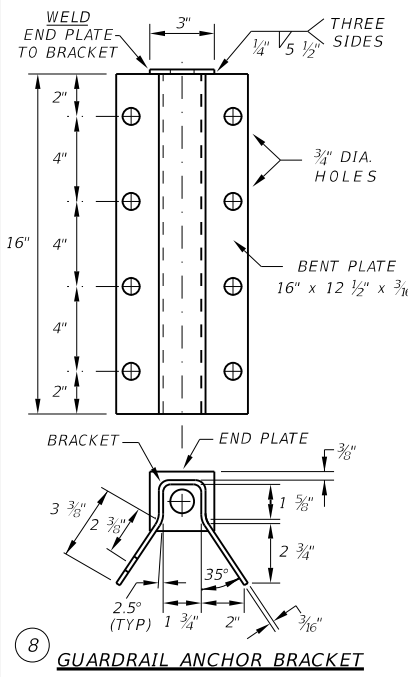
DOWNSTREAM ANCHOR TERMINAL (DAT)

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

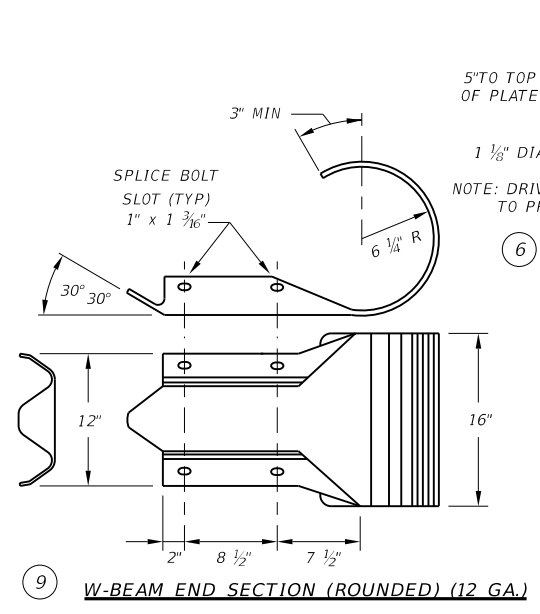


TERMINAL RAIL ELEMENT FOR DAT

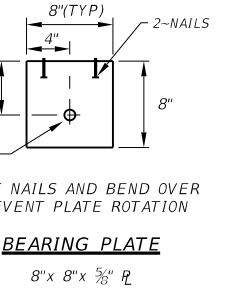
#	(DAT) PARTS LIST	QTY
1	STEEL FOUNDATION TUBE	2
2	DAT TERMINAL POST	2
3	CHANNEL STRUT	2
4	TERMINAL RAIL ELEMENT	1
5	SHELF ANGLE BRACKET	1
6	BCT BEARING PLATE	1
7	BCT POST SLEEVE	1
8	GUARDRAIL ANCHOR BRACKET	1
9	(ROUNDED) W-BEAM END SECTION	1
10	BCT CABLE ANCHOR	1
11	RECESSED NUT, GUARDRAIL	20
12	1 1/4" BUTTON HEAD BOLT	4
13	10" BUTTON HEAD BOLT	2
14	5/8" X 2" HEX HEAD BOLT	8
15	5/8" X 8" HEX HEAD BOLT	4
16	5/8" X 10" HEX HEAD BOLT	2
17	5/8" FLAT WASHER	18



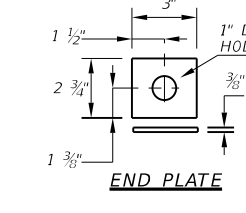
GUARDRAIL ANCHOR BRACKET



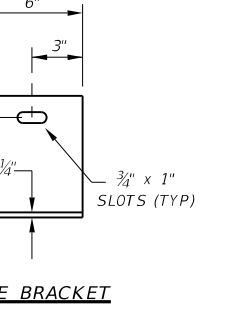
W-BEAM END SECTION (ROUNDED) (12 GA.)



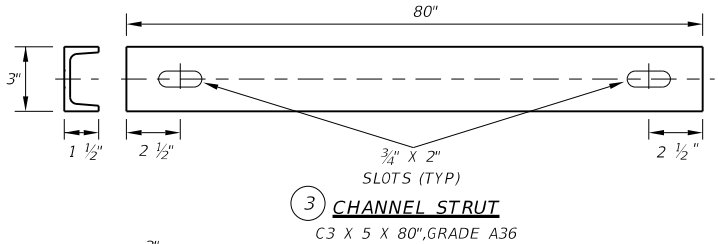
BEARING PLATE



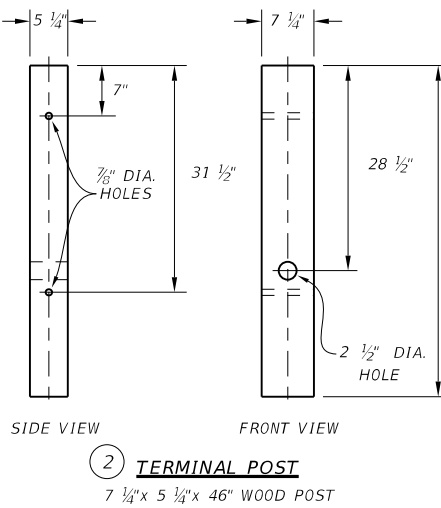
END PLATE



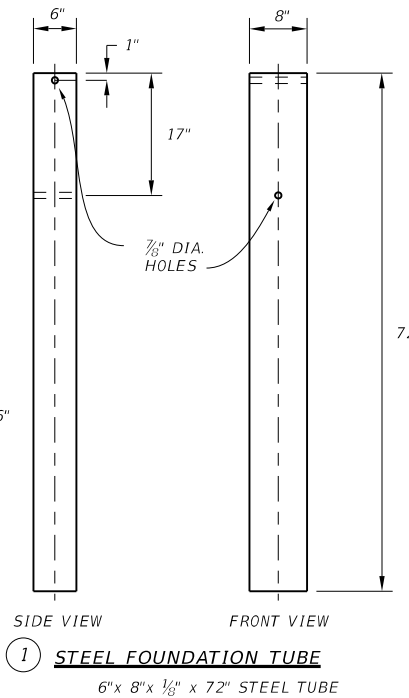
SHELF ANGLE BRACKET



CHANNEL STRUT



TERMINAL POST

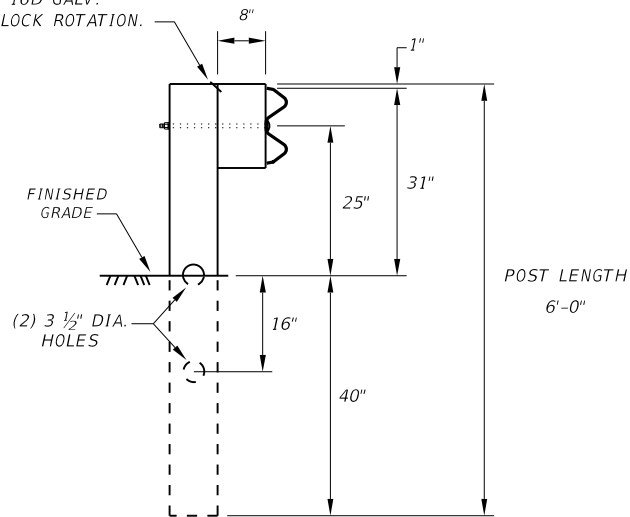


STEEL FOUNDATION TUBE

Texas Department of Transportation
METAL BEAM GUARD FENCE (DOWNSTREAM ANCHOR TERMINAL) TL-3 MASH COMPLIANT GF(31)DAT-19

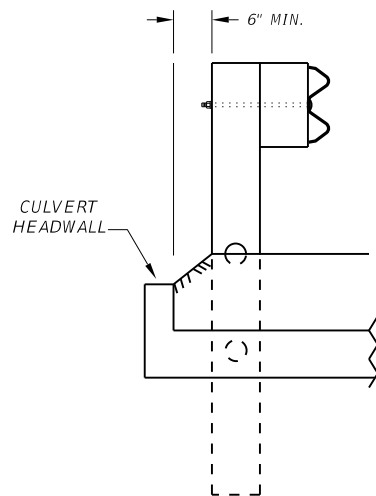
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 NOVEMBER 2019 CONT SECT JOB HIGHWAY
 0111 03 063 FM 521
 DIST COUNTY SHEET NO.
 HOU FORT BEND 78

NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.



RECTANGULAR CRT POST
(6" X 8" X 6' LONG)

(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS



LATERAL OFFSET BETWEEN THE
GUARDRAIL AND THE CULVERT HEADWALL

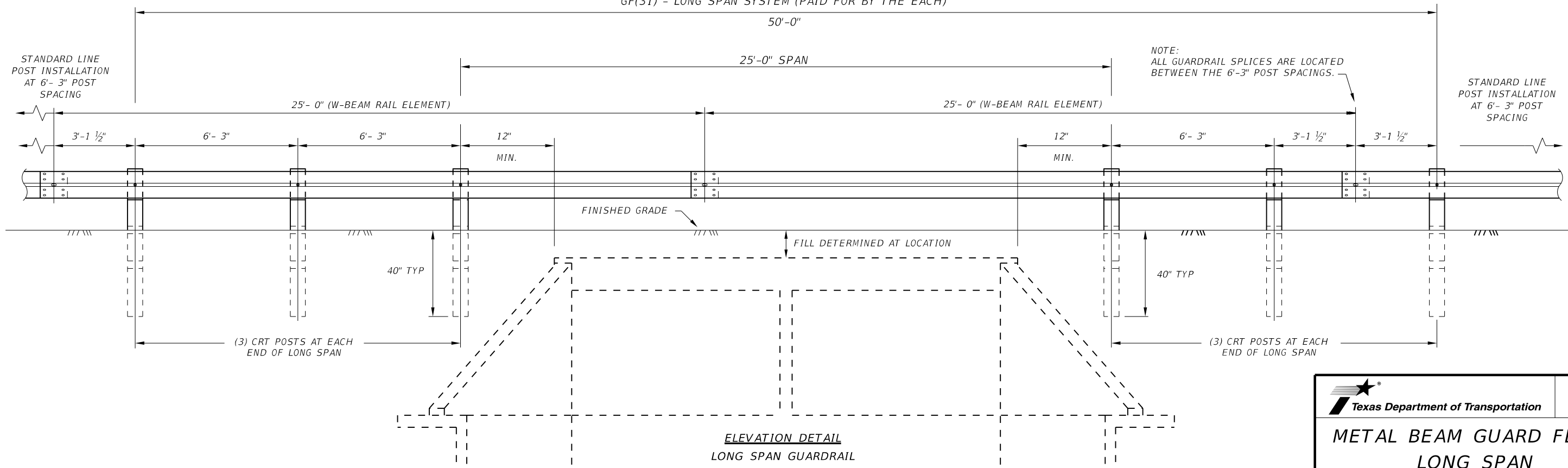
GENERAL NOTES

1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12'- 6" OR 25'- 0" NOMINAL LENGTHS.
3. RAIL POST HOLES ARE OFFSET 3'- 1 1/2" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16a) AND NO MORE THAN 1" BEYOND IT.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

NOTE: SEE GF(31) STANDARD FOR STANDARD LINE POSTS.

DIRECTION OF TRAFFIC

GF(31) - LONG SPAN SYSTEM (PAID FOR BY THE EACH)

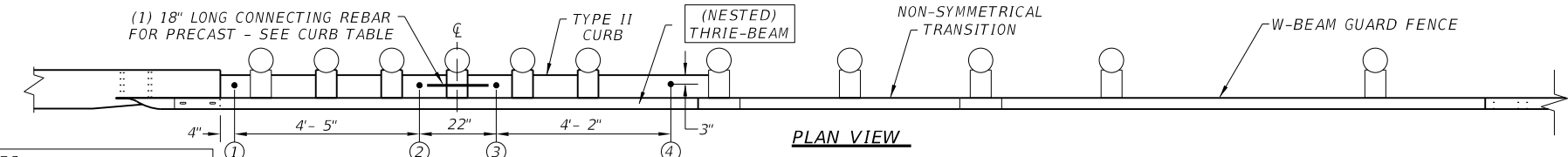


ELEVATION DETAIL
LONG SPAN GUARDRAIL

				Design Division Standard
METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT				
GF(31)LS-19				
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NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	79	

GENERAL NOTES

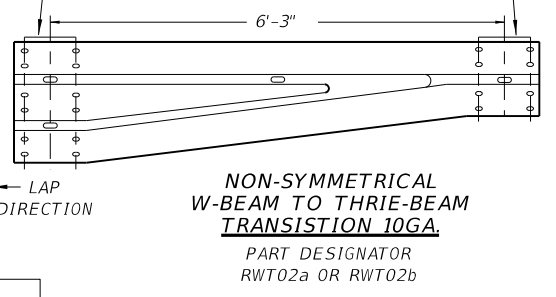
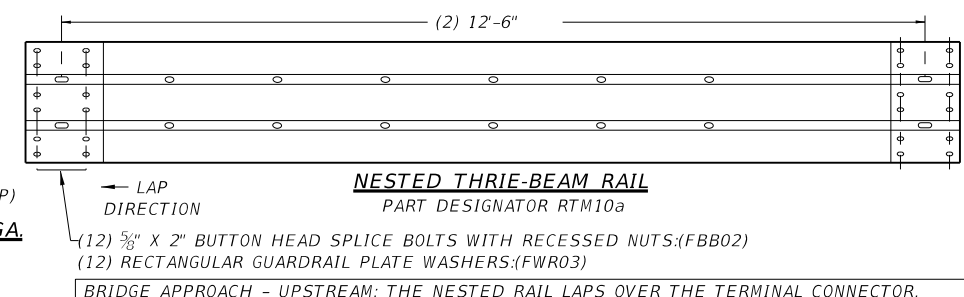
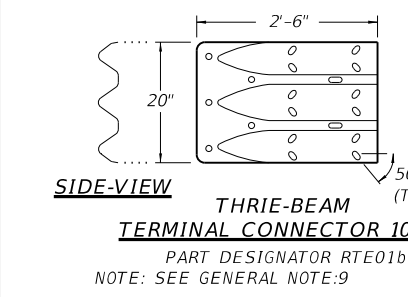
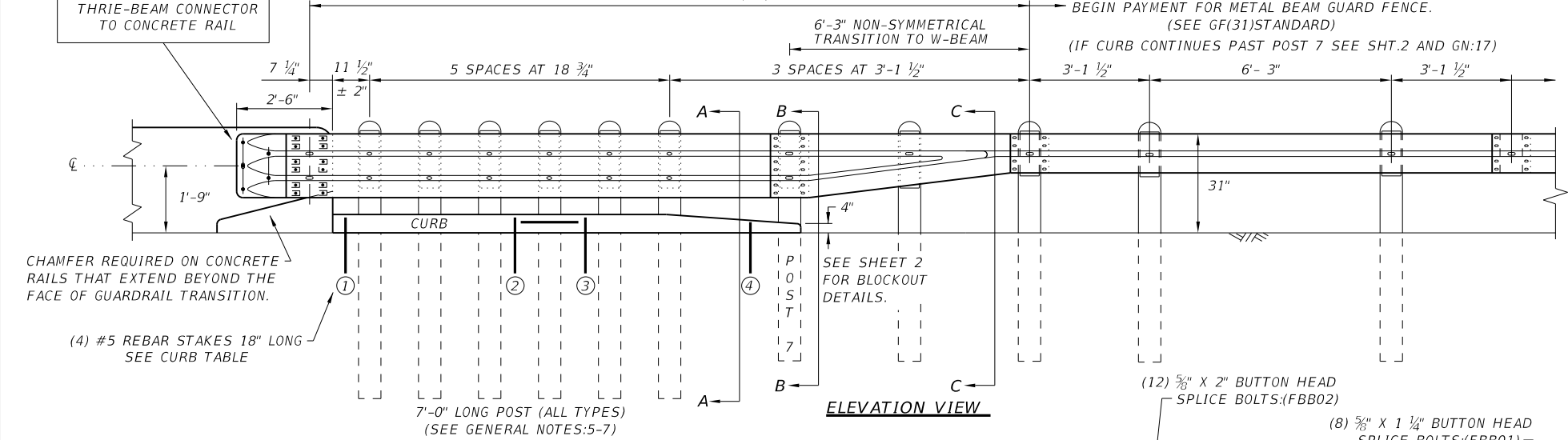
- CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
- CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5'- 3/4" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE CURB PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE:17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
- CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
- UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
- FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
- THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
- THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST 3/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
- POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
- RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
- BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 3/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
- FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
- CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
- WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
- UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
- REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
- THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
- IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED) (TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED) (STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.



- (5) 1" DIA. HOLES.
- (5) 3/8" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
- (10) 1 3/4" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
- (5) 3/8" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

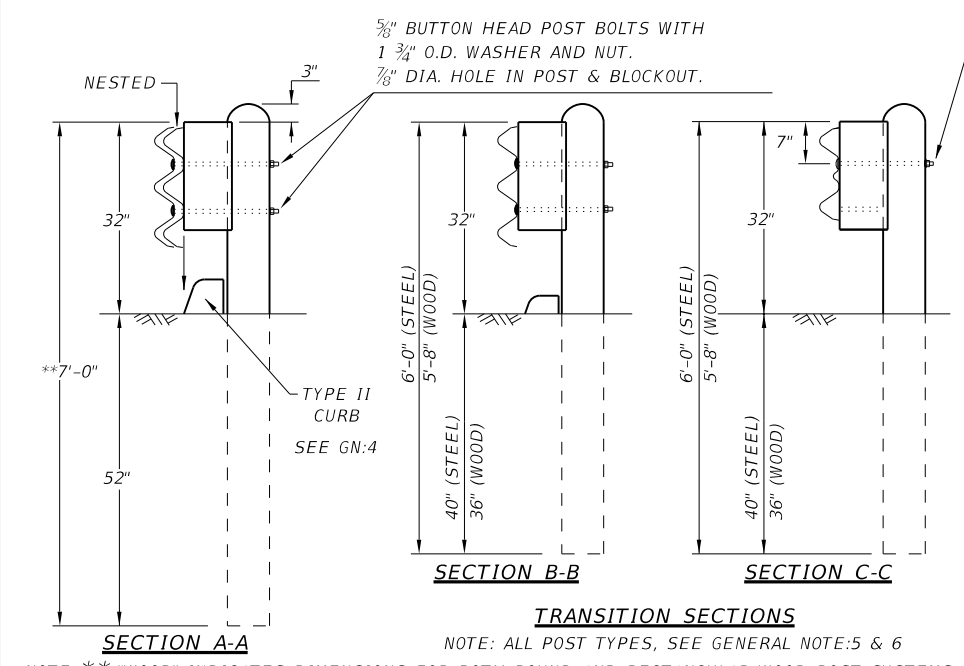
NOTE: HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE 3/8" HEX NUT. TRIM AS REQUIRED.

NOTE: CURB IS A REQUIRED COMPONENT FOR THE TRANSITION TO FUNCTION PROPERLY. SEE GENERAL NOTES:2-4 AND 16-17.



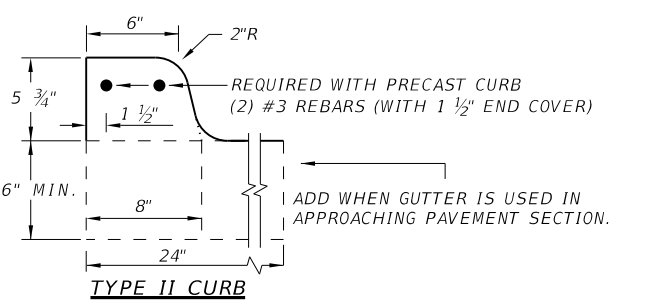
BRIDGE APPROACH - UPSTREAM: THE NESTED RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.

BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



THRIE-BEAM TERMINAL - CURB TABLE	
PRECAST CURB FULL LENGTH EQUALS 12'- 2"	
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.	
CURB (1) LENGTH 5'- 8"	
CURB (2) LENGTH 6'- 6"	
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7	
CONNECTING PRECAST CURB SECTIONS (1) & (2):	
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END.	
USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.	
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE*:	
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB.	
FILL HOLES WITH APPROVED GROUT MIXTURE.	

* NOTES: NOT NEEDED FOR CAST-IN-PLACE. SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS. PERCUSSION DRILLING IS NOT PERMITTED WITH: TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.

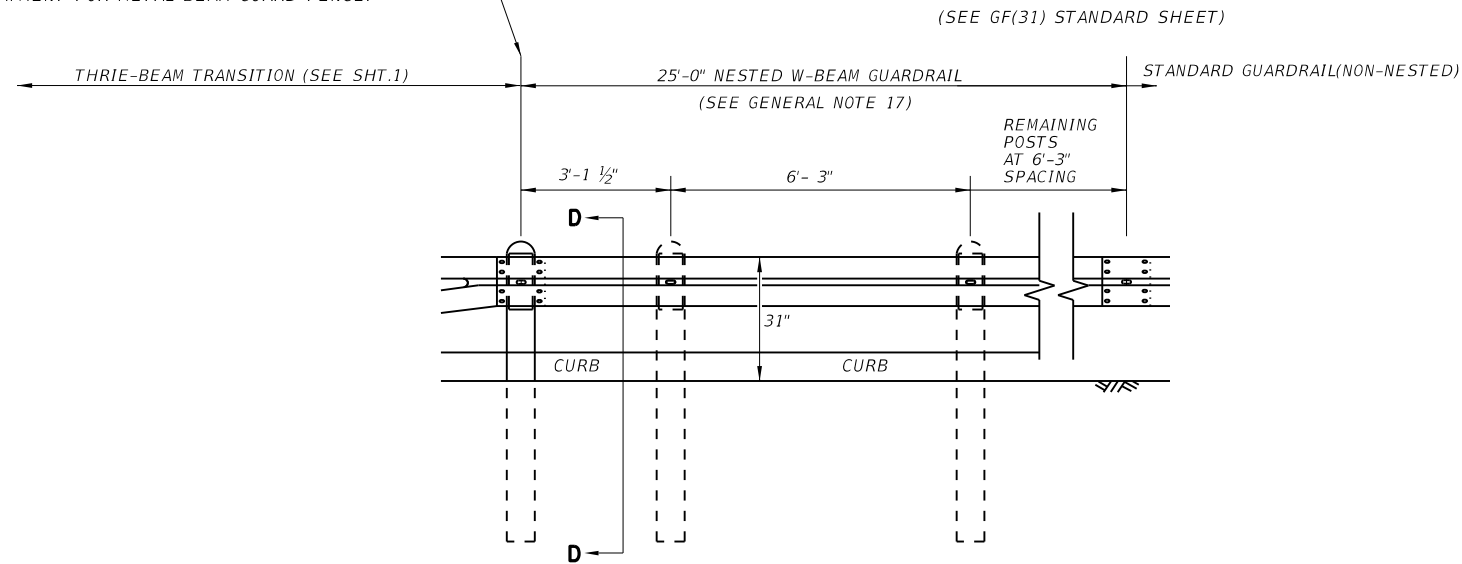


**METAL BEAM GUARD FENCE
THRIE-BEAM TRANSITION
TL-3 MASH COMPLIANT
GF(31)TR TL3-20**

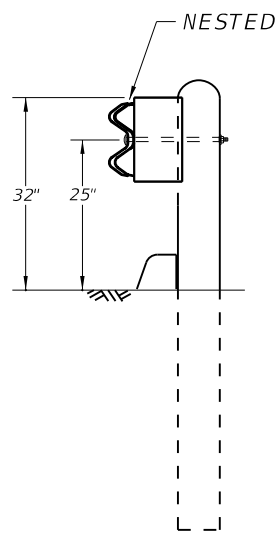
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REVISIONS	0111 03	063	FM 521	
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	80	

REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)

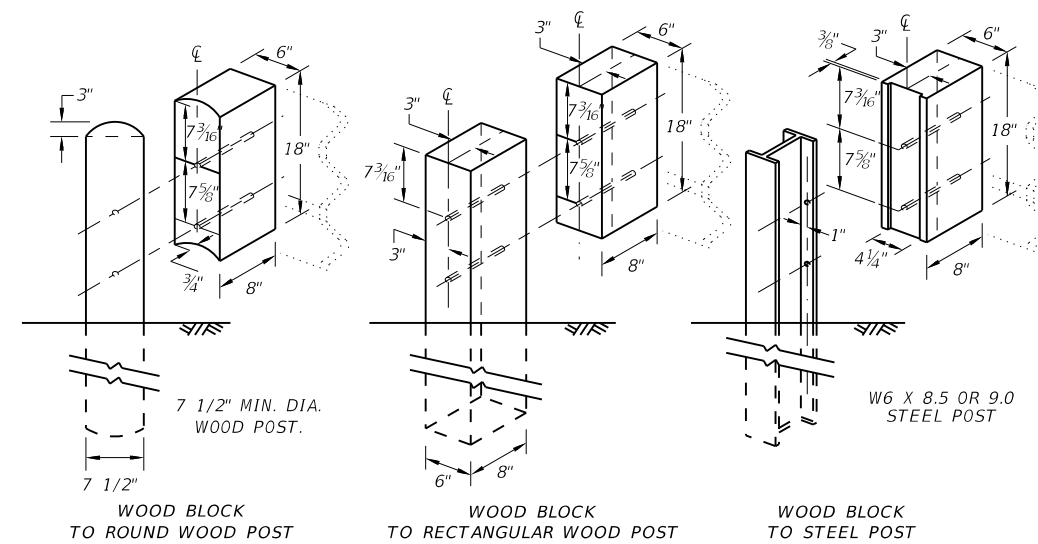
END PAYMENT FOR METAL BEAM GUARD FENCE TRANSITION.
BEGIN PAYMENT FOR METAL BEAM GUARD FENCE.



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

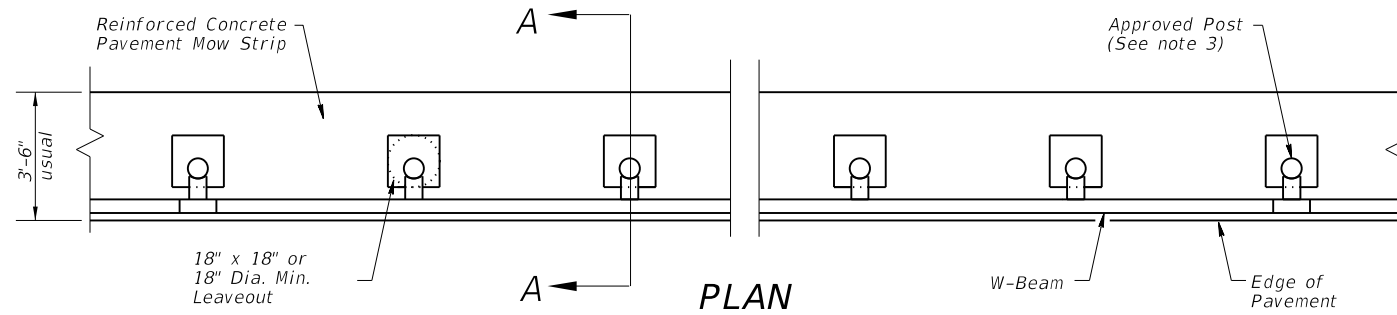
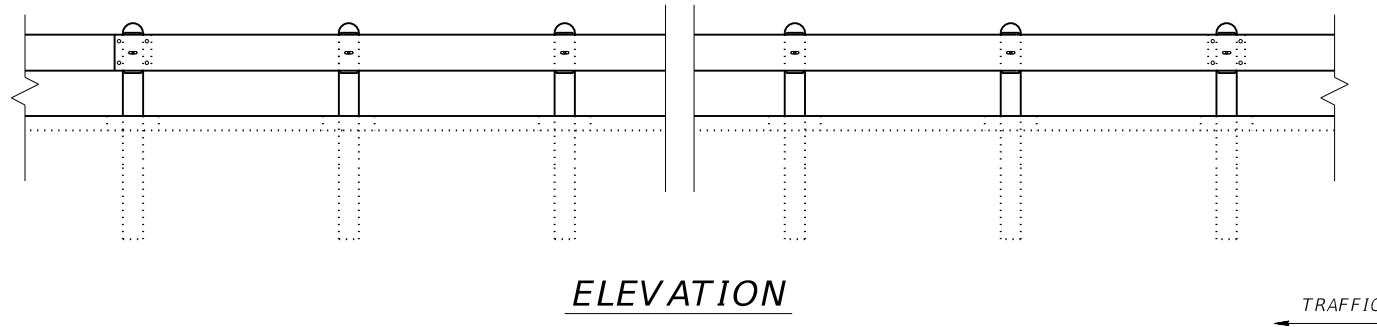
SHEET 2 OF 2



METAL BEAM GUARD FENCE
THRIE-BEAM TRANSITION
TL-3 MASH COMPLIANT

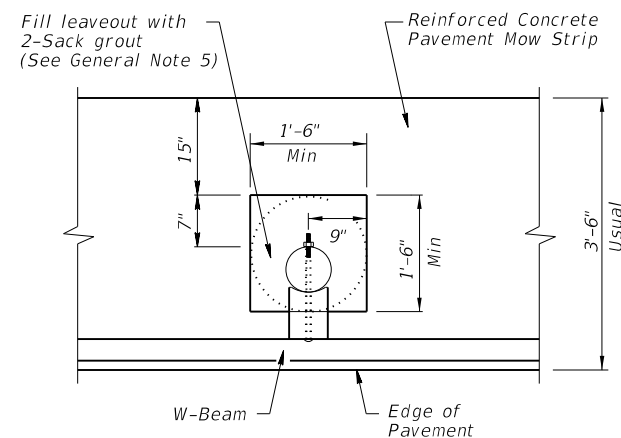
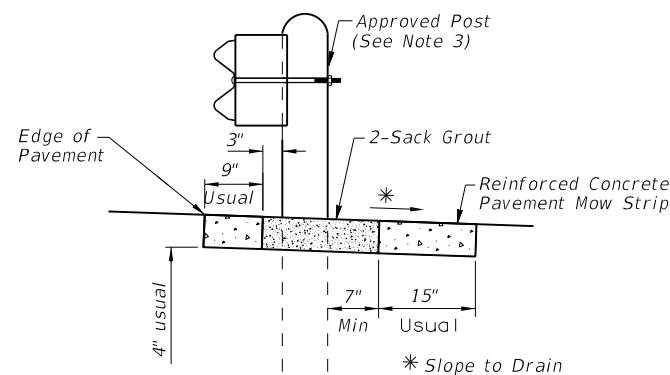
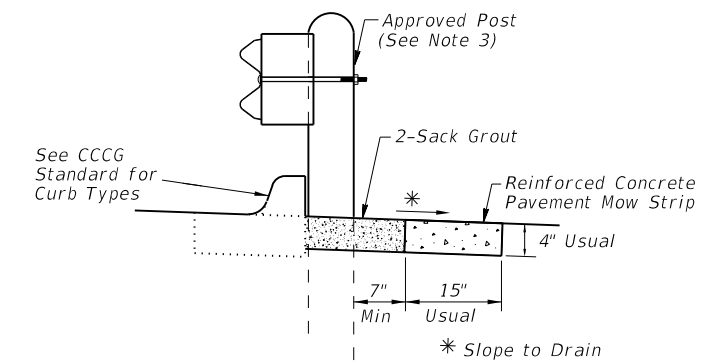
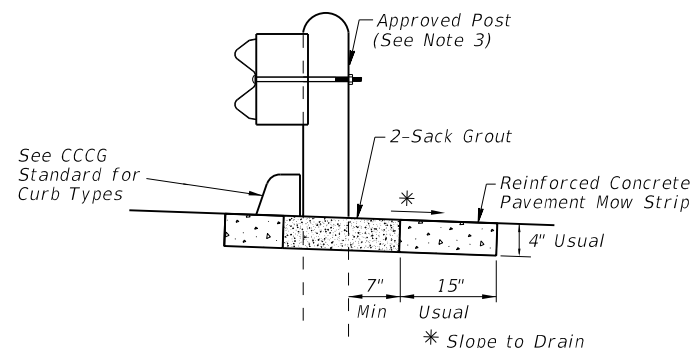
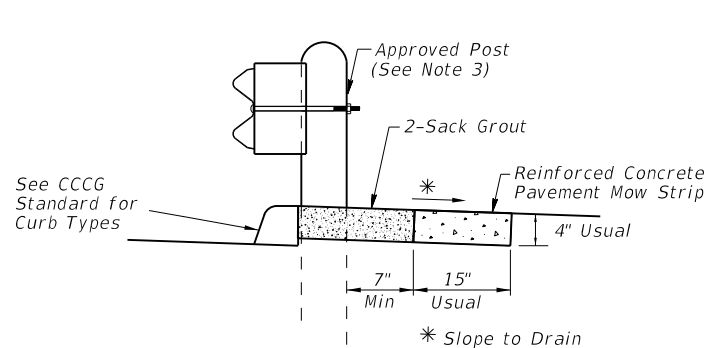
GF(31)TR TL3-20

FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	81	



GENERAL NOTES

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



MOW STRIP DETAIL

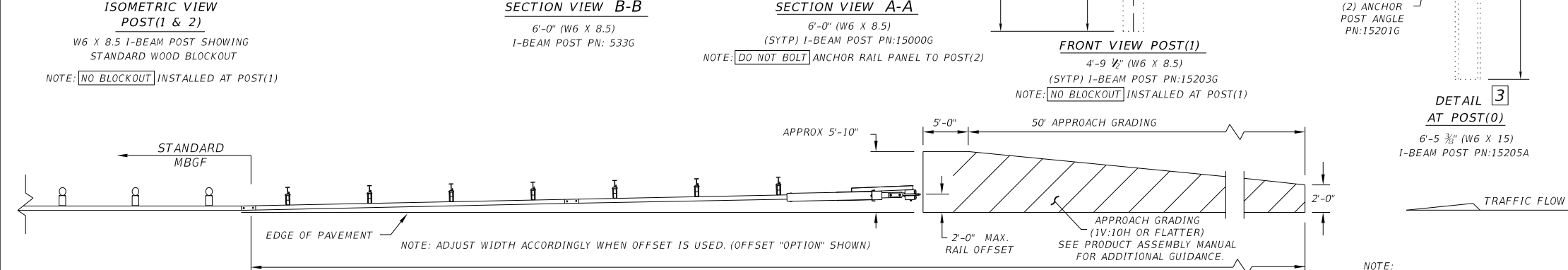
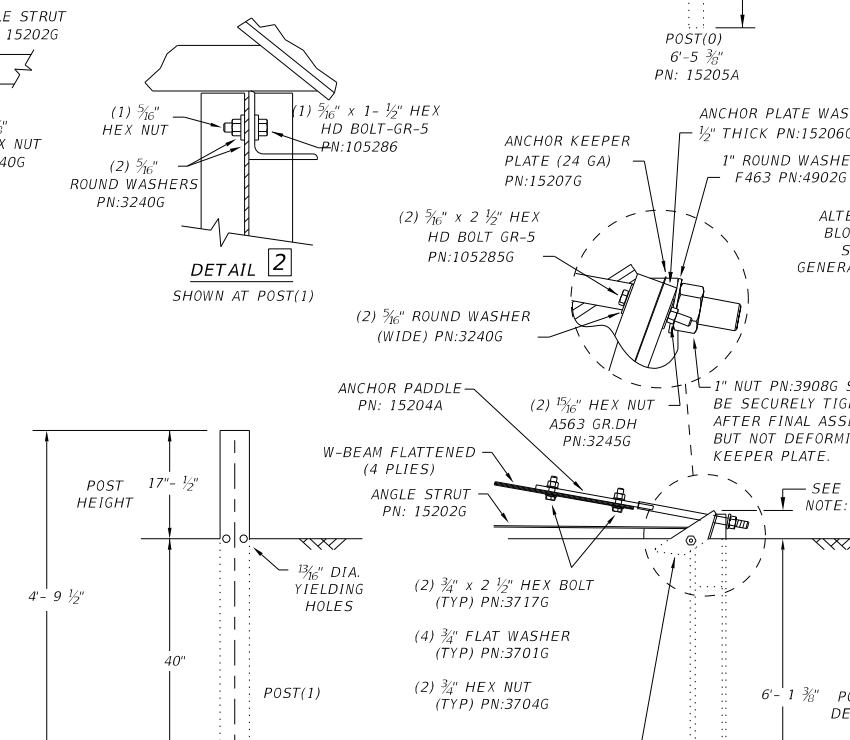
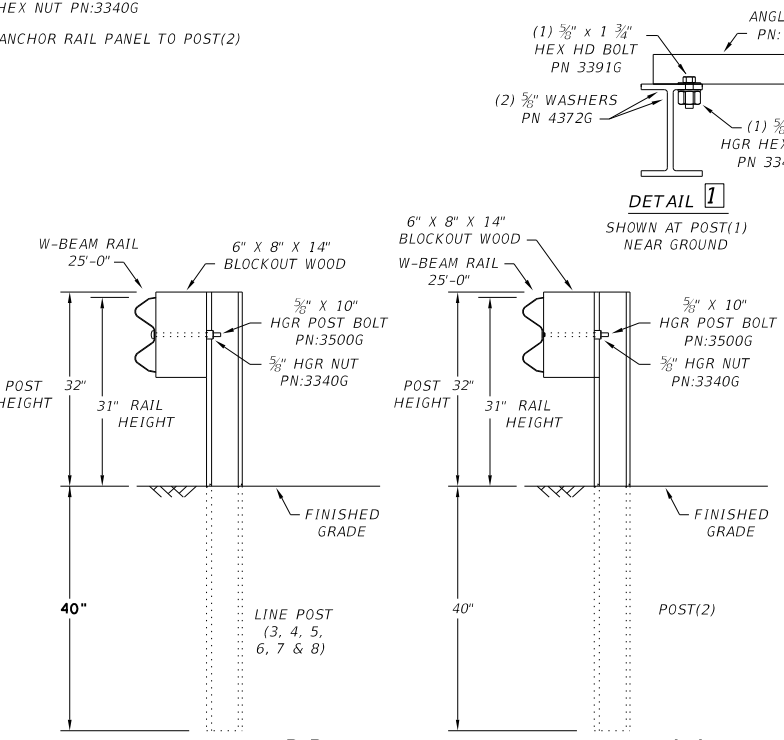
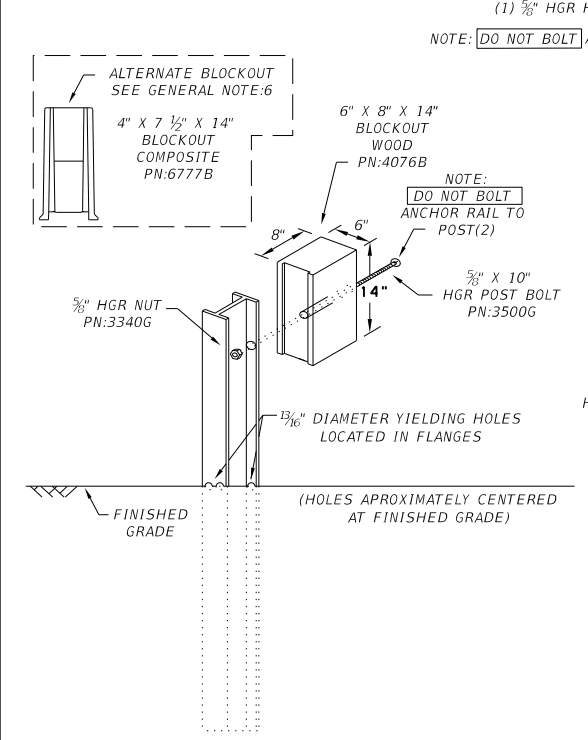
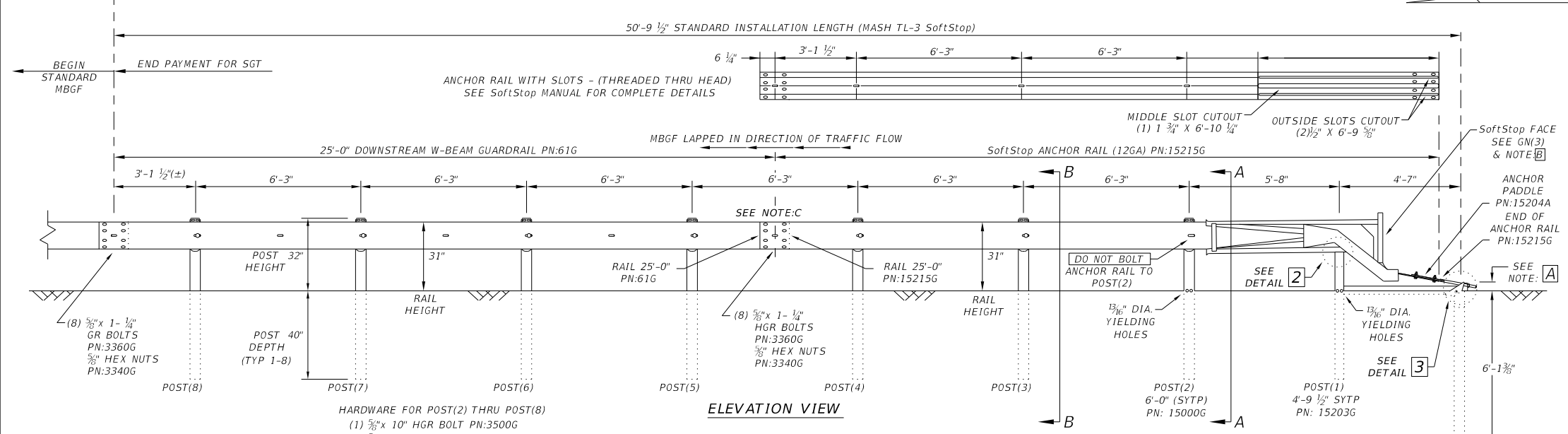
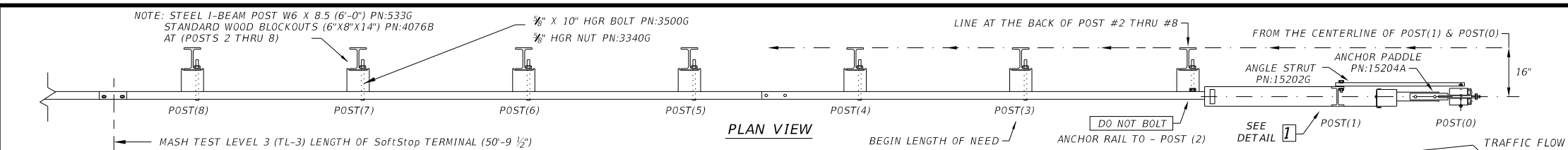
Reinforced Concrete Pavement Mow Strip with 18" x 18" or 18" dia. minimum leaveout.

Texas Department of Transportation
 Houston District

MOW STRIP

MS

FILE: STDE5.DGN	DN:	CK:	DW:	CK1:
©TXDOT 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
03/15 2014 SPECS	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		82



- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY AT 1(888)323-6374, 2525 N. STEMMONS FREEWAY, DALLAS, TX 75207
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL, PN:620237B
 - APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - A COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
 - IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
 - DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
 - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
 - A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCRoACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.

NOTE:A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-3/4" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE:B	PART PN:5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN:5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE:C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN:61G ANCHOR RAIL 25'-0" PN:15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

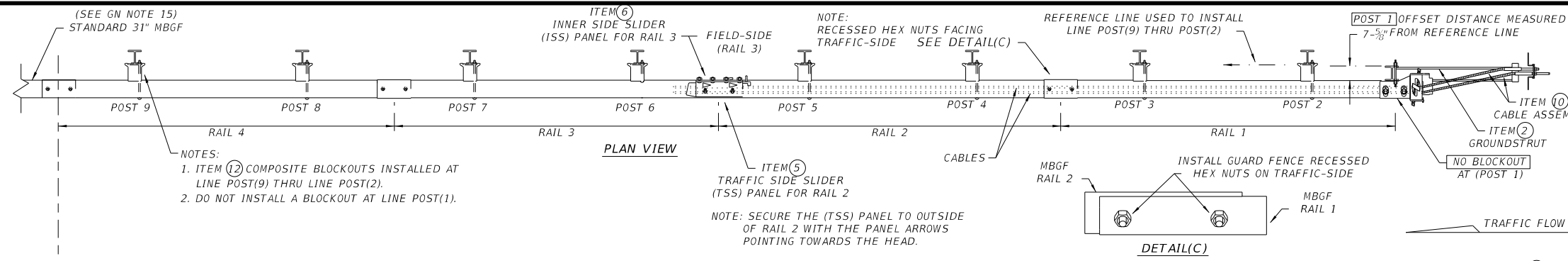
PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 3/8")
15203G	1	POST #1 - (SYTP) (4'- 9 1/2")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 1/2" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (1/2" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
HARDWARE		
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	3/4" x 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR.DH
3360G	16	5/8" x 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	5/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	3/8" x 10" HGR POST BOLT A307
3391G	1	5/8" x 1 3/4" HEX HD BOLT A325
4489G	1	3/8" x 9" HEX HD BOLT A325
4372G	4	3/8" WASHER F436
105285G	2	5/16" x 2 1/2" HEX HD BOLT GR-5
105286G	1	5/16" x 1 1/2" HEX HD BOLT GR-5
3240G	6	5/16" ROUND WASHER (WIDE)
3245G	3	5/16" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

Texas Department of Transportation Design Division Standard

TRINITY HIGHWAY SOFTSTOP END TERMINAL MASH - TL-3 SGT(10S)31-16

FILE: sgt10s3116	DN: TXDOT	CK: KM	DW: VP	CK: MB/VP
©TXDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	83	

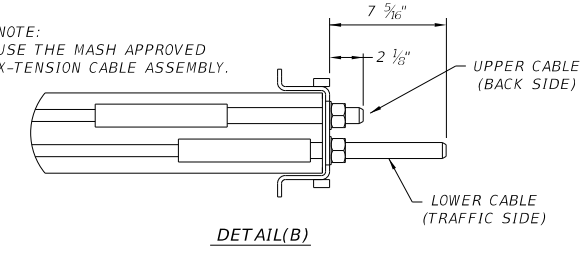
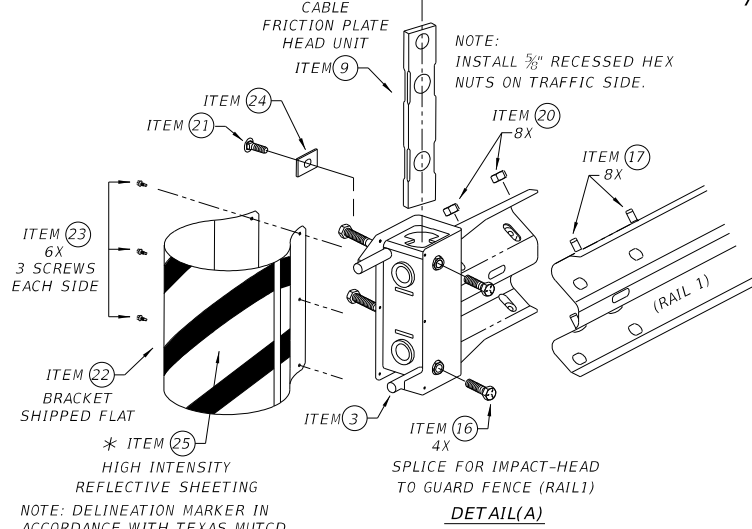
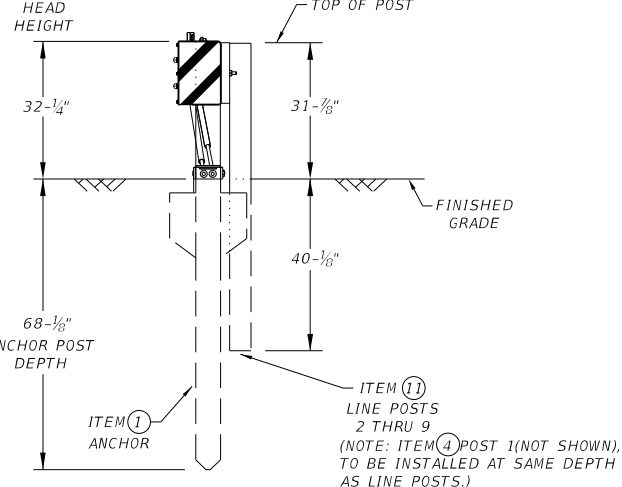
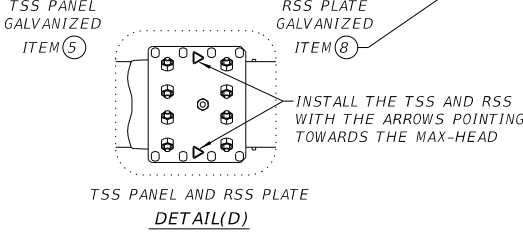
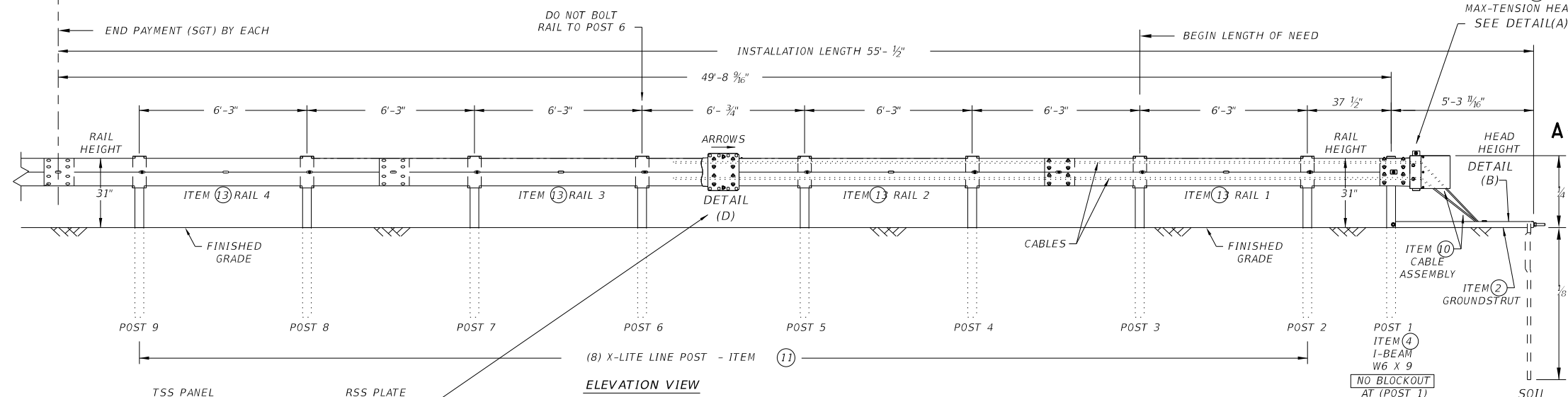
NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE SoftStop END TERMINAL. IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.



NOTES:
 1. ITEM 12 COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
 2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

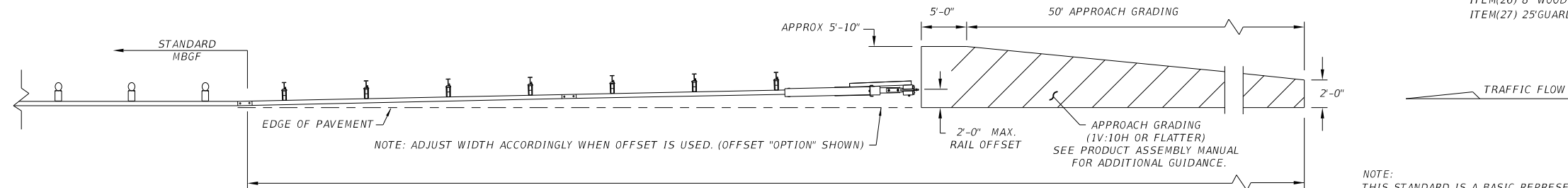
NOTE: SECURE THE (TSS) PANEL TO OUTSIDE OF RAIL 2 WITH THE PANEL ARROWS POINTING TOWARDS THE HEAD.

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



ITEM#	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	TOOTH - GEOMET	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	3/8" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	3/8" X 1 1/2" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	3/8" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	3/8" WASHER F436 STRUCTURAL MGAL	2
20	4001116	3/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	3/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	1/4" X 3/4" SCREW SD HH 41055	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.
 ** ALTERNATIVE ITEMS NOT SHOWN.
 ITEM(26) 8" WOOD-BLOCKOUTS
 ITEM(27) 25' GUARD FENCE PANELS



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

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

Texas Department of Transportation Design Division Standard

MAX-TENSION END TERMINAL

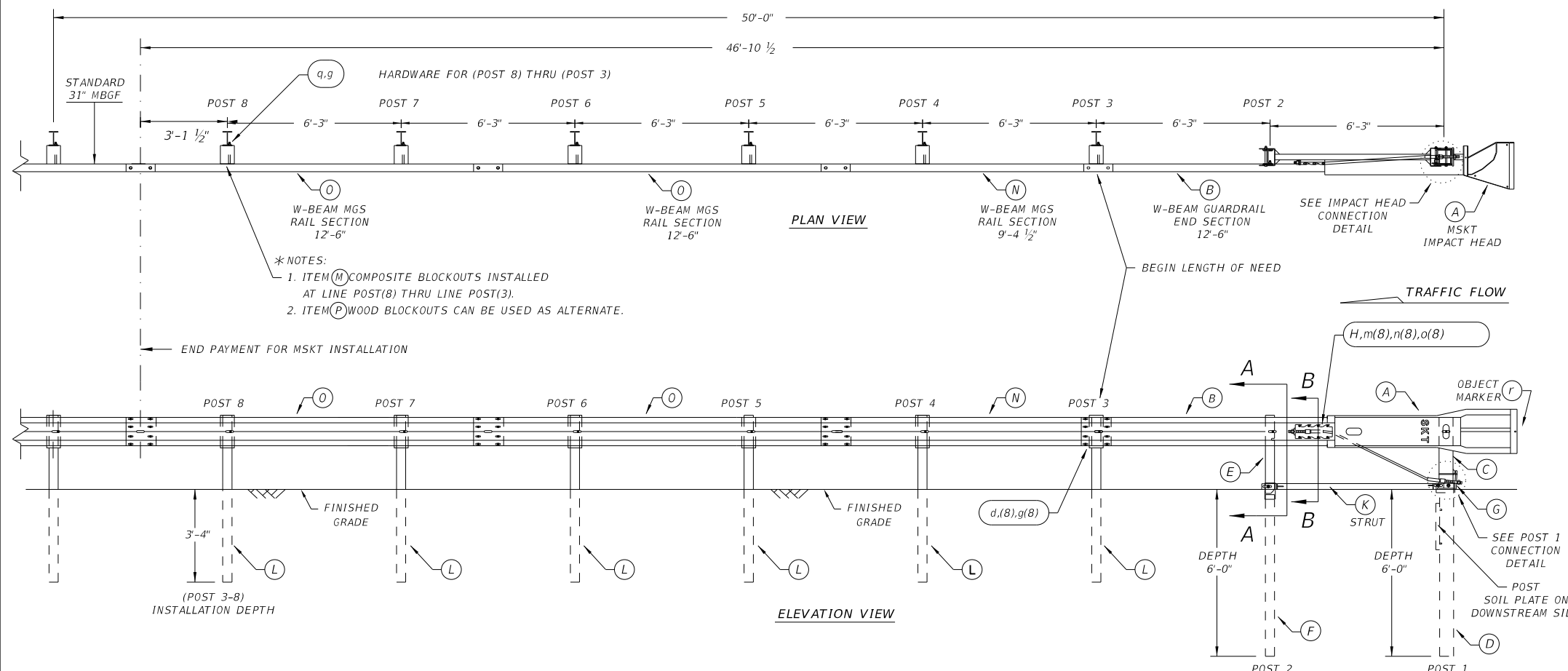
MASH - TL-3

SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
©TXDOT FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	84	

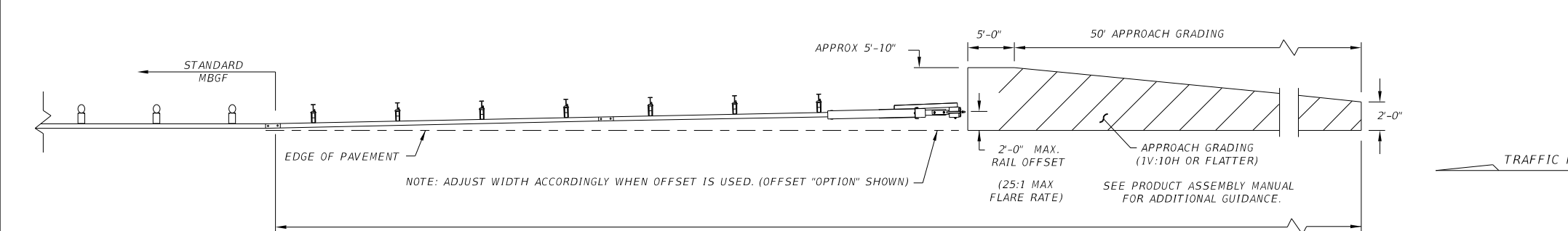
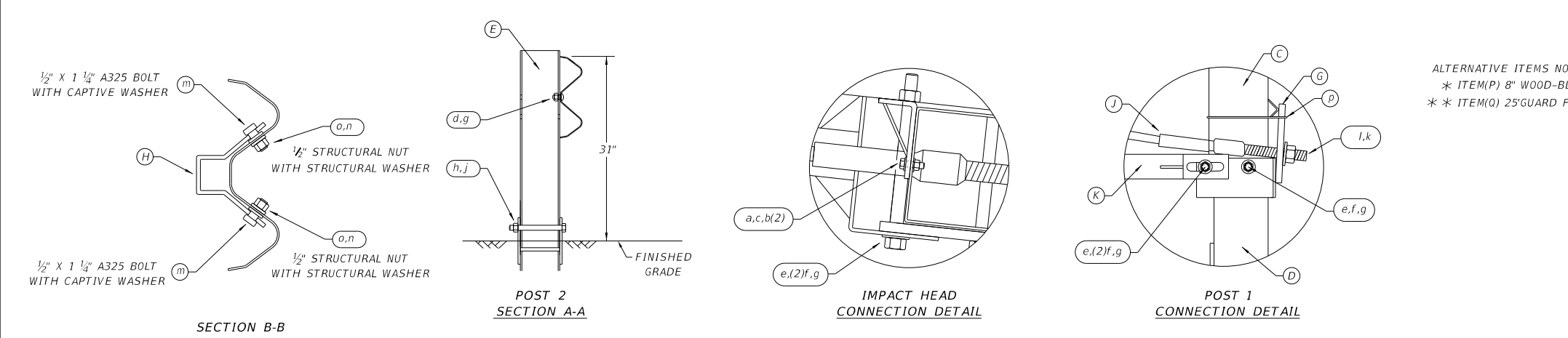
GENERAL NOTES

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



ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6" W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6" W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209

SMALL HARDWARE			
a	2	1 5/16" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	1 5/16" WASHER	W0516
c	2	1 5/16" HEX NUT	N0516
d	25	3/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	3/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	3/8" WASHER	W050
g	33	3/8" Dia. H.G.R. NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 3/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	3/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

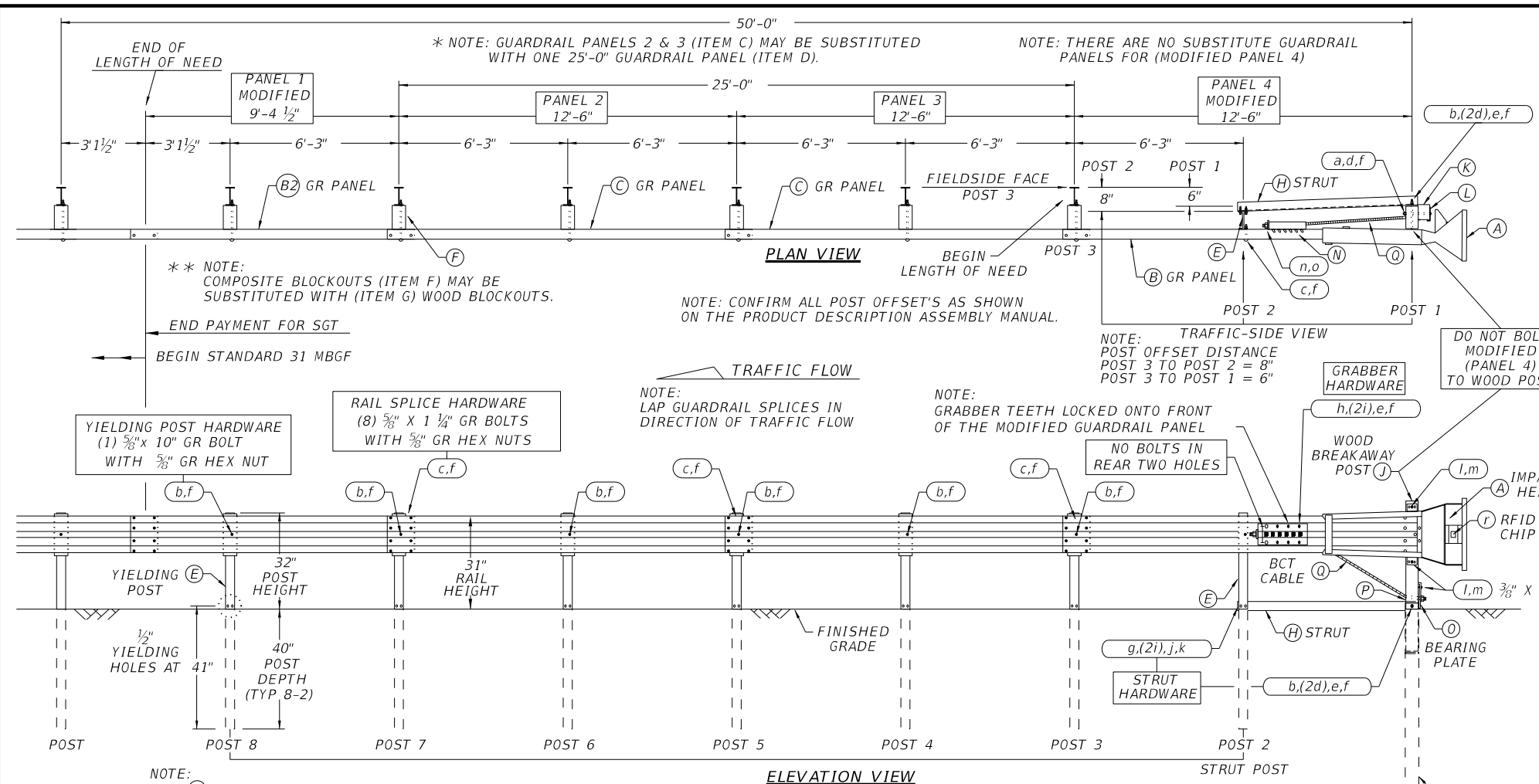
NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MSKT END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Design Division Standard

Texas Department of Transportation

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

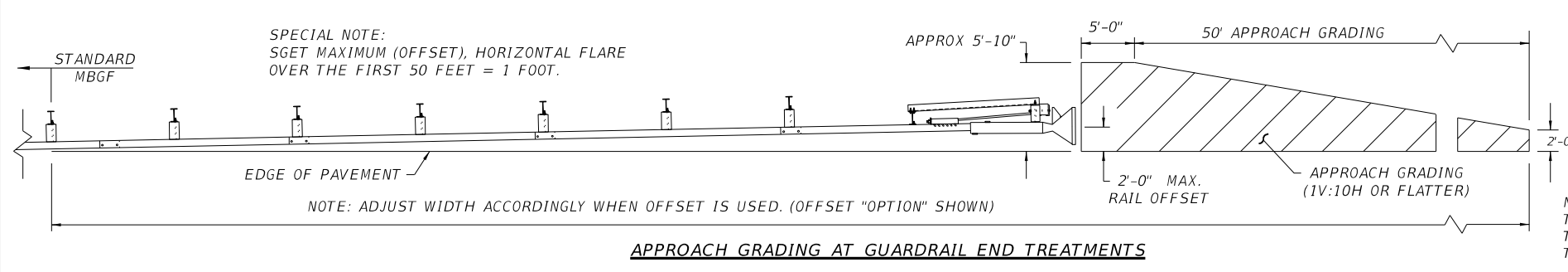
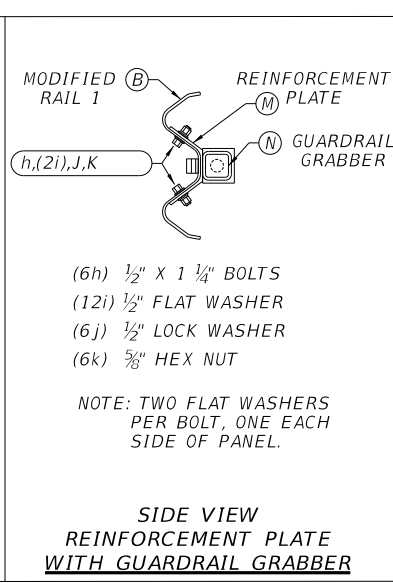
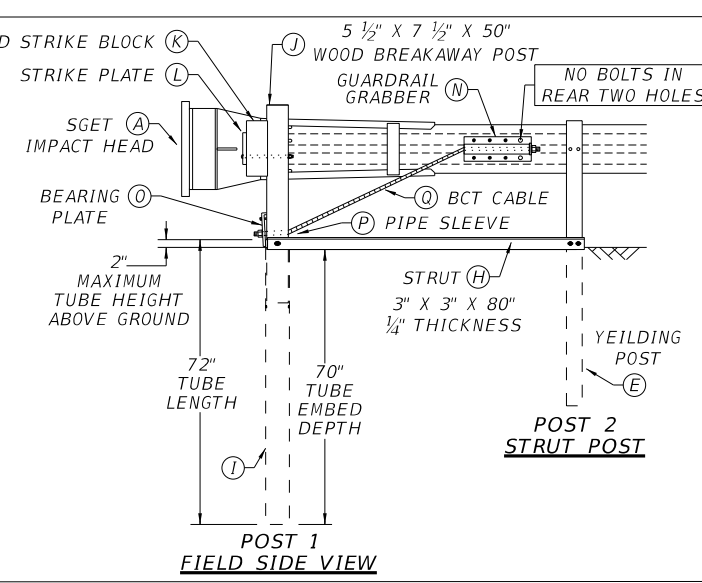
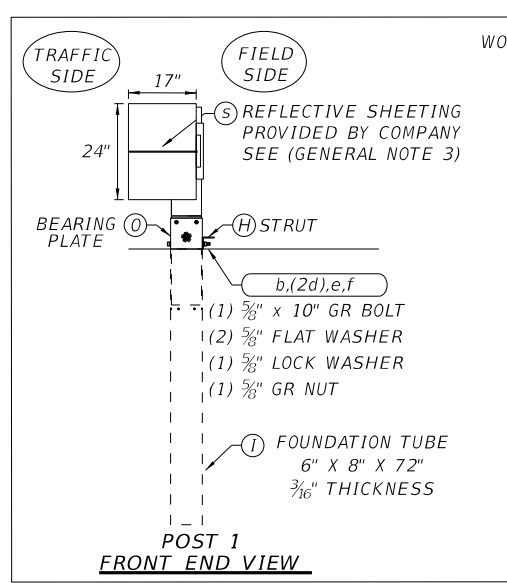
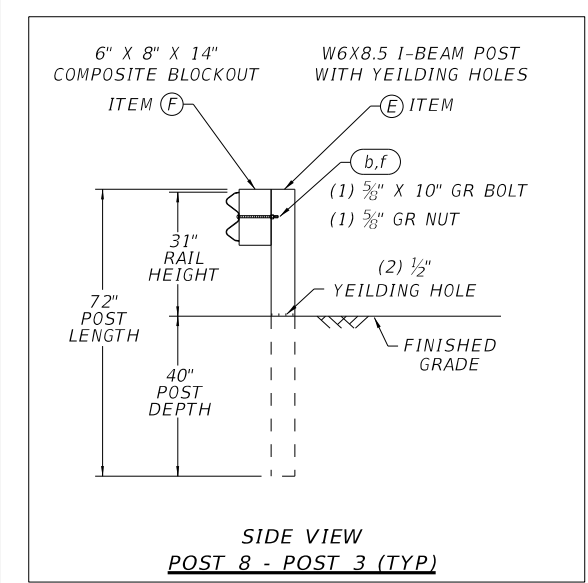
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©TxDOT: APRIL 2018	CONT SECT	JOB	HIGHWAY	
REVISIONS	0111	03	063	FM 521
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		85



- ### GENERAL NOTES
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
 - MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
 - THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
 - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
 - THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CB08
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WB08
H	1	STRUT 3" X 3"	STR80
I	1	FOUNDATION	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" x 8 5/8" x 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" x 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" x 81" LENGTH	CBL81

ITEM	QTY	SMALL HARDWARE	ITEM #
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563DH HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

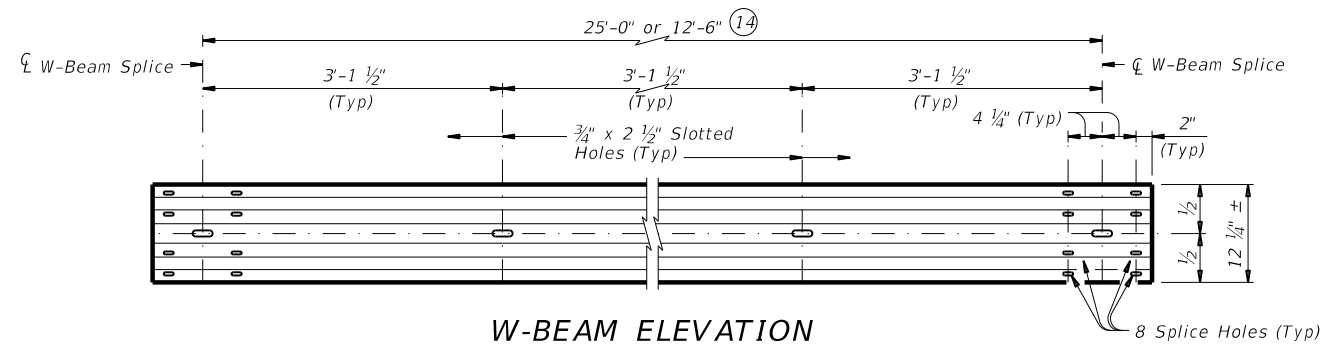


NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

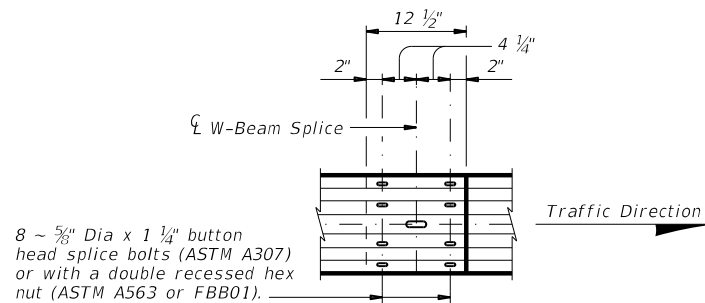
Texas Department of Transportation
Design Division Standard

SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

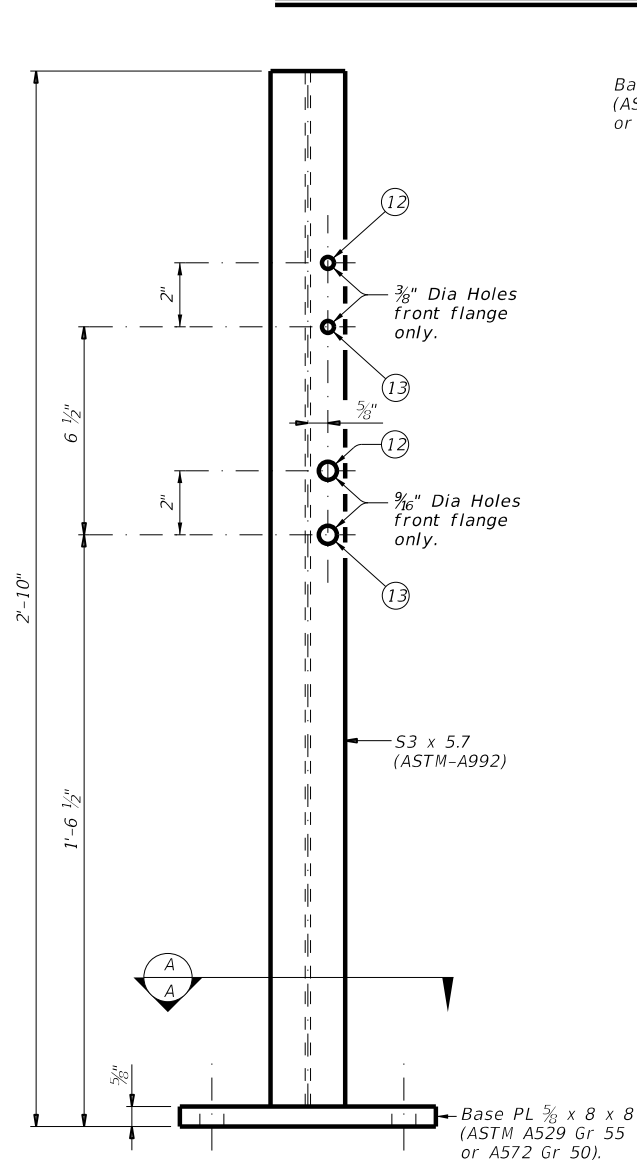
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©TXDOT: APRIL 2020	CONT: SGET	JOB: 063	HIGHWAY: FM 521	
REVISIONS	0111	03		
	DIST: HOU	COUNTY: FORT BEND	SHEET NO: 86	



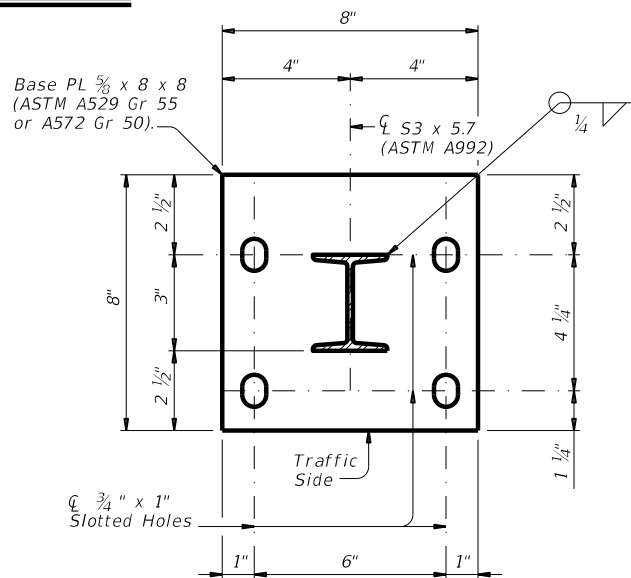
W-BEAM ELEVATION



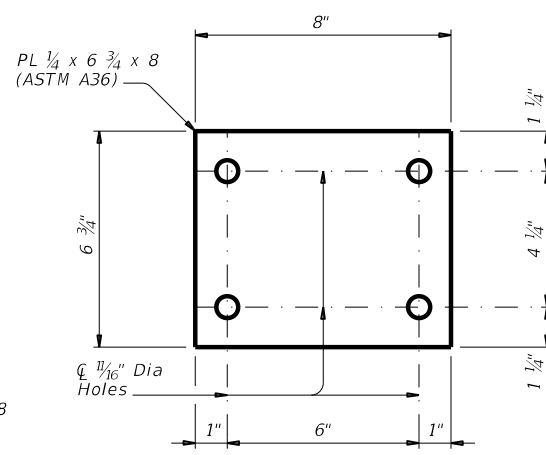
W-BEAM SPLICE ELEVATION



POST ELEVATION

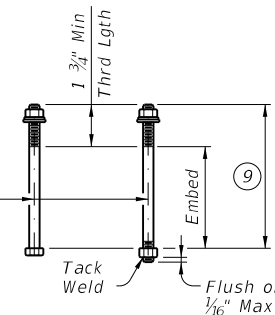


SECTION A-A



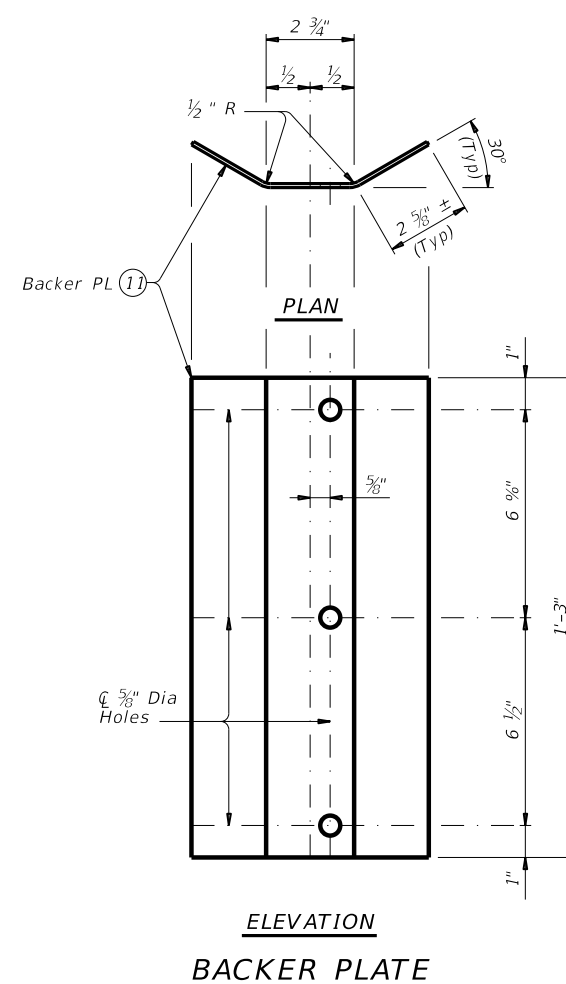
WASHER PLATE DETAIL

9 5/8" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ASTM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod.



CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS (9)

- 9 See "Rail Details On Bridge Slab" and/or "Rail Section On Abutment Wingwall".
- 10 See "Material Notes" for anchor bolt information.
- 11 Backer PL 1/4" x 8 x 1'-3" (ASTM A1011 CS or SS Gr 33, or A1008 CS or SS Gr 33 (11 Gage acceptable)).
- 12 Used for structures with overlay.
- 13 Used for structures without overlay.
- 14 At the nominal end of the bridge rail for payment, one 9'-4 1/2" or 6'-3" W-beam section is permitted in order to achieve the required W-Beam splice location on the MBGF.



ELEVATION

BACKER PLATE

MBGF AND END TREATMENT NOTES:

This traffic railing must be anchored by metal beam guard fence (MBGF) and guard fence end treatments. Determine MBGF length of need in accordance with the Roadway Design Manual, unless otherwise specified. The minimum MBGF length of need required for anchoring the railing is 25' of MBGF plus the appropriate end treatment.

CONSTRUCTION NOTES:

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

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

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

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

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

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

Shop drawings are not required for this rail.

MATERIAL NOTES:

Galvanize all steel components.

Anchor bolts for base plate must be 5/8" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Optional adhesive anchorage system must be 5/8" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 3/4". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

W-beam must meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'-0" or 12'-6" (Nominal) lengths and a single rail element of 9'-4 1/2" or 6'-3" (Nominal) length. W-Beam must have slotted holes at 3'-1 1/2".

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

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

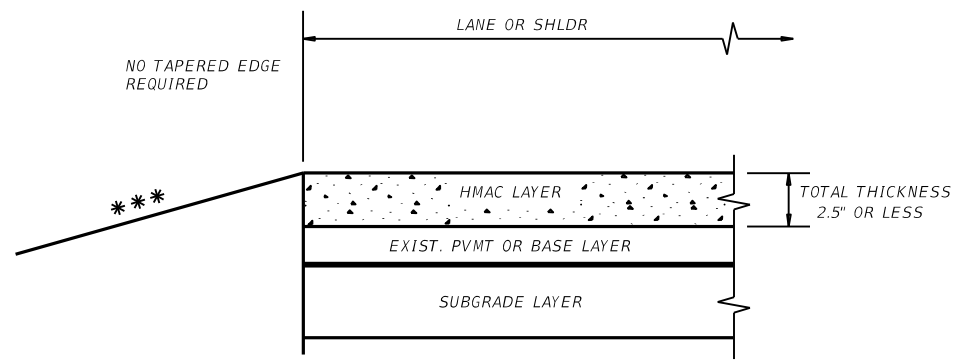
Repairs to impact-damaged post and base plate unit are not permitted. Replace all impact-damaged posts with a new post and base plate unit.

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

Average weight of railing with no overlay: 20 plf total.

SHEET 2 OF 2

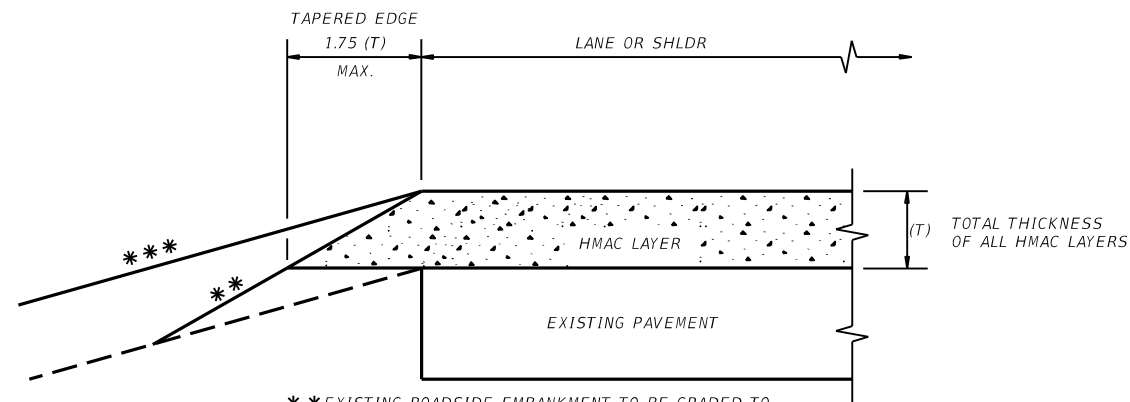
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<h1>TRAFFIC RAIL</h1>			
<h2>TYPE T631</h2>			
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REVISIONS	CONTRACT	SECTION	JOB
0111	03	063	FM 521
07-20: Allowing 9'-4 1/2" or 6'-3" W-Beam sections.	DIST	COUNTY	SHEET NO.
	HOU	FORT BEND	88



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 1

THIN HMAC SURFACES OR HMAC OVERLAY
WITH THICKNESS OF 2.5" OR LESS

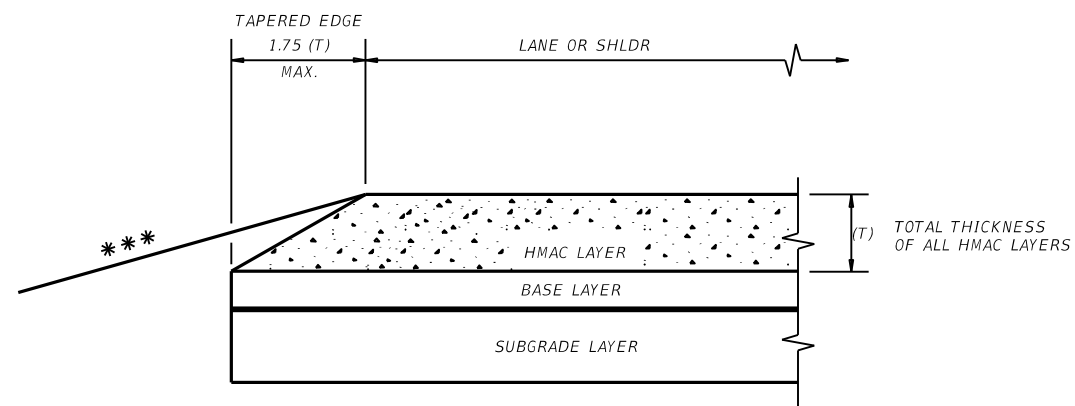


***EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2

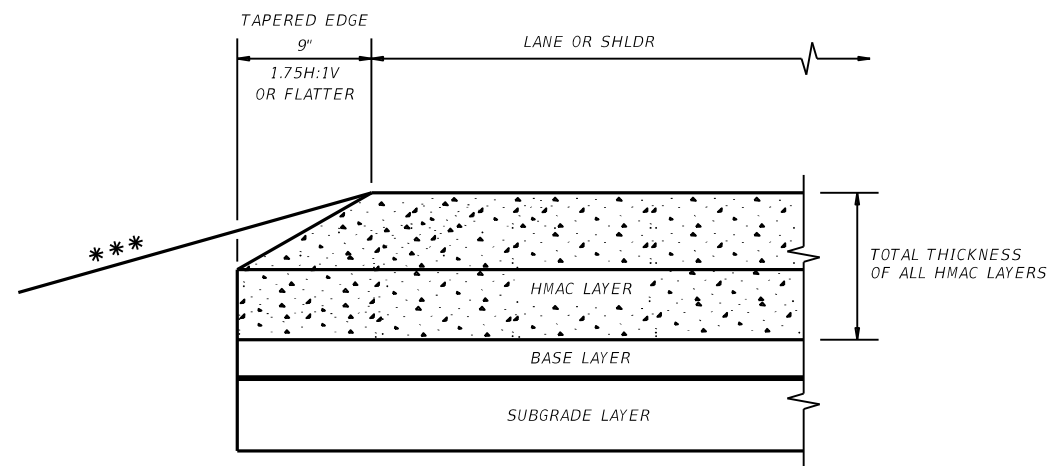
OVERLAY OF EXISTING PAVEMENT
HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3

NEW OR RECONSTRUCTED PAVEMENT
HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4

NEW OR RECONSTRUCTED PAVEMENT
HMAC THICKNESS 5" OR GREATER

GENERAL NOTES

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

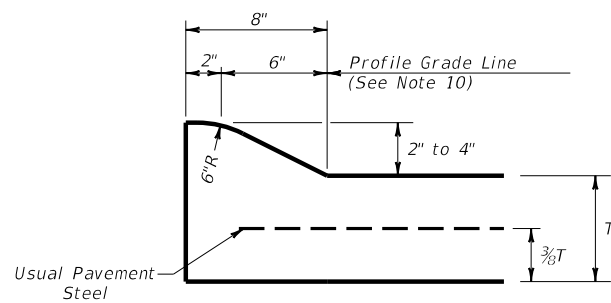
(NOT TO SCALE)

Texas Department of Transportation
Design Division Standard

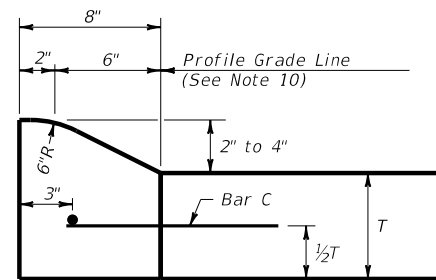
**TAPERED EDGE DETAILS
HMAC PAVEMENT**

TE(HMAC)-11

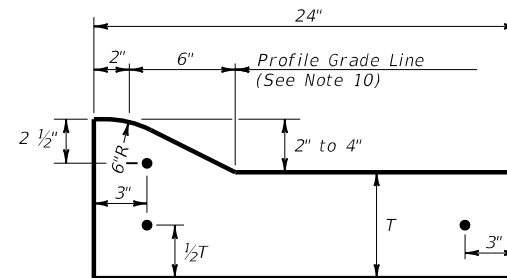
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©TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
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	HOU	FORT BEND	89	



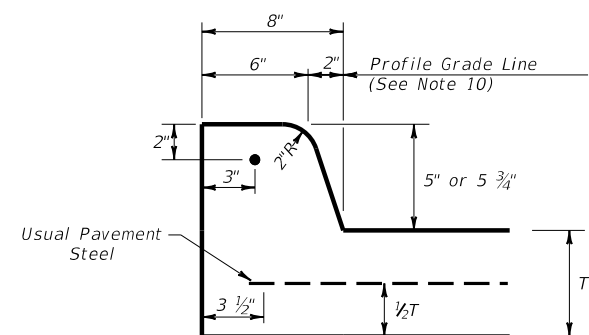
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2" - 4" HEIGHT



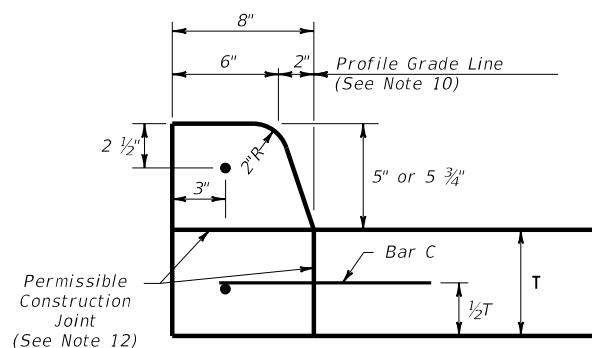
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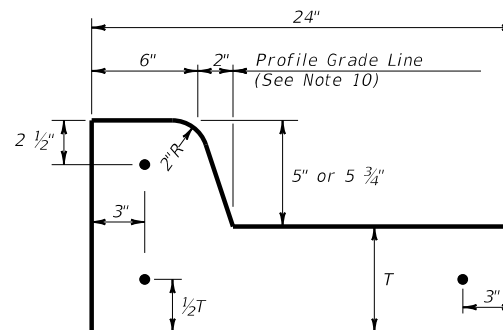
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



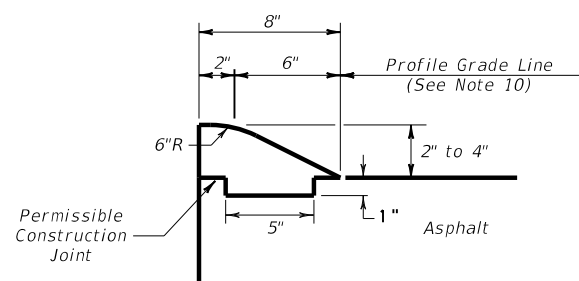
TYPE II CURB (MONOLITHIC)
5" - 5 3/4" HEIGHT



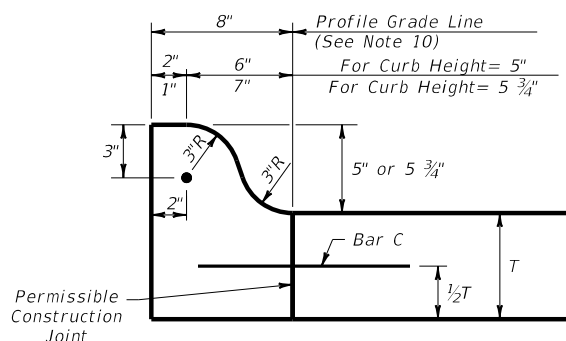
TYPE II CURB
5" - 5 3/4" HEIGHT



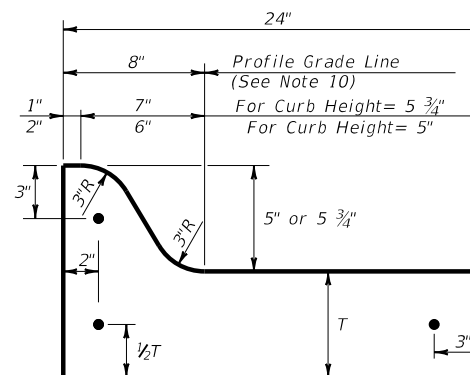
TYPE II CURB AND GUTTER
5" - 5 3/4" HEIGHT



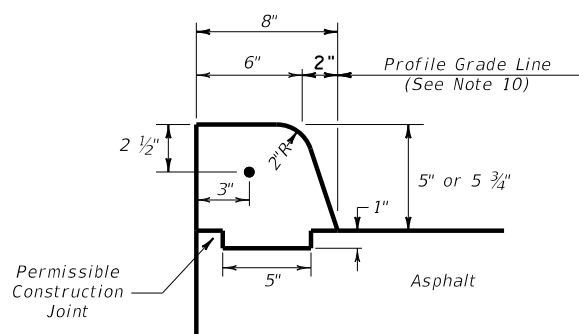
TYPE III CURB (KEYED)
2" - 4" HEIGHT



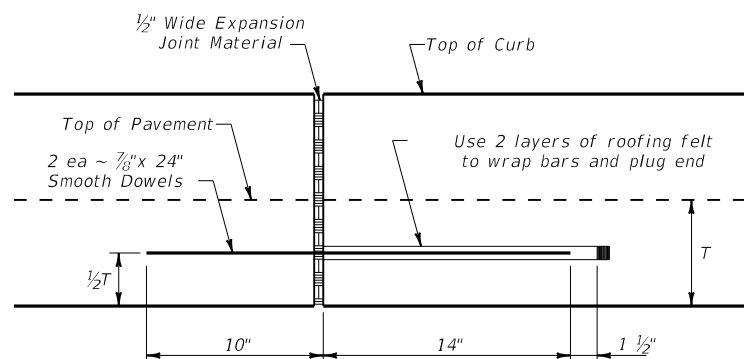
TYPE IIa CURB
5" - 5 3/4" HEIGHT



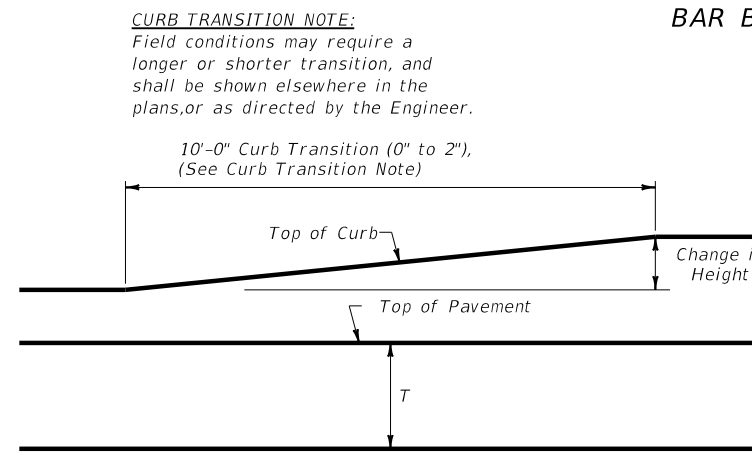
TYPE IIa CURB AND GUTTER
5" - 5 3/4" HEIGHT



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



EXPANSION JOINT DETAIL

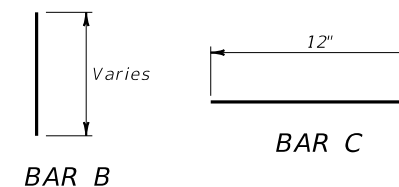


CURB TRANSITION

Note: To be paid for as Highest Curb

GENERAL NOTES

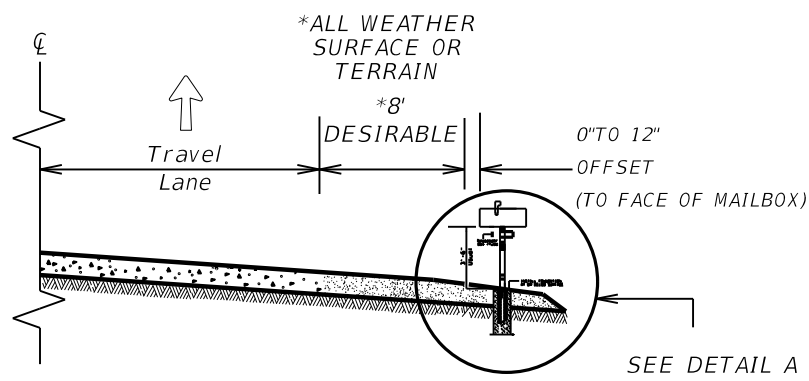
- All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
- Concrete shall be Class A.
- When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is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



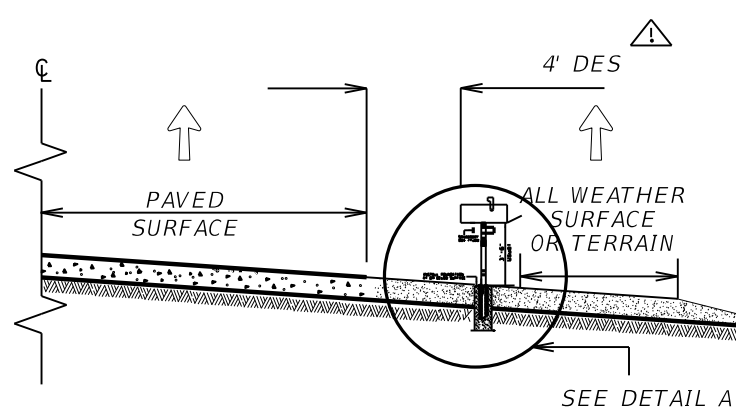
CURB TRANSITION NOTE:

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

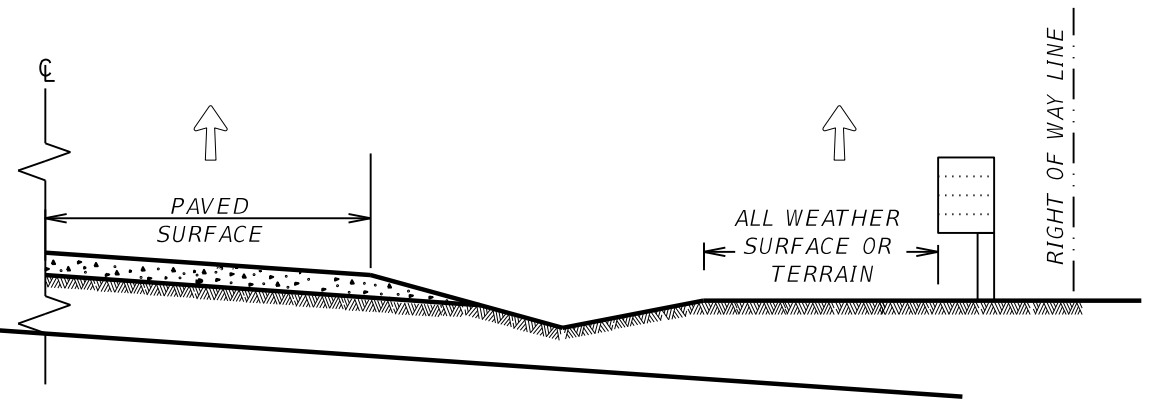
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CONCRETE CURB AND GUTTER					
CCCG-21					
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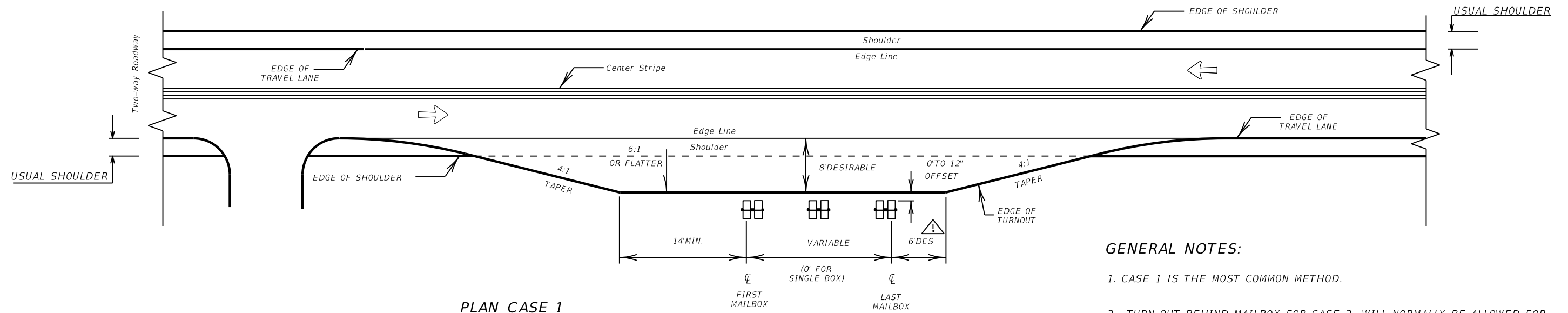
CASE 1. OFF TRAVEL WAY DELIVERY



CASE 2. BACK SIDE DELIVERY



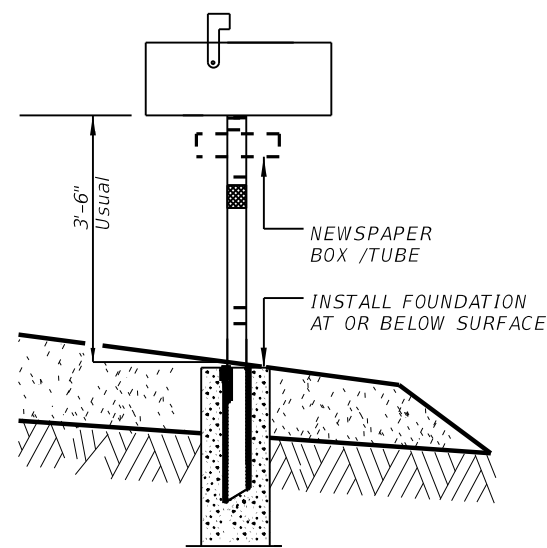
CASE 3. DELIVERY NEAR RIGHT OF WAY LINE



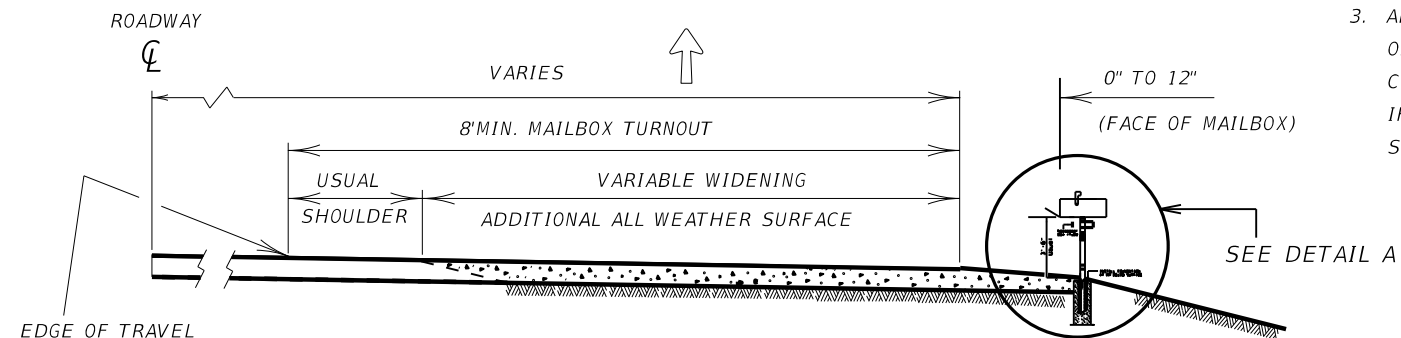
PLAN CASE 1

GENERAL NOTES:

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



DETAIL A

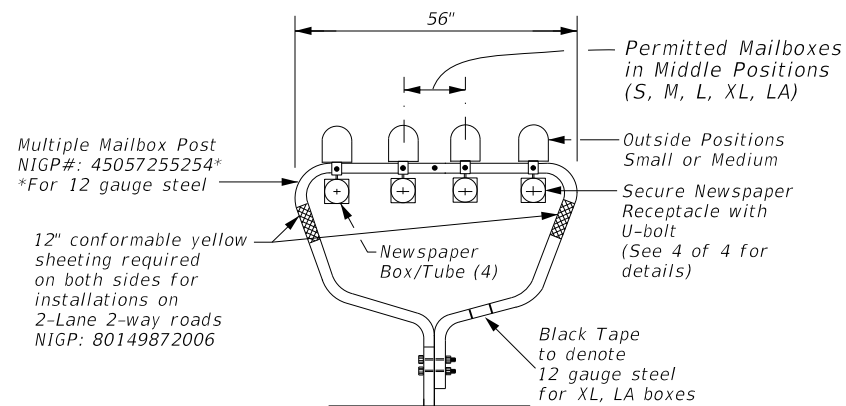


TYPICAL SECTION CASE 1

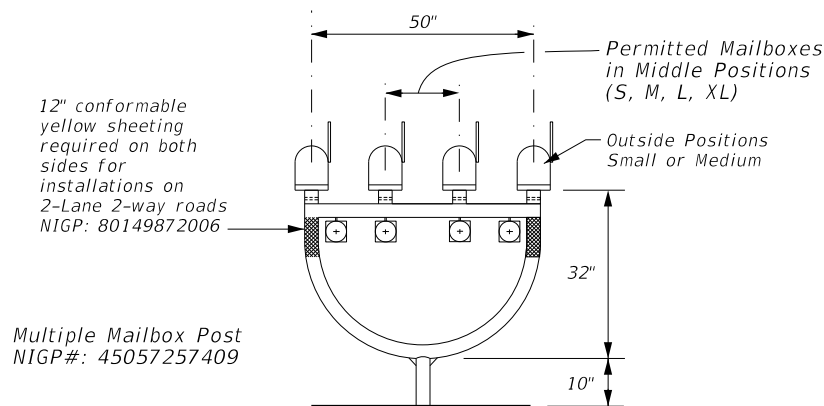
↑ MAIL DELIVERY VEHICLE TRAVEL DIRECTION

		Maintenance Division Standard	
<i>Guideline</i> MAILBOX SIDE ROAD PLACEMENT AND TURNOUTS MB-14(2)			
FILE:MB14(2).DGN	DN:JEO	CK:	DW:JEO
©TxDOT MAY 2014	CONT	SECT	HIGHWAY
REVISIONS	0111	03	063 FM 521
DECEMBER 2012-NEW TxDOT TITLE BLOCK	DIST	COUNTY	SHEET NO.
	HOU	FORT BEND	91

TYPE 1 - MULTIPLE



TYPE 4 - MULTIPLE



MAILBOX SIZES

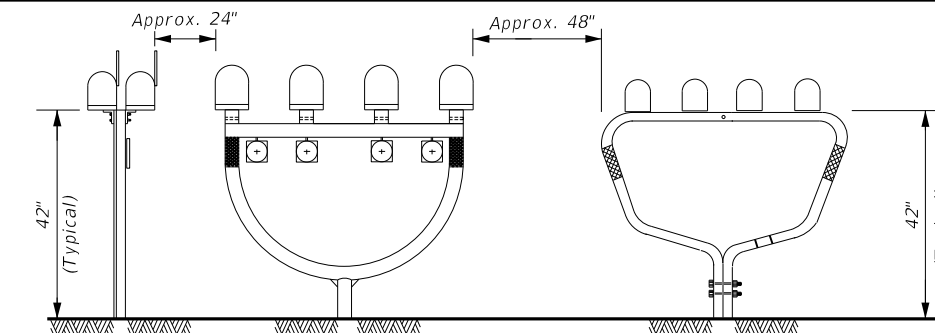
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2"	8"	11 1/2"	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

GENERAL NOTES:

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

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

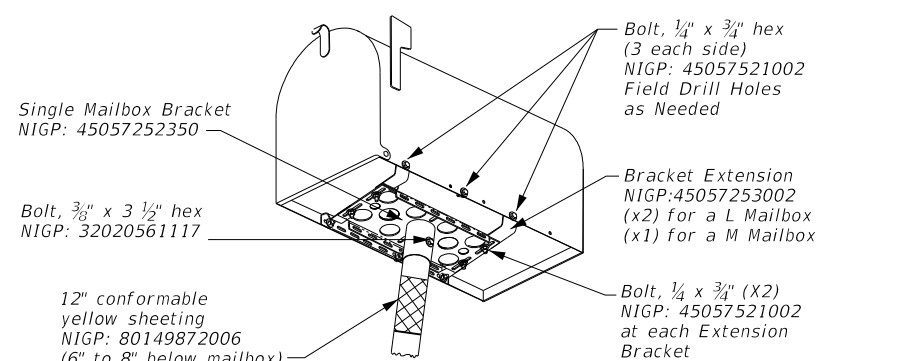
TYPICAL INSTALLATION MEASUREMENTS



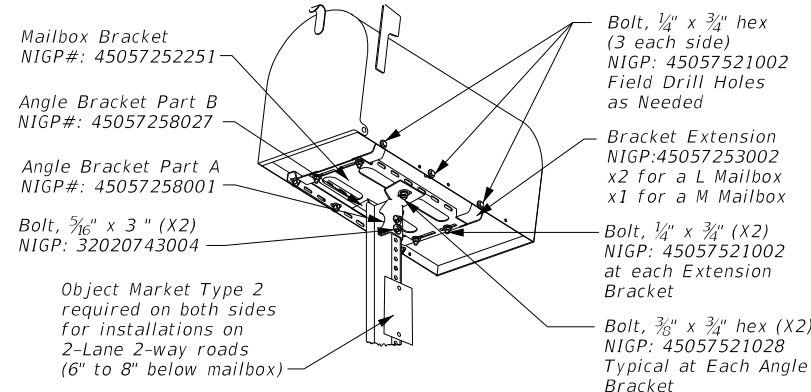
NOTE:

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

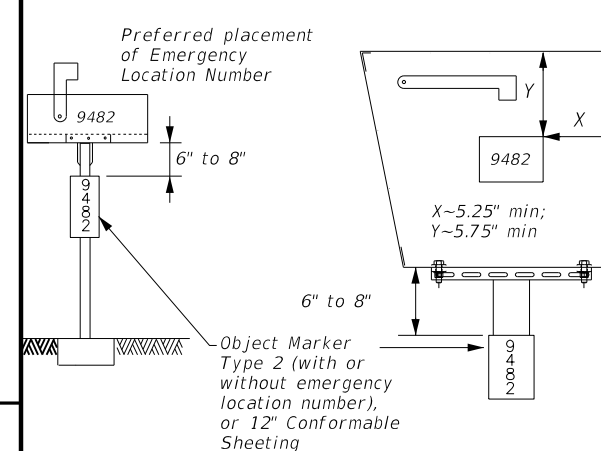
TYPE 2 and 4 - SINGLE/DOUBLE



TYPE 3 - SINGLE/DOUBLE



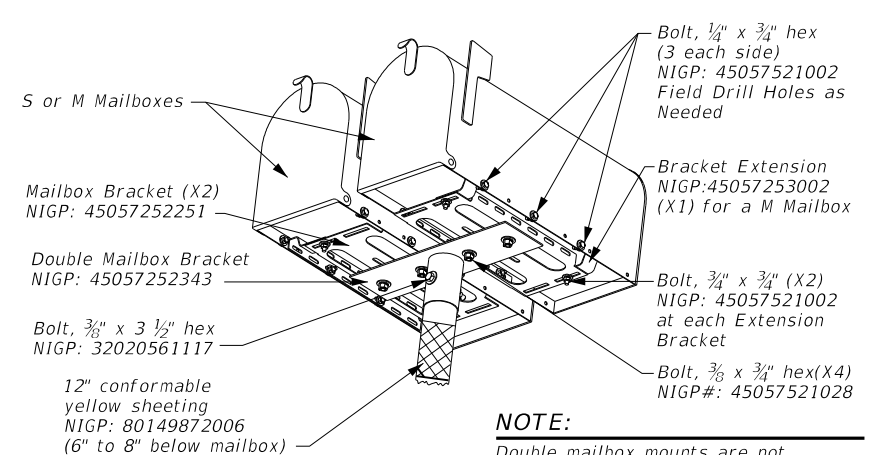
PLACEMENT OF EMERGENCY LOCATION NUMBER



NOTES:

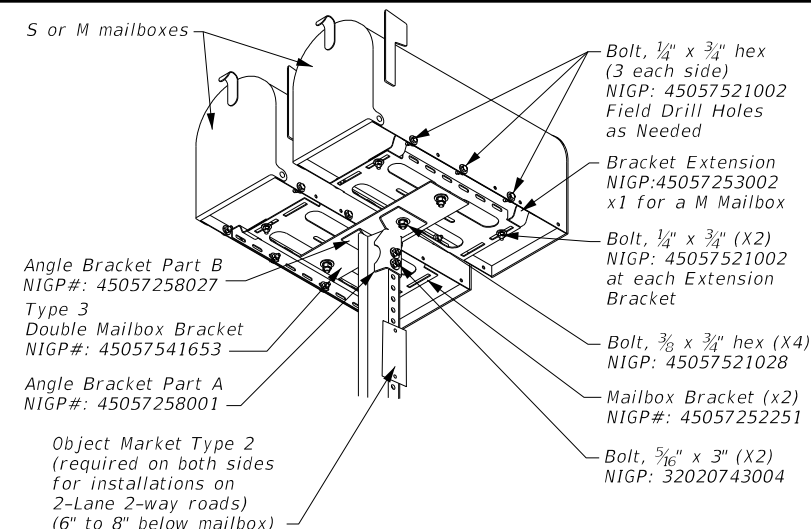
- Location numbers are provided by homeowner. Minimum size 1" height.
- Location number is typically placed on the mailbox in a contrasting color.
- Black numbers may be placed on the Type 2 object marker if the numbers cannot be placed on the mailbox.
- Alternatively, a green or blue plate with white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

SHEET 1 OF 4

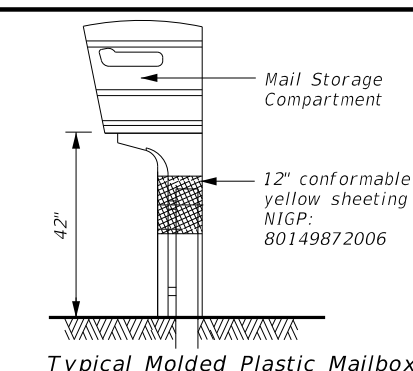


NOTE:

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



TYPE 5



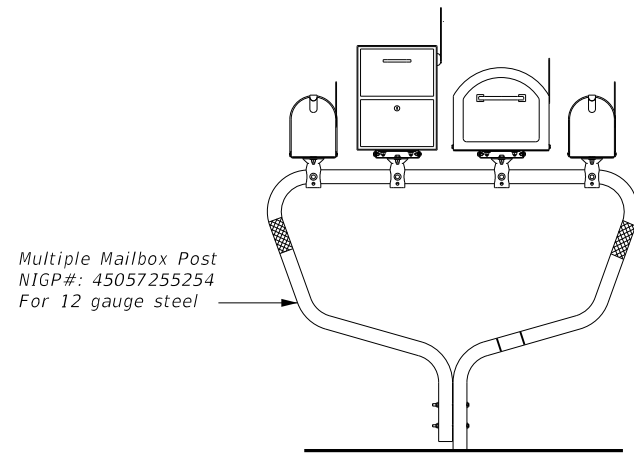
Texas Department of Transportation Maintenance Division Standard

MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CON: 0111	SECT: 03	JOB: 063	HIGHWAY: FM 521
2/2005	REVISIONS	11/2009	4/2015	
6/2005		1/2011		
11/2006		7/2014		
	DIST: HOU	COUNTY: FORT BEND	SHEET NO: 92	

TYPE 1 - MULTI LOCKABLE AND XL MAILBOX



Multiple Mailbox Post
NIGP#: 45057255254
For 12 gauge steel

TYPE 2/4 - SINGLE LOCKABLE MAILBOX

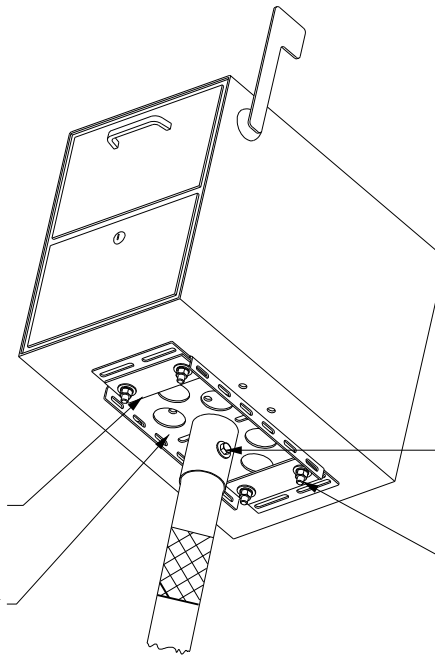


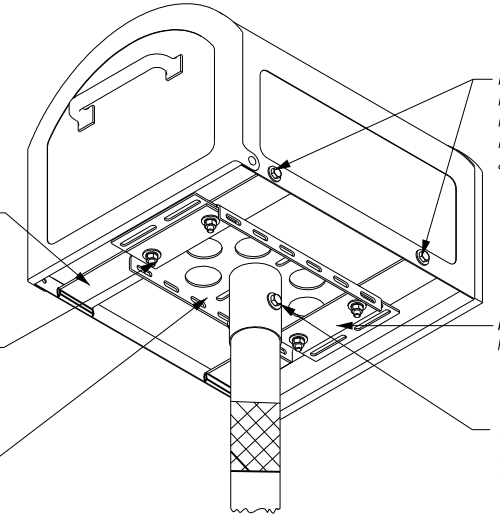
Plate Washer (X2)
NIGP: 45057250255

Single Mailbox Bracket
NIGP: 45057252350

Bolt, 3/8" x 3 1/2"
hex (X2)
NIGP: 32020561117

Bolt, 5/16" x 1 1/4"
hex (X4)
NIGP: 32020681246

TYPE 2/4 - SINGLE XL MAILBOX



L-bracket (X4)
NIGP#: 45057250263

Bolt, 3/8" x 3 1/2"
hex (X2)
NIGP: 32020561117

Bolt, 5/16" x 1 1/2"
hex (X4)
NIGP: 32020560507

Single Mailbox Bracket
NIGP: 45057252350

Bolt, 1/4" x 3/4"
hex (2 each side)
NIGP: 45057521002
Field Drill Holes
as Needed

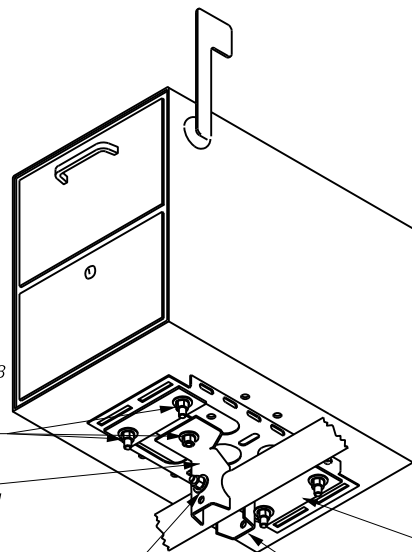
Plate Washer (X2)
NIGP: 45057250255

Bolt, 3/8" x 3 1/2"
hex (X2)
NIGP: 32020561117

NOTE:

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

TYPE 1 MULTI - LOCKABLE ARCHITECTURAL (LA)



Bolt, 3/8" x 3/4"
hex (X6)
NIGP: 45057521028
Typical at Each
Angle Bracket
and plate washer

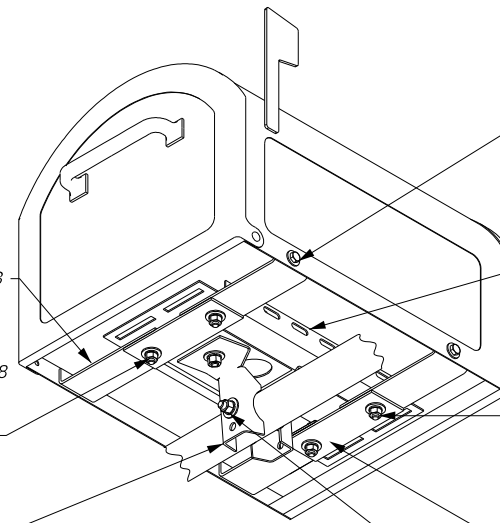
Mailbox Bracket
NIGP: 45057252251
(Inverted)

Bolt, 3/8" x 4 1/2" hex
NIGP: 32020561133
Drill 7/16" hole in Post

Plate Washer (X2)
NIGP: 45057250255

Angle Bracket
Part A (X2)
NIGP: 45057258001

TYPE 1 MULTI - XL MAILBOX



L-bracket (X4)
NIGP# 45057250263

Bolt, 3/8" x 3/4"
hex (X6)
NIGP: 45057521028
Typical at Each
Angle Bracket
and plate washer

Angle Bracket
Part A (X2)
NIGP: 45057258001

Bolt, 1/4" x 3/4" hex
(2 each side)
NIGP: 45057521002
Field Drill Holes
as Needed

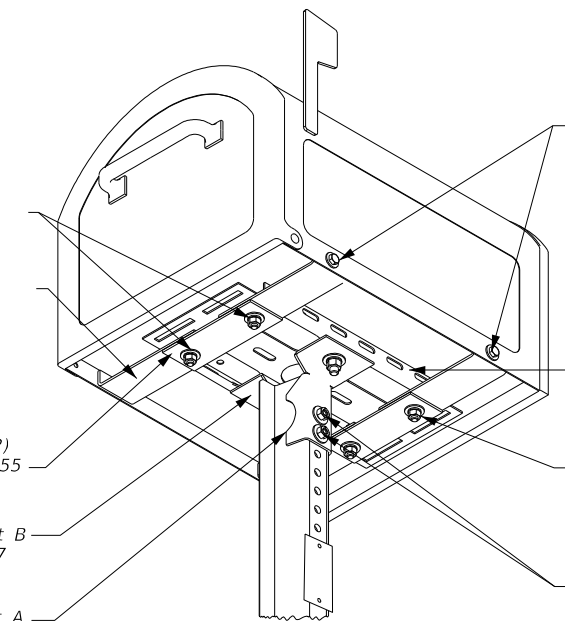
Mailbox Bracket
NIGP#: 45057252251
(Inverted)

Bolt, 5/16" x 2 1/2" hex (X4)
NIGP: 32020220938
Use existing
hole in mailbox

Plate Washer (x2)
NIGP#: 45057250255

Bolt, 3/8" x 4 1/2" hex
NIGP: 32020561133
Drill 7/16" hole
in Post

TYPE 3 - XL MAILBOX MOUNTING



Bolt, 5/16" x 1- 1/2"
hex (X4)
NIGP: 32020560507

L-bracket (x4)
NIGP: 45057250263

Plate Washer (X2)
NIGP: 45057250255

Angle Bracket Part B
NIGP: 45057258027

Angle Bracket Part A
NIGP: 45057258001

Bolt, 1/4" x 3/4" hex
(2 each side)
NIGP: 45057521002
Field Drill Holes
as Needed

Mailbox Bracket
NIGP: 45057252251
(Inverted)

Bolt, 3/8" x 3/4"
hex (X2)
NIGP: 45057521028
Typical at Each
Angle Bracket

Bolt, 5/16" x 3" (X2)
NIGP: 32020743004

SHEET 2 OF 4

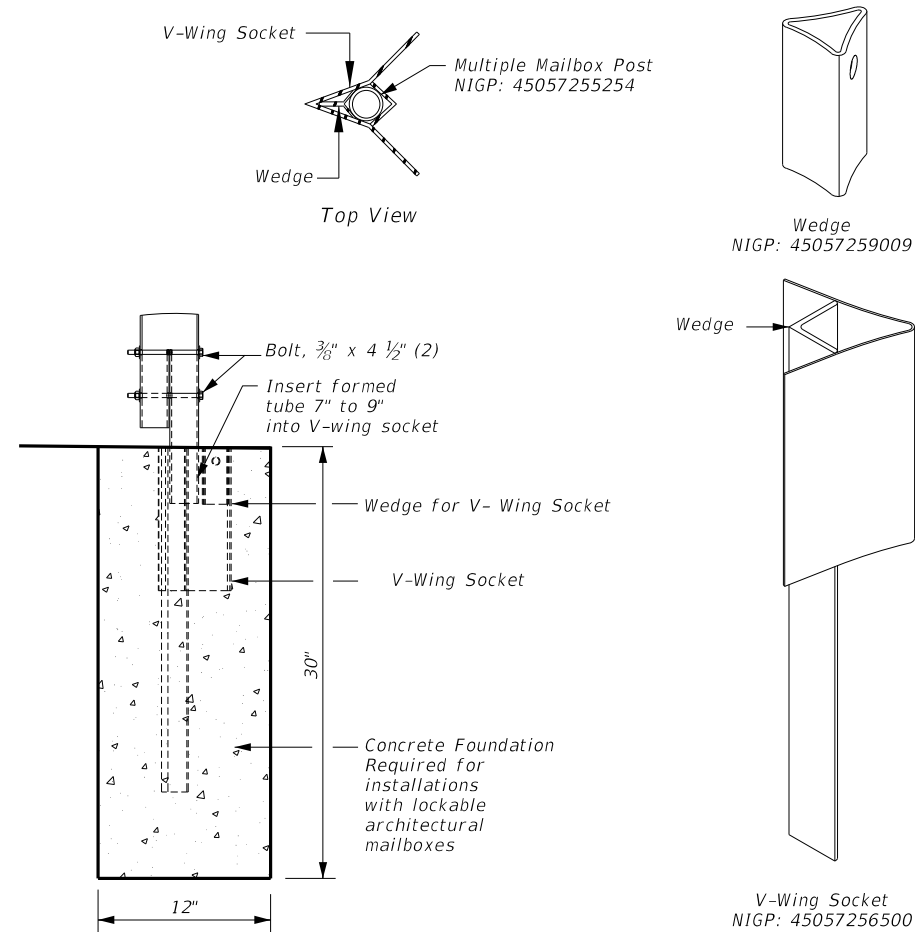


**XL AND LOCKABLE
ARCHITECTURAL
MAILBOX ASSEMBLY
MB(2)-21**

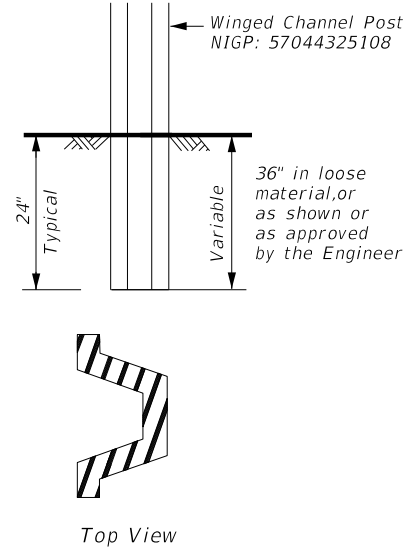
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©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
2/2005	REVISIONS	0111	03	063
6/2005	11/2009			FM 521
11/2006	1/2011			
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	93	

TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



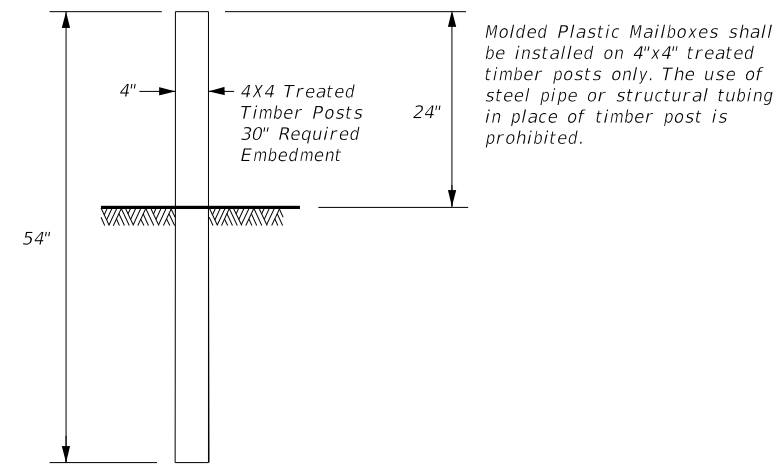
TYPE 3 - SUPPORT/FOUNDATION



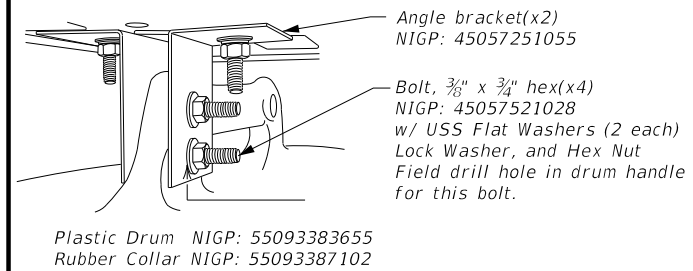
NOTES:

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

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT

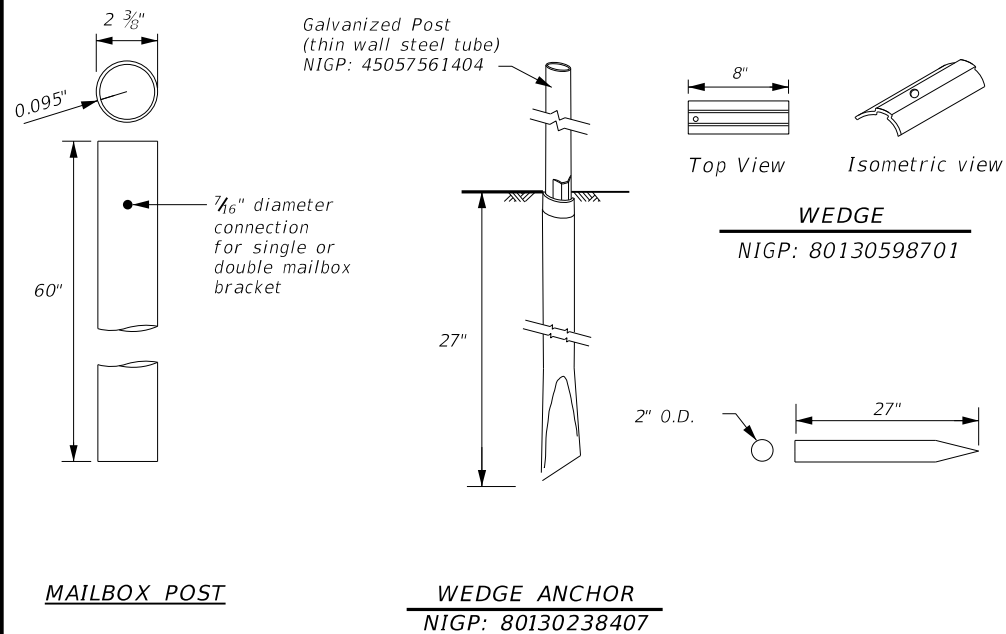


NOTES:

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

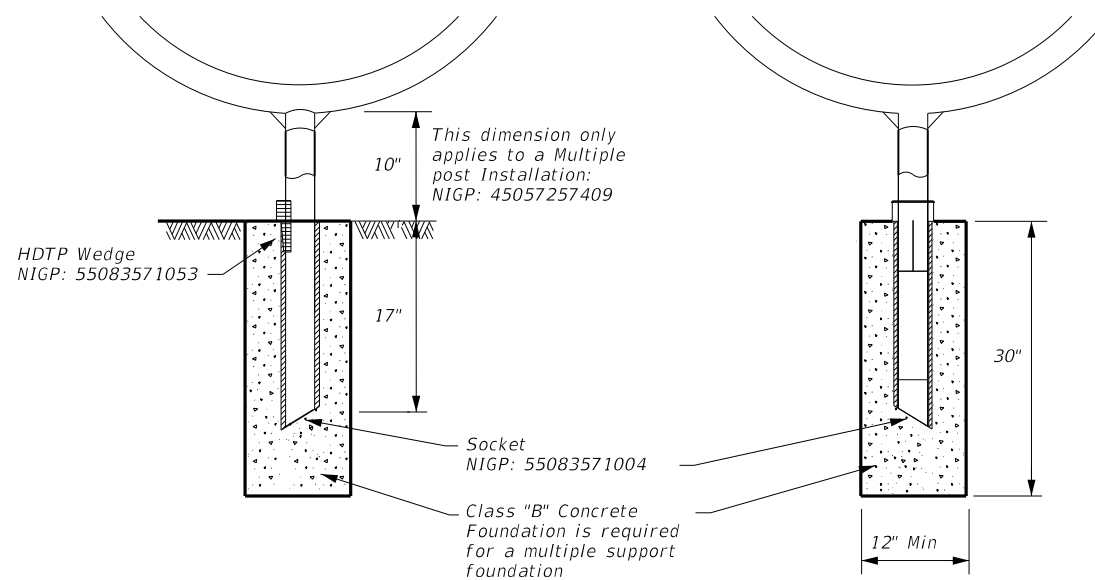
TYPE 2 - SUPPORT/FOUNDATION

Thin Wall Steel Tube w/Wedge Anchor System



TYPE 4 - SUPPORT/FOUNDATION

Whitecoated steel post NIGP: 45057561107
 Multiple post NIGP: 45057257409
 Recycled Rubber post (RR) NIGP: 45057561057



GENERAL NOTES:

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

SHEET 3 OF 4

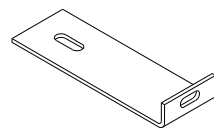
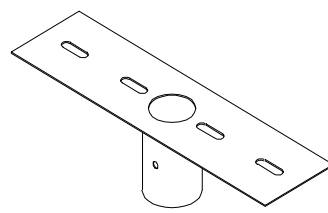
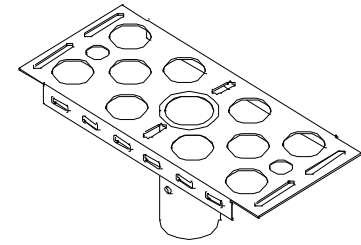
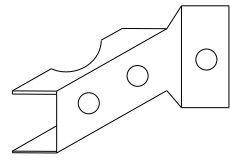
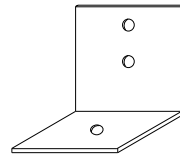
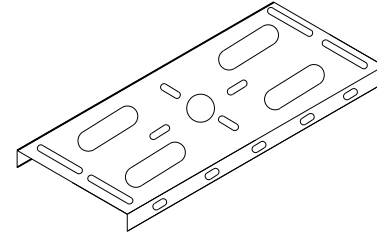
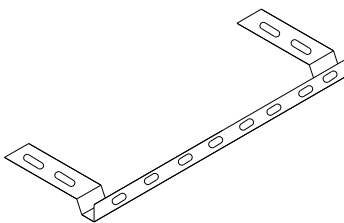
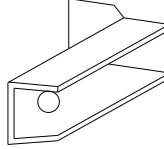
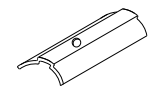


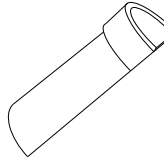
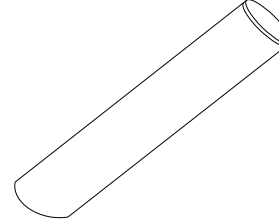

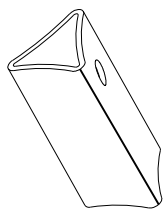
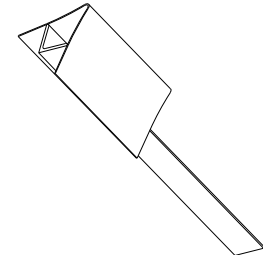


MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

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©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
2/2005	0111	03	063	FM 521
6/2005	DIST	COUNTY	SHEET NO.	
11/2006	HOU	FORT BEND	94	

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

 NIGP: 45057250263 L-Bracket x4 for XL sized mailboxes	 NIGP: 45057252343 Double Mailbox Bracket For Type 2 and Type 4 double mount	 NIGP: 45057252350 Single Mailbox Bracket For Type 2 single and for Type 4 single and multi mount	 NIGP: 45057258001 Part "A" Angle Bracket For Type 1 multi (2 per mailbox) and Type 3 single and double
 NIGP: 45057251055 Type 6 Angle Bracket (2 per mailbox)	 NIGP: 45057252251 Mailbox Bracket For Type 1 multi and any double mount (use 2)	 NIGP: 45057253002 Bracket Extension Use 1 for a medium Mailbox Use 2 for a Large Mailbox	 NIGP: 45057258027 Part "B" Angle Bracket For Type 3 single and double
 NIGP: 80130598701 Wedge for Type 2	 NIGP: 45057250255 Plate Washer for Architectural and XL Mailboxes	 NIGP: 45057541653 Type 3 double mailbox bracket	 NIGP: 55083571053 Type 4 Mailbox Wedge
 NIGP: 55083571004 Type 4 Mailbox Socket	 NIGP: 80130238407 Type 2 Wedge Anchor	 NIGP: 45057259009 Wedge for Type 1 V-wing Socket	 NIGP: 45057256500 V-wing Socket for Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 0M 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 0M 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

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

BID CODES FOR CONTRACTS

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

Type of Mailbox _____

S = Single
D = Double
M = Multiple
MP = Molded Plastic


Type of Post _____

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

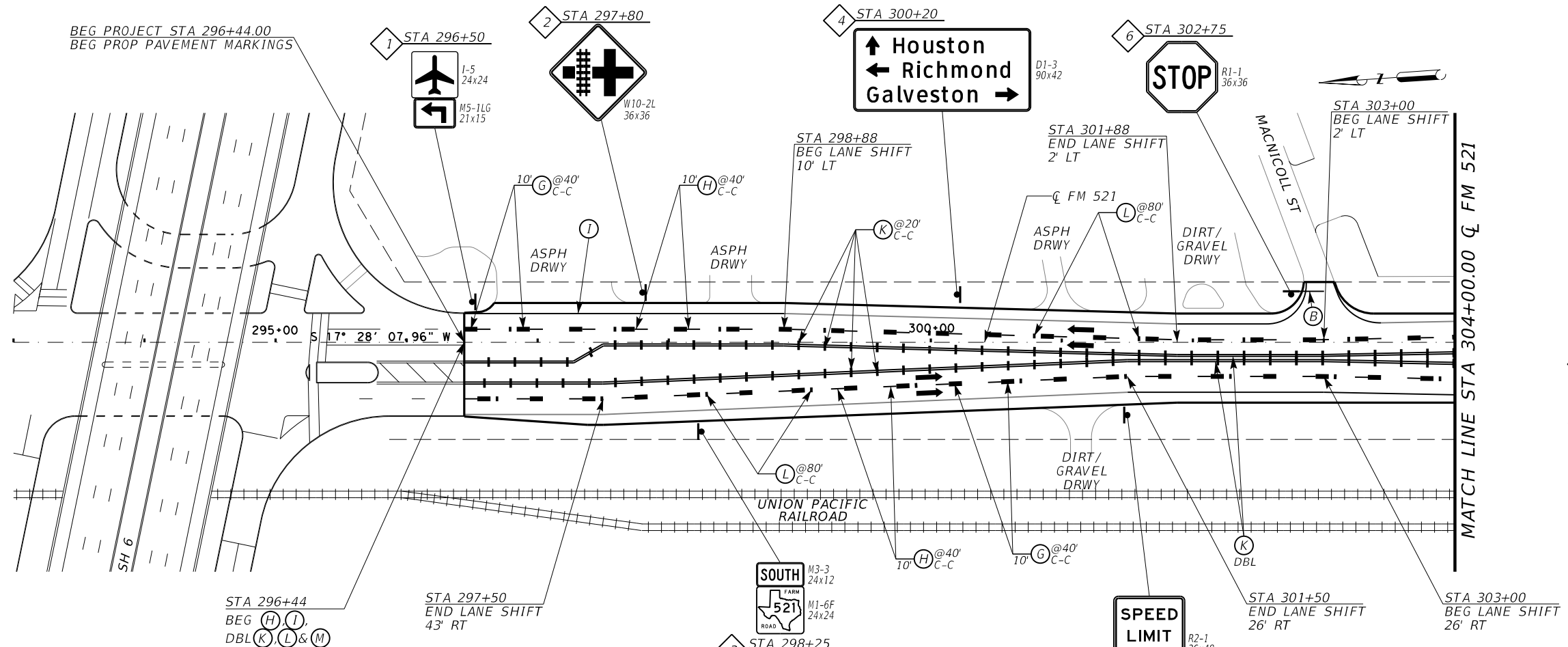
Type of Foundation _____

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

SHEET 4 OF 4

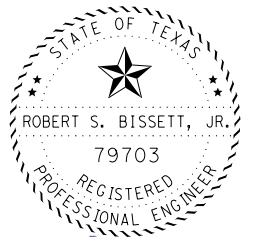
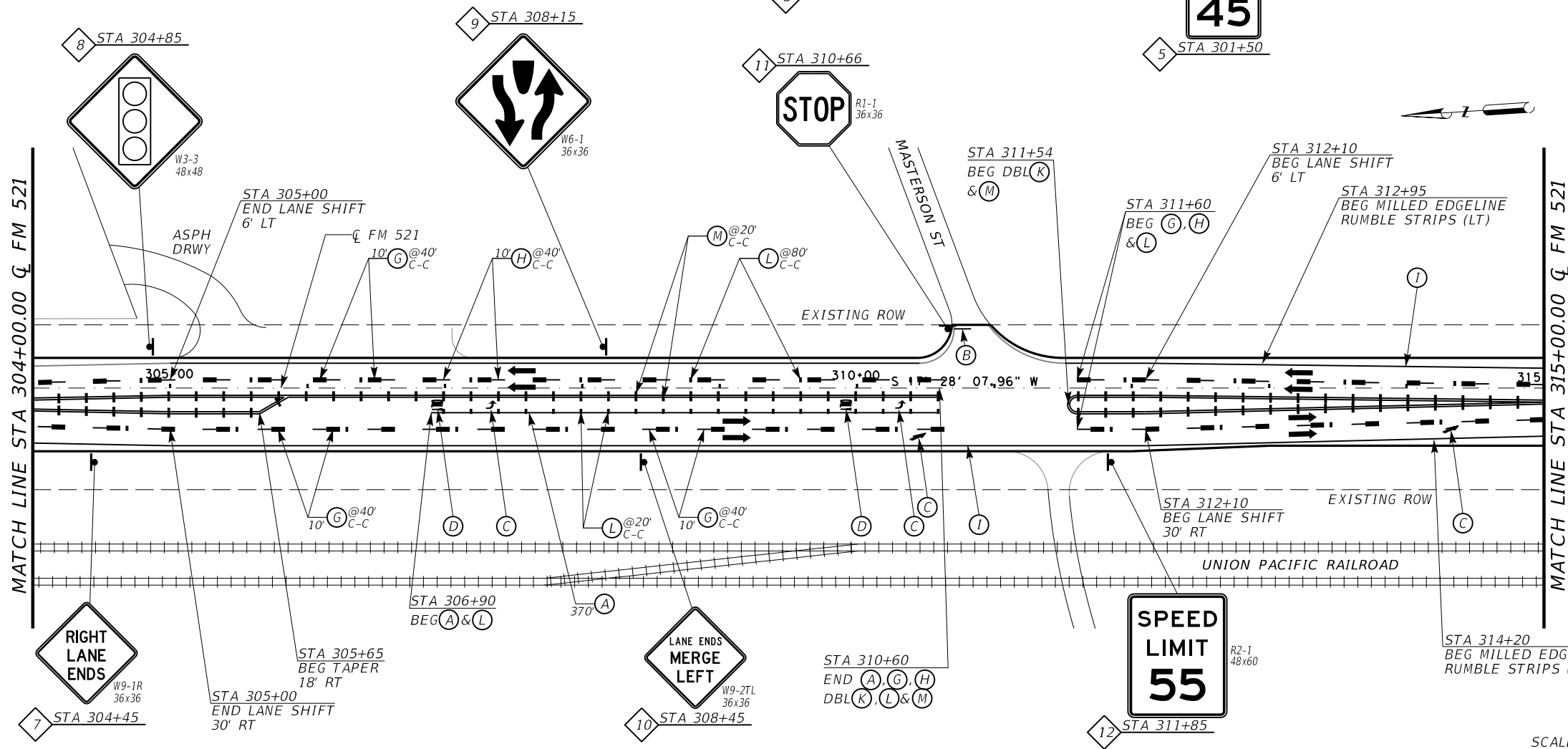
 Texas Department of Transportation				Maintenance Division Standard	
<h2>NIGP PARTS LIST AND COMPATIBILITY</h2> <h3>MB(4)-21</h3>					
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
©TxDOT March 2004	CONTRACT	SECT	JOB	HIGHWAY	
	0111	03	063	FM 521	
2/2005	11/2009	4/2015			
6/2005	1/2011		DIST	COUNTY	SHEET NO.
11/2006	7/2014		HOU	FORT BEND	95

BEG PROJECT STA 296+44.00
BEG PROP PAVEMENT MARKINGS



LEGEND

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
 - (B) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
 - (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
 - (E) REFL PAV MRK TY I (W)(RR XING)(100MIL)
 - (F) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (G) REFL PAV MRK TY I (BLACK)6"(SHADOW)(100MIL)
 - (H) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
 - (I) REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)
 - (J) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
 - (K) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
 - (L) REFL PAV MRK TY I-C
 - (M) REFL PAV MRK TY II-A-A
- # PROPOSED SMALL SIGN NUMBER
 - PROPOSED SMALL SIGN
 - TRAFFIC DIRECTION
 - INSTL OM ASSM (OM-2Y)(WC)GND
 - INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)



Robert S. Bissett, Jr.
10/29/21

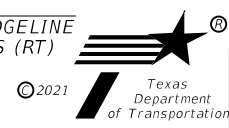
SIGNING & PAVEMENT MARKING LAYOUT

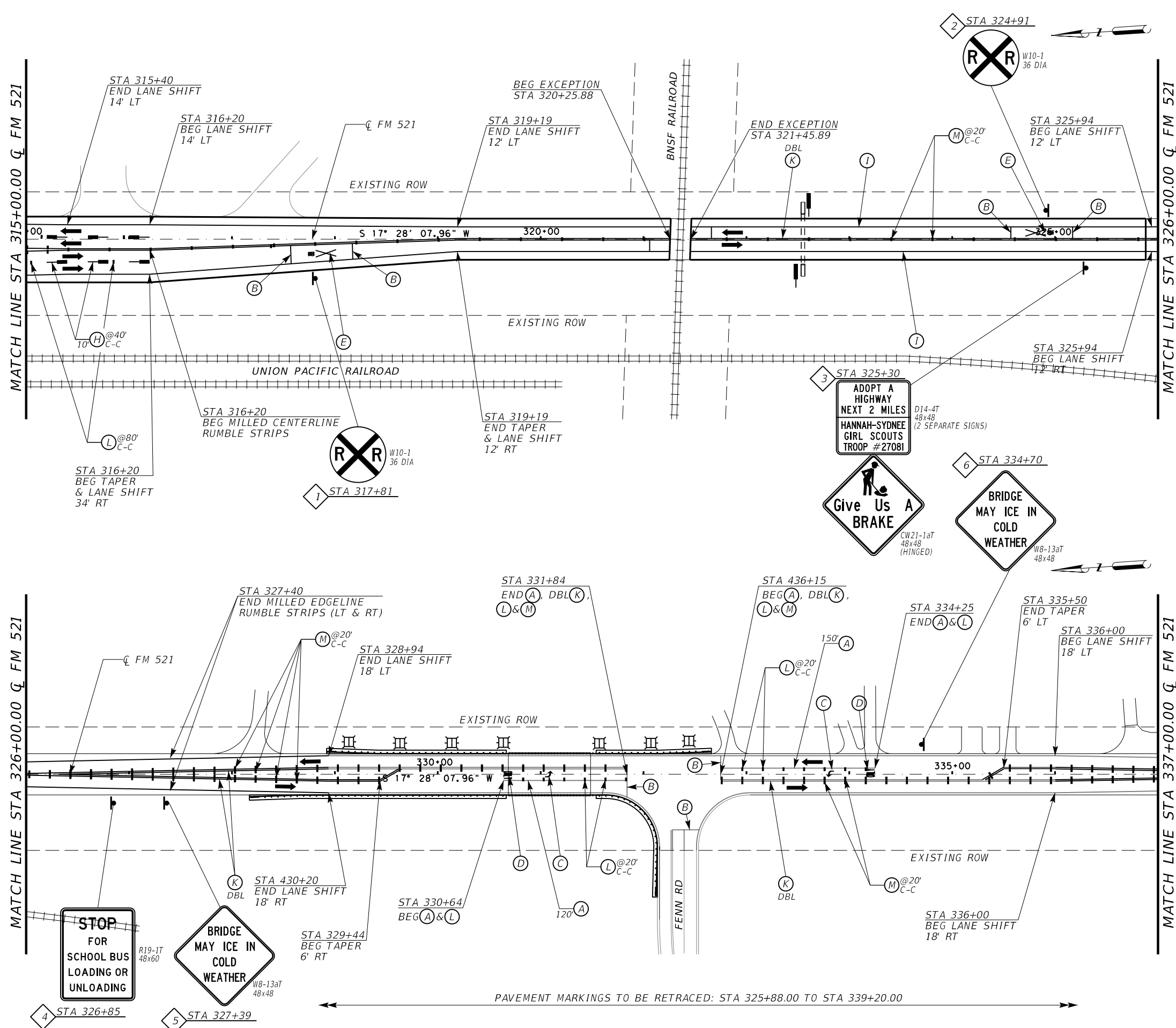
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SHEET 1 OF 12

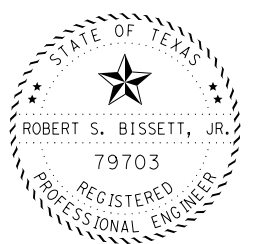
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0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	96

SCALE: 1"=100'





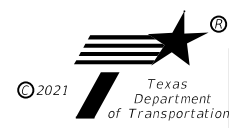
- LEGEND**
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
 - (B) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
 - (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
 - (E) REFL PAV MRK TY I (W)(RR XING)(100MIL)
 - (F) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (G) REFL PAV MRK TY I (BLACK)6"(SHADOW)(100MIL)
 - (H) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
 - (I) REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)
 - (J) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
 - (K) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
 - (L) REFL PAV MRK TY I-C
 - (M) REFL PAV MRK TY II-A-A
- # PROPOSED SMALL SIGN NUMBER
 - PROPOSED SMALL SIGN
 - TRAFFIC DIRECTION
 - INSTL OM ASSM (OM-2Y)(WC)GND
 - INSTL DEL ASSM (D-SW)SZ I(BRF)GF2(BI)



Robert S. Bissett, Jr.
 10/29/21
SIGNING & PAVEMENT MARKING LAYOUT

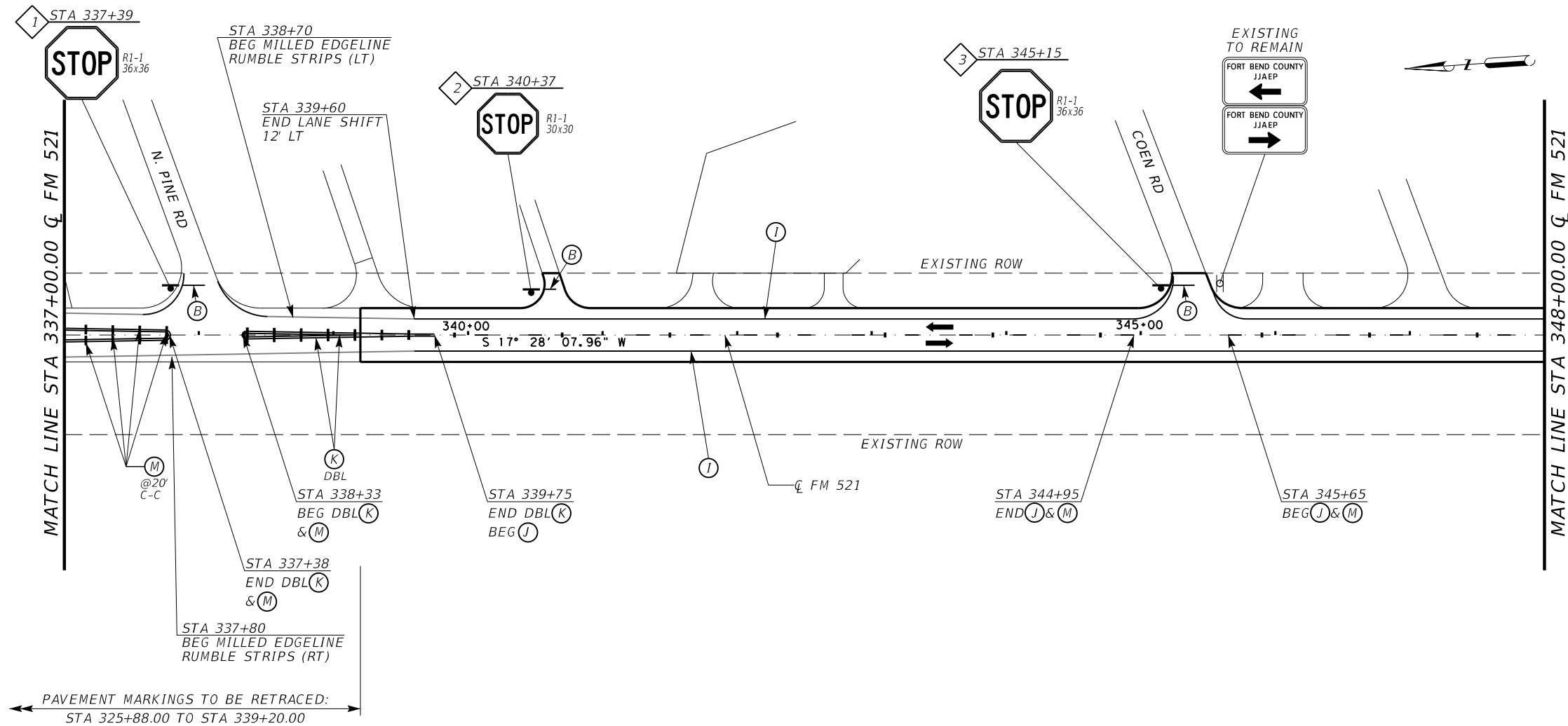
STA 315+00.00
 TO
 STA 337+00.00

SHEET 2 OF 12



SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	97

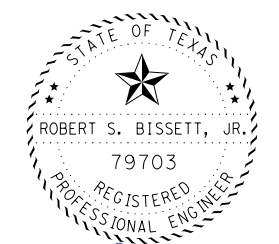
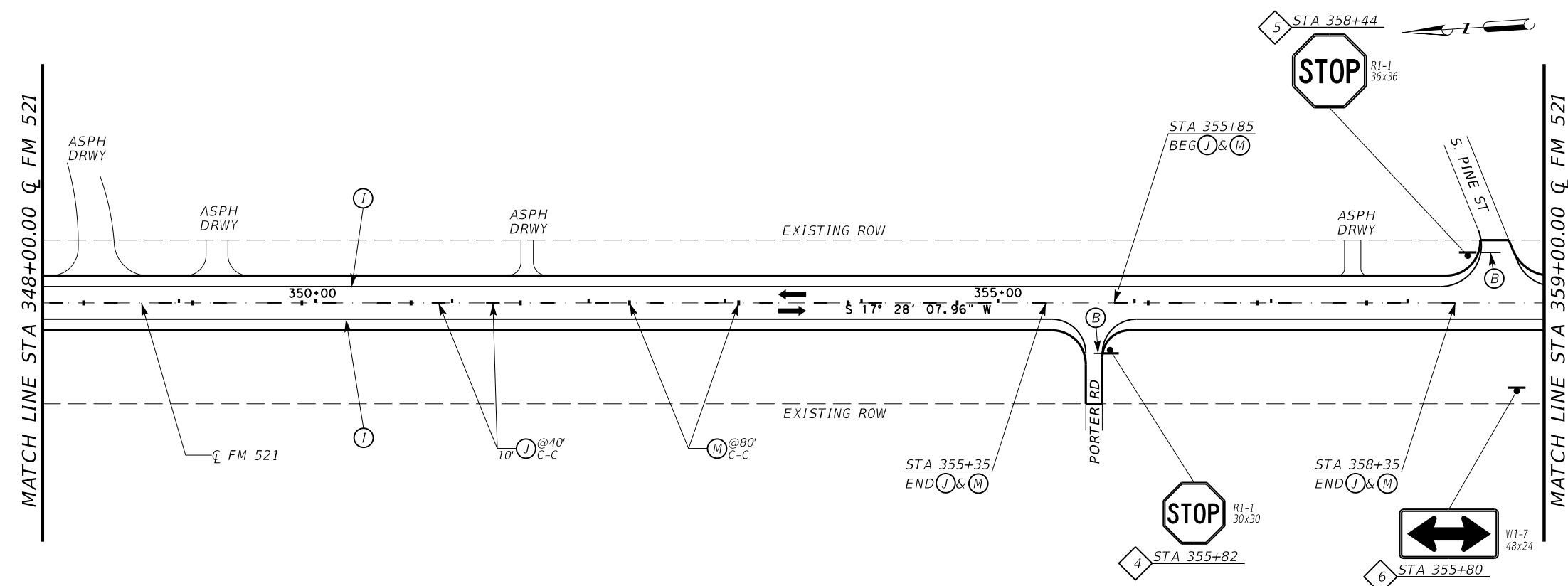


- LEGEND**
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
 - (B) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
 - (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
 - (E) REFL PAV MRK TY I (W)(RR XING)(100MIL)
 - (F) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (G) REFL PAV MRK TY I (BLACK)6"(SHADOW)(100MIL)
 - (H) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
 - (I) REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)
 - (J) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
 - (K) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
 - (L) REFL PAV MRK TY I-C
 - (M) REFL PAV MRK TY II-A-A

- ◆ PROPOSED SMALL SIGN NUMBER
- ▬ PROPOSED SMALL SIGN
- ← TRAFFIC DIRECTION
- ▬ INSTL OM ASSM (OM-2Y)(WC)GND
- ▬ INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)

- NOTES**
1. BEGIN MILLED EDGELINE RUMBLE STRIPS AT STA 338+70 (LEFT).
 2. BEGIN MILLED EDGELINE RUMBLE STRIPS AT STA 337+80 (RIGHT).

PAVEMENT MARKINGS TO BE RETRACED:
STA 325+88.00 TO STA 339+20.00

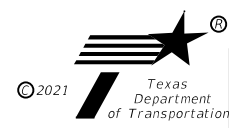


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STA 337+00.00
TO
STA 359+00.00

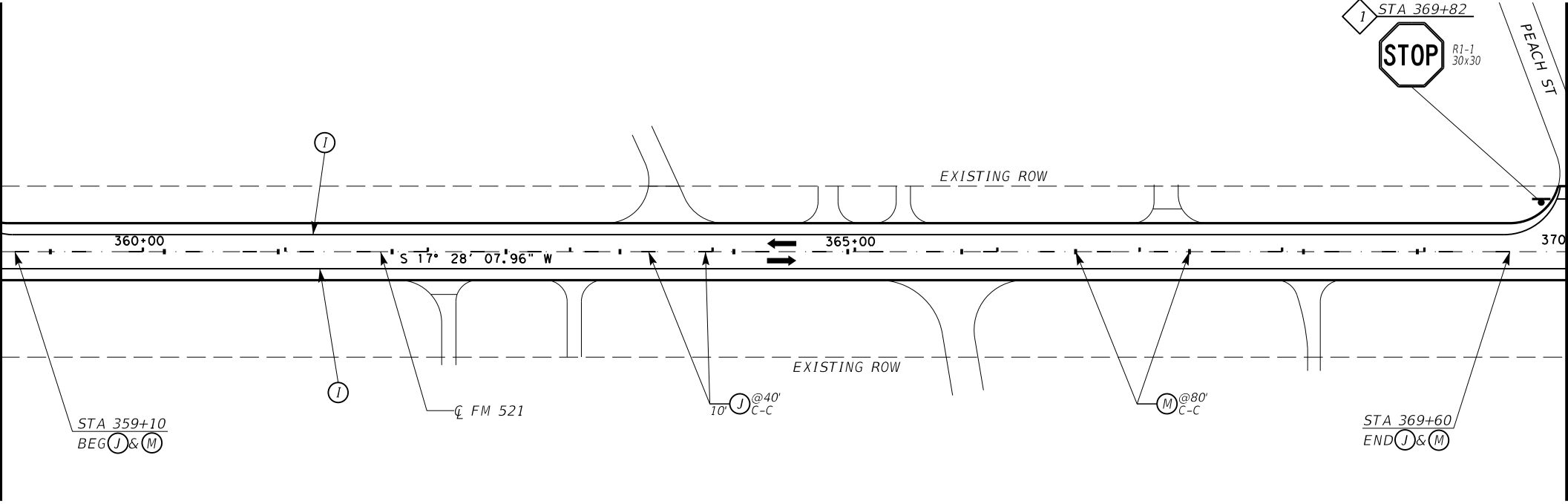
SHEET 3 OF 12



SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	98

MATCH LINE STA 359+00.00 Q FM 521



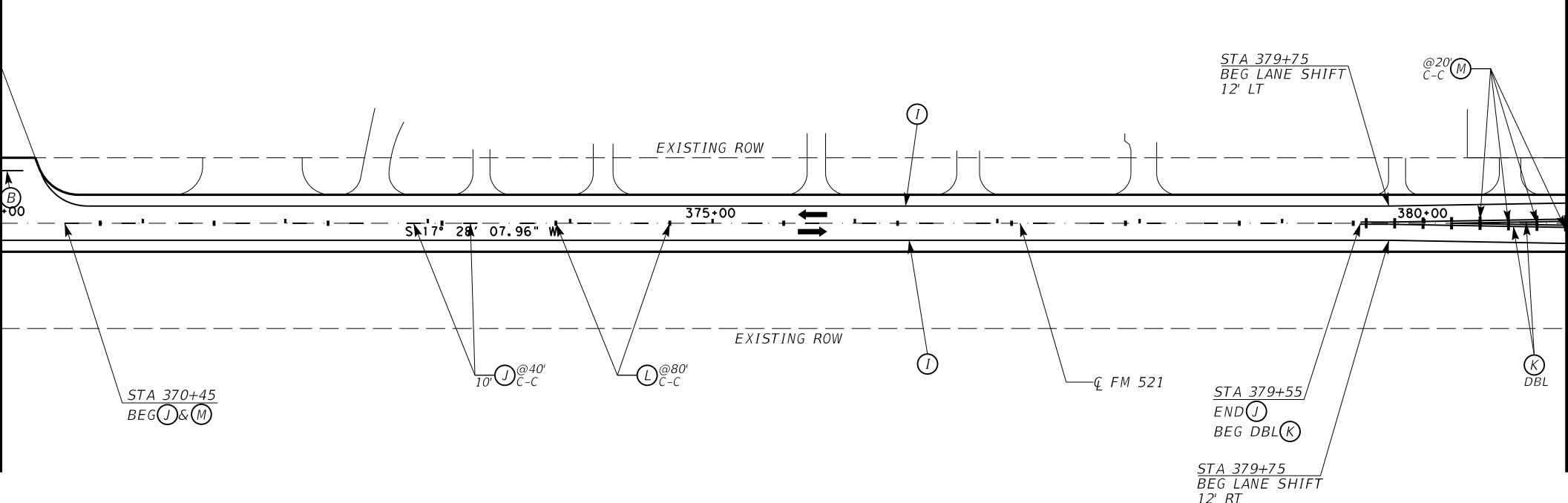
MATCH LINE STA 370+00.00 Q FM 521

LEGEND

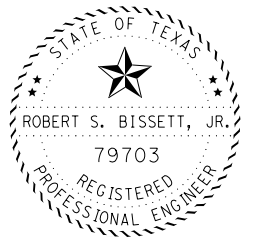
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)ARROW(100MIL)
- (D) REFL PAV MRK TY I (W)WORD(100MIL)
- (E) REFL PAV MRK TY I (W)RR XING(100MIL)
- (F) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- (G) REFL PAV MRK TY I (BLACK)6"(SHADOW)(100MIL)
- (H) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
- (I) REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)
- (J) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (L) REFL PAV MRK TY I-C
- (M) REFL PAV MRK TY II-A-A

- # PROPOSED SMALL SIGN NUMBER
- PROPOSED SMALL SIGN
- TRAFFIC DIRECTION
- INSTL OM ASSM (OM-2Y)(WC)GND
- INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)

MATCH LINE STA 370+00.00 Q FM 521



MATCH LINE STA 381+00.00 Q FM 521



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09/13/21

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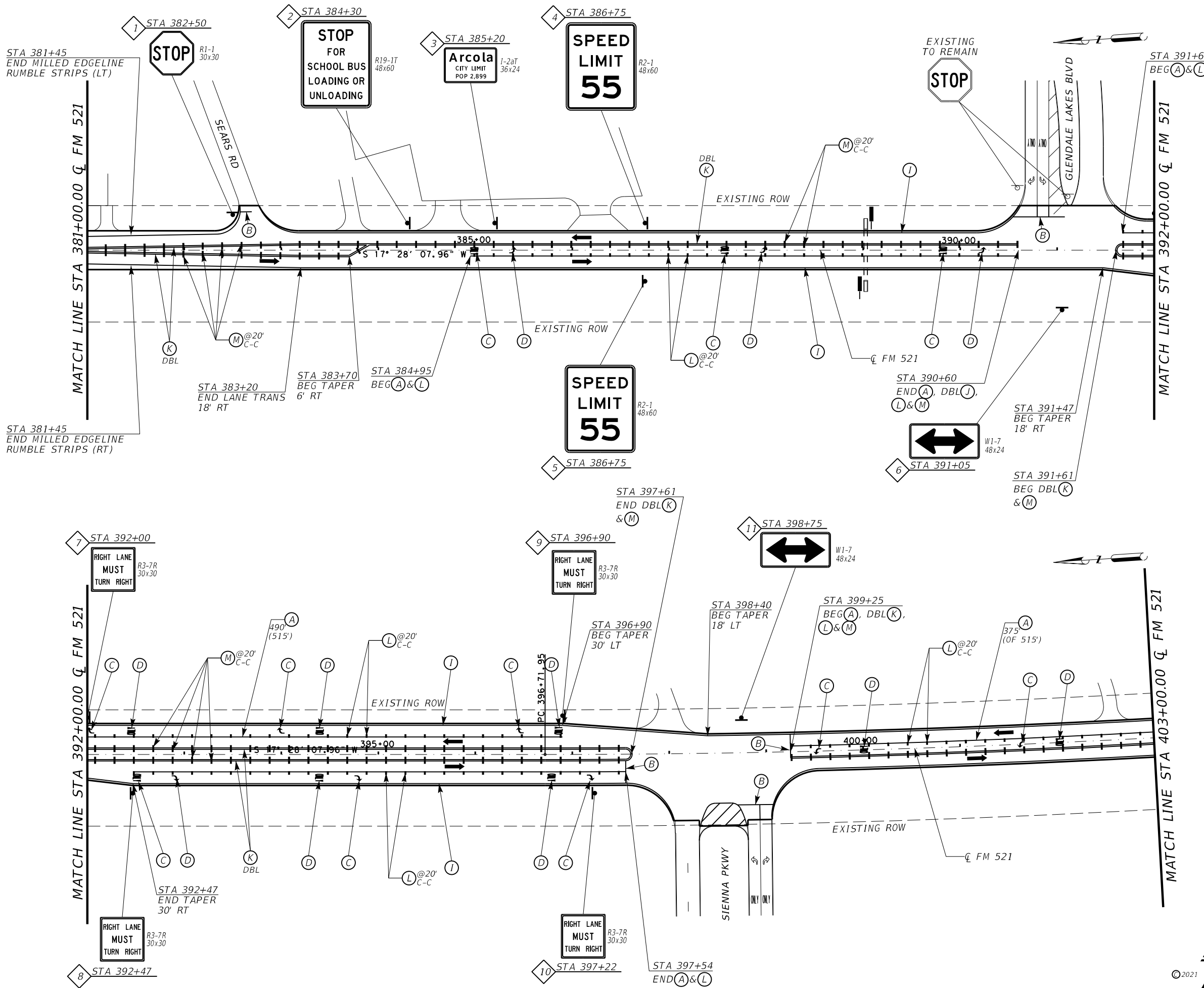
STA 359+00.00
TO
STA 381+00.00

SHEET 4 OF 12

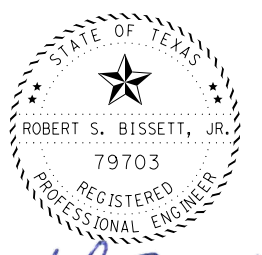


SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	99



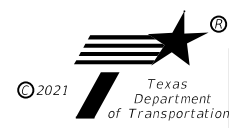
- LEGEND**
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
 - (B) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
 - (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
 - (E) REFL PAV MRK TY I (W)(RR XING)(100MIL)
 - (F) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (G) REFL PAV MRK TY I (BLACK)6"(SHADOW)(100MIL)
 - (H) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
 - (I) RE PROF PAV MRK TY I (W)6"(SLD)(100MIL)
 - (J) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
 - (K) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
 - (L) REFL PAV MRK TY I-C
 - (M) REFL PAV MRK TY II-A-A
- # PROPOSED SMALL SIGN NUMBER
 - PROPOSED SMALL SIGN
 - TRAFFIC DIRECTION
 - INSTL OM ASSM (OM-2Y)(WC)GND
 - INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)



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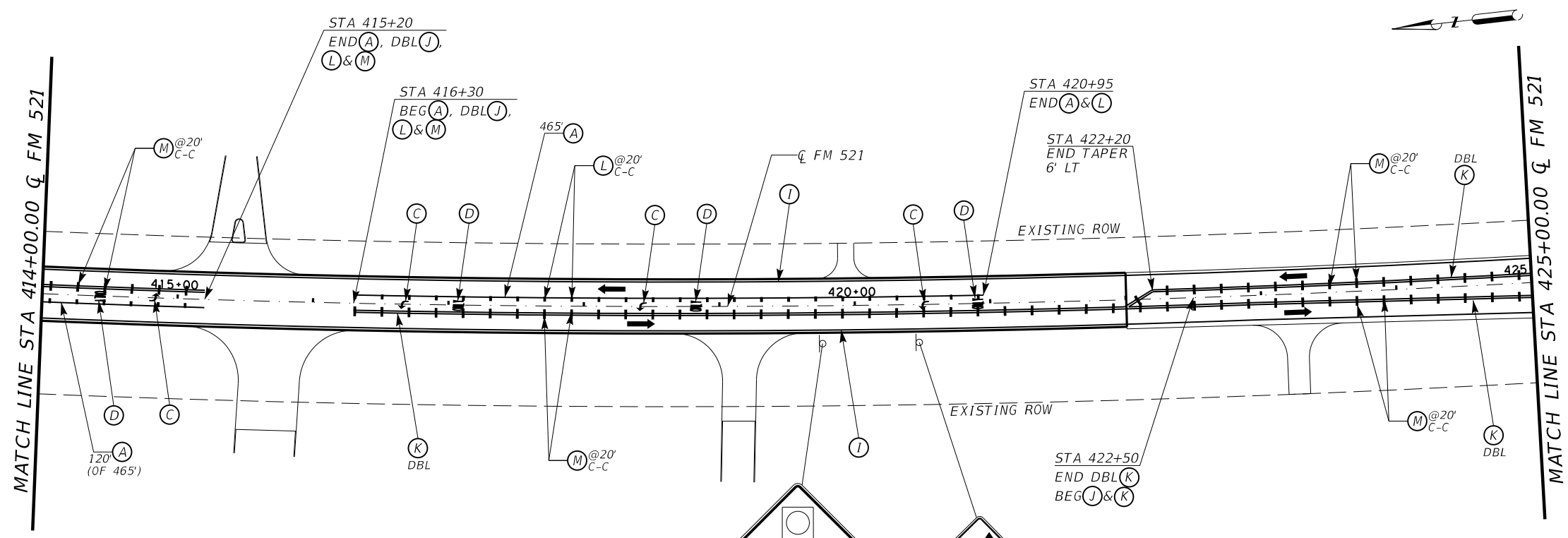
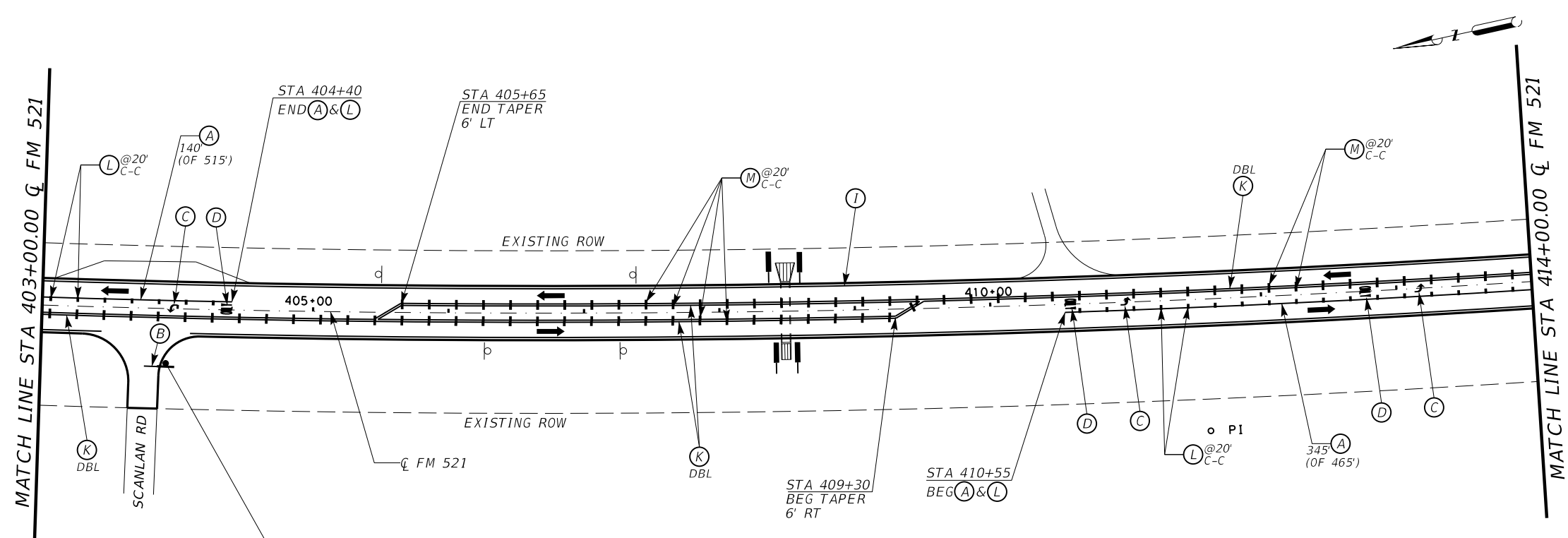
STA 381+00.00
 TO
 STA 403+00.00

SHEET 5 OF 12

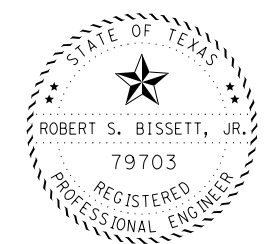
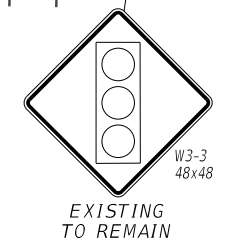
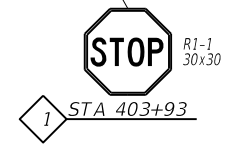


SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	100



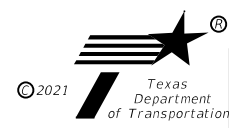
- LEGEND**
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
 - (B) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
 - (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
 - (E) REFL PAV MRK TY I (W)(RR XING)(100MIL)
 - (F) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (G) REFL PAV MRK TY I (BLACK)6"(SHADOW)(100MIL)
 - (H) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
 - (I) REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)
 - (J) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
 - (K) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
 - (L) REFL PAV MRK TY I-C
 - (M) REFL PAV MRK TY II-A-A
- ◆ PROPOSED SMALL SIGN NUMBER
 - ▬ PROPOSED SMALL SIGN
 - ➔ TRAFFIC DIRECTION
 - ▬ INSTL OM ASSM (OM-2Y)(WC)GND
 - ▬ INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)



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SIGNING & PAVEMENT MARKING LAYOUT

STA 403+00.00
 TO
 STA 425+00.00

SHEET 6 OF 12



SCALE: 1"=100'

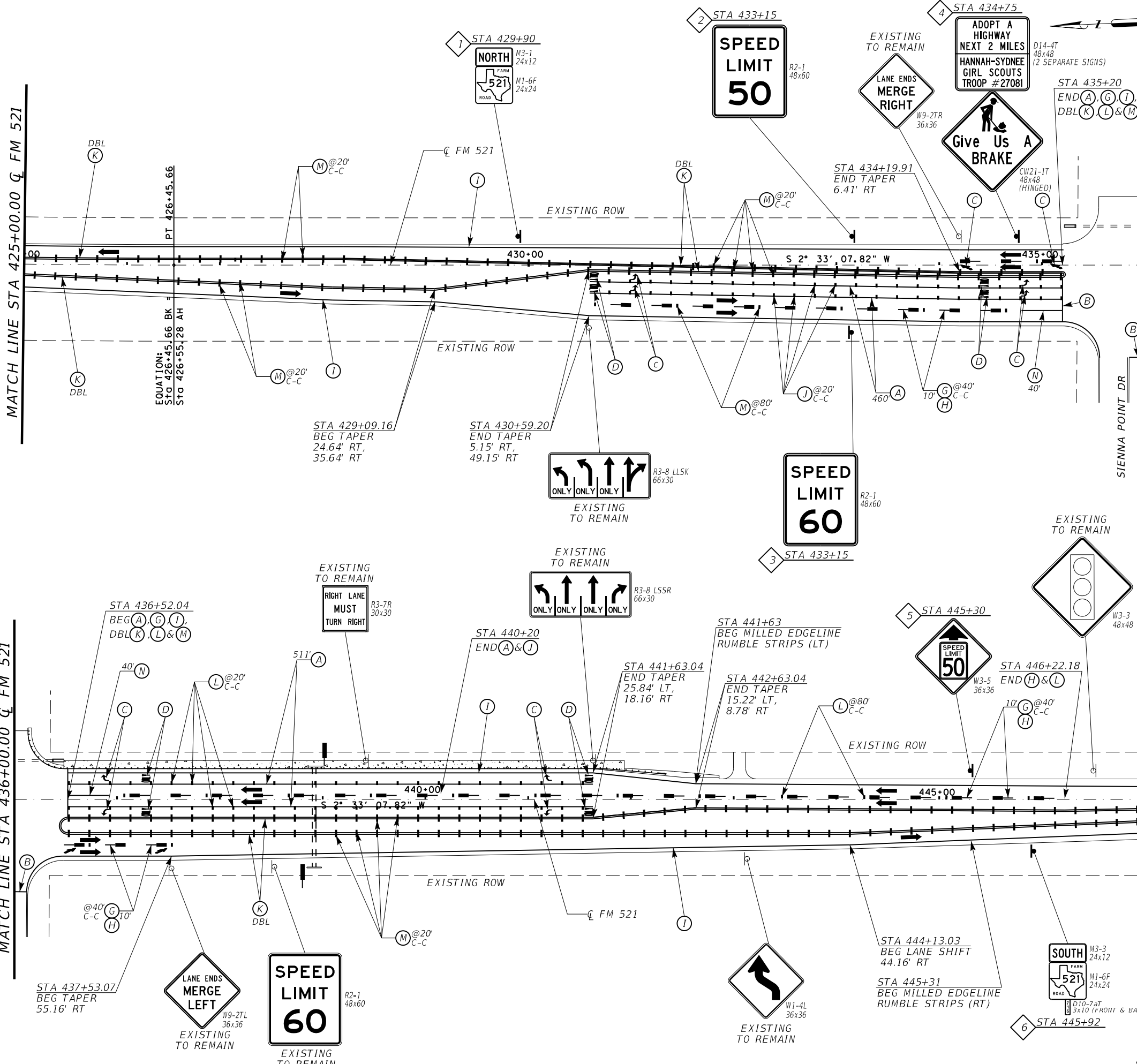
CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	101

MATCH LINE STA 425+00.00 Q FM 521

MATCH LINE STA 436+00.00 Q FM 521

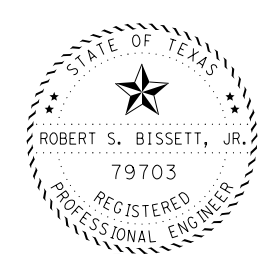
MATCH LINE STA 436+00.00 Q FM 521

MATCH LINE STA 447+00.00 Q FM 521



- LEGEND**
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
 - (B) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (C) REFL PAV MRK TY I (W)ARROW(100MIL)
 - (D) REFL PAV MRK TY I (W)WORD(100MIL)
 - (E) REFL PAV MRK TY I (W)RR XING(100MIL)
 - (F) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (G) REFL PAV MRK TY I (BLACK)6"(SHADOW)(100MIL)
 - (H) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
 - (I) REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)
 - (J) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
 - (K) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
 - (L) REFL PAV MRK TY I-C
 - (M) REFL PAV MRK TY II-A-A
 - (N) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)

- # PROPOSED SMALL SIGN NUMBER
- PROPOSED SMALL SIGN
- TRAFFIC DIRECTION
- INSTL OM ASSM (OM-2Y)(WC)GND
- INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)



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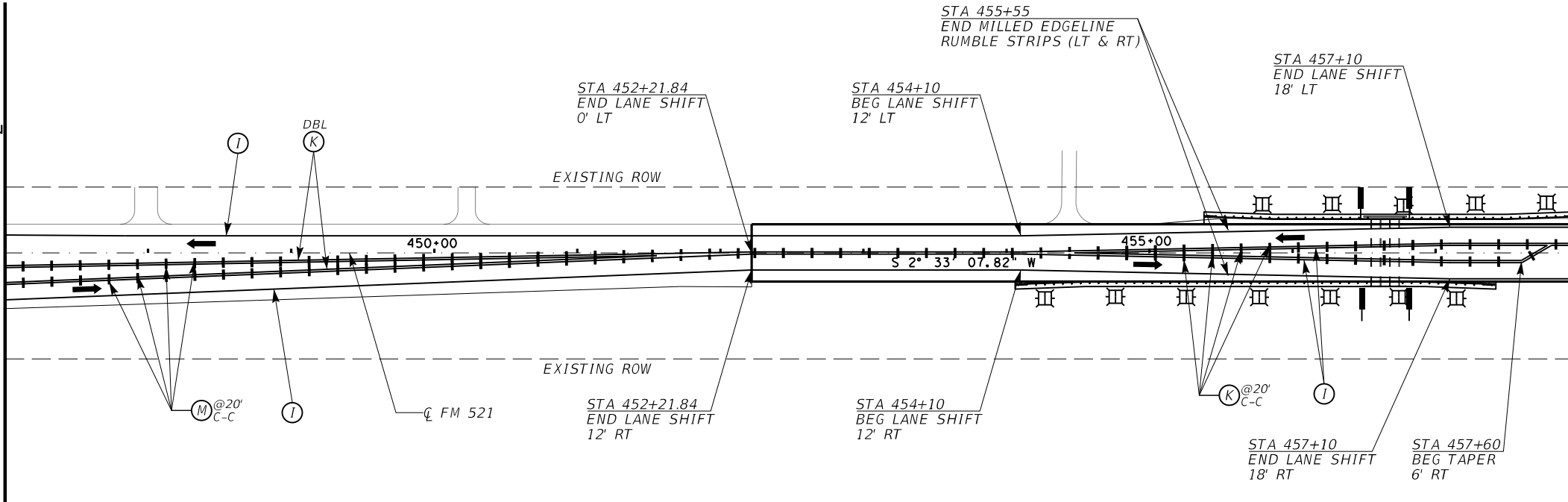
STA 425+00.00
TO
STA 447+00.00

SHEET 7 OF 12

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			102

SCALE: 1"=100'

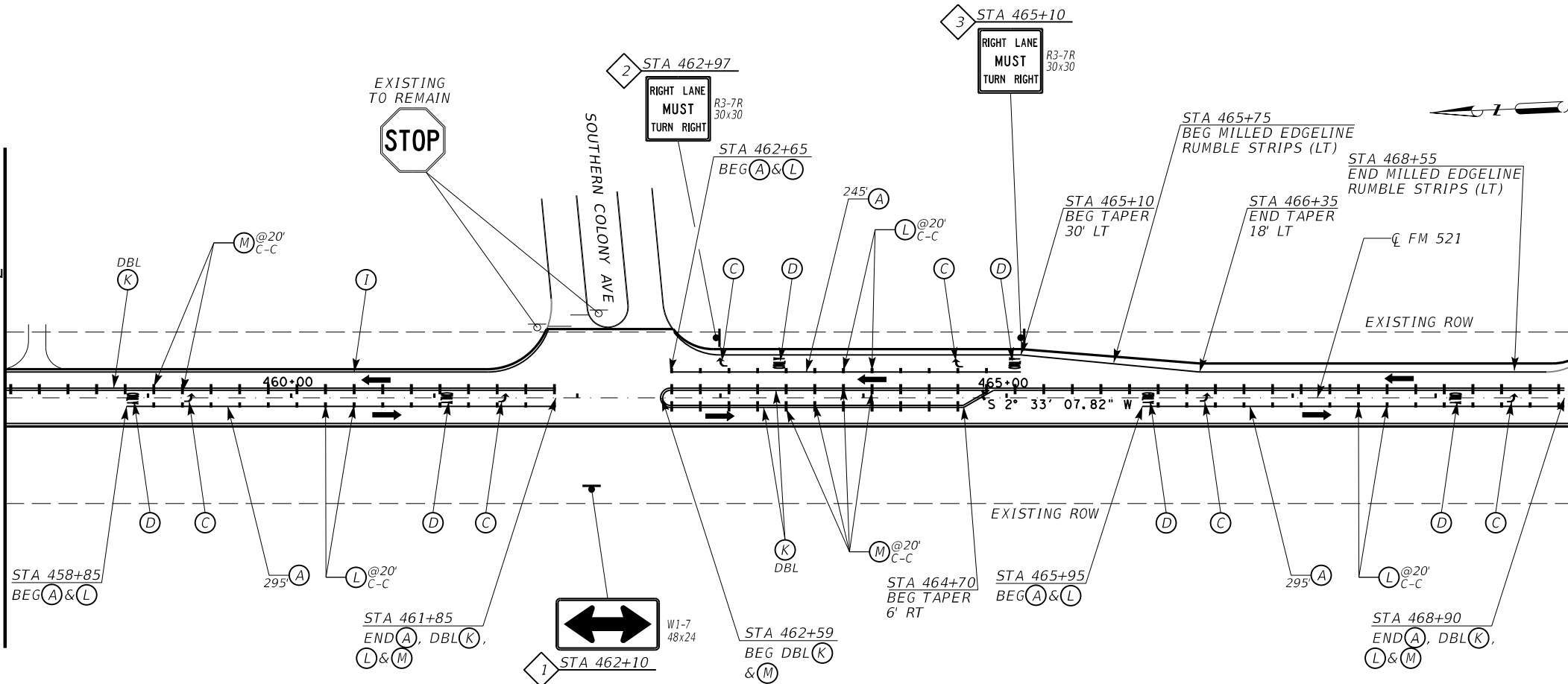
MATCH LINE STA 447+00.00 Q FM 521



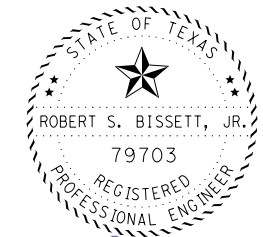
MATCH LINE STA 458+00.00 Q FM 521

- LEGEND**
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
 - (B) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
 - (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
 - (E) REFL PAV MRK TY I (W)(RR XING)(100MIL)
 - (F) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (G) REFL PAV MRK TY I (BLACK)6"(SHADOW)(100MIL)
 - (H) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
 - (I) REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)
 - (J) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
 - (K) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
 - (L) REFL PAV MRK TY I-C
 - (M) REFL PAV MRK TY II-A-A
- # PROPOSED SMALL SIGN NUMBER
 - PROPOSED SMALL SIGN
 - TRAFFIC DIRECTION
 - INSTL OM ASSM (OM-2Y)(WC)GND
 - INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)

MATCH LINE STA 458+00.00 Q FM 521



MATCH LINE STA 469+00.00 Q FM 521

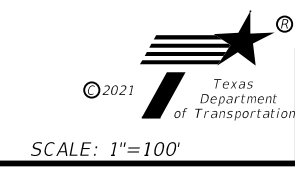


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SIGNING & PAVEMENT MARKING LAYOUT

STA 447+00.00
TO
STA 469+00.00

SHEET 8 OF 12



CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	103

EXISTING TO REMAIN



2 STA 470+17

RIGHT LANE MUST TURN RIGHT R3-7R 30x30

3 STA 472+15

RIGHT LANE MUST TURN RIGHT R3-7R 30x30

MATCH LINE STA 469+00.00 Q FM 521

HORSE CHESTNUT ST

STA 469+85

BEG (A) & (L)

230' (A)

(C) (D)

(L) @ 20' C-C

STA 472+15

BEG TAPER 30' LT

(C) (D)

(L) @ 20' C-C

STA 474+15

END TAPER 18' LT

(C) (D)

(L) @ 20' C-C

STA 474+84

BEG DBL (K) & (M)

(M) @ 20' C-C

STA 475+50

BEG LANE SHIFT 18' LT

(M) @ 20' C-C

STA 471+20

BEG MILLED EDGELINE RUMBLE STRIPS (LT)

(I)

STA 477+70

END LANE SHIFT 14' LT

(I)

EXISTING ROW

475+00

S 2° 33' 07.82" W

480

EXISTING ROW

Q FM 521

STA 475+50

BEG LANE SHIFT 18' RT

(K) DBL

STA 477+70

END LANE SHIFT 22' RT

(I)

MATCH LINE STA 480+00.00 Q FM 521



1 STA 469+35

4 STA 486+72



R1-1 36x36

6 STA 488+05

RIGHT LANE MUST TURN RIGHT R3-7R 30x30

MATCH LINE STA 480+00.00 Q FM 521

EXISTING ROW

STA 481+50

BEG TAPER 10' RT

(K) DBL (I)

(L) @ 20' C-C

Q FM 521

STA 482+75

BEG (A) & (L)

(D) (C)

(L) @ 20' C-C

400' (A)

(M) @ 20' C-C

(K) DBL

(I)

(D) (C)

(L) @ 20' C-C

STA 486+75

END (A), DBL (I), (J) & (K)

(I)

(D) (C)

(L) @ 20' C-C

STA 487+73

BEG (A) & (J)

(C) (D)

(A) 327' (OF 415')

(L) @ 20' C-C

485+00

S 2° 33' 07.82" W

490+00

EXISTING ROW



5 STA 187+13

STA 487+67

BEG DBL (I) & (K)

(K) DBL

STA 488+86

BEG LANE SHIFT 22' RT

(I)

STA 490+25

BEG MILLED EDGELINE RUMBLE STRIPS (RT)

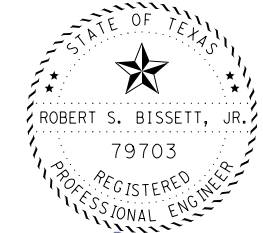
(I)

MATCH LINE STA 491+00.00 Q FM 521

LEGEND

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)ARROW(100MIL)
- (D) REFL PAV MRK TY I (W)WORD(100MIL)
- (E) REFL PAV MRK TY I (W)RR XING(100MIL)
- (F) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- (G) REFL PAV MRK TY I (BLACK)6"(SHADOW)(100MIL)
- (H) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
- (I) REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)
- (J) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (L) REFL PAV MRK TY I-C
- (M) REFL PAV MRK TY II-A-A

- # PROPOSED SMALL SIGN NUMBER
- PROPOSED SMALL SIGN
- TRAFFIC DIRECTION
- INSTL OM ASSM (OM-2Y)(WC)GND
- INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)



Robert S. Bissett, Jr.
09/13/21

SIGNING & PAVEMENT MARKING LAYOUT

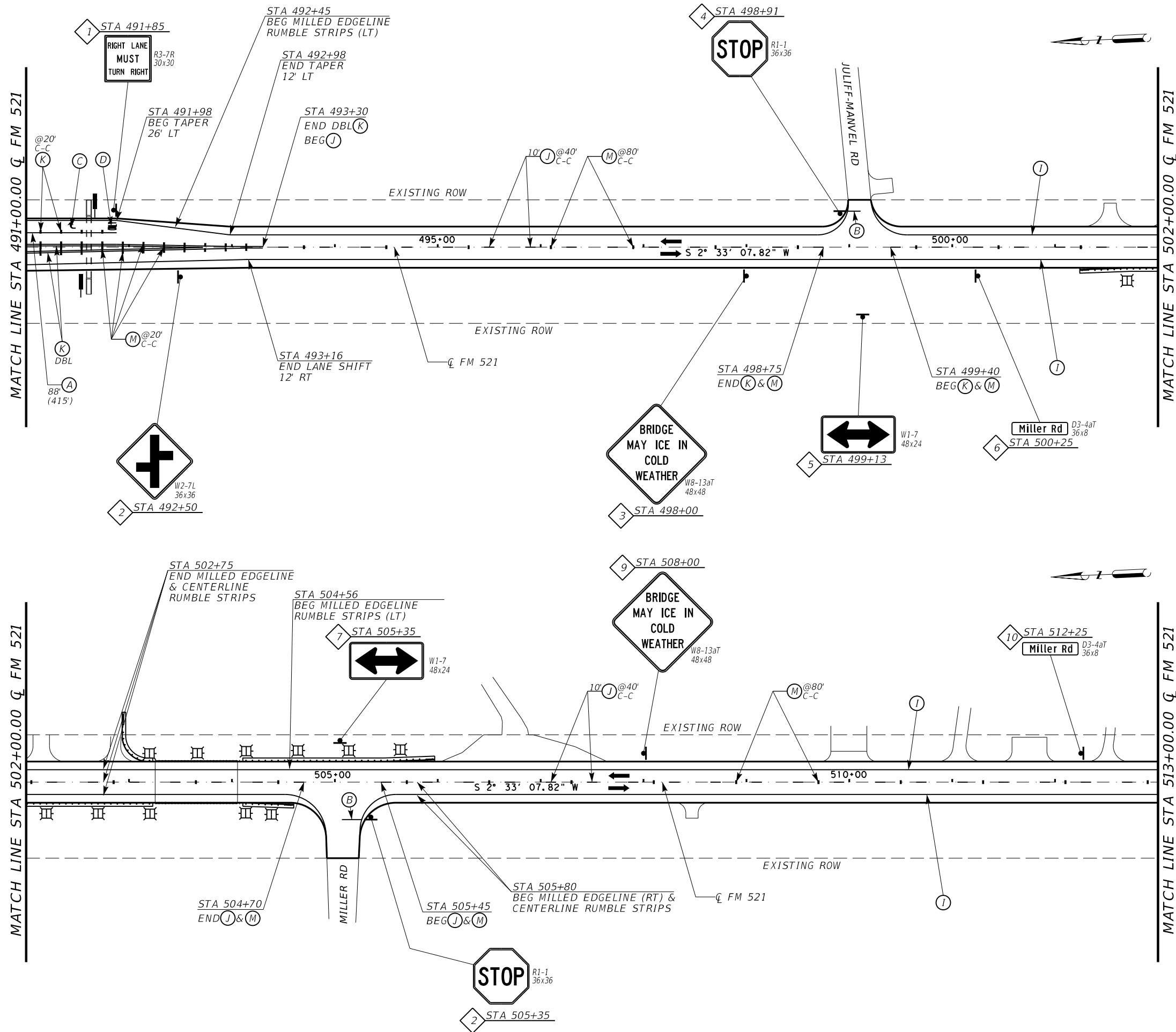
STA 469+00.00 TO STA 491+00.00

SHEET 9 OF 12



SCALE: 1"=100'

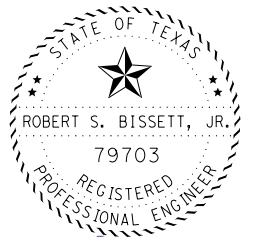
CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	104



LEGEND

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
- (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
- (E) REFL PAV MRK TY I (W)(RR XING)(100MIL)
- (F) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- (G) REFL PAV MRK TY I (BLACK)6"(SHADOW)(100MIL)
- (H) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
- (I) REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)
- (J) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
- (K) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (L) REFL PAV MRK TY I-C
- (M) REFL PAV MRK TY II-A-A

- # PROPOSED SMALL SIGN NUMBER
- PROPOSED SMALL SIGN
- TRAFFIC DIRECTION
- INSTL OM ASSM (OM-2Y)(WC)GND
- INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)



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09/13/21

SIGNING & PAVEMENT MARKING LAYOUT

STA 491+00.00
TO
STA 513+00.00

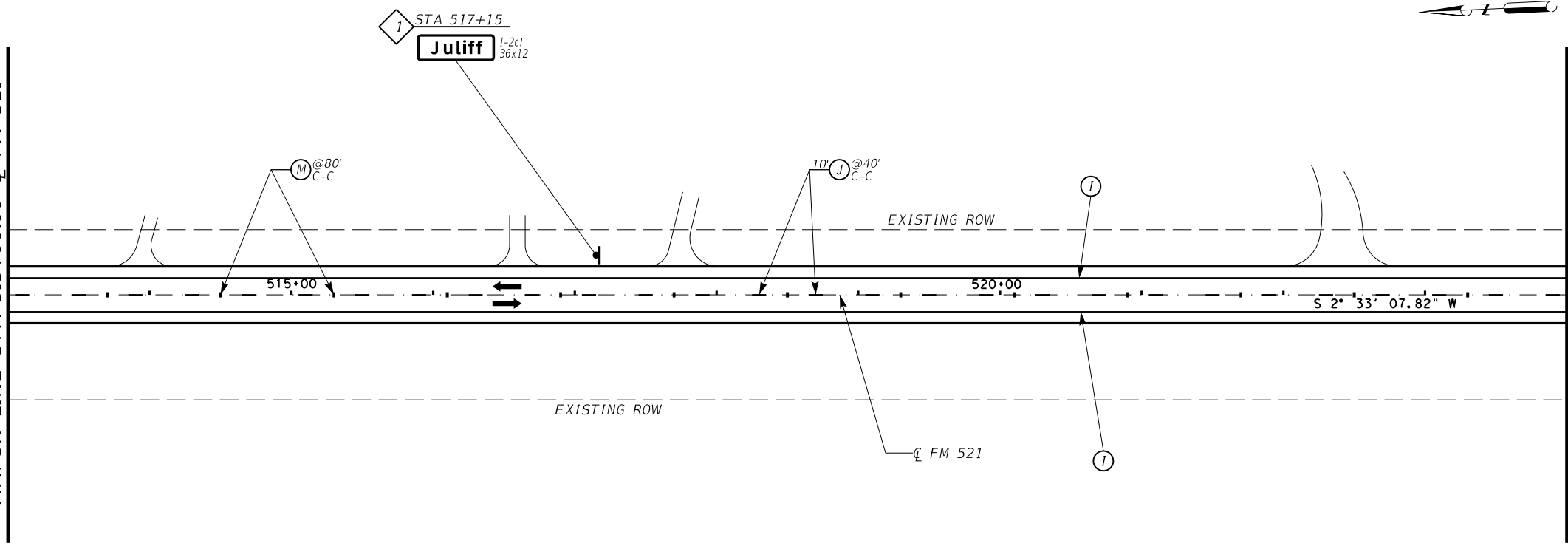
SHEET 10 OF 12



SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	105

MATCH LINE STA 513+00.00 Q FM 521

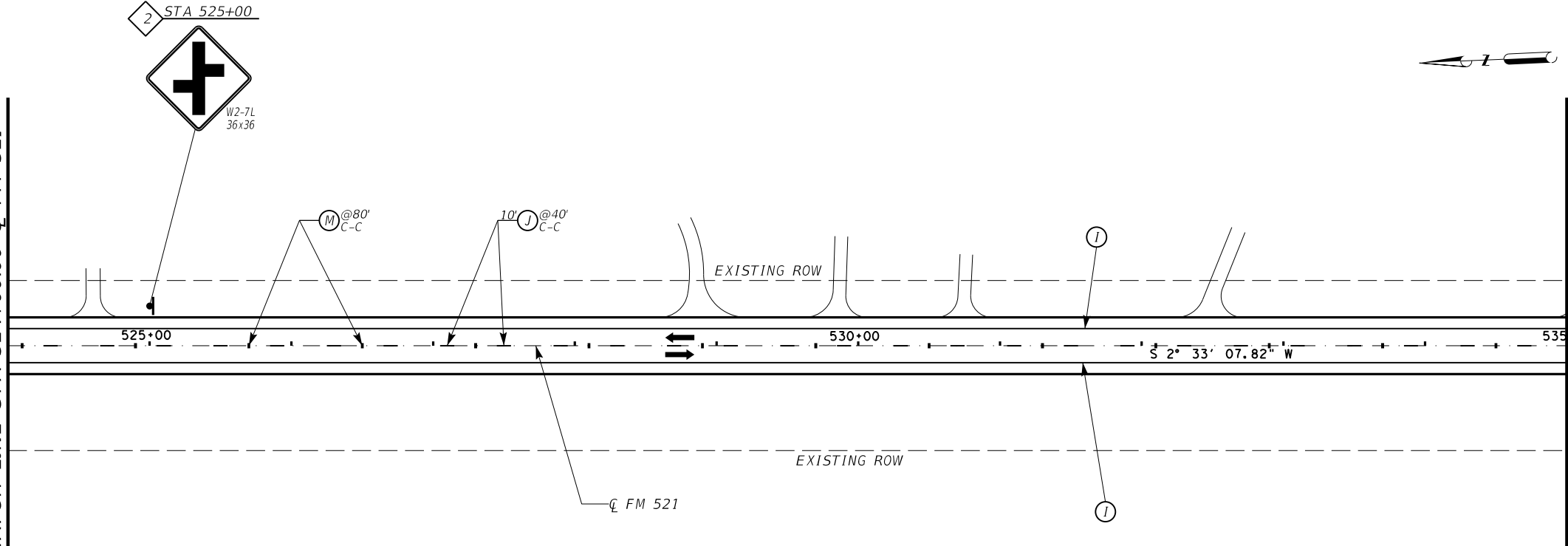


MATCH LINE STA 524+00.00 Q FM 521

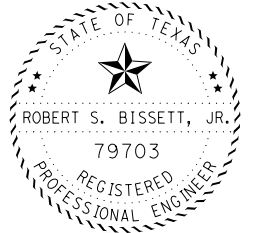
LEGEND

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
 - (B) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
 - (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
 - (E) REFL PAV MRK TY I (W)(RR XING)(100MIL)
 - (F) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
 - (G) REFL PAV MRK TY I (BLACK)6"(SHADOW)(100MIL)
 - (H) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
 - (I) REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)
 - (J) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
 - (K) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
 - (L) REFL PAV MRK TY I-C
 - (M) REFL PAV MRK TY II-A-A
- # PROPOSED SMALL SIGN NUMBER
 - ▬ PROPOSED SMALL SIGN
 - ⇄ TRAFFIC DIRECTION
 - ▬ INSTL OM ASSM (OM-2Y)(WC)GND
 - ▬ INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)

MATCH LINE STA 524+00.00 Q FM 521



MATCH LINE STA 535+00.00 Q FM 521

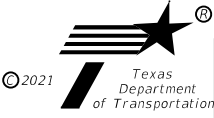


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09/13/21

**SIGNING & PAVEMENT
MARKING LAYOUT**

STA 513+00.00
TO
STA 535+00.00

SHEET 11 OF 12

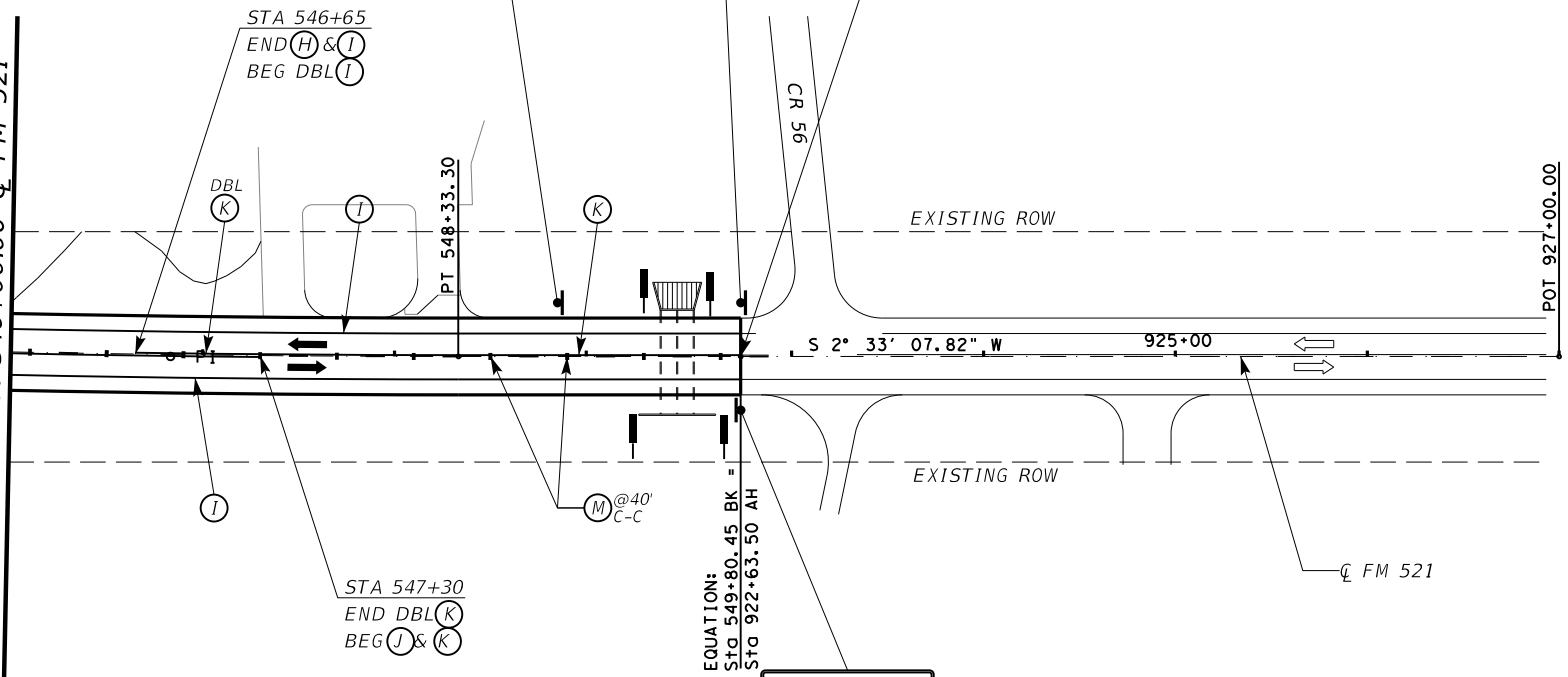
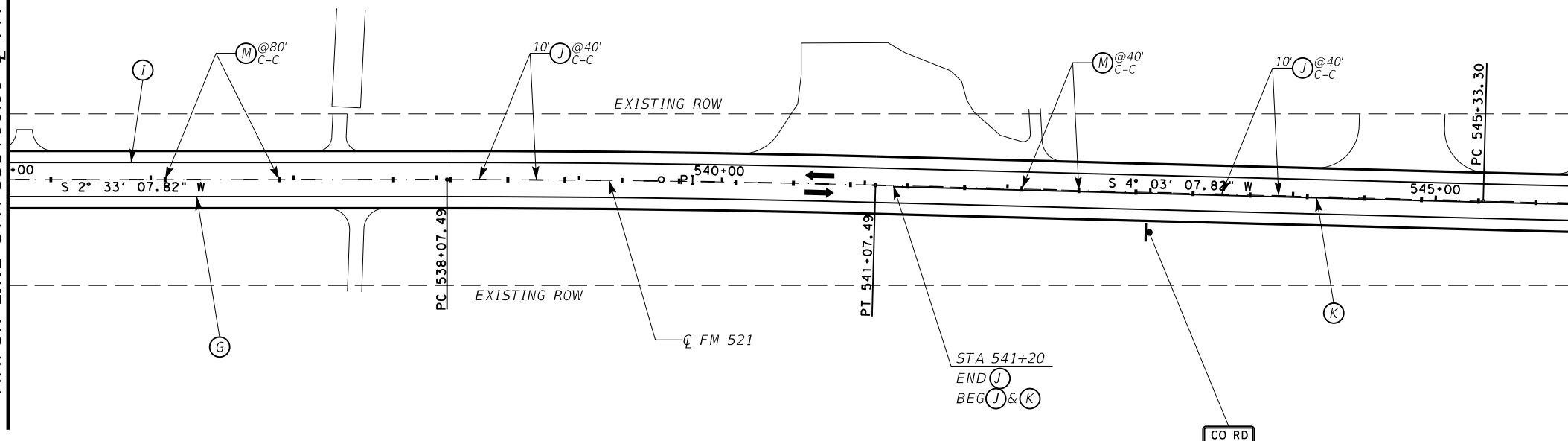


SCALE: 1"=100'

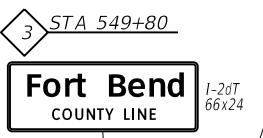
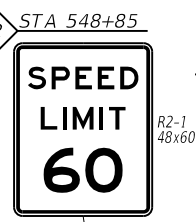
CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			106

MATCH LINE STA 535+00.00 Q FM 521

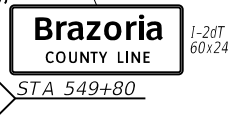
MATCH LINE STA 546+00.00 Q FM 521



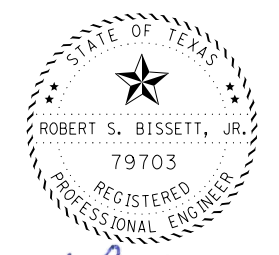
- LEGEND**
- (A) REFL PAV MRK TY I (W)8\"(SLD)(100MIL)
 - (B) REFL PAV MRK TY I (Y)24\"(SLD)(100MIL)
 - (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
 - (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
 - (E) REFL PAV MRK TY I (W)(RR XING)(100MIL)
 - (F) REFL PAV MRK TY I (Y)24\"(SLD)(100MIL)
 - (G) REFL PAV MRK TY I (BLACK)6\"(SHADOW)(100MIL)
 - (H) RE PM W/RET REQ TY I (W)6\"(BRK)(100MIL)
 - (I) REF PROF PAV MRK TY I (W)6\"(SLD)(100MIL)
 - (J) RE PM W/RET REQ TY I (Y)6\"(BRK)(100MIL)
 - (K) RE PM W/RET REQ TY I (Y)6\"(SLD)(100MIL)
 - (L) REFL PAV MRK TY I-C
 - (M) REFL PAV MRK TY II-A-A
- # PROPOSED SMALL SIGN NUMBER
 - PROPOSED SMALL SIGN
 - TRAFFIC DIRECTION
 - INSTL OM ASSM (OM-2Y)(WC)GND
 - INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)



END PROJECT STA 549+80.45
 END PROP PAVEMENT MARKINGS
 END PROP MILLED EDGELINE RUMBLE STRIPS
 END PROP MILLED CENTERLINE RUMBLE STRIPS



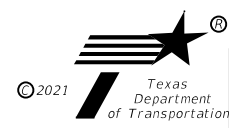
EQUATION:
 Sta 549+80.45 BK =
 Sta 922+63.50 AH



Robert S. Bissett, Jr.
 09/13/21
SIGNING & PAVEMENT MARKING LAYOUT

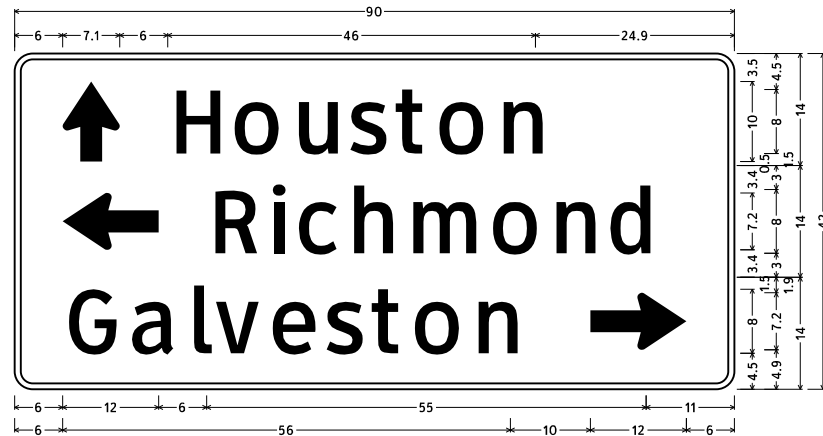
STA 535+00.00
 TO
 STA 557+00.00

SHEET 12 OF 12



SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	107



Identifier : D1-3 8in UP-LT-RT;
 2.3" Radius, 0.8" Border, White on Green;
 Standard Arrow Custom 10.0" X 7.1" 90°; [Houston] ClearviewHwy-3-W specified length;
 2.3" Radius, 0.8" Border, White on Green;
 Standard Arrow Custom 12.0" X 7.1" 180°; [Richmond] ClearviewHwy-3-W;
 2.3" Radius, 0.8" Border, White on Green;
 [Galveston] ClearviewHwy-3-W specified length; Standard Arrow Custom 12.0" X 7.1" 0°;
 Table of letter and object lefts.

H	o	u	s	t	o	n			
6.0	19.1	26.7	34.5	41.3	47.2	52.3	60.1		
R	i	c	h	m	o	n	d		
6.0	24.0	31.2	34.8	41.4	48.8	59.0	66.7	73.7	
G	a	l	v	e	s	t	o	n	
6.0	13.9	21.3	24.7	31.5	38.3	44.2	49.3	56.9	72.0

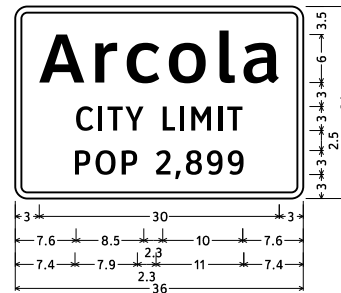
SIGN NO. 4: STA 300+20; SHEET 1 OF 12



Identifier : D14-4T;
 3.0" Radius, 1.0" Border, White on Blue;
 [ADOPT A] C; [HIGHWAY] C; [NEXT 2 MILES] C;
 3.0" Radius, 1.0" Border, White on Blue;
 [HANNAH-SYDNEE] C 50% spacing; [GIRL SCOUTS] C;
 [TROOP #27081] C 50% spacing;
 Table of letter and object lefts.

A	D	O	P	T	A							
11.2	15.1	18.7	22.6	26.2	33.7							
H	I	G	H	W	A	Y						
12.3	16.0	17.8	21.6	25.2	29.2	32.6						
N	E	X	T	2	M	I	L	E	S			
3.3	7.1	10.5	14.0	21.5	29.2	33.5	35.2	38.6	41.9			
H	A	N	N	A	H	S	Y	D	N	E	E	
3.3	6.4	10.0	13.2	16.4	19.9	23.2	26.1	29.3	32.8	36.1	39.3	42.2
G	I	R	L	S	C	O	U	T	S			
5.2	9.0	10.7	14.5	22.0	25.6	29.2	33.1	36.7	40.1			
T	R	O	O	P	#	2	7	O	8	1		
4.7	7.6	10.7	14.1	17.5	25.2	29.4	32.6	35.7	39.1	42.3		

SIGN NO. 3: STA 325+30; SHEET 2 OF 12
 SIGN NO. 7: STA 434+75; SHEET 7 OF 12
 CONSTRUCTED AS 2 SEPARATE SIGNS

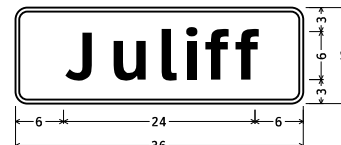


Identifier : I-2aT 6In;
 1.5" Radius, 0.8" Border, White on Green;
 "Arcola", ClearviewHwy-5-W-R specified length;
 "CITY LIMIT", ClearviewHwy-3-W;
 "POP 2,899", ClearviewHwy-3-W;
 Table of letter and object lefts

A	r	c	o	l	a			
3.0	10.0	13.9	19.2	25.5	28.5			
C	I	T	Y	L	I	M	I	T
7.6	10.4	11.5	13.8	18.4	20.6	22.0	25.4	26.5

P	O	P	2	8	9	9	
7.4	10.0	13.3	17.6	20.0	21.3	23.9	26.6

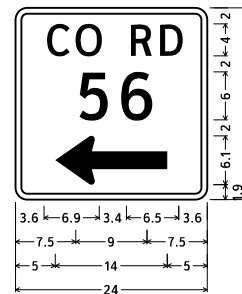
SIGN NO. 3: STA 385+20; SHEET 5 OF 12



Identifier : I-2cT 6In;
 1.5" Radius, 0.5" Border, White on Green;
 [Juliff] ClearviewHwy-5-W-R;
 Table of letter and object lefts.

J	u	l	i	f	f
6.0	11.4	17.4	20.5	23.3	27.1

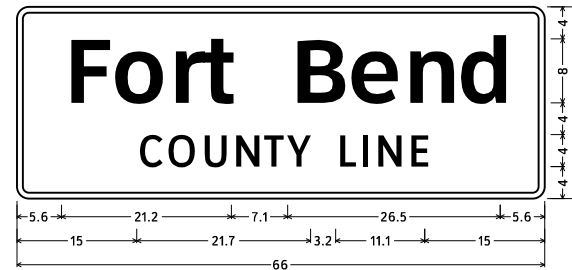
SIGN NO. 1: STA 517+15; SHEET 11 OF 12



Identifier : D20-1TL_24x24;
 1.5" Radius, 0.8" Border, White on Green;
 [CO RD] ClearviewHwy-3-W;
 [56] ClearviewHwy-3-W;
 Standard Arrow Custom 14.0" X 6.1" 180°;
 Table of letter and object lefts.

C	O	R	D
3.6	7.1	13.9	17.6
5	6		
7.5	12.5		
←	5.0		

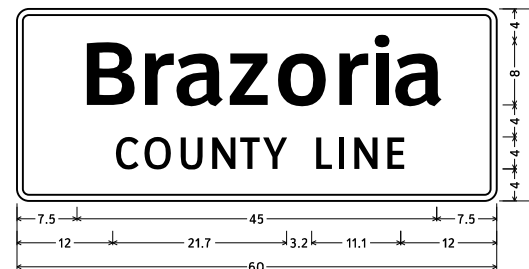
SIGN NO. 1: STA 543+00; SHEET 12 OF 12



Identifier : I-2dT 8In;
 1.5" Radius, 0.8" Border, White on Green;
 [Fort Bend] ClearviewHwy-5-W-R 50% spacing;
 [COUNTY LINE] ClearviewHwy-3-W;
 Table of letter and object lefts.

F	o	r	t	B	e	n	d		
5.6	11.4	18.6	22.9	33.9	40.9	47.9	54.6		
C	O	U	N	T	Y	L	I	N	E
15.0	18.6	22.9	26.9	30.7	33.6	39.9	42.8	44.6	48.8

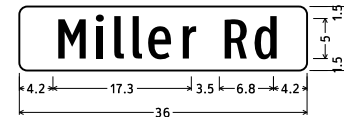
SIGN NO. 3: STA 549+80; SHEET 12 OF 12



Identifier : I-2dT 8In;
 1.5" Radius, 0.8" Border, White on Green;
 [Brazoria] ClearviewHwy-5-W-R specified length;
 [COUNTY LINE] ClearviewHwy-3-W;
 Table of letter and object lefts.

B	r	a	z	o	r	i	a		
7.5	14.8	19.2	25.9	31.7	39.1	43.6	46.5		
C	O	U	N	T	Y	L	I	N	E
12.0	15.6	19.9	23.9	27.7	30.6	36.9	39.8	41.6	45.8

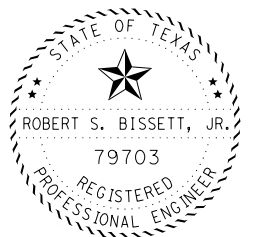
SIGN NO. 4: STA 549+80; SHEET 12 OF 12



Identifier : D3-4aT;
 1.0" Radius, No border, Green;
 [Miller Rd] White ClearviewHwy-2-W specified length;
 Table of letter and object lefts.

M	i	l	l	e	r	R	d
4.2	9.0	11.2	13.5	15.6	19.8	25.0	28.9

SIGN NO. 6: STA 500+25; SHEET 10 OF 12
 SIGN NO. 10: STA 512+25; SHEET 10 OF 12



Robert S. Bissett, Jr.
 09/13/21

GUIDE SIGN
 DETAILS

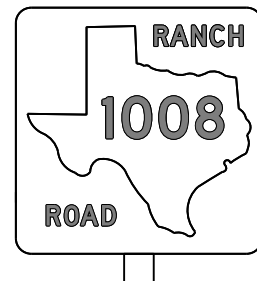
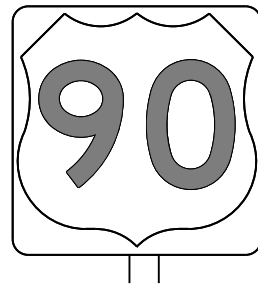
SHEET 1 OF 1



CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		108

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

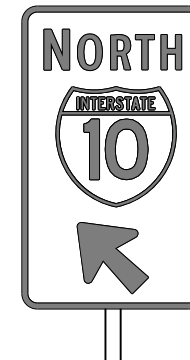
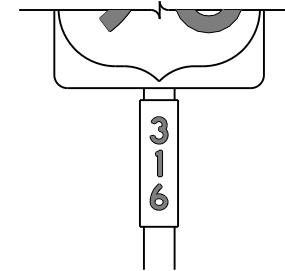
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

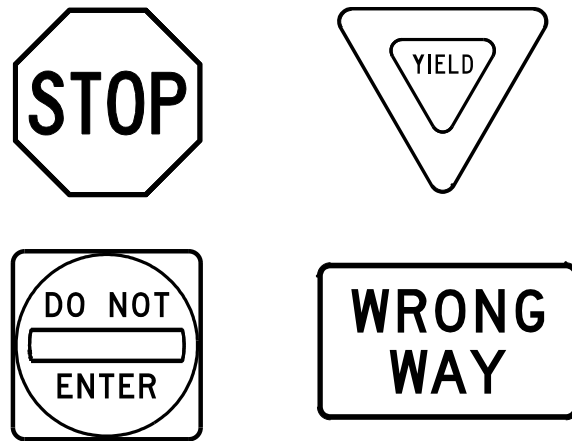
The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

<http://www.txdot.gov/>

Texas Department of Transportation				Traffic Operations Division Standard
<h2 style="margin: 0;">TYPICAL SIGN REQUIREMENTS</h2> <h3 style="margin: 0;">TSR(3)-13</h3>				
FILE: tsf3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	October 2003	CONT	SECT	HIGHWAY
REVISIONS	0111	03	063	FM 521
12-03 7-13	DIST	COUNTY	SHEET NO.	
9-08	HOU	FORT BEND	109	

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

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.

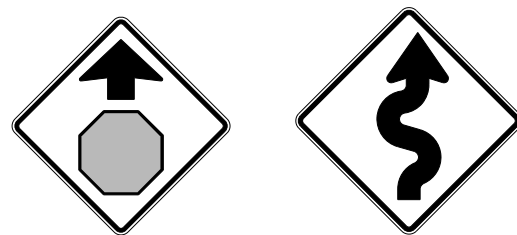
ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

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/>

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



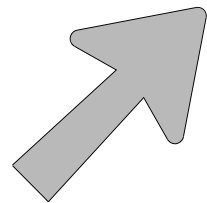
TYPICAL EXAMPLES

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

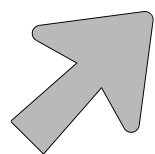
				Traffic Operations Division Standard	
<h2>TYPICAL SIGN REQUIREMENTS</h2>					
<h3>TSR(4)-13</h3>					
FILE:	tsr4-13.dgn	DN:	TxDOT	CK:	TxDOT
©TxDOT	October 2003	CONT:	SECT:	JOB:	HIGHWAY:
REVISIONS		0111	03	063	FM 521
12-03	7-13	DIST:	COUNTY:	SHEET NO.	
9-08		HOU	FORT BEND	110	

ARROW DETAILS

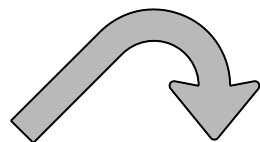
for Large Ground-Mounted and Overhead Guide Signs



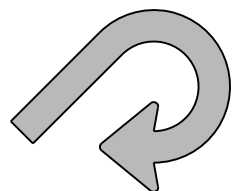
Type A



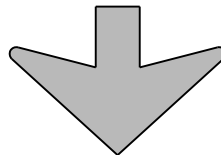
Type B



E-3



E-4



Down Arrow

TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

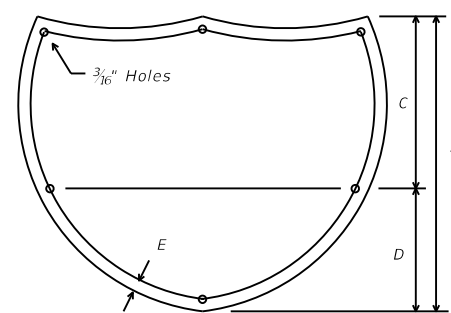
CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

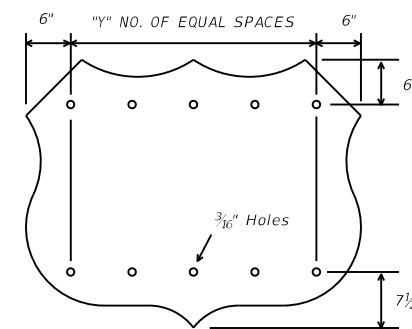
The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website:
<http://www.txdot.gov/>

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)



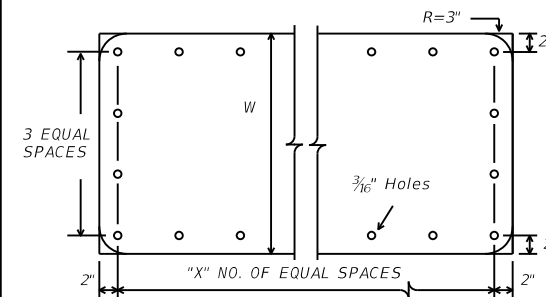
INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4



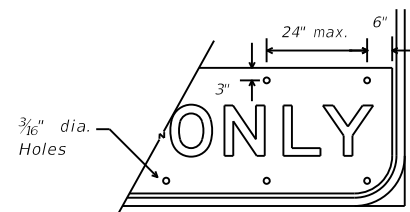
U.S. ROUTE MARKERS

Sign Size	"Y" NO. OF EQUAL SPACES
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

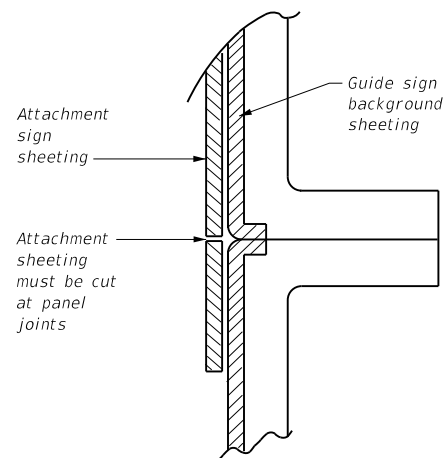
No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5



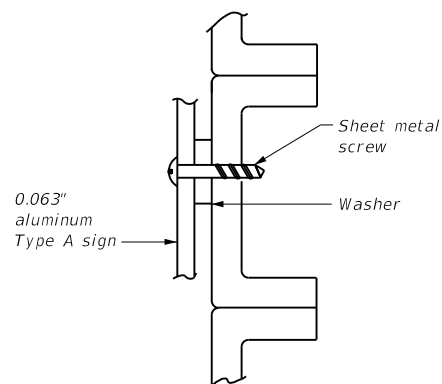
EXIT ONLY PANEL

MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE

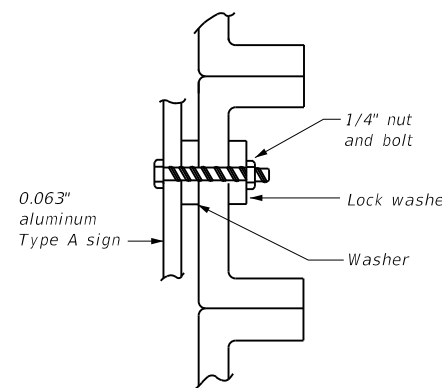
("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

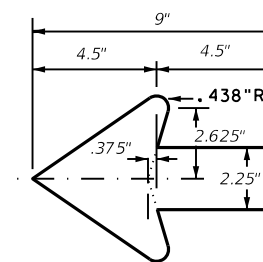
- Sheeting for legend, symbols, and borders must be cut at panel joints.
- Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

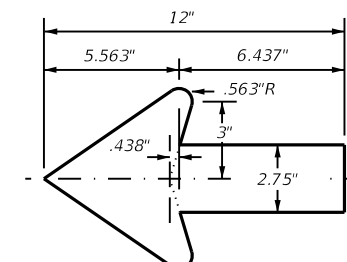
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



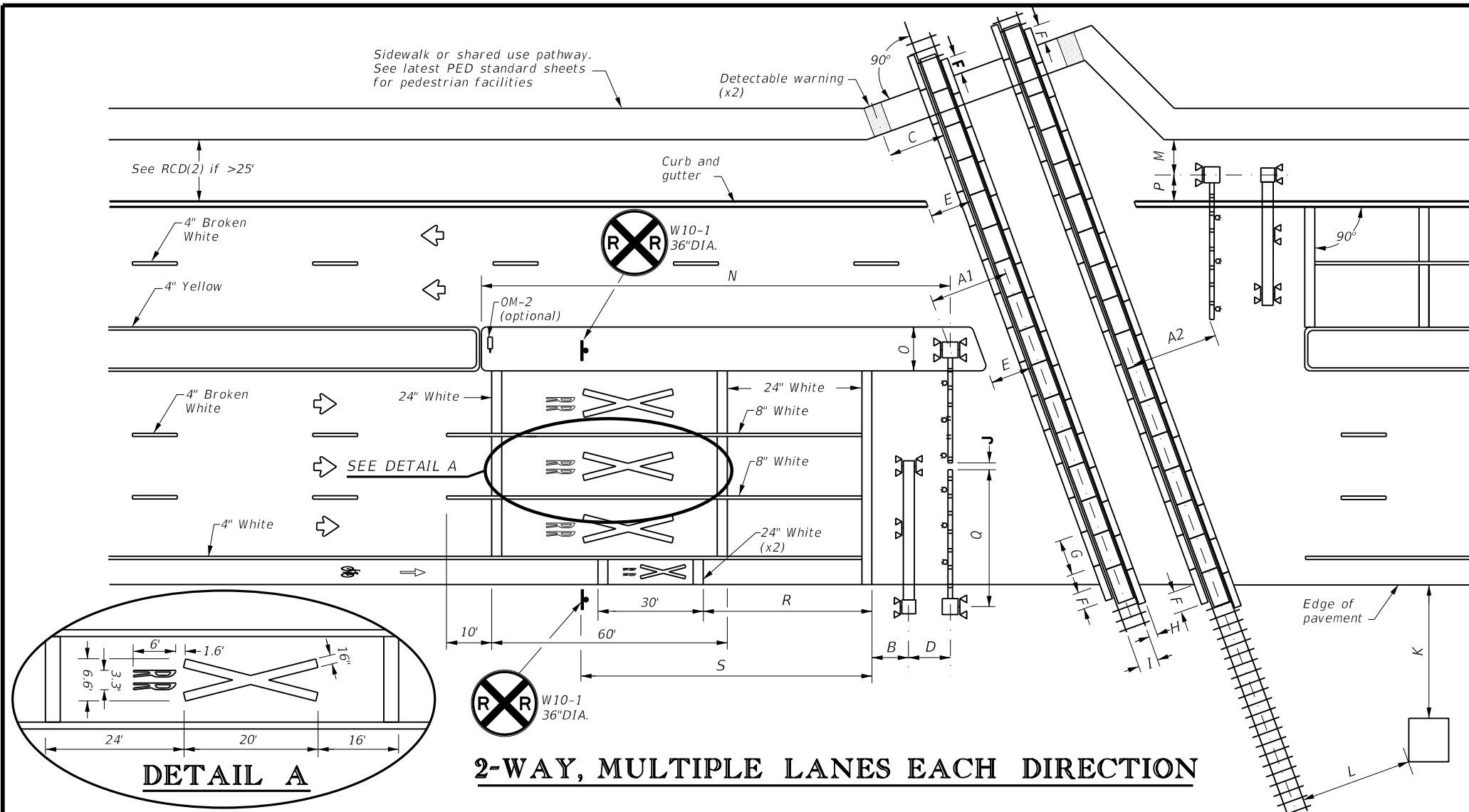
Standard arrow to be used with 8 inch letters.



TYPICAL SIGN REQUIREMENTS

TSR(5)-13

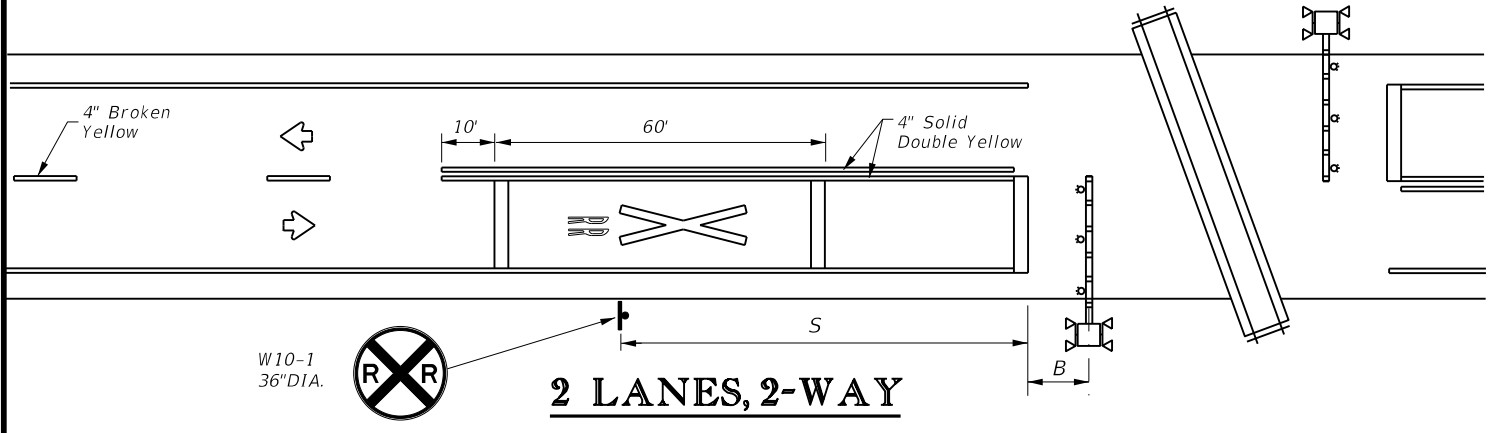
FILE: lsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
12-03 7-13	DIST	COUNTY	SHEET NO.	
9-08	HOU	FORT BEND	111	



2-WAY, MULTIPLE LANES EACH DIRECTION

NOTES

- A1: Center of RR mast to center of rail: 12' minimum, 15' typical.
- A2: Tip of gate to center of rail: 12' minimum, 15' typical.
- B: Center of mast (cantilever, gate, or mast flasher) of nearest active traffic control device to stop line: 8' (NOTE: Stop line may be moved as needed, but should be at least 8' back from gates, if present).
- C: Center of detectable warning device to nearest rail: 6' minimum
- D: Center of gate mast to center of cantilever mast: 6' typical. NOTE: Cantilever may be located in front or behind gates.
- E: Edge of median or curb to nearest rail: 10' typical. NOTE: Design median edge to be parallel with rail.
- F: Edge of planking panel from edge of pavement or sidewalk: 3' minimum. NOTE: Field panels need not be in line with gauge panels.
- G: Length of panels along rail: 8' typical.
- H: Width of field panel: 2' typical (check with railroad company).
- I: Distance between rails: 4'-8.5".
- J: Tip of gate to tip of gate: 2' maximum for Quiet Zone SSM or 90% of traveled way covered by gates for all other locations.
- K: Nearest edge of RR cabin from edge of pavement: 30' typical. NOTE: Cabinet not required to be parallel to edge of pavement.
- L: Nearest edge of RR cabin from nearest rail: 25' typical.
- M: Center of RR mast to edge of sidewalk: 6' minimum.
- N: Center of gate mast to leading edge of non-traversable median: 100' minimum to qualify as a Quiet Zone SSM. NOTE: 60' will suffice if there is a street intersection within the 100' and all street intersections within 60' are closed.
- O: Width of median: 8'-6" minimum, 10' typical when using median gates. NOTE: Center of gate mast minimum 4'-3" from face of curb.
- P: Center of RR mast to face of curb: 4'-3" minimum. Center of RR mast to edge of pavement (with shoulder): 6' minimum. Center of RR mast to edge of pavement (no shoulder): 8'-3" minimum. NOTE: BNSF prefers 5'-3", 7', and 9'-3" minimums, respectively.
- Q: Gate length: 28' or less typical, but railroad company may allow up to 32' under special circumstances.
- R: Stop line to first RR Crossing transverse line (bike lane): 50' typical.
- S: Stop line to GRADE CROSSING ADVANCE WARNING (W10-1) sign and adjacent RR Crossing pavement markings. See Table 1. See RCD(2) for other signs.



2 LANES, 2-WAY

TABLE 1

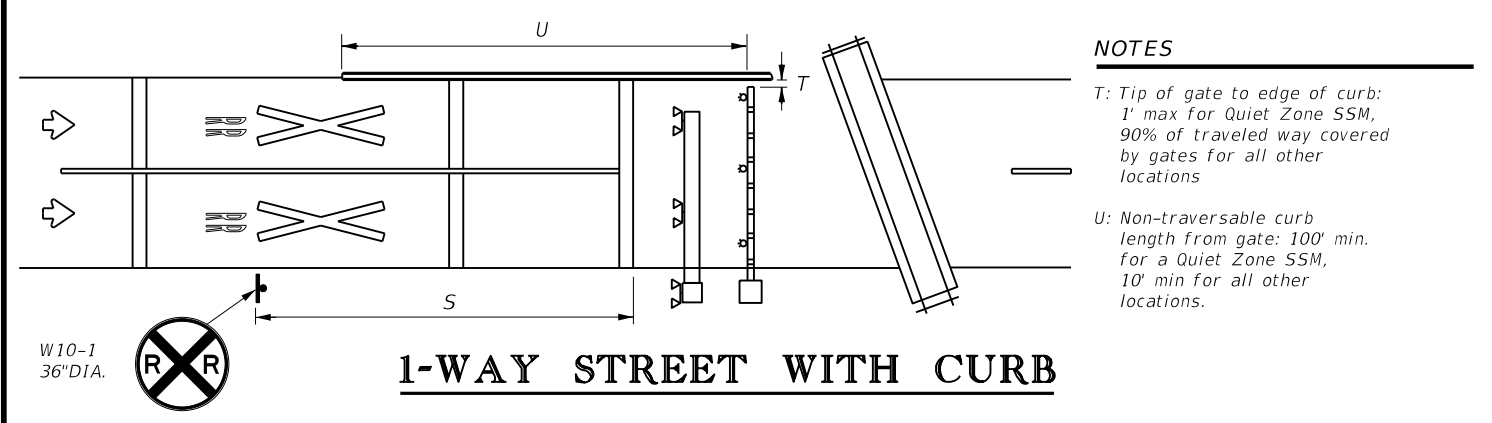
Approach Speed(mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

LEGEND

	Sign
	Object Marker
	Traffic Flow
	Cantilever
	Gate Assembly
	Mast Flasher Pair

GENERAL NOTES

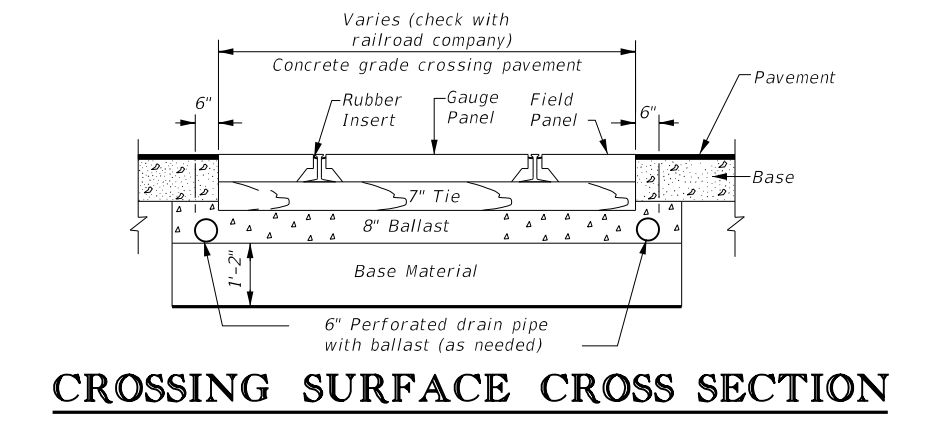
1. Medians and curbs must be non-traversable to qualify as a Quiet Zone Supplementary Safety Measure (SSM). Non-traversable curbs in Quiet Zones are 6" tall minimum and used on roadways where speed does not exceed 40 mph.
2. Raised pavement markers may be used to supplement striping. See PM(2) and PM(3) standard sheets.
3. Medians preferred whenever possible to prevent vehicles from driving around gates.
4. Longitudinal edge striping may be continued thru crossing as needed. Illumination may also be considered for nighttime visibility.
5. See SMD standard sheets for sign mounting details.
6. See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.



1-WAY STREET WITH CURB

NOTES

- T: Tip of gate to edge of curb: 1' max for Quiet Zone SSM, 90% of traveled way covered by gates for all other locations
- U: Non-traversable curb length from gate: 100' min. for a Quiet Zone SSM, 10' min for all other locations.

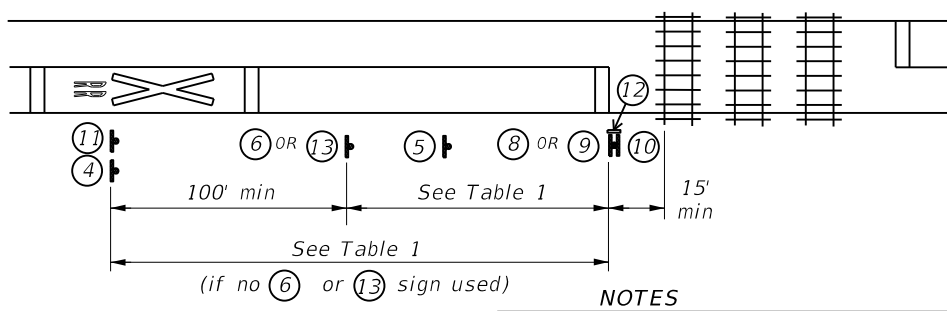


CROSSING SURFACE CROSS SECTION

Texas Department of Transportation
Traffic Operations Division Standard

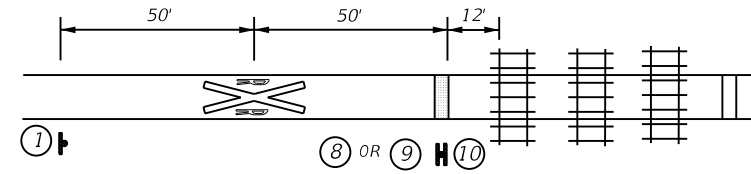
RAILROAD CROSSING DETAILS
SIGNING, STRIPING, AND DEVICE PLACEMENT
RCD(1)-16

FILE: rcd1-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	112	



- NOTES**
1. Stop or yield sign may also be installed to the left of the crossbuck sign, rather than below it.
 2. A 2" white retroreflective strip shall be installed on front and back of crossbuck sign post.

PASSIVE CROSSING



- NOTES**
1. A shared use pathway is considered a separate pathway crossing when more than 25' from traveled way of adjacent roadway.
 2. Detectable warning used at stop bar.
 3. Smaller sign sizes preferred than shown to the right on this sheet.

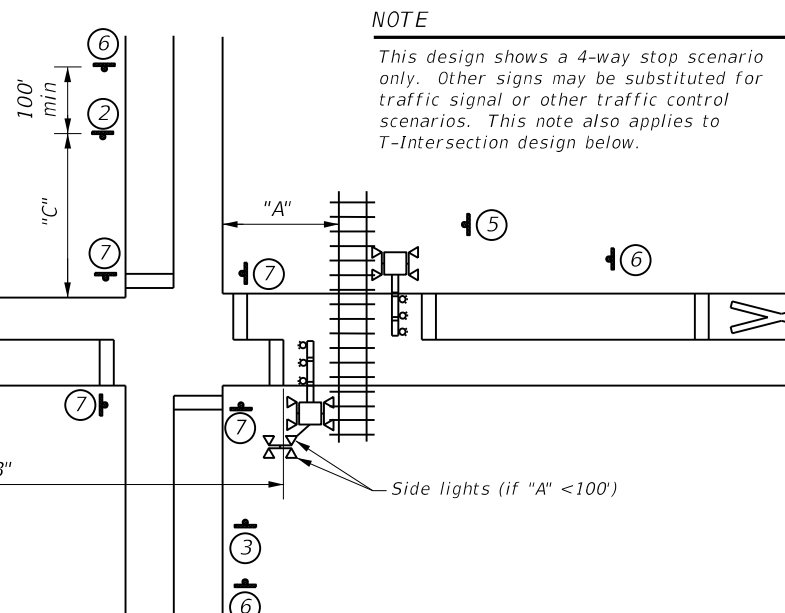
PATHWAY CROSSING

TABLE 1

Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

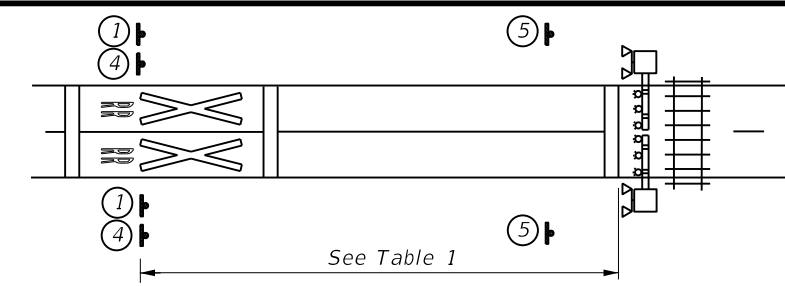
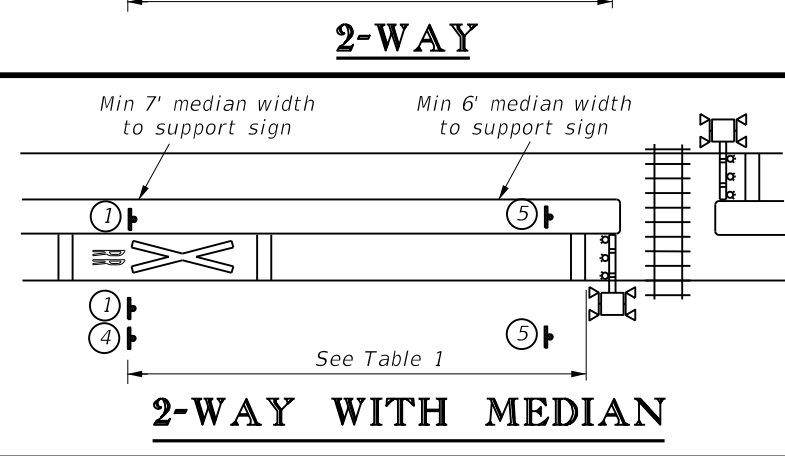
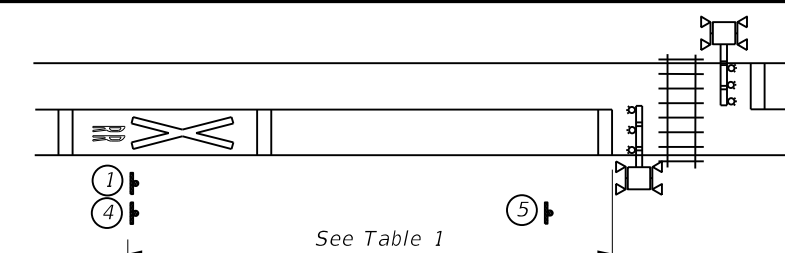
GENERAL NOTES

1. Railroad company to provide active traffic control devices, CROSSBUCK (R15-1), NUMBER OF TRACKS Plaque (R15-2P) (if more than 1 track), and EMERGENCY NOTIFICATION (I-13) signs.
2. LOW GROUND CLEARANCE (W10-5) signs may be relocated further upstream of crossing to provide advance warning of alternate route.
3. GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2) signs may be modified as needed to fit roadway geometry.
4. Table 1 placement distances may vary per Sect. 2C.05 of the TMUTCD.
5. See Table 1 to determine placement of STOP AHEAD (W3-1) and YIELD AHEAD (W3-2) signs unless shown otherwise.
6. DO NOT STOP ON TRACKS (R8-8) signs installed when potential for vehicles stopping on tracks is significant as determined by sealing engineer. Install so sign does not block view of RR mast.
7. See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.

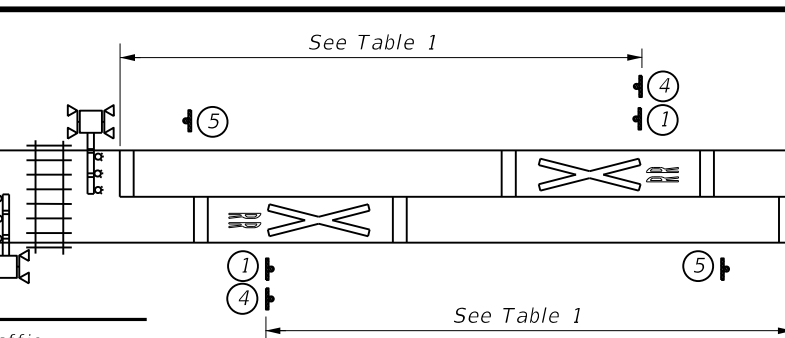


	"A" < 100'	"A" ≥ 100'
"B"	See Table 1. Place pavement markings and signs on opposite side of intersection from rail if spacing from Table 1 would put markings within intersection.	See Table 1. Place pavement markings and signs between rail and intersection if spacing from Table 1 would put markings within intersection.
"C"	See Table 1.	GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2, W10-3, W10-4) signs should only be installed if W10-1 sign is not between intersection and railroad crossing. If needed, see Table 1.

GRADE CROSSING NEAR A PARALLEL STREET



1-WAY

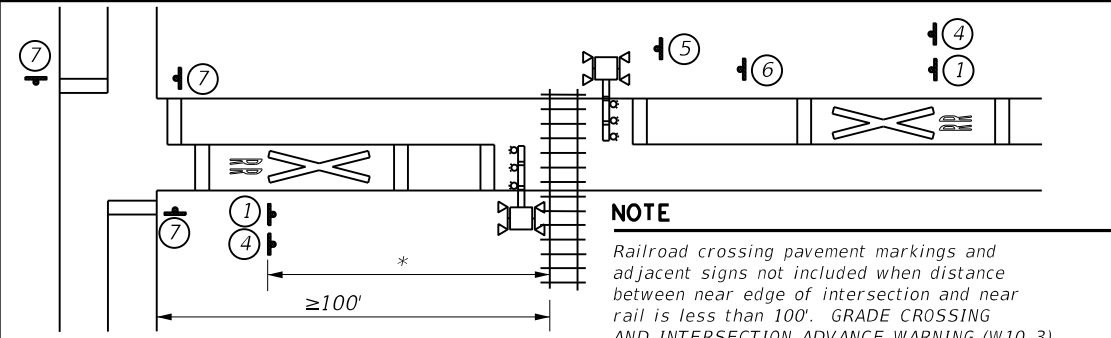


- NOTE**
- Separate active traffic control devices, railroad crossing pavement markings, and adjacent signs required when tracks are more than 100' apart.

2 ADJACENT CROSSINGS

SIGNS

** ① W10-1 36"DIA.	** ② W10-2L 36"X36"	** ③ W10-2R 36"X36"	IF NEEDED ④ W10-5 36"X36" LOW GROUND CLEARANCE W10-5P 30"X24"
IF NEEDED ⑤ R8-8 24"X30" DO NOT STOP ON TRACKS	IF NEEDED ⑥ W3-1 30"X30" YIELD AHEAD	⑦ R1-1 36"X36" STOP ALL WAY R1-3P 18"X6"	IF NEEDED ⑧ R15-1 48"X9" RAIL CROSSING CROSSROAD 3 TRACKS R15-2P 27"X18" STOP R1-1 36"X36"
⑨ R15-1 48"X9" RAIL CROSSING CROSSROAD 3 TRACKS R15-2P 27"X18" YIELD R1-2 48"X48"X48"	⑩ R15-1 48"X9" RAIL CROSSING CROSSROAD 3 TRACKS R15-2P 27"X18"	⑪ ** W10-13P 30"X24" NO GATES OR LIGHTS	REPORT EMERGENCY OR PROBLEM 1-800-555-5555 CROSSING 836 597 H Sign may be placed perpend. to travel lanes. ⑫ I-13 15"X9"
⑬ W3-2 30"X30" IF NEEDED YIELD AHEAD	** Includes a NO TRAIN HORN Plaque (W10-9P) if crossing is in a Quiet Zone. LOW GROUND CLEARANCE Plaque (W10-5P) if needed is mounted below W10-2/W10-3/W10-4 signs.	⑬ W10-9P 30"X24" NO TRAIN HORN	⑬ W10-5P 30"X24" LOW GROUND CLEARANCE



T-INTERSECTION

Texas Department of Transportation
Traffic Operations Division Standard

RAILROAD CROSSING DETAILS SIGNING & STRIPING

RCD(2)-16

FILE: rcd2-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	113	

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS				DELINEATORS				D & OM DESCRIPTIVE CODES		
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	SINGLE		DOUBLE			
SHEETING	Yellow, White or Red Type B or C reflective sheeting				SHEETING				Yellow, White or Red Type B or C Reflective Sheeting	
NOTE	<p>1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx).</p> <p>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.</p>				POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX	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 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
					MOUNT TYPE	GND	GND, SRF	GND	GND, SRF	

OBJECT MARKERS								D & OM DESCRIPTIVE CODES							
DEVICE	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)	INSTL OM ASSM (OM-XX) (XXXX)XXX(XX) 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						
		OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C		OM-4	DEPARTMENTAL MATERIAL SPECIFICATIONS <table border="1"> <tr> <td>FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)</td> <td>DMS-4400</td> </tr> <tr> <td>SIGN FACE MATERIALS</td> <td>DMS-8300</td> </tr> <tr> <td>DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS</td> <td>DMS-8600</td> </tr> </table>	FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400	SIGN FACE MATERIALS	DMS-8300
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400														
SIGN FACE MATERIALS	DMS-8300														
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600														
SHEETING	Yellow-Type B _{FL} or C _{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroreflective yellow - Type B _{FL} or C _{FL} Sheeting			Red -Type B _{FL} or C _{FL} Sheeting							
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT							
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP							

BARRIER REFLECTORS (BRF)			CHEVRONS				ONE DIRECTION LARGE ARROW		NOTE: Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.		
DEVICE	GF1	GF2	CTB	 W1-8				 W1-6			
	<p>1. Barrier reflectors shall meet the requirements of DMS 8600.</p> <p>2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.</p>			SIZE (W x L)	18" x 24" (Conventional)	24" x 30" (Conventional Oversize)	30" x 36" (Expressway)	36" x 48" (Freeway)	SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
				MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only		MOUNTING HEIGHT	7'-0"	
				NOTE	<p>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).</p> <p>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).</p>						
SHEETING	Yellow, White, Red										
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.										

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	03	063	FM 521
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	HOU	FORT BEND	114	

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

TYPE OF BARRIER MOUNTS

WING CHANNEL (WC)

FLEXIBLE POSTS (YFLX, WFLX)

WEDGE ANCHOR SYSTEMS

GUARD FENCE ATTACHMENT

GND

GND

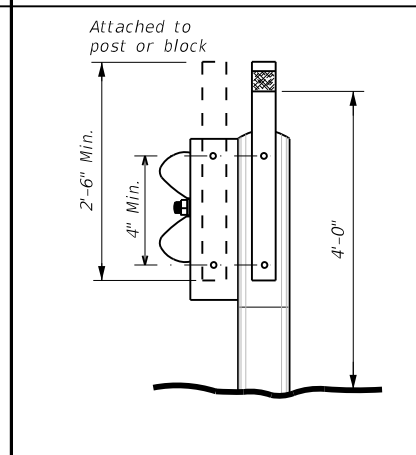
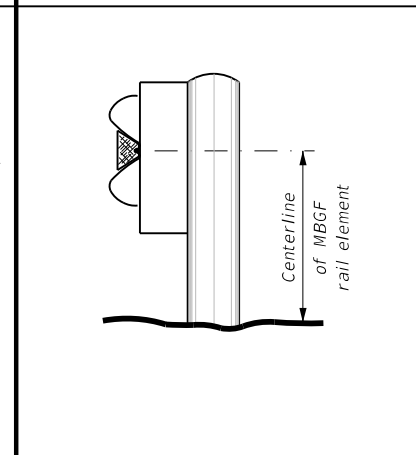
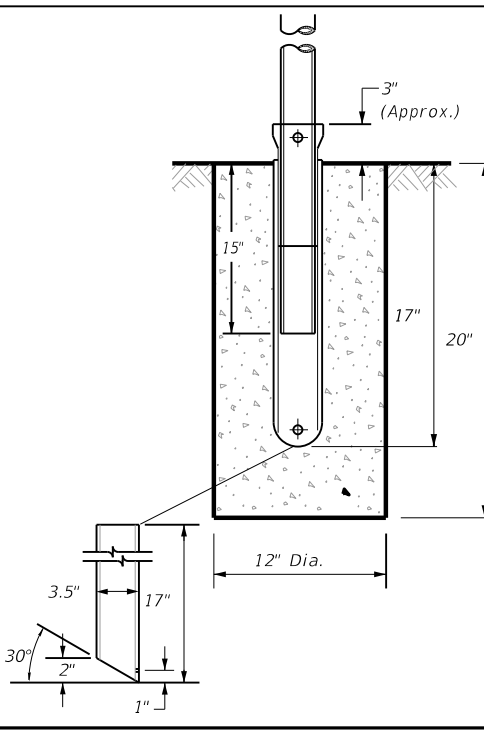
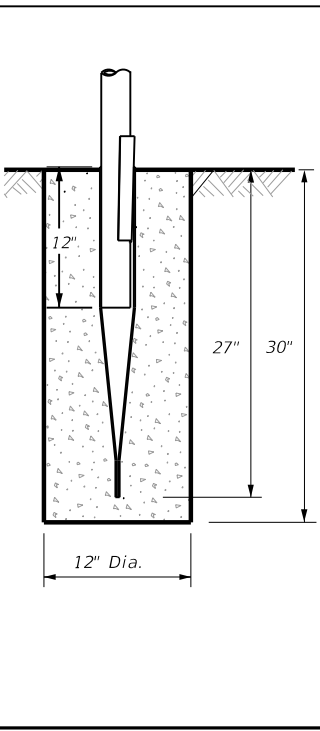
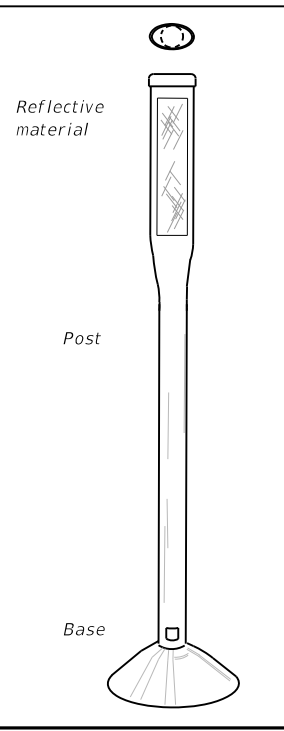
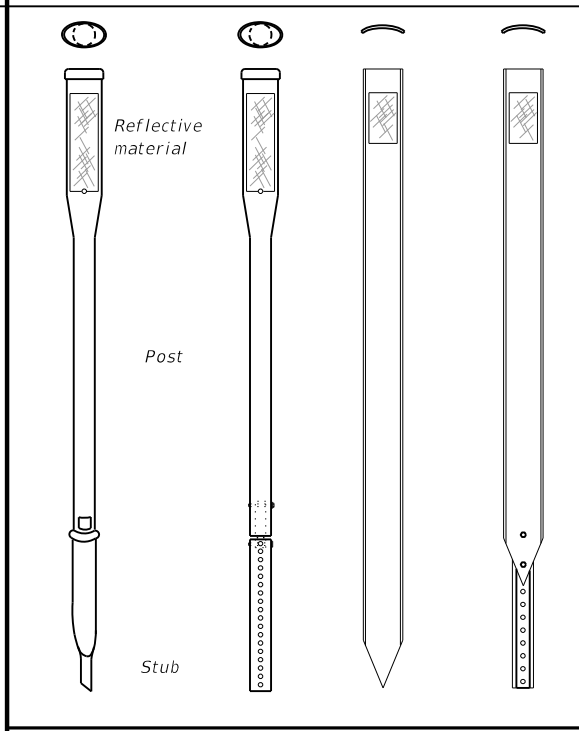
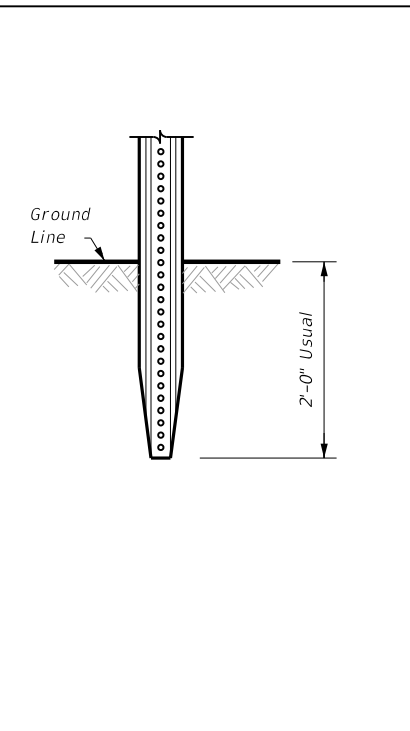
SRF

WAS

WAP

GF1

GF2

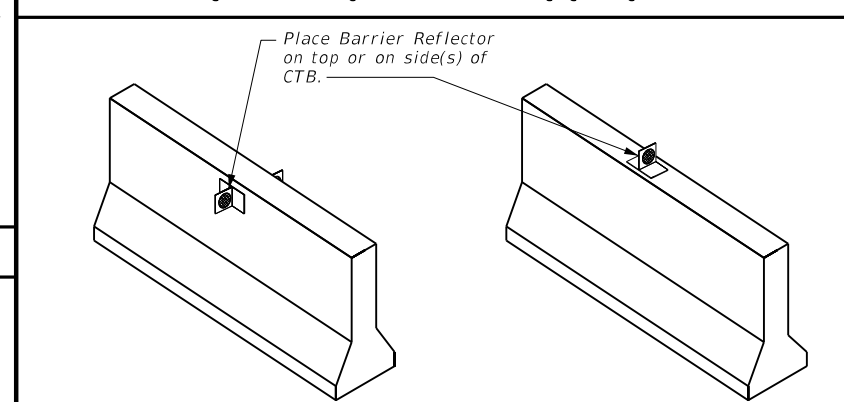


NOTES
 1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
 2. 1.12 lbs/ft steel per ASTM A 1011 55 Gr. 50, or ASTM A499.

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

NOTE
 1. Install per manufacturer's recommendations.

CONCRETE TRAFFIC BARRIER (CTB)

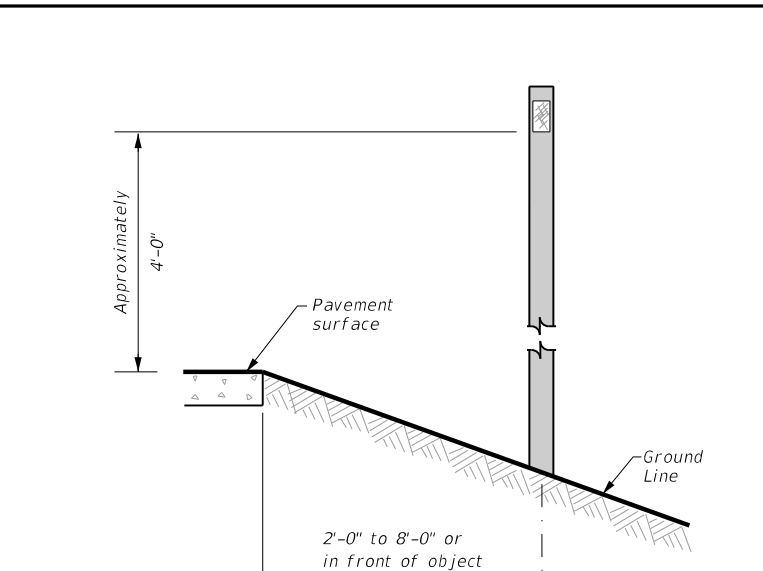
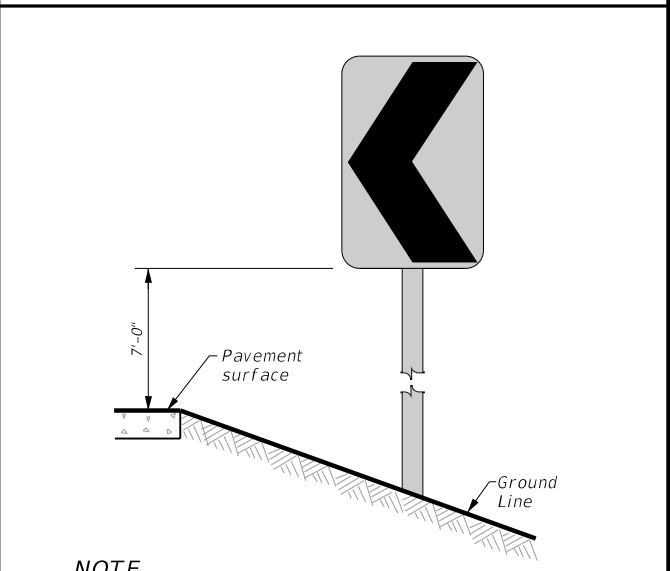
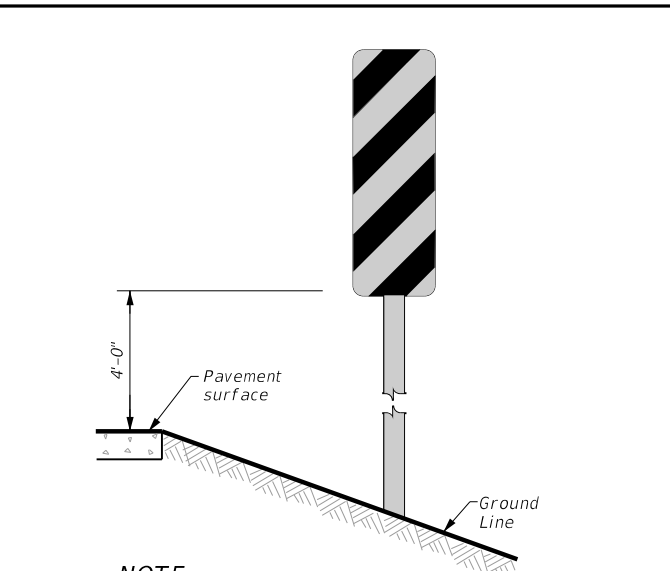


GENERAL NOTES
 1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
 2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
 3. When Type 2 object markers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

TYPES 1,3, AND 4 OBJECT MARKERS AND CHEVRONS

CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN

DELINEATORS AND TYPE 2 OBJECT MARKERS



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

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

See general notes 1, 2 and 3.

Texas Department of Transportation
 Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

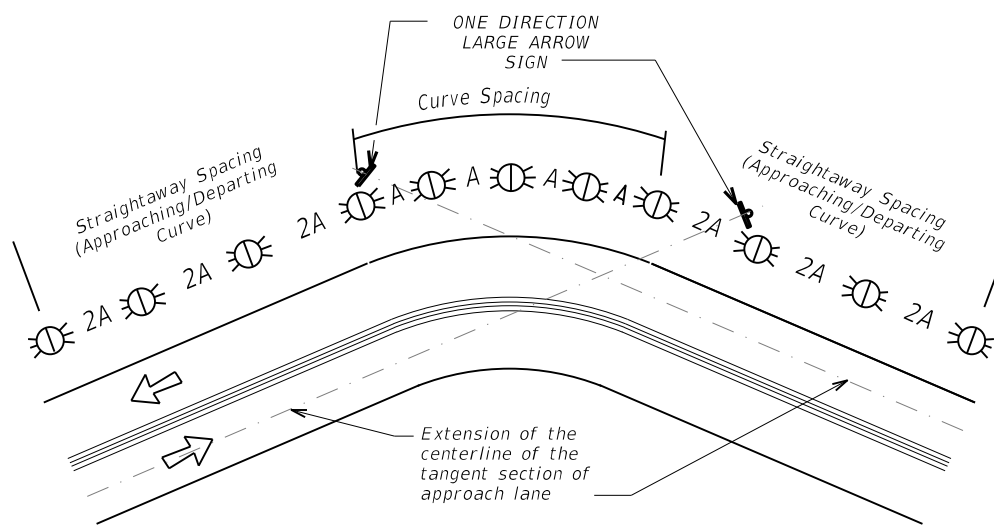
D & OM(2)-20

FILE: ddm2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	HOU	FORT BEND	115	

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

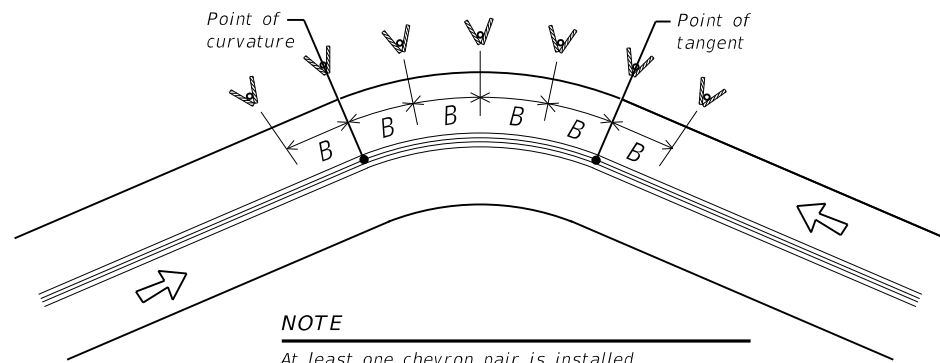
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN				
Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN			
Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy./Exp. Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete) and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100' max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100' max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

- 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.
- Barrier reflectors may be used to replace required delineators.
- Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

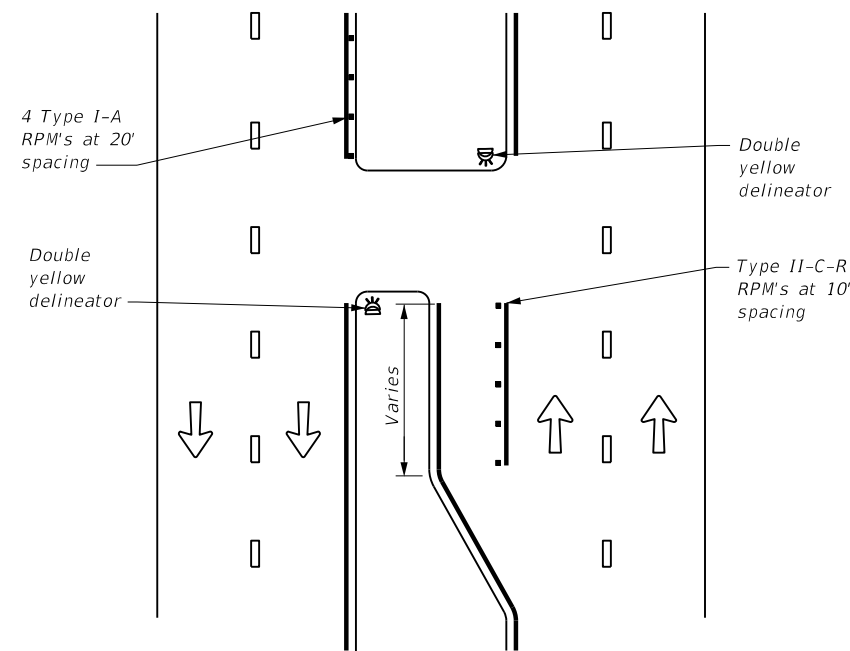


DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

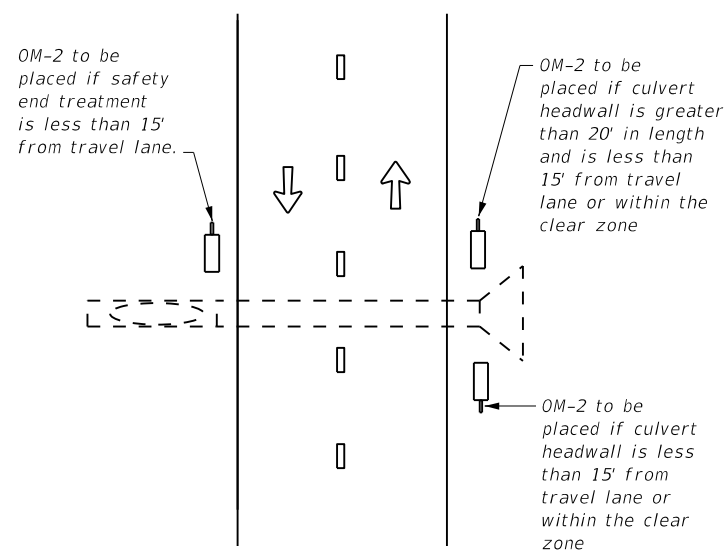
FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
3-15 8-15	DIST	COUNTY	SHEET NO	
8-15 7-20	HOU	FORT BEND	116	

CROSSOVERS



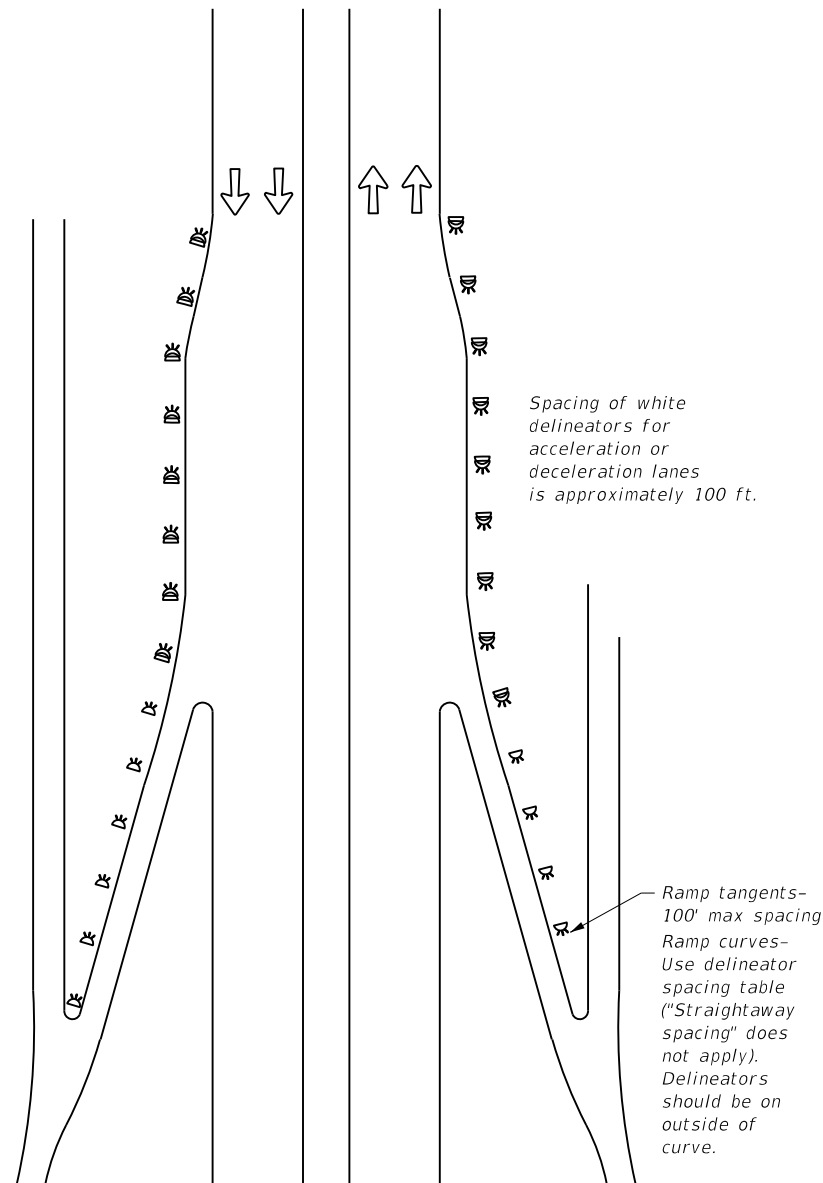
DETAIL 1

FOR CULVERTS WITHOUT MBGF



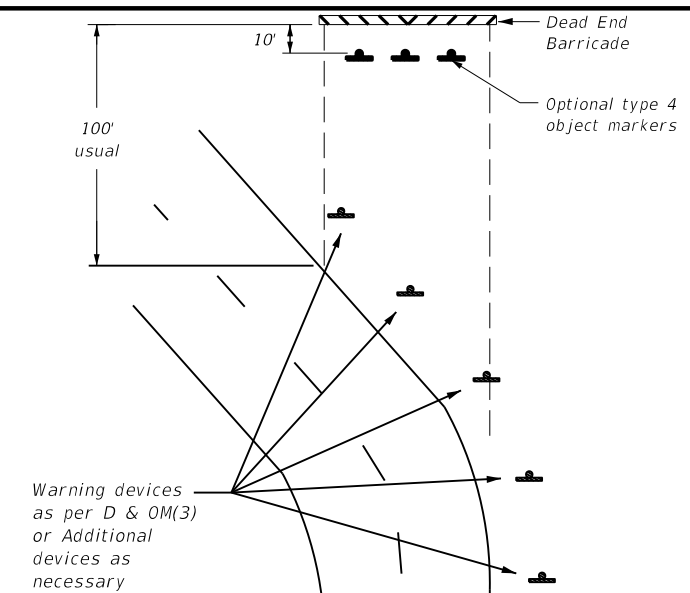
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



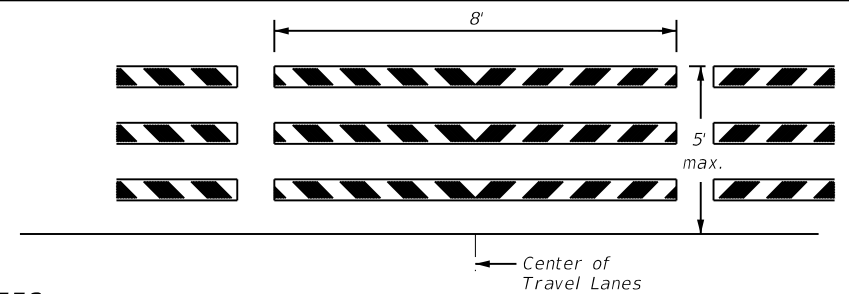
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

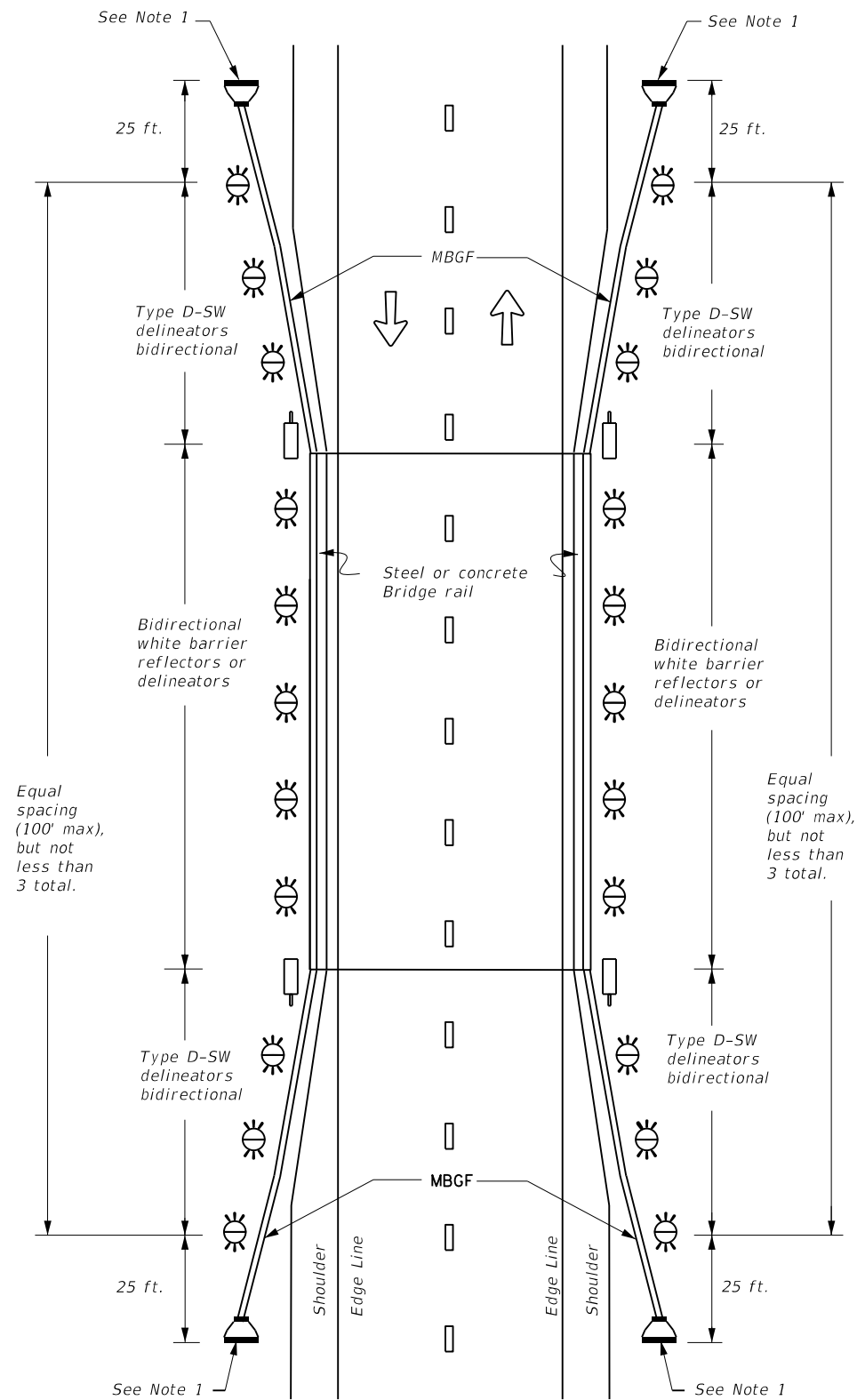


DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	OW: TXDOT	CK: TXDOT
©TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
3-15	DIST	COUNTY	SHEET NO.	
7-20	HOU	FORT BEND	117	

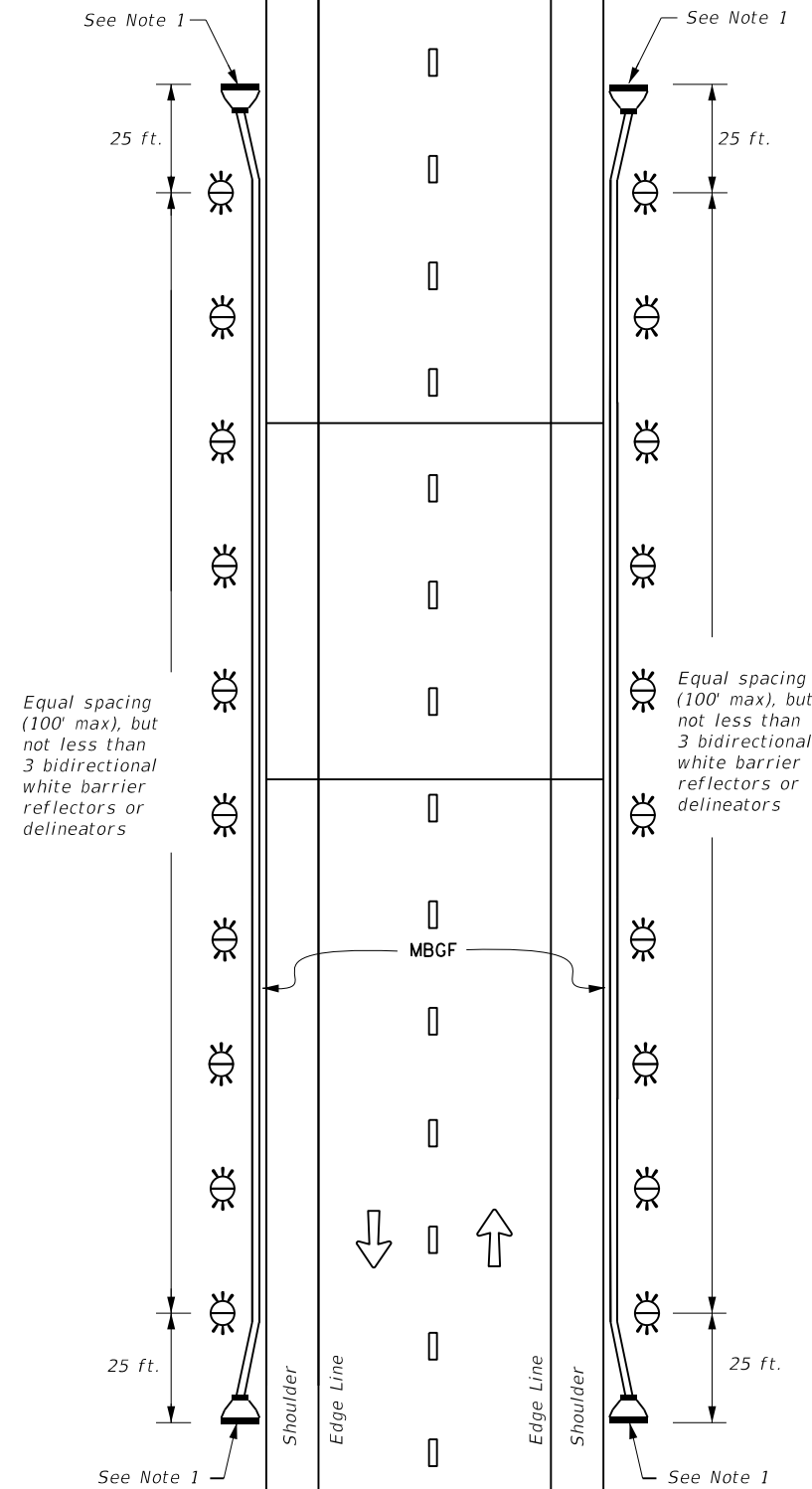
**TWO-WAY, TWO LANE ROADWAY
WITH REDUCED WIDTH APPROACH RAIL**



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

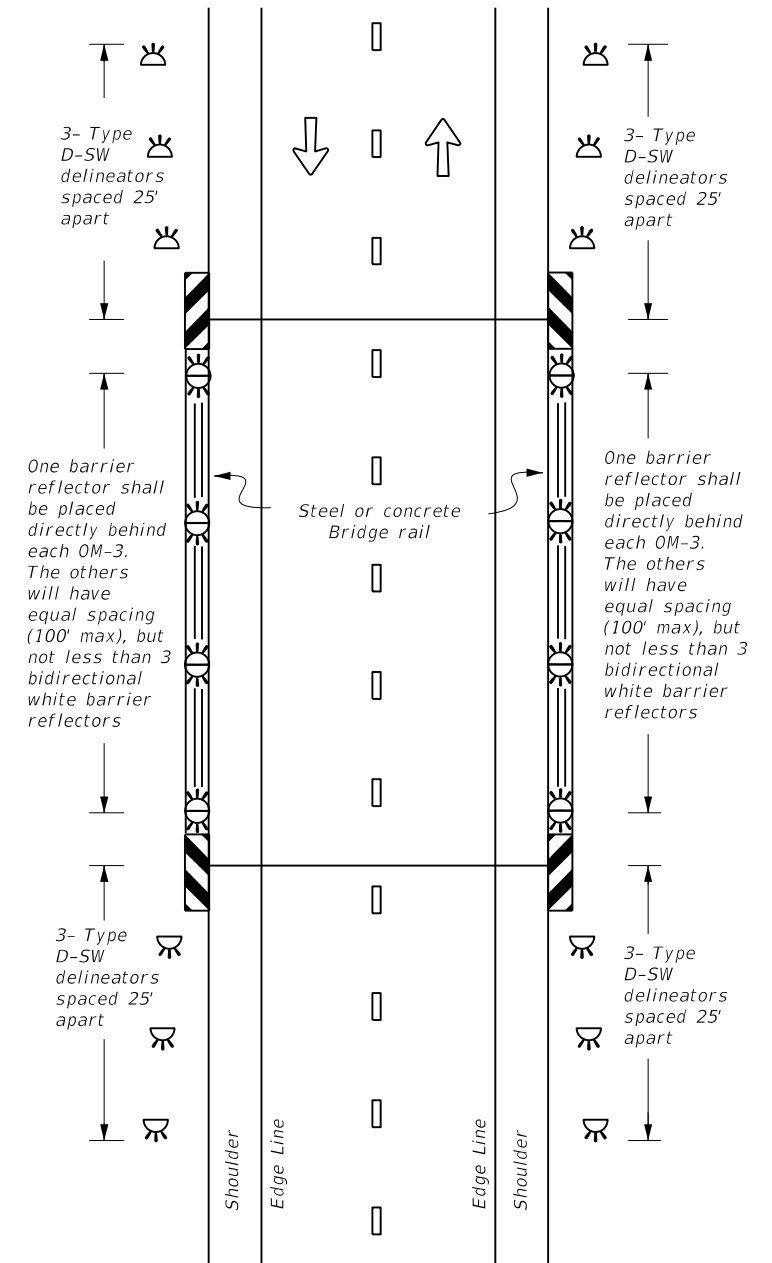
**TWO-WAY, TWO LANE ROADWAY
WITH METAL BEAM GUARD FENCE (MBGF)**



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

**TWO-WAY, TWO LANE ROADWAY
BRIDGE WITH NO APPROACH RAIL**



LEGEND

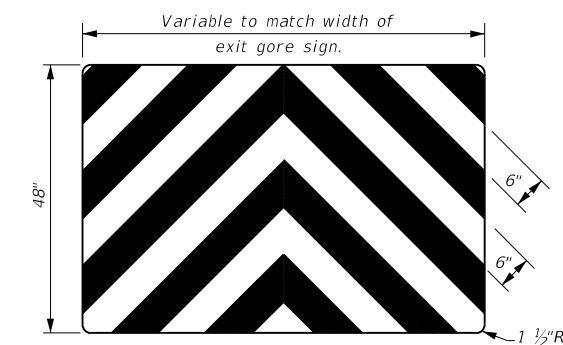
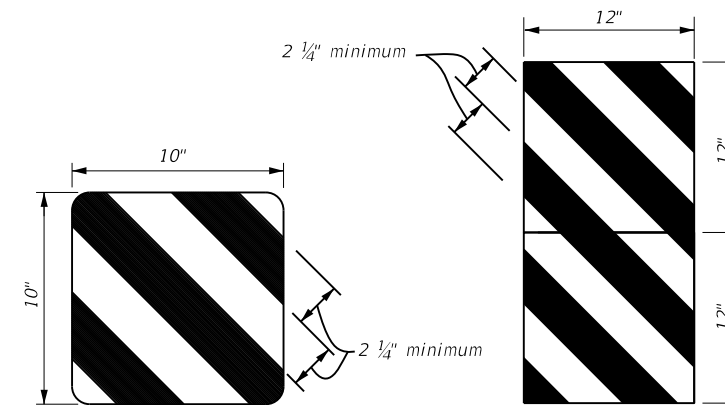
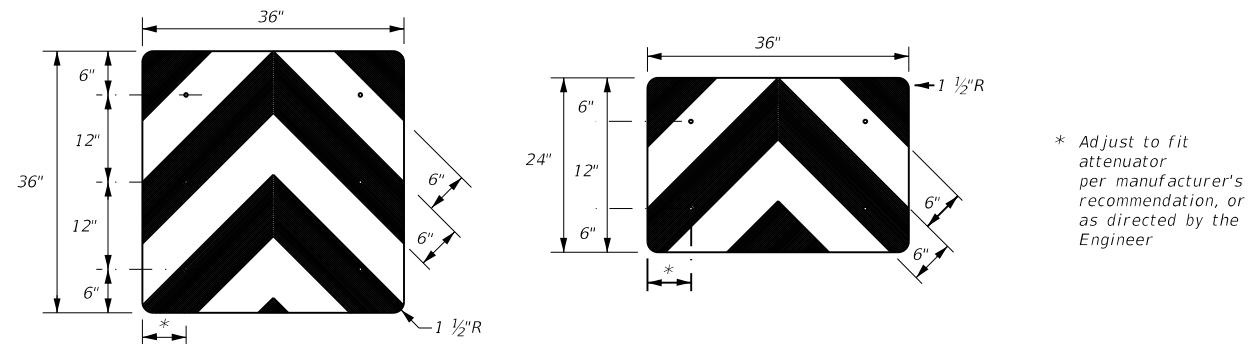
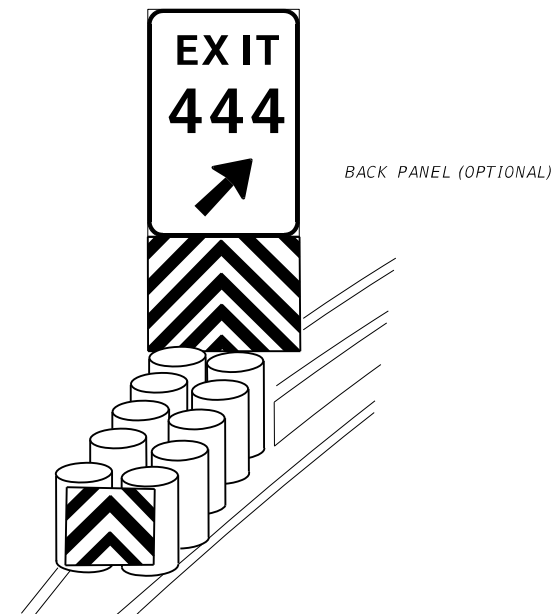
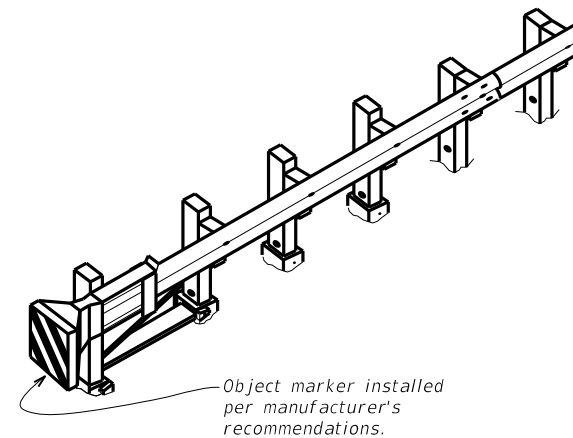
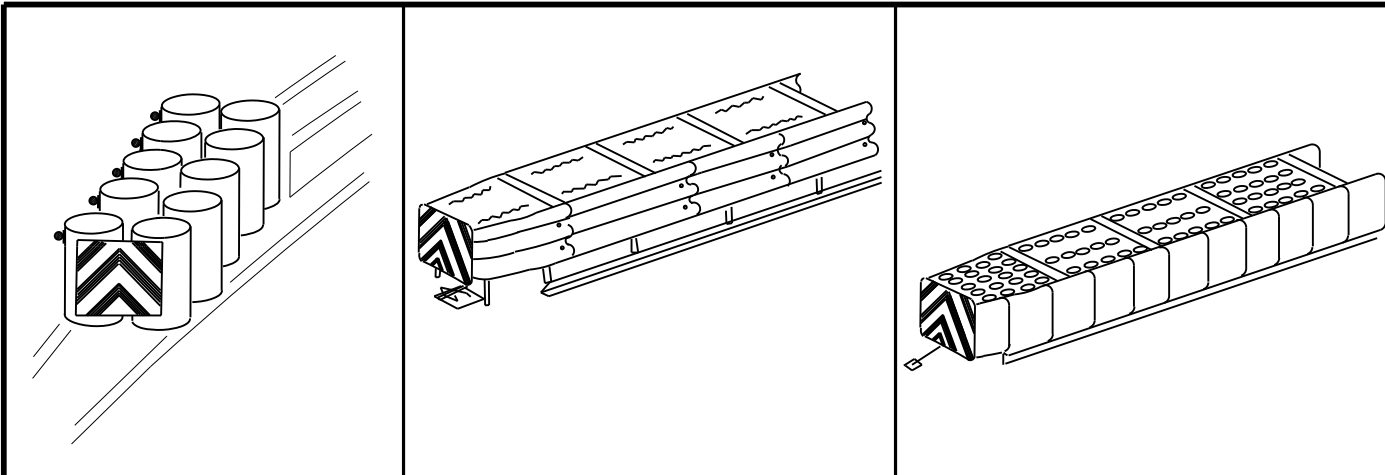
	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow



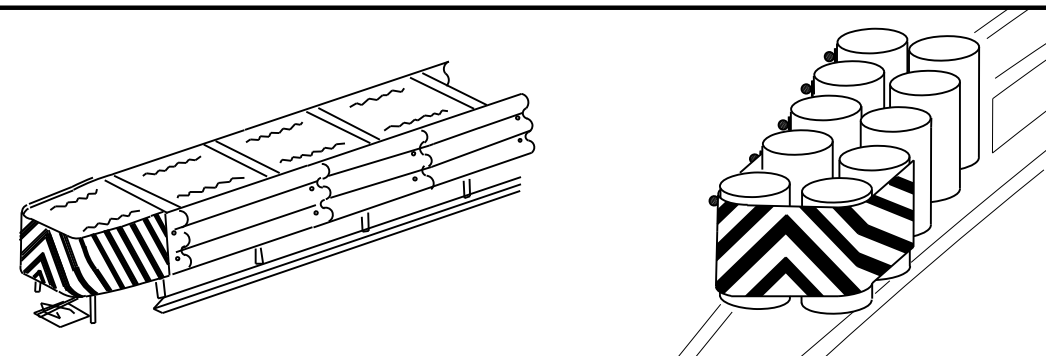
**DELINEATOR &
OBJECT MARKER
PLACEMENT DETAILS**

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	03	063	FM 521
7-20	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	118	



OBJECT MARKERS SMALLER THAN 3 FT²

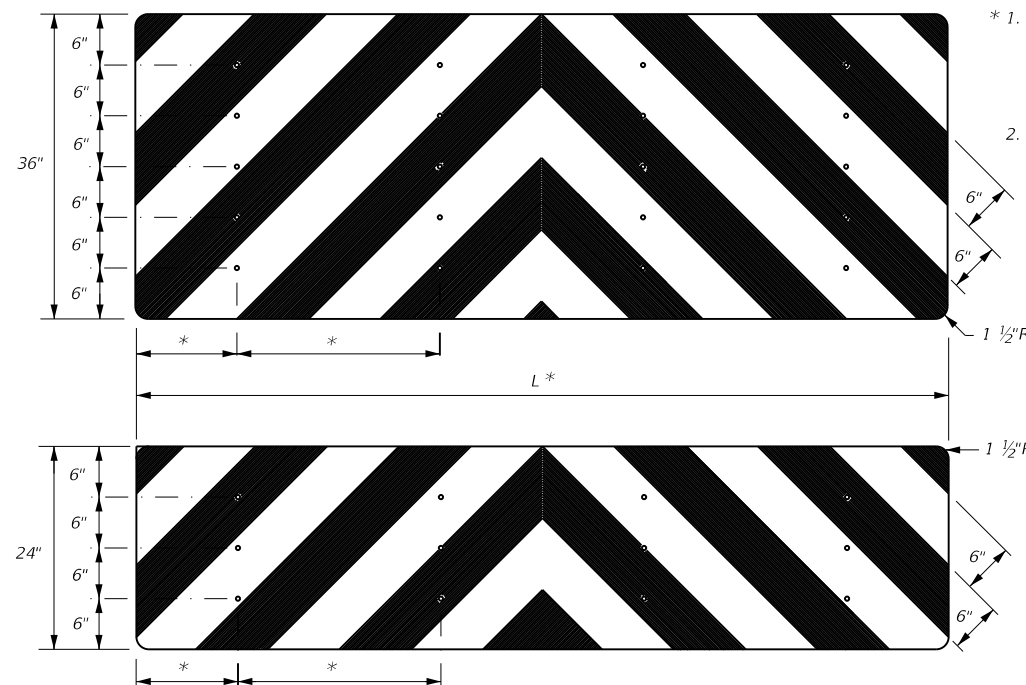


NOTES

- Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.
- Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.
- Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 1/4".
- Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.
- Object Marker at nose of attenuator is subsidiary to the attenuator.
- See D & OM (1-4) for required barrier reflectors.

NOTES

- Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturer's recommendation, or as directed by the Engineer.
- Mounting should be flush with top of attenuator. Minimum size 96" x 24".

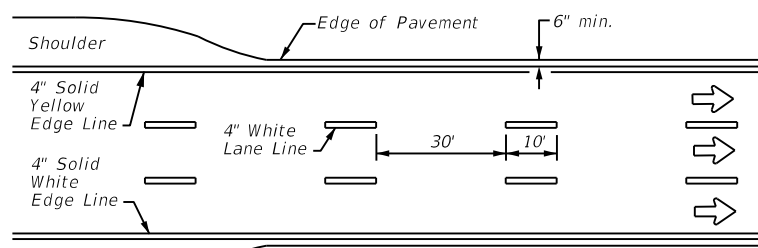


Texas Department of Transportation
Traffic Safety Division Standard

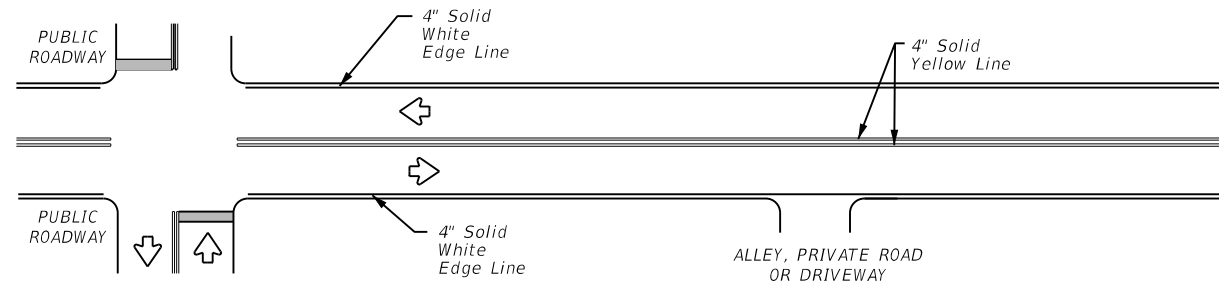
DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS
D & OM(VIA)-20

FILE: _dovvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TXDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
4-92 8-04	DIST	COUNTY	SHEET NO.	
8-95 3-15	HOU	FORT BEND	119	
4-98 7-20				

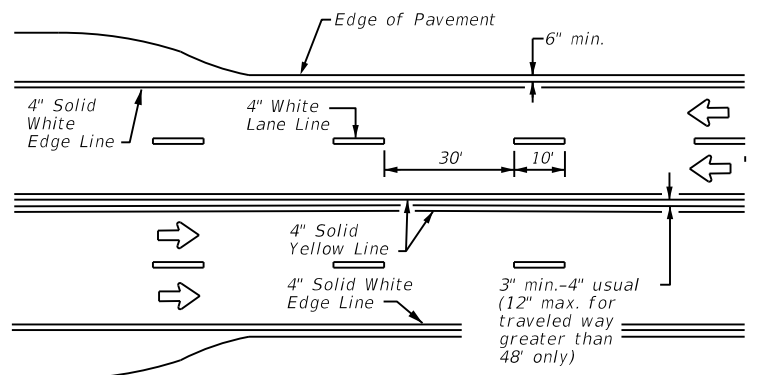
206



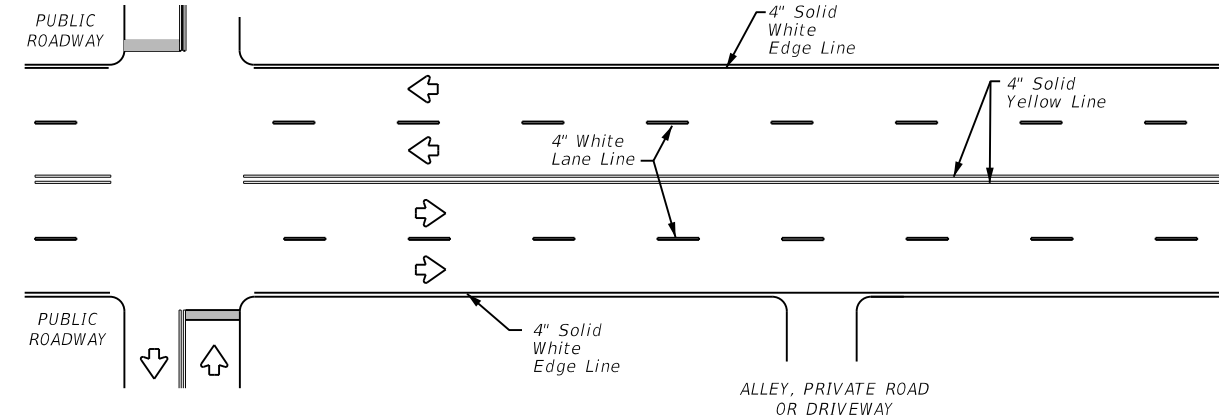
**EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**



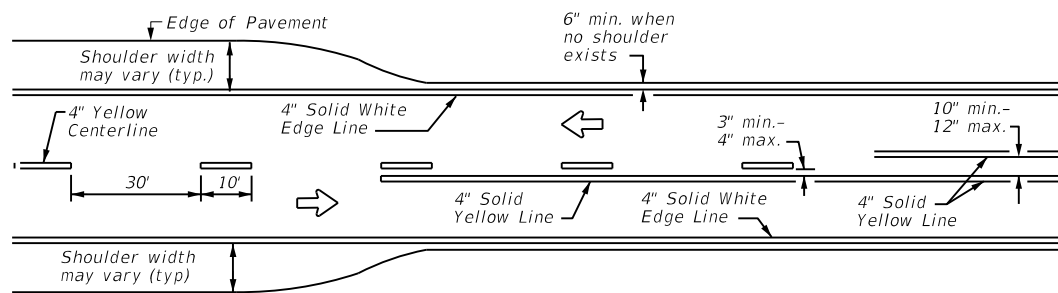
**TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS**



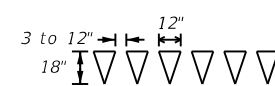
**CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**



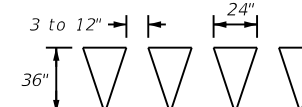
**TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS**



**TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**

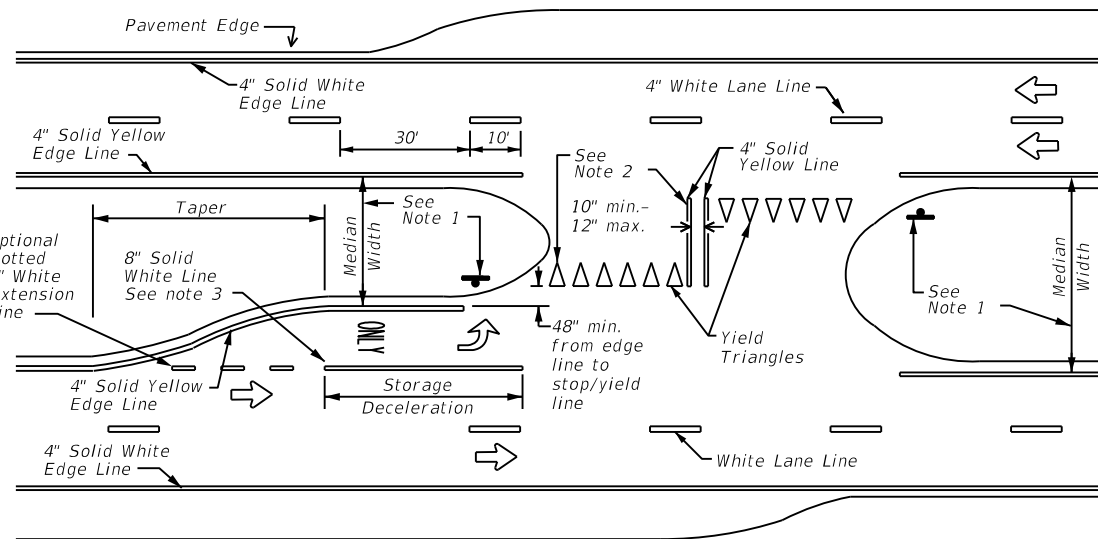


For posted speed on road being marked equal to or less than 40 MPH.



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

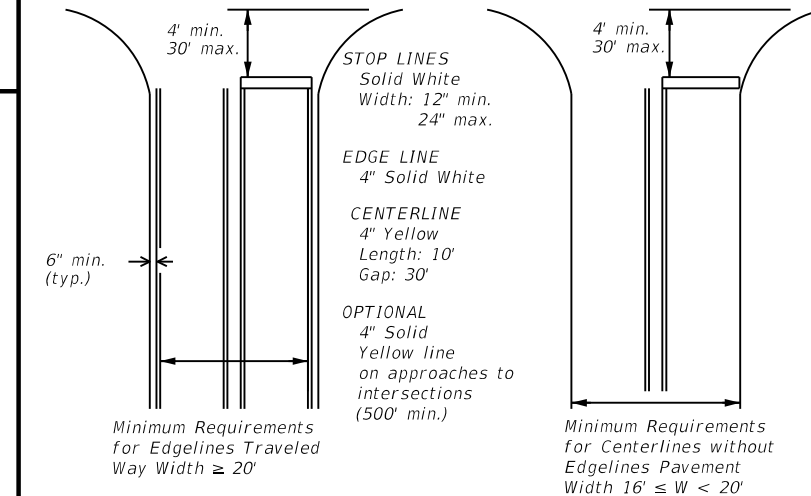
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling 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 triangles 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 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

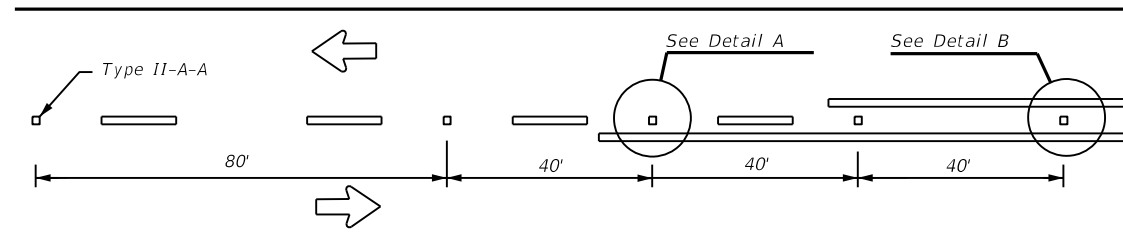


**TYPICAL STANDARD
PAVEMENT MARKINGS**

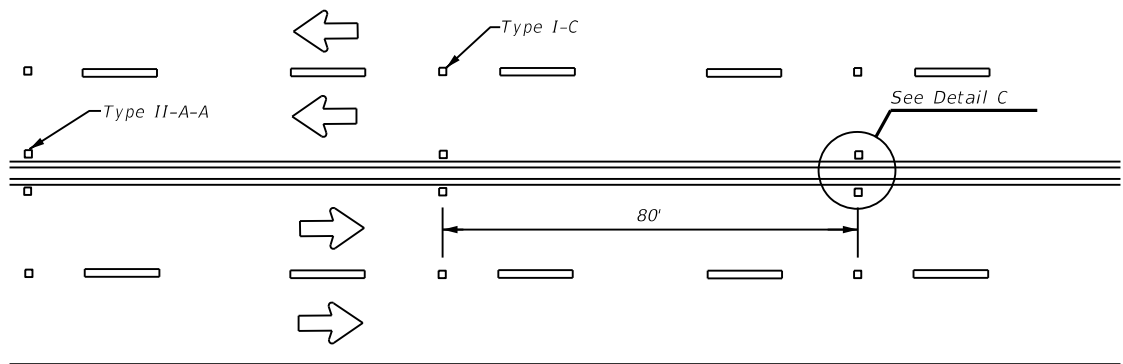
PM-20

©TXDOT NOVEMBER 1978		DN: TXDOT	CK: TXDOT	OW: TXDOT	CK: TXDOT
REVISIONS		CONT	SECT	JOB	HIGHWAY
8-95	2-12	0111	03	063	FM 521
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8-00	7-20				
3-03					
		DIST	COUNTY	SHEET NO.	
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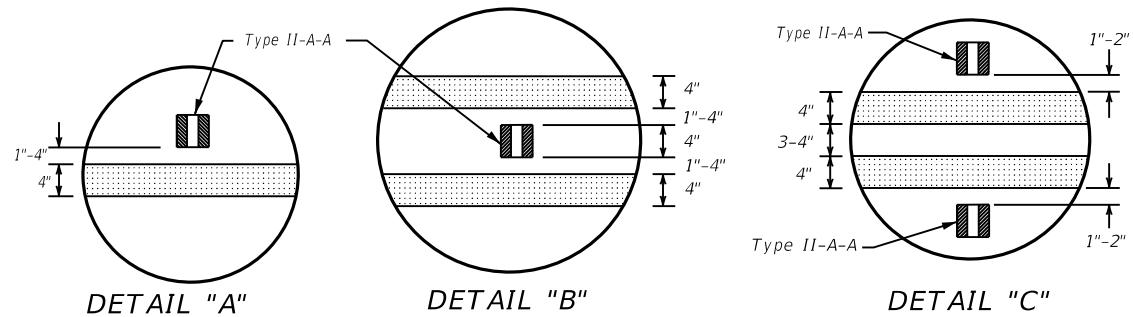
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



CENTERLINE FOR ALL TWO LANE ROADWAYS



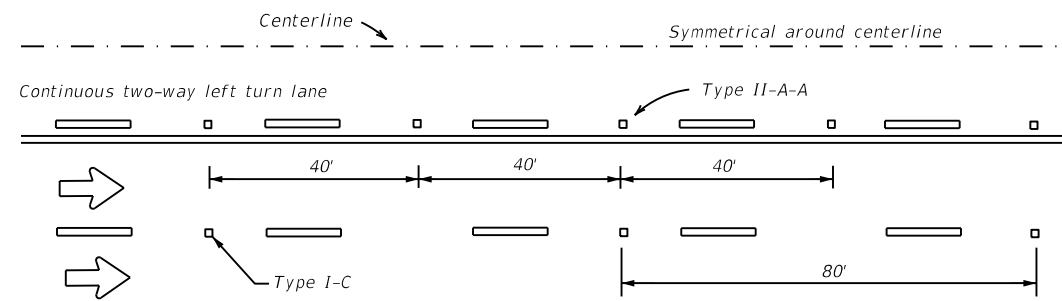
**CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY HIGHWAYS**



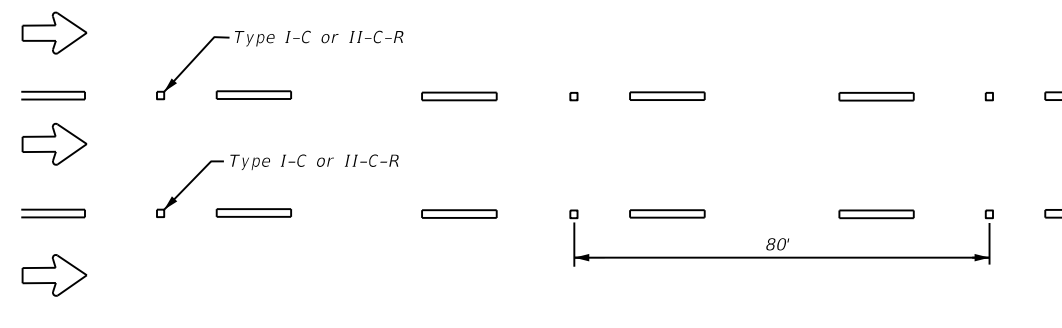
DETAIL "A"

DETAIL "B"

DETAIL "C"

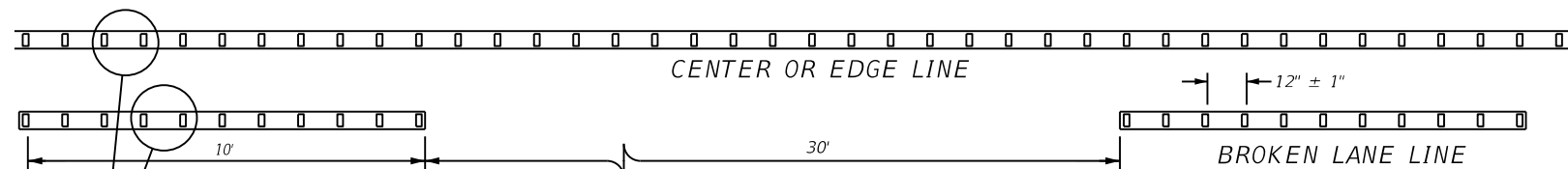


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



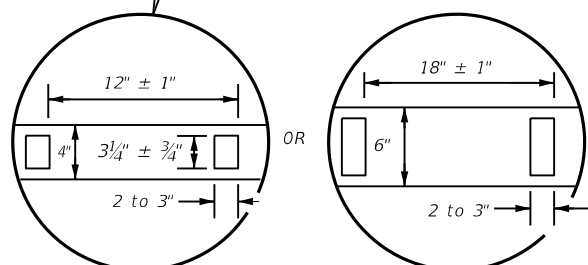
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.



**REFLECTORIZED PROFILE
PATTERN DETAIL**

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE,
CENTER LINE
OR LANE LINE

OPTIONAL 6" EDGE
LINE, CENTER LINE
OR LANE LINE

NOTE

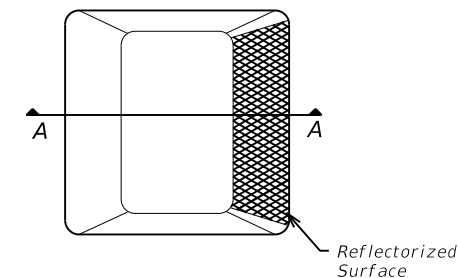
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

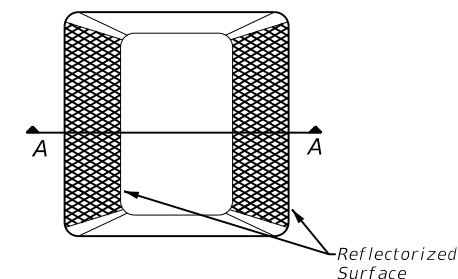
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

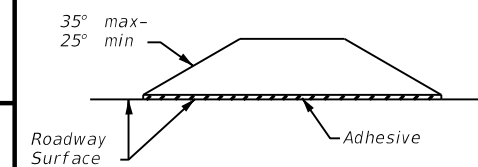
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



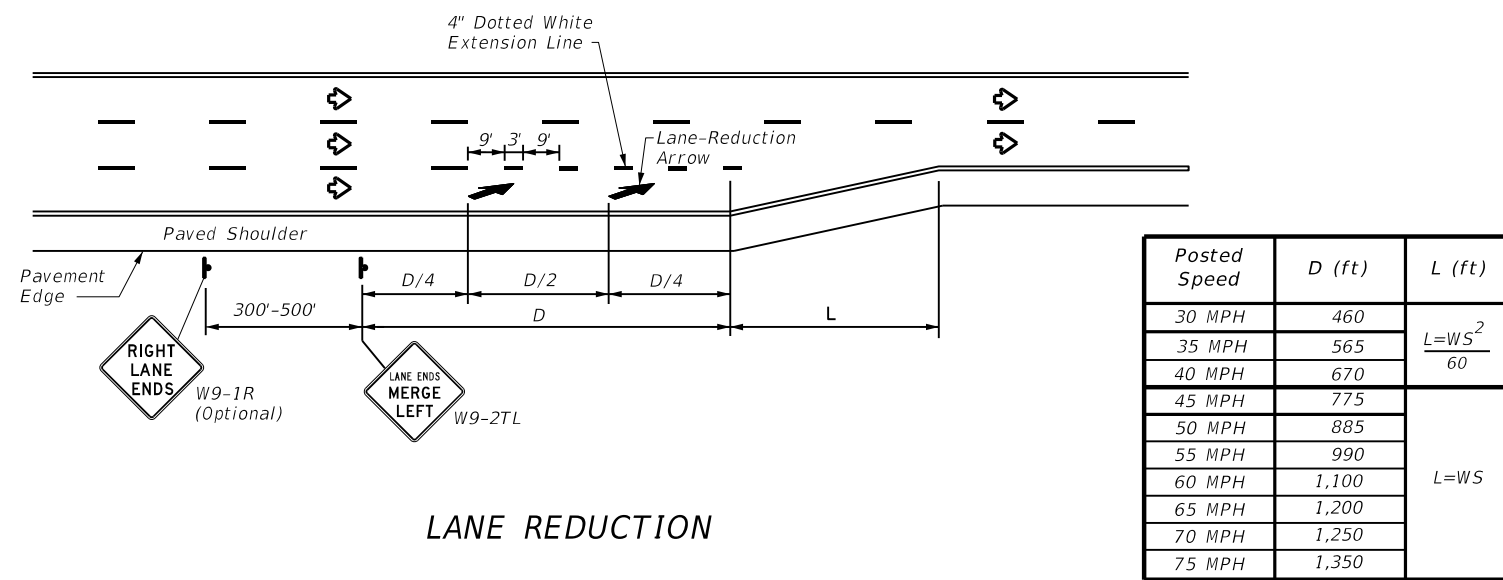
SECTION A

RAISED PAVEMENT MARKERS



**POSITION GUIDANCE USING
RAISED MARKERS
REFLECTORIZED PROFILE
MARKINGS
PM(2)-20**

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
4-92 2-10 REVISIONS	0111	03	063	FM 521
5-00 2-12	DIST	COUNTY	SHEET NO.	
8-00 6-20	HOU	FORT BEND	121	

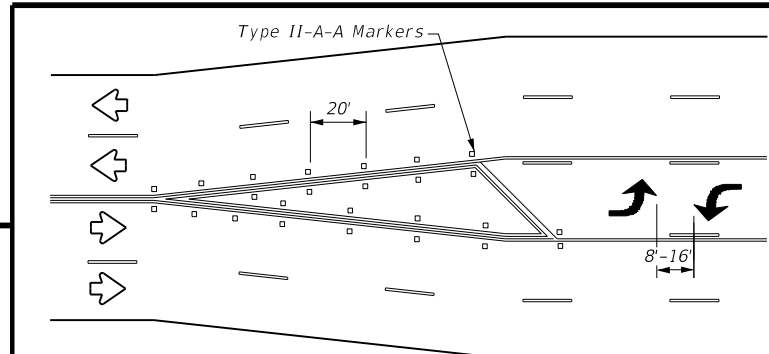


NOTES

- 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.
- 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.
- 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.
- For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

GENERAL NOTES

- 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.
- 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.
- 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.
- Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

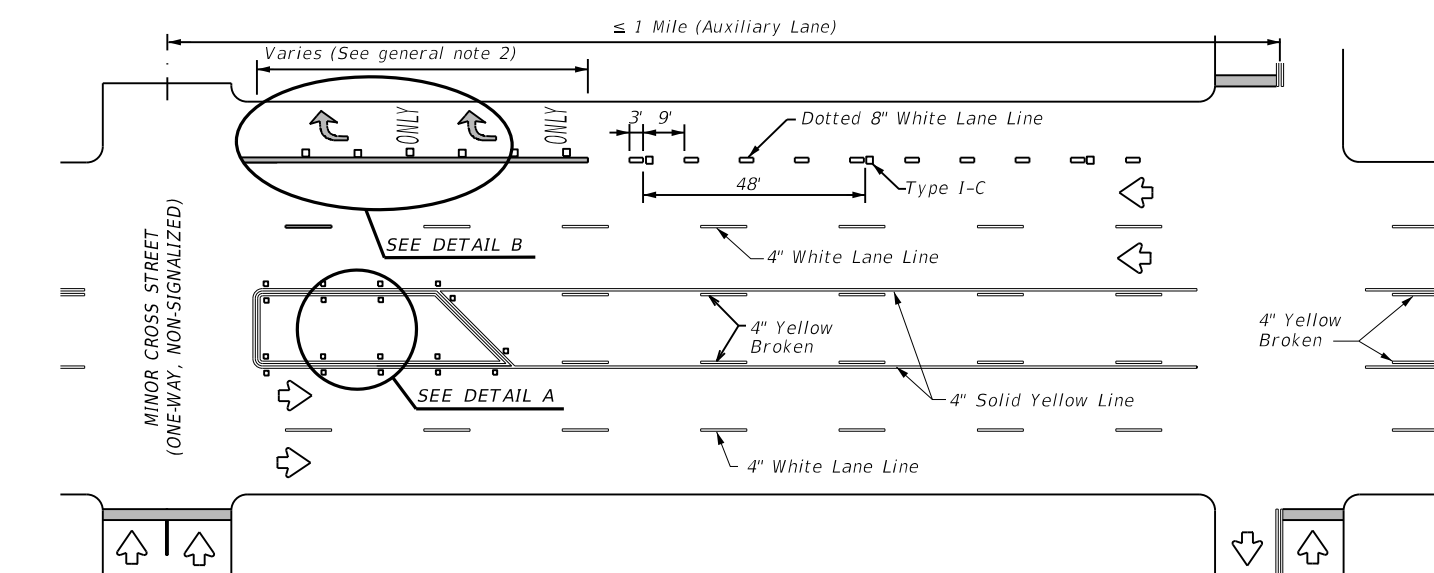


A two-way left-turn (TWLTL) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

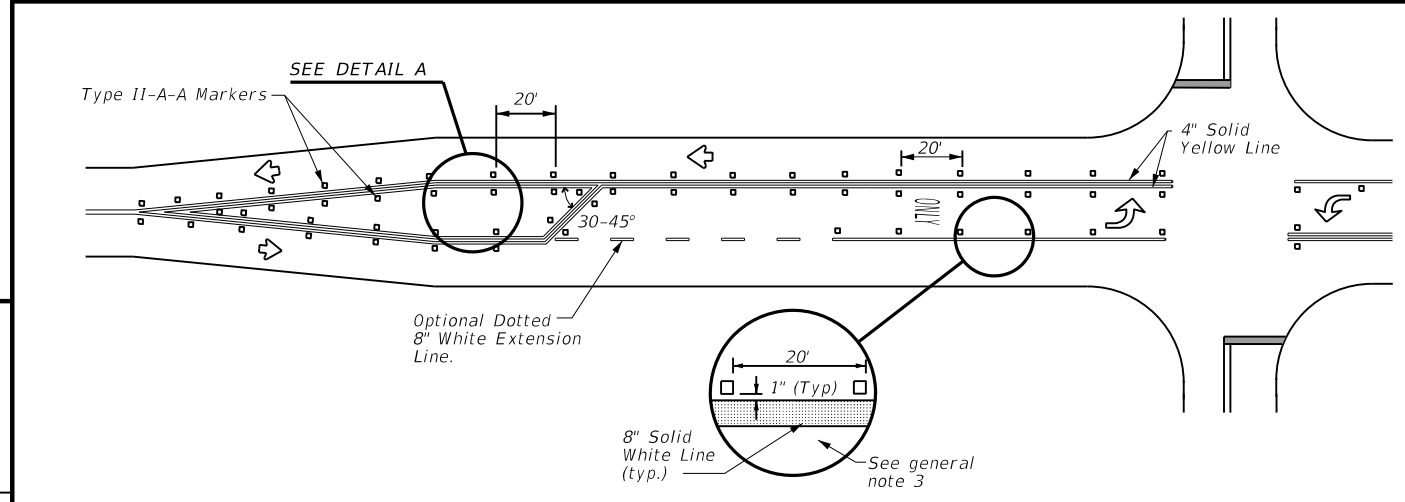
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

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

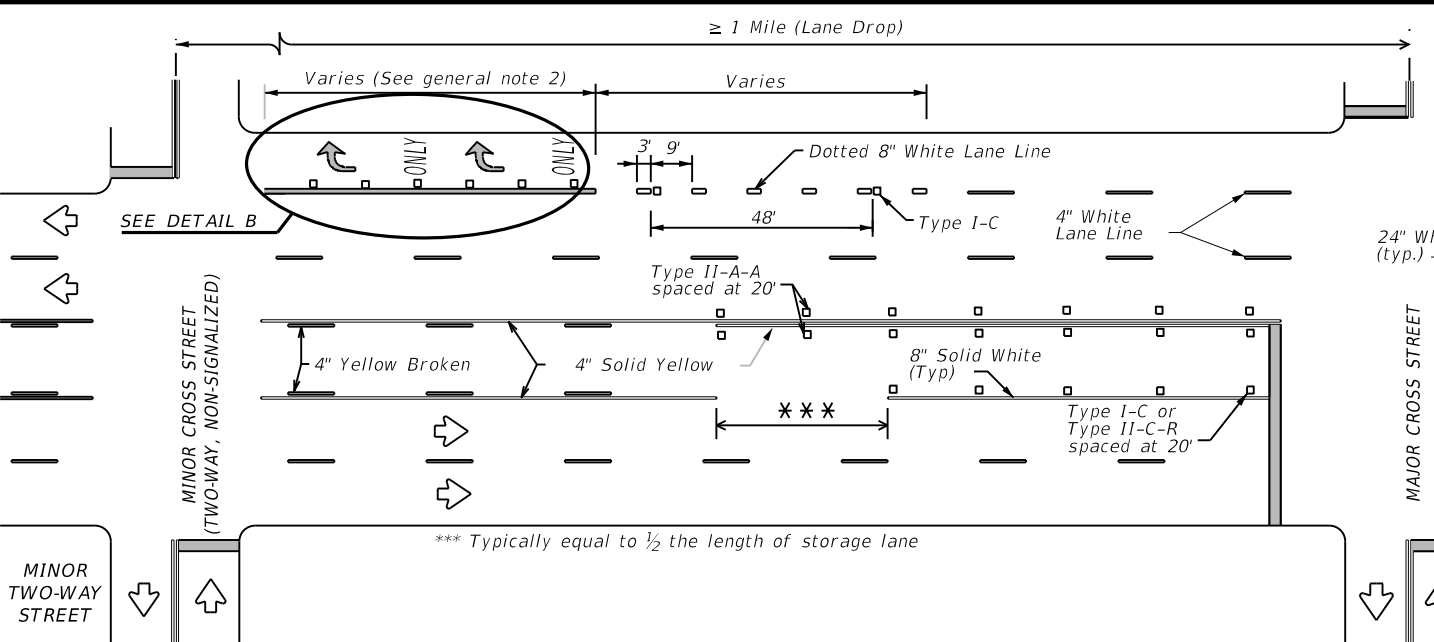
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



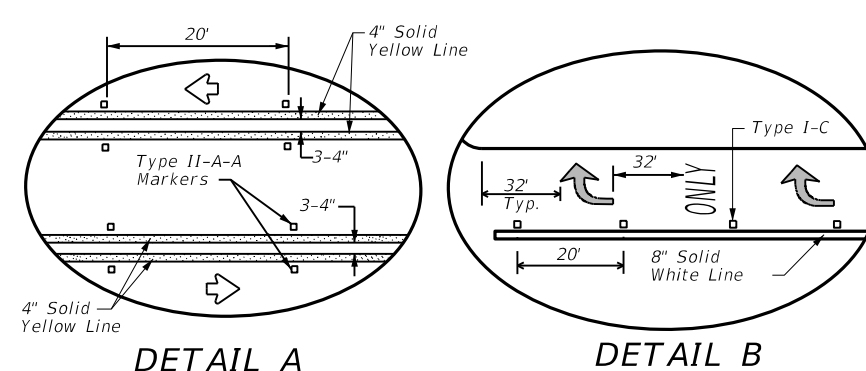
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



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	CONV	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
5-00 2-10	DIST	COUNTY	SHEET NO.	
8-00 2-12	HOU	FORT BEND	122	
3-03 6-20				

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
 TWT = Thin-Walled Tubing (see SMD(TWT))
 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
 S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
 UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
 WS = Wedge Anchor Steel - (see SMD(TWT))
 WP = Wedge Anchor Plastic (see SMD(TWT))
 SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
 SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

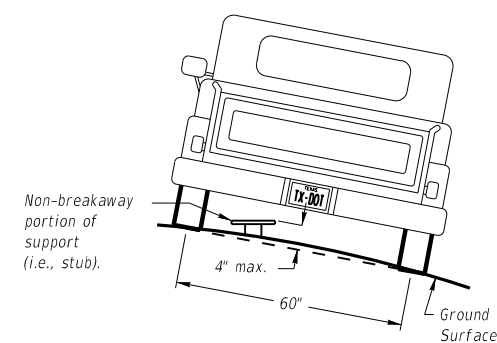
Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
 T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
 U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))

IF REQUIRED

1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
 BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
 WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
 EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT

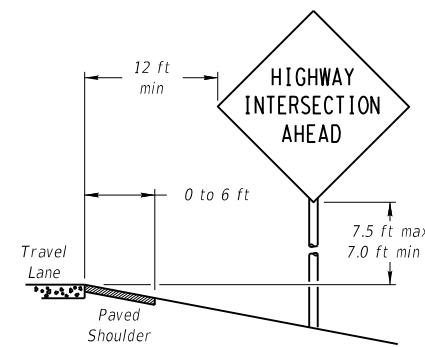


Non-breakaway portion of support (i.e., stub).

To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

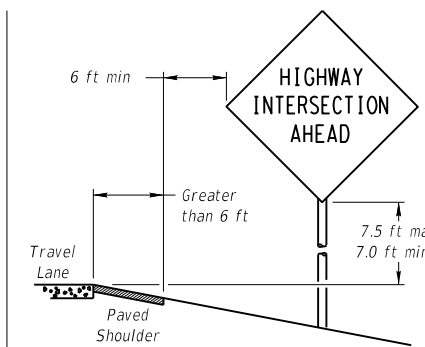
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

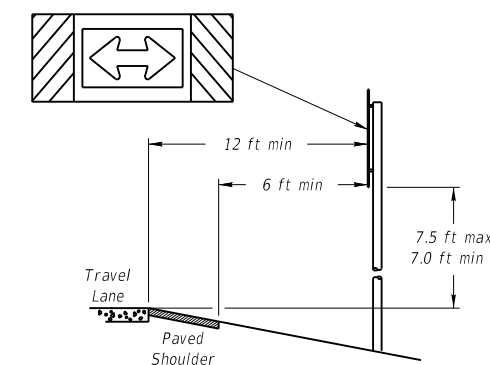
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



GREATER THAN 6 FT. WIDE

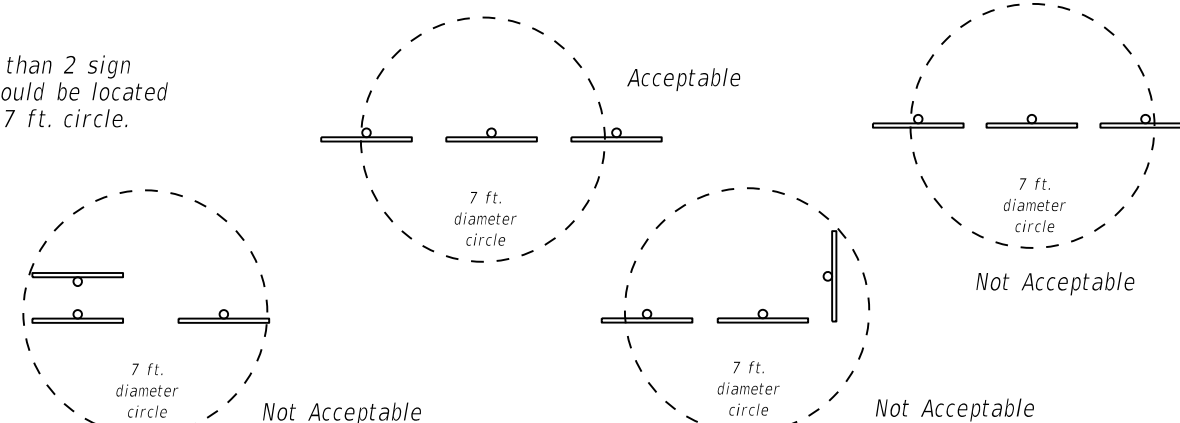
When the shoulder is greater than 6 ft. in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

T-INTERSECTION

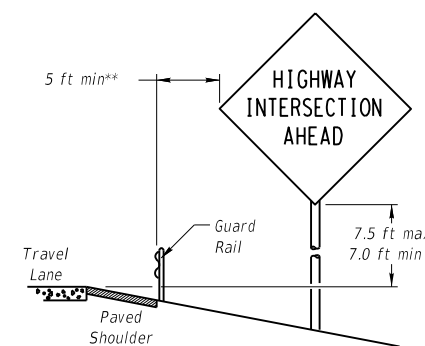


When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

No more than 2 sign posts should be located within a 7 ft. circle.

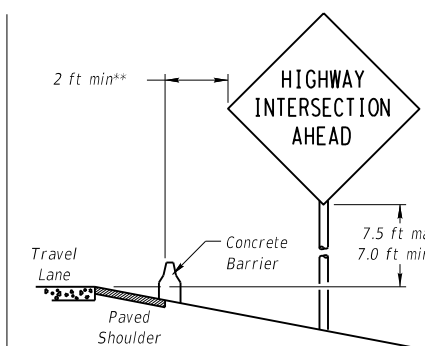


BEHIND BARRIER



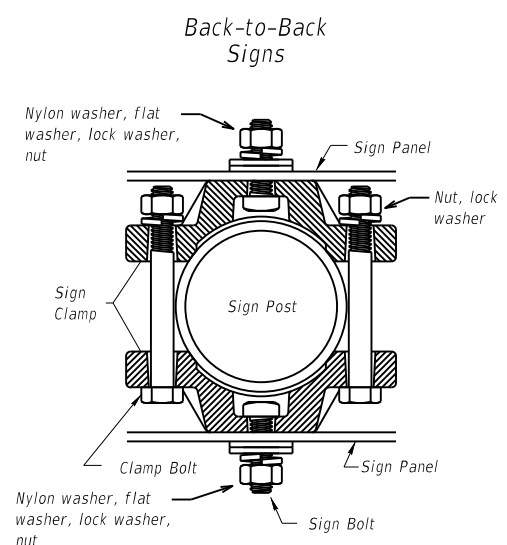
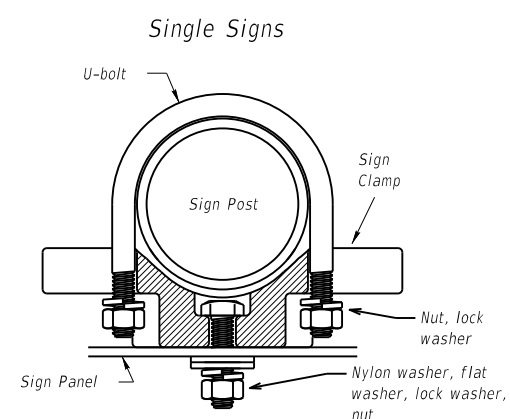
BEHIND GUARDRAIL

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.



BEHIND CONCRETE BARRIER

TYPICAL SIGN ATTACHMENT DETAIL



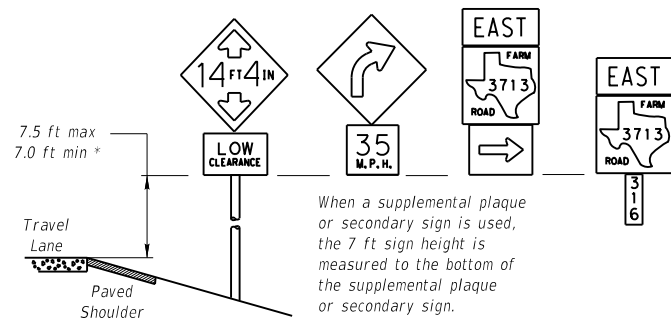
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

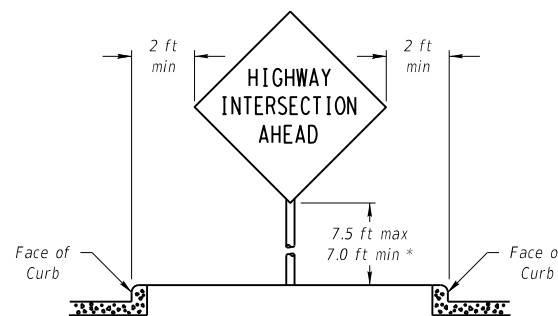
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



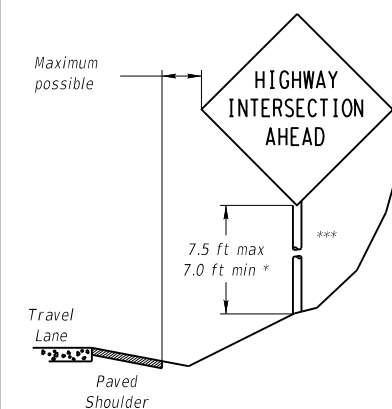
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

- a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or
- a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
<http://www.txdot.gov/publications/traffic.htm>

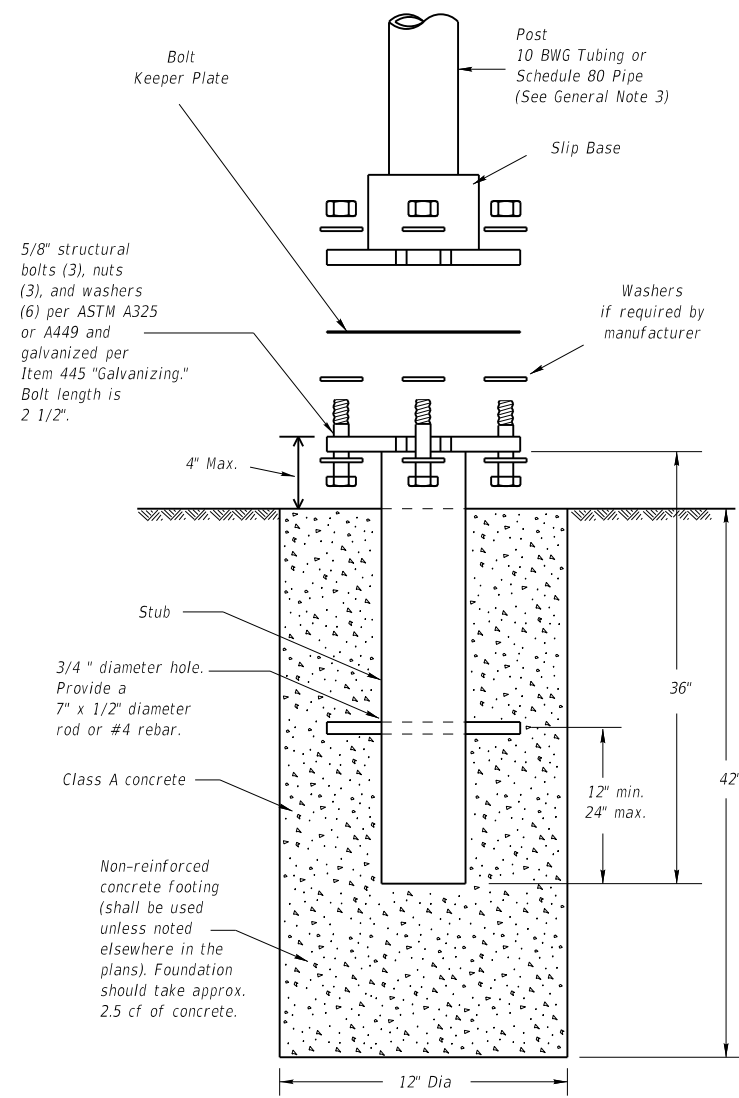
Texas Department of Transportation
 Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

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9-08	REVISIONS	CONT	SECT	JOB
		0111	03	063
		DIST	COUNTY	SHEET NO.
		HOU	FORT BEND	123

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:

- Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
- Material used as post with this system shall conform to the following specifications:
 - 10 BWG Tubing (2.875" outside diameter)
 - 0.134" nominal wall thickness
 - Seamless or electric-resistance welded steel tubing or pipe
 - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
 - Other steels may be used if they meet the following:
 - 55,000 PSI minimum yield strength
 - 70,000 PSI minimum tensile strength
 - 20% minimum elongation in 2"
 - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
 - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
 - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
 - Schedule 80 Pipe (2.875" outside diameter)
 - 0.276" nominal wall thickness
 - Steel tubing per ASTM A500 Gr C
 - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
 - 46,000 PSI minimum yield strength
 - 62,000 PSI minimum tensile strength
 - 21% minimum elongation in 2"
 - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
 - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
 - Galvanization per ASTM A123
- See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: <http://www.txdot.gov/publications/traffic.htm>
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

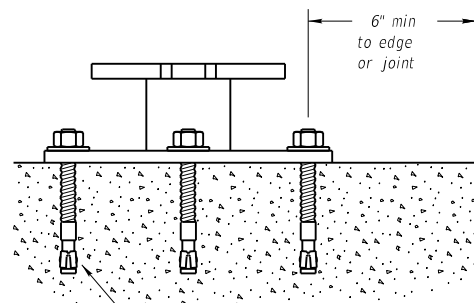
Foundation

- Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
- The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
- Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
- Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
- The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support

- Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
- Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



5/8" diameter Concrete Anchor - 8 places (embed a minimum of 5 1/2" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.

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

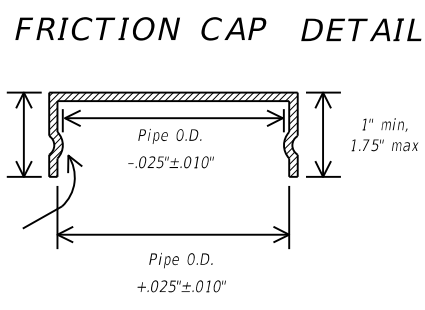
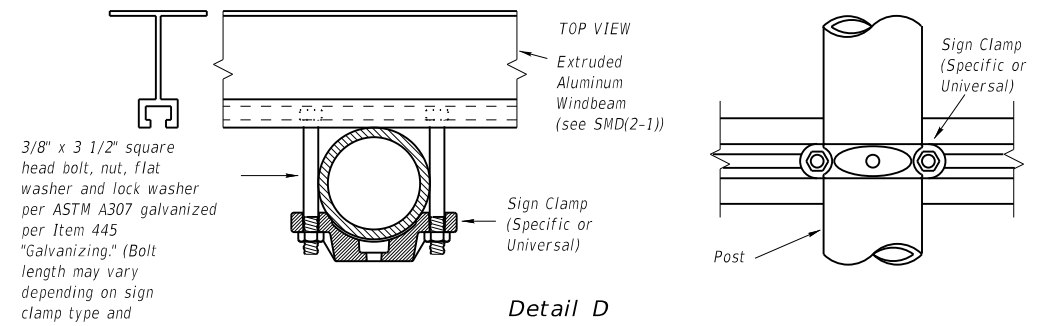
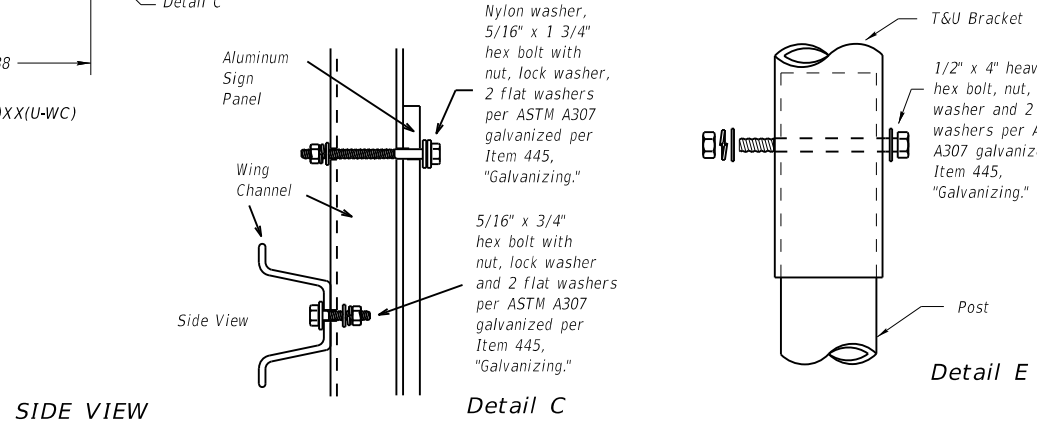
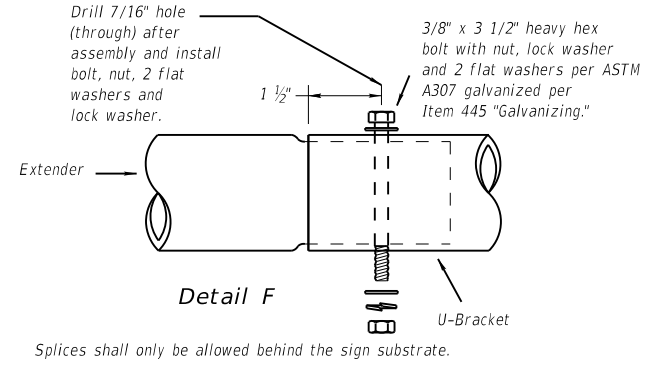
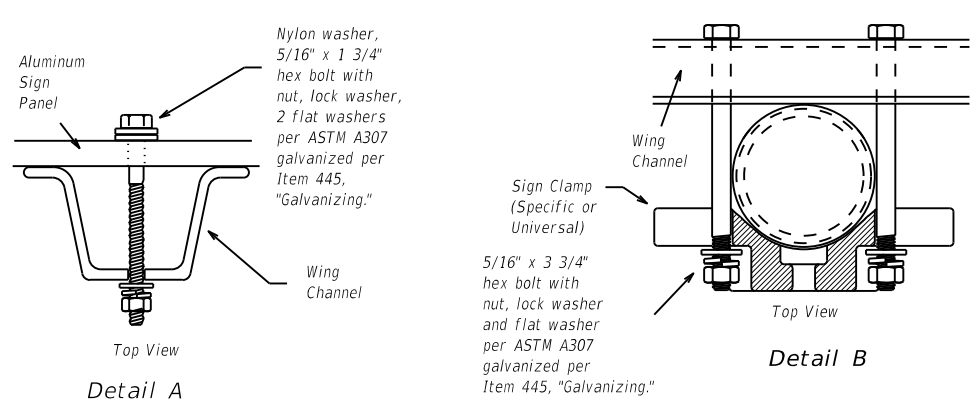
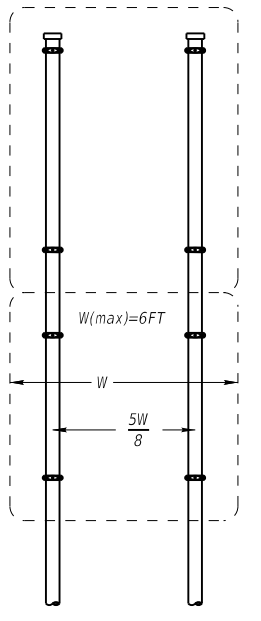
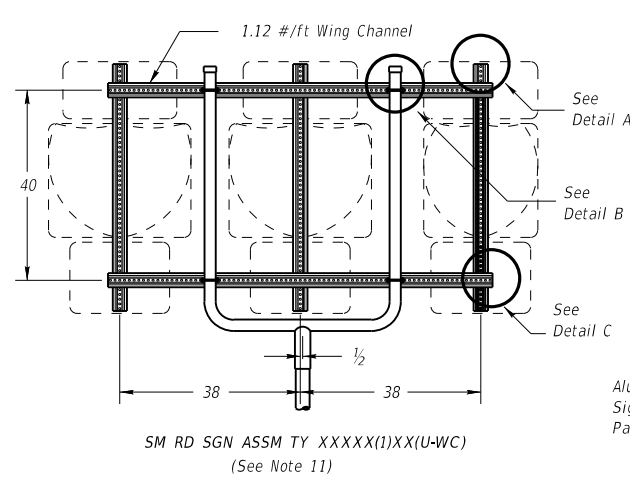
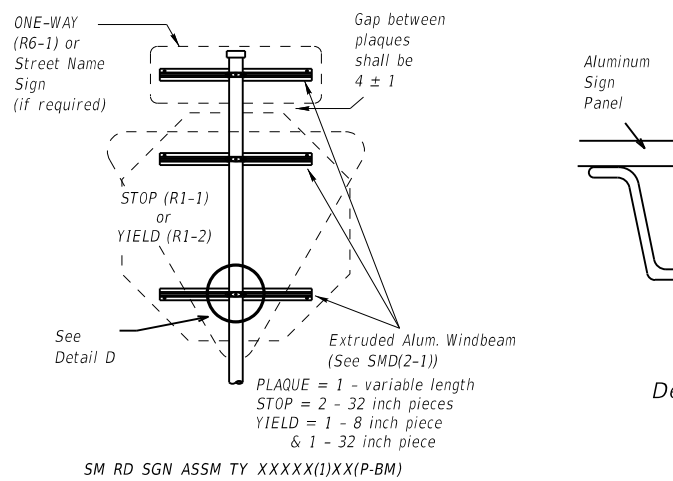
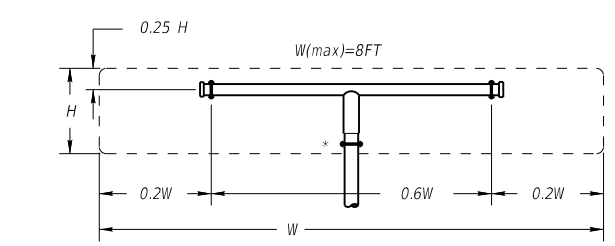
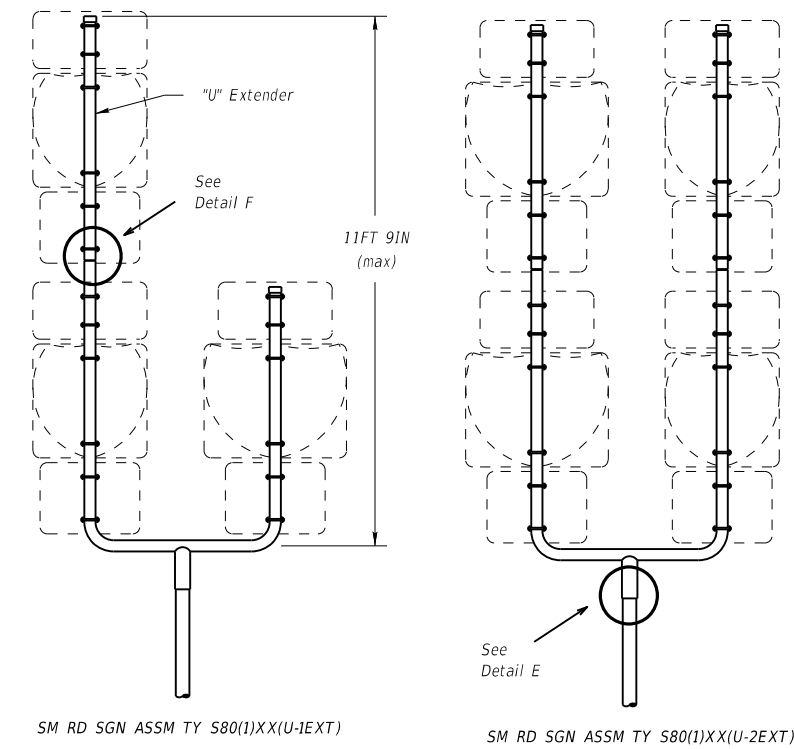
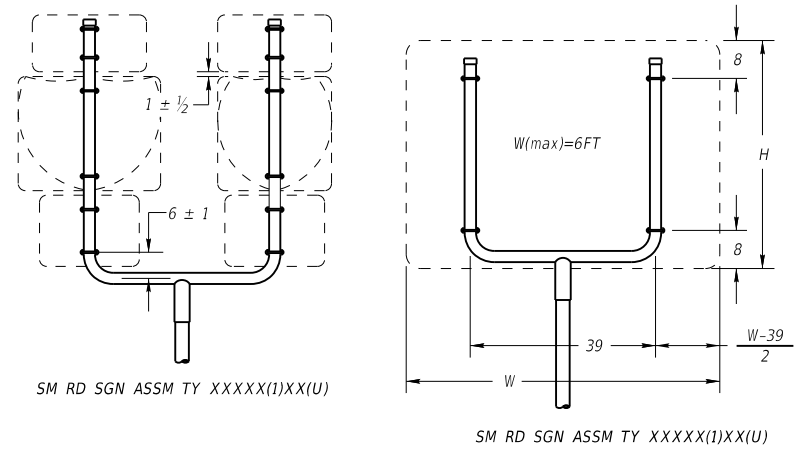
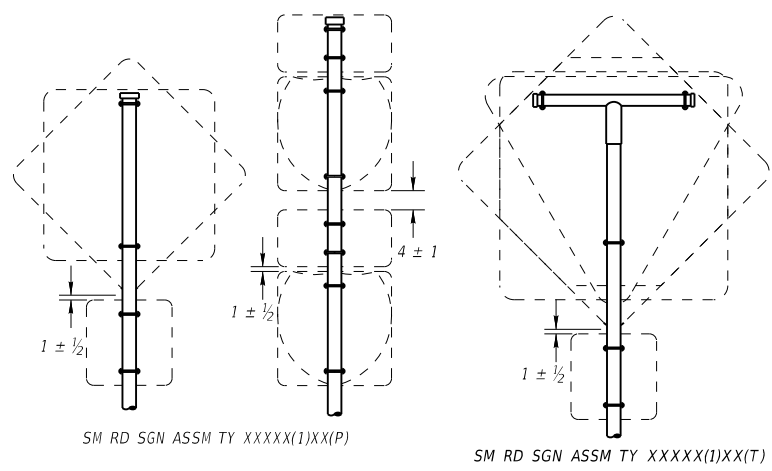
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized 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.



SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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		0111	03	063
		DIST	COUNTY	HIGHWAY
		HOU	FORT BEND	FM 521
				SHEET NO.
				124



GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
- 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.
- Post open ends shall be fitted with Friction Caps.
- 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)
Warning	48x60-inch signs	TY S80(1)XX(T)
	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)	



**SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM**

SMD(SLIP-2)-08

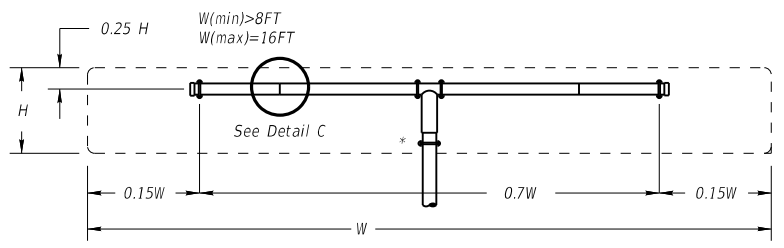
Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes. The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no 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.

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	0111	03	063	FM 521
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	125	

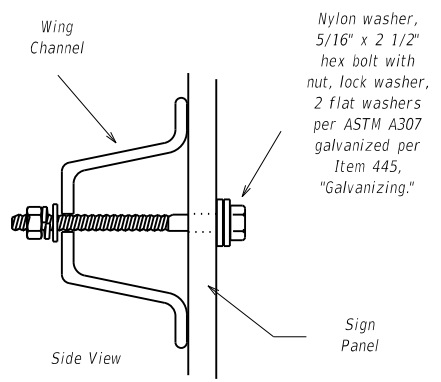
GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

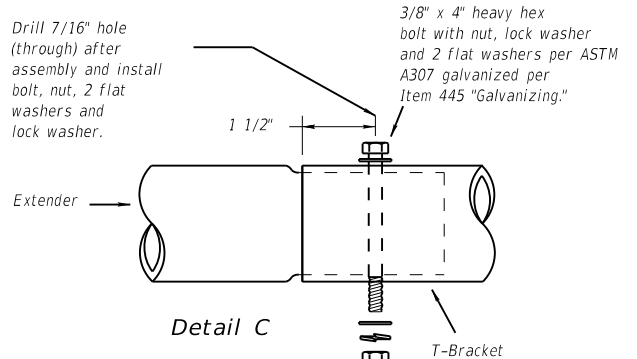
- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Sign blanks shall be the sizes and shapes shown on the plans.
- Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
- Post open ends shall be fitted with Friction Caps.



SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)

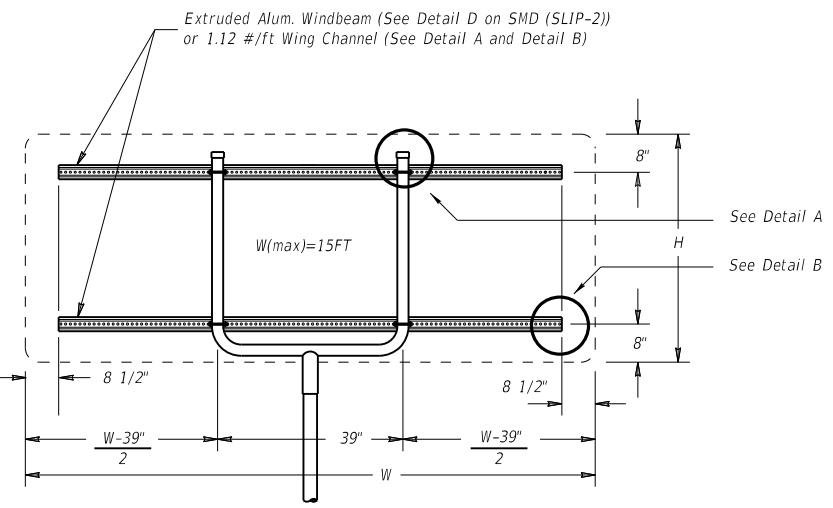


Detail B

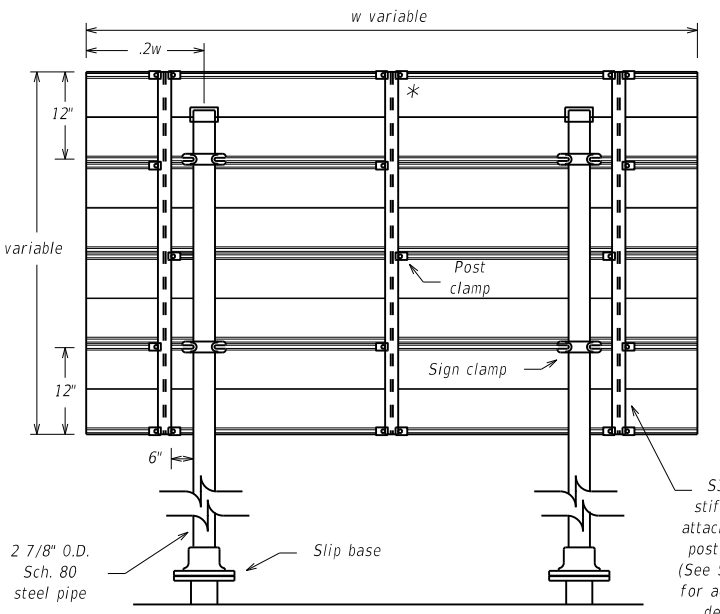


Detail C

Splices shall only be allowed behind the sign substrate.

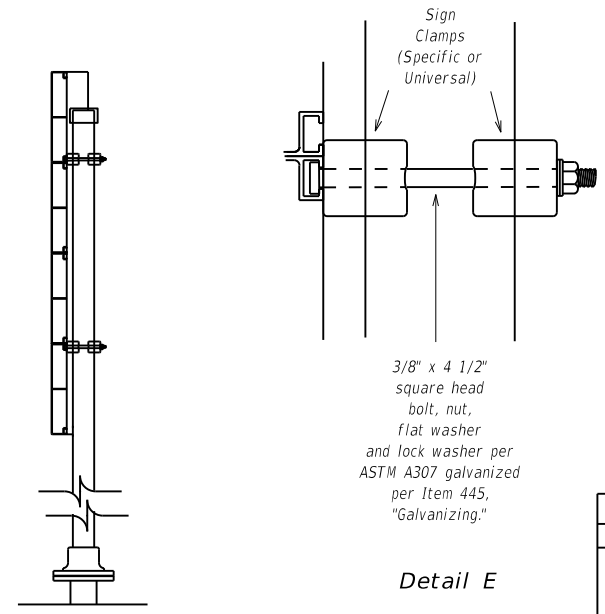


SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

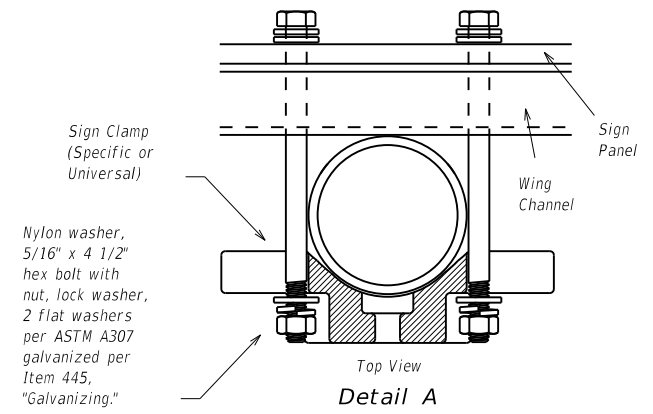


Typical Sign Mount
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

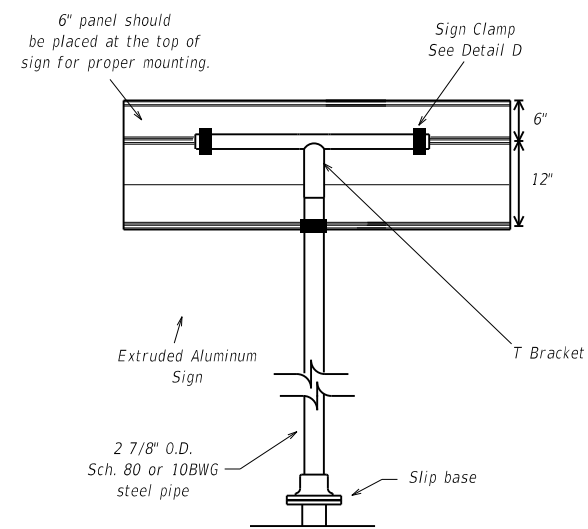
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



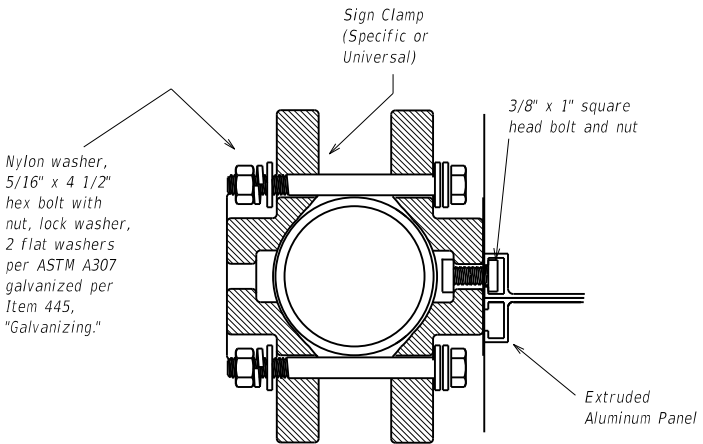
Detail E



Detail A



Extruded Aluminum Sign With T Bracket



Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

REQUIRED SUPPORT		
SIGN DESCRIPTION	SUPPORT	
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
Warning	48x60-inch signs	TY S80(1)XX(T)
	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)	

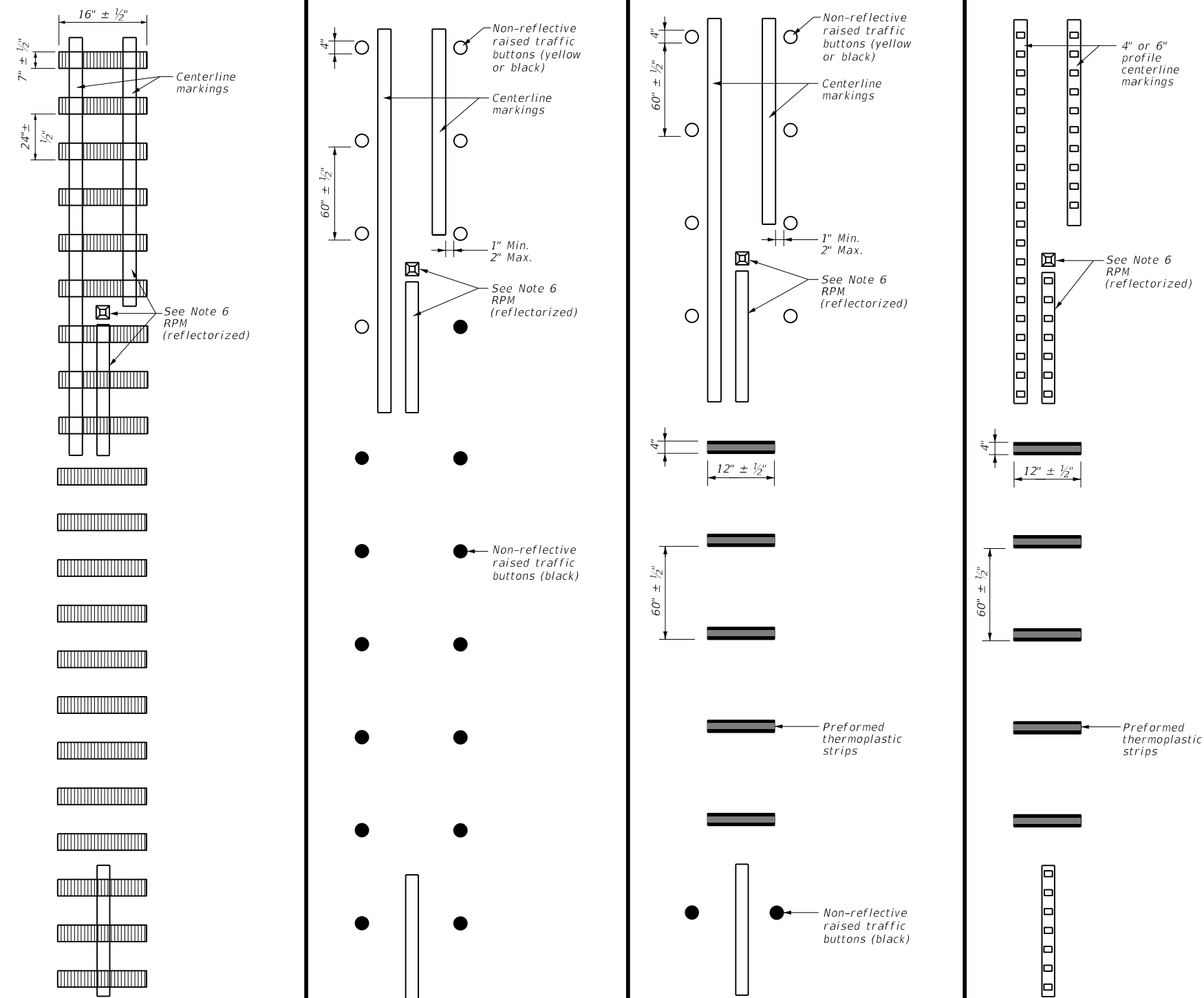
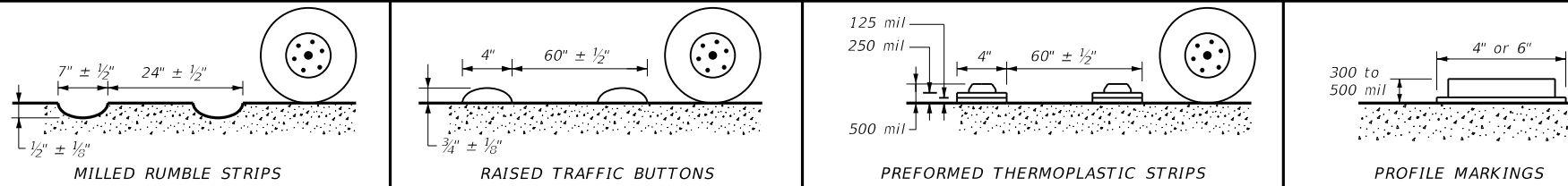


**SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM**

SMD(SLIP-3)-08

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9-08 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0111	03	063	FM 521
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		126

CENTERLINE RUMBLE STRIPS



PLAN VIEW
OPTION 1

PLAN VIEW
OPTION 2

PLAN VIEW
OPTION 3

PLAN VIEW
OPTION 4

TWO LANE TWO-WAY
ROADWAYS

MILLED CENTERLINE
RUMBLE STRIPS

RAISED CENTERLINE
RUMBLE STRIPS

RAISED CENTERLINE RUMBLE
STRIPS AND PREFORMED
THERMOPLASTIC STRIPS

PROFILE CENTERLINE MARKINGS
AND PREFORMED THERMOPLASTIC
STRIPS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
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 crossings, 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, and dimensions 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.

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 buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. The color of the button should be yellow for a continuous no passing roadway. Black buttons should be used in areas where passing is allowed.

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

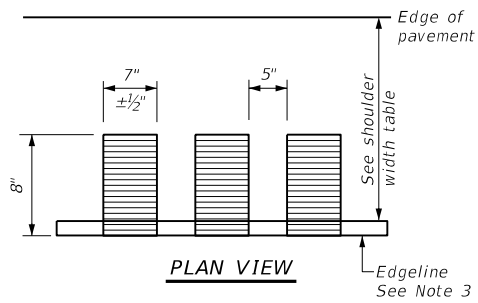
12. See standard sheet RS(4).



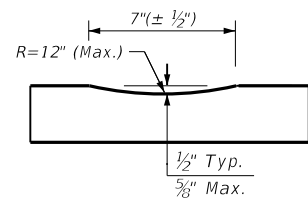
CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS

RS(3)-13

FILE: rs(3)-13.dwg	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
DIST	COUNTY	SHEET NO.		
HOU	FORT BEND	127		

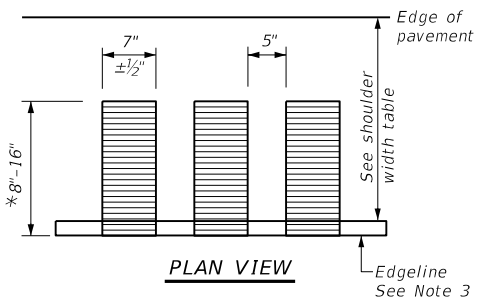


PLAN VIEW

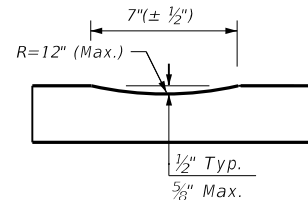


PROFILE VIEW
OPTION 1

CONTINUOUS MILLED
DEPRESSIONS
(Rumble Stripes)

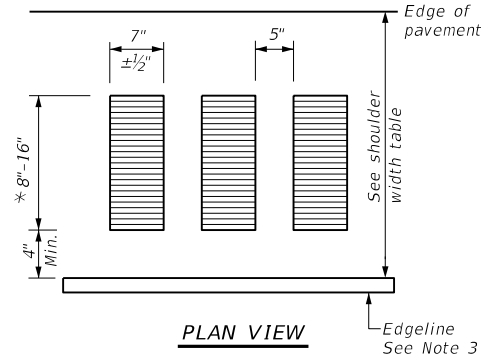


PLAN VIEW



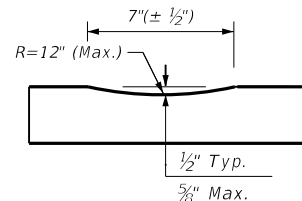
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED
DEPRESSIONS
(Rumble Stripes)



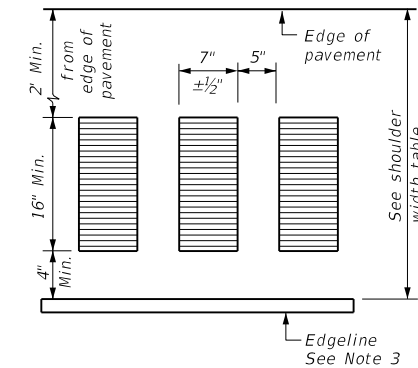
PLAN VIEW

* This distance may vary based on width of shoulder

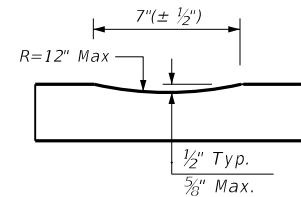


PROFILE VIEW
OPTION 3

CONTINUOUS MILLED
DEPRESSIONS
(Rumble Stripes)



PLAN VIEW



PROFILE VIEW
OPTION 4

CONTINUOUS MILLED
DEPRESSIONS
(Rumble Stripes)

GENERAL NOTES

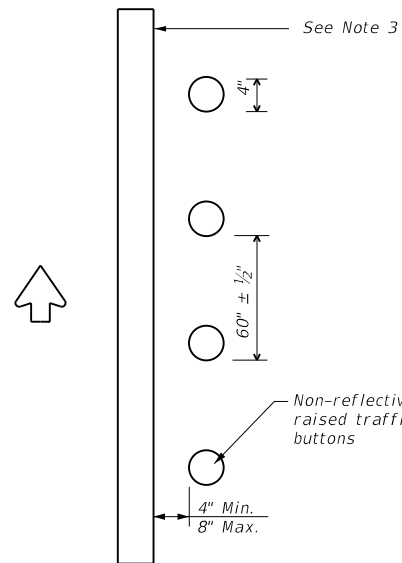
- Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
- Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not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

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

- See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
- Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble strip.
- 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.
- Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
- 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.
- 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.

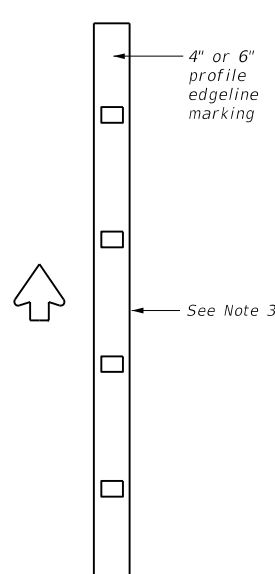
WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

- 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.
- 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.
- 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.
- 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.
- The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
- Raised profile thermoplastic markings used as edgelines may substitute for buttons.



PLAN VIEW
OPTION 5

RAISED EDGELINE
RUMBLE STRIPS



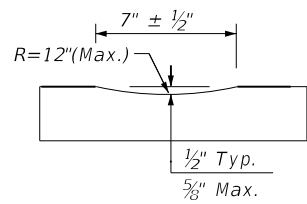
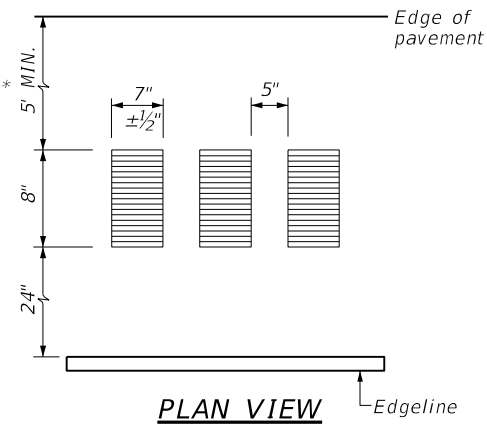
PLAN VIEW
OPTION 6

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

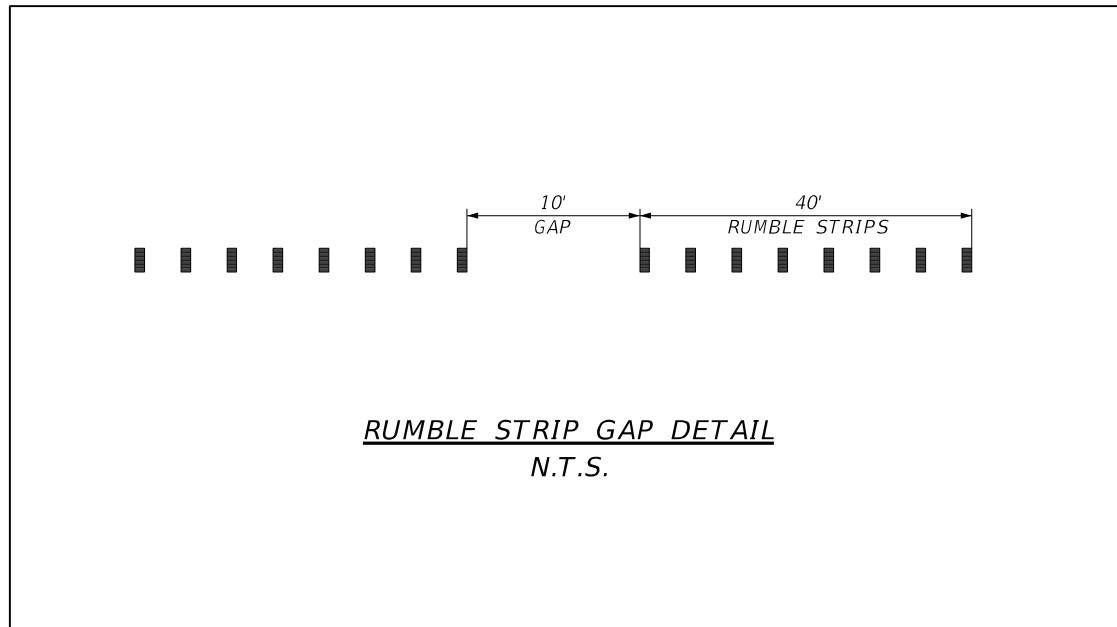
				Texas Department of Transportation		Traffic Operations Division Standard			
EDGELINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(4)-13									
FILE:	rs(4)-13.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
©TxDOT	October 2013	CON:		SECT:		JOB:		HIGHWAY:	
REVISIONS		0111	03	063		FM 521			
		DIST:	COUNTY:		SHEET NO.				
		HOU	FORT BEND		128				

* RESERVED FOR BICYCLES



PROFILE VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



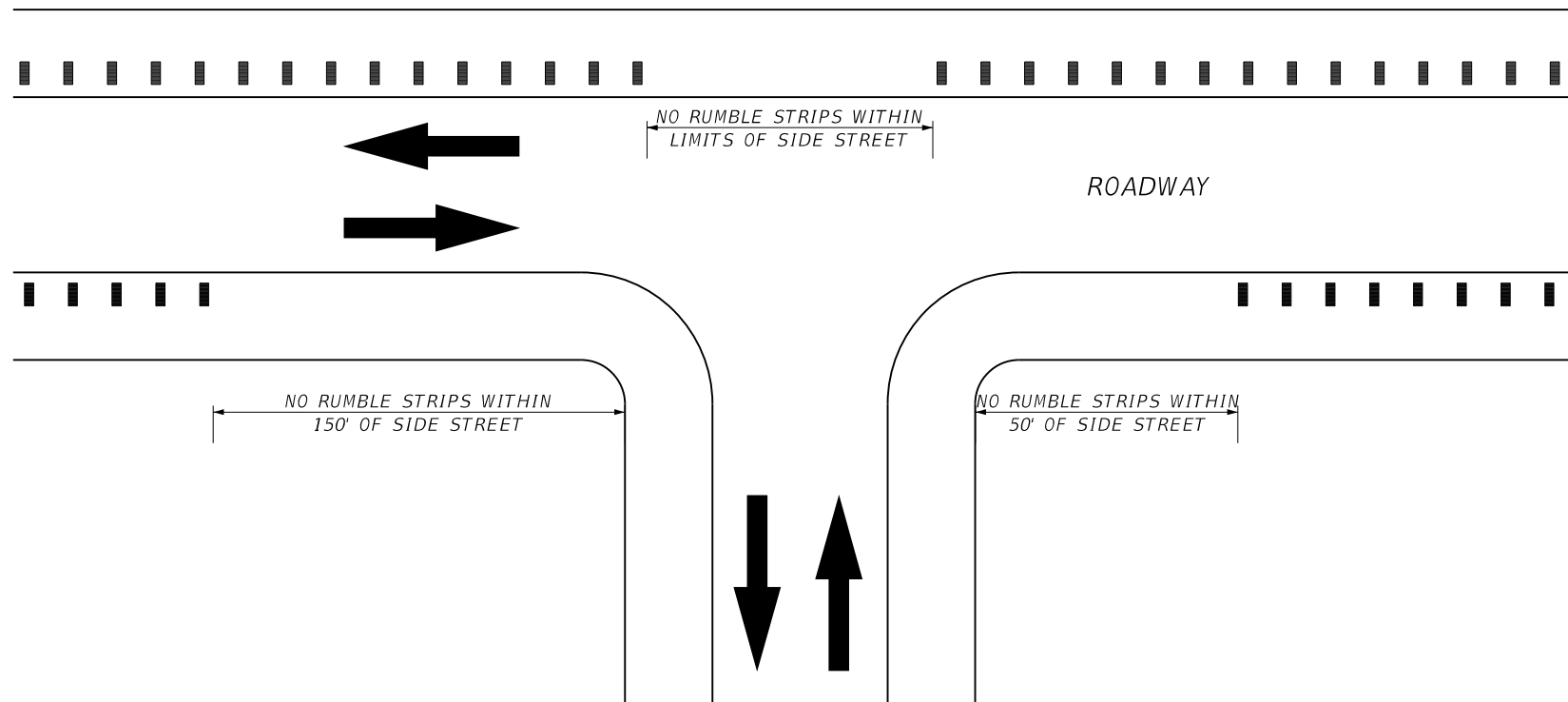
RUMBLE STRIP GAP DETAIL
N.T.S.

GENERAL NOTES

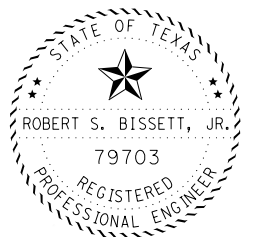
1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

3. 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.
4. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
5. 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.
6. 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.



INTERSECTION DETAIL



Robert S. Bissett, Jr.
12/30/21

EDGELINE RUMBLE STRIPS DETAILS



SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0111	03	063	FM 521
DIST COUNTY			SHEET NO.
HOU FORT BEND			129

N.T.S.

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

DOT #: 022659D
 Crossing Type: AT-GRADE
 RR Company Owning Track at Crossing: BNSF RAILWAY COMPANY (BNSF)
 Operating RR Company at Track: BNSF
 RR MP: 42.898
 RR Subdivision: GALVESTON
 City: ARCOLA
 County: FORT BEND
 CSJ at this Crossing: 0111-03-063
 Highway/Roadway name crossing the railroad: FM 521
 # of regularly scheduled trains per day at this crossing: 12
 # of switching movements per day at this crossing: 0
 % of estimated contract cost of work within railroad ROW: 0.63

Scope of Work at this Crossing to Be Performed by State Contractor:

1. BASE REPAIR & 1 1/2" PLANING
2. 1 1/2" PFC OVERLAY
3. SIGNING AND PAVEMENT MARKINGS

Scope of Work at this Crossing to Be Performed by Railroad Company:

N/A

II. OTHER PROJECT WORK WITHIN RAILROAD RIGHTS-OF-WAY (ROW)

N/A

III. FLAGGING & INSPECTION

of Days of Railroad Flagging Expected: 3

On this project, night or weekend flagging is:

- Expected
 Not Expected

Flagging services will be provided by:

- Railroad Company: TxDOT will pay flagging invoices
 Outside Party: Contractor will pay flagging invoices, to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30 day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

- UPRR - UP.info@railpros.com
 Call Center 877-315-0513, Select #1 for flagging
 BNSF - BNSF.info@railpros.com
 Call Center 877-315-0513, Select #1 for flagging
 KCS - KCS.info@railpros.com
 Call Center 877-315-0513, Select #1 for flagging
 - Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

OTHERS _____

Contractor must incorporate Construction Inspection into anticipated construction schedule.

- Not Required
 Required: Contact Information for Construction Inspection:

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

On this project, construction work to be performed by a railroad company is:

- Required
 Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

V. RAILROAD INSURANCE REQUIREMENTS

Railroad reference number shall be provided by TxDOT CST or DO.

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies must be issued for and on behalf of the Railroad. Where more than one Railroad Company is operating on the same right of way or where several Railroad Companies are involved and operate on their own separate rights of way, provide separate insurance policies in the name of each Railroad Company.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	\$500,000 / \$500,000 / \$500,000
Commercial General Liability	\$2,000,000 / \$4,000,000
Business Automobile	\$2,000,000 combined single limit
Railroad Protective Liability	
<input type="checkbox"/> Not Required	
<input checked="" type="checkbox"/> Non - Bridge Projects	\$2,000,000 / \$6,000,000
<input type="checkbox"/> Bridge Projects	\$5,000,000 / \$10,000,000
<input type="checkbox"/> Other	

VI. CONTRACTOR'S RIGHT OF ENTRY (ROE) AGREEMENT

On this project, an ROE agreement is:

- Not Required
 Required: TxDOT CST to assist in obtaining with the UPRR (see Item 5, Article 8.3)
 Required: Contractor to obtain (see Item 5, Article 8.4)

With the following railroad companies: BNSF

To view previously approved ROE Agreement templates agreed upon between the State and Railroad, see:

<http://www.txdot.gov/inside-txdot/division/rail/samples.html>

Approved ROE Agreement templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed ROE agreement between the Contractor and the Railroad if required on project.

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:

- Not Required
 Required


See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are required to maintain the same insurance coverage as required of the Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
 Call BNSF
 Railroad Emergency Line at 800-832-5452 Option 1
 Location: DOT 022659D
 RR Milepost: 42.898
 Subdivision: Galveston

 Texas Department of Transportation				Rail Division	
RAILROAD SCOPE OF WORK BNSF PROJECT SPECIFIC DETAILS					
FILE:	RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:
©TxDOT	June 2014	CONT	SECT	JOB	HIGHWAY
3/2020		REVISIONS	0111	03	063 FM 521
		DIST	COUNTY		SHEET NO.
		HOU	FORT BEND		130

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

DOT #: NEAR 920410N
 Crossing Type: AT-GRADE
 RR Company Owning Track at Crossing: UNION PACIFIC RAILROAD COMPANY (UPRR)
 Operating RR Company at Track: UPRR
 RR MP: 12.700
 RR Subdivision: POPP IND LD
 City: ARCOLA
 County: FORT BEND
 CSJ at this Crossing: 0111-03-063
 Highway/Roadway name crossing the railroad: FENN RD. AT FM 521
 # of regularly scheduled trains per day at this crossing: 2
 # of switching movements per day at this crossing: 0
 % of estimated contract cost of work within railroad ROW: 0.00

Scope of Work at this Crossing to Be Performed by State Contractor:
N/A

Scope of Work at this Crossing to Be Performed by Railroad Company:
N/A

II. OTHER PROJECT WORK WITHIN RAILROAD RIGHTS-OF-WAY (ROW)

N/A

III. FLAGGING & INSPECTION

of Days of Railroad Flagging Expected: N/A

On this project, night or weekend flagging is:

- Expected
 Not Expected

Flagging services will be provided by:

- Railroad Company: TxDOT will pay flagging invoices
 Outside Party: Contractor will pay flagging invoices, to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30 day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

- UPRR - UP.info@railpros.com
 Call Center 877-315-0513, Select #1 for flagging
 BNSF - BNSF.info@railpros.com
 Call Center 877-315-0513, Select #1 for flagging
 KCS - KCS.info@railpros.com
 Call Center 877-315-0513, Select #1 for flagging
 - Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

OTHERS _____

Contractor must incorporate Construction Inspection into anticipated construction schedule.

- Not Required
 Required: Contact Information for Construction Inspection:

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

On this project, construction work to be performed by a railroad company is:

- Required
 Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

V. RAILROAD INSURANCE REQUIREMENTS

Railroad reference number shall be provided by TxDOT CST or DO.

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies must be issued for and on behalf of the Railroad. Where more than one Railroad Company is operating on the same right of way or where several Railroad Companies are involved and operate on their own separate rights of way, provide separate insurance policies in the name of each Railroad Company.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	\$500,000 / \$500,000 / \$500,000
Commercial General Liability	\$2,000,000 / \$4,000,000
Business Automobile	\$2,000,000 combined single limit
Railroad Protective Liability	
<input checked="" type="checkbox"/> Not Required	
<input type="checkbox"/> Non - Bridge Projects	\$2,000,000 / \$6,000,000
<input type="checkbox"/> Bridge Projects	\$5,000,000 / \$10,000,000
<input type="checkbox"/> Other	

VI. CONTRACTOR'S RIGHT OF ENTRY (ROE) AGREEMENT

On this project, an ROE agreement is:

- Not Required
 Required: TxDOT CST to assist in obtaining with the UPRR (see Item 5, Article 8.3)
 Required: Contractor to obtain (see Item 5, Article 8.4)

With the following railroad companies: _____

To view previously approved ROE Agreement templates agreed upon between the State and Railroad, see:

<http://www.txdot.gov/inside-txdot/division/rail/samples.html>

Approved ROE Agreement templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed ROE agreement between the Contractor and the Railroad if required on project.

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:

- Not Required
 Required


See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are required to maintain the same insurance coverage as required of the Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
 Call UPRR
 Railroad Emergency Line at 888-877-7267
 Location: DOT 920410N
 RR Milepost: 12.700
 Subdivision: POPP IND LD

				Rail Division	
RAILROAD SCOPE OF WORK UPRR PROJECT SPECIFIC DETAILS					
FILE:	RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:
©TxDOT	June 2014	CONT	SECT	JOB	HIGHWAY
3/2020	REVISIONS	0111	03	063	FM 521
		DIST	COUNTY	SHEET NO.	
		HOU	FORT BEND	131	

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the Right-of-Way and/or properties of the Railroad Company and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right-of-Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right-Of-Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right-Of-Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

- A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of Railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.
- B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.
- C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.
- D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.
- E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.
- F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.
- G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

- A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.
- B. All railroad tracks within and adjacent to the Contract Site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. Railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.
- C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:
 - 1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a Railroad flag person will be required. At the direction of the Railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.
 - 2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

- A. Do not perform any work within Railroad Right-of-Way without a valid executed Right of Entry Agreement if required on this project.
- B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right-of-Way and observe the Railroad's rules and regulations with respect thereto.
- C. Perform all work upon Railroad Right-of-Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.
- D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
 - 1. Exactly what the work entails.
 - 2. The days and hours that work will be performed.
 - 3. The exact location of work, and proximity to the tracks.
 - 4. The type of window requested and the amount of time requested.
 - 5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.
- E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right-of-Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right-of-Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

- A. Complete the Railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on Railroad property. This orientation is available at www.contractororientation.com. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR,BNSF,KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."
- B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right-of-Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES


Abide by the following minimum temporary clearances during the course of construction:

- A. 15' - 0" (BNSF/UPRR) and 14'-0" (KCS) horizontal from centerline of track
- B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

- A. Maintain minimum track clearances during construction as specified in Section 3.07.
- B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.
- C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

 Texas Department of Transportation				Rail Division	
RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS					
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
©TxDOT	October 2018	CONT	SECT	JOB	HIGHWAY
	REVISIONS	0111	03	063	FM 521
		DIST	COUNTY	SHEET NO.	
		HOU	FORT BEND	132	

3.09 MAINTENANCE OF RAILROAD FACILITIES

- A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right-of-Way and repair any other damage to the property of the Railroad, or its tenants.
- B. Perform all such maintenance and repair of damages due to the Contractor's operations at Contractor's expense.
- C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the Project Site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD'S DESIGNATED REPRESENTATIVE

- A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
 1. Pre-construction meetings.
 2. Pile driving/drilling of caissons or drilled shafts.
 3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
 4. Erection of precast concrete or steel bridge superstructure.
 5. Placement of waterproofing (prior to placing ballast on bridge deck).
 6. Completion of the bridge structure.
- B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.
- C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

- A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.
- B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other Railroad facilities may be subject to settlement or movement.
- C. During any clearing, grubbing, excavation or grading in proximity to Railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger Railroad facilities or operations.
- D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, Railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.
- E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around Railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

- A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".
- B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

UPRR 1-800-336-9193
7:00 AM to 9:00 PM CST Monday-Friday except holidays,
staffed 24 hrs/day for emergencies
48 hrs notice required

BNSF 1-800-533-2891
24 hour number
5 working days notice required

KCS 1-800-344-8377
Texas One Call, a 24 hour number
48 hrs notice required, excluding weekends and holidays

If a telecommunications system is buried anywhere on or near Railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near Railroad property. Refer to the project General Notes for additional information.


- C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor-assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of 1/4" vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the RIGHT OF ENTRY agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor work and at least 30 working days in advance of any Contractor work in which any person or equipment will be within 25 feet of nearest rail.

3.16 CLEANING OF RIGHT-OF-WAY

When work is complete, remove all tools, implements, and other materials brought into Railroad Right-of-Way and leave the Right-of-Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

 Texas Department of Transportation				Rail Division	
RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS					
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
©TxDOT	October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521	
DIST	COUNTY			SHEET NO.	
HOU	FORT BEND			133	

SITE DESCRIPTION

PROJECT LIMITS:

FM 521: SH 6 TO BRAZORIA COUNTY LINE

PROJECT DESCRIPTION:

CONSTRUCTION OF MISCELLANEOUS WORK CONSISTING OF BASE REPAIR, 1.5" PLANING, 1.5" ACP OVERLAY, RUMBLE STRIPS, SIGNING AND PAVEMENT MARKINGS

MAJOR SOIL DISTURBING ACTIVITIES:

N/A

TOTAL PROJECT AREA: N/A

TOTAL AREA TO BE DISTURBED: N/A

WEIGHTED RUNOFF COEFFICIENT:
(AFTER CONSTRUCTION): N/A

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

ACCORDING TO THE USDA GENERAL SOIL MAP OF TEXAS, THE PROJECT AREA CONSISTS OF LAKE CHARLES-BERNARD-EDNA SOILS. LAKE CHARLES SOILS ARE WELL-DEVELOPED CLAYEY SOILS WITH HIGH SHRINK-SWELL PROPERTIES. BERNARD AND EDNA SOILS HAVE LOAMY SURFACE TEXTURES AND LOAMY AND CLAYEY SUBSOIL HORIZONS, AND THEY DIFFER PRIMARILY ON DRAINAGE CLASS AND MINERALOGY. THE MOST COMMON VEGETATIVE COVER IS BERMUDA GRASS.

NAME OF RECEIVING WATERS:

RUNOFF WILL BE RECEIVED BY THE BRISCOE IRRIGATION CHANNEL AND THE GULF COAST WATER AUTHORITY IRRIGATION CHANNEL. ULTIMATELY DRAINS INTO SEGMENT 1108 CHOCOLATE BAYOU ABOVE TIDAL.

RUNOFF AT THE SOUTHERN END OF THE PROJECT WILL ULTIMATELY DRAIN INTO SEGMENT 1110 OYSTER CREEK ABOVE TIDAL.

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

- TEMPORARY SEEDING
- PERMANENT PLANTING, SODDING, OR SEEDING
- MULCHING
- SOIL RETENTION BLANKET
- BUFFER ZONES
- PRESERVATION OF NATURAL RESOURCES

OTHER:

STRUCTURAL PRACTICES:

- SILT FENCES
- HAY BALES
- ROCK BERMS
- DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- DIVERSION DIKE AND SWALE COMBINATIONS
- PIPE SLOPE DRAINS
- PAVED FLUMES
- ROCK BEDDING AT CONSTRUCTION EXIT
- TIMBER MATTING AT CONSTRUCTION EXIT
- CHANNEL LINERS
- SEDIMENT TRAPS
- SEDIMENT BASINS
- STORM INLET SEDIMENT TRAP
- STONE OUTLET STRUCTURES
- CURBS AND GUTTERS
- STORM SEWERS
- VELOCITY CONTROL DEVICES
- EROSION CONTROL LOGS

OTHER:

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

AFTER THE SIGNS AND BARRICADES HAVE BEEN INSTALLED:

1. INSTALL ANY SWP3 AS DIRECTED BY ENGINEER.
2. MAINTAIN THE SWP3 DURING THE PROJECT.
3. REMOVE THE SWP3 ON COMPLETION OF WORK AT EACH LOCATION.

STORM WATER MANAGEMENT:

ANY DEVICES REQUIRED TO MINIMIZE SEDIMENT 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 TO LOWS IN THE ROAD PROFILE WHERE IT WILL OUTFALL INTO THE RECEIVING WATERS.

POST CONSTRUCTION STORM WATER MANAGEMENT: THERE WILL BE NO DEVICES INSTALLED DURING THE CONSTRUCTION PROCESS TO CONTROL STORM WATER DISCHARGES THAT WILL REMAIN AFTER CONSTRUCTION OPERATIONS HAVE BEEN 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.

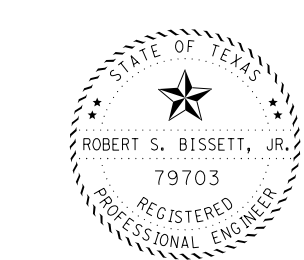
OFFSITE VEHICLE TRACKING:

- 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.



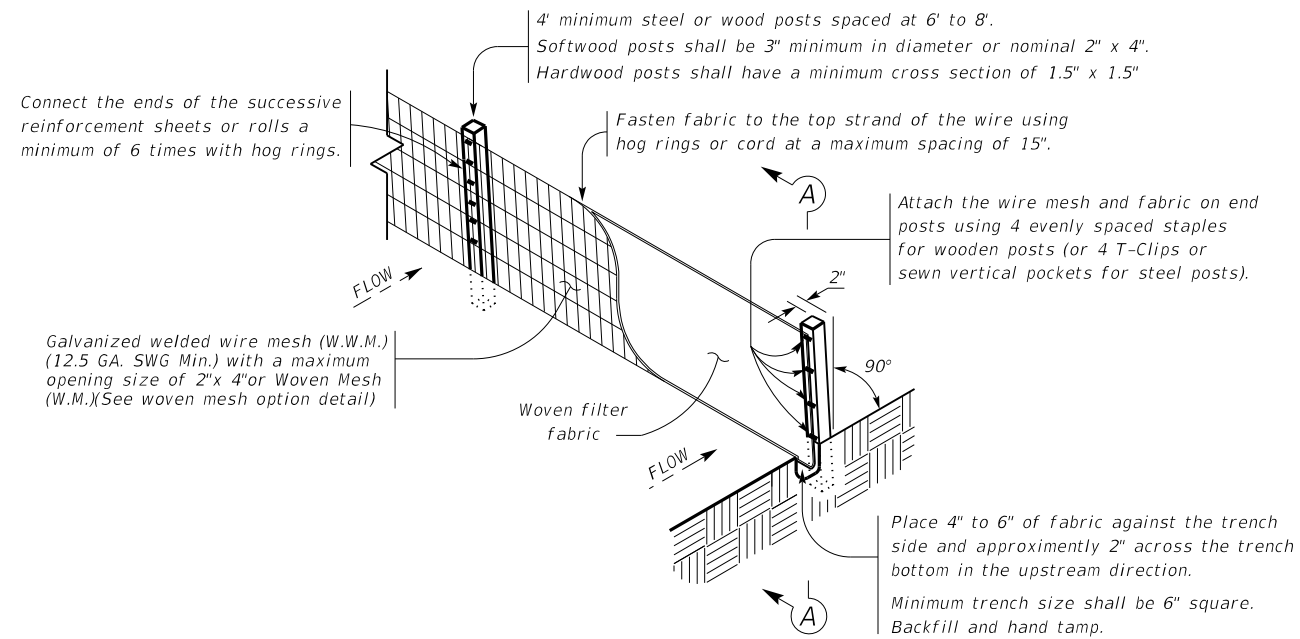
Robert S. Bissett, Jr.
10/29/21

Texas Department of Transportation
Houston District

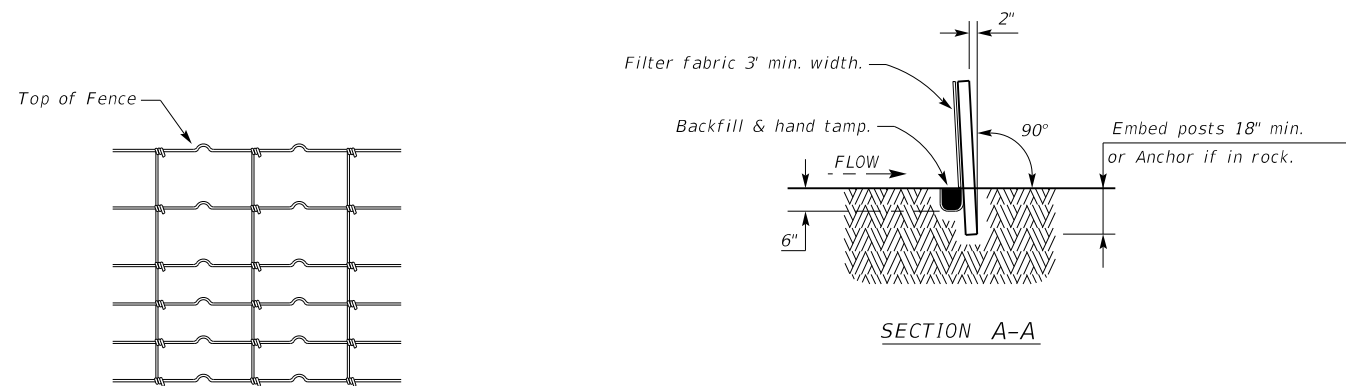
TxDOT STORM WATER POLLUTION PREVENTION PLAN

SWP3

FILE: STDG1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
©TxDOT JANUARY 2007	CONT	SECT	JOB	HIGHWAY
	0111	03	063	FM 521
REVISIONS	DIST	COUNTY	SHEET NO.	
9/2010 INSPECTION NOTE	HOU	FORT BEND	134	
9/2013 INSPECTION NOTE				
11/2013 SWP3 TO SWP3				
03/2015 2014 SPECS				



TEMPORARY SEDIMENT CONTROL FENCE



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

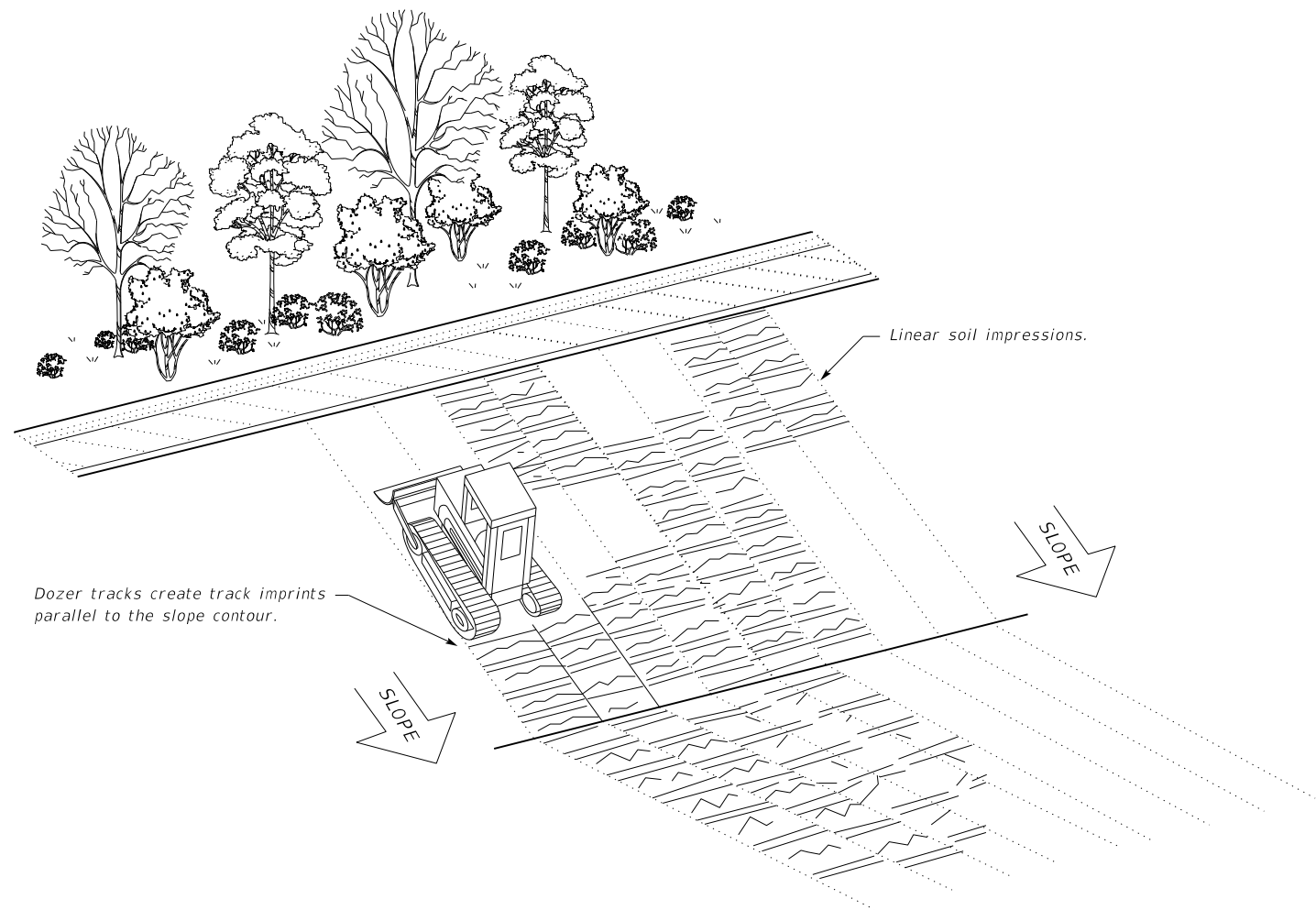
A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT². Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

LEGEND
Sediment Control Fence
SCF

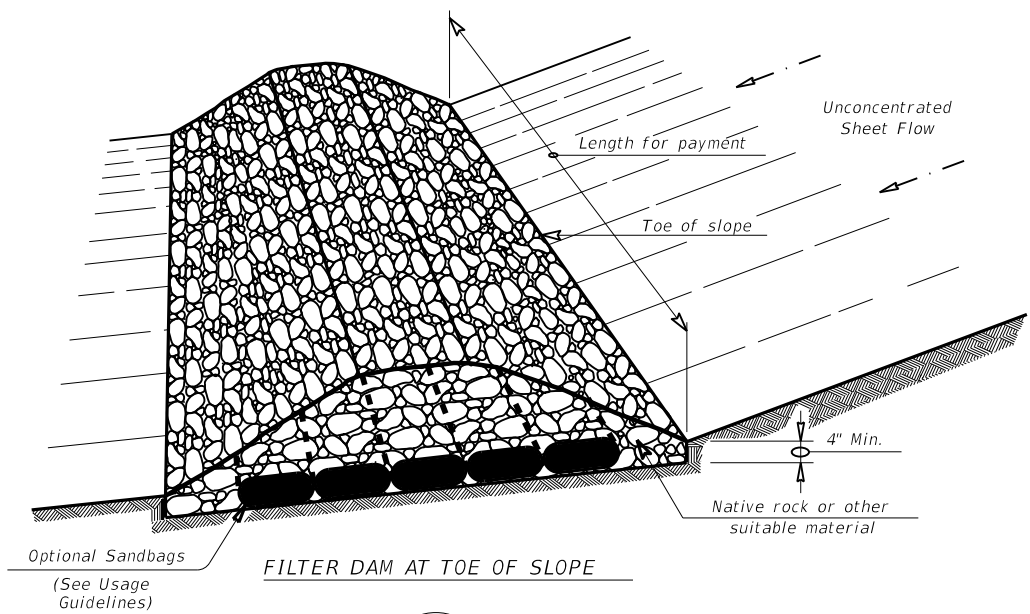
GENERAL NOTES

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 continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



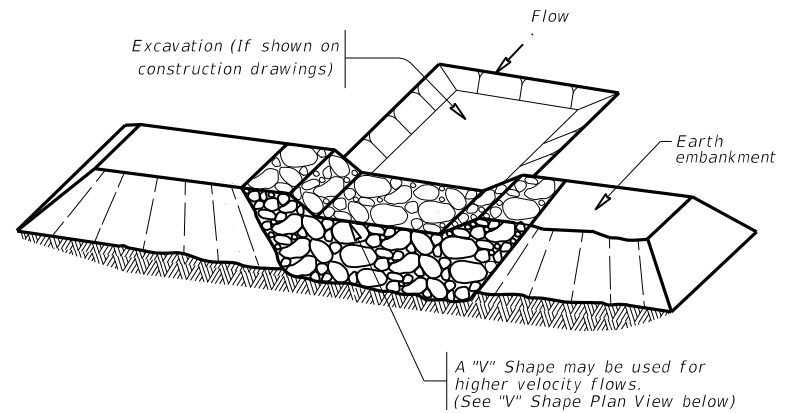
VERTICAL TRACKING

				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	CK: LS	
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0111	03	063	FM 521	
	DIST	COUNTY	SHEET NO.		
	HOU	FORT BEND	135		



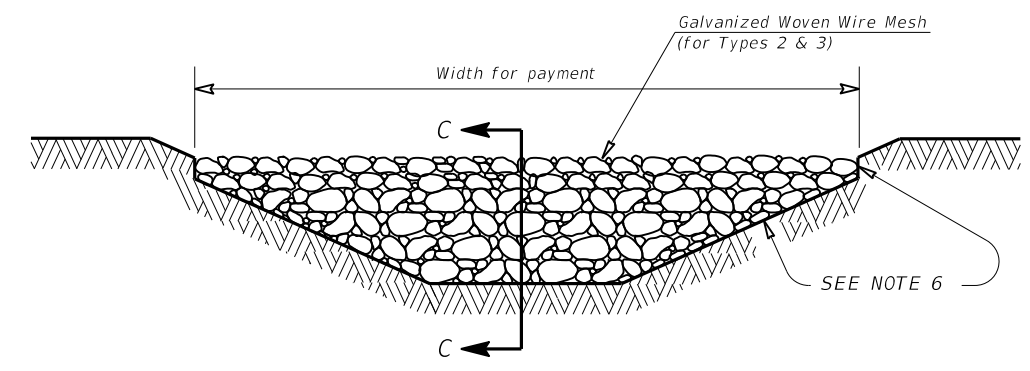
FILTER DAM AT TOE OF SLOPE

(RFD1)



FILTER DAM AT SEDIMENT TRAP

(RFD1) OR (RFD2)

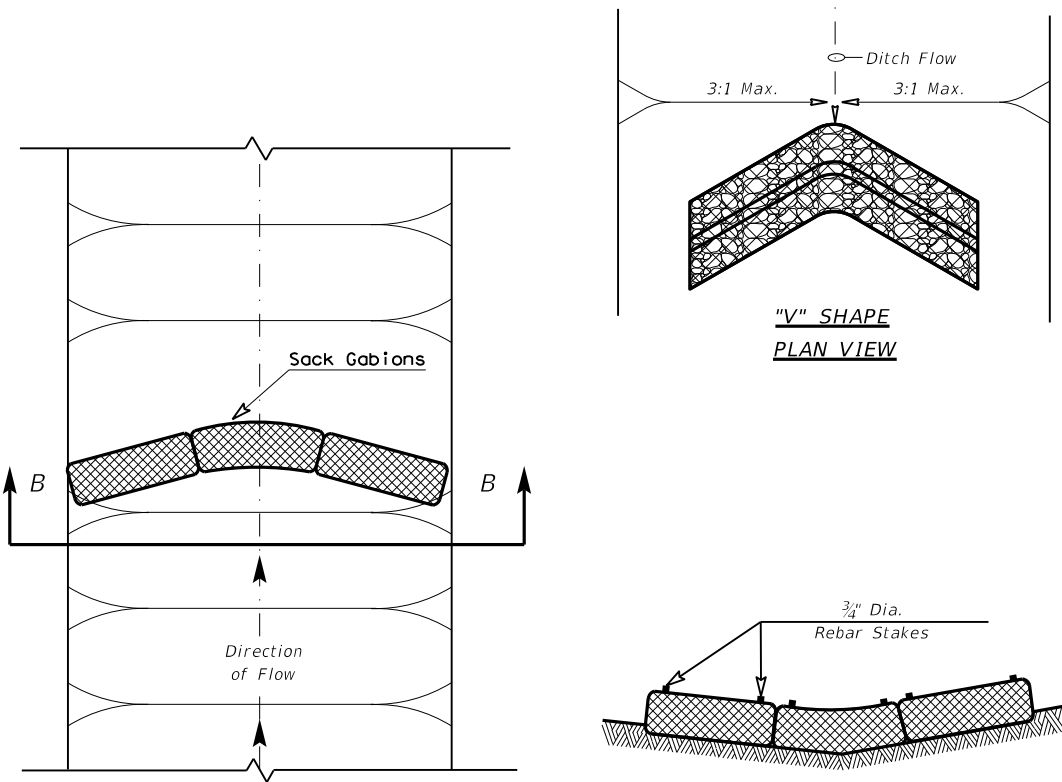


FILTER DAM AT CHANNEL SECTIONS

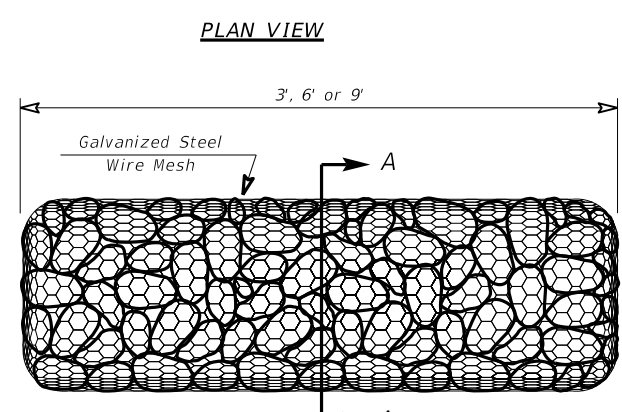
(RFD1) OR (RFD2) OR (RFD3)

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 3/4" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 1/2" x 3 1/4".
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.



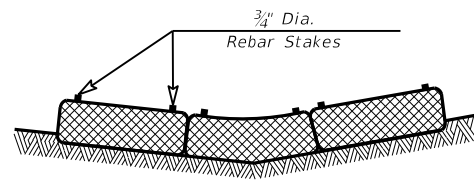
"V" SHAPE PLAN VIEW



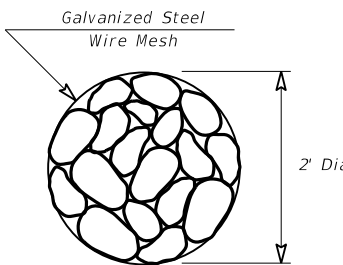
PLAN VIEW

TYPE 4 (SACK GABIONS)

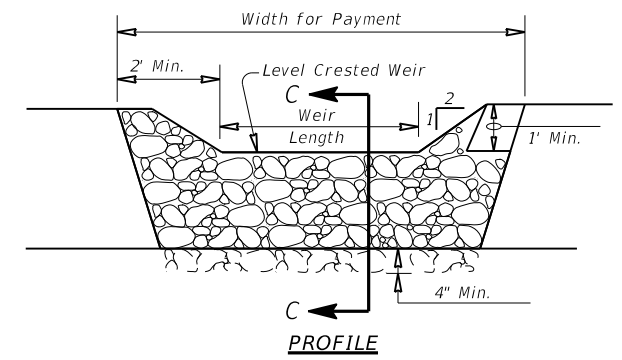
(RFD4)



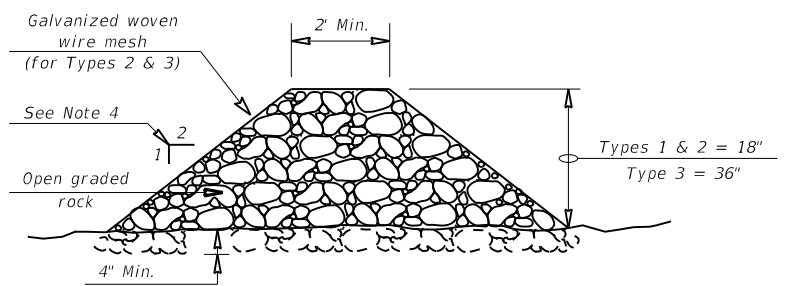
SECTION B-B



SECTION A-A



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT² 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 (approximately 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.

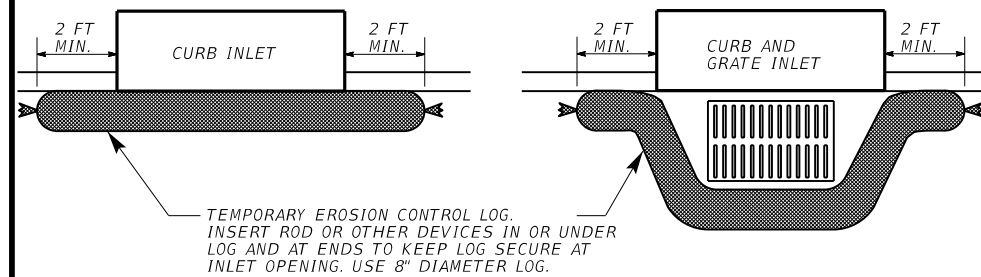
PLAN SHEET LEGEND

- Type 1 Rock Filter Dam (RFD1)
- Type 2 Rock Filter Dam (RFD2)
- Type 3 Rock Filter Dam (RFD3)
- Type 4 Rock Filter Dam (RFD4)

		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
©TxDOT: JULY 2016	CONT: 0111	SECT: 03	JOB: 063
REVISIONS	DIST: HOU	COUNTY: FORT BEND	SHEET NO: 136

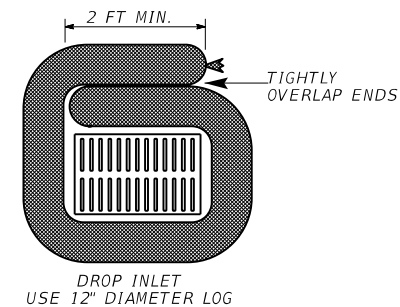
CURB INLETS 8" DIAMETER LOGS

ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8")

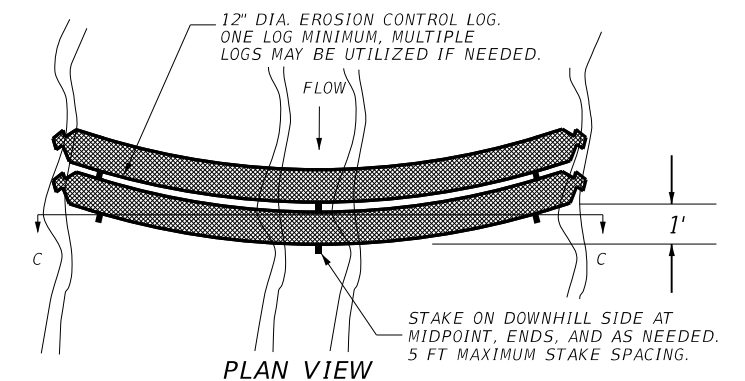


DROP INLETS AND OTHER LOCATIONS 12" DIAMETER LOGS

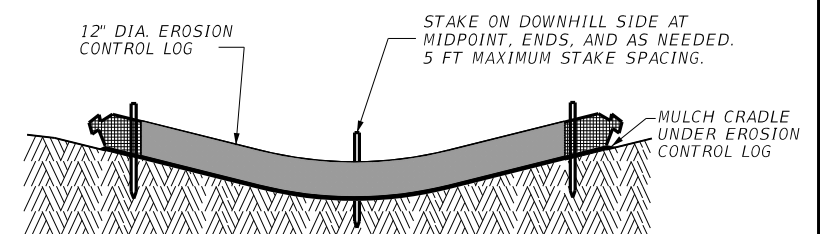
ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL)(12")



DROP INLETS



PLAN VIEW



**SECTION C-C
DRAINAGE SWALE OR DITCH**

MATERIAL REQUIREMENTS

FILL:

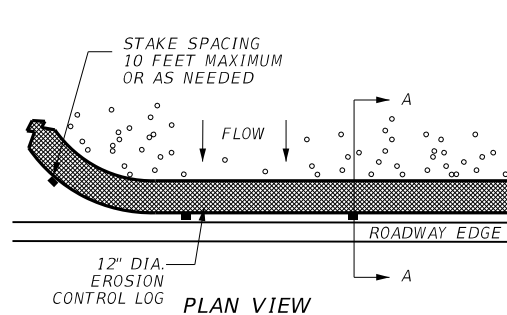
Use 100% shredded mulch or other non-compost biodegradable material as fill for logs.

No compost or fines.

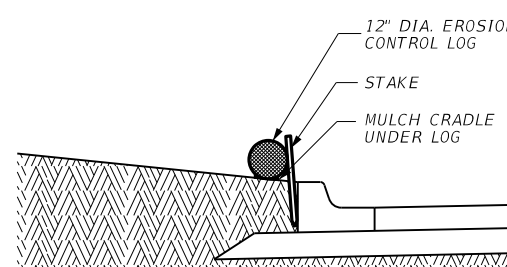
DO NOT USE MATERIAL WHICH PROHIBITS WATER INFILTRATION.

LOG MESH:

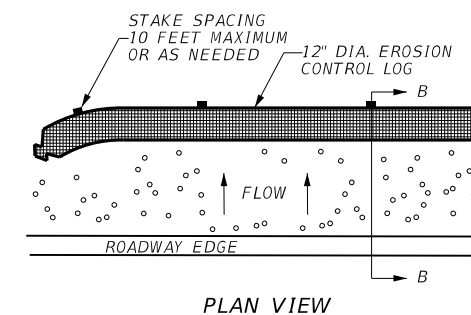
Use mesh with 1/4" openings or larger. Mesh must allow water infiltration but also hold fill material in place.



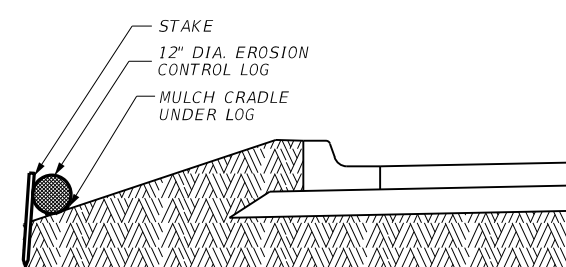
PLAN VIEW



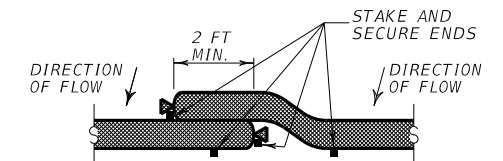
**SECTION A-A
SLOPE TO ROADWAY EDGE**



PLAN VIEW



**SECTION B-B
SLOPE AWAY FROM ROADWAY EDGE**



END OF LOG OVERLAP

SEDIMENT BASIN & TRAP USAGE GUIDELINES

A sediment trap (erosion control log) may be used to filter sediment out of runoff draining from an unstabilized area.

Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

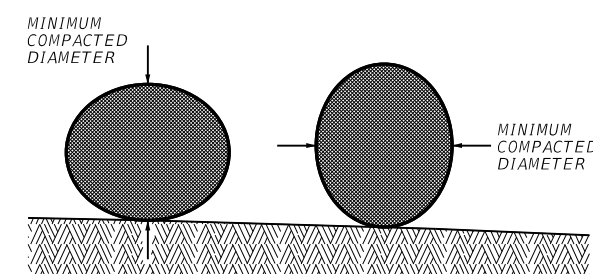
Sediment traps should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way

The trap should be cleaned when the capacity has been reduced by 1/2 or the sediment has accumulated to a depth of 1', whichever is less.

REQUIRED ITEMS:

- ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8") LF
- ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL) (12") LF
- ITEM 506-6043 BIODEG EROSN CONT LOGS (REMOVE) LF



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation
Houston District


EROSION CONTROL LOG

ECL-12

FILE: STDG4a.DGN	DW: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
©TxDOT 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0111	03	063	FM 521
3/15 MINOR CORRECTIONS	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	137	

<p>I. STORMWATER POLLUTION PREVENTION</p> <p>Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506. Refer to Storm Water Pollution Prevention Plan (SWP3) Houston District standard plan.</p> <p>No Additional Comments</p>	<p>III. CULTURAL RESOURCES</p> <p>Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the area and contact the Engineer immediately.</p> <p>No Additional Comments</p>	<p>VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES</p> <p>Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.</p> <p>No Additional Comments</p>
<p>II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS</p> <p>United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.</p> <p><input checked="" type="checkbox"/> No United States Army Corps (USACE) Permit Required</p> <p><input type="checkbox"/> Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set. The USACE general conditions are in the "General Notes."</p> <p><input type="checkbox"/> Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) with a Pre-Construction Notification (PCN). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set. The USACE general conditions are in the "General Notes."</p> <p><input type="checkbox"/> Work is authorized by the United States Army Corps of Engineers (USACE) under a Individual Permit (IP). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set.</p> <p><input type="checkbox"/> Work would be authorized by the United States Army Corps of Engineers (USACE) permit. The project specific permit issued by the USACE will be provided to the contractor.</p> <p>United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.</p> <p><input checked="" type="checkbox"/> No United States Coast Guard (USCG) Coordination Required</p> <p><input type="checkbox"/> United States Coast Guard (USCG) Permit</p> <p><input type="checkbox"/> United States Coast Guard (USCG) Exemption</p> <p>No Additional Comments</p>	<p>IV. VEGETATION RESOURCES</p> <p>Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.</p> <p>No Additional Comments</p> <p>V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS</p> <p>If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.</p> <p>The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document "Avoiding Migratory Birds and Handling Potential Violations" found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)</p> <p>No Additional Comments</p> <p><small>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.</small></p>	<p>VII. OTHER ENVIRONMENTAL ISSUES</p> <p>Comments:</p>

DATE: Feb 24, 2021
FILE:

				TxDOT Houston District	
<p>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</p> <p>EPIC</p>					
FILE:	EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0111	03	063	FM 521	
UPDATED section V, text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY			SHEET NO.
	HOU	Fort Bend			138

Version 2.1