INDEX OF SHEETS

SEE PLAN SHEET 2

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

BRAZORIA COUNTY
FM 2611
CSJ 2524-02-025, ETC

STATE PROJECT NO. C 2524-2-25

PROJECT LENGTH: 55,212.34 FT = 10.457 MILES

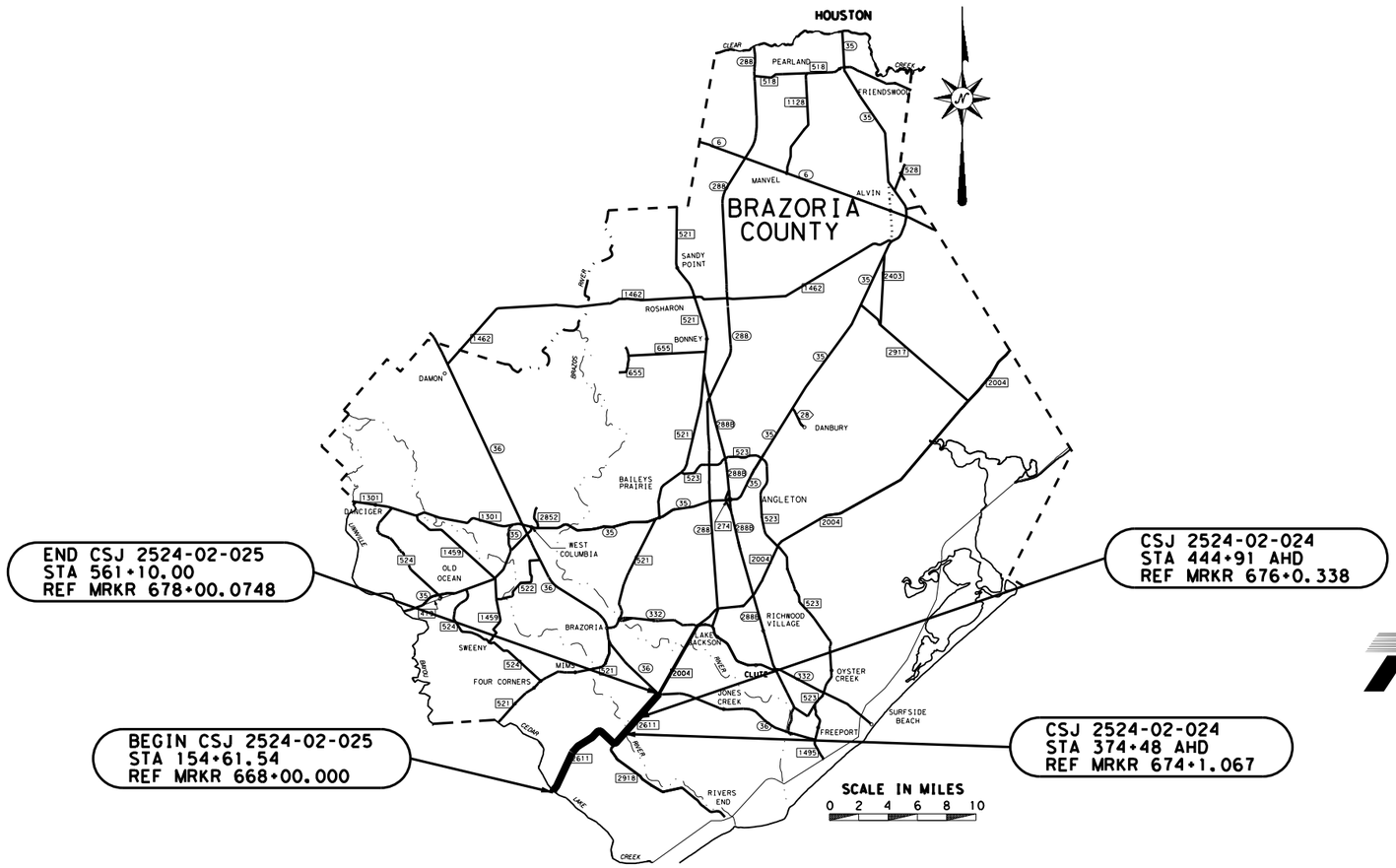
LIMITS: FROM MATAGORDA COUNTY LINE TO SH 36

FOR THE CONSTRUCTION OF THE REHABILITATION OF EXISTING ROADWAY CONSISTING OF SUBGRADE WIDENING, FLEX BASE, ASPHALT STABILIZED BASE, CULVERT EXTENSION, BASE REPAIRS, SEAL COAT, ASPHALT CONCRETE PAVEMENT OVERLAY, SIGNING AND PAVEMENT MARKINGS.

DESIGN SPEED- 60 MPH
ADT- 4,400 (2020)
6,200 (2040)
RURAL MAJOR COLLECTOR

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	C 2524-2-25		1
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC.	FM 2611

CSJ	ROADWAY LENGTH		BRIDGE LENGTH		TOTAL LENGTH	
	FEET	MILE	FEET	MILE	FEET	MILE
2524-02-025	48,110.46′ =	9.112	60.00′ =	0.011	48,170.46′ =	9.123
2524-02-024	5,862.88′ =	1.110	1,179.00′ =	0.223	7,041.88′ =	1.333
PROJECT LENGTH	53,973.34′ =	10.222	1,239.00′ =	0.235	55,212.34′ =	10.457



END CSJ 2524-02-025
STA 561+10.00
REF MRKR 678+00.0748

BEGIN CSJ 2524-02-025
STA 154+61.54
REF MRKR 668+00.000

CSJ 2524-02-024
STA 444+91 AHD
REF MRKR 676+0.338

CSJ 2524-02-024
STA 374+48 AHD
REF MRKR 674+1.067

PROJECT VICINITY MAP

RAILROAD CROSSING: NONE
EXCEPTIONS: NONE
EQUATIONS: 489+00.00 BK = 343+36.12 AHD (+14,563.88′)

Texas Department of Transportation®

RECOMMENDED FOR LETTING: 12/22/2020

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

APPROVED FOR LETTING: 12/29/2020

DocuSigned by:
James W. Koch . P.E.
842ACEA46EC24CC...
DISTRICT ENGINEER

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

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED
PROFESSIONAL ENGINEER

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

Eugene Ampomah, P.E.

12.22.2020

INDEX OF SHEETS

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		2

SCALE N.T.S.
SHEET 1 OF 3

#203	D & OM (4) - 20	
#204	D & OM (5) - 20	
#205	D & OM (6) - 20	
#206	D & OM (VIA) - 20	
	ENVIRONMENTAL ISSUES	
207-226	STORMWATER POLLUTION PREVENTION PLAN	
227	(SWP3)(HOU DIST)	
228-229	EPIC	
#230	EC(1) -16	
#231	EC(2) -16	
#232	EC(3) -16	
#233	FERTILIZER, SEED, SOD, STRAW, COMPOST, AND WATER (HOU DIST)	

STATE OF TEXAS
EUGENE AMPOMAH
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Eugene Ampomah, P.E.

12.22.2020

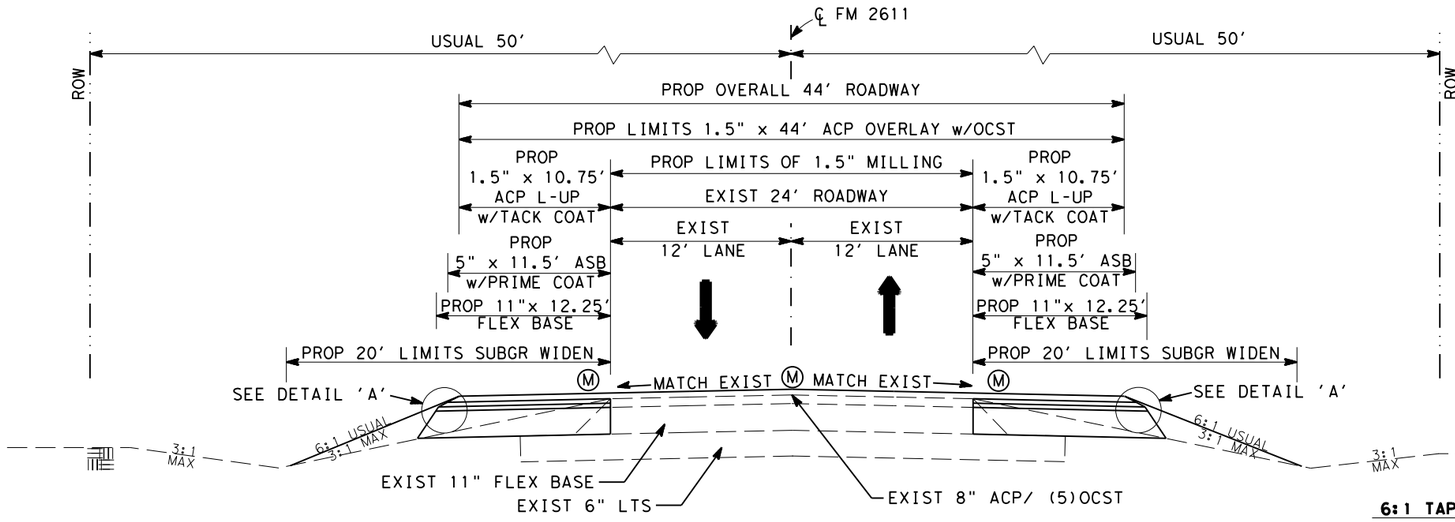
INDEX OF SHEETS

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		3

SCALE N.T.S.
SHEET 2 OF 3

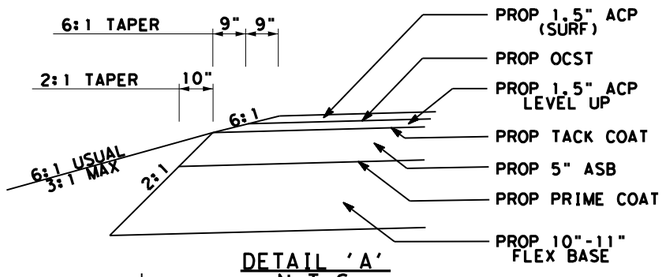
12/21/2020
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\252402025\4 - Design\Plan Set\1. General\INDEX.dgn



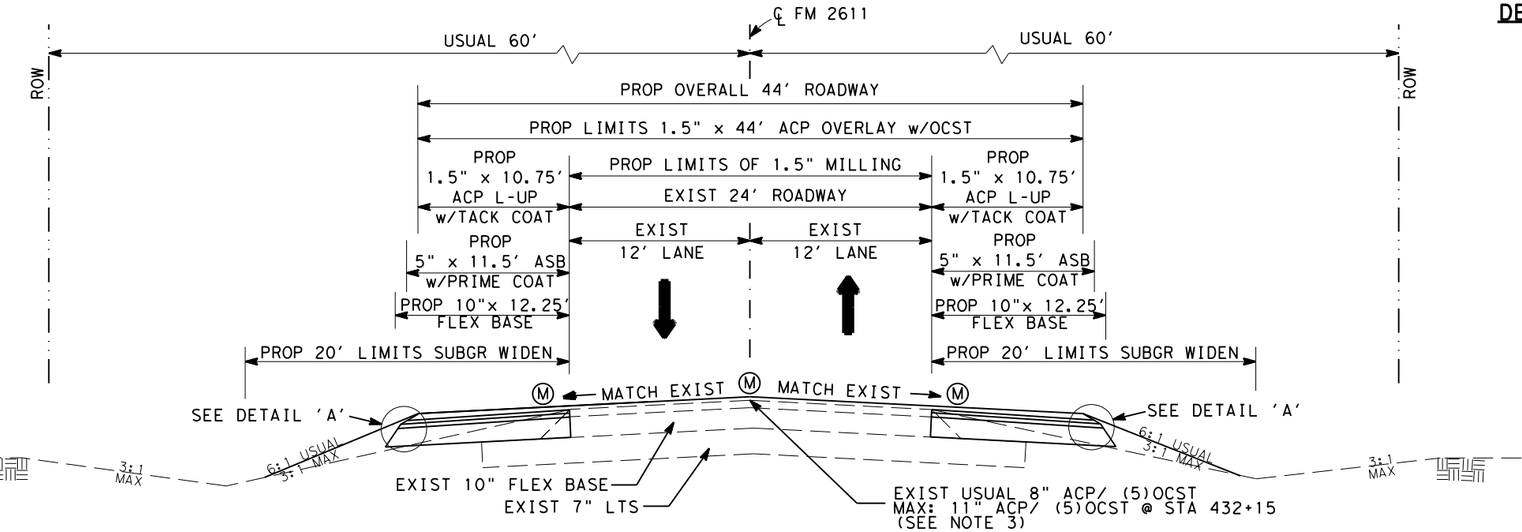
EXIST/PROP TYPICAL SECTION

STA 154+61 TO STA 343+36.12 BK
STA 343+36.12 BK TO STA 489+00 BK
STA 343+36.12 AHD TO STA 359+28 AHD

EQUATION: STA 489+00 BK =
STA 343+36.12 AHD
(+14,563.88)



DETAIL 'A'
N.T.S.



EXIST/PROP TYPICAL SECTION

STA 402+06 AHD TO STA 549+11

LEGEND

ACP - ASPHALT CONC. PAV
ASB - ASPHALT STABILIZED BASE
LTS - LIME TREATED SUBGRADE
OCST - ONE COURSE SURFACE TREATMENT
Ⓜ - MILLED IN RUMBLE STRIPS (SEE MILLED IN RUMBLE STRIPS DETAILS SHEET FOR PLACEMENT)

NOTES:

1. BLADE OFF EXISTING VEGETATION FROM PAVEMENT EDGE PRIOR TO ACP OVERLAY AND SHOULDER UP AFTER ACP OVERLAY. VEGETATION REMOVAL AND SHOULDERING UP IS SUBSIDIARY TO VARIOUS BID ITEMS.
2. ENGINEER TO DETERMINE PAVEMENT REPAIR AFTER MILLING OPERATIONS. NO REPAIRS TO BE MADE PRIOR TO MILLING.
3. EXIST PAVEMENT MATERIALS AND DEPTHS MAY VARY.
4. SEAL COAT SHALL START WITHIN 10 DAYS OF MILLING OPERATIONS. ACP OVERLAY SHALL START WITHIN 10 DAYS OF SEAL COAT OPERATIONS.
5. SAWCUTTING OF EXISTING PAVEMENT SHALL NOT BE PAID FOR SEPARATELY, BUT SHALL BE SUBSIDIARY TO RELEVANT BID ITEMS.

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E.

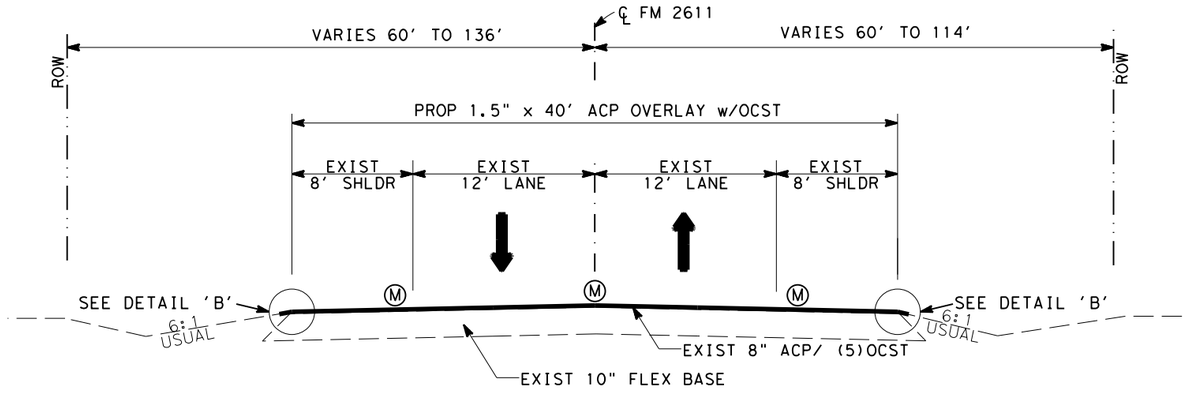
12.22.2020

TYPICAL SECTIONS

Texas Department of Transportation

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		4

SCALE N.T.S.
SHEET 1 OF 2

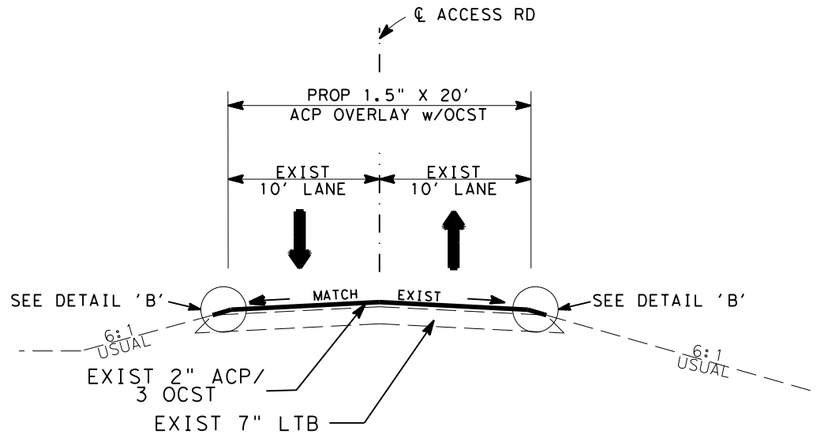


EXIST/PROP TYPICAL SECTION

STA STA 549+11 TO STA 556+60

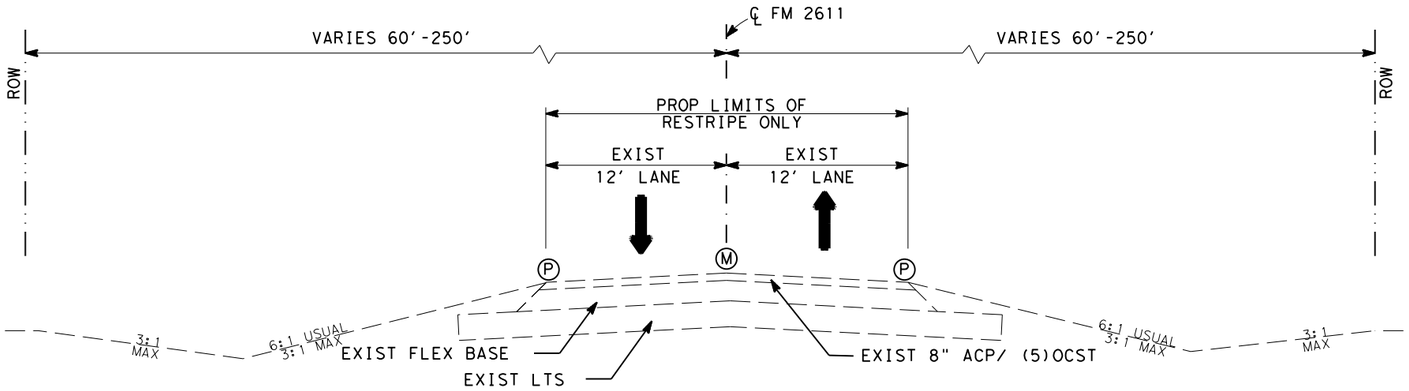
LEFT TURN LANE (0' TO 16')

STA 556+60 TO STA 561+10



EXIST/PROP TYPICAL SECTION

STA 800+00 TO STA 809+54.52
STA 900+00 TO STA 907+07.96
STA 1102+99 TO STA 1111+51.30
STA 1201+85 TO STA 1211+52.71



EXIST/PROP TYPICAL SECTION

STA 359+28 AHD TO STA 402+06 AHD

LIMITS OF Ⓜ AND Ⓟ

STA 359+28 AHD TO STA 374+66 AHD
STA 386+46 AHD TO STA 402+06 AHD

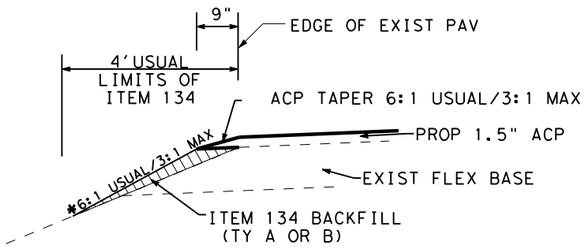
LEGEND

ACP - ASPHALT CONC. PAV
ASB - ASPHALT STABILIZED BASE
LTS - LIME TREATED SUBGRADE
OCST - ONE COURSE SURFACE TREATMENT
Ⓜ - MILLED IN RUMBLE STRIPS (SEE MILLED IN RUMBLE STRIPS DETAILS SHEET FOR PLACEMENT)
Ⓟ - PROP PROF MARKINGS SEE PM SHEET FOR DETAILS

NOTES:

1. BLADE OFF EXISTING VEGETATION FROM PAVEMENT EDGE PRIOR TO ACP OVERLAY AND SHOULDER UP AFTER ACP OVERLAY. VEGETATION REMOVAL AND SHOULDERING UP IS SUBSIDIARY TO VARIOUS BID ITEMS.
2. ENGINEER TO DETERMINE PAVEMENT REPAIR AFTER MILLING OPERATIONS. NO REPAIRS TO BE MADE PRIOR TO MILLING.
3. EXIST PAVEMENT MATERIALS AND DEPTHS MAY VARY.
4. SEAL COAT SHALL START WITHIN 10 DAYS OF MILLING OPERATIONS. ACP OVERLAY SHALL START WITHIN 10 DAYS OF SEAL COAT OPERATIONS.
5. SAWCUTTING OF EXISTING PAVEMENT SHALL NOT BE PAID FOR SEPARATELY, BUT SHALL BE SUBSIDIARY TO RELEVANT BID ITEMS.

* PROVIDE A 6:1 ACP TAPER WHERE GEOMETRY ALLOWS. WHERE FRONT SLOPES ARE TOO STEEP TO PROVIDE THE 6:1 TAPER, PROVIDE THE FLATTEST TAPER POSSIBLE UP TO THE MAX 3:1 SLOPE.



DETAIL 'B'

N.T.S.

SCALE N.T.S.
SHEET 2 OF 2

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E.

12.22.2020

TYPICAL SECTIONS

Texas Department of Transportation®
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CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		5

12/21/2020
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\252402025\4 - Design\Plan Set\1. General\Typicals (NEW).dgn

FY	MSEC	HIGHWAY	RDBD	REFERENCE MARKERS BEGIN	REFERENCE MARKERS END	LEN	PTYPE	TEST MM/DD/	IRI(IN/MI) DIST TRAV	IRI(IN/MI) LEFT	IRI(IN/MI) RIGH	IRI(IN/MI) SI	COMMENTS
2020	02	FM2611	K6	0666 + 0.899	0666 + 0.935		10	10/9/2019		160	226	2.3	
2020	02	FM2611	K6	0668 + 0.001	0668 + 0.101		10	10/9/2019		63	78	4.3	
2020	02	FM2611	K6	0668 + 0.101	0668 + 0.201		10	10/9/2019		67	71	4.3	
2020	02	FM2611	K6	0668 + 0.201	0668 + 0.301		10	10/9/2019		49	82	4.4	
2020	02	FM2611	K6	0668 + 0.301	0668 + 0.401		10	10/9/2019		55	116	3.9	
2020	02	FM2611	K6	0668 + 0.401	0668 + 0.501		10	10/9/2019		72	104	3.9	
2020	02	FM2611	K6	0668 + 0.501	0668 + 0.601		10	10/9/2019		83	96	3.9	
2020	02	FM2611	K6	0668 + 0.601	0668 + 0.701		10	10/9/2019		65	128	3.7	
2020	02	FM2611	K6	0668 + 0.701	0668 + 0.801		10	10/9/2019		63	92	4.1	
2020	02	FM2611	K6	0668 + 0.801	0668 + 0.901		10	10/9/2019		56	72	4.4	
2020	02	FM2611	K6	0668 + 0.901	0668 + 1.001		10	10/9/2019		43	81	4.5	
2020	02	FM2611	K6	0668 + 1.001	0668 + 1.101		10	10/9/2019		56	71	4.4	
2020	02	FM2611	K6	0668 + 1.101	0668 + 1.201		10	10/9/2019		62	103	4.0	
2020	02	FM2611	K6	0668 + 1.201	0668 + 1.301		10	10/9/2019		55	67	4.5	
2020	02	FM2611	K6	0668 + 1.301	0668 + 1.401		10	10/9/2019		79	75	4.1	
2020	02	FM2611	K6	0668 + 1.401	0668 + 1.501		10	10/9/2019		51	79	4.4	
2020	02	FM2611	K6	0668 + 1.501	0668 + 1.601		10	10/9/2019		62	71	4.4	
2020	02	FM2611	K6	0668 + 1.601	0668 + 1.701		10	10/9/2019		51	78	4.4	
2020	02	FM2611	K6	0668 + 1.701	0668 + 1.801		10	10/9/2019		43	69	4.6	
2020	02	FM2611	K6	0668 + 1.801	0668 + 1.901		10	10/9/2019		45	85	4.4	
2020	02	FM2611	K6	0668 + 1.901	0670 + 0.061		10	10/9/2019		56	132	3.8	
2020	02	FM2611	K6	0670 + 0.061	0670 + 0.161		10	10/9/2019		72	108	3.8	
2020	02	FM2611	K6	0670 + 0.161	0670 + 0.261		10	10/9/2019		66	103	4.0	
2020	02	FM2611	K6	0670 + 0.261	0670 + 0.361		10	10/9/2019		56	74	4.4	
2020	02	FM2611	K6	0670 + 0.361	0670 + 0.461		10	10/9/2019		34	76	4.6	
2020	02	FM2611	K6	0670 + 0.461	0670 + 0.561		10	10/9/2019		52	82	4.3	
2020	02	FM2611	K6	0670 + 0.561	0670 + 0.661		10	10/9/2019		38	71	4.7	
2020	02	FM2611	K6	0670 + 0.661	0670 + 0.761		10	10/9/2019		63	55	4.5	
2020	02	FM2611	K6	0670 + 0.761	0670 + 0.861		10	10/9/2019		94	75	4.0	
2020	02	FM2611	K6	0670 + 0.861	0670 + 0.961		10	10/9/2019		79	79	4.1	
2020	02	FM2611	K6	0670 + 0.961	0670 + 1.061		10	10/9/2019		76	86	4.0	
2020	02	FM2611	K6	0670 + 1.061	0670 + 1.161		10	10/9/2019		60	69	4.4	
2020	02	FM2611	K6	0670 + 1.161	0670 + 1.261		10	10/9/2019		47	61	4.7	
2020	02	FM2611	K6	0670 + 1.261	0670 + 1.361		10	10/9/2019		45	49	4.9	
2020	02	FM2611	K6	0670 + 1.361	0670 + 1.461		10	10/9/2019		47	60	4.7	
2020	02	FM2611	K6	0670 + 1.461	0670 + 1.561		10	10/9/2019		59	64	4.5	
2020	02	FM2611	K6	0670 + 1.561	0670 + 1.661		10	10/9/2019		67	60	4.4	
2020	02	FM2611	K6	0670 + 1.661	0670 + 1.761		10	10/9/2019		87	62	4.2	
2020	02	FM2611	K6	0670 + 1.761	0670 + 1.861		10	10/9/2019		71	54	4.4	
2020	02	FM2611	K6	0670 + 1.861	0672 + 0.015		10	10/9/2019		76	69	4.2	
2020	02	FM2611	K6	0672 + 0.015	0672 + 0.115		10	10/9/2019		62	67	4.4	
2020	02	FM2611	K6	0672 + 0.115	0672 + 0.215		10	10/9/2019		59	57	4.6	
2020	02	FM2611	K6	0672 + 0.215	0672 + 0.315		10	10/9/2019		73	64	4.3	
2020	02	FM2611	K6	0672 + 0.315	0672 + 0.415		10	10/9/2019		76	115	3.7	
2020	02	FM2611	K6	0672 + 0.415	0672 + 0.515		10	10/9/2019		96	73	4.0	
2020	02	FM2611	K6	0672 + 0.515	0672 + 0.615		10	10/9/2019		67	73	4.3	
2020	02	FM2611	K6	0672 + 0.615	0672 + 0.715		10	10/9/2019		47	53	4.8	
2020	02	FM2611	K6	0672 + 0.715	0672 + 0.815		10	10/9/2019		68	59	4.4	
2020	02	FM2611	K6	0672 + 0.815	0672 + 0.915		10	10/9/2019		59	54	4.6	
2020	02	FM2611	K6	0672 + 0.915	0672 + 1.015		10	10/9/2019		56	56	4.6	
2020	02	FM2611	K6	0672 + 1.015	0672 + 1.115		10	10/9/2019		84	71	4.1	
2020	02	FM2611	K6	0672 + 1.115	0672 + 1.215		10	10/9/2019		54	60	4.6	
2020	02	FM2611	K6	0672 + 1.215	0672 + 1.315		10	10/9/2019		67	64	4.4	
2020	02	FM2611	K6	0672 + 1.315	0672 + 1.351		10	10/9/2019		57	102	4.1	
2020	02	FM2611	K6	0672 + 1.351	0672 + 1.451		10	10/9/2019		61	50	4.6	
2020	02	FM2611	K6	0672 + 1.451	0672 + 1.551		10	10/9/2019		53	64	4.5	
2020	02	FM2611	K6	0672 + 1.551	0672 + 1.651		10	10/9/2019		42	77	4.5	
2020	02	FM2611	K6	0672 + 1.651	0672 + 1.751		10	10/9/2019		45	56	4.8	
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2020	02	FM2611	K6	0672 + 1.851	0674 + 0.009		10	10/9/2019		51	59	4.6	
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2020	02	FM2611	K6	0674 + 0.309	0674 + 0.409		10	10/9/2019		62	83	4.2	
2020	02	FM2611	K6	0674 + 0.409	0674 + 0.509		10	10/9/2019		54	76	4.4	
2020	02	FM2611	K6	0674 + 0.509	0674 + 0.609		10	10/9/2019		43	58	4.8	
2020	02	FM2611	K6	0674 + 0.609	0674 + 0.709		10	10/9/2019		53	86	4.3	
2020	02	FM2611	K6	0674 + 0.709	0674 + 0.809		10	10/9/2019		39	43	5.0	
2020	02	FM2611	K6	0674 + 0.809	0674 + 0.909		10	10/9/2019		49	55	4.7	
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2020	02	FM2611	K6	0674 + 1.109	0674 + 1.209		10	10/9/2019		179	213	2.3	
2020	02	FM2611	K6	0674 + 1.209	0674 + 1.309		10	10/9/2019		219	253	1.8	
2020	02	FM2611	K6	0674 + 1.309	0674 + 1.409		10	10/9/2019		81	80	4.0	
2020	02	FM2611	K6	0674 + 1.409	0674 + 1.509		10	10/9/2019		62	68	4.4	
2020	02	FM2611	K6	0674 + 1.509	0674 + 1.609		10	10/9/2019		61	51	4.6	
2020	02	FM2611	K6	0674 + 1.609	0674 + 1.709		10	10/9/2019		63	68	4.4	
2020	02	FM2611	K6	0674 + 1.709	0674 + 1.809		10	10/9/2019		82	72	4.1	
2020	02	FM2611	K6	0674 + 1.809	0674 + 1.909		10	10/9/2019		67	56	4.5	
2020	02	FM2611	K6	0674 + 1.909	0674 + 2.009		10	10/9/2019		67	65	4.4	
2020	02	FM2611	K6	0674 + 2.009	0676 + 0.043		10	10/9/2019		62	57	4.5	
2020	02	FM2611	K6	0676 + 0.043	0676 + 0.143		10	10/9/2019		73	49	4.5	
2020	02	FM2611	K6	0676 + 0.143	0676 + 0.243		10	10/9/2019		87	84	3.9	
2020	02	FM2611	K6	0676 + 0.243	0676 + 0.343		10	10/9/2019		87	83	3.9	
2020	02	FM2611	K6	0676 + 0.343	0676 + 0.443		10	10/9/2019		103	85	3.8	
2020	02	FM2611	K6	0676 + 0.443	0676 + 0.543		10	10/9/2019		74	61	4.3	
2020	02	FM2611	K6	0676 + 0.543	0676 + 0.643		10	10/9/2019		72	69	4.3	
2020	02	FM2611	K6	0676 + 0.643	0676 + 0.743		10	10/9/2019		75	59	4.3	
2020	02	FM2611	K6	0676 + 0.743	0676 + 0.843		10	10/9/2019		82	75	4.1	
2020	02	FM2611	K6	0676 + 0.843	0676 + 0.943		10	10/9/2019		84	65	4.2	
2020	02	FM2611	K6	0676 + 0.943	0676 + 1.043		10	10/9/2019		71	65	4.3	
2020	02	FM2611	K6	0676 + 1.043	0676 + 1.143		10	10/9/2019		78	60	4.3	
2020	02	FM2611	K6	0676 + 1.143	0676 + 1.243		10	10/9/2019		78	68	4.2	
2020	02	FM2611	K6	0676 + 1.243	0676 + 1.343		10	10/9/2019		96	104	3.7	
2020	02	FM2611	K6	0676 + 1.343	0676 + 1.443		10	10/9/2019		80	69	4.2	
2020	02	FM2611	K6	0676 + 1.443	0676 + 1.543		10	10/9/2019		80	71	4.1	
2020	02	FM2611	K6	0676 + 1.543	0676 + 1.643		10	10/9/2019		90	75	4.0	
2020	02	FM2611	K6	0676 + 1.643	0676 + 1.743		10	10/9/2019		75	78	4.1	
2020	02	FM2611	K6	0676 + 1.743	0678 + 0.048		10	10/9/2019		89	79	4.0	
2020	02	FM2611	K6	0678 + 0.048	0678 + 0.148		10	10/9/2019		80	68	4.2	
2020	02	FM2611	K6	0678 + 0.148	0678 + 0.248		10	10/9/2019		62	54	4.6	
2020	02	FM2611	K6	0678 + 0.248	0678 + 0.348		10	10/9/2019		69	91	4.1	
2020	02	FM2611	K6	0678 + 0.348	0678 + 0.448		10	10/9/2019		68	64	4.4	
2020	02	FM2611	K6	0678 + 0.448	0678 + 0.548		10	10/9/2019		77	121	3.7	
2020	02	FM2611	K6	0678 + 0.548	0678 + 0.648		10	10/9/2019		75	69	4.2	
2020	02	FM2611	K6	0678 + 0.648	0678 + 0.748		10	10/9/2019		175	172	2.6	
2020	02	FM2611	K6	0668 + 0.020	0668 + 0.112		10	12/3/2019		57	76	4.4	
2020	02	FM2611	K6	0668 + 0.112	0668 + 0.211		10	12/3/2019		73	76	4.2	

FOR CONTRACTOR'S INFORMATION ONLY

IRI DATA

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		6

2020	02	FM2611	K6	0668	+	0.211	0668	+	0.308	10	12/3/2019	51	85	4.3	2020	02	FM2611	K6	0674	+	0.065	0674	+	0.166	10	12/3/2019	66	60	4.4
2020	02	FM2611	K6	0668	+	0.308	0668	+	0.406	10	12/3/2019	50	113	4.0	2020	02	FM2611	K6	0674	+	0.166	0674	+	0.272	10	12/3/2019	63	71	4.3
2020	02	FM2611	K6	0668	+	0.406	0668	+	0.502	10	12/3/2019	58	100	4.1	2020	02	FM2611	K6	0674	+	0.272	0674	+	0.378	10	12/3/2019	60	70	4.4
2020	02	FM2611	K6	0668	+	0.502	0668	+	0.600	10	12/3/2019	70	93	4.0	2020	02	FM2611	K6	0674	+	0.378	0674	+	0.479	10	12/3/2019	66	108	3.9
2020	02	FM2611	K6	0668	+	0.600	0668	+	0.696	10	12/3/2019	64	127	3.7	2020	02	FM2611	K6	0674	+	0.479	0674	+	0.579	10	12/3/2019	45	58	4.7
2020	02	FM2611	K6	0668	+	0.696	0668	+	0.794	10	12/3/2019	64	95	4.1	2020	02	FM2611	K6	0674	+	0.579	0674	+	0.678	10	12/3/2019	57	92	4.2
2020	02	FM2611	K6	0668	+	0.794	0668	+	0.891	10	12/3/2019	58	74	4.4	2020	02	FM2611	K6	0674	+	0.678	0674	+	0.778	10	12/3/2019	48	59	4.7
2020	02	FM2611	K6	0668	+	0.891	0668	+	0.988	10	12/3/2019	44	69	4.6	2020	02	FM2611	K6	0674	+	0.778	0674	+	0.878	10	12/3/2019	49	54	4.7
2020	02	FM2611	K6	0668	+	0.988	0668	+	1.086	10	12/3/2019	55	60	4.6	2020	02	FM2611	K6	0674	+	0.878	0674	+	0.978	10	12/3/2019	47	54	4.8
2020	02	FM2611	K6	0668	+	1.086	0668	+	1.183	10	12/3/2019	61	79	4.3	2020	02	FM2611	K6	0674	+	0.978	0674	+	1.078	10	12/3/2019	81	109	3.8
2020	02	FM2611	K6	0668	+	1.183	0668	+	1.280	10	12/3/2019	58	70	4.4	2020	02	FM2611	K6	0674	+	1.078	0674	+	1.178	10	12/3/2019	214	246	1.9
2020	02	FM2611	K6	0668	+	1.280	0668	+	1.377	10	12/3/2019	71	79	4.2	2020	02	FM2611	K6	0674	+	1.178	0674	+	1.278	10	12/3/2019	187	241	2.1
2020	02	FM2611	K6	0668	+	1.377	0668	+	1.474	10	12/3/2019	57	78	4.3	2020	02	FM2611	K6	0674	+	1.278	0674	+	1.377	10	12/3/2019	148	137	3.0
2020	02	FM2611	K6	0668	+	1.474	0668	+	1.571	10	12/3/2019	60	76	4.3	2020	02	FM2611	K6	0674	+	1.377	0674	+	1.476	10	12/3/2019	65	78	4.2
2020	02	FM2611	K6	0668	+	1.571	0668	+	1.669	10	12/3/2019	53	82	4.3	2020	02	FM2611	K6	0674	+	1.476	0674	+	1.577	10	12/3/2019	60	61	4.5
2020	02	FM2611	K6	0668	+	1.669	0668	+	1.766	10	12/3/2019	46	68	4.6	2020	02	FM2611	K6	0674	+	1.577	0674	+	1.676	10	12/3/2019	67	61	4.4
2020	02	FM2611	K6	0668	+	1.766	0668	+	1.863	10	12/3/2019	47	82	4.4	2020	02	FM2611	K6	0674	+	1.676	0674	+	1.776	10	12/3/2019	80	73	4.1
2020	02	FM2611	K6	0668	+	1.863	0670	+	0.020	10	12/3/2019	61	145	3.6	2020	02	FM2611	K6	0674	+	1.776	0674	+	1.876	10	12/3/2019	85	67	4.1
2020	02	FM2611	K6	0670	+	0.020	0670	+	0.117	10	12/3/2019	66	101	4.0	2020	02	FM2611	K6	0674	+	1.876	0674	+	1.976	10	12/3/2019	66	71	4.3
2020	02	FM2611	K6	0670	+	0.117	0670	+	0.215	10	12/3/2019	60	98	4.1	2020	02	FM2611	K6	0674	+	1.976	0676	+	0.010	10	12/3/2019	57	61	4.5
2020	02	FM2611	K6	0670	+	0.215	0670	+	0.312	10	12/3/2019	55	65	4.5	2020	02	FM2611	K6	0676	+	0.010	0676	+	0.109	10	12/3/2019	74	58	4.4
2020	02	FM2611	K6	0670	+	0.312	0670	+	0.409	10	12/3/2019	41	57	4.8	2020	02	FM2611	K6	0676	+	0.109	0676	+	0.209	10	12/3/2019	76	58	4.3
2020	02	FM2611	K6	0670	+	0.409	0670	+	0.506	10	12/3/2019	54	72	4.4	2020	02	FM2611	K6	0676	+	0.209	0676	+	0.309	10	12/3/2019	105	97	3.6
2020	02	FM2611	K6	0670	+	0.506	0670	+	0.604	10	12/3/2019	42	58	4.8	2020	02	FM2611	K6	0676	+	0.309	0676	+	0.409	10	12/3/2019	108	99	3.6
2020	02	FM2611	K6	0670	+	0.604	0670	+	0.702	10	12/3/2019	62	56	4.5	2020	02	FM2611	K6	0676	+	0.409	0676	+	0.508	10	12/3/2019	84	76	4.1
2020	02	FM2611	K6	0670	+	0.702	0670	+	0.800	10	12/3/2019	101	82	3.8	2020	02	FM2611	K6	0676	+	0.508	0676	+	0.608	10	12/3/2019	75	61	4.3
2020	02	FM2611	K6	0670	+	0.800	0670	+	0.902	10	12/3/2019	76	79	4.1	2020	02	FM2611	K6	0676	+	0.608	0676	+	0.708	10	12/3/2019	70	64	4.3
2020	02	FM2611	K6	0670	+	0.902	0670	+	1.002	10	12/3/2019	81	74	4.1	2020	02	FM2611	K6	0676	+	0.708	0676	+	0.807	10	12/3/2019	76	72	4.2
2020	02	FM2611	K6	0670	+	1.002	0670	+	1.102	10	12/3/2019	63	65	4.4	2020	02	FM2611	K6	0676	+	0.807	0676	+	0.906	10	12/3/2019	94	74	4.0
2020	02	FM2611	K6	0670	+	1.102	0670	+	1.204	10	12/3/2019	56	61	4.5	2020	02	FM2611	K6	0676	+	0.906	0676	+	1.006	10	12/3/2019	79	72	4.1
2020	02	FM2611	K6	0670	+	1.204	0670	+	1.308	10	12/3/2019	41	70	4.6	2020	02	FM2611	K6	0676	+	1.006	0676	+	1.106	10	12/3/2019	73	60	4.4
2020	02	FM2611	K6	0670	+	1.308	0670	+	1.411	10	12/3/2019	47	61	4.7	2020	02	FM2611	K6	0676	+	1.106	0676	+	1.206	10	12/3/2019	89	69	4.1
2020	02	FM2611	K6	0670	+	1.411	0670	+	1.515	10	12/3/2019	57	66	4.5	2020	02	FM2611	K6	0676	+	1.206	0676	+	1.305	10	12/3/2019	94	86	3.8
2020	02	FM2611	K6	0670	+	1.515	0670	+	1.618	10	12/3/2019	56	56	4.6	2020	02	FM2611	K6	0676	+	1.305	0676	+	1.405	10	12/3/2019	90	86	3.9
2020	02	FM2611	K6	0670	+	1.618	0670	+	1.722	10	12/3/2019	73	59	4.4	2020	02	FM2611	K6	0676	+	1.405	0676	+	1.504	10	12/3/2019	85	76	4.0
2020	02	FM2611	K6	0670	+	1.722	0670	+	1.825	10	12/3/2019	70	55	4.4	2020	02	FM2611	K6	0676	+	1.504	0676	+	1.603	10	12/3/2019	100	88	3.8
2020	02	FM2611	K6	0670	+	1.825	0670	+	1.928	10	12/3/2019	73	75	4.2	2020	02	FM2611	K6	0676	+	1.603	0676	+	1.703	10	12/3/2019	87	61	4.2
2020	02	FM2611	K6	0670	+	1.928	0672	+	0.086	10	12/3/2019	59	69	4.4	2020	02	FM2611	K6	0676	+	1.703	0678	+	0.007	10	12/3/2019	97	92	3.8
2020	02	FM2611	K6	0672	+	0.086	0672	+	0.190	10	12/3/2019	61	59	4.5	2020	02	FM2611	K6	0678	+	0.007	0678	+	0.108	10	12/3/2019	80	67	4.2
2020	02	FM2611	K6	0672	+	0.190	0672	+	0.292	10	12/3/2019	66	68	4.3	2020	02	FM2611	K6	0678	+	0.108	0678	+	0.208	10	12/3/2019	79	69	4.2
2020	02	FM2611	K6	0672	+	0.292	0672	+	0.392	10	12/3/2019	63	129	3.7	2020	02	FM2611	K6	0678	+	0.208	0678	+	0.307	10	12/3/2019	67	80	4.2
2020	02	FM2611	K6	0672	+	0.392	0672	+	0.492	10	12/3/2019	79	77	4.1	2020	02	FM2611	K6	0678	+	0.307	0678	+	0.407	10	12/3/2019	69	73	4.2
2020	02	FM2611	K6	0672	+	0.492	0672	+	0.592	10	12/3/2019	67	78	4.2	2020	02	FM2611	K6	0678	+	0.407	0678	+	0.506	10	12/3/2019	67	111	3.9
2020	02	FM2611	K6	0672	+	0.592	0672	+	0.692	10	12/3/2019	49	50	4.8	2020	02	FM2611	K6	0678	+	0.506	0678	+	0.606	10	12/3/2019	83	94	3.9
2020	02	FM2611	K6	0672	+	0.692	0672	+	0.793	10	12/3/2019	66	60	4.4	2020	02	FM2611	K6	0678	+	0.606	0678	+	0.707	10	12/3/2019	72	68	4.3
2020	02	FM2611	K6	0672	+	0.793	0672	+	0.897	10	12/3/2019	60	51	4.6															
2020	02	FM2611	K6	0672	+	0.897	0672	+	1.002	10	12/3/2019	58	59	4.5															
2020	02	FM2611	K6	0672	+	1.002	0672	+	1.104	10	12/3/2019	74	76	4.2															
2020	02	FM2611	K6	0672	+	1.104	0672	+	1.204	10	12/3/2019	65	66	4.4															
2020	02	FM2611	K6	0672	+	1.204	0672	+	1.305	10	12/3/2019	67	70	4.3															
2020	02	FM2611	K6	0672	+	1.305	0672	+	1.405	10	12/3/2019	58	54	4.6															
2020	02	FM2611	K6	0672	+	1.405	0672	+	1.504	10	12/3/2019	49	76	4.4															
2020	02	FM2611	K6	0672	+	1.504	0672	+	1.605	10	12/3/2019	46	80	4.4															
2020	02	FM2611	K6	0672	+	1.605	0672	+	1.706	10	12/3/2019	40	46	5.0															
2020	02	FM2611	K6	0672	+	1.706	0672	+	1.806	10	12/3/2019	50	78	4.4															
2020	02	FM2611	K6	0672	+	1.806	0672	+	1.907	10	12/3/2019	62	73	4.3															
2020	02	FM2611	K6	0672	+	1.907	0674	+	0.065	10	12/3/2019	55	62	4.5															

FOR CONTRACTOR'S
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IRI DATA

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		7

General Notes:

General:

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

Maria Aponte, P.E. *maria.aponte@txdot.gov*
Carlos Zepeda, P.E. *carlos.zepeda@txdot.gov*

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

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

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

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

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

Superelevate the curves to match the existing surface.

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

The following standard detail sheets are modified:

Modified Standards

TCP (7-1)-13

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

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

Grade street intersections and median openings for surface drainage.

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

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

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

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

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

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.

General: Roadway Illumination and Electrical

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

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

General: Traffic Signals

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

General: Site Management

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

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

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

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

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

General: Traffic Control and Construction

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

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

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

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

General: Utilities

Consider the locations of underground utilities 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 to schedule marking of underground lines on the ground. Use caution if working in these areas to avoid damaging or interfering with existing facilities.

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

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

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

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

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

Item 5: Control of Work

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

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

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

Submit shop drawings electronically for the fabrication of items as documented in Table 1 below. Information and requirements for electronic submittals can be viewed in the “Guide to Electronic Shop Drawing Submittal” which can be accessed through the following web link, ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf. References to

11 in. x 17 in. sheets in individual specifications for structural items imply electronic CAD sheets.

Table 1

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

Spec Item No.'s	Product	Submittal Required	Approval Required (Y/N)	Contractor/ Fabricator P.E. Seal Required	Reviewing Party	Shop or Working Drawing (Note 1)
7.16.1&.2	Construction Load Analyses	Y	Y	Y	B	WD
400	Excavation and Backfill for Structures (cofferdams)	Y	N	Y	A	WD
403	Temporary Special Shoring	Y	N	Y	C	WD
420	Formwork/Falsework	Y	N	Y	A	WD
423	Retaining Walls, (calcs req'd.)	Y	Y	Y	C	SD
425	Optional Design Calculations (Prstrs Bms)	Y	Y	Y	B	SD
425	Prestr Concr Sheet Piling	Y	Y	N	B	SD
425	Prestr Concr Beams	Y	Y	N	B	SD
425	Prestr Concr Bent	Y	Y	N	B	SD
426	Post Tension Details	Y	Y	N	B	SD
434	Elastomeric Bearing Pads (All)	Y	Y	N	B	SD
441	Bridge Protective Assembly	Y	Y	N	B	SD
441	Misc Steel (various steel assemblies)	Y	Y	N	B	SD
441	Steel Pedestals (bridge raising)	Y	Y	N	B	SD
441	Steel Bearings	Y	Y	N	B	SD
441	Steel Bent	Y	Y	N	B	SD
441	Steel Diaphragms	Y	Y	N	B	SD
441	Steel Finger Joint	Y	Y	N	B	SD
441	Steel Plate Girder	Y	Y	N	B	SD
441	Steel Tub-Girders	Y	Y	N	B	SD
441	Erection Plans, including Falsework	Y	N	Y	A	WD
449	Sign Structure Anchor Bolts	Y	Y	N	T	SD
450	Railing	Y	Y	N	A	SD
462	Concrete Box Culvert	Y	Y	N	C	SD
462	Concrete Box Culvert (Alternate Designs Only,calcs reqd.)	Y	Y	Y	B	SD
464	Reinforced Concrete Pipe (Jack and Bore only; ONLY when requested)	Y	Y	Y	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets	Y	Y	N	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets (Alternate Designs Only, calcs req'd.)	Y	Y	Y	B	SD
466	Pre-cast Headwalls and Wingwalls	Y	Y	N	A	SD
467	Pre-cast Safety End Treatments	Y	Y	N	A	SD
495	Raising Existing Structure (calcs reqd.)	Y	Y	Y	B	SD
610	Roadway Illumination Supports (Non-Standard only, calcs reqd.)	Y	Y	Y	BRG	SD
613	High Mast Illumination Poles (Non-standard only, calcs reqd.)	Y	Y	Y	BRG	SD
627	Treated Timber Poles	Y	Y	N	T	SD
644	Special Non-Standard Supports (Bridge Mounts, Barrier Mounts, Etc.)	Y	Y	Y	T	SD
647	Large Roadside Sign Supports	Y	Y	Y	T	SD
650	Cantilever Sign Structure Supports - Alternate Design Calcs.	Y	Y	Y	T	SD
650	Sign Structures	Y	Y	N	T	SD
680	Installation of Highway Traffic Signals	Y	Y	N	T	SD
682	Vehicle and Pedestrian Signal Heads	Y	Y	N	T	SD
684	Traffic Signal Cables	Y	Y	N	T	SD
685	Roadside Flashing Beacon Assemblies	Y	Y	N	T	SD
686	Traffic Signal Pole Assemblies (Steel) (Non-Standard only)	Y	Y	Y	T	SD
687	Pedestal Pole Assemblies	Y	Y	N	T	SD
688	Detectors	Y	Y	N	A	SD
784	Repairing Steel Bridge Members	Y	Y	Y	B	WD
SS	Prestr Concr Crown Span	Y	Y	N	B	SD
SS	Sound Barrier Walls	Y	Y	Y	A	SD
SS	Camera Poles	Y	Y	Y	TMS	SD
SS	Pedestrian Bridge (Calcs req'd.)	Y	Y	Y	B	SD
SS	Screw-In Type Anchor Foundations	Y	Y	N	T	SD
SS	Fiber Optic/Communication Cable	Y	Y	N	TMS	SD
SS	Spread Spectrum Radios for Signals	Y	Y	N	T	SD
SS	VIVDS System for Signals	Y	Y	N	T	SD
SS	CTMS Equipment	Y	Y	N	TMS	SD

Notes:

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

B - Houston Bridge Engineer

Bridge Design (Houston TxDOT)	HOU-BrgShpDrwgs@txdot.gov

C - Construction Office

Construction	HOU-ConstrShpDrwgs@txdot.gov
Laboratory	HOU-LabShpDrwgs@txdot.gov

T - Traffic Engineer

Traffic Operations	HOU-TrfShpDrwgs@txdot.gov

Item 7: Legal Relations and Responsibilities

Do not initiate activities in a Project Specific Location (PSL), associated with a U.S. Army Corps of Engineers (USACE) permit area, that have not been previously evaluated by the USACE as part of the permit review of this project. Such activities include those pertaining to, but are not

limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here means materials are delivered to or from the PSL. The permit area includes the waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. Assume responsibility for consultations with the USACE regarding activities, including PSLs that have not been previously evaluated by the USACE. Provide the Department with a copy of consultations or approvals from the USACE before initiating activities.

The Contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or if proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The Contractor is solely responsible for documenting any determinations that their activities do not affect a USACE permit area. Maintain copies of their determinations for review by the Department or any regulatory agency.

Document and coordinate with the USACE, if required, before hauling any excavation from or hauling any embankment to a USACE permit area by either 1 or 2 below:

1. **Restricted Use of Materials for the Previously Evaluated Permit Areas.** Document both the Project Specific Locations (PSL) and their authorization. Maintain copies for review by the Department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:
   a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in the Item, “Excavation” is used for permanent or temporary fill (under the Item, “Embankment”) within a USACE permit area.
   b. Suitable embankment (under the Item, “Embankment”) from within the USACE permit area is used as fill within a USACE evaluated area.
   c. Unsuitable excavation or excess excavation, “Waste” (under the Item, “Excavation”), that is disposed of at a location approved within a USACE evaluated area.

2. **Contractor Materials from Areas Other than Previously Evaluated Areas.** Provide the Department with a copy of USACE coordination or approvals before initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to, haul roads, equipment staging areas, borrow and disposal sites:
   a. The Item, “Embankment” used for temporary or permanent fill within a USACE permit area.
   b. Unsuitable excavation or excess excavation, “Waste” (under the Item, “Excavation”), that is disposed of outside a USACE evaluated area.

The total area disturbed for this project is 50 acres. The disturbed area in this project, the project locations in the Contract, and Contractor project specific locations (PSLs) within 1 mile of the project limits for the Contract, will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from

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

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

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

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

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

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

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

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

This project requires *a Nationwide Permit 14 with a Preconstruction Notice* with environmental resource agencies. There is a high probability of encountering environmentally sensitive areas on Contractor designated project specific locations (PSLs) for this project (haul roads, equipment staging areas, borrow pits, disposal sites, field offices, storage areas, parking areas, etc.). This Item provides listings of regulatory agencies the Contractor may need to contact for this project.

USACE Contact: Sabrina Stachowski *sabrina.stachowski@txdot.gov*

TxDOT will need to coordinate with Texas Parks and Wildlife (TPWD) if dewatering will be required. The TPWD Kills and Spills (KAST) contact for Harris County is Heather Biggs, who may be reached by email at: Heather.Biggs@tpwd.texas.gov or by phone at: (281) 534-0133 for more information.

Report any activity that results in measurable spills and/or injury or mortality of aquatic or other organisms immediately to TPWD Law Enforcement Communications at Austin Headquarters, (512) 389-4848.

The work proposed at the cross structure located at STA 300+93 requires a *Nationwide Permit 14 with a Preconstruction Notice* from the USACE. The Contractor shall not commence work at this location until after the *NWP14 w/PCN* is cleared by the USACE.

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

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

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

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

No significant traffic generator events have been identified.

Item 8: Prosecution and Progress

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

Working days will be computed and charged based on a 5 day workweek in accordance with Section 8.3.1.1.

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 $ *100*. 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 105: Removing Treated and Untreated Base and Asphalt Pavement

RAP generated by this project will be used as the material for backfill in Item 134 prior to removing from projects. Any remaining RAP will become the property of the Contractor.

Item 110: Excavation

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

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

Item 112: Subgrade Widening

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

Item 132: Embankment

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

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

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

Topsoil work is paid under the Item, “Topsoil.”

Item 134: Backfilling Pavement Edges

Use a roadwidener or other equipment as approved to place backfill material in accordance with the proposed typical sections.

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

Quantity by station includes both sides of the roadway.

RAP generated by this project will be used as the material for backfill in Item 134 prior to removing from projects. Any remaining RAP will become the property of the Contractor.

After all RAP generated by this project has been used 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.

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

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

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

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

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

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

Item 204: Sprinkling

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

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

Item 210: Rolling

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

Item 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 292: Asphalt Treatment (Plant-Mixed)

Excavate only what can replaced in one day.

Use paving machine to install asphalt stabilized base shoulder.

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 using the iron ore topsoil as the primary aggregate, meaning 80 percent or more by weight of the total mixture, the requirements for the water susceptibility test are waived.

Mixtures containing the iron ore topsoil are exempted from test methods TEX-217-F (Part I, separation of deleterious material and Part II, decantation test for coarse aggregate) and TEX-203-F (Sand Equivalent Test).

Assume responsibility for proportioning the materials entering the asphalt mixture, regardless of the type of plant used.

Furnish the mix designs for approval.

Item 310: Prime Coat

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

Item 316: Seal Coat

Place seal coats only from May 1 to September 15, inclusive, unless written approval is obtained to extend the placement period if weather conditions warrant an extension.

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

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

For ADT greater than 5000	ADT 1000 to 5000	ADT less than 1000
AC-20 XP	AC-15P	AC-10-2TR
AC-20-5TR	AC-20-5TR	AC-10 w/2% SBR
	AC-20-XP	AC-15P
	AC-10-2TR	

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.

Begin ACP Overlay within 10 calendar days of placing surface treatment.

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

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

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

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

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

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

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

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

Dilution of tack coat is not allowed.

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

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

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

Item 351: Flexible Pavement Structure Repair

Use asphalt stabilized base for the base material.

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

Item 354: Planing and Texturing Pavement

RAP generated by this project will be used as the material for backfill in Item 134 prior to removing from projects. Any remaining RAP will become the property of the Contractor.

Keep the removed depth as uniform as possible during each removal pass if the pavement depth being removed is composed of different asphalt layers. Stockpile the RAP of differing types of quality separately by its intended use such as for asphalt treatment, cement treatment, lime treatment, or asphalt concrete pavement (level up). Break, crush, or mill the stockpiled materials so that 100 percent passes the 2-in. sieve.

Verify the depth of asphalt pavement to be removed before beginning the removal.

Item 400: Excavation and Backfill for Structures

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

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

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

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

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

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

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

Item 464: Reinforced Concrete Pipe

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

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

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

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

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

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

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

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

Items 496: Removing Structures

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

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

Item 502: Barricades, Signs, and Traffic Handling

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

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

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

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

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

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

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

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

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

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

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

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

One Lane Closure

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday – 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	Emergency Only	5:00 AM – 9:00 AM 3:00 PM – 7:00 PM
Saturday	Engineer Approval	Emergency Only	None
Sunday	Emergency Only	Engineer Approval	None

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.

Use Uneven Lane Signs (CW 8-11) during resurfacing operations for elevation differences between adjacent lanes of greater than 1 in.

Portable Changeable Message Signs will be used for the duration of the project.

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

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

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

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

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

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

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

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

Item 512: Portable Traffic Barrier

After completing the project, Standard Height Safety Shape Portable Traffic Barriers used for traffic handling and the associated connecting hardware will become the property of the Contractor.

Item 530: Intersections, Driveways, and Turnouts

An air-entraining admixture is not required.

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

Item 540: Metal Beam Guard Fence

Painting the timber posts is not required.

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

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

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

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

No exposed bridge rail ends or guard fence ends will be allowed after normal working hours. Complete all work at each location during the normal working day.

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.

No exposed bridge rail ends or guard fence ends will be allowed after normal working hours. Complete all work at each location during the normal working day.

Item 545: Crash Cushion Attenuators

A MASH compliant crash cushion attenuator is required for every temporary and permanent installation.

Item 585: Ride Quality for Pavement Surfaces

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

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

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

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

Item 636: Signs

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

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

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

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

Item 644: Small Roadside Sign Assemblies

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

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

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

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

Provide and install the materials for speed limit signs. For speed limit signs that are indicated with “XX,” the Area Engineer will request a speed study through the Director of Transportation Operations to determine the legal speeds to be posted. This request will be made as soon as possible after the roadway opens to traffic. After the speed limit to be posted is determined, this information will be provided to the Contractor by the Area Engineer.

Assume ownership of the removed existing signs.

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

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

Item 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
Item 668: Prefabricated Pavement Markings

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

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

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 677: Eliminating Existing Pavement Markings and Markers

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

Item 678: Pavement Surface Preparation for Markings

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

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

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

Do not clean concrete pavement by grinding.

Item 730: Roadside Mowing

Mow areas of existing vegetation within the project limits according to the following chart for the duration of the project or as directed. This work is paid for under their respective bid items.

Roadside Mowing
4 cycles

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.

Basis of Estimate

Item	Description	Limit and Rate	Unit
134	Backfilling Pavement Edges • Asphalt Emulsion	 0.25 Gal. / Sq. Yd.	STA
247	Flexible Base Crushed Stone	 138 Lb. / Cu. Ft.	TON
292	Asphalt Treatment (Plant-Mixed) • Asphalt • Aggregate	110 Lb. / Sq. Yd.-In. 5 % by weight 95 % by weight	TON
310	Prime Coat	0.25 Gal. / Sq. Yd.	GAL
316	Seal Coat • Asphalt • Aggregate (Gr 4) A-R Binder • Asphalt • Aggregate (Gr 4)	 0.32 Gal. / Sq. Yd. 1/130 Cu. Yd. / Sq. Yd. 0.42 Gal. / Sq. Yd. 1/130 Cu. Yd. / Sq. Yd.	 GAL CY GAL CY
3076	Dense-Graded Hot Mix Asphalt • Asphalt • Aggregate Tack Coat • Applied on new HMA • Applied on Existing HMA • Applied 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

QUANTITY SHEET

CONTROLLING PROJECT ID 2524-02-025 **DISTRICT** Houston **COUNTY** Brazoria
HIGHWAY FM 2611

				CONTROL SECTION JOB		2524-02-024		2524-02-025		TOTAL EST.	TOTAL FINAL
				PROJECT ID		A00122929		A00124129			
				COUNTY		Brazoria		Brazoria			
				HIGHWAY		FM 2611		FM 2611			
ALT	BID CODE	DESCRIPTION		UNIT	EST.	FINAL	EST.	FINAL			
	105-6008	REMOVING STAB BASE AND ASPH PAV (6")		SY			280.000		280.000		
	105-6021	REMOVING STAB BASE AND ASPH PAV (0-4")		SY	174.800		171.700		346.500		
	112-6002	SUBGRADE WIDENING (DENS CONT)		STA	43.850		457.780		501.630		
	134-6004	BACKFILL (TY A OR B)		STA			12.270		12.270		
	161-6017	COMPOST MANUF TOPSOIL (4")		SY	19,517.000		202,412.000		221,929.000		
	162-6003	STRAW OR HAY MULCH		SY	39,034.000		404,824.000		443,858.000		
	164-6051	DRILL SEED (TEMP)(WARM OR COOL)		SY	9,758.500		101,206.000		110,964.500		
	164-6066	DRILL SEEDING (PERM)(WARM OR COOL)		SY	19,517.000		202,412.000		221,929.000		
	166-6001	FERTILIZER		AC	8.060		83.640		91.700		
	168-6001	VEGETATIVE WATERING		MG	969.000		10,049.000		11,018.000		
	247-6231	FL BS (CMP IN PLACE)(TY A GR 1-2)(10")		SY	981.000		40,764.000		41,745.000		
	247-6232	FL BS (CMP IN PLACE)(TY A GR 1-2)(11")		SY			98,601.000		98,601.000		
	292-6002	ASPHALT STAB BASE (GR 2)(PG 64)		TON	263.000		36,987.000		37,250.000		
	310-6009	PRIME COAT (MC-30)		GAL	239.000		33,476.000		33,715.000		
	316-6001	ASPH (MULTI OPTION)		GAL	7,057.000		79,005.000		86,062.000		
	316-6224	AGGR(TY-PB GR-4 SAC-B)		CY	171.000		1,821.000		1,992.000		
	351-6008	FLEXIBLE PAVEMENT STRUCTURE REPAIR(12")		SY			250.000		250.000		
	351-6013	FLEXIBLE PAVEMENT STRUCTURE REPAIR(4")		SY			250.000		250.000		
	354-6041	PLANE ASPH CONC PAV (1.5")		SY	10,963.000		116,727.000		127,690.000		
	400-6005	CEM STABIL BKFL		CY			373.350		373.350		
	400-6012	CUT AND RESTORE PAV (FLEX BASE)		SY			286.000		286.000		
	402-6001	TRENCH EXCAVATION PROTECTION		LF			44.000		44.000		
	429-6006	CONC STR REPR(RAPID DECK REP(FULL DPT))		SF			4.860		4.860		
	432-6045	RIPRAP (MOW STRIP)(4 IN)		CY	41.410		26.080		67.490		
	464-6003	RC PIPE (CL III)(18 IN)		LF			4.000		4.000		
	464-6005	RC PIPE (CL III)(24 IN)		LF			16.000		16.000		
	464-6007	RC PIPE (CL III)(30 IN)		LF			28.000		28.000		
	464-6008	RC PIPE (CL III)(36 IN)		LF			16.000		16.000		
	464-6009	RC PIPE (CL III)(42 IN)		LF			100.000		100.000		
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)		EA			80.000		80.000		
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)		EA			141.000		141.000		
	467-6423	SET (TY II) (30 IN) (RCP) (6: 1) (P)		EA			16.000		16.000		
	467-6448	SET (TY II) (36 IN) (RCP) (3: 1) (C)		EA			4.000		4.000		
	467-6450	SET (TY II) (36 IN) (RCP) (4: 1) (C)		EA			10.000		10.000		
	467-6454	SET (TY II) (36 IN) (RCP) (6: 1) (P)		EA			24.000		24.000		
	467-6463	SET (TY II) (42 IN) (RCP) (4: 1) (C)		EA			10.000		10.000		
	467-6466	SET (TY II) (42 IN) (RCP) (6: 1) (P)		EA			6.000		6.000		

QUANTITY SHEET

CONTROLLING PROJECT ID 2524-02-025 **DISTRICT** Houston **COUNTY** Brazoria
HIGHWAY FM 2611

				CONTROL SECTION JOB		2524-02-024		2524-02-025		TOTAL EST.	TOTAL FINAL
				PROJECT ID		A00122929		A00124129			
				COUNTY		Brazoria		Brazoria			
				HIGHWAY		FM 2611		FM 2611			
ALT	BID CODE	DESCRIPTION		UNIT	EST.	FINAL	EST.	FINAL			
	472-6011	REMOV & RE - LAY PIPE (36 IN)		LF			40.000		40.000		
	480-6001	CLEAN EXIST CULVERTS		EA			8.000		8.000		
	496-6004	REMOV STR (SET)		EA			2.000		2.000		
	496-6006	REMOV STR (HEADWALL)		EA			16.000		16.000		
	496-6007	REMOV STR (PIPE)		LF			644.000		644.000		
	496-6008	REMOV STR (BOX CULVERT)		LF			91.000		91.000		
	500-6001	MOBILIZATION		LS	6.50%		93.50%		100.00%		
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO			18.000		18.000		
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)		LF	20.000		190.000		210.000		
	506-6011	ROCK FILTER DAMS (REMOVE)		LF	20.000		190.000		210.000		
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)		SY			1,000.000		1,000.000		
	506-6024	CONSTRUCTION EXITS (REMOVE)		SY			1,000.000		1,000.000		
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)		LF	790.000		6,795.000		7,585.000		
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)		LF	790.000		6,795.000		7,585.000		
	512-6106	PORT CTB REMOVE(F-SHAPE OR SNGL SLP)TY1		LF	120.000				120.000		
	530-6004	DRIVEWAYS (CONC)		SY			116.000		116.000		
	530-6005	DRIVEWAYS (ACP)		SY			574.000		574.000		
	530-6016	DRIVEWAYS (BASE)		SY			4,777.000		4,777.000		
	533-6001	RUMBLE STRIPS (SHOULDER)		LF	8,770.000		93,378.000		102,148.000		
	533-6002	RUMBLE STRIPS (CENTERLINE)		LF	5,845.000		48,127.000		53,972.000		
	540-6001	MTL W-BEAM GD FEN (TIM POST)		LF	337.500		175.000		512.500		
	540-6021	MTL THRIE-BEAM GD FEN (TIM POST)		EA			3.000		3.000		
	540-6033	MTL BM GD FEN (LONG SPAN SYSTEM)		EA	2.000				2.000		
	540-6037	MTL BM GD FEN TRANS (ANCHOR PLATE)		EA			3.000		3.000		
	542-6001	REMOVE METAL BEAM GUARD FENCE		LF	250.000		262.500		512.500		
	544-6001	GUARDRAIL END TREATMENT (INSTALL)		EA	4.000		3.000		7.000		
	544-6003	GUARDRAIL END TREATMENT (REMOVE)		EA	4.000		3.000		7.000		
	544-6009	GUARDRAIL END TRTMNT(RETRO)(WOOD POST)		EA			2.000		2.000		
	545-6005	CRASH CUSH ATTEN (REMOVE)		EA			1.000		1.000		
	545-6007	CRASH CUSH ATTEN (INSTL)(L)(N)(TL3)		EA			1.000		1.000		
	560-6011	MAILBOX INSTALL-S (TWW-POST) TY 4		EA			48.000		48.000		
	560-6012	MAILBOX INSTALL-D (TWW-POST) TY 4		EA			10.000		10.000		
	560-6013	MAILBOX INSTALL-M (TWW-POST) TY 4		EA			3.000		3.000		
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)		EA			172.000		172.000		
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)		EA			19.000		19.000		
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)		EA			19.000		19.000		
	644-6031	IN SM RD SN SUP&AM TYS80(1)SA(T-2EXT)		EA			9.000		9.000		

QUANTITY SHEET

CONTROLLING PROJECT ID 2524-02-025 **DISTRICT** Houston **COUNTY** Brazoria
HIGHWAY FM 2611

		CONTROL SECTION JOB		**2524-02-024**		**2524-02-025**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00122929**		**A00124129**			
		COUNTY		**Brazoria**		**Brazoria**			
		HIGHWAY		**FM 2611**		**FM 2611**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL		
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA			2.000		2.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	2.000		143.000		145.000	
	658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA			18.000		18.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA			4.000		4.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	26.000		14.000		40.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	22,168.000		421,188.000		443,356.000	
	662-6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF	18.000		342.000		360.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	48.000		909.000		957.000	
	662-6017	WK ZN PAV MRK NON-REMOV (W)(ARROW)	EA	1.000		5.000		6.000	
	662-6029	WK ZN PAV MRK NON-REMOV(W)(WORD)	EA	1.000		5.000		6.000	
	662-6032	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	LF	1,696.000		32,222.000		33,918.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	8,912.000		169,320.000		178,232.000	
	662-6041	WK ZN PAV MRK NON-REMOV (Y)24"(SLD)	LF	22.000		419.000		441.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	2,487.000		47,249.000		49,736.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	2,487.000		47,249.000		49,736.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF			120.000		120.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF			319.000		319.000	
	666-6147	REFL PAV MRK TY I (Y)24"(SLD)(100MIL)	LF			147.000		147.000	
	666-6225	PAVEMENT SEALER 6"	LF			4,980.000		4,980.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	5,113.000		109,515.000		114,628.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF			11,306.000		11,306.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	2,556.000		40,276.000		42,832.000	
	666-6343	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	LF	212.000		5,497.000		5,709.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA			2.000		2.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA			2.000		2.000	
	672-6007	REFL PAV MRKR TY I-C	EA			7.000		7.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	32.000		1,195.000		1,227.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	2,487.000		47,249.000		49,736.000	
	677-6002	ELIM EXT PAV MRK & MRKS (6")	LF			4,980.000		4,980.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF			174,475.000		174,475.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF			120.000		120.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF			466.000		466.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA			2.000		2.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA			2.000		2.000	
	730-6107	FULL - WIDTH MOWING	CYC			4.000		4.000	
	3076-6041	D-GR HMA TY-D SAC-A PG70-22	TON	1,932.000		21,620.000		23,552.000	
	3076-6043	D-GR HMA TY-D PG70-22 (LEVEL-UP)	TON	78.000		11,010.000		11,088.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 2524-02-025 **DISTRICT** Houston **COUNTY** Brazoria
HIGHWAY FM 2611

			CONTROL SECTION JOB	**2524-02-024**		**2524-02-025**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00122929**		**A00124129**			
			COUNTY	**Brazoria**		**Brazoria**			
			HIGHWAY	**FM 2611**		**FM 2611**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL		
	3076-6066	TACK COAT	GAL	58.000		8,077.000		8,135.000	
	4122-6004	THERMO PIPE(18")(HDPE)(TY S)(CSB)	LF			237.000		237.000	
	4122-6005	THERMO PIPE(24")(HDPE)(TY S)(CSB)	LF			277.000		277.000	
	4122-6006	THERMO PIPE(36")(HDPE)(TY S)(CSB)	LF			33.000		33.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY			366.000		366.000	
	6185-6002	TMA (STATIONARY)	DAY			366.000		366.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY			42.000		42.000	
	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	

PLAN LAYOUT SHEETS	SUMMARY OF ROADWAY ITEMS												
	** 110 6001	112 6002	** 132 6006	134 6004	247 6231	247 6232	292 6002	310 6009	316 6001	316 6224	351 6008	351 6013	354 6041
	** EXCAVATION (ROADWAY)	SUBGRADE WIDENING (DENS CONT)	** EMBANKMENT (FINAL) (DENS CONT) (TY C)	BACKFILL (TY A OR B)	FL BS (CMP IN PLACE) (TY A GR 1-2) (10")	FL BS (CMP IN PLACE) (TY A GR 1-2) (11")	ASPHALT STAB BASE (GR 2) (PG 64)	PRIME COAT (MC-30)	ASPH (MULTI OPTION)	AGGR (TY-PB GR-4 SAC-B)	FLEXIBLE PAVEMENT STRUCTURE REPAIR (12")	FLEXIBLE PAVEMENT STRUCTURE REPAIR (4")	PLANE ASPH CONC PAV (1.5")
	CY	STA	CY	STA	SY	SY	TON	GAL	GAL	CY	SY	SY	SY
1	2755.7	30.3	1272.1			8374	2225	2010	4843	116			7597
2	3056.32	30	834.47			8500	2255	2042	4854	117			7500
3	2849.13	30	964.82			8500	2255	2042	4854	117			7500
4	2719.1	30	1148.81			8500	2255	2042	4854	117			7500
5	2817.67	30	1497.76			8500	2255	2042	4854	117			7500
6	2700.45	30	1362.46			8500	2255	2042	4854	117			7500
7	2776.54	30	1686.33			8500	2255	2042	4854	117			7500
8	3252.38	29.4	1266.67			7931	2109	1903	4633	112			7350
9	3597.33	30	478.87			8500	2255	2042	4854	117			7500
10	2918.28	30	1579.37			8500	2255	2042	4854	117			7500
11	3227.02	30	1348.31			8500	2255	2042	4854	117			7500
12	1856.2	20.6	1082.34			5781	1536	1389	3320	81	250	250	5160
13	13.14	0.28	7.35	0.28		15	5	3	3597	1			70
*14	367.13	3.94	132.74		981		263	239	599	15			985
*15	2511.49	30	1220.95						4854	117			7500
15					8500		2255	2042					
*16	1060.4	9.91	321.5						1604	39			2478
16	2309.2	23.09	151.5		8500		2256	2042	3251	79			5023
17	3609.73	30	93.18		8500		2255	2042	4854	117			7500
18	3327.33	30	301.25		8500		2255	2042	4854	117			7500
19	2870.73	24.11	68.44	5.89	6764		1796	1625	4768	115			7501
20				6.1					1199	30			1526
SUBTOTALS 2524-02-025	46656.25	457.78	15144.03	12.27	40764	98601	36987	33476	79005	1821	250	250	116727
*SUBTOTALS 2524-02-024	3939.02	43.85	1675.19	0	981	0	263	239	7057	171	0	0	10963
PROJECT TOTALS	50595.27	501.63	16819.22	12.27	41745	98601	37250	33715	86062	1992	250	250	127690

** FOR CONTRACTOR'S INFORMATION ONLY

PLAN LAYOUT SHEETS	SUMMARY OF ROADWAY ITEMS											
	533 6001	533 6002	560 6011	560 6012	560 6013	730 6107	3076 6041	3076 6043	3076 6066	6001 6001	6185 6002	6185 6005
	RUMBLE STRIPS (SHOULDER)	RUMBLE STRIPS (CENTERLINE)	MAILBOX INSTALL-S (TWW-POST) TY 4	MAILBOX INSTALL-D (TWW-POST) TY 4	MAILBOX INSTALL-M (TWW-POST) TY 4	FULL - WIDTH MOWING	D-GR HMA TY-D SAC-A PG70-22	D-GR HMA TY-D PG70-22 (LEVEL-UP)	TACK COAT	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	LF	LF	EA	EA	EA	CYC	TON	TON	GAL	DAY	DAY	DAY
1	6076	3038					1325	663	486			
2	6000	3000					1328	671	492			
3	6000	3000					1328	671	492			
4	6000	3000					1328	671	492			
5	6000	3000					1328	671	492			
6	6000	3000					1328	671	492			
7	6000	3000					1328	671	492			
8	5880	2940					1269	628	462			
9	6000	3000					1328	671	492			
10	6000	3000					1328	671	492			
11	6000	3000					1328	671	492			
12	4128	2064	48	10	3	4	910	458	337	366	366	42
13	56	1466					985	2	2			
*14	788	1854					165	78	58			
*15	6000	3000					1328	671	492			
15												
*16	1982	991					439	222	163			
16	4018	2009					889	450	330			
17	6000	3000					1328	671	492			
18	6000	3000					1328	671	492			
19	6000	3000					1305	535	393			
20	1220	610					329		0			
SUBTOTALS 2524-02-025	93378	48127	48	10	3	4	21620	11010	8077	366	366	42
*SUBTOTALS 2524-02-024	8770	5845	0	0	0	0	1932	78	58	0	0	0
PROJECT TOTALS	102148	53972	48	10	3	4	23552	11088	8135	366	366	42

SUMMARY OF ROADWAY QUANTITIES

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		24

SHEET 1 OF 1

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SUMMARY OF MBGF ITEMS

LOCATION	105 6021	429 6006	432 6045	512 6106	540 6001	540 6021	540 6033	540 6037	542 6001	544 6001	544 6003	544 6009	545 6005	545 6007	658 6013	658 6062
	REMOVING STAB BASE AND ASPH PAV (0-4")	CONC STR REPR(RAPID DECK REP(FULL DPT))	RIPRAP (MOW STRIP)(4 IN)	PORT CTB REMOVE(F-SHAPE OR SNGL SLP)TY1	MTL W-BEAM GD FEN (TIM POST)	MTL THRIE-BEAM GD FEN (TIM POST)	MTL BM GD FEN (LONG SPAN SYSTEM)	MTL BM GD FEN TRANS (ANCHOR PLATE)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	GUARDRAIL END TRTMNT(RETRO)(WOOD POST)	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL)(L)(N)(TL3)	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
	SY	SF	CY	LF	LF	EA	EA	EA	LF	EA	EA	EA	EA	EA	EA	EA
CEDAR LAKE BRIDGE																
STA 154+61.54																
NB DEPARTURE												1			5	
SB APPROACH												1			5	
COCKLEBURR SLOUGH BRIDGE																
STA 391+72 BK																
NB APPROACH	43.7		7.52		25	1		1	62.5	1	1					5
NB DEPARTURE	53.4		9.15		62.5	1		1	87.5	1	1					4
BRIDGE		4.86													8	
SB APPROACH	63.1		9.41		87.5	1		1	112.5	1	1					5
SB DEPARTURE	11.5												1	1		
*CROSS STRUCTURE																
STA 439+22 AHD																
NB APPROACH	58.3		9.95		100				100	1	1					5
AT STRUCTURE			2.15	60			1									3
NB DEPARTURE	29.1		7.8		50				25	1	1					5
SB APPROACH	58.3		11.56		137.5				100	1	1					5
AT STRUCTURE			2.15	60			1									3
SB DEPARTURE	29.1		7.8		50				25	1	1					5
*SUBTOTALS 2524-02-024	174.8	0	41.41	120	337.5	0	2	0	250	4	4	0	0	0	0	26
SUBTOTALS 2524-02-025	171.7	4.86	26.08	0	175	3	0	3	262.5	3	3	2	1	1	18	14
PROJECT TOTALS	346.5	4.86	67.49	120	512.5	3	2	3	512.5	7	7	2	1	1	18	40

NOTES:

REMOVAL OF ASPHALT AND BASE MATERIAL ENCOUNTERED WHILE DRILLING HOLES FOR POST IS INCIDENTAL TO VARIOUS BID ITEMS.

SCALE N.T.S.
SHEET 1 OF 1

SUMMARY OF MBGF QUANTITIES

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		25

SUMMARY OF CROSS STRUCTURES ITEMS									
LOCATION OF CROSS STRUCTURES	400 6005	402 6001	464 6008	464 6009	467 6448	467 6450	467 6463	480 6001	472 6011
	CEM STABIL BKFL	TRENCH EXCAVATION PROTECTION	RC PIPE (CL III) (36 IN)	RC PIPE (CL III) (42 IN)	SET (TY II) (36 IN) (RCP) (3: 1) (C)	SET (TY II) (36 IN) (RCP) (4: 1) (C)	SET (TY II) (42 IN) (RCP) (4: 1) (C)	CLEAN EXIST CULVERTS	REMOV & RE - LAY PIPE (36 IN)
	CY	LF	LF	LF	EA	EA	EA	EA	LF
STA 170+00	14.32	6	12			6			24
STA 235+92	22.85	16		32			8		
STA 300+93	4.96				4				16
STA 442+89						2			
STA 480+46	2.76	6	4			2			
AFTER EQUATION									
STA 357+91	6.46	16		8			2		
STA 439+22								1	
STA 495+91								1	
STA 510+51								1	
STA 521+26								1	
STA 521+63								1	
STA 529+83								1	
STA 542+16								1	
STA 560+49								1	
PROJECT TOTALS	51.35	44	16	40	4	10	10	8	40

N. T. S.
SHEET 1 OF 1

SUMMARY OF CROSS STRUCTURES

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		26

	SUMMARY OF SIDE ROAD STRUCTURES																					
	105	400	400	464	464	464	464	467	467	467	467	467	496	496	496	496	530	530	530	658	4122	4122	4122
	6008	6005	6012	6003	6005	6007	6009	6363	6395	6423	6454	6466	6004	6006	6007	6008	6004	6005	6016	6047	6004	6005	6006
PLAN LAYOUT SHEET	REMOVING STAB BASE AND ASPH PAV (6")	CEM STABIL BKFL	CUT AND RESTORE PAV (FLEX BASE)	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	RC PIPE (CL III) (30 IN)	RC PIPE (CL III) (42 IN)	SET (TY II) (18 IN) (RCP) (6:1) (P)	SET (TY II) (24 IN) (RCP) (6:1) (P)	SET (TY II) (30 IN) (RCP) (6:1) (P)	SET (TY II) (36 IN) (RCP) (6:1) (P)	SET (TY II) (42 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (HEADWALL)	REMOV STR (PIPE)	REMOV STR (BOX CULVERT)	DRIVEWAYS (CONC)	DRIVEWAYS (ACP)	DRIVEWAYS (BASE)	INSTL OM ASSM (OM-2Y) (WC) GND	THERMO PIPE (18") (HDPE) (TY S) (CSB)	THERMO PIPE (24") (HDPE) (TY S) (CSB)	THERMO PIPE (36") (HDPE) (TY S) (CSB)
	SY	CY	SY	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	LF	LF	SY	SY	SY	EA	LF	LF	LF
STA 161+90 RT																			33				
EXIST 3-36" x 41' CP																							
PROP SET LT, RT											6												
STA 161+91 LT																			37				
EXIST 1-24" x 24' CP																							
PROP SET LT, RT									2														
STA 193+40 RT																							
EXIST 1-18" x 41' CP																							
PROP SET LT, RT								2															
STA 193+67 LT																			37				
EXIST 1-18" x 29' CP																							
PROP SET LT, RT								2															
STA 217+30 LT																			37				
EXIST 1-18" x 32' CP																							
NO WORK																							
STA 217+76 RT																							
EXIST 1-18" x 19' CP																							
PROP SET LT, RT								2															
STA 220+09 RT																			37				
EXIST 1-18" x 31' CP																							
PROP SET LT, RT								2															
STA 294+54 LT																			37				
EXIST DWY W/NO CULVERT																							
STA 294+54 RT																		37					
EXIST DWY W/NO CULVERT																							
STA 296+69 RT																							
EXIST 1-15" x 17' CP																							
PROP 1-18" x 20' RCP W/SET		8	9					2							17						20		
STA 302+90 RT																			33				
EXIST 1-12" x 15' CP																							
PROP 1-18" x 20' RCP W/SET		8	9					2							15						20		
STA 311+87 RT																			37				
EXIST 1-12" x 23' CP																							
PROP 1-18" x 26' RCP W/SET		10	12					2							23						26		
STA 314+59 LT																			37				
EXIST 1-18" x 24' CMP																							
PROP 1-18" x 26' RCP W/SET		10	12					2					2		24						26		
STA 333+81 RT																			37				
EXIST 1-18" x 21' CMP																							
PROP 1-18" x 26' RCP W/SET		10	12					2							21						26		
STA 342+55 LT																	37						
EXIST 1-18" x 21' CP																							
PROP SET LT, RT								2															
STA 344+86 BK RT																			33				
EXIST 1-18" x 21' CP																							
PROP SET LT, RT								2															
SUBTOTALS SHEET 1	0	46	54	0	0	0	0	22	2	0	6	0	2	0	100	0	37	37	395	0	118	0	0

NOTES:

REFER TO MISCELLANEOUS DETAILS FOR METHOD FOR LOCATING DRIVEWAYS DETAIL

N. T. S.
SHEET 1 OF 11

SUMMARY OF SIDE ROAD STRUCTURES

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		27

SUMMARY OF SIDE ROAD STRUCTURES

PLAN LAYOUT SHEET	105 6008 REMOVING STAB BASE AND ASPH PAV (6") SY	400 6005 CEM STABIL BKFL CY	400 6012 CUT AND RESTORE PAV (FLEX BASE) SY	464 6003 RC PIPE (CL III)(18 IN) LF	464 6005 RC PIPE (CL III)(24 IN) LF	464 6007 RC PIPE (CL III)(30 IN) LF	464 6009 RC PIPE (CL III)(42 IN) LF	467 6363 SET (TY II)(18 IN)(RCP)(6:1)(P) EA	467 6395 SET (TY II)(24 IN)(RCP)(6:1)(P) EA	467 6423 SET (TY II)(30 IN)(RCP)(6:1)(P) EA	467 6454 SET (TY II)(36 IN)(RCP)(6:1)(P) EA	467 6466 SET (TY II)(42 IN)(RCP)(6:1)(P) EA	496 6004 REMOV STR (SET) EA	496 6006 REMOV STR (HEADWALL) EA	496 6007 REMOV STR (PIPE) LF	496 6008 REMOV STR (BOX CULVERT) LF	530 6004 DRIVEWAYS (CONC) SY	530 6005 DRIVEWAYS (ACP) SY	530 6016 DRIVEWAYS (BASE) SY	658 6047 INSTL OM ASSM (OM-2Y)(WC)GND EA	4122 6004 THERMO PIPE(18")(HDPE)(TY S)(CSB) LF	4122 6005 THERMO PIPE(24")(HDPE)(TY S)(CSB) LF	4122 6006 THERMO PIPE(36")(HDPE)(TY S)(CSB) LF
STA 362+89 BK LT																			37				
EXIST 1-18" x 16' CP																							
PROP SET LT, RT								2															
STA 370+89 BK RT																			37				
EXIST 1-18" x 16' CP																							
PROP SET LT, RT								2															
STA 375+73 BK RT																			37				
EXIST 1-24" x 22' CP																							
PROP SET LT, RT									2														
STA 376+50 BK LT																		37					
EXIST CP W/SET																							
NO WORK																							
STA 378+50 BK RT																			37				
EXIST 1-24" x 17' CP																							
PROP SET LT, RT									2														
STA 378+88 BK LT																			37				
EXIST 1-18" x 19' CMP																							
PROP 1-18" x 20' RCP W/SET		8	9					2							19						20		
STA 380+49 BK LT																			37				
EXIST 1-24" x 25' CP W/SET																							
NO WORK																							
STA 380+65 BK RT																			37				
EXIST 1-24" x 19' CP																							
PROP SET LT, RT									2														
STA 381+83 BK RT																			37				
EXIST 1-24" x 41' CP																							
PROP SET LT, RT									2														
STA 382+38 BK RT																			33				
EXIST 1-24" x 21' CP W/SET																							
NO WORK																							
STA 383+71 BK RT																			33				
EXIST 1-24" x 21' CP W/SET																							
NO WORK																							
STA 384+44 BK RT																			37				
EXIST 1-24" x 16' CP																							
PROP SET LT, RT									2														
STA 385+65 BK RT																			37				
EXIST 1-24" x 20' CP																							
PROP SET LT, RT									2														
STA 386+06 BK LT																			41				
EXIST 1-30" x 28' CP W/SET																							
NO WORK																							
STA 387+38 BK RT																			37				
EXIST 1-24" x 19' CMP																							
PROP 1-24" x 20' RCP W/SET		10	9						2						19							20	
SUBTOTALS SHEET 2	0	18	18	0	0	0	0	6	14	0	0	0	0	0	38	0	37	0	514	0	20	20	0

NOTES:

REFER TO MISCELLANEOUS DETAILS FOR METHOD FOR LOCATING DRIVEWAYS DETAIL

N. T. S.
SHEET 2 OF 11

SUMMARY OF SIDE ROAD STRUCTURES

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		28

SUMMARY OF SIDE ROAD STRUCTURES

PLAN LAYOUT SHEET	105 6008 REMOVING STAB BASE AND ASPH PAV (6") SY	400 6005 CEM STABIL BKFL CY	400 6012 CUT AND RESTORE PAV (FLEX BASE) SY	464 6003 RC PIPE (CL III)(18 IN) LF	464 6005 RC PIPE (CL III)(24 IN) LF	464 6007 RC PIPE (CL III)(30 IN) LF	464 6009 RC PIPE (CL III)(42 IN) LF	467 6363 SET (TY II)(18 IN)(RCP)(6:1)(P) EA	467 6395 SET (TY II)(24 IN)(RCP)(6:1)(P) EA	467 6423 SET (TY II)(30 IN)(RCP)(6:1)(P) EA	467 6454 SET (TY II)(36 IN)(RCP)(6:1)(P) EA	467 6466 SET (TY II)(42 IN)(RCP)(6:1)(P) EA	496 6004 REMOV STR (SET) EA	496 6006 REMOV STR (HEADWALL) EA	496 6007 REMOV STR (PIPE) LF	496 6008 REMOV STR (BOX CULVERT) LF	530 6004 DRIVEWAYS (CONC) SY	530 6005 DRIVEWAYS (ACP) SY	530 6016 DRIVEWAYS (BASE) SY	658 6047 INSTL OM ASSM (OM-2Y)(WC)GND EA	4122 6004 THERMO PIPE(18")(HDPE)(TY S)(CSB) LF	4122 6005 THERMO PIPE(24")(HDPE)(TY S)(CSB) LF	4122 6006 THERMO PIPE(36")(HDPE)(TY S)(CSB) LF
STA 389+41 BK RT																		41					
EXIST 1-18" x 21' CMP																							
PROP 1-18" x 26' RCP W/SET		10	12					2							21							26	
STA 390+02 BK RT																			41				
EXIST 1-18" x 17' CP																							
PROP SET LT, RT								2															
STA 391+13 BK LT																			42				
EXIST 1-32" x 43' CP W/SET																							
NO WORK																							
STA 393+57 BK RT																			37				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 393+82 BK LT																			41				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 394+63 BK LT																			41				
EXIST 1-24" x 35' CMP																							
PROP 1-24" x 39' RCP W/SET		19	18						2						35								39	
STA 395+10 BK RT																			37				
EXIST 1-24" x 17' CP																							
PROP SET LT, RT									2														
STA 397+84 BK RT																			33				
EXIST 1-18" x 15' CP																							
PROP SET LT, RT								2															
STA 398+56 BK RT																			37				
EXIST 1-18" x 25' CP																							
PROP SET LT, RT								2															
STA 399+70 BK RT																			37				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 400+24 BK RT																			37				
EXIST 1-24" x 17' CP																							
PROP SET LT, RT									2														
STA 400+30 BK LT																			33				
EXIST 1-24" x 20' CP																							
PROP SET LT, RT									2														
STA 400+68 BK RT																							
EXIST 1-24" x 17' CP																							
PROP RMV PIPE, DWY	38														17								
STA 401+17 BK RT																			33				
EXIST 1-24" x 17' CP																							
PROP SET LT, RT									2														
STA 402+22 BK LT																			37				
EXIST 1-24" x 25' CP																							
PROP SET LT, RT									2														
SUBTOTALS SHEET 3	38	29	30	0	0	0	0	8	18	0	0	0	0	0	73	0	0	41	486	0	26	39	0

NOTES:

REFER TO MISCELLANEOUS DETAILS FOR METHOD FOR LOCATING DRIVEWAYS DETAIL

N. T. S.
SHEET 3 OF 11

SUMMARY OF SIDE ROAD STRUCTURES

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		29

	SUMMARY OF SIDE ROAD STRUCTURES																						
	105	400	400	464	464	464	464	467	467	467	467	467	496	496	496	496	530	530	530	658	4122	4122	4122
	6008	6005	6012	6003	6005	6007	6009	6363	6395	6423	6454	6466	6004	6006	6007	6008	6004	6005	6016	6047	6004	6005	6006
PLAN LAYOUT SHEET	REMOVING STAB BASE AND ASPH PAV (6")	CEM STABIL BKFL	CUT AND RESTORE PAV (FLEX BASE)	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)	RC PIPE (CL III)(30 IN)	RC PIPE (CL III)(42 IN)	SET (TY II)(18 IN)(RCP)(6:1)(P)	SET (TY II)(24 IN)(RCP)(6:1)(P)	SET (TY II)(30 IN)(RCP)(6:1)(P)	SET (TY II)(36 IN)(RCP)(6:1)(P)	SET (TY II)(42 IN)(RCP)(6:1)(P)	REMOV STR (SET)	REMOV STR (HEADWALL)	REMOV STR (PIPE)	REMOV STR (BOX CULVERT)	DRIVEWAYS (CONC)	DRIVEWAYS (ACP)	DRIVEWAYS (BASE)	INSTL OM ASSM (OM-2Y)(WC)GND	THERMO PIPE(18")(HDPE)(TY S)(CSB)	THERMO PIPE(24")(HDPE)(TY S)(CSB)	THERMO PIPE(36")(HDPE)(TY S)(CSB)
	SY	CY	SY	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	LF	LF	SY	SY	SY	EA	LF	LF	LF
STA 402+79 BK RT																			37				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 403+82 BK RT																			37				
EXIST 1-24" x 25' CP																							
PROP SET LT, RT									2														
STA 406+06 BK RT																			37				
EXIST 1-18" x 21' CP																							
PROP SET LT, RT								2															
STA 407+04 BK LT																							
EXIST 1-18" x 74' CP																							
PROP SET LT, RT								2															
STA 417+37 BK LT																			37				
EXIST 1-18" x 21' CP																							
PROP SET LT, RT								2															
STA 418+78 BK LT																			37				
EXIST 1-18" x 16' CP																							
PROP SET LT, RT								2															
STA 418+85 BK RT																			33				
EXIST 1-18" x 25' CP W/SET NO WORK																							
STA 420+28 BK RT																			33				
EXIST 1-18" x 17' CP																							
PROP SET LT, RT								2															
STA 422+46 BK RT																			33				
EXIST 1-18" x 16' CP																							
PROP SET LT, RT								2															
STA 423+49 BK LT																			44				
EXIST 1-18" x 29' CP																							
PROP SET LT, RT								2															
STA 423+92 BK RT																			37				
EXIST 1-18" x 12' CP																							
PROP RT EXTND 1-18" x 4' RCP W/SET		2		4				2															
STA 427+66 BK LT																			37				
EXIST 1-18" x 16' CP																							
PROP SET LT, RT								2															
STA 428+63 BK LT																			37				
EXIST 1-18" x 25' CP																							
PROP SET LT, RT								2															
STA 429+27 BK LT																			37				
EXIST 1-18" x 20' CP																							
PROP SET LT, RT								2															
STA 433+21 BK RT																			33				
EXIST 1-24" x 20' CP																							
PROP SET LT, RT									2														
SUBTOTALS SHEET 4	0	2	0	4	0	0	0	22	6	0	0	0	0	0	0	0	0	0	509	0	0	0	0

NOTES:

REFER TO MISCELLANEOUS DETAILS FOR METHOD FOR LOCATING DRIVEWAYS DETAIL

N. T. S.
SHEET 4 OF 11

SUMMARY OF SIDE ROAD STRUCTURES

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		30

	SUMMARY OF SIDE ROAD STRUCTURES																						
	105	400	400	464	464	464	464	467	467	467	467	467	496	496	496	496	530	530	530	658	4122	4122	4122
	6008	6005	6012	6003	6005	6007	6009	6363	6395	6423	6454	6466	6004	6006	6007	6008	6004	6005	6016	6047	6004	6005	6006
PLAN LAYOUT SHEET	REMOVING STAB BASE AND ASPH PAV (6")	CEM STABIL BKFL	CUT AND RESTORE PAV (FLEX BASE)	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	RC PIPE (CL III) (30 IN)	RC PIPE (CL III) (42 IN)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY I) (24 IN) (RCP) (6: 1) (P)	SET (TY I) (30 IN) (RCP) (6: 1) (P)	SET (TY II) (36 IN) (RCP) (6: 1) (P)	SET (TY II) (42 IN) (RCP) (6: 1) (P)	REMOV STR (SET)	REMOV STR (HEADWALL)	REMOV STR (PIPE)	REMOV STR (BOX CULVERT)	DRIVEWAYS (CONC)	DRIVEWAYS (ACP)	DRIVEWAYS (BASE)	INSTL OM ASSM (OM-2Y) (WC) GND	THERMO PIPE (18") (HDPE) (TY S) (CSB)	THERMO PIPE (24") (HDPE) (TY S) (CSB)	THERMO PIPE (36") (HDPE) (TY S) (CSB)
	SY	CY	SY	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	LF	LF	SY	SY	SY	EA	LF	LF	LF
STA 433+61 BK LT																							
EXIST 1-18" x 24' CP																			33				
PROP SET LT, RT								2															
STA 435+13 BK LT																			33				
EXIST 1-18" x 16' CP																							
PROP SET LT, RT								2															
STA 436+20 BK LT																			37				
EXIST 1-18" x 21' CP W/HDWL																							
PROP RMV HDWL, PROP SET LT, RT								2						2									
STA 436+63 BK LT																			37				
EXIST 1-18" x 18' CP																							
PROP SET LT, RT								2															
STA 436+91 BK RT																			33				
EXIST 1-24" x 16' CP																							
PROP SET LT, RT									2														
STA 439+32 BK LT																			37				
EXIST 1-18" x 17' CP																							
PROP SET LT, RT								2															
STA 441+01 BK RT																			41				
EXIST 1-24" x 33' CP																							
PROP SET LT, RT									2														
STA 442+28 BK LT																			41				
EXIST 1-36" x 16' CP																							
PROP SET LT, RT											2												
STA 444+44 BK RT																			37				
EXIST 1-24" x 33' CP																							
PROP SET LT, RT									2														
STA 448+50 BK RT																			33				
EXIST 1-18" x 21' CP																							
PROP SET LT, RT								2															
STA 449+45 BK LT																			43				
EXIST 1-24" x 26' CP W/SET NO WORK																							
STA 449+58 BK RT																			37				
EXIST 1-24" x 19' CP																							
PROP SET LT, RT									2														
STA 452+22 BK RT																			37				
EXIST 1-24" x 32' CP																							
PROP SET LT, RT									2														
STA 453+60 BK RT																			37				
EXIST 1-24" x 26' CP																							
PROP SET LT, RT									2														
STA 454+15 BK LT																			37				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 456+68 BK LT																			41				
EXIST 1-24" x 41' CP																							
PROP SET LT, RT									2														
SUBTOTALS SHEET 5	0	0	0	0	0	0	0	12	16	0	2	0	0	2	0	0	0	0	594	0	0	0	0

NOTES:

REFER TO MISCELLANEOUS DETAILS FOR METHOD FOR LOCATING DRIVEWAYS DETAIL

N. T. S.
SHEET 5 OF 11

SUMMARY OF SIDE ROAD STRUCTURES

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		31

	SUMMARY OF SIDE ROAD STRUCTURES																						
	105 6008	400 6005	400 6012	464 6003	464 6005	464 6007	464 6009	467 6363	467 6395	467 6423	467 6454	467 6466	496 6004	496 6006	496 6007	496 6008	530 6004	530 6005	530 6016	658 6047	4122 6004	4122 6005	4122 6006
PLAN LAYOUT SHEET	REMOVING STAB BASE AND ASPH PAV (6")	CEM STABIL BKFL	CUT AND RESTORE PAV (FLEX BASE)	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	RC PIPE (CL III) (30 IN)	RC PIPE (CL III) (42 IN)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)	SET (TY II) (30 IN) (RCP) (6: 1) (P)	SET (TY II) (36 IN) (RCP) (6: 1) (P)	SET (TY II) (42 IN) (RCP) (6: 1) (P)	REMOV STR (SET)	REMOV STR (HEADWALL)	REMOV STR (PIPE)	REMOV STR (BOX CULVERT)	DRIVEWAYS (CONC)	DRIVEWAYS (ACP)	DRIVEWAYS (BASE)	INSTL OM ASSM (OM-2Y) (WC) GND	THERMO PIPE (18") (HDPE) (TY S) (CSB)	THERMO PIPE (24") (HDPE) (TY S) (CSB)	THERMO PIPE (36") (HDPE) (TY S) (CSB)
	SY	CY	SY	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	LF	LF	SY	SY	SY	EA	LF	LF	LF
STA 456+93 BK RT																			43				
EXIST 1-24" x 29' CP																							
PROP SET LT, RT									2														
STA 458+78 BK LT																			33				
EXIST 1-24" x 22' CP																							
PROP SET LT, RT									2														
STA 459+66 BK RT																			42				
EXIST 1-24" x 52' CP																							
PROP 1-24" x 4' RCP W/SET		2	2		4				2						4								
STA 460+19 BK LT																			33				
EXIST 1-24" x 25' CP																							
PROP SET LT, RT									2														
STA 460+93 BK RT																			41				
EXIST 1-24" x 35' CP																							
PROP SET LT, RT									2														
STA 462+24 BK RT																			37				
EXIST 1-24" x 25' CP																							
PROP SET LT, RT									2														
STA 462+93 BK LT																			33				
EXIST 1-24" x 22' CP																							
PROP 1-24" x 4' RCP W/SET		2	2		4				2						4								
STA 463+10 BK RT																			37				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 465+29 BK LT																							
EXIST 1-42" x 42' CMP																							
PROP 1-42" x 44' RCP W/SET		36	20				44					2			42								
STA 465+88 BK RT																							
EXIST 1-36" x 41' CP W/SET																							
NO WORK																							
STA 467+66 BK LT																			33				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 468+76 BK RT																			41				
EXIST 1-36" x 46' CP																							
PROP SET LT, RT											2												
STA 469+54 BK LT																			37				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 469+58 BK RT																							
EXIST 1-36" x 25' CP																							
PROP RMV PIPE, DWY	58														25								
STA 470+95 BK RT																							
EXIST 1-24" x 21' CP																							
PROP RMV PIPE, DWY	58														21								
STA 471+93 BK LT																			37				
EXIST 1-24" x 12' CP																							
PROP SET LT, RT									2														
SUBTOTALS SHEET 6	116	40	24	0	8	0	44	0	22	0	2	2	0	0	96	0	0	0	447	0	0	0	0

NOTES:

REFER TO MISCELLANEOUS DETAILS FOR METHOD FOR LOCATING DRIVEWAYS DETAIL

N. T. S.
SHEET 6 OF 11

SUMMARY OF SIDE ROAD STRUCTURES

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		32

	SUMMARY OF SIDE ROAD STRUCTURES																						
	105	400	400	464	464	464	464	467	467	467	467	467	496	496	496	496	530	530	530	658	4122	4122	4122
	6008	6005	6012	6003	6005	6007	6009	6363	6395	6423	6454	6466	6004	6006	6007	6008	6004	6005	6016	6047	6004	6005	6006
PLAN LAYOUT SHEET	REMOVING STAB BASE AND ASPH PAV (6")	CEM STABIL BKFL	CUT AND RESTORE PAV (FLEX BASE)	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	RC PIPE (CL III) (30 IN)	RC PIPE (CL III) (42 IN)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)	SET (TY II) (30 IN) (RCP) (6: 1) (P)	SET (TY II) (36 IN) (RCP) (6: 1) (P)	SET (TY II) (42 IN) (RCP) (6: 1) (P)	REMOV STR (SET)	REMOV STR (HEADWALL)	REMOV STR (PIPE)	REMOV STR (BOX CULVERT)	DRIVEWAYS (CONC)	DRIVEWAYS (ACP)	DRIVEWAYS (BASE)	INSTL OM ASSM (OM-2Y) (WC) GND	THERMO PIPE (18") (HDPE) (TY S) (CSB)	THERMO PIPE (24") (HDPE) (TY S) (CSB)	THERMO PIPE (36") (HDPE) (TY S) (CSB)
	SY	CY	SY	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	LF	LF	SY	SY	SY	EA	LF	LF	LF
STA 472+26 BK RT																			37				
EXIST 1-36" x 25' CP																							
PROP SET LT, RT											2												
STA 472+94 BK LT																			33				
EXIST 1-24" x 16' CP																							
PROP SET LT, RT									2														
STA 473+49 BK RT																			37				
EXIST 1-24" x 22' CP																							
PROP SET LT, RT									2														
STA 474+37 BK RT																			33				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 475+27 BK LT																			37				
EXIST 1-24" x 17' CP																							
PROP SET LT, RT									2														
STA 475+50 BK RT																			37				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 476+53 BK LT																			37				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 477+61 BK RT																			33				
EXIST 1-24" x 22' CP																							
PROP SET LT, RT									2														
STA 478+37 BK LT																			33				
EXIST 1-24" x 20' CP																							
PROP SET LT, RT									2														
STA 481+63 BK LT																			37				
EXIST 1-24" x 28' CP																							
PROP 1-24" x 4' RCP W/SET		2	2		4				2						4								
STA 484+25 BK LT																		37					
EXIST 1-24" x 20' CP																							
PROP SET LT, RT									2														
STA 485+74 BK LT																			37				
EXIST 1-24" x 20' CP																							
PROP SET LT, RT									2														
STA 488+30 BK LT																		37					
EXIST 1-24" x 23' CP																							
PROP SET LT, RT									2														
STA 343+40 AHD LT																			41				
EXIST 1-30" x 21' CP																							
PROP SET LT, RT										2													
STA 343+58 AHD RT																			42				
EXIST 1-36" x 50' CP W/SET																							
NO WORK																							
STA 345+66 AHD LT																			33				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
SUBTOTALS SHEET 7	0	2	2	0	4	0	0	0	26	2	2	0	0	0	4	0	0	74	507	0	0	0	0

NOTES:

REFER TO MISCELLANEOUS DETAILS FOR METHOD FOR LOCATING DRIVEWAYS DETAIL

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SUMMARY OF SIDE ROAD STRUCTURES

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		33

SUMMARY OF SIDE ROAD STRUCTURES

PLAN LAYOUT SHEET	105 6008 REMOVING STAB BASE AND ASPH PAV (6") SY	400 6005 CEM STABIL BKFL CY	400 6012 CUT AND RESTORE PAV (FLEX BASE) SY	464 6003 RC PIPE (CL III) (18 IN) LF	464 6005 RC PIPE (CL III) (24 IN) LF	464 6007 RC PIPE (CL III) (30 IN) LF	464 6009 RC PIPE (CL III) (42 IN) LF	467 6363 SET (TY II) (18 IN) (RCP) (6:1) (P) EA	467 6395 SET (TY II) (24 IN) (RCP) (6:1) (P) EA	467 6423 SET (TY II) (30 IN) (RCP) (6:1) (P) EA	467 6454 SET (TY II) (36 IN) (RCP) (6:1) (P) EA	467 6466 SET (TY II) (42 IN) (RCP) (6:1) (P) EA	496 6004 REMOV STR (SET) EA	496 6006 REMOV STR (HEADWALL) EA	496 6007 REMOV STR (PIPE) LF	496 6008 REMOV STR (BOX CULVERT) LF	530 6004 DRIVEWAYS (CONC) SY	530 6005 DRIVEWAYS (ACP) SY	530 6016 DRIVEWAYS (BASE) SY	658 6047 INSTL OM ASSM (OM-2Y) (WC) GND EA	4122 6004 THERMO PIPE (18") (HDPE) (TY S) (CSB) LF	4122 6005 THERMO PIPE (24") (HDPE) (TY S) (CSB) LF	4122 6006 THERMO PIPE (36") (HDPE) (TY S) (CSB) LF
STA 346+43 AHD LT																			33				
EXIST 1-24" x 21' CP																							
PROP 1-24" x 4' RCP W/SET		2	2		4				2						4								
STA 347+84 AHD LT																			37				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 349+35 AHD LT																			37				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 351+72 AHD LT																			33				
EXIST 1-24" x 17' CP																							
PROP SET LT, RT									2														
STA 352+19 AHD LT																			37				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 354+44 AHD LT																			37				
EXIST 1-24" x 22' CP																							
PROP SET LT, RT									2														
STA 356+04 AHD LT																			33				
EXIST 1-30" x 19' CP																							
PROP SET LT, RT										2													
STA 356+82 AHD LT																			41				
EXIST 1-24" x 36' CP W/SET																							
NO WORK																							
STA 359+04 AHD LT																			33				
EXIST 1-24" x 21' CP																							
PROP SET LT, RT									2														
STA 360+60 AHD LT																			37				
EXIST 2-24" x 21' CP																							
PROP SET LT, RT									4														
STA 360+83 AHD RT																			42				
EXIST 2-36" x 45' CP W/SET																							
NO WORK																							
STA 361+36 AHD LT																		42					
EXIST 1-30" x 23' CP																							
PROP SET LT, RT										2													
STA 362+79 AHD LT																			37				
EXIST 2-30" x 22' CP																							
PROP SET LT, RT										4													
STA 363+43 AHD LT																		107					
EXIST 2-30" x 50' CP																							
PROP LT RMV 2-30" x 8' CP, REDUCE DWY WIDTH, PROP SET LT	42									2					16								
PROP RT EXTND 2-30" x 4' RCP W/SET		5				8				2													
STA 363+80 AHD RT																		44					
EXIST 2-36" x 33' CP																							
PROP SET LT, RT											4												
SUBTOTALS SHEET 8	42	7	2	0	4	8	0	0	18	12	4	0	0	0	20	0	42	151	437	0	0	0	0

NOTES:

REFER TO MISCELLANEOUS DETAILS FOR METHOD FOR LOCATING DRIVEWAYS DETAIL

N.T.S.
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SUMMARY OF SIDE ROAD STRUCTURES

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		34

	SUMMARY OF SIDE ROAD STRUCTURES																						
	105 6008	400 6005	400 6012	464 6003	464 6005	464 6007	464 6009	467 6363	467 6395	467 6423	467 6454	467 6466	496 6004	496 6006	496 6007	496 6008	530 6004	530 6005	530 6016	658 6047	4122 6004	4122 6005	4122 6006
PLAN LAYOUT SHEET	REMOVING STAB BASE AND ASPH PAV (6")	CEM STABIL BKFL	CUT AND RESTORE PAV (FLEX BASE)	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	RC PIPE (CL III) (30 IN)	RC PIPE (CL III) (42 IN)	SET (TY II) (18 IN) (RCP) (6:1) (P)	SET (TY II) (24 IN) (RCP) (6:1) (P)	SET (TY II) (30 IN) (RCP) (6:1) (P)	SET (TY II) (36 IN) (RCP) (6:1) (P)	SET (TY II) (42 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (HEADWALL)	REMOV STR (PIPE)	REMOV STR (BOX CULVERT)	DRIVEWAYS (CONC)	DRIVEWAYS (ACP)	DRIVEWAYS (BASE)	INSTL OM ASSM (OM-2Y) (WC) GND	THERMO PIPE (18") (HDPE) (TY S) (CSB)	THERMO PIPE (24") (HDPE) (TY S) (CSB)	THERMO PIPE (36") (HDPE) (TY S) (CSB)
	SY	CY	SY	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	LF	LF	SY	SY	SY	EA	LF	LF	LF
STA 364+71 AHD RT																		44					
EXIST 2-36" x 33' CP																							
PROP SET LT, RT											4												
STA 364+75 AHD LT																		120					
EXIST 2-42" x 45' CP																							
PROP LT, RT EXTND 2-42" x 4' RCP W/SET *		7					16					4											
STA 399+50 AHD LT																		107					
EXIST CP W/SET																							
NO WORK																							
STA 401+63 AHD RT																			37				
EXIST 1-18" x 28' CP																							
PROP SET LT, RT								2															
STA 405+90 AHD LT																							
EXIST 1-24" x 33' CP																							
PROP SET LT, RT									2														
STA 410+05 AHD LT																			37				
EXIST 1-24" x 17' CP																							
PROP SET LT, RT									2														
STA 412+68 AHD LT																			42				
EXIST 1-15" x 29' CMP																							
PROP 1-18" x 33' RCP W/SET		13	15					2							29						33		
STA 414+77 AHD LT																			42				
EXIST 1-18" x 22' W/SET																							
NO WORK																							
STA 417+66 AHD LT																			37				
EXIST 1-15" x 18' CMP																							
PROP 1-18" x 20' RCP W/SET		8	9					2							18						20		
STA 431+43 AHD RT																			37				
EXIST 1-18" x 21' CP																							
PROP SET LT, RT								2															
STA 434+96 AHD LT																			37				
EXIST 1-24" x 19' CMP																							
PROP 1-24" x 20' RCP W/SET		10	9						2						19							20	
STA 436+78 AHD RT																			33				
EXIST 1-24" x 18' CMP																							
PROP 1-24" x 20' RCP W/SET		10	9						2						18							20	
STA 437+79 AHD LT																			37				
EXIST 1-15" x 17' CP																							
PROP 1-18" x 20' RCP W/SET		8	9					2							17						20		
STA 438+40 AHD LT																							
EXIST 1-30" x 19' CMP																							
PROP 1-30" x 20' RCP W/SET		12	9			20				2					19								
STA 445+69 AHD LT																							
EXIST 1-24" x 61' CMP																							
PROP 1-24" x 66' RCP W/SET		32	30						2						61							66	
SUBTOTALS SHEET 9	0	100	90	0	0	20	16	10	10	2	4	4	0	0	181	0	0	271	339	0	73	106	0

NOTES:

REFER TO MISCELLANEOUS DETAILS FOR METHOD FOR LOCATING DRIVEWAYS DETAIL

* GRADE AROUND SET'S AND DITCH TO ENSURE PROPER DRAINAGE. THIS WORK WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCIDENTAL TO PERTINENT ITEMS

N.T.S.
SHEET 9 OF 11

SUMMARY OF SIDE ROAD STRUCTURES

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		35

SUMMARY OF SIDE ROAD STRUCTURES

PLAN LAYOUT SHEET	105 6008 REMOVING STAB BASE AND ASPH PAV (6") SY	400 6005 CEM STABIL BKFL CY	400 6012 CUT AND RESTORE PAV (FLEX BASE) SY	464 6003 RC PIPE (CL III)(18 IN) LF	464 6005 RC PIPE (CL III)(24 IN) LF	464 6007 RC PIPE (CL III)(30 IN) LF	464 6009 RC PIPE (CL III)(42 IN) LF	467 6363 SET (TY II)(18 IN)(RCP)(6:1)(P) EA	467 6395 SET (TY II)(24 IN)(RCP)(6:1)(P) EA	467 6423 SET (TY II)(30 IN)(RCP)(6:1)(P) EA	467 6454 SET (TY II)(36 IN)(RCP)(6:1)(P) EA	467 6466 SET (TY II)(42 IN)(RCP)(6:1)(P) EA	496 6004 REMOV STR (SET) EA	496 6006 REMOV STR (HEADWALL) EA	496 6007 REMOV STR (PIPE) LF	496 6008 REMOV STR (BOX CULVERT) LF	530 6004 DRIVEWAYS (CONC) SY	530 6005 DRIVEWAYS (ACP) SY	530 6016 DRIVEWAYS (BASE) SY	658 6047 INSTL OM ASSM (OM-2Y)(WC)GND EA	4122 6004 THERMO PIPE(18")(HDPE)(TY S)(CSB) LF	4122 6005 THERMO PIPE(24")(HDPE)(TY S)(CSB) LF	4122 6006 THERMO PIPE(36")(HDPE)(TY S)(CSB) LF
STA 445+71 AHD RT																							
EXIST 1-24" x 30' CMP																							
EXIST 1-36" x 30' CMP																							
PROP 1-24" x 33' RCP W/SET		16	15						2						30							33	
PROP 1-36" x 33' RCP W/SET		23	15								2				30								33
STA 456+45 AHD RT																			33				
EXIST 1-36" x 25' CP																							
PROP SET LT, RT											2												
STA 457+80 AHD LT																			37				
EXIST 1-24" x 24' CMP																							
PROP 1-24" x 26' RCP W/SET		13	12						2						24							26	
STA 477+54 AHD LT																			41				
EXIST 1-24" x 20' CP W/SET																							
NO WORK																							
STA 479+07 AHD LT																			41				
EXIST 1-24" x 19' CP W/SET																							
NO WORK																							
STA 484+25 AHD LT																			37				
EXIST 1-24" x 33' CP W/SET																							
NO WORK																							
STA 493+38 LT																			43				
EXIST DWY W/NO CULVERT																							
STA 497+91 LT																			41				
EXIST 1-24" x 19' CMP																							
PROP 1-24" x 20' RCP W/SET		10	9						2						19							20	
STA 498+00 RT																			42				
EXIST DWY W/NO CULVERT																							
STA 520+05 LT																			37				
EXIST 1-24" x 20' CP W/SET																							
NO WORK																							
STA 521+00 RT																			41				
EXIST 1-24" x 32' CP																							
PROP SET RT									1														
STA 521+45 LT																			41				
EXIST DWY W/NO CULVERT																							
STA 539+40 RT																			33				
EXIST 1-2' x 13' BOX CULV W/HDWL																							
PROP INSTALL OBJ MARK LT, RT																				2			
STA 540+11 RT																							
EXIST 1-18" x 34' CP W/SET																							
NO WORK																							
STA 541+02 RT																							
EXIST 1-2' x 13' BOX CULV W/HDWL																							
PROP RMV BOX CULV, HDWL, DWY	12													2		13							
STA 541+76 RT																							
EXIST 1-2' x 13' BOX CULV W/HDWL																							
PROP RMV BOX CULV, HDWL, DWY	12													2		13							
SUBTOTALS SHEET 10	24	62	51	0	0	0	0	0	7	0	4	0	0	4	103	26	0	0	467	2	0	79	33

NOTES:

REFER TO MISCELLANEOUS DETAILS FOR METHOD FOR LOCATING DRIVEWAYS DETAIL

N.T.S.
SHEET 10 OF 11

SUMMARY OF SIDE ROAD STRUCTURES

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		36

SUMMARY OF SIDE ROAD STRUCTURES

PLAN LAYOUT SHEET	105 6008 REMOVING STAB BASE AND ASPH PAV (6") SY	400 6005 CEM STABIL BKFL CY	400 6012 CUT AND RESTORE PAV (FLEX BASE) SY	464 6003 RC PIPE (CL III) (18 IN) LF	464 6005 RC PIPE (CL III) (24 IN) LF	464 6007 RC PIPE (CL III) (30 IN) LF	464 6009 RC PIPE (CL III) (42 IN) LF	467 6363 SET (TY II) (18 IN) (RCP) (6:1) (P) EA	467 6395 SET (TY II) (24 IN) (RCP) (6:1) (P) EA	467 6423 SET (TY II) (30 IN) (RCP) (6:1) (P) EA	467 6454 SET (TY II) (36 IN) (RCP) (6:1) (P) EA	467 6466 SET (TY II) (42 IN) (RCP) (6:1) (P) EA	496 6004 REMOV STR (SET) EA	496 6006 REMOV STR (HEADWALL) EA	496 6007 REMOV STR (PIPE) LF	496 6008 REMOV STR (BOX CULVERT) LF	530 6004 DRIVEWAYS (CONC) SY	530 6005 DRIVEWAYS (ACP) SY	530 6016 DRIVEWAYS (BASE) SY	658 6047 INSTL OM ASSM (OM-2Y) (WC) GND EA	4122 6004 THERMO PIPE (18") (HDPE) (TY S) (CSB) LF	4122 6005 THERMO PIPE (24") (HDPE) (TY S) (CSB) LF	4122 6006 THERMO PIPE (36") (HDPE) (TY S) (CSB) LF
STA 542+55 RT																							
EXIST 1-2' x 13' BOX CULV W/HDWL																							
PROP RMV BOX CULV, HDWL, DWY	12													2		13							
STA 542+99 LT																				41			
EXIST 1-24" x 29' CMP																							
PROP 1-24" x 33' RCP W/SET		16	15						2						29							33	
STA 543+29 RT																							
EXIST 1-2' x 13' BOX CULV W/HDWL																							
PROP RMV BOX CULV, HDWL, DWY	12													2		13							
STA 544+18 RT																							
EXIST 1-2' x 13' BOX CULV W/HDWL																							
PROP RMV BOX CULV, HDWL, DWY	12													2		13							
STA 545+07 RT																							
EXIST 1-2' x 13' BOX CULV W/HDWL																							
PROP RMV BOX CULV, HDWL, DWY	12													2		13							
STA 545+82 RT																							
EXIST 1-2' x 13' BOX CULV W/HDWL																							
PROP RMV BOX CULV, HDWL, DWY	12													2		13							
STA 547+26 RT																				41			
EXIST 1-18" x 26' CP W/HDWL																							
PROP INSTALL OBJ MARK LT, RT																					2		
SUBTOTALS SHEET 11	60	16	15	0	0	0	0	0	2	0	0	0	0	10	29	65	0	0	82	2	0	33	0
PROJECT TOTALS	280	322	286	4	16	28	60	80	141	16	24	6	2	16	644	91	116	574	4777	4	237	277	33

NOTES:

REFER TO MISCELLANEOUS DETAILS FOR METHOD FOR LOCATING DRIVEWAYS DETAIL

N. T. S.
SHEET 11 OF 11

SUMMARY OF SIDE ROAD STRUCTURES

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		37

SUMMARY OF EROSION CONTROL ITEMS												
SWP3 PLAN LAYOUT SHEETS	161 6017	162 6003	164 6051	164 6066	166 6001	168 6001	506 6003	506 6011	506 6020	506 6024	506 6038	506 6039
	COMPOST MANUF TOPSOIL (4")	STRAW OR HAY MULCH	DRILL SEED (TEMP) (WARM OR COOL)	DRILL SEEDING (PERM) (WARM OR COOL)	FERTILIZER	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 3)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	SY	SY	AC	MG	LF	LF	SY	SY	LF	LF
1	13505	27010	6752.5	13505	5.58	670	15	15			560	560
2	13334	26668	6667	13334	5.51	662					420	420
3	13334	26668	6667	13334	5.51	662	30	30			420	420
4	13334	26668	6667	13334	5.51	662					420	420
5	13334	26668	6667	13334	5.51	662	15	15			485	485
6	13334	26668	6667	13334	5.51	662					420	420
7	13334	26668	6667	13334	5.51	662					420	420
8	13334	26668	6667	13334	5.51	662					490	490
9	13334	26668	6667	13334	5.51	662					420	420
10	13334	26668	6667	13334	5.51	662					350	350
11	13334	26668	6667	13334	5.51	662	15	15	1000	1000	480	480
12	9174	18348	4587	9174	3.79	456					350	350
13	80	160	40	80	0.03	4						
*14	1778	3556	889	1778	0.73	88					70	70
*15	13334	26668	6667	13334	5.51	662					420	420
*16	4405	8810	2202.5	4405	1.82	219	20	20			300	300
16	8929	17858	4464.5	8929	3.69	443					190	190
17	13334	26668	6667	13334	5.51	662					320	320
18	13334	26668	6667	13334	5.51	662	70	70			540	540
19	10716	21432	5358	10716	4.43	532	30	30			440	440
20							15	15			70	70
SUBTOTALS 2524-02-025	202412	404824	101206	202412	83.64	10049	190	190	1000	1000	6795	6795
*SUBTOTALS 2524-02-024	19517	39034	9758.5	19517	8.06	969	20	20	0	0	790	790
PROJECT TOTALS	221929	443858	110964.5	221929	91.7	11018	210	210	1000	1000	7585	7585

SUMMARY OF SWP3 QUANTITIES

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		38

SUMMARY OF PAVEMENT MARKING ITEMS												
LOCATION	644 6076	662 6004	662 6012	662 6016	662 6017	662 6029	662 6032	662 6034	662 6041	662 6063	662 6095	677 6001
	REMOVE SM RD SN SUP&AM	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	WK ZN PAV MRK NON-REMOV (W)(ARROW)	WK ZN PAV MRK NON-REMOV (W)(WORD)	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	WK ZN PAV MRK NON-REMOV (Y)24"(SLD)	WK ZN PAV MRK REMOV (W)4"(SLD)	WK ZN PAV MRK REMOV (Y)4"(SLD)	ELIM EXT PAV MRK & MRKS (4")
	EA	LF	LF	LF	EA	EA	LF	LF		LF	LF	LF
SHOULDER WIDENING		99472						49736		49736	49736	49736
	145											
MILLING		114628	120	319	2	2	11306	42832	147			
SEAL COAT		114628	120	319	2	2	11306	42832	147			
ACP OVERLAY		114628	120	319	2	2	11306	42832	147			
PROJECT TOTALS	145	443356	360	957	6	6	33918	178232	441	49736	49736	49736

SCALE N.T.S.
SHEET 1 OF 1

SUMMARY OF WORK ZONE PAV MRK QTY'S

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		39

SUMMARY OF PERMANENT PAVEMENT MARKING QUANTITIES

LAYOUT SHEET NO.	STATION FROM	STATION TO	*666-PAVEMENT SEALER (6225) 6" LF A,E,F	666-REFL PAV MRK (6036) TY I (W) 8" (SLD) (100MIL) LF C	(6048) TY I (W) 24" (SLD) (100MIL) LF D	(6147) TY I (Y) 24" (SLD) (100MIL) LF G	666 (6309) RE PM W/RET REQ TY I (W) 6" (SLD) (100MIL) LF A	(6318) RE PM W/RET REQ TY I (Y) 6" (BRK) (100MIL) LF F	(6321) RE PM W/RET REQ TY I (Y) 6" (SLD) (100MIL) LF E	(6343) REF PROF PAV MRK TY I (W) 6" (SLD) (100MIL) LF A1
CSJ: 2524-02-025										
1	154+61.54	178+00	-	-	-	-	4680	213	3830	-
2	178+00	202+00	-	-	18	-	4822	600	146	-
3	202+00	226+00	-	-	-	-	4800	600	-	-
4	226+00	250+00	-	-	-	-	4800	600	-	-
5	250+00	274+00	-	-	-	-	4800	600	-	-
6	274+00	298+00	-	-	-	-	4820	521	1785	-
7	298+00	322+00	-	-	18	-	4788	428	2920	-
8	322+00	346+00	-	-	-	-	4800	533	1600	-
9	346+00	370+00	-	-	-	-	4800	600	830	-
10	370+00	394+00	240	-	-	-	4820	43	4650	-
11	394+00	418+00	-	-	18	-	4841	-	4660	-
12	418+00	442+00	-	-	-	-	4800	575	1200	-
13	442+00	466+00	-	-	25	-	4823	578	600	-
14	466+00	489+00 BK	-	-	16	-	4930	123	4596	-
15	343+36.12 AHD	367+00	-	-	-	-	3184	591	1710	1544
16	367+00	380+50	2340	-	46	-	5946	370	3928	1220
17	380+50	394+00	2400	-	40	-	6076	414	3837	1325
18	394+00	418+00	-	-	15	-	3195	600	875	1620
19	418+00	442+00	-	-	12	-	4862	600	550	-
20	442+00	466+00	-	-	35	-	4851	583	1515	-
21	466+00	490+00	-	-	-	-	4800	600	-	-
22	490+00	514+00	-	-	-	-	4800	600	-	-
23	514+00	538+00	-	-	20	-	4860	600	-	-
24	538+00	561+10	-	120	56	147	4730	338	3600	-
PROJECT TOTAL			4980	120	319	147	114628	11306	42832	5709

*** PAVEMENT SEALER TO BE APPLIED ON CONCRETE SURFACE ONLY.**

Texas Department of Transportation

SUMMARY OF PERMANENT PAVEMENT MARKING QUANTITIES

© 2019 SHEET 1 OF 2

STATE	FEDERAL	PROJECT NO.		SHEET
DISTRICT	REGION			40
HOU	6			HIGHWAY
COUNTY	CONTROL	SECTION	JOB	NO.
BRAZORIA	2524	02	025, ETC	FM 2611

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SUMMARY OF PERMANENT PAVEMENT MARKING QUANTITIES

LAYOUT SHEET NO.	STATION		668-PREFAB PAV MRK		672-REFL PAV MRKR		677-ELIM EXT PAV MRK & MRKS	678-PAV SURF PREP FOR MRK				
			(6077)	(6085)	(6007)	(6009)	(6002)	(6002)	(6004)	(6008)	(6009)	(6016)
	FROM	TO	TY C (W) (ARROW)	TY C (W) (WORD)	TY I-C	TY II-A-A	(6")	(6")	(8")	(24")	(ARROW)	(WORD)
			EA	EA	EA	EA	LF	LF	LF	LF	EA	EA
			K	L	I	J	A,E,F	A,E,F, A1	C	D,G	K	L
CSJ: 2524-02-025												
1	154+61.54	178+00	-	-	-	61	-	8723	-	-	-	-
2	178+00	202+00	-	-	-	35	-	5568	-	18	-	-
3	202+00	226+00	-	-	-	32	-	5400	-	-	-	-
4	226+00	250+00	-	-	-	32	-	5400	-	-	-	-
5	250+00	274+00	-	-	-	32	-	5400	-	-	-	-
6	274+00	298+00	-	-	-	52	-	7126	-	-	-	-
7	298+00	322+00	-	-	-	62	-	8136	-	18	-	-
8	322+00	346+00	-	-	-	49	-	6933	-	-	-	-
9	346+00	370+00	-	-	-	43	-	6230	-	-	-	-
10	370+00	394+00	-	-	-	62	240	9513	-	-	-	-
11	394+00	418+00	-	-	-	62	-	9501	-	18	-	-
12	418+00	442+00	-	-	-	47	-	6575	-	-	-	-
13	442+00	466+00	-	-	-	39	-	6001	-	25	-	-
14	466+00	489+00 BK	-	-	-	62	-	9649	-	16	-	-
15	343+36.12 AHD	367+00	-	-	-	55	-	7029	-	-	-	-
16	367+00	380+50	-	-	-	73	2340	11464	-	46	-	-
17	380+50	394+00	-	-	-	76	2400	11652	-	40	-	-
18	394+00	418+00	-	-	-	44	-	6290	-	15	-	-
19	418+00	442+00	-	-	-	40	-	6012	-	12	-	-
20	442+00	466+00	-	-	-	51	-	6949	-	35	-	-
21	466+00	490+00	-	-	-	32	-	5400	-	-	-	-
22	490+00	514+00	-	-	-	32	-	5400	-	-	-	-
23	514+00	538+00	-	-	-	32	-	5460	-	20	-	-
24	538+00	561+10	2	2	7	121	-	8668	120	203	2	2
PROJECT TOTAL			2	2	7	1227	4980	174475	120	466	2	2

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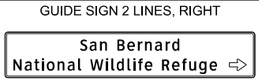
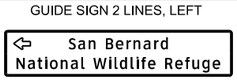
Texas Department of Transportation

SUMMARY OF PERMANENT PAVEMENT MARKING QUANTITIES

STATE	FEDERAL	PROJECT NO.		SHEET
DISTRICT	REGION			41
HOU	6			HIGHWAY
COUNTY	CONTROL	SECTION	JOB	NO.
BRAZORIA	2524	02	025, ETC	FM 2611

DATE: 11/25/2020 TIME: 12:51:15 PM
FILE: H:\Trfsigning\FM-2611 CSJ 2524-02-025, ETC (Brazoria County)\Summary\2524-02-025 SMALL SIGN SUMMARY.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	644-INS SM RD SN SUP & AM													636	
							6001	6002	6004	6005	6007	6028	6030	6031	6033	6034	6035	6064	6065	6076	6001	6007
							TY 10BWG (1) SA (P)	TY 10BWG (1) SA (P-BM)	TY 10BWG (1) SA (T)	TY 10BWG (1) SA (T-2EXT)	TY 10BWG (1) SA (U)	TY S80 (1) SA (P-BM)	TY S80 (1) SA (T)	TY S80 (1) SA (T-2EXT)	TY S80 (1) SA (U)	TY S80 (1) SA (U-1EXT)	TY S80 (1) SA (U-2EXT)	IN BRIDGE MNT CLR SGN ASSM (TY N)	IN BRIDGE MNT CLR SGN ASSM (TY S)	REMOVE SM RD SN SUP & AM	ALUM SIGNS (TY A)	REPLACE EXT ALUM SIGNS (TY A)
							EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	SF	SF
1	1	I-3	CEDDAR LAKE 	30 x 18	X		X														3.75	
	2	I-2dT	(MATAGORDA) COUNTY LINE 	78 x 24	X				X												13	
	3	D20-1TL	COUNTY ROAD (275) 	24 x 24	X		X														4	
	4	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	X		X														9	
	5	M3-2	EAST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611) 	24 x 24	X		X														4	
	6	I-2dT	(BRAZORIA) COUNTY LINE 	66 x 24	X				X												11	
	7	R19-6aT	DON'T MESS WITH TEXAS UP TO $2000 FINE	48 x 30	X				X												10	
	8	W1-4R	SYMBOL - REVERSE CURVE RIGHT	30 x 30	X																6.25	
		W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE> (SEE NOTE: 4) 	18 x 18	X																2.25	
	9	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
2	1	D7-1TR	GUIDE SIGN 2 LINES, RIGHT 	132 x 24	X									X							22	
	2	M3-4	WEST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611) 	24 x 24	X																4	
	3	W1-7T	<BI-DIRECTIONAL LRG ARRW w/ CHEVRONS>	96 x 36	X								X								24	
	4	M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X		X														4	
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN> 	21 x 15	X																2.1875	
	5	D20-1TL	COUNTY ROAD (306) 	24 x 24	X		X														4	
	6	D7-1TL	GUIDE SIGN 2 LINES, LEFT 	120 x 24	X									X							20	
	7	D20-1TR	COUNTY ROAD (306) 	24 x 24	X		X														4	
	8	R1-1	STOP	30 x 30	X		X														6.25	
	9	M3-2	EAST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611) 	24 x 24	X		X														4	
	10	W11-3	SYMBOL - BE ALERT FOR DEER	30 x 30	X		X														6.25	
	11	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
SHEET TOTAL							14		3				1	2							180	

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, laterally or longitudinally to more desirable locations or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Description Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).
4. Speed Limit with "XX" shall be provided after Speed Study. For further clarification, refer General Notes Item 644.
5. Actual Clearance/distance to be shown will be verified in the field by the Contractor and approved by the Engineer prior to fabrication of this sign.

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

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"

SUMMARY OF SMALL SIGNS

DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
HOU	BRAZORIA	2524	02	025	FM 2611 42

STD-N29

DATE: 11/24/2020 TIME: 3:26:52 PM
FILE: H:\TrfSigning\FM-2611 CSJ 2524-02-025, ETC (Brazoria County)\Summary\2524-02-025 SMALL SIGN SUMMARY.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	644-INS SM RD SN SUP & AM 6001 TY 10BWG (1) SA (P)	6002 TY 10BWG (1) SA (P-BM)	6004 TY 10BWG (1) SA (T)	6005 TY 10BWG (1) SA (T-2EXT)	6007 TY 10BWG (1) SA (U)	6028 TY S80 (1) SA (P-BM)	6030 TY S80 (1) SA (T)	6031 TY S80 (1) SA (T-2EXT)	6033 TY S80 (1) SA (U)	6034 TY S80 (1) SA (U-1EXT)	6035 TY S80 (1) SA (U-2EXT)	6064 IN BRIDGE MNT CLR SGN ASSM (TY N)	6065 IN BRIDGE MNT CLR SGN ASSM (TY S)	6076 REMOVE SM RD SN SUP & AM	636 6001 ALUM SIGNS (TY A)	636 6007 REPLACE EXT ALUM SIGNS (TY A)
							EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	SF	SF
5	1	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	2	M3-4	WEST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611) WEST FARM 2611 ROAD	24 x 24	X																4	
	3	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	4	M3-2	EAST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611) EAST FARM 2611 ROAD	24 x 24	X																4	
6	1	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	2	W1-2aL	SYMBOL - HORIZ CURVE LEFT w/ (SPEED XX) (SEE NOTE: 4)	36 x 36	X		X														9	
	3	W1-2R	SYMBOL - HORIZ CURVE RIGHT	30 x 30	X		X														6.25	
		W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE> (SEE NOTE: 4) XX M.P.H	18 x 18	X																2.25	
	4	W1-2aR	SYMBOL - HORIZ CURVE RIGHT w/ (SPEED XX) (SEE NOTE: 4)	36 x 36	X		X														9	
	5	W2-2L	SYMBOL - SIDE ROAD AHEAD LEFT	30 x 30	X		X														6.25	
7	1	W1-2L	SYMBOL - HORIZ CURVE LEFT	30 x 30	X		X														6.25	
		W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE> (SEE NOTE: 4) XX M.P.H	18 x 18	X																2.25	
	2	R1-1	STOP	30 x 30	X		X														6.25	
	3	D1-2	(DESTINATION - 2 LINE) CO RD 316 ⇨ Sweeny 10 ⇨	90 x 30	X								X								18.75	
	4	D7-1TR	GUIDE SIGN 2 LINES, RIGHT Nannie M. Stringfellow Wildlife Management Area ⇨	144 x 24	X									X							24	
	5	W2-2R	SYMBOL - SIDE ROAD AHEAD RIGHT	30 x 30	X		X														6.25	
	6	D7-1TL	GUIDE SIGN 2 LINES, LEFT Nannie M. Stringfellow Wildlife Management Area ⇨	126 x 24	X									X							21	
	7	D1-2	(DESTINATION - 2 LINE) ⇦ CO RD 316 ⇦ Sweeny 10	90 x 30	X								X								18.75	
	8	M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X		X														4	
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN> FARM 2611 ROAD	21 x 15	X																2.1875	
	9	W1-7T	<BI-DIRECTIONAL LRG ARRW w/ CHEVRONS>	96 x 36	X								X								24	
	10	W1-2R	SYMBOL - HORIZ CURVE RIGHT	30 x 30	X		X														6.25	
		W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE> (SEE NOTE: 4) XX M.P.H	18 x 18	X																2.25	
	11	W1-2aR	SYMBOL - HORIZ CURVE RIGHT w/ (SPEED XX) (SEE NOTE: 4)	36 x 36	X		X														9	
8	1	W1-2aL	SYMBOL - HORIZ CURVE LEFT w/ (SPEED XX) (SEE NOTE: 4)	36 x 36	X		X														9	
	2	W1-2L	SYMBOL - HORIZ CURVE LEFT	30 x 30	X		X														6.25	
		W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE> (SEE NOTE: 4) XX M.P.H	18 x 18	X																2.25	
	3	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
			SHEET TOTAL				18						3	2							234	

ALUMINUM SIGN BLANKS THICKNESS

Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

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

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).
4. Speed Limit with "XX" shall be provided after Speed Study. For further clarification, refer General Notes item# 644.
5. Actual Clearance/distance to be shown will be verified in the field by the Contractor and approved by the Engineer prior to fabrication of this sign.

SUMMARY OF SMALL SIGNS

STATE DISTRICT	FEDERAL REGION	PROJECT NO.			SHEET
HOU	6				43
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA		2524	02	025	FM 2611

STD-N29

DATE: 11/24/2020 TIME: 3:27:39 PM
FILE: H:\Trfsigning\FM-2611 CSJ 2524-02-025, ETC (Brazoria County)\Summary\2524-02-025 SMALL SIGN SUMMARY.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	644-INS SM RD SN SUP & AM													636	
							6001	6002	6004	6005	6007	6028	6030	6031	6033	6034	6035	6064	6065	6076	6001	6007
							TY 10BWG (1) SA (P)	TY 10BWG (1) SA (P-BM)	TY 10BWG (1) SA (T)	TY 10BWG (1) SA (T-2EXT)	TY 10BWG (1) SA (U)	TY S80 (1) SA (P-BM)	TY S80 (1) SA (T)	TY S80 (1) SA (T-2EXT)	TY S80 (1) SA (U)	TY S80 (1) SA (U-1EXT)	TY S80 (1) SA (U-2EXT)	IN BRIDGE MNT CLR SGN ASSM (TY N)	IN BRIDGE MNT CLR SGN ASSM (TY S)	REMOVE SM RD SN SUP & AM	ALUM SIGNS (TY A)	REPLACE EXT ALUM SIGNS (TY A)
							EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	SF	SF
9	1	M3-4	WEST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X																4	
	2	M3-2	EAST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X																4	
	3	W11-3	SYMBOL - BE ALERT FOR DEER	30 x 30	X		X														6.25	
	4	R19-1T	STOP FOR SCHOOL BUS LOADING OR UNLOADING	48 x 60	X								X								20	
	5	R19-1T	STOP FOR SCHOOL BUS LOADING OR UNLOADING	48 x 60	X								X								20	
	6	W1-2L	SYMBOL - HORIZ CURVE LEFT	30 x 30	X		X														6.25	
		W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE> (SEE NOTE: 4)	18 x 18	X																2.25	
10	1	W1-2aL	SYMBOL - HORIZ CURVE LEFT w/ (SPEED XX) (SEE NOTE: 4)	36 x 36	X		X														9	
	2	W1-2aR	SYMBOL - HORIZ CURVE RIGHT w/ (SPEED XX) (SEE NOTE: 4)	36 x 36	X		X														9	
	3	W1-2R	SYMBOL - HORIZ CURVE RIGHT	30 x 30	X		X														6.25	
		W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE> (SEE NOTE: 4)	18 x 18	X																2.25	
	4	I-3	COCKLEBUR SLOUGH	48 x 18	X				X												6	
	5	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	6	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	X		X														9	
	7	W5-2	NARROW BRIDGE	36 x 36	X		X														9	
	8	I-3	COCKLEBUR SLOUGH	48 x 18	X				X												6	
11	1	W5-2	NARROW BRIDGE	36 x 36	X		X														9	
	2	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	X		X														9	
	3	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	4	M3-4	WEST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X																4	
	5	W1-10R	SYMBOL - CURVE RIGHT w/ TEE INTERSEC	36 x 36	X		X														9	
		W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE> (SEE NOTE: 4)	18 x 18	X																2.25	
	6	D20-1TL	COUNTY ROAD (310)	24 x 24	X		X														4	
	7	R1-1	STOP	30 x 30	X		X														6.25	
	8	D20-1TR	COUNTY ROAD (310)	24 x 24	X		X														4	
	9	M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X		X														4	
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN>	21 x 15	X																2.1875	
	10	W1-7T	<BI-DIRECTIONAL LRG ARRW w/ CHEVRONS>	96 x 36	X								X								24	
	11	M3-2	EAST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X																4	
	12-23	W1-8L	<CHEVRON LEFT>	18 x 24	X		X														36	
		W1-8R	<CHEVRON RIGHT>	18 x 24	X																36	
SHEET TOTAL							32		2				3								291	

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within reasonable limits, laterally or longitudinally to secure more desirable locations or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Description Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).
4. Speed Limit with "XX" shall be provided after Speed Study. For further clarification, refer General Notes Item 644.
5. Actual Clearance/distance to be shown will be verified in the field by the Contractor and approved by the Engineer prior to fabrication of this sign.

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

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"

SUMMARY OF SMALL SIGNS

DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
HOU	BRAZORIA	2524	02	025	44

STD-N29

DATE: 11/24/2020 TIME: 3:28:19 PM
FILE: H:\Trfsigning\FM-2611 CSJ 2524-02-025, ETC (Brazoria County)\Summary\2524-02-025 SMALL SIGN SUMMARY.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	644-INS SM RD SN SUP & AM													636	
							6001	6002	6004	6005	6007	6028	6030	6031	6033	6034	6035	6064	6065	6076	6001	6007
							TY 10BWG (1) SA (P)	TY 10BWG (1) SA (P-BM)	TY 10BWG (1) SA (T)	TY 10BWG (1) SA (T-2EXT)	TY 10BWG (1) SA (U)	TY S80 (1) SA (P-BM)	TY S80 (1) SA (T)	TY S80 (1) SA (T-2EXT)	TY S80 (1) SA (U)	TY S80 (1) SA (U-1EXT)	TY S80 (1) SA (U-2EXT)	IN BRIDGE MNT CLR SGN ASSM (TY N)	IN BRIDGE MNT CLR SGN ASSM (TY S)	REMOVE SM RD SN SUP & AM	ALUM SIGNS (TY A)	REPLACE EXT ALUM SIGNS (TY A)
							EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	SF	SF
12	1	W1-8L	<CHEVRON LEFT>	18 x 24	X		X														3	
		W1-8R	<CHEVRON RIGHT>	18 x 24	X																3	
	2	W1-8L	<CHEVRON LEFT>	18 x 24	X		X														3	
		W1-8R	<CHEVRON RIGHT>	18 x 24	X																3	
	3	W1-10L	SYMBOL - CURVE LEFT w/ TEE INTERSEC	36 x 36	X		X														9	
		W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE> (SEE NOTE: 4)	18 x 18	X																2.25	
	4	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
13	1	R19-1T	STOP FOR SCHOOL BUS LOADING OR UNLOADING	48 x 60	X								X								20	
	2	R19-1T	STOP FOR SCHOOL BUS LOADING OR UNLOADING	48 x 60	X								X								20	
	3	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	4	R1-1	STOP	30 x 30	X		X														6.25	
	5	D1-2	(DESTINATION - 2 LINE)	102 x 30	X									X							21.25	
14	1	D1-2	(DESTINATION - 2 LINE)	102 x 30	X									X							21.25	
	2	R1-1	STOP	30 x 30	X		X														6.25	
	3	W1-10L	SYMBOL - CURVE LEFT w/ TEE INTERSEC	36 x 36	X		X														9	
		W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE> (SEE NOTE: 4)	18 x 18	X																2.25	
	4	M2-1	JCT <AUXILIARY SIGN>	21 x 15	X		X														2.1875	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X																4	
	5	D7-1TR	GUIDE SIGN 2 LINES, RIGHT	132 x 24	X									X							22	
	6	M3-2	EAST <AUXILIARY SIGN>	24 x 12	X										X						2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X																4	
		M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15	X																2.1875	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2918)	24 x 24	X																4	
		M6-1	<ARROW - HORIZ. STRGHT> (WHITE)	21 x 15	X																2.1875	
	7	W1-7T	<BI-DIRECTIONAL LRG ARRW w/ CHEVRONS>	96 x 36	X								X								24	
	8	M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X		X														4	
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN>	21 x 15	X																2.1875	
	9	M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2918)	24 x 24	X										X						4	
		M6-1	<ARROW - HORIZ. STRGHT> (WHITE)	21 x 15	X																2.1875	
		M3-4	WEST <AUXILIARY SIGN>	24 x 12	X																2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X																4	
		M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15	X																2.1875	
SHEET TOTAL							10						3	3	2						227	

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines where practical, to obtain more desirable locations or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Description Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).
4. Speed Limit with "XX" shall be provided after Speed Study. For further clarification, refer General Notes Item 644.
5. Actual Clearance/distance to be shown will be verified in the field by the Contractor and approved by the Engineer prior to fabrication of this sign.

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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"

SUMMARY OF SMALL SIGNS

DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
HOU	BRAZORIA	2524	02	025	45

STD-N29

DATE: 11/24/2020 TIME: 3:28:43 PM
FILE: H:\Trfsigning\FM-2611 CSJ 2524-02-025, ETC (Brazoria County)\Summary\2524-02-025 SMALL SIGN SUMMARY.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	644-INS SM RD SN SUP & AM													636	
							6001	6002	6004	6005	6007	6028	6030	6031	6033	6034	6035	6064	6065	6076	6001	6007
							TY 10BWG (1) SA (P)	TY 10BWG (1) SA (P-BM)	TY 10BWG (1) SA (T)	TY 10BWG (1) SA (T-2EXT)	TY 10BWG (1) SA (U)	TY S80 (1) SA (P-BM)	TY S80 (1) SA (T)	TY S80 (1) SA (T-2EXT)	TY S80 (1) SA (U)	TY S80 (1) SA (U-1EXT)	TY S80 (1) SA (U-2EXT)	IN BRIDGE MNT CLR SGN ASSM (TY N)	IN BRIDGE MNT CLR SGN ASSM (TY S)	REMOVE SM RD SN SUP & AM	ALUM SIGNS (TY A)	REPLACE EXT ALUM SIGNS (TY A)
							EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	SF	SF
14 CONT	10	D7-1TL	GUIDE SIGN 2 LINES, LEFT ⇦ San Bernard National Wildlife Refuge	120 x 24	X									X							20	
	11	M2-1 M1-6F	JCT <AUXILIARY SIGN> <FM SHIELD> FARM ROAD (ROUTE # 2918) JCT / FARM ROAD 2918	21 x 15 24 x 24	X X		X														2.1875 4	
	12	R1-2 R5-1	YIELD DO NOT ENTER YIELD / DO NOT ENTER B to B	36 x 36 x 36 30 x 30	X X		X														9 6.25	
	13	R1-1	STOP	30 x 30	X		X														6.25	
	14	R1-2 R5-1	YIELD DO NOT ENTER YIELD / DO NOT ENTER B to B	36 x 36 x 36 30 x 30	X X		X														9 6.25	
	15	M3-2 M1-6F	EAST <AUXILIARY SIGN> <FM SHIELD> FARM ROAD (ROUTE # 2611) EAST / FARM ROAD 2611	24 x 12 24 x 24	X X		X														2 4	
	16-27	W1-8L W1-8R	<CHEVRON LEFT> <CHEVRON RIGHT> B to B	18 x 24 18 x 24	X X		X														36 36	
15	1	W1-10R W13-1P	SYMBOL - CURVE RIGHT w/ TEE INTERSEC (XX) MPH <ADVISORY SPEED PLAQUE> (SEE NOTE: 4) XX MPH	36 x 36 18 x 18	X X		X														9 2.25	
	2	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	3	R19-1T	STOP FOR SCHOOL BUS LOADING OR UNLOADING	48 x 60	X								X								20	
	4	D14-4T-3	ADOPT A HWY NEXT (2) MILES (FRIENDS OF THE RIVER SAN BERNARD) ADOPT A HIGHWAY NEXT 2 MILES / FRIENDS OF THE RIVER SAN BERNARD	48 x 48	X								X								16	
	5	W11-3	SYMBOL - BE ALERT FOR DEER	30 x 30	X		X														6.25	
	6	W11-3	SYMBOL - BE ALERT FOR DEER	30 x 30	X		X														6.25	
	7	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	8	R19-1T	STOP FOR SCHOOL BUS LOADING OR UNLDING	48 x 60	X								X								20	
	9	W2-1	SYMBOL - 4-WAY INTERSECTION AHEAD	30 x 30	X		X														6.25	
	10	W3-4 W16-13P	BE PREPARED TO STOP WHEN FLASHING (PLAQUE) BE PREPARED TO STOP / WHEN FLASHING	36 x 36 24 x 18	X X		X														9 3	
	11	D3-2 (1)	(CO RD 659) 1 line CO RD 659 NEXT INTERSECTION	78 x 30	X								X								16.25	
	12	R12-1T	WEIGHT LIMIT/GROSS (84,000) LBS WEIGHT LIMIT / GROSS / 84,000 LBS	24 x 36	X		X														6	
	13	D20-2T	COUNTY ROAD (659) CO RD 659	24 x 24	X		X														4	
SHEET TOTAL							26						4	1							276	

NOTE:

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2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
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http://www.txdot.gov/

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"

SUMMARY OF SMALL SIGNS

STATE DISTRICT	FEDERAL REGION	PROJECT NO.	SHEET NO.
HOU	6		46

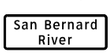
COUNTY	CONTROL	SECTION	JOB
BRAZORIA	2524	02	025

FM 2611

STD-N29

DATE: 12/15/2020 TIME: 11:09:39 AM
FILE: H:\Trfsigning\FM-2611 CSJ 2524-02-025, ETC (Brazoria County)\Summary\2524-02-025 SMALL SIGN SUMMARY.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	644-INS SM RD SN SUP & AM													636	
							6001	6002	6004	6005	6007	6028	6030	6031	6033	6034	6035	6064	6065	6076	6001	6007
							TY 10BWG (1) SA (P)	TY 10BWG (1) SA (P-BM)	TY 10BWG (1) SA (T)	TY 10BWG (1) SA (T-2EXT)	TY 10BWG (1) SA (U)	TY S80 (1) SA (P-BM)	TY S80 (1) SA (T)	TY S80 (1) SA (T-2EXT)	TY S80 (1) SA (U)	TY S80 (1) SA (U-1EXT)	TY S80 (1) SA (U-2EXT)	IN BRIDGE MNT CLR SGN ASSM (TY N)	IN BRIDGE MNT CLR SGN ASSM (TY S)	REMOVE SM RD SN SUP & AM	ALUM SIGNS (TY A)	REPLACE EXT ALUM SIGNS (TY A)
							EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	SF	SF
16	1	R1-1	STOP	30 x 30	X		X														6.25	
	2	W1-6L	<LARGE ARROW LEFT>	48 x 24	X		X														8	
	3	W1-6R	<LARGE ARROW RIGHT>	48 x 24	X		X														8	
	4	D20-4T	COUNTY ROAD (659)	24 x 24	X		X														4	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X																4	
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN>	21 x 15	X																2.1875	
																						
	5	W1-2aL	SYMBOL - HORIZ CURVE LEFT w/ (SPEED XX) (SEE NOTE: 4)	36 x 36	X		X														9	
	6	W3-1	SYMBOL - STOP AHEAD	30 x 30	X		X														6.25	
	7	W1-2L	SYMBOL - HORIZ CURVE LEFT	30 x 30	X		X														6.25	
		W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE> (SEE NOTE: 4)	18 x 18	X																2.25	
																						
	8	W3-2	SYMBOL - YIELD AHEAD	30 x 30	X		X														6.25	
	9	W1-7	<BI-DIRECTIONAL LARGE ARROW>	48 x 24	X				X												8	
	10	D20-2T	COUNTY ROAD (659)	24 x 24	X		X														4	
																						
	11	D20-2T	COUNTY ROAD (659)	24 x 24	X		X														4	
																						
	12	D3-2 (1)	(CO RD 659) 1 line	78 x 30	X								X								16.25	
																						
	13	W2-1	SYMBOL - 4-WAY INTERSECTION AHEAD	30 x 30	X		X														6.25	
	14	R1-2	YIELD	36 x 36 x 36	X		X														9	
	15	R1-1	STOP	30 x 30	X		X														6.25	
	16	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	17	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	X		X														9	
	18	W7-1	SYMBOL - HILL	30 x 30	X		X														6.25	
	19	I-3	(SAN BERNARD) RIVER	54 x 18	X				X												6.75	
																						
	20	D20-4T	COUNTY ROAD (659)	24 x 24	X		X														4	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X																4	
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN>	21 x 15	X																2.1875	
																						
	21	W1-6R	<LARGE ARROW RIGHT>	48 x 24	X				X												8	
	22	W1-6L	<LARGE ARROW LEFT>	48 x 24	X				X												8	
	23	W1-2aR	SYMBOL - HORIZ CURVE RIGHT w/ (SPEED XX) (SEE NOTE: 4)	36 x 36	X		X														9	
	24	W3-1	SYMBOL - STOP AHEAD	30 x 30	X		X														6.25	
	25	W1-2R	SYMBOL - HORIZ CURVE RIGHT	30 x 30	X		X														6.25	
		W13-1P	(XX) MPH <ADVISORY SPEED PLAQUE> (SEE NOTE: 4)	18 x 18	X																2.25	
																						
	26	W3-2	SYMBOL - YIELD AHEAD	30 x 30	X		X														6.25	
	27	R1-2	YIELD	36 x 36 x 36	X		X														9	
	28	D20-2T	COUNTY ROAD (659)	24 x 24	X		X														4	
																						
	29	W1-7	<BI-DIRECTIONAL LARGE ARROW>	48 x 24	X				X												8	
		SHEET TOTAL					23		5				1								221	

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within reasonable limits, to a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).
4. Speed Limit with "XX" shall be provided after Speed Study. For further clarification, refer General Notes Item 644.
5. Actual Clearance/distance to be shown will be verified in the field by the Contractor and approved by the Engineer prior to fabrication of this sign.

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

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"

SUMMARY OF SMALL SIGNS

 SHEET 6 OF 10

DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
HOU	BRAZORIA	2524	02	025	47

STD-N29

DATE: 11/24/2020 TIME: 3:29:25 PM
FILE: H:\Trfsigning\FM-2611 CSJ 2524-02-025, ETC (Brazoria County)\Summary\2524-02-025 SMALL SIGN SUMMARY.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	644-INS SM RD SN SUP & AM													636	
							6001	6002	6004	6005	6007	6028	6030	6031	6033	6034	6035	6064	6065	6076	6001	6007
							TY 10BWG (1) SA (P)	TY 10BWG (1) SA (P-BM)	TY 10BWG (1) SA (T)	TY 10BWG (1) SA (T-2EXT)	TY 10BWG (1) SA (U)	TY S80 (1) SA (P-BM)	TY S80 (1) SA (T)	TY S80 (1) SA (T-2EXT)	TY S80 (1) SA (U)	TY S80 (1) SA (U-1EXT)	TY S80 (1) SA (U-2EXT)	IN BRIDGE MNT CLR SGN ASSM (TY N)	IN BRIDGE MNT CLR SGN ASSM (TY S)	REMOVE SM RD SN SUP & AM	ALUM SIGNS (TY A)	REPLACE EXT ALUM SIGNS (TY A)
							EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	SF	SF
17	1	I-3	(SAN BERNARD) RIVER San Bernard River	54 x 18	X				X												6.75	
	2	W7-1	SYMBOL - HILL	30 x 30	X		X														6.25	
	3	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	X		X														9	
	4	R1-1	STOP	30 x 30	X		X														6.25	
	5	W2-1	SYMBOL - 4-WAY INTERSECTION AHEAD	30 x 30	X		X														6.25	
	6	D7-5TL	PUBLIC BOAT RAMP LEFT PUBLIC BOAT RAMP	48 x 24	X				X												8	
	7	R1-1	STOP	30 x 30	X		X														6.25	
18	1	D7-5TR	PUBLIC BOAT RAMP RIGHT PUBLIC BOAT RAMP	48 x 24	X				X												8	
	2	R12-1T	WEIGHT LIMIT/GROSS (84,000) LBS WEIGHT LIMIT / GROSS 84,000 LBS	24 x 36	X		X														6	
	3	W2-1	SYMBOL - 4-WAY INTERSECTION AHEAD	30 x 30	X		X														6.25	
	4	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	5	M3-4	WEST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611) WEST FARM 2611 ROAD	24 x 24	X																4	
	6	R1-1	STOP	30 x 30	X		X														6.25	
	7	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	8	D20-1TL	COUNTY ROAD (432) CO RD 432	24 x 24	X		X														4	
	9	D20-3TR	COUNTY ROAD (432) CO RD 432	24 x 24	X		X														4	
	10	M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X		X														4	
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN> FARM 2611 ROAD	21 x 15	X																2.1875	
	11	W1-7T	<BI-DIRECTIONAL LRG ARRW w/ CHEVRONS>	96 x 36	X								X								24	
	12	M3-2	EAST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611) EAST FARM 2611 ROAD	24 x 24	X																4	
19	1	R1-1	STOP	30 x 30	X		X														6.25	
	2	D9-12	SYMBOL - RV SANITARY STATION AHEAD	24 x 24	X		X														4	
		D9-1dP	ARROW	24 x 6	X																1	
	3	D20-1TL	COUNTY ROAD (629) CO RD 629	24 x 24	X		X														4	
	4	M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X		X														4	
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN> FARM 2611 ROAD	21 x 15	X																2.1875	
SHEET TOTAL							19		3				1								157	

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within reasonable limits, laterally or longitudinally to secure more desirable locations or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).
4. Speed Limit with "XX" shall be provided after Speed Study. For further clarification, refer General Notes Items 644.
5. Actual Clearance/distance to be shown will be verified in the field by the Contractor and approved by the Engineer prior to fabrication of this sign.

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

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"

SUMMARY OF SMALL SIGNS

STATE DISTRICT	URBAN REGION	PROJECT NO.	SHEET
HOU	6		48
COUNTY		CONTROL SECTION JOB	HIGHWAY
BRAZORIA		2524 02 025	FM 2611

STD-N29

DATE: 11/24/2020 TIME: 3:29:51 PM
FILE: H:\Trfsigning\FM-2611 CSJ 2524-02-025, ETC (Brazoria County)\Summary\2524-02-025 SMALL SIGN SUMMARY.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	644-INS SM RD SN SUP & AM													636	
							6001	6002	6004	6005	6007	6028	6030	6031	6033	6034	6035	6064	6065	6076	6001	6007
							TY 10BWG (1) SA (P)	TY 10BWG (1) SA (P-BM)	TY 10BWG (1) SA (T)	TY 10BWG (1) SA (T-2EXT)	TY 10BWG (1) SA (U)	TY S80 (1) SA (P-BM)	TY S80 (1) SA (T)	TY S80 (1) SA (T-2EXT)	TY S80 (1) SA (U)	TY S80 (1) SA (U-1EXT)	TY S80 (1) SA (U-2EXT)	IN BRIDGE MNT CLR SGN ASSM (TY N)	IN BRIDGE MNT CLR SGN ASSM (TY S)	REMOVE SM RD SN SUP & AM	ALUM SIGNS (TY A)	REPLACE EXT ALUM SIGNS (TY A)
							EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	SF	SF
19	5	W1-7T	<BI-DIRECTIONAL LRG ARRW w/ CHEVRONS>	96 x 36	X								X								24	
CONT	6	D20-3TR	COUNTY ROAD (629) 	24 x 24	X		X														4	
	7	D9-12	SYMBOL - RV SANITARY STATION AHEAD	24 x 24	X		X														4	
		M6-1B	<ARROW - HORIZ. STRGHT> (BLUE) 	21 x 15	X																2.1875	
	8	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	9	D14-4T-3	ADOPT A HWY NEXT (2) MILES (FRIENDS OF THE RIVER SAN BERNARD) 	48 x 48	X				X												16	
	10	W2-1	SYMBOL - 4-WAY INTERSECTION AHEAD	30 x 30	X		X														6.25	
20	1	M3-4	WEST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611) 	24 x 24	X																4	
	2	R1-1	STOP	30 x 30	X		X														6.25	
	3	D20-4T	COUNTY ROAD (NUMBER)	24 x 24	X		X														4	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X																4	
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN> 	21 x 15	X																2.1875	
	4	D1-2	(DESTINATION - 2 LINE) 	90 x 30	X								X								18.75	
	5	W3-4	BE PREPARED TO STOP	36 x 36	X		X														9	
		W16-13P	WHEN FLASHING (PLAQUE) 	24 x 18	X																3	
	6	W2-1	SYMBOL - 4-WAY INTERSECTION AHEAD	30 x 30	X		X														6.25	
	7	W3-4	BE PREPARED TO STOP	36 x 36	X		X														9	
		W16-13P	WHEN FLASHING (PLAQUE) 	24 x 18	X																3	
	8	D1-2	(DESTINATION - 2 LINE) 	90 x 30	X								X								18.75	
	9	D20-4T	COUNTY ROAD (306)	24 x 24	X		X														4	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X																4	
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN> 	21 x 15	X																2.1875	
	10	R1-1	STOP	30 x 30	X		X														6.25	
	11	M3-2	EAST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611) 	24 x 24	X																4	
	12	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
SHEET TOTAL							14		1				3								180	

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, as necessary to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Description Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).
4. Speed Limit with "XX" shall be provided after Speed Study. For further clarification, refer General Notes Item# 644.
5. Actual clearance/distance to be shown will be verified in the field by the Contractor and approved by the Engineer prior to fabrication of this sign.

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

ALUMINUM SIGN BLANKS THICKNESS

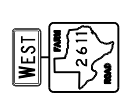
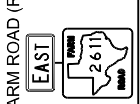
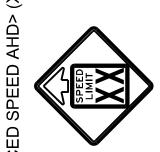
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

SUMMARY OF SMALL SIGNS

DISTRICT	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
HOU	BRAZORIA	2524	02	025	FM 2611

STD-N29

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	644-INS SM RD SN SUP & AM 6001 TY 10BWG (1) SA (P) EA	6002 TY 10BWG (1) SA (P-BM) EA	6004 TY 10BWG (1) SA (T) EA	6005 TY 10BWG (1) SA (T-2EXT) EA	6007 TY 10BWG (1) SA (U) EA	6028 TY S80 (1) SA (P-BM) EA	6030 TY S80 (1) SA (T) EA	6031 TY S80 (1) SA (T-2EXT) EA	6033 TY S80 (1) SA (U) EA	6034 TY S80 (1) SA (U-1EXT) EA	6035 TY S80 (1) SA (U-2EXT) EA	6064 IN BRIDGE MNT CLR SGN ASSM (TY N) EA	6065 IN BRIDGE MNT CLR SGN ASSM (TY S) EA	6076 REMOVE SM RD SN SUP & AM EA	636 6001 ALUM SIGNS (TY A) SF	6007 REPLACE EXT ALUM SIGNS (TY A) SF
22	1	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	2	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	3	M3-4 M1-6F	WEST <AUXILIARY SIGN> <FM SHIELD> FARM ROAD (ROUTE # 2611) 	24 x 12 24 x 24	X X		X														2 4	
	4	M3-2 M1-6F	EAST <AUXILIARY SIGN> <FM SHIELD> FARM ROAD (ROUTE # 2611) 	24 x 12 24 x 24	X X		X														2 4	
23	1	R1-1	STOP	30 x 30	X		X														6.25	
	2	R1-1	STOP	30 x 30	X		X														6.25	
	3	W3-5	<SYMBOL - REDUCED SPEED AHD> (XX) SEE NOTE: 4 	36 x 36	X		X														9	
SHEET TOTAL							7														44	

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"

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http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).
4. Speed Limit with "XX" shall be provided after Speed Study. For further clarification, refer General Notes item# 644.
5. Actual Clearance/distance to be shown will be verified in the field by the Contractor and approved by the Engineer prior to fabrication of this sign.

SUMMARY OF SMALL SIGNS

 SHEET 9 OF 10

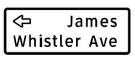
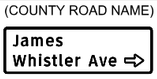
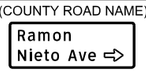
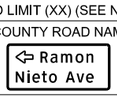
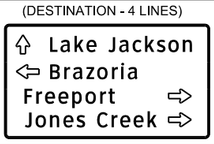
STATE DISTRICT	FEDERAL REGION	PROJECT NO.			SHEET
HOU	6				50
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
BRAZORIA		2524	02	025	FM 2611

STD-N29

DATE: 11/24/2020 TIME: 3:30:46 PM
FILE: H:\TrfSigning\FM-2611 CSJ 2524-02-025, ETC (Brazoria County)\Summary\2524-02-025 SMALL SIGN SUMMARY.dgn

DATE: 12/15/2020 TIME: 11:08:24 AM
FILE: H:\Trfsigning\FM-2611 CSJ 2524-02-025, ETC (Brazoria County)\Summary\2524-02-025 SMALL SIGN SUMMARY.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	644-INS SM RD SN SUP & AM													636	
							6001	6002	6004	6005	6007	6028	6030	6031	6033	6034	6035	6064	6065	6076	6001	6007
							TY 10BWG (1) SA (P)	TY 10BWG (1) SA (P-BM)	TY 10BWG (1) SA (T)	TY 10BWG (1) SA (T-2EXT)	TY 10BWG (1) SA (U)	TY S80 (1) SA (P-BM)	TY S80 (1) SA (T)	TY S80 (1) SA (T-2EXT)	TY S80 (1) SA (U)	TY S80 (1) SA (U-1EXT)	TY S80 (1) SA (U-2EXT)	IN BRIDGE MNT CLR SGN ASSM (TY N)	IN BRIDGE MNT CLR SGN ASSM (TY S)	REMOVE SM RD SN SUP & AM	ALUM SIGNS (TY A)	REPLACE EXT ALUM SIGNS (TY A)
							EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	SF	SF
24	1	D21-1aTL	(COUNTY ROAD NAME) 	66 x 24	X				X												11	
	2	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	3	D21-1aTR	(COUNTY ROAD NAME) 	78 x 24	X				X												13	
	4	R1-1	STOP	30 x 30	X		X														6.25	
	5	D21-1aTR	(COUNTY ROAD NAME) 	66 x 24	X				X												11	
	6	R1-1	STOP	30 x 30	X		X														6.25	
	7	R2-1	SPEED LIMIT (XX) (SEE NOTE: 4)	24 x 30	X		X														5	
	8	D21-1aTL	(COUNTY ROAD NAME) 	54 x 24	X				X												9	
	9	W17-9T	Hitchhiker inmates 	78 X 24	X				X												13	
	10	M3-4	WEST <AUXILIARY SIGN>	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X																4	
		M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15	X																2.1875	
		M1-6T	(ROUTE # 36) TEXAS	24 x 24	X																4	
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN> 	21 x 15	X																2.1875	
	11	W2-1	SYMBOL - 4-WAY INTERSECTION AHEAD	30 x 30	X		X														6.25	
	12	W3-3	SYMBOL - SIGNALIZED INTERSECTION AHEAD	30 x 30	X		X														6.25	
	13	M2-1	JCT <AUXILIARY SIGN>	21 x 15	X		X														2.1875	
		M1-6T	(ROUTE # 36) TEXAS 	24 x 24	X																4	
	14	D1-3(MOD)	(DESTINATION - 4 LINES) 	108 x 60	X									X							45	
	15	M3-1	NORTH (WHITE)	24 x 12	X		X														2	
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE # 2611)	24 x 24	X																4	
		M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15	X																2.1875	
		M1-6T	(ROUTE # 36) TEXAS	24 x 24	X																4	
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN> 	21 x 15	X																2.1875	
SHEET TOTAL							9		5					1							172	
TOTAL							172		19				19	9	2					145*	1982	

* Removal of all existing signs are not shown in the Pavement Marking and Signing Layouts.

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Detail Sheet (GEN).
4. Speed Limit with "XX" shall be provided after Speed Study. For further clarification, refer General Notes Item 644.
5. Actual Clearance/distance to be shown will be verified in the field by the Contractor and approved by the Engineer prior to fabrication of this sign.

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

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"

SUMMARY OF SMALL SIGNS

 SHEET 10 OF 10

STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
HOU	BRAZORIA	2524	02	025	51

STD-N29

TRAFFIC CONTROL SEQUENCE

PHASE I

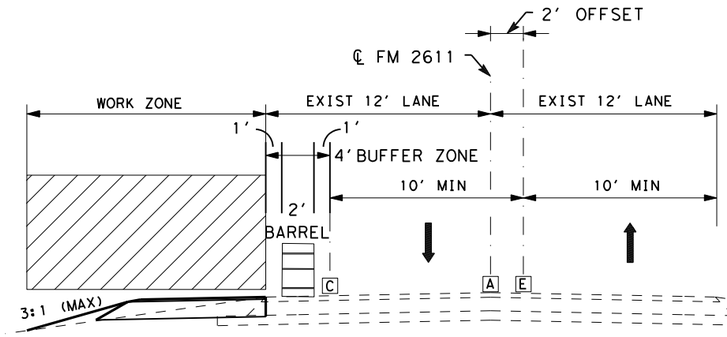
1. SET UP PERIMETER BARRICADES, SIGNS, AND PERTINENT TRAFFIC CONTROL DEVICES ACCORDING TO THE BARRICADES AND CONSTRUCTION STANDARDS.
2. INSTALL SWP3 DEVICES ACCORDING TO SWP3 LAYOUT SHEETS.
3. SHIFT TRAFFIC IN WORK AREA BY ELIMINATING EXIST CENTERLINE PVMT MARKS AND PLACING WORK ZONE PVMT MARKS IN CONJUNCTION WITH TCP TYPICAL A AND TCP(2-3)-18.
4. UTILIZE THE TCP TYPICAL A TO WIDEN WB ROADWAY IN CONJUNCTION WITH TCP(2-3)-18 FOR ADVANCED SIGNS.
5. SHIFT TRAFFIC IN WORK AREA BY REMOVING WORK ZONE CENTERLINE/EDGELINE PVMT MARKS AND PLACING NON-REMOV WORK ZONE PVMT MARKS IN CONJUNCTION WITH TCP TYPICAL B AND TCP(2-3)-18.
6. UTILIZE THE TCP TYPICAL B TO WIDEN EB ROADWAY IN CONJUNCTION WITH TCP(2-3)-18 FOR ADVANCED SIGNS.

PHASE II

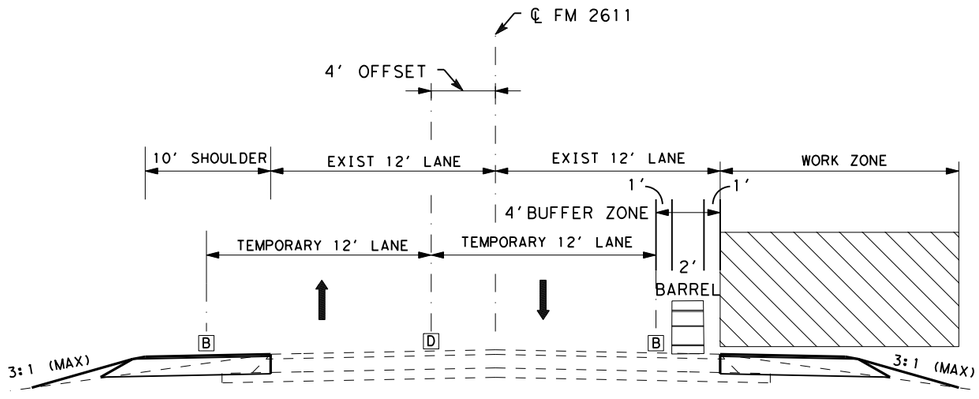
5. CONSTRUCT THE FULL WIDTH SEAL COAT AND OVERLAY UTILIZING TCP(2-3)-18.
6. UTILIZE MOBILE TCP STANDARDS TO INSTALL TEMPORARY AND PERMANENT PAVEMENT MARKINGS ACCORDING TO PLANS.

LEGEND

- [A] ITEM 677-6001 ELIM EXT PAV MRK & MRKS (4")
- [B] ITEM 662-6004 WK ZN PAV MRK NON-REMOV (W) 4" (SLD)
- [C] ITEM 662-6063 WK ZN PAV MRK REMOV (W) 4" (SLD)
- [D] ITEM 662-6034 WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)
- [E] ITEM 662-6095 WK ZN PAV MRK REMOV (Y) 4" (SLD)



TCP TYPICAL A



TCP TYPICAL B

NOTES:

1. ONLY INSTALL CLOSURES WHERE WORK IS BEING CONDUCTED. DO NOT EXCAVATE BEYOND WHAT CAN BE REPLACED SAME WORK DAY.
2. COORDINATION WITH ADJACENT CONSTRUCTION PROJECT IS REQUIRED.
3. UTILIZE POLICE OFFICERS FOR THE VARIOUS ITEMS OF WORK AS APPROVED BY THE ENGINEER, SHOULD TRAFFIC BACK-UPS WARRANT THEIR USE.
4. THIS IS A SUGGESTED SEQUENCE OF WORK. THE CONTRACTOR MAY SUBMIT A REVISED SEQUENCE OF WORK TO THE ENGINEER FOR APPROVAL.
5. SEE TYPICAL SECTIONS AND LAYOUTS FOR ADDITIONAL DETAILS.
6. ALL WORK AND MATERIAL TO ACHIEVE TRAFFIC CONTROL SHALL BE PER STANDARDS, TMUTCD AND SUBSIDIARY TO ITEM 502 EXCEPT AS MAY BE UTILIZED BY THE SAFETY CONTINGENCY FORCE ACCOUNT.

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E.

12/22/2020

Texas Department of Transportation

CONSTRUCTION SEQUENCE AND NOTES

CONT	SECT	JOB	HIGHWAY
2524	02	025	FM 2611
DIST	FEDERAL AID PROJECT NUMBER		
HOU			
	COUNTY		SHEET NO.
	BRAZORIA		52

DATE: 12/21/2020 1:48:32 PM
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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. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

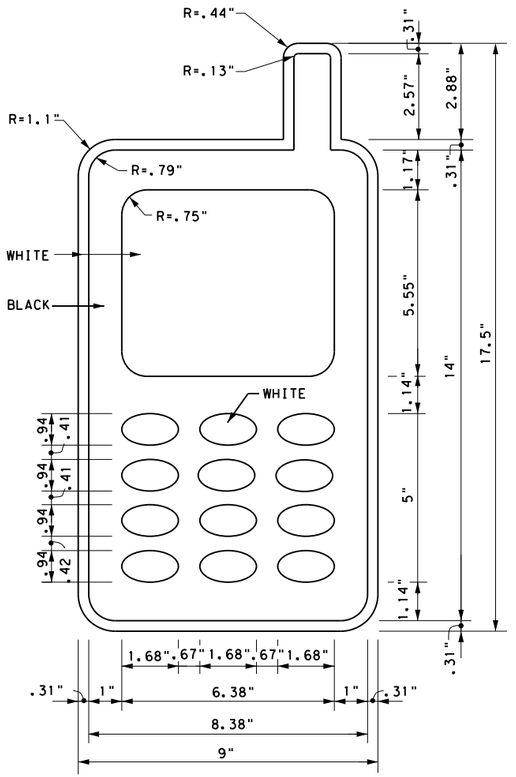
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

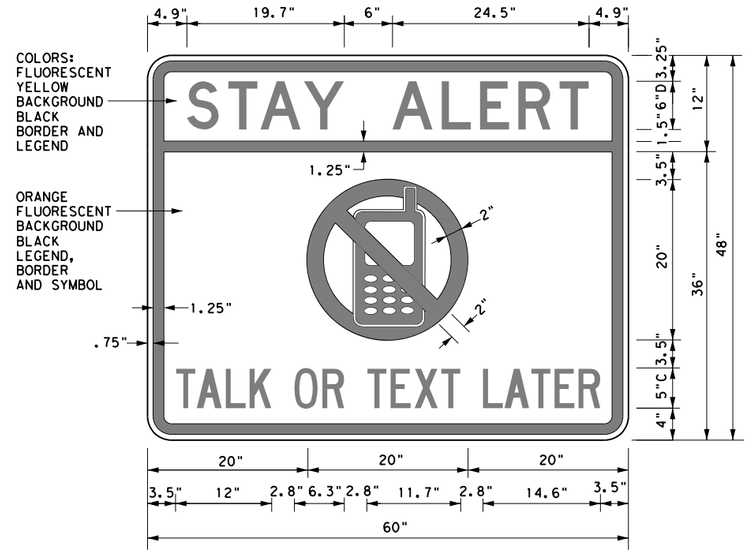
12. The Engineer has the final decision on the location of all traffic control devices.

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 APPAREL 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.





3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;
[STAY ALERT] Font: D
3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange;
[TALK OR TEXT LATER] Font: C specified length;

SIGN DETAIL (G20-10T)

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

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

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13	HOU	BRAZORIA		53

DATE: 12/21/2020 1:48:33 PM
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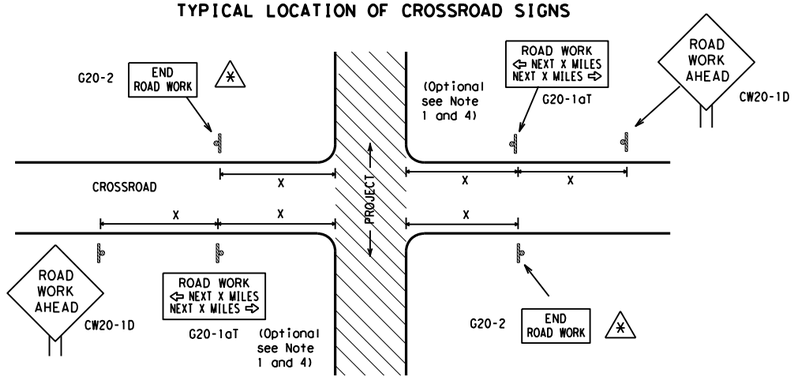
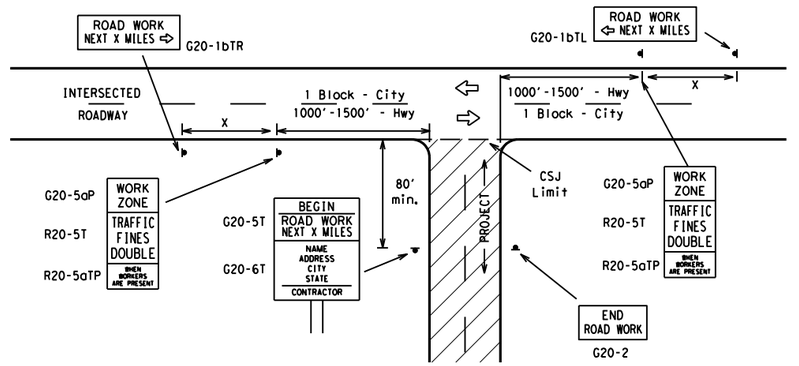
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

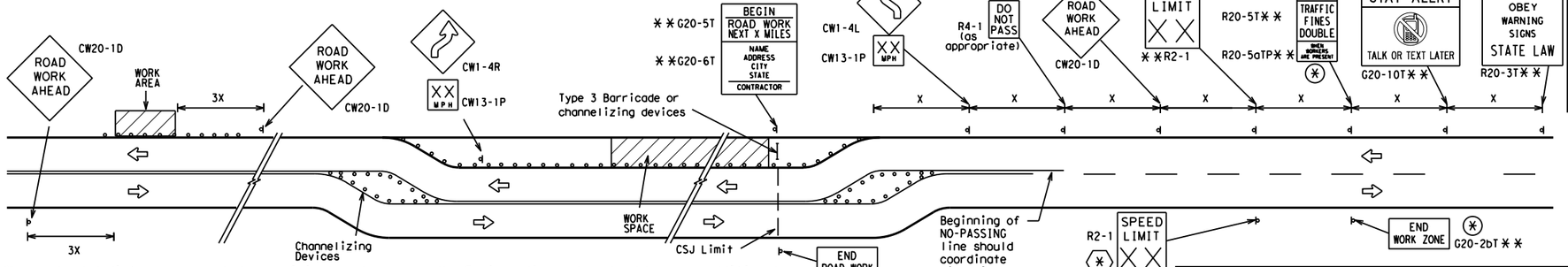
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

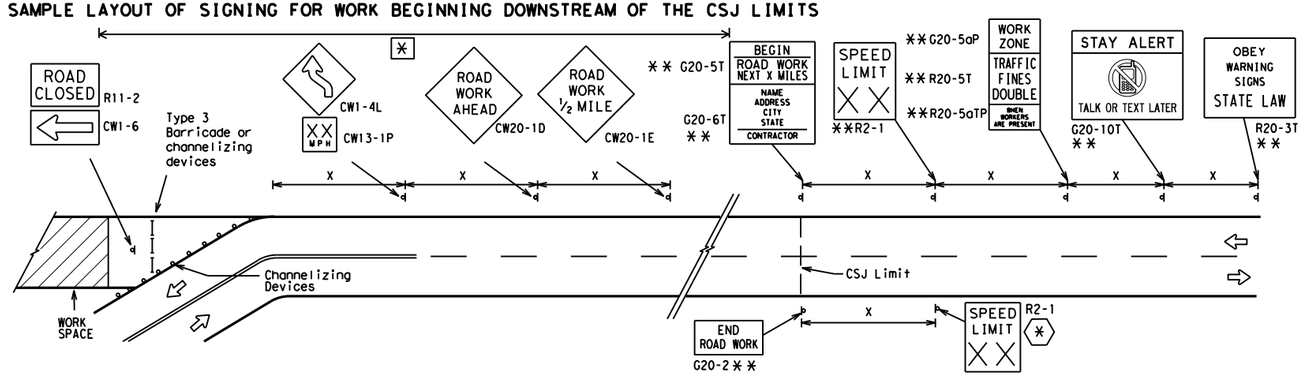
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

** Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

[*] 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

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

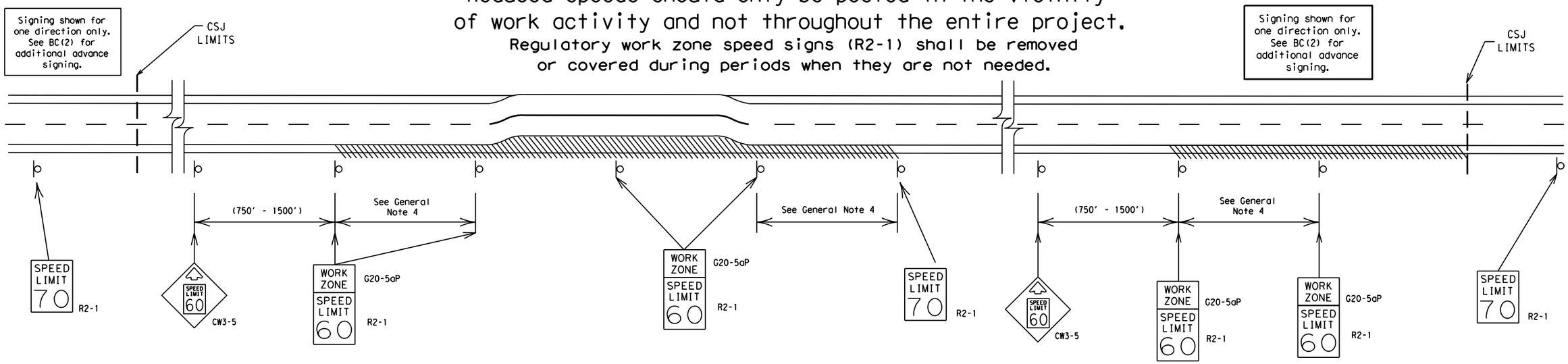
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	HOU	BRAZORIA		54

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

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SHEET 3 OF 12

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	2524	02	025,ETC	FM 2611
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		55

DATE: 12/21/2020 1:48:36 PM
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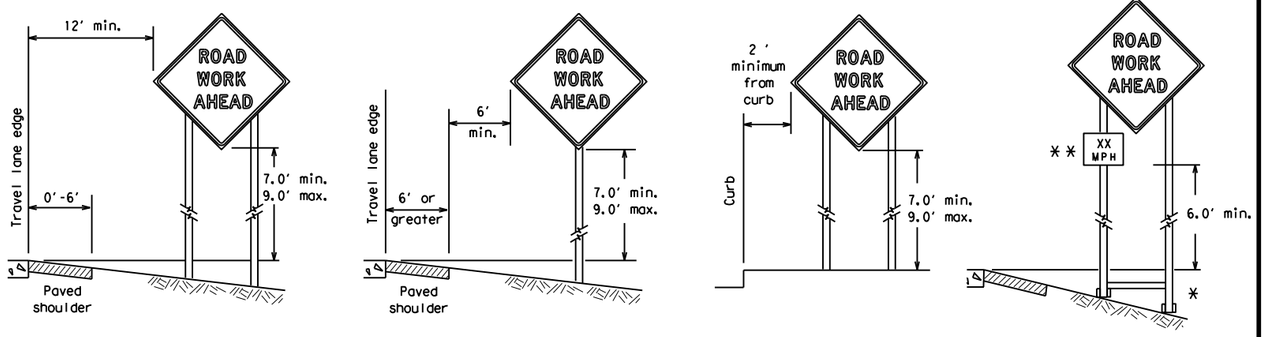
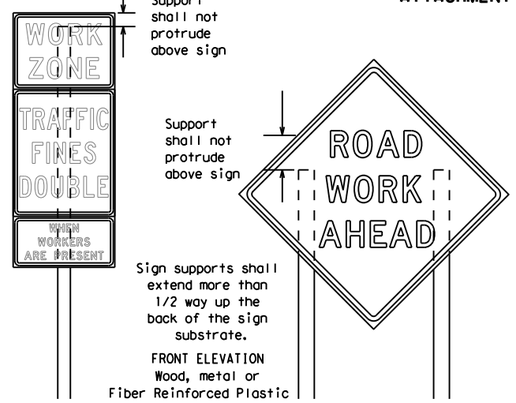
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



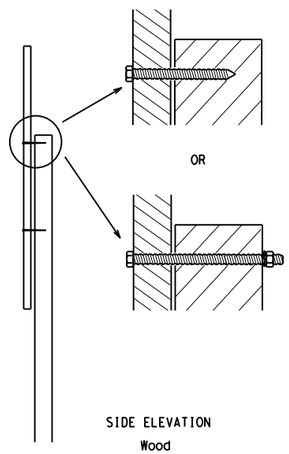
* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



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

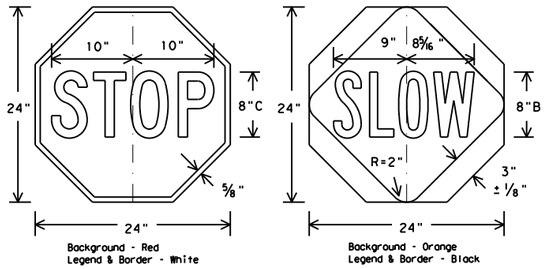


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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



CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	HOU	BRAZORIA		56

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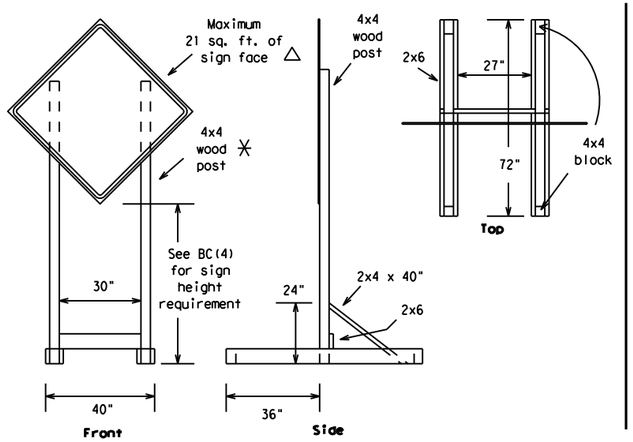
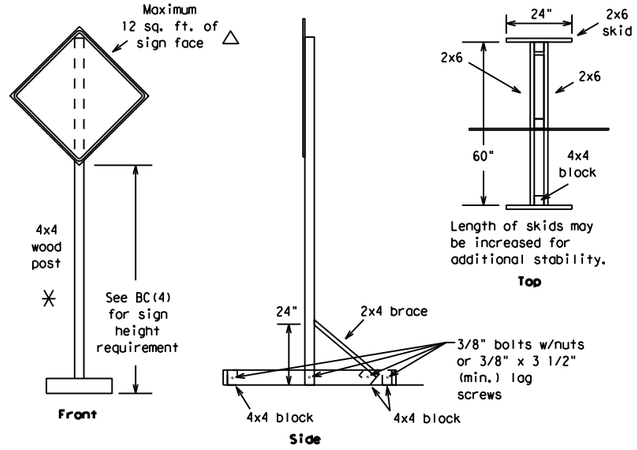
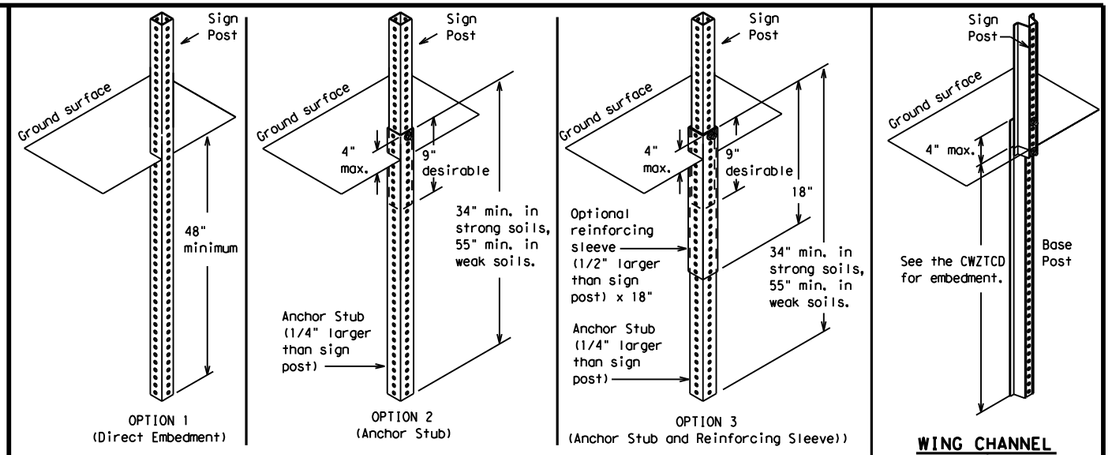




SKID MOUNTED WOOD SIGN SUPPORTS

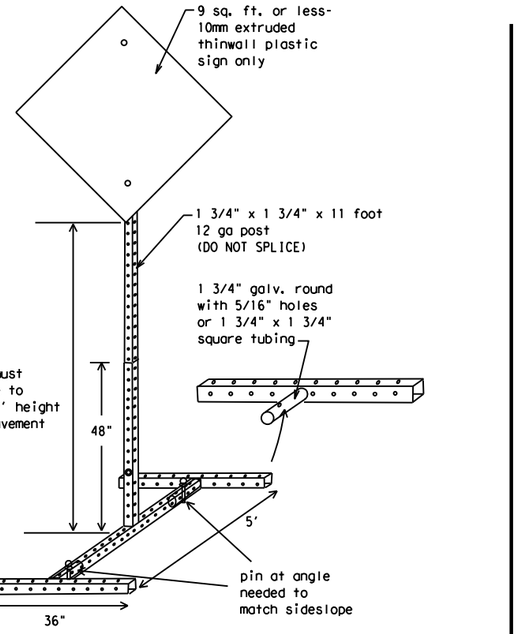
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

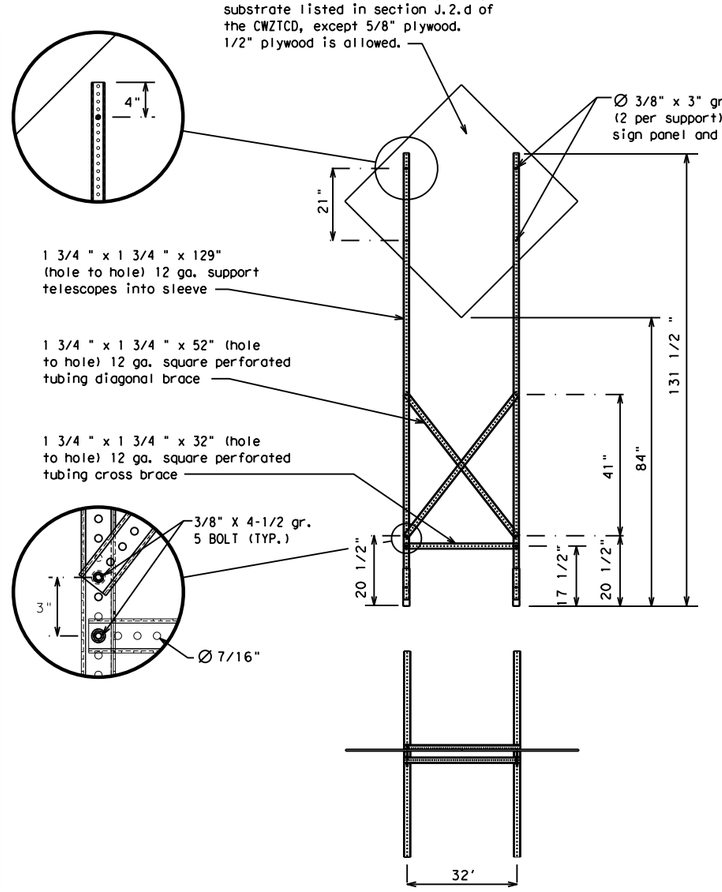


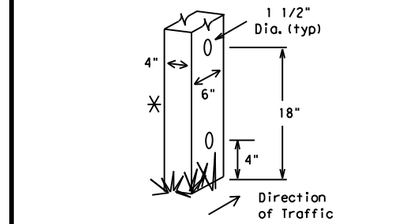
PERFORATED SQUARE METAL TUBING

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.

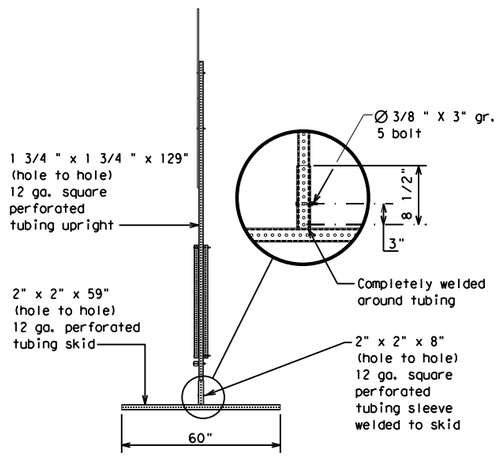






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation — Traffic Operations Division Standard

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	HOU	BRAZORIA		57

DATE: 12/21/2020 1:48:39 PM
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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

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

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

Phase 2: Possible Component Lists

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

* * See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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7-13	HOU	BRAZORIA		58

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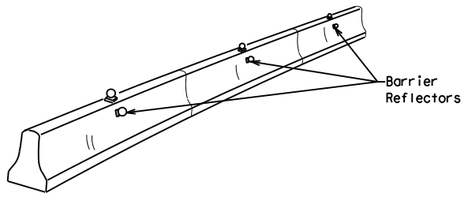
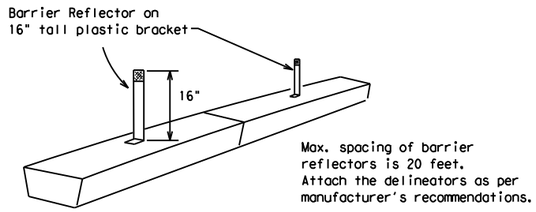
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

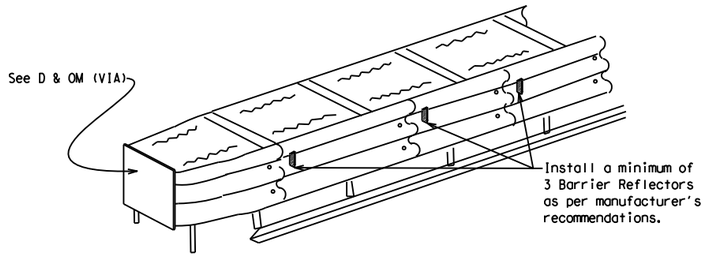


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)

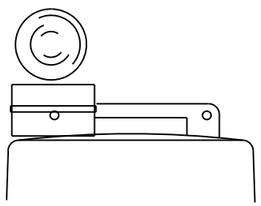


DELINEATION OF END TREATMENTS

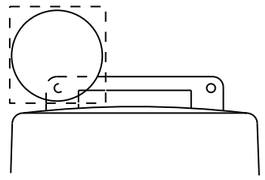
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

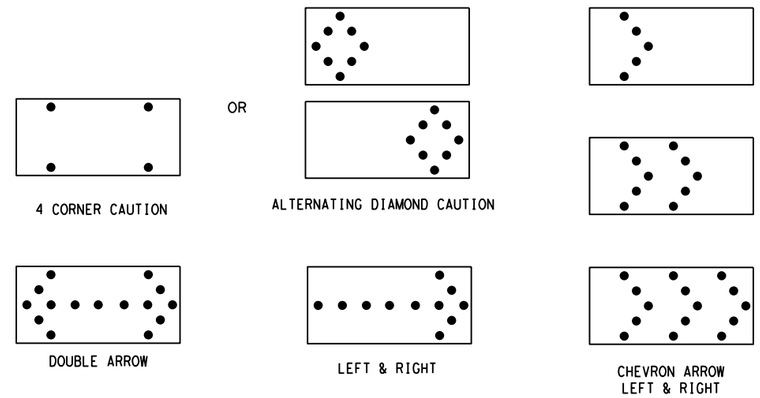
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

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

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Operations Division Standard

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

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	2524	02	025,ETC	FM 2611
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		59

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

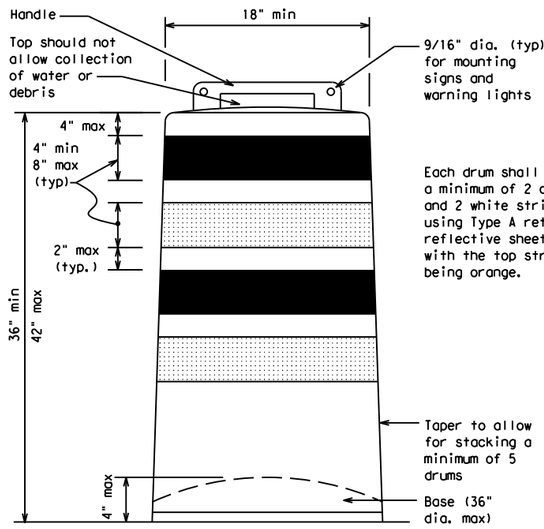
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

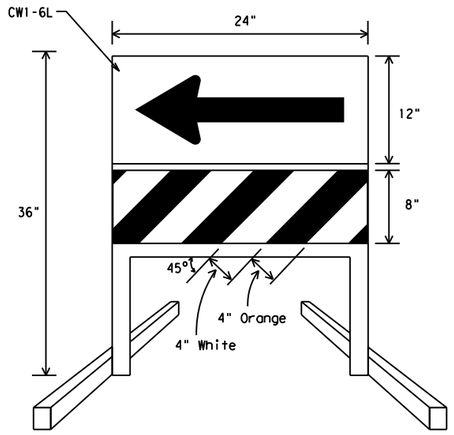
RETROREFLECTIVE SHEETING

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

BALLAST

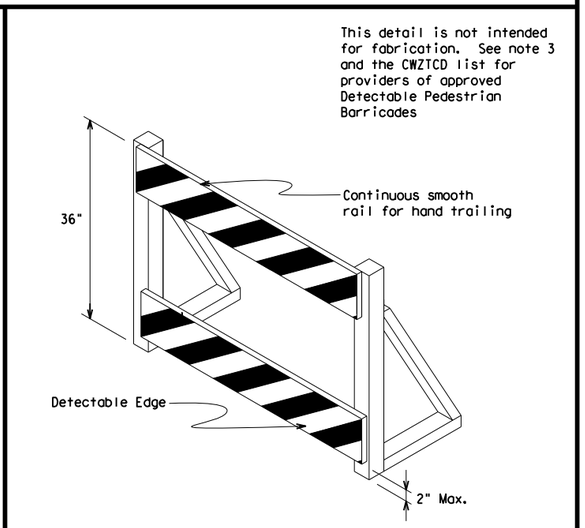
1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other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





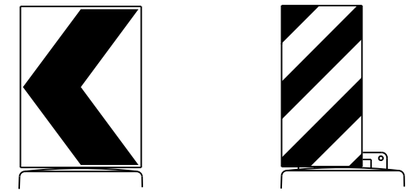
DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.



DETECTABLE PEDESTRIAN BARRICADES

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



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

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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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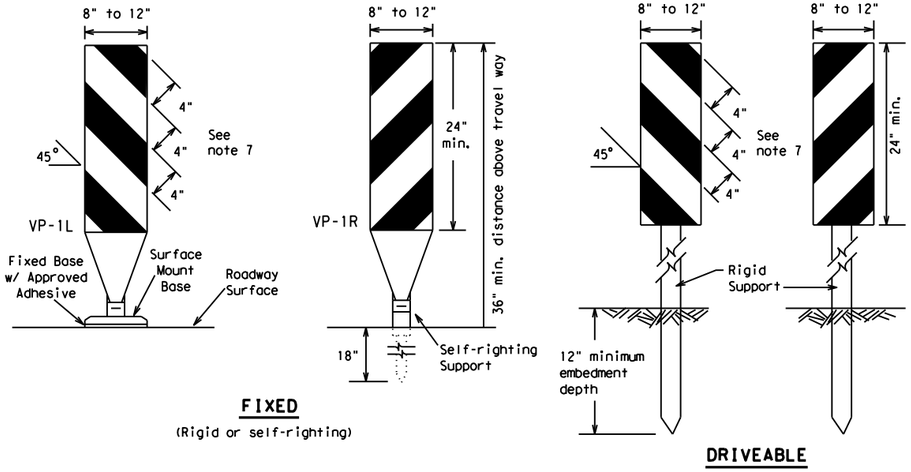
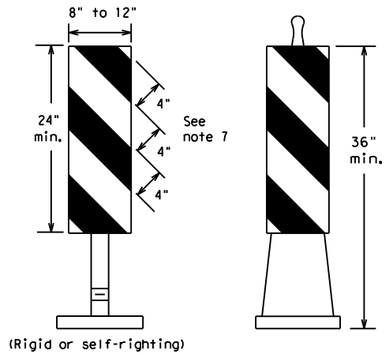


FIXED
(Rigid or self-righting)

DRIVEABLE

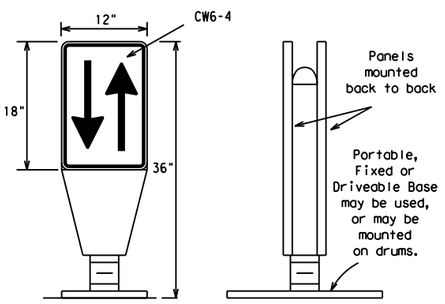


(Rigid or self-righting)

PORTABLE

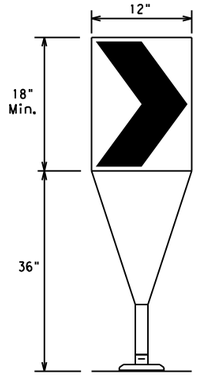
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of 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 conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



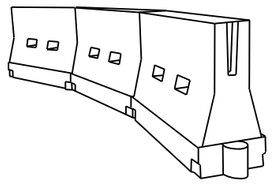
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed 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 NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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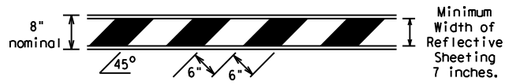
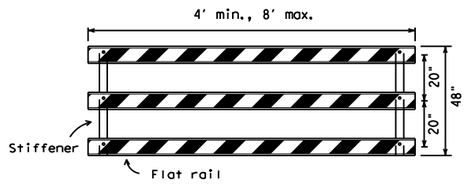
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



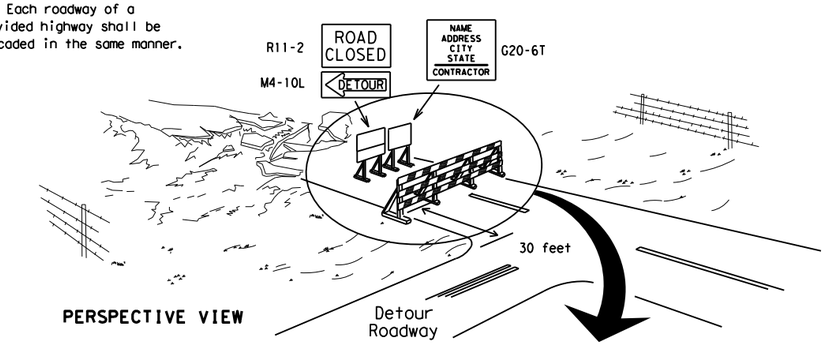
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

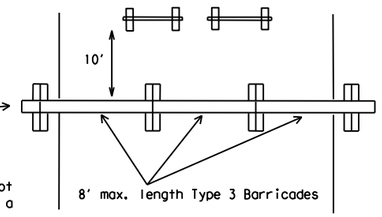
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

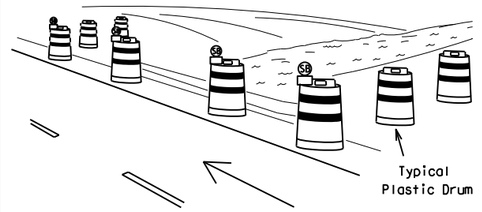
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

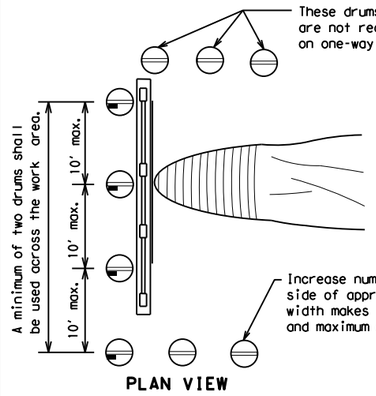
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

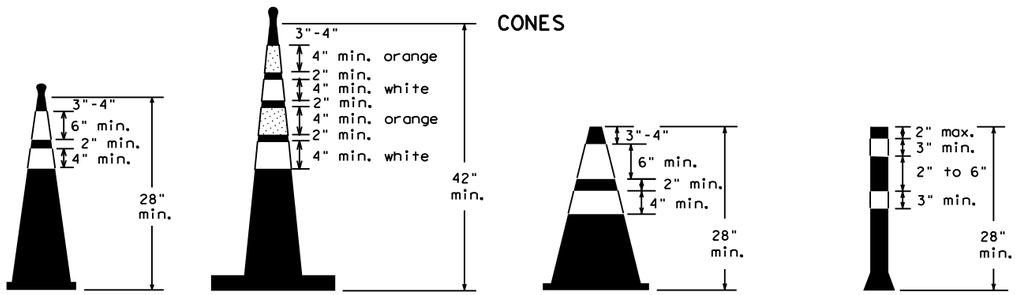
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

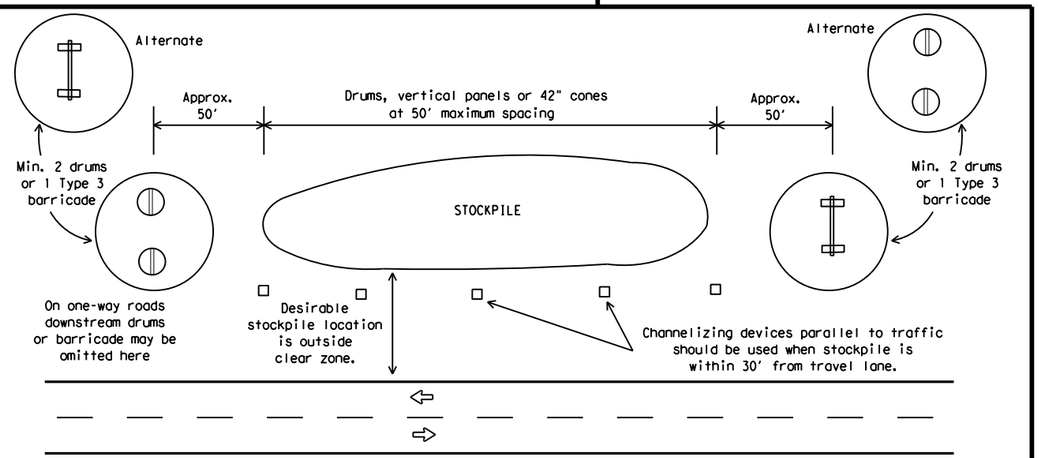
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

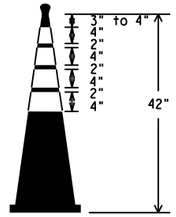
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



EDGELINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

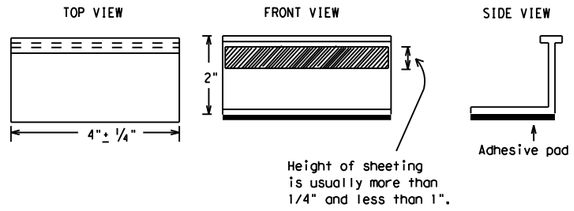
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

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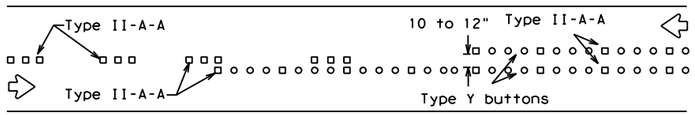
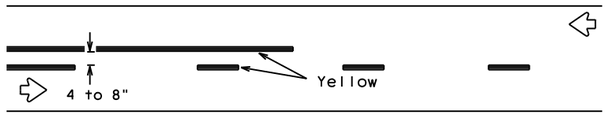
PAVEMENT MARKING PATTERNS

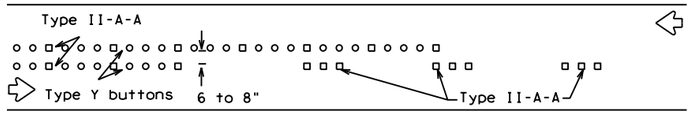
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



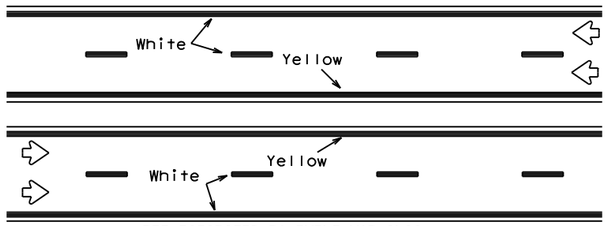
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



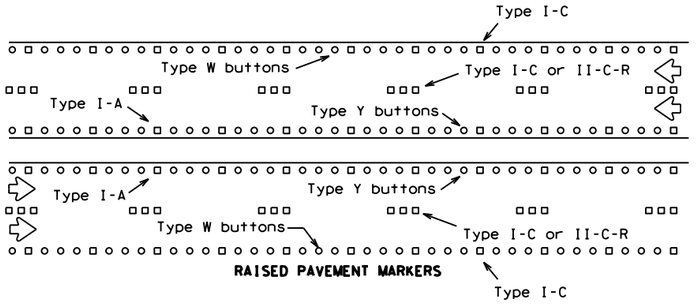
RAISED PAVEMENT MARKERS - PATTERN B

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

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



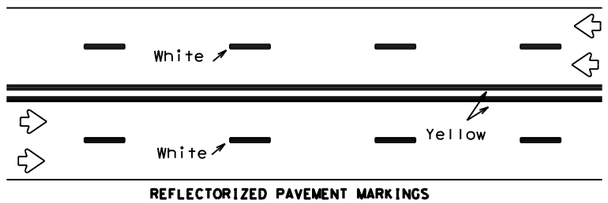
REFLECTORIZED PAVEMENT MARKINGS



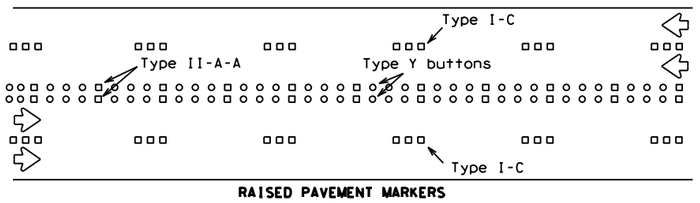
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



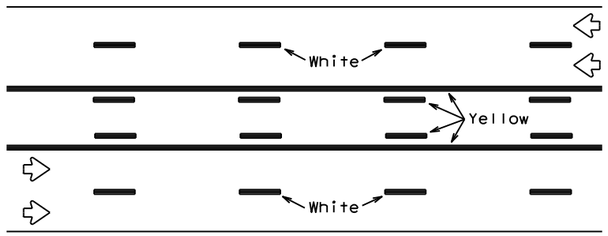
REFLECTORIZED PAVEMENT MARKINGS



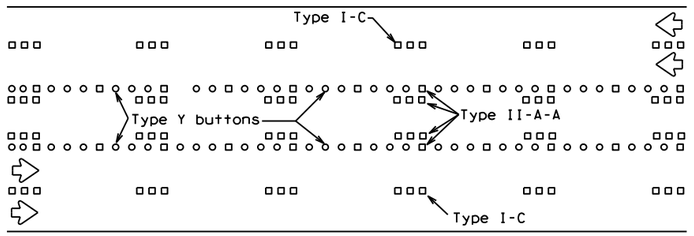
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

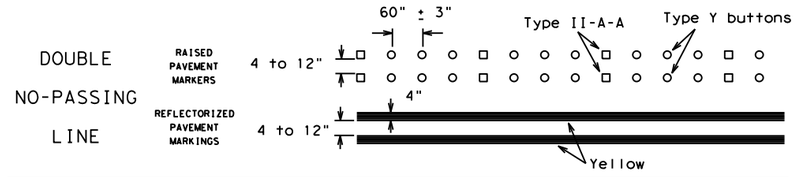
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

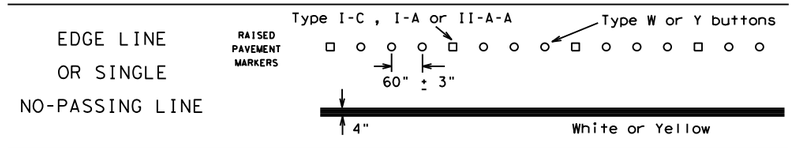
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

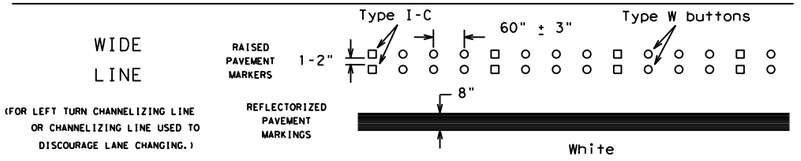


EDGE LINE OR SINGLE NO-PASSING LINE



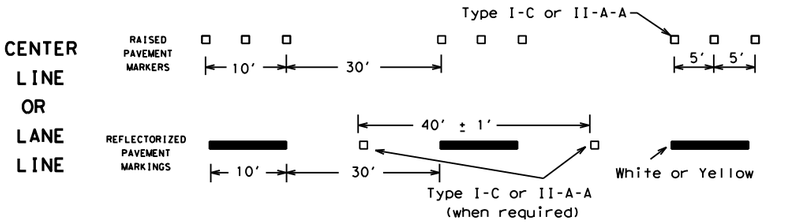
WIDE LINE

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

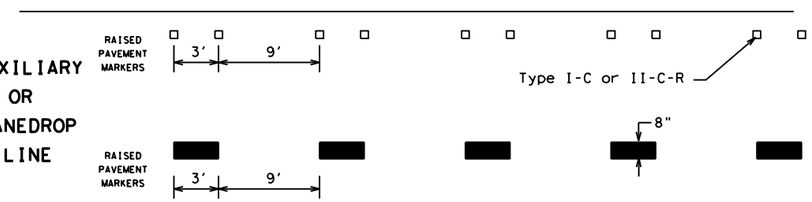


BROKEN LINES

CENTER LINE OR LANE LINE

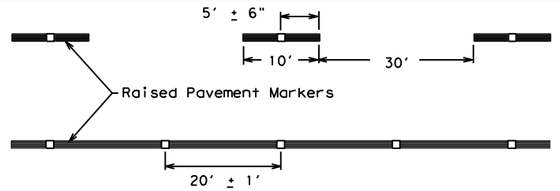


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

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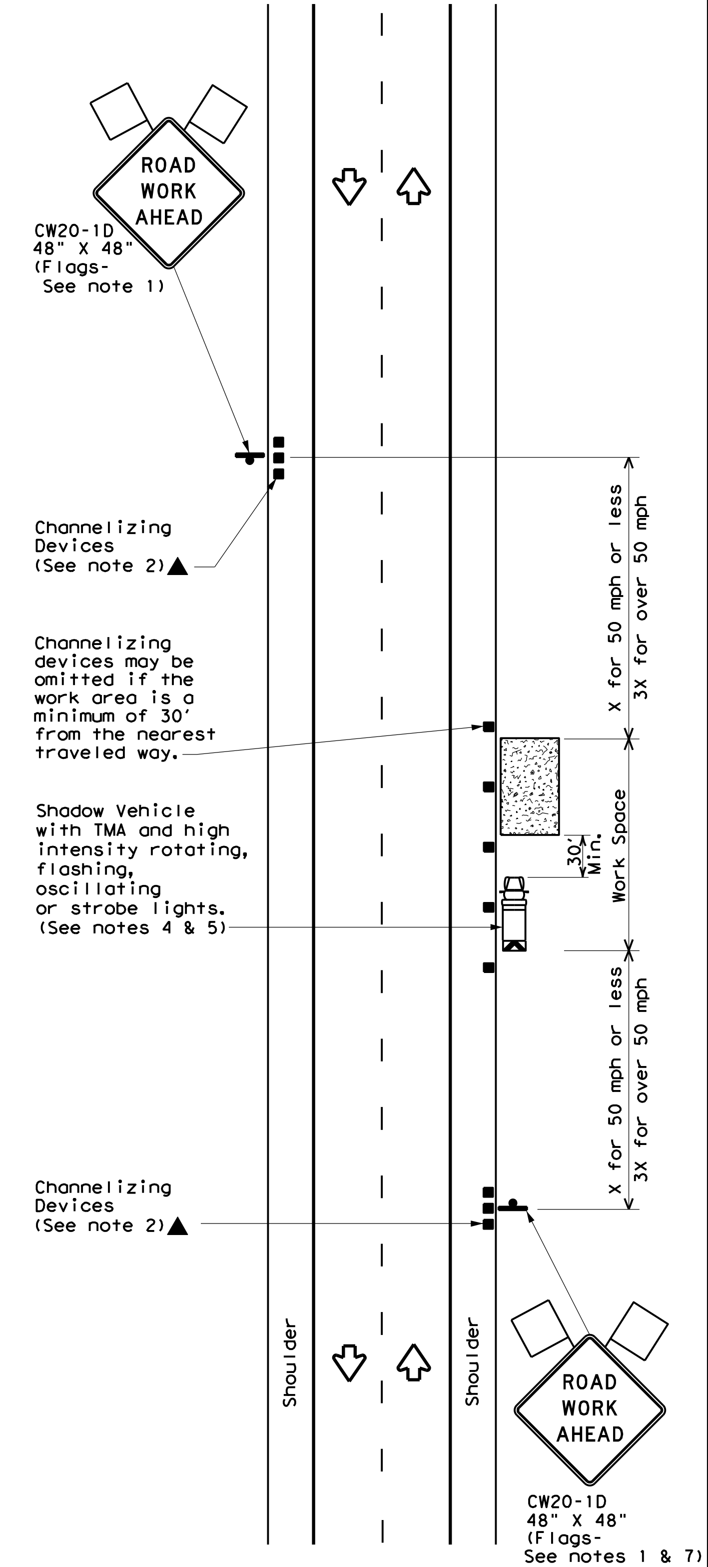
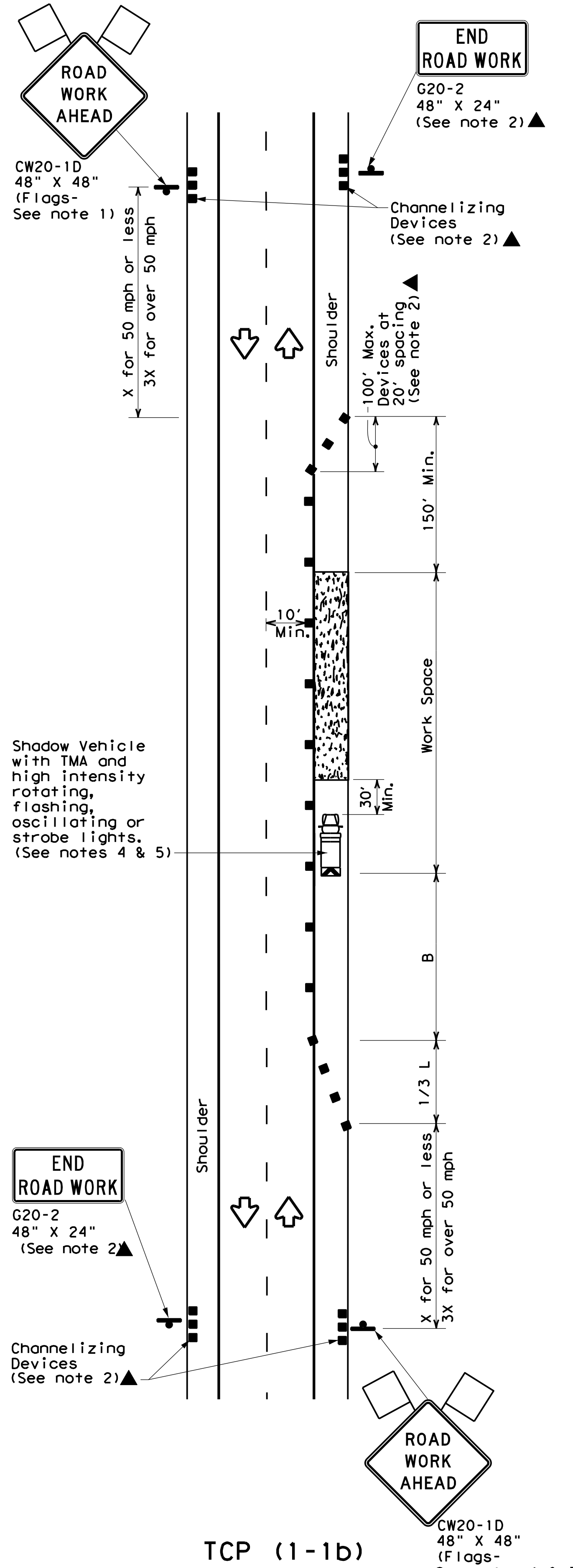


TCP (1-1a)

WORK SPACE NEAR SHOULDER

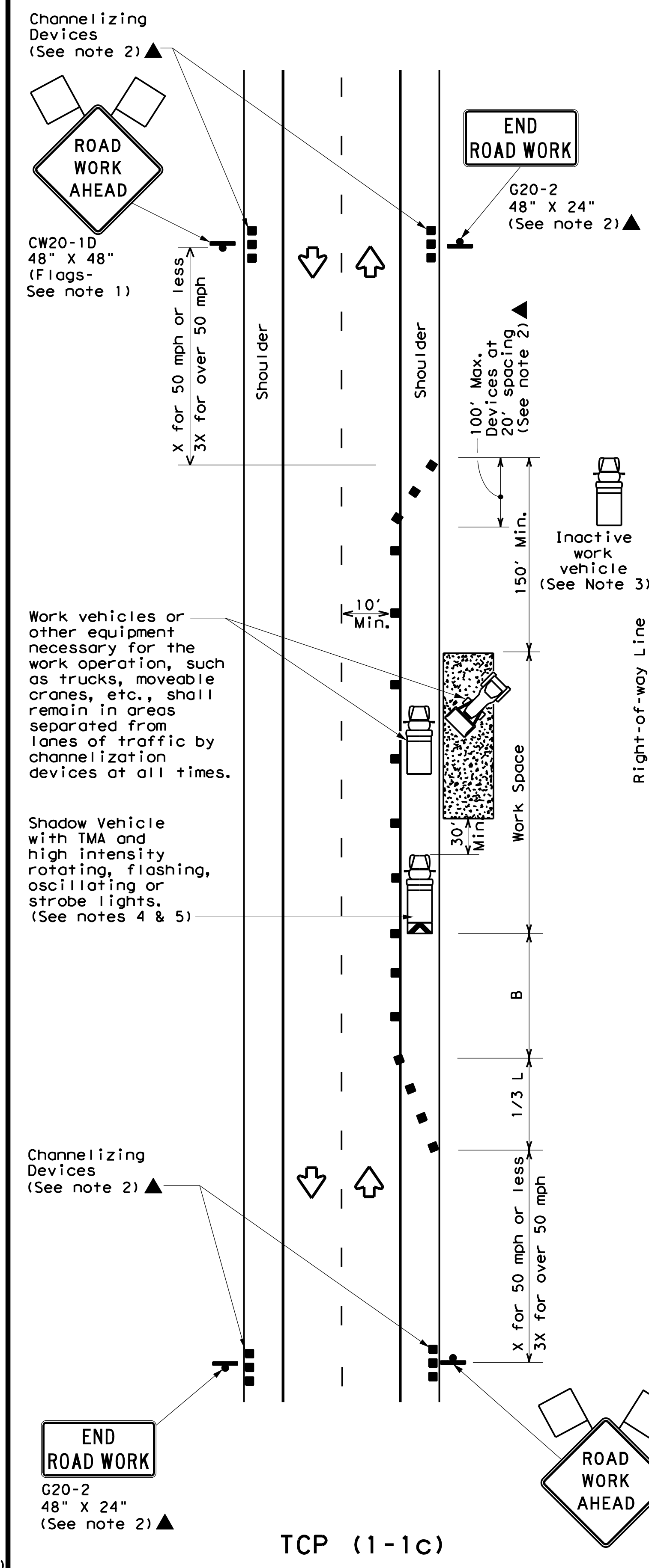
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER

Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER

Conventional Roads

LEGEND

Symbol	Description	Symbol	Description
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		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

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT 2524	SECT 02	JOB 025,ETC	HIGHWAY FM 2611
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	DIST HOU		COUNTY BRAZORIA	SHEET NO. 65

151

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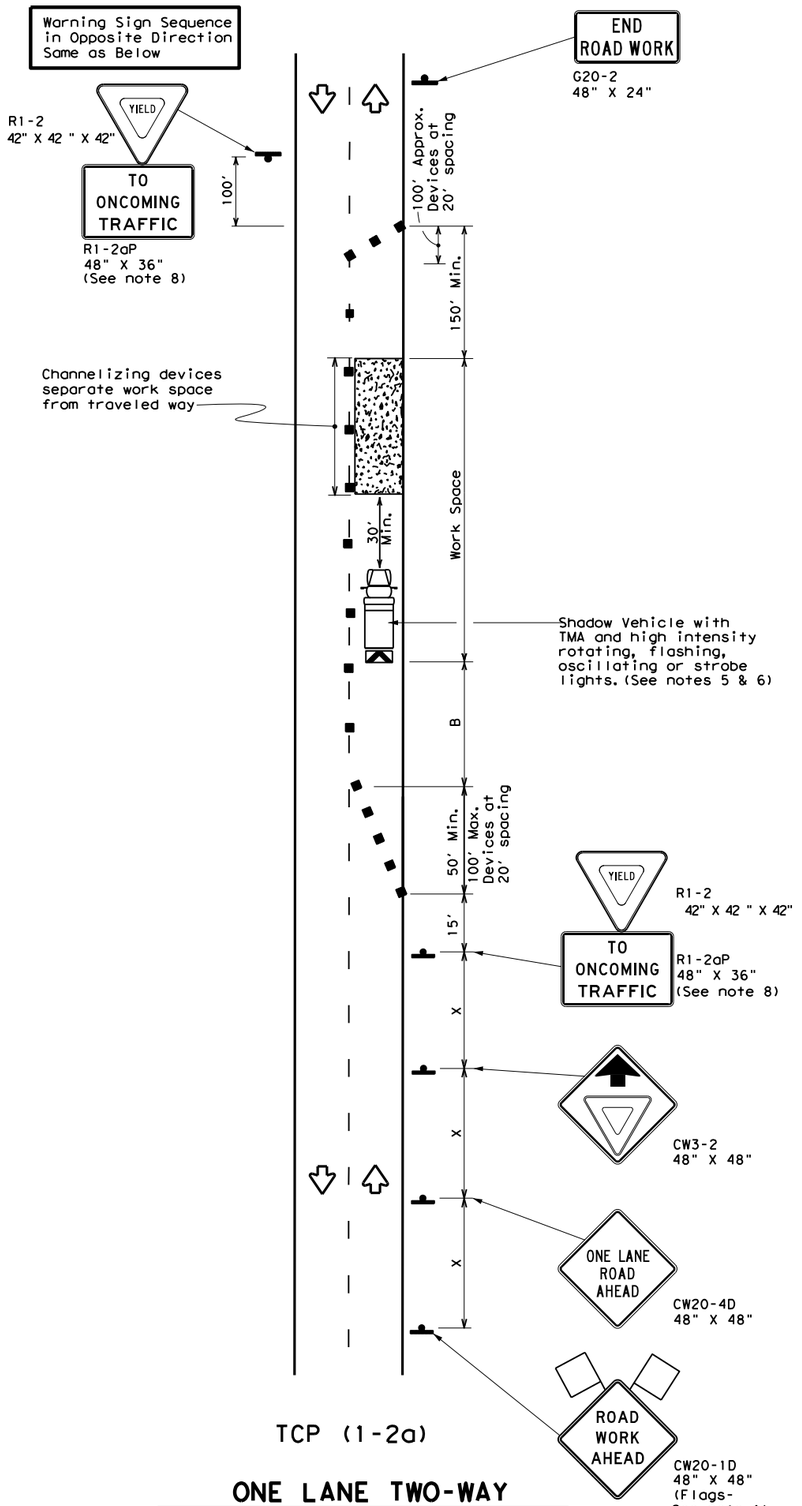
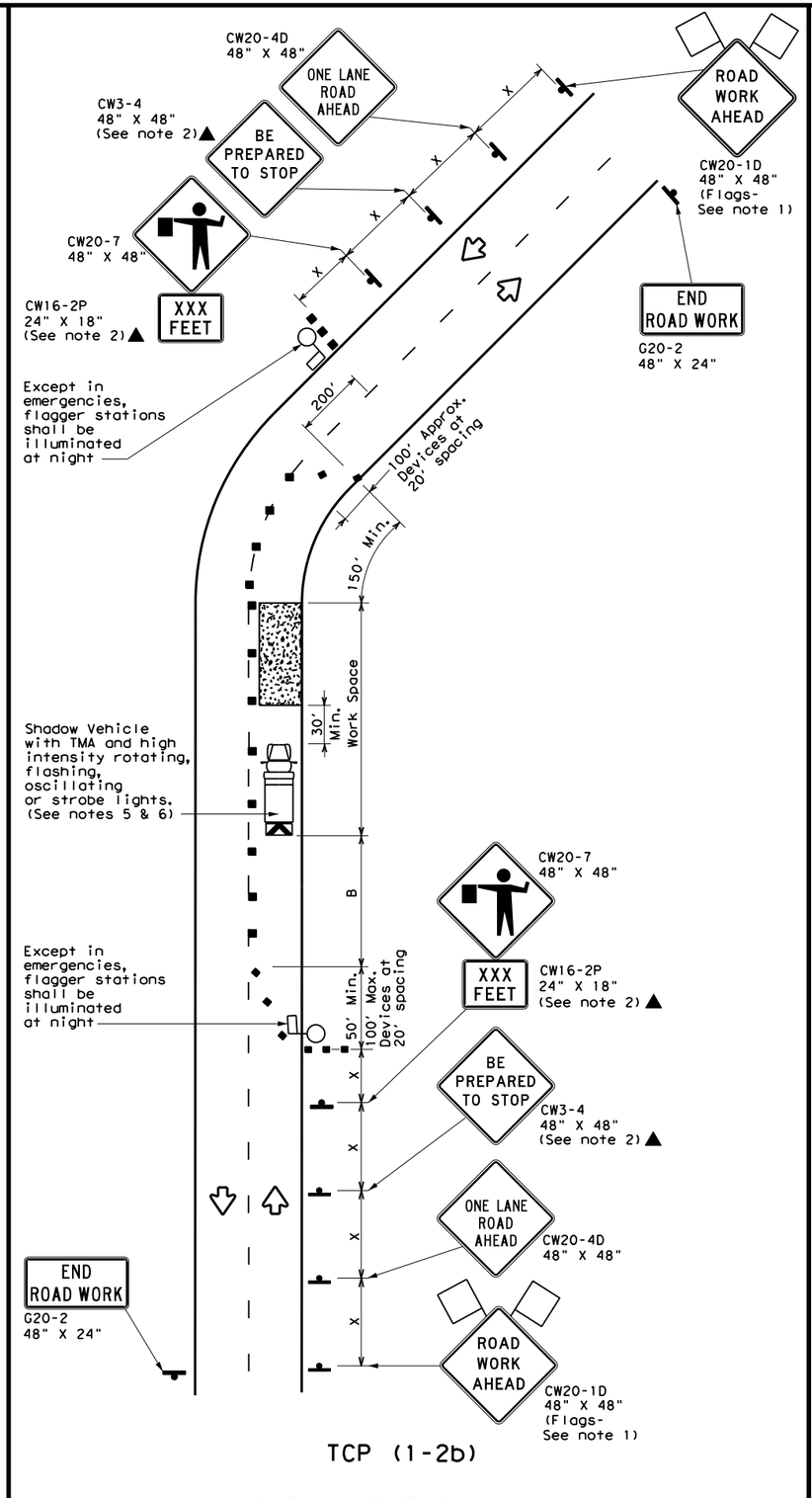


TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

7. 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.
8. 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)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. 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).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	2524	02	025,ETC	FM 2611
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		66

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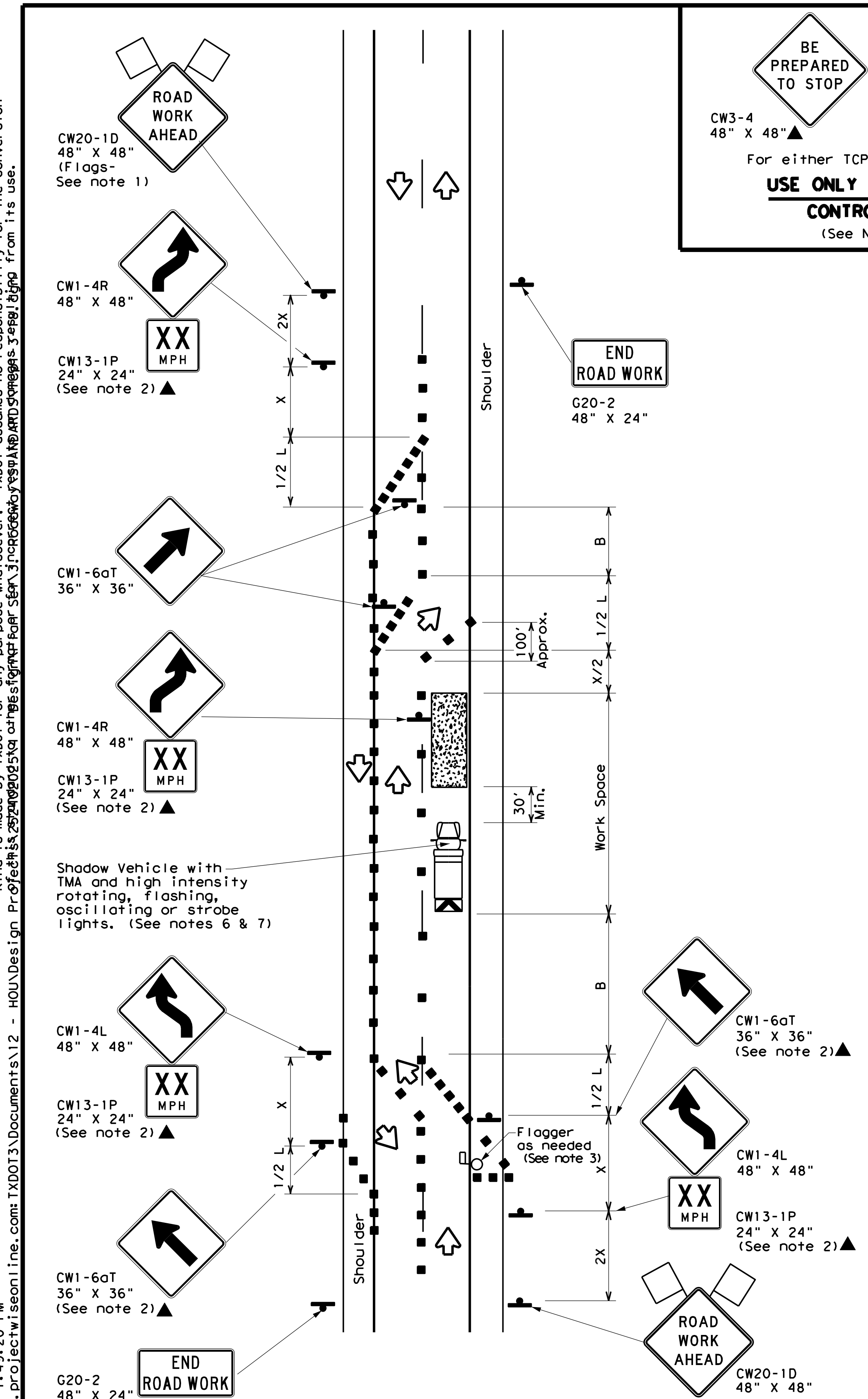


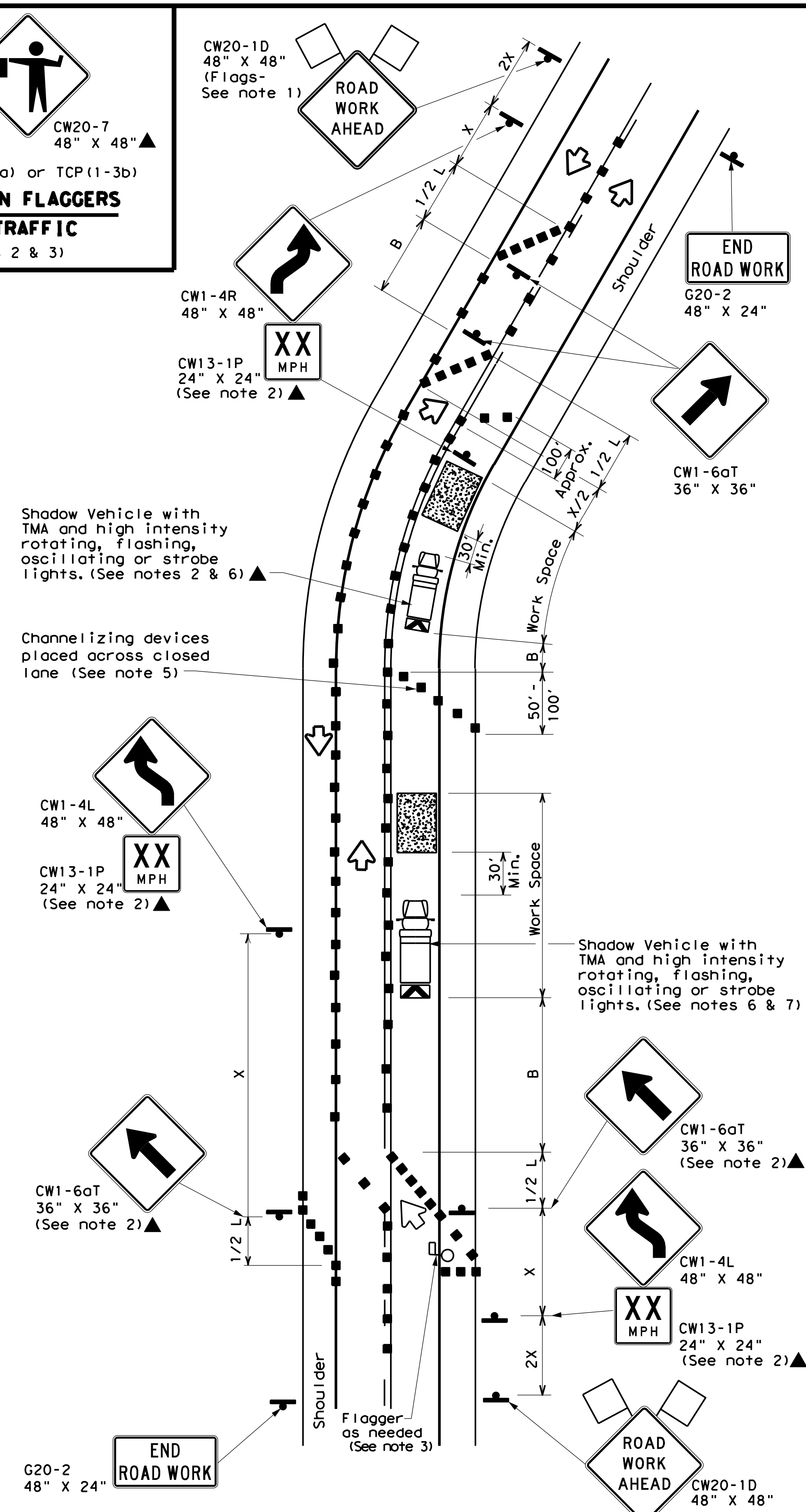
TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW

For either TCP(1-3a) or TCP(1-3b)

USE ONLY WHEN FLAGGERS CONTROL TRAFFIC

(See Notes 2 & 3)



TCP (1-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. 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.
4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. 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.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
8. 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

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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2-94 4-98 / 8-95 2-12 / 1-97 2-18	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	67

153

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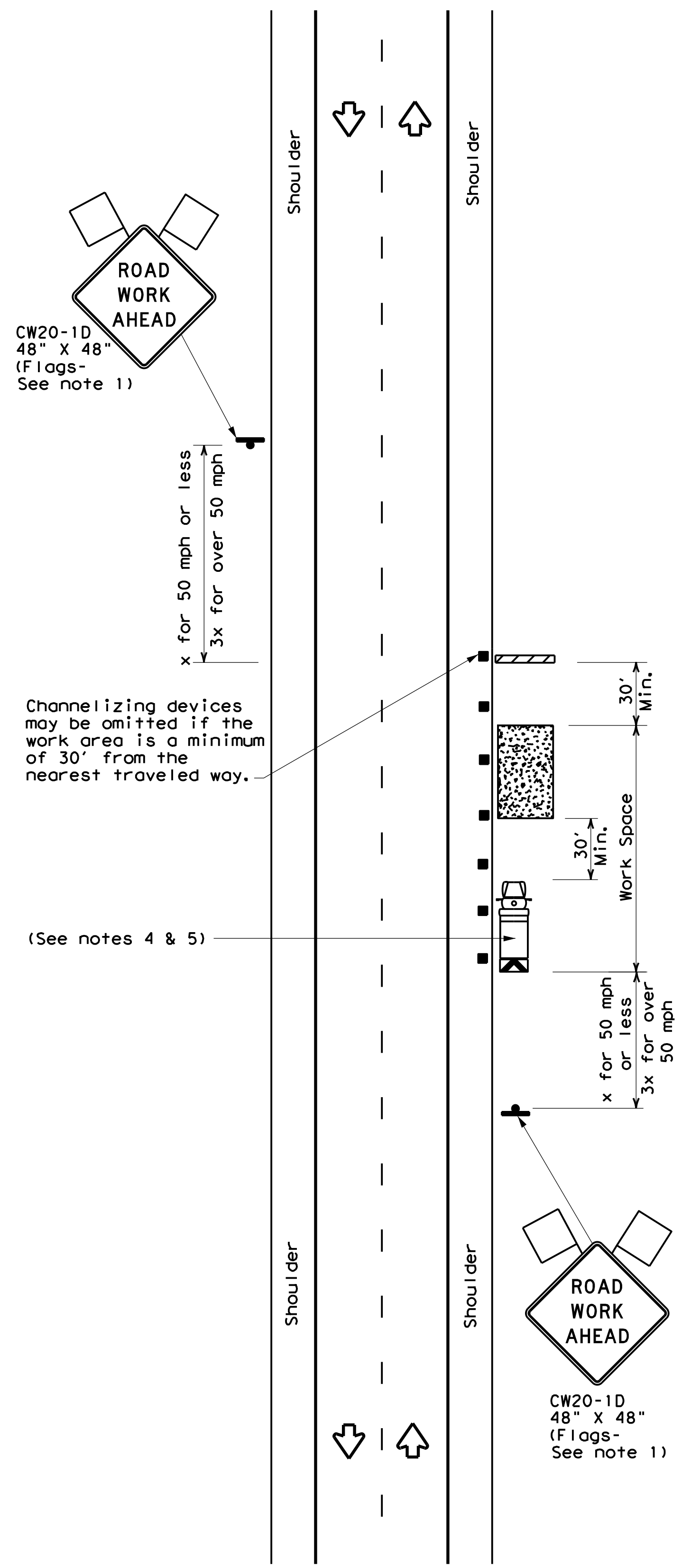
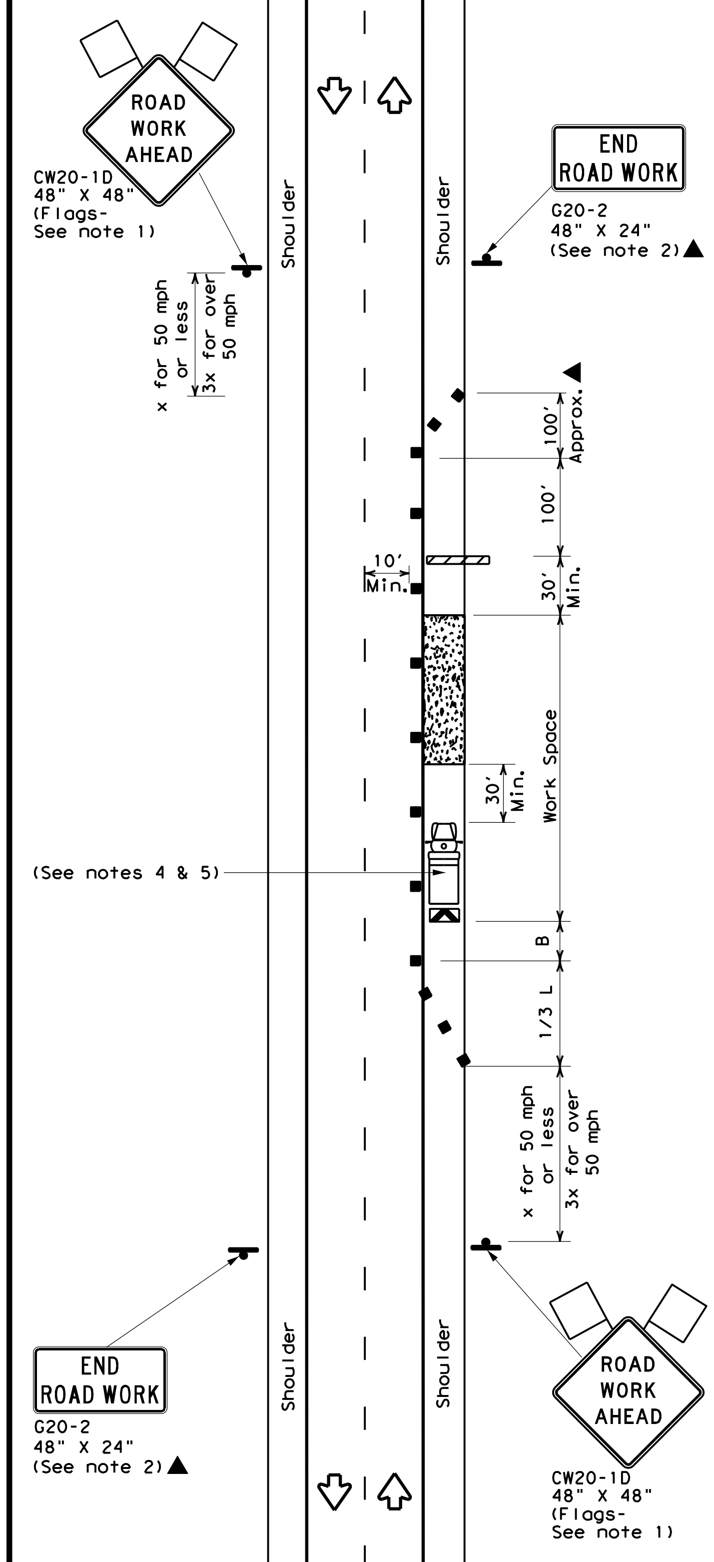


TCP (2-1a)

WORK SPACE NEAR SHOULDER

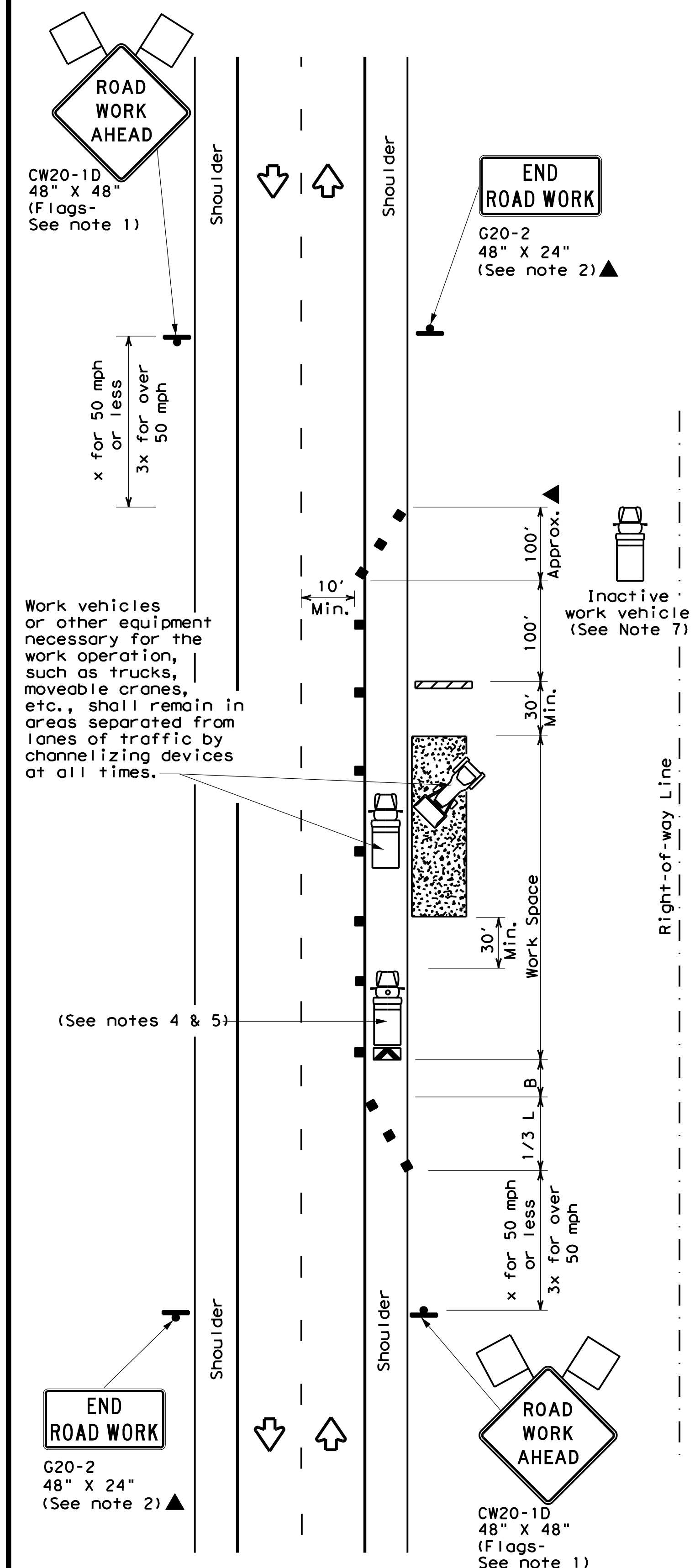
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER

Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER

Conventional Roads

LEGEND

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

* Conventional Roads Only

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

TYPICAL USAGE

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

GENERAL NOTES

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	2524	02	025,ETC	FM 2611
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	HOU		BRAZORIA	68

161

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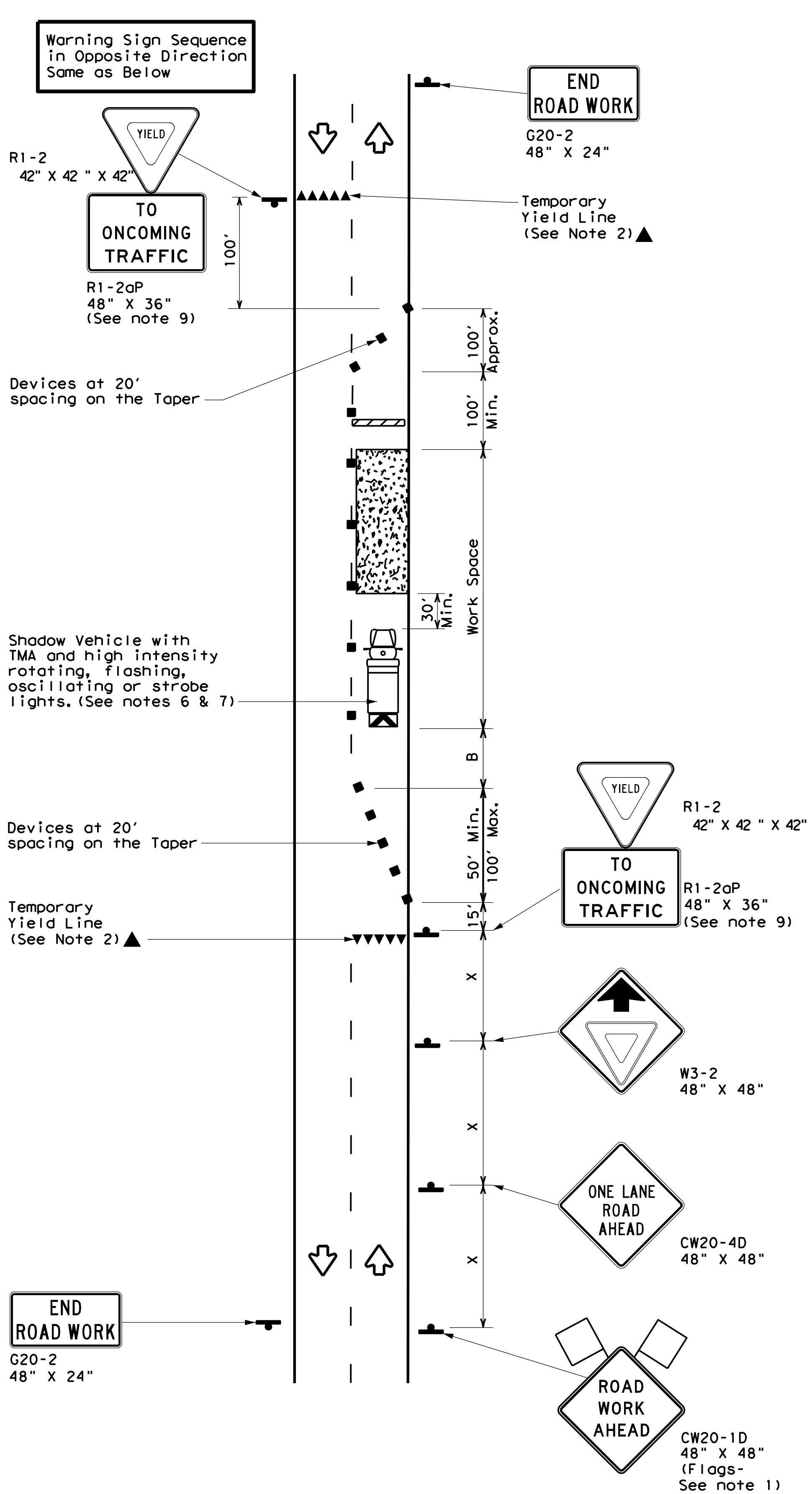


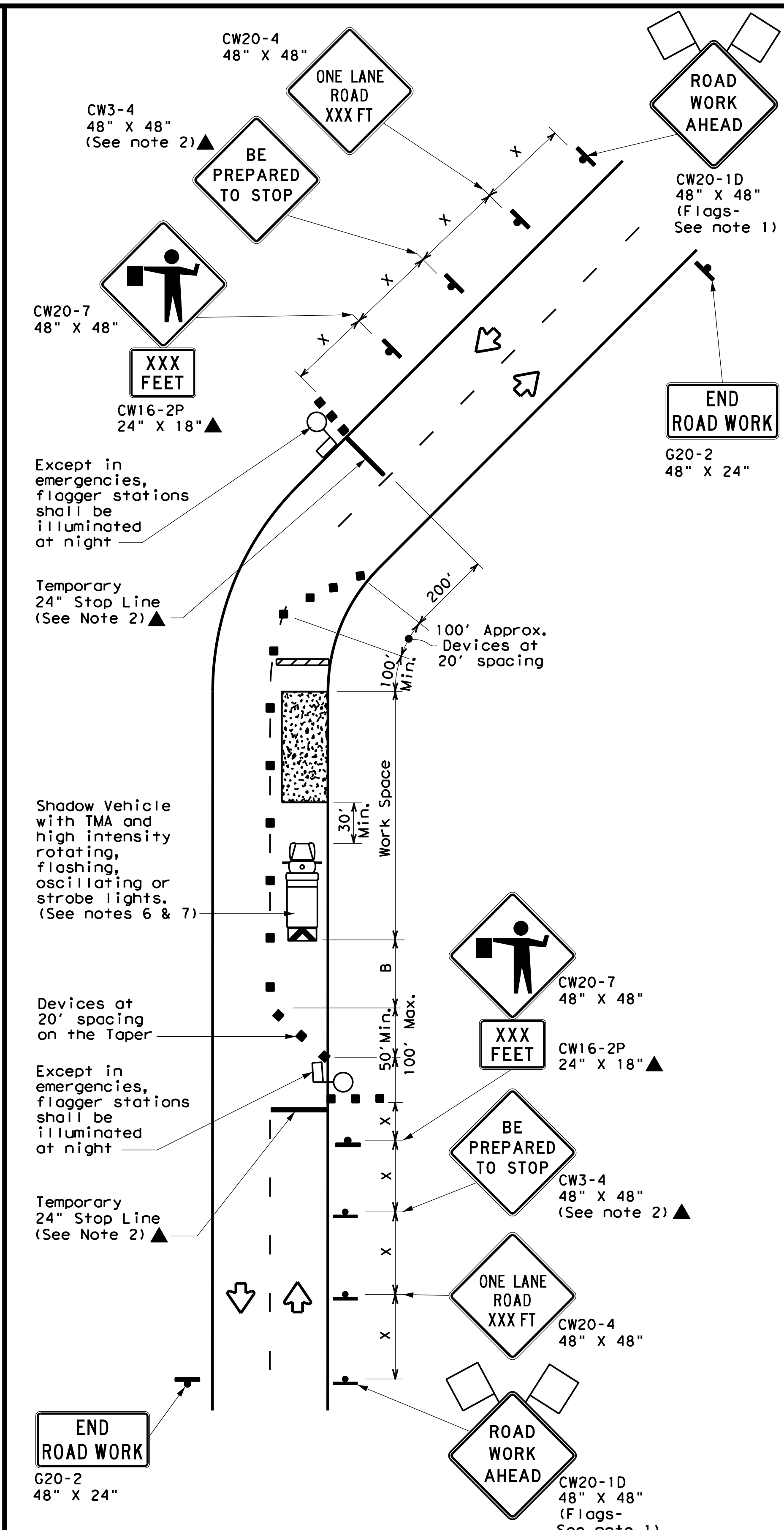
TCP (2-2a)

2-LANE ROADWAY WITHOUT PAVED SHOULDERS

ONE LANE TWO-WAY

CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See Note 9)



TCP (2-2b)

2-LANE ROADWAY WITHOUT PAVED SHOULDERS

ONE LANE TWO-WAY

CONTROL WITH FLAGGERS

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 = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only

** Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

8. 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.
9. The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. 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).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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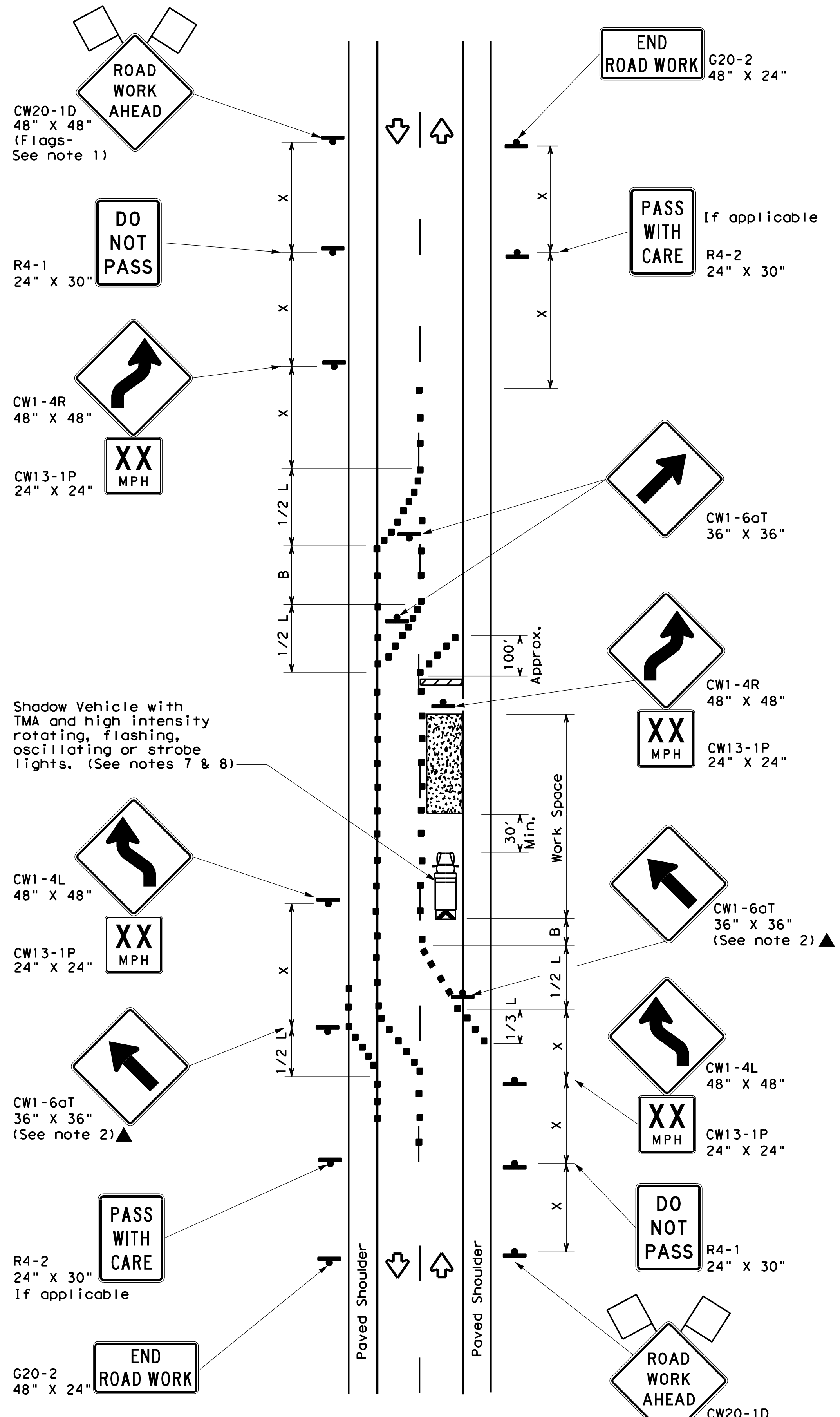
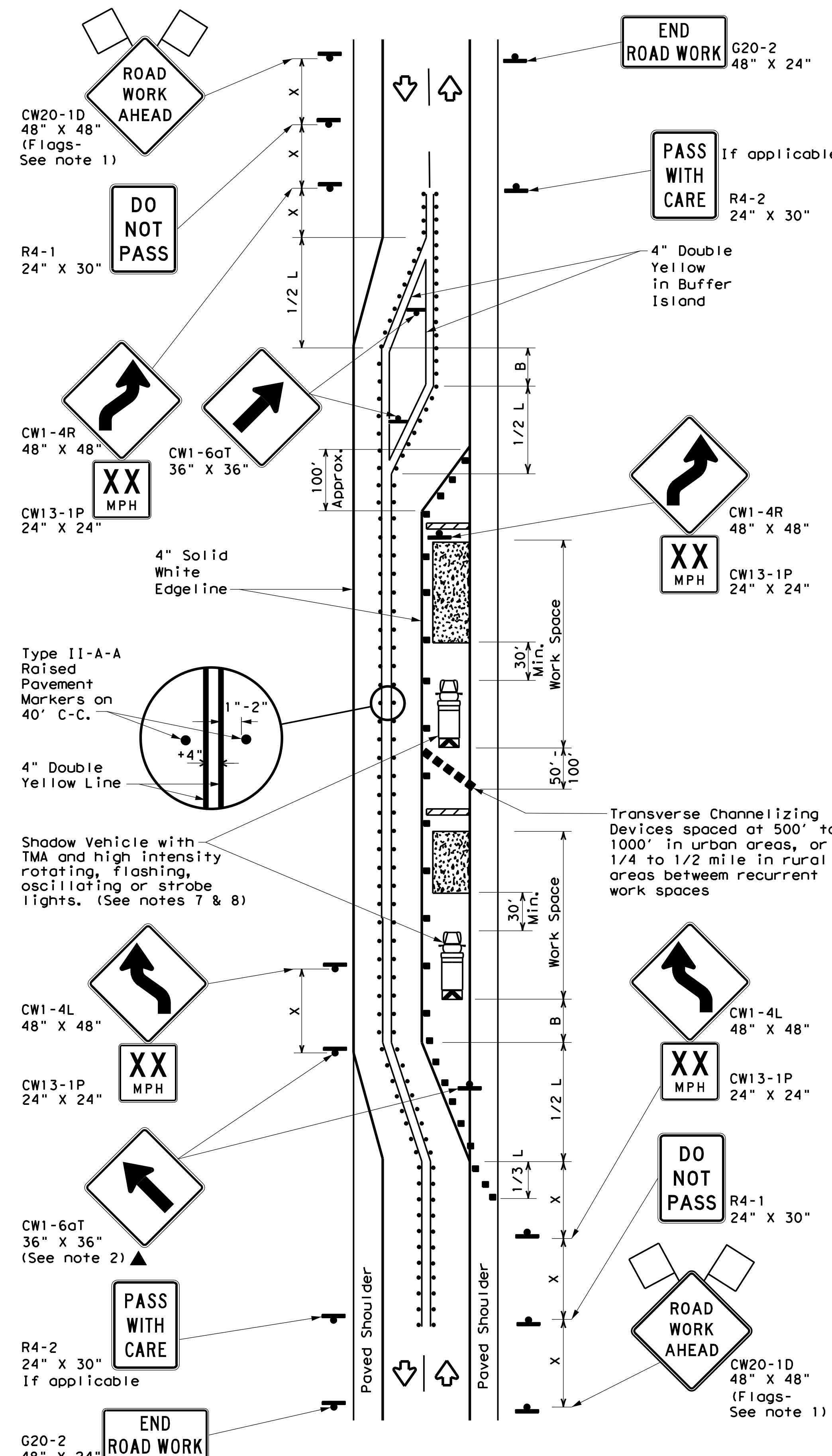


TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (2-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND

Symbol	Description	Symbol	Description
(barricade)	Type 3 Barricade	■ ■	Channelizing Devices
(vehicle)	Heavy Work Vehicle	(TMA)	Truck Mounted Attenuator (TMA)
(arrow board)	Trailer Mounted Flashing Arrow Board	• • • •	Raised Pavement Markers Ty II-AA
(sign)	Sign	(arrow)	Traffic Flow
(flag)	Flag	(flagger)	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 TCP(2-3b)ONLY
			✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. 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.
4. 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.
5. 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.
6. Conflicting pavement marking shall be removed for long term projects.
7. 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.
8. 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)

9. 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.

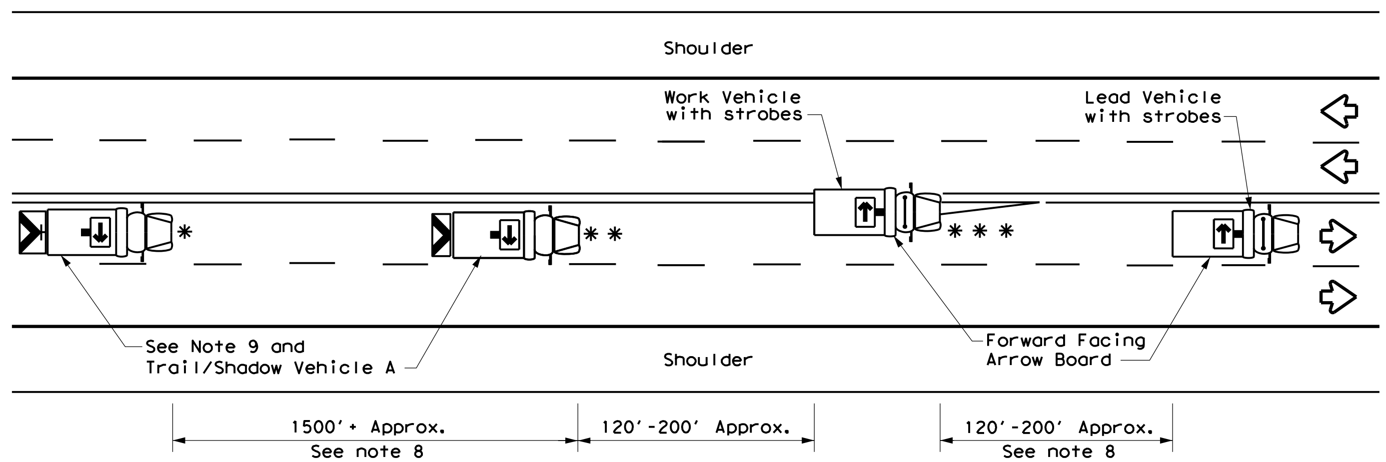
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-18

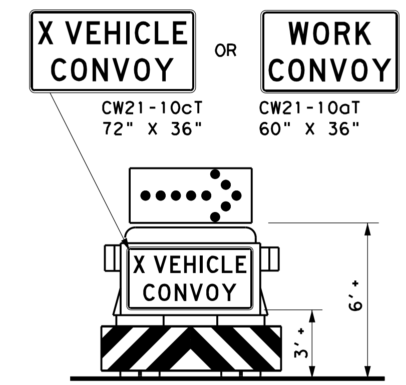
FILE: tcp(2-3)-18.dgn	DN:	CK:	DW:	CK:

© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03, 1-97 2-12, 4-98 2-18	2524	02	025,ETC	FM 2611
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		70



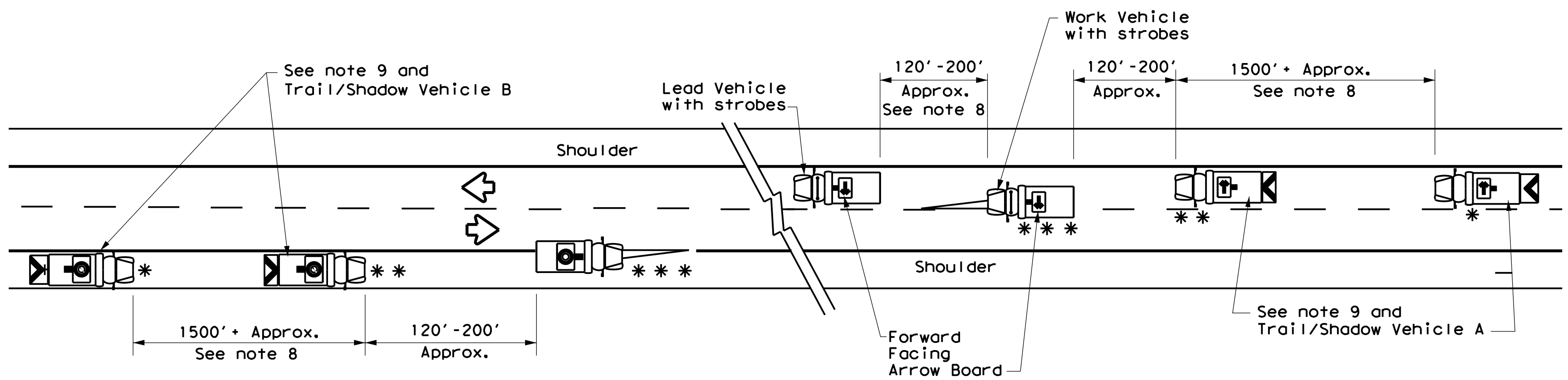
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

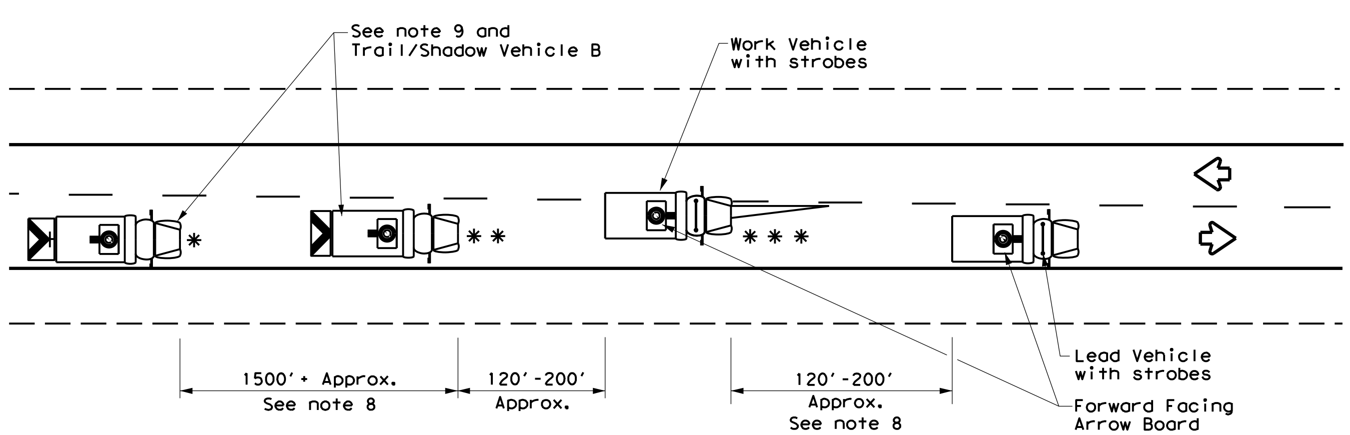


WORK ON SHOULDER

WORK ON TRAVEL LANE

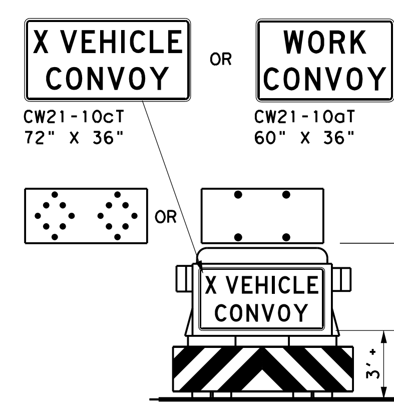
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display

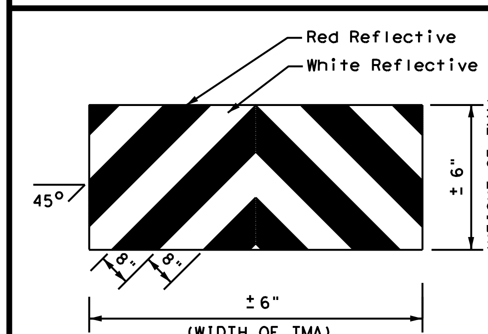
LEGEND

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	2524	02	025,ETC	FM 2611
	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	71

175

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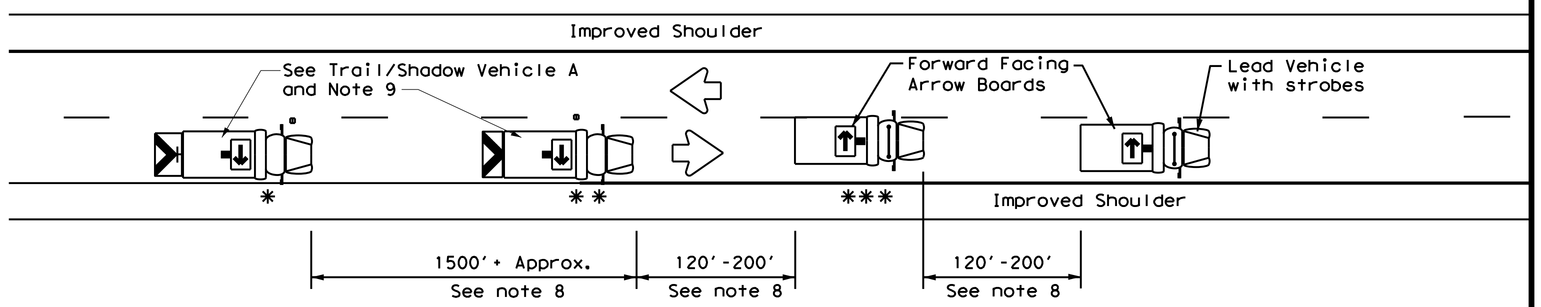
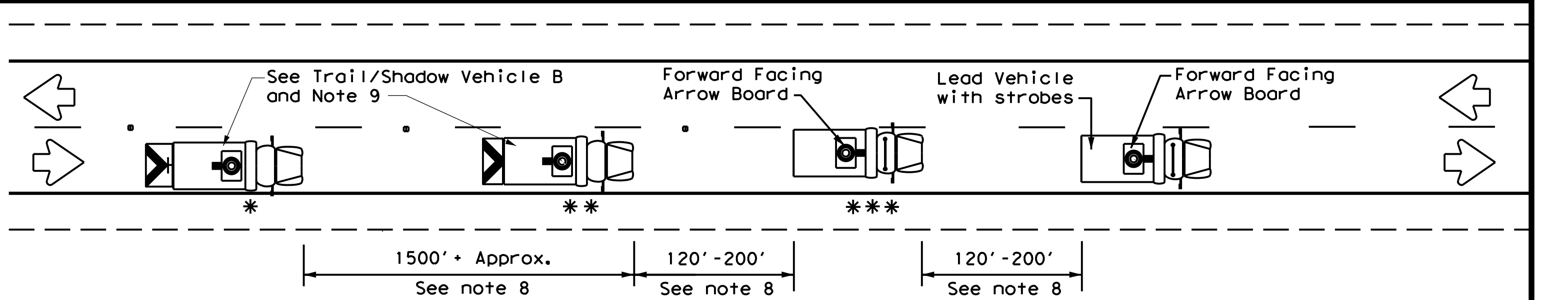


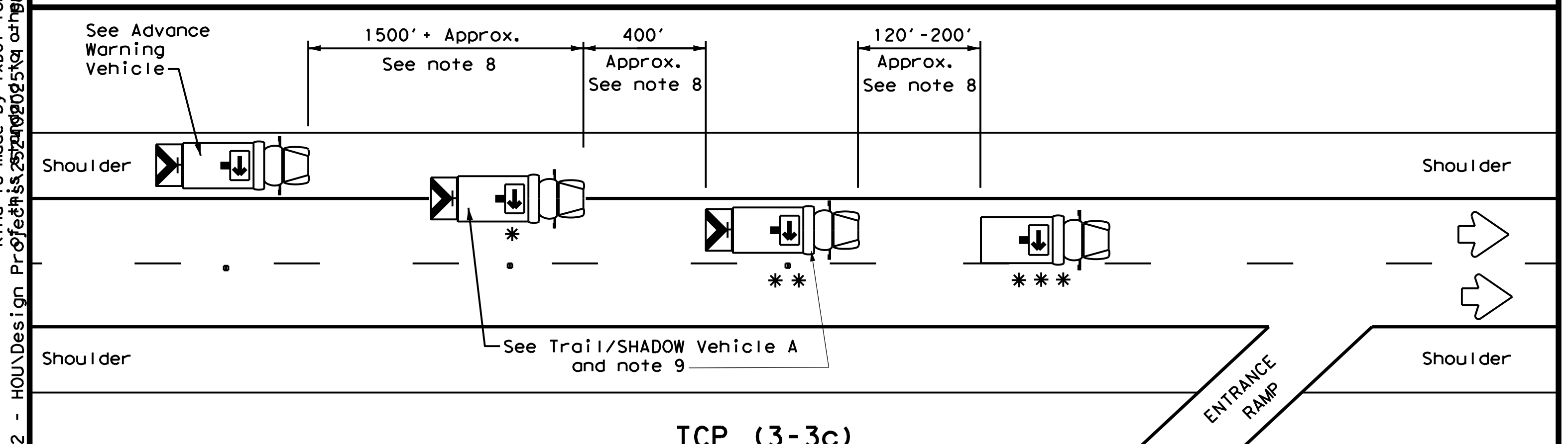
TCP (3-3a)

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



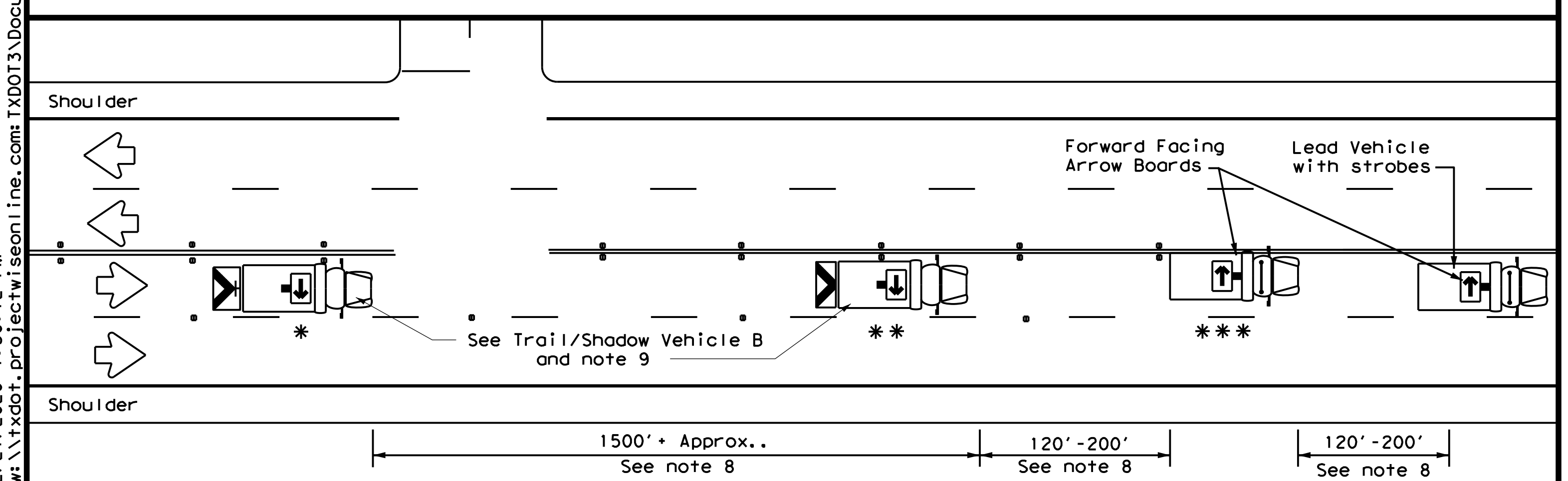
TCP (3-3b)

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



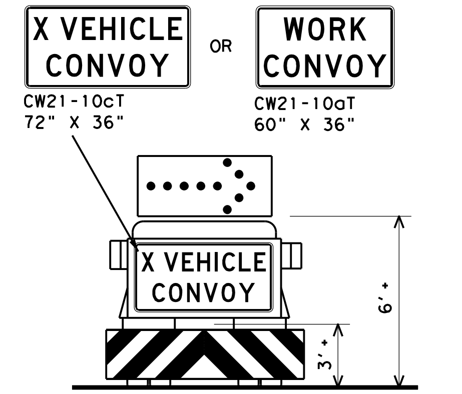
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



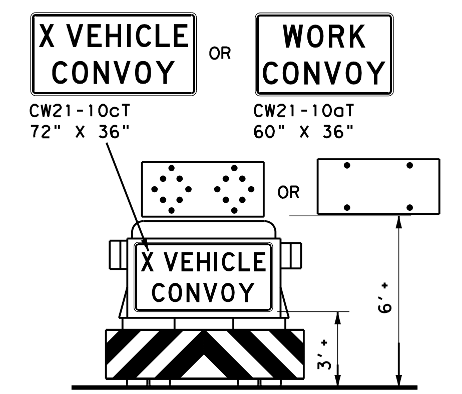
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



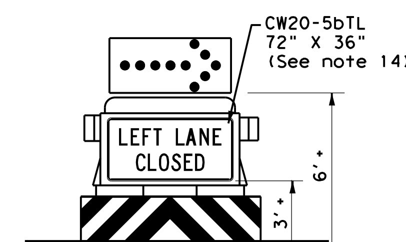
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

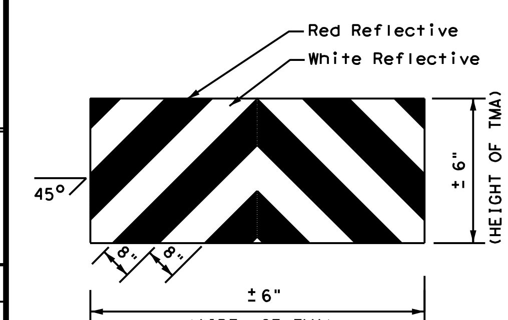


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

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

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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2-94 4-98 / 8-95 7-13 / 1-97 7-14	DIST		COUNTY	SHEET NO.
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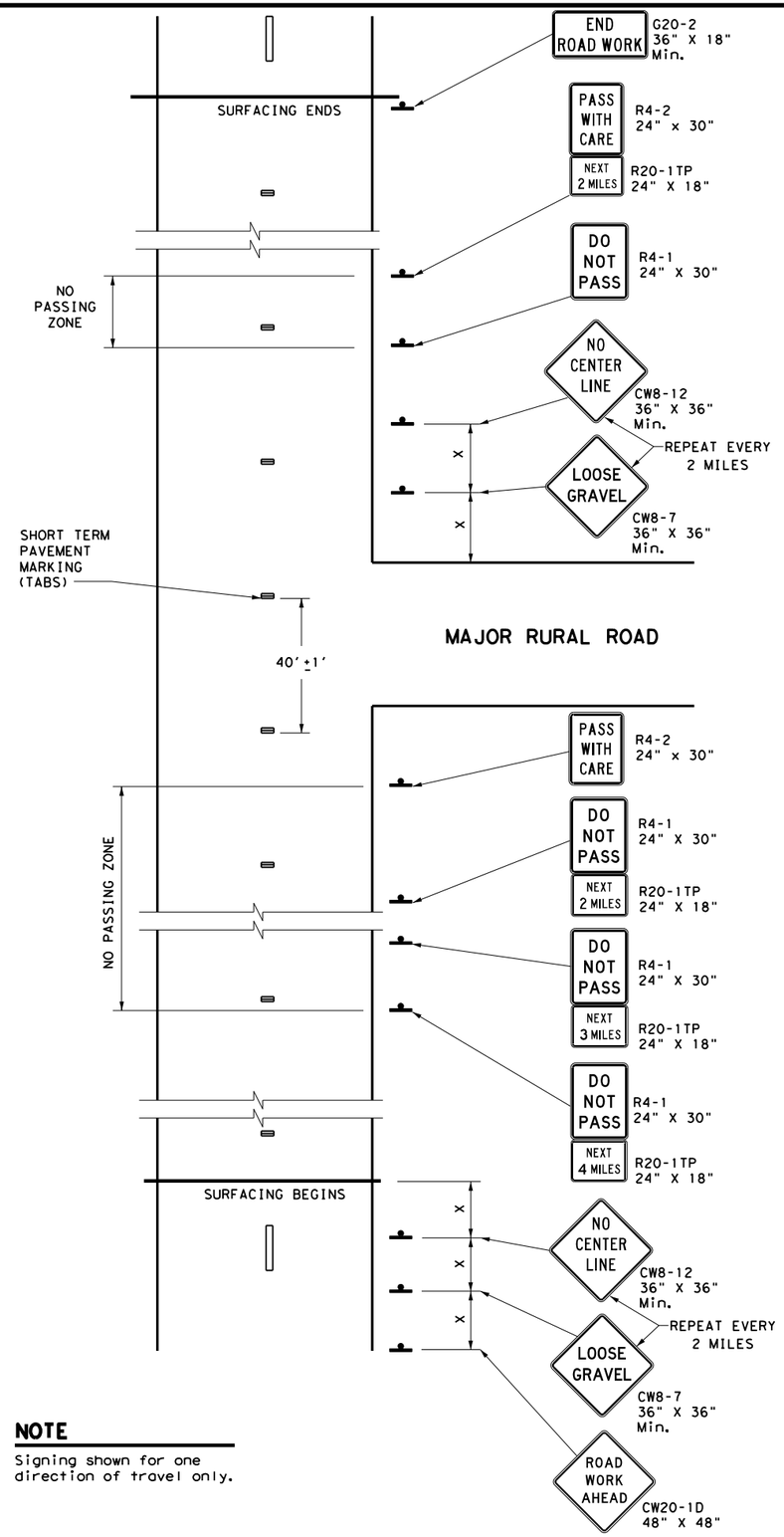
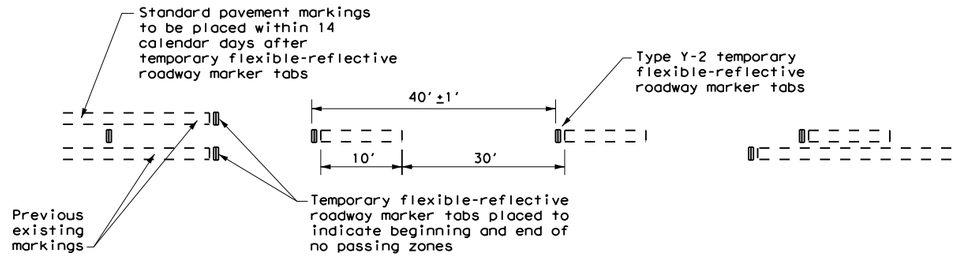


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

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

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

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

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

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

"NO CENTER LINE" SIGN (CW8-12)

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

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

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

"LOOSE GRAVEL" SIGN (CW8-7)

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

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

PAVEMENT MARKINGS (FOR EMERGENCY USE ONLY) ⚠ *CHANGED VERBAGE FOR 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.

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E.

12.22.2020

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13(MOD)

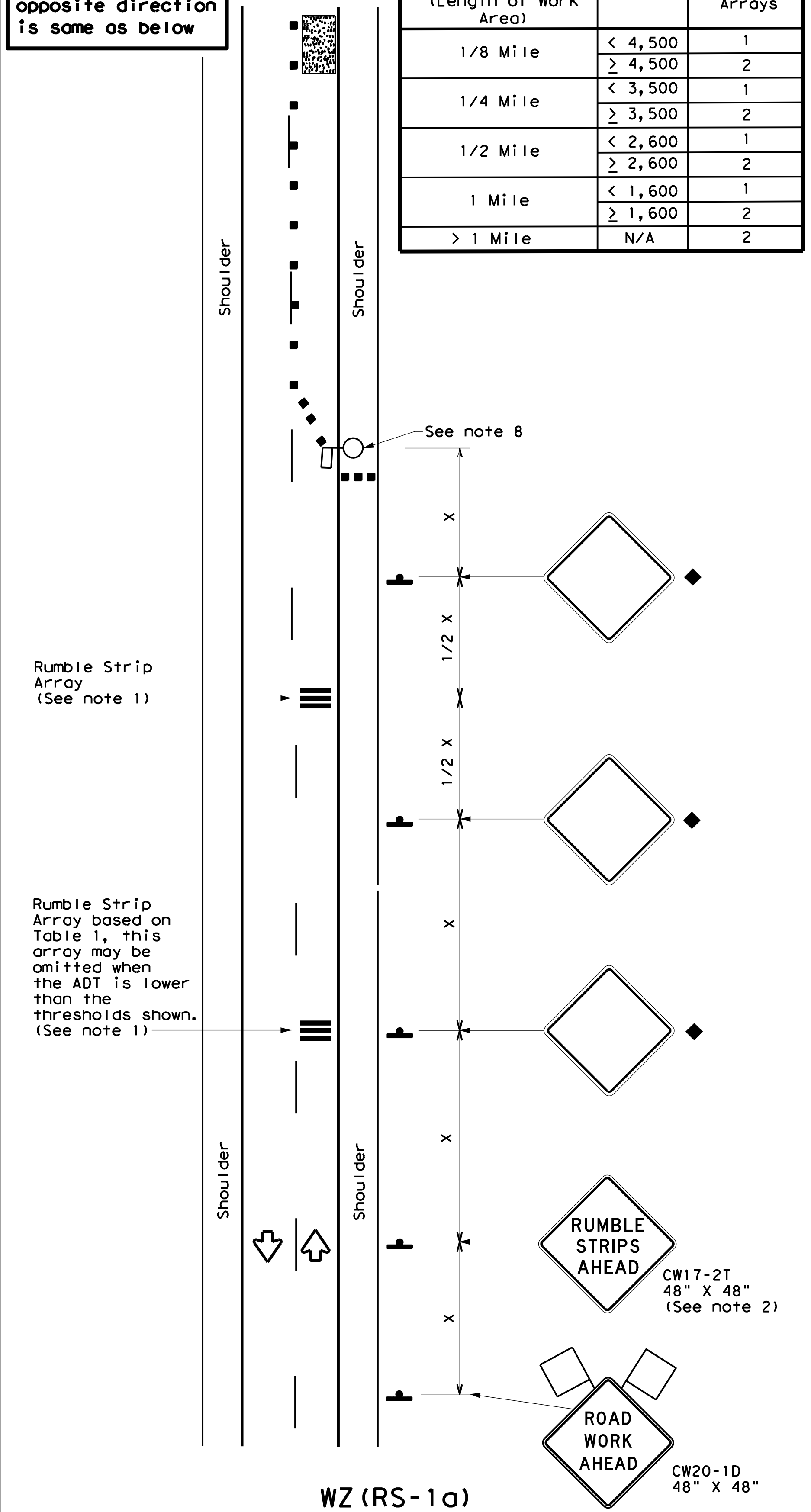
FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	HOU	BRAZORIA		73

210

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

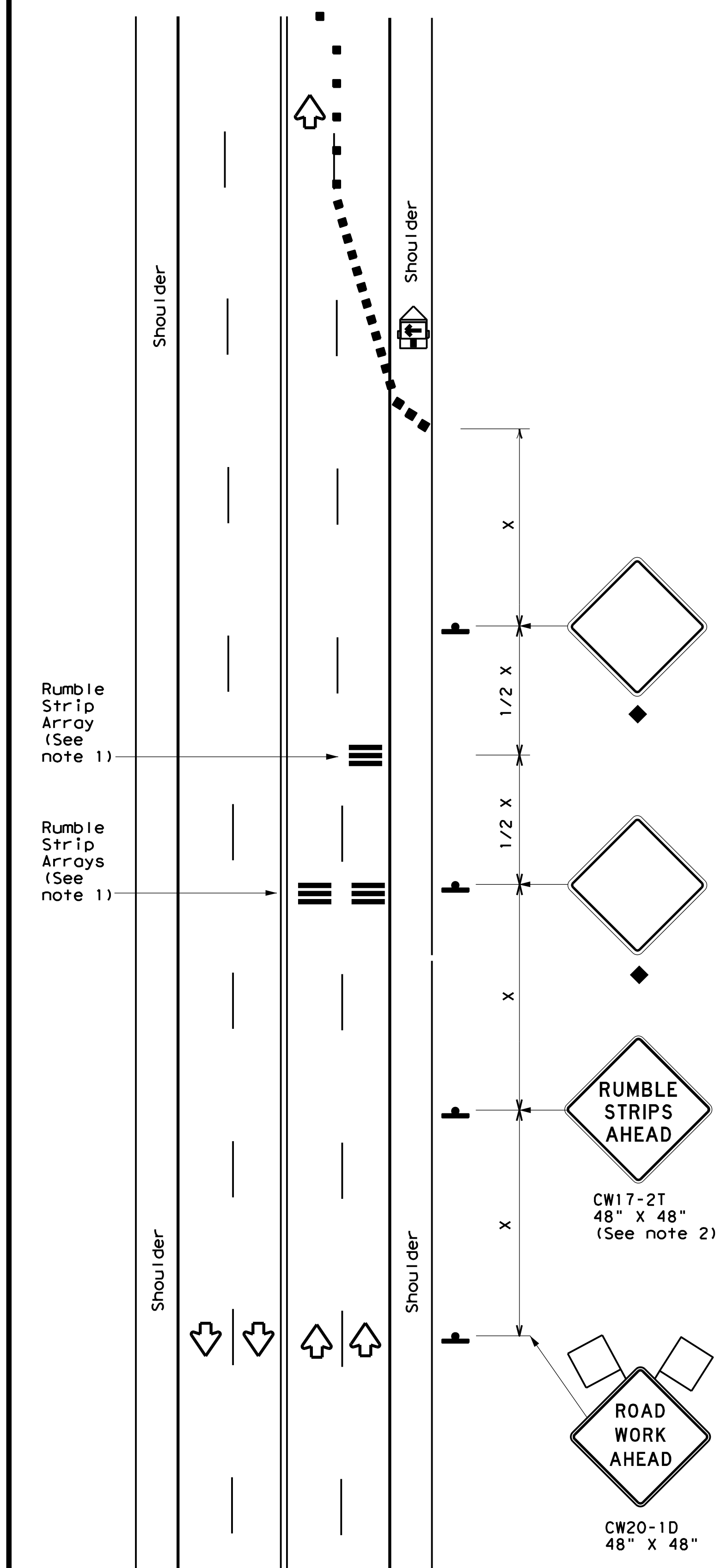
TABLE 1

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



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)
75 mph or Less

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			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
	✓	✓		

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

TABLE 2

Speed	Approximate distance between strips in an Array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
> 55 MPH	20'

Texas Department of Transportation
Traffic Operations Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2012	CONT 2524	SECT 02	JOB 025,ETC	HIGHWAY FM 2611
REVISIONS 2-14 4-16	DIST HOU	COUNTY BRAZORIA		SHEET NO. 74

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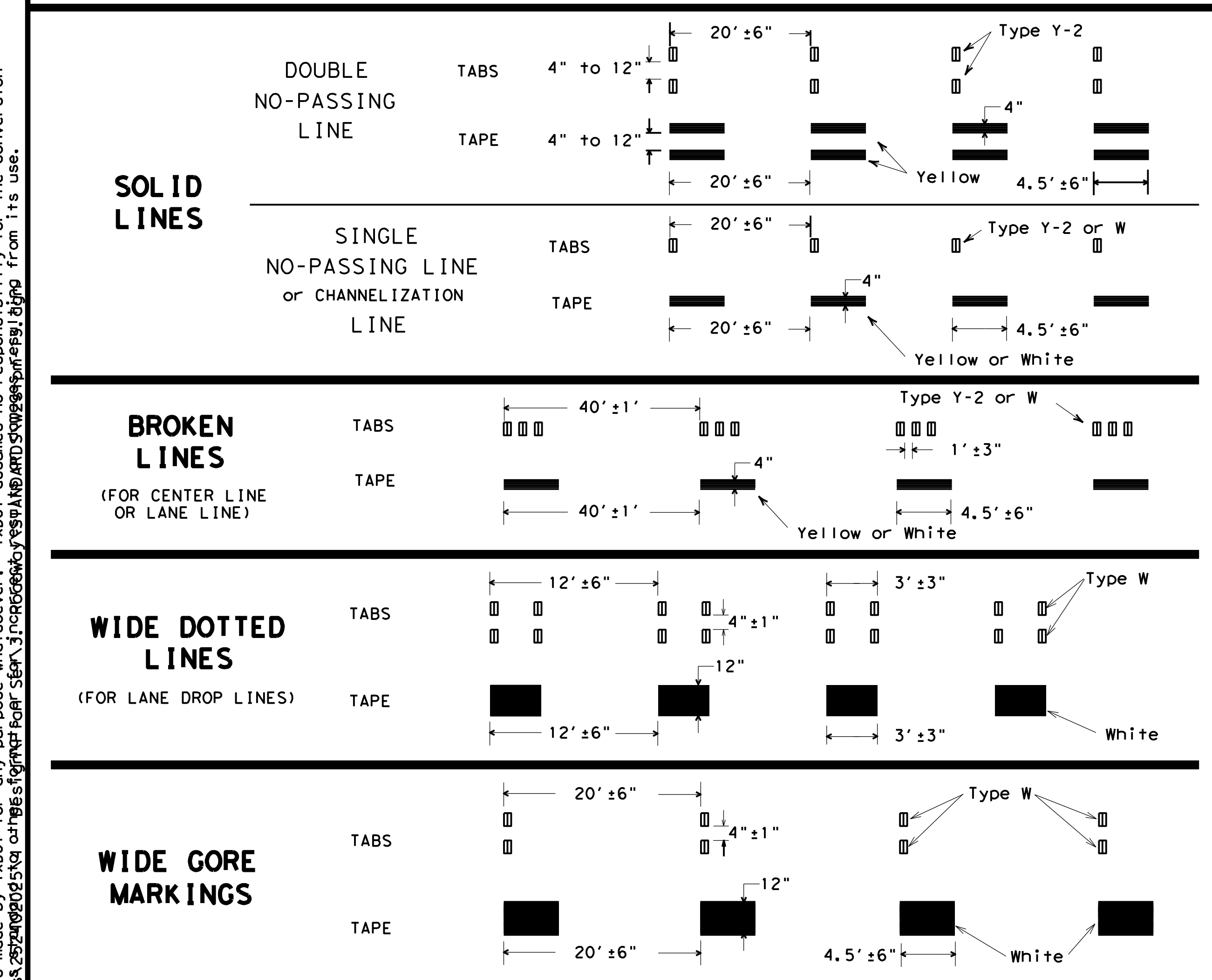
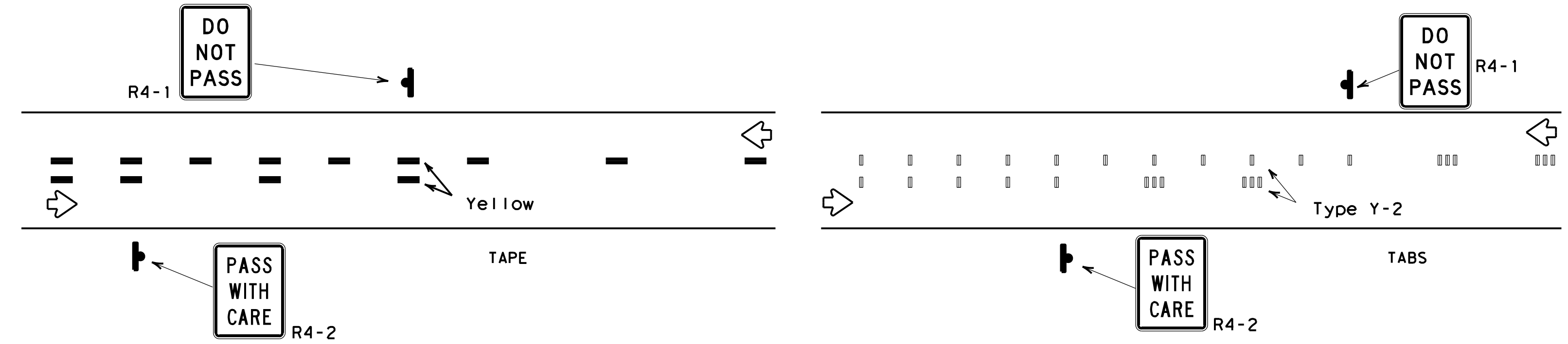
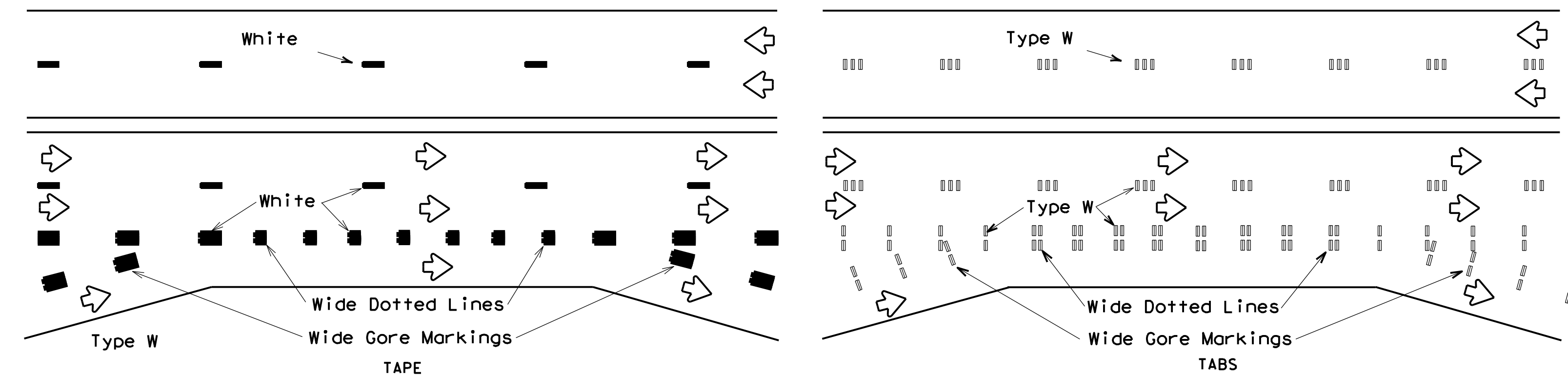
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



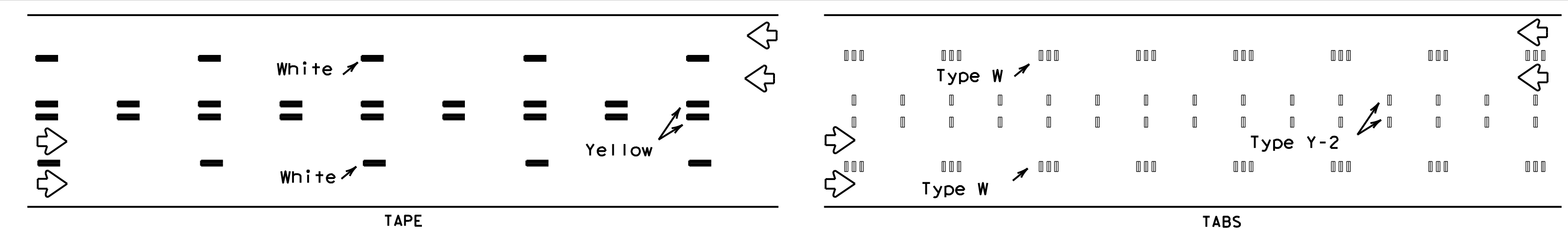
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



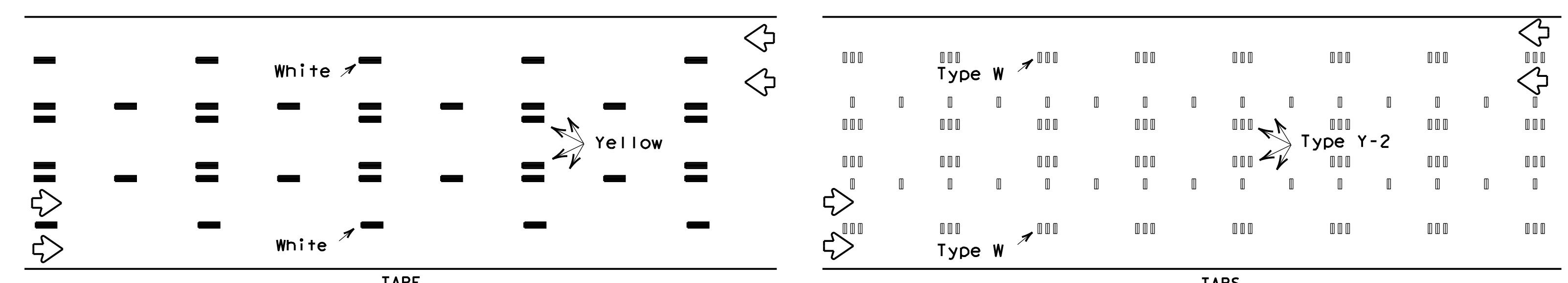
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



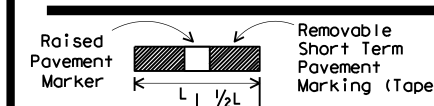
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

NOTES:

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

TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

Texas Department of Transportation — Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE: wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT 2524	SECT 02	JOB 025,ETC	HIGHWAY FM 2611
REVISIONS 1-97 3-03 7-13	DIST HOU		COUNTY BRAZORIA	SHEET NO. 75

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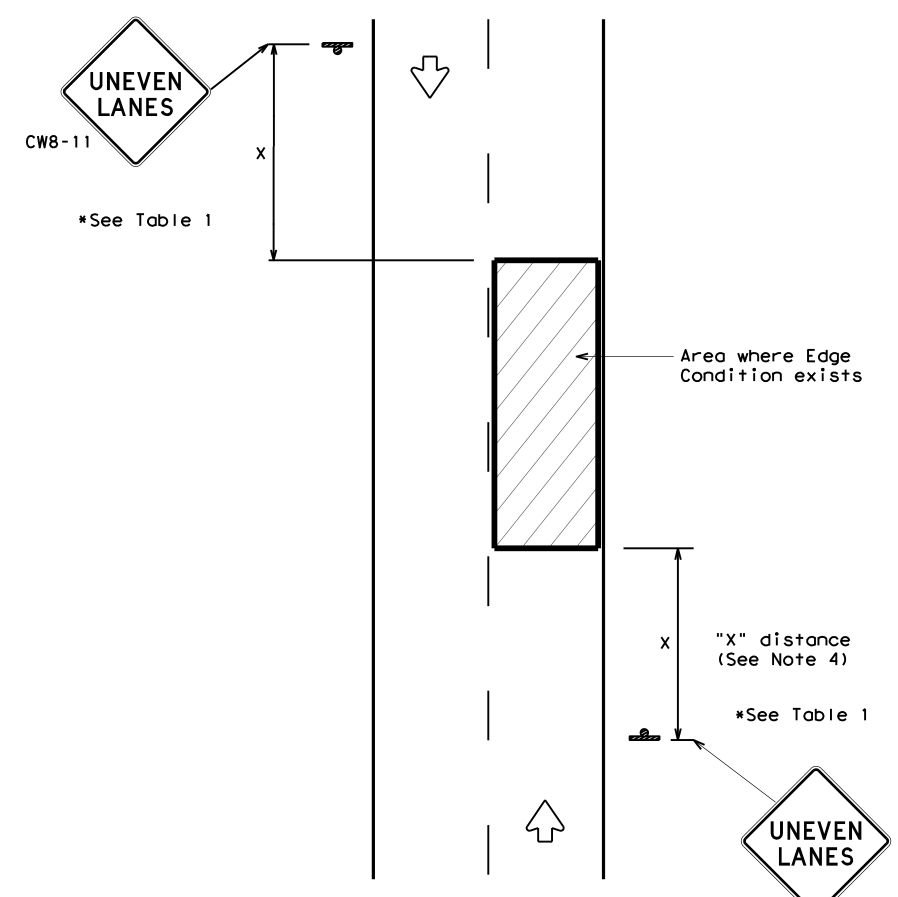
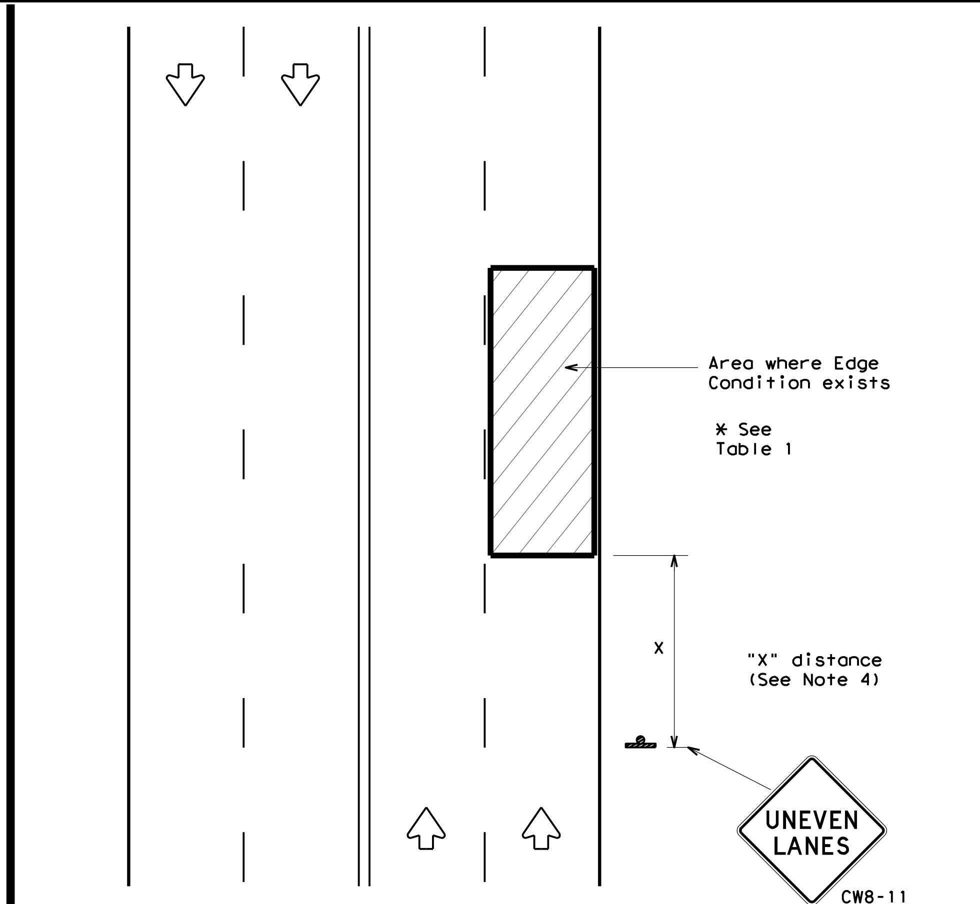
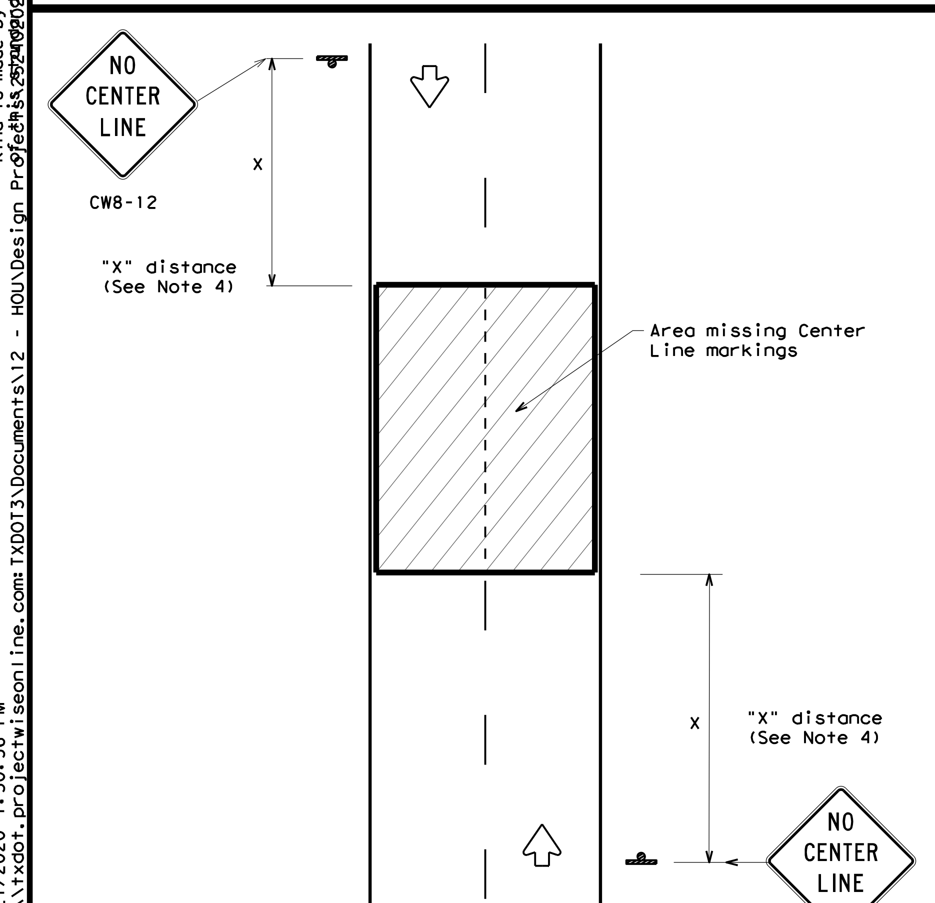


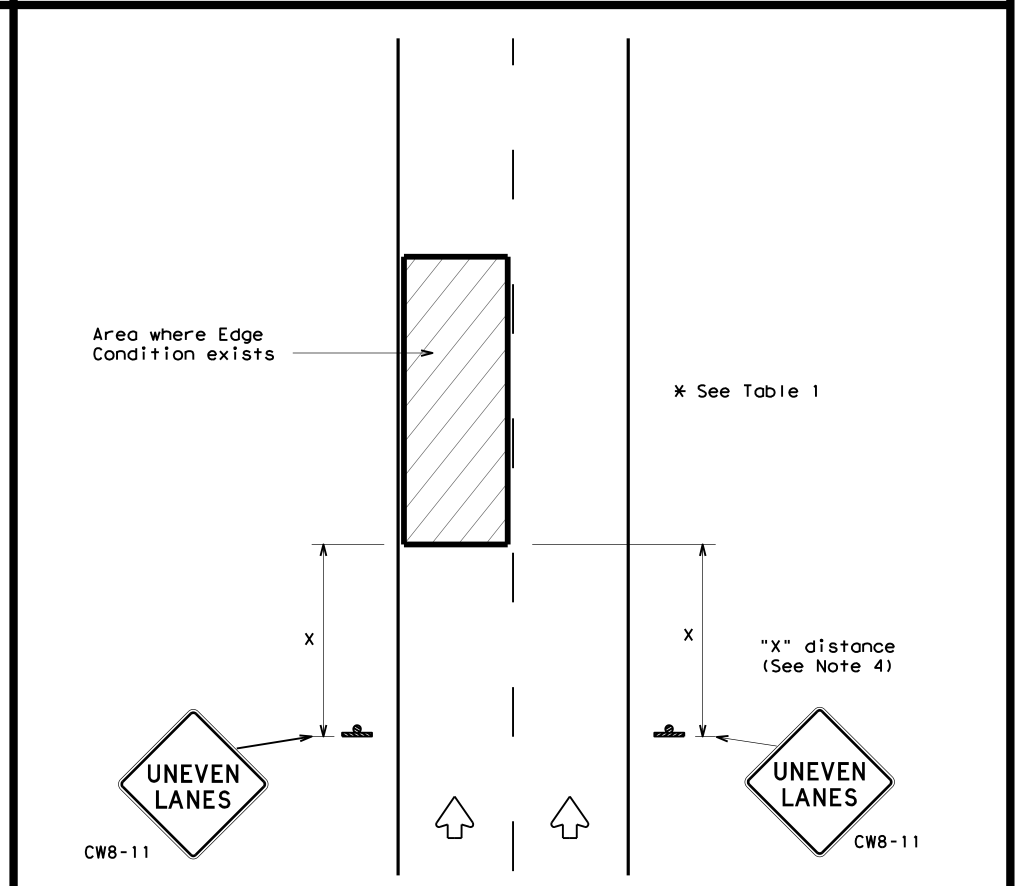
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

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

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

GENERAL NOTES

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

TABLE 1

Edge Condition	Edge Height (D)	* Warning Devices
① D	Less than or equal to: 1¼" (maximum-planing) 1½" (typical-overlay)	Sign: CW8-11
	Distance "D" may be a maximum of 1 1/4 " for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.	
② >3 1 D	Less than or equal to 3"	Sign: CW8-11
③ 0" to 3/4" D 12" Notched Wedge Joint	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
8-95 2-98 7-13 1-97 3-03	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	76

112

DATE:
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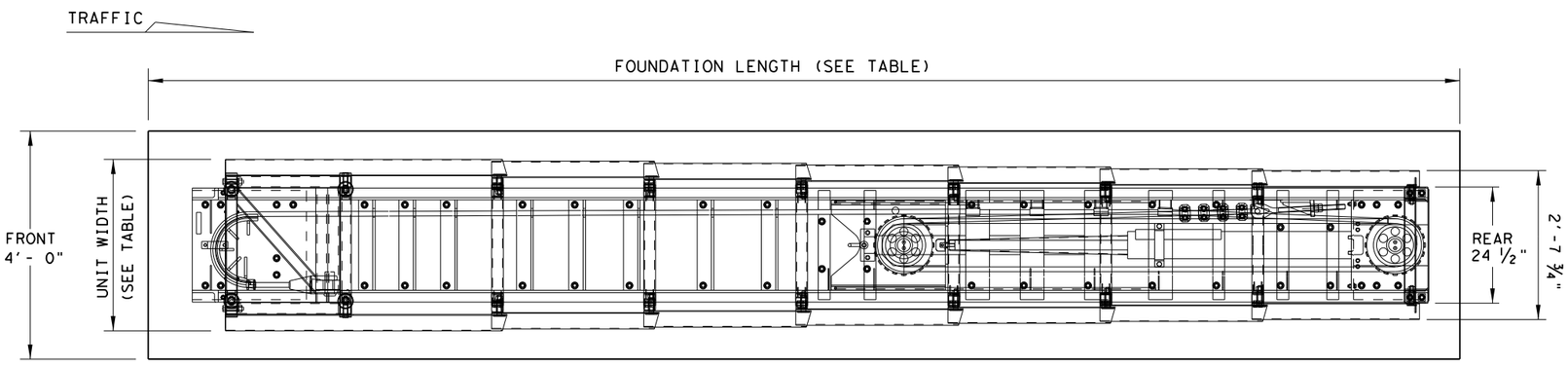
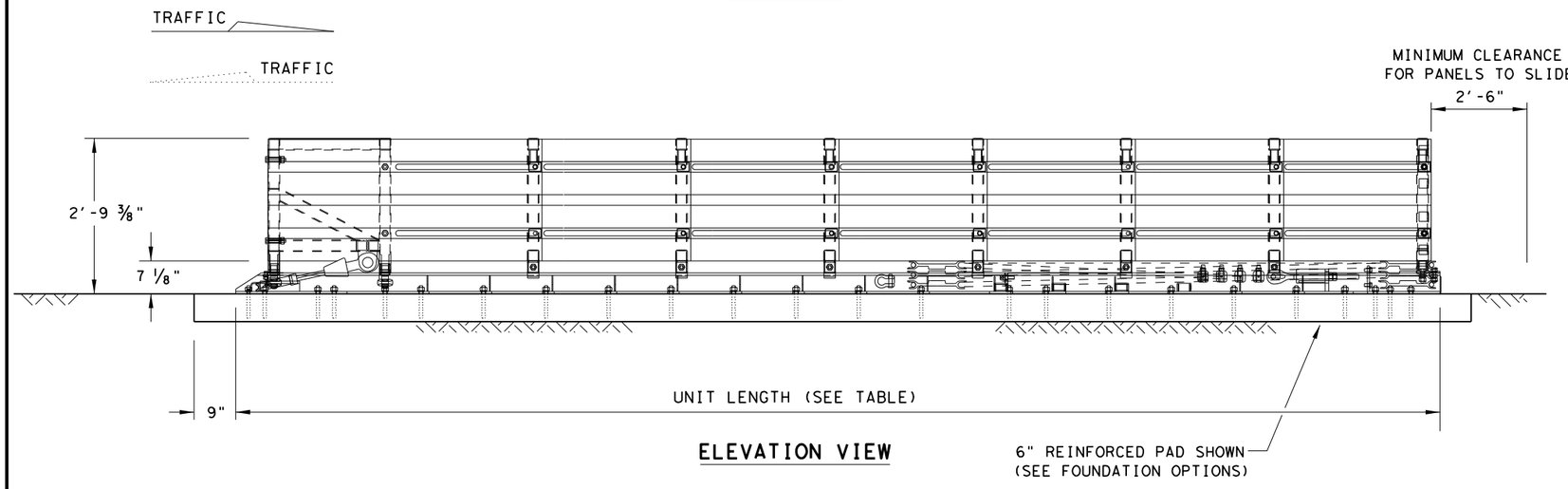


PLAN VIEW



ELEVATION VIEW

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: WORK AREA PROTECTION, CORP. AT (800) 327-4417, OR (630) 377-9100.
2. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION PANELS WILL BE REQUIRED.
3. ADDITIONAL DETAILS FOR THE TRANSITION OPTION AND FOUNDATION OPTION WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
5. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE SCI100GM & SCI70GM SYSTEMS SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTERLINE OF MERGING BARRIERS.

NOTE:
FOR ATTACHMENT AND TRANSITIONS TO OTHER SHAPES, BARRIERS, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. (SEE MANUFACTURER'S PRODUCT MANUAL)

NOTE:
SIDE PANELS CAN TRAVEL 30" BEYOND THE LAST TERMINAL BRACE AT THE REAR OF THE CUSHION. ALL OBJECTS THAT MAY INTERFERE WITH THIS MOTION CAN AFFECT PERFORMANCE OF AND MAY CAUSE UNDUE DAMAGE TO THE CRASH CUSHION.

MODEL	TEST LEVEL	UNIT LENGTH (approx.)	UNIT WIDTH	FOUNDATION LENGTH	OBSTACLE WIDTH
SCI70GM	TL-2	13′-6"	2′-10 ⅝"	15′- 6 ¼"	24"to 36"
SCI100GM	TL-3	21′-6"	3′-1 ½"	23′- 0"	24"to 36"

SYSTEM AND PAD LENGTHS VARY DEPENDING ON BACKUP TYPE.

FOUNDATION OPTIONS
6" REINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
8" UNREINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
3" MIN. ASPHALT OVER 3" MIN. CONCRETE (16 ½" ANCHOR EMBED.)
6" ASPHALT OVER 6" COMPACT SUBBASE (16 ½" ANCHOR EMBED.)
8" MINIMUM ASPHALT (16 ½" ANCHOR EMBEDMENT)

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, SEE MANUFACTURER'S PRODUCT MANUAL.

TRANSITION OPTIONS
CONCRETE VERTICAL WALL
CONCRETE TRAFFIC BARRIERS
GUARDRAIL (W-BEAM)
GUARDRAIL (THRIE-BEAM)

TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOR BI-DIRECTIONAL TRANSITION PANEL AND END SHOE DETAILS, SEE MANUFACTURER'S PRODUCT MANUAL.

LOW MAINTENANCE

Texas Department of Transportation

Design Division Standard

WORK AREA PROTECTION CORP (SMART-NARROW)

SMTC(N)-16

FILE: smtcn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
© TxDOT: February 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 06, 2013 (VP) REVISED 03, 2016 (VP)	252402	025,ETC	FM	2611
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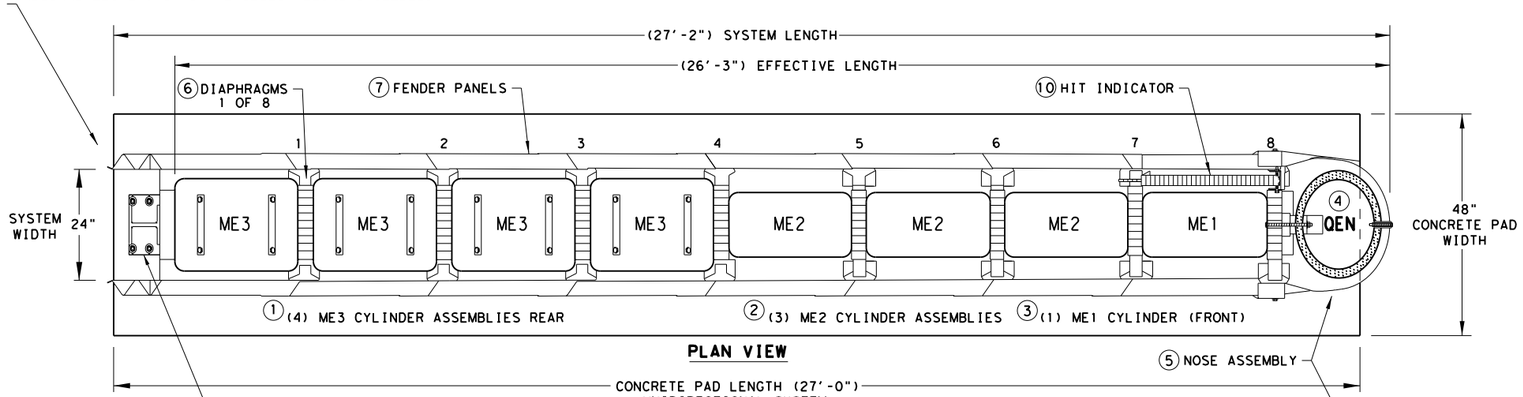
NOTE:
A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD ELITE M10 TO THE OBJECT BEING SHIELDED.

QUADGUARD ELITE M10 24" WIDE (8 BAY) SYSTEM



PLAN VIEW

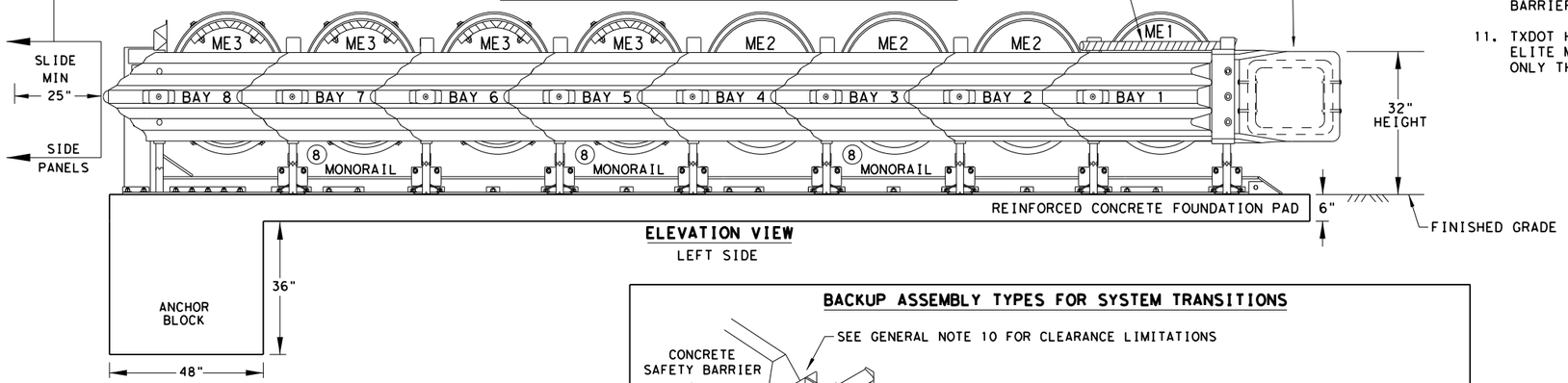
⑨ SHOWN WITH TENSION STRUT BACKUP ASSEMBLY

KEY		KEY	
①	ME3 CYLINDER ASSEMBLIES	⑥	DIAPHRAGMS
②	ME2 CYLINDER ASSEMBLIES	⑦	FENDER PANELS
③	ME1 CYLINDER ASSEMBLY	⑧	MONORAILS
④	QEN CYLINDER	⑨	TYPE OF BACKUP
⑤	NOSE BELT ASSEMBLY	⑩	HIT INDICATOR

④ QEN CYLINDER INSTALLED INSIDE OF NOSE BELT ASSEMBLY ⑤

NOTE:
PROVISION SHALL BE MADE FOR REAR FENDER SIDE PANELS TO SLIDE REARWARD UPON IMPACT, 25" MIN.

NOTE:
HIT INDICATOR WILL RAISE UPON IMPACT.



ELEVATION VIEW
LEFT SIDE

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR CONCRETE PAD AND ANCHOR BLOCK INSTALLATION REQUIREMENTS.

A MANUFACTURER'S DRAWING PACKAGE UNIQUE AND SPECIFIC FOR THE QUADGUARD ELITE M10 FIELD INSTALATION AND INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY REQUIRED FOR THE TRANSITION WILL BE PROVIDED BY THE MANUFACTURER TO THE ENGINEER AND INSTALLER.

6" REINFORCED CONCRETE PAD REQUIRES THE INSTALLATION OF AN ANCHOR BLOCK AS SHOWN ON THE MANUFACTURER'S DRAWING PACKAGE.

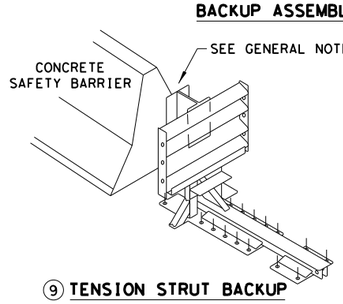
8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

CONCRETE PAD AND ANCHOR BLOCK COMBINATIONS SHALL BE CONFIRMED WITH THE MANUFACTURER BASED UPON SITE SPECIFIC DATA (SSD).

NOTE:
THE QUADGUARD ELITE M10 8-BAY, 24" WIDE - NARROW SYSTEM TESTED TO MASH TEST LEVEL 3.

TL-3 MODEL #	QM10024E	CYLINDER TYPES IN BAYS			
BAYS	8	TYPE-ME3	TYPE-ME2	TYPE-ME1	TYPE-QEN
DIAPHRAGMS	8	4	3	1	1
WIDTH	24"	REAR	FRONT		NOSE

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS

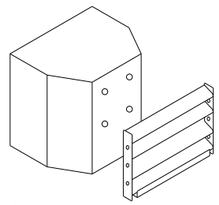


⑨ TENSION STRUT BACKUP

SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO CONCRETE SAFETY BARRIER
2	QUAD-BEAM TO CONCRETE BRIDGE RAIL
3	QUAD-BEAM TO CONCRETE END SHOE
4	QUAD-BEAM TO THRIE-BEAM RAIL
5	QUAD-BEAM TO W-BEAM RAIL

NOTE:
TRANSITION ASSEMBLIES FOR THE QUADGUARD ELITE M10 TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:

10 (W6X9) I-BEAM POSTS.
POST 1 THRU 4 (84" LONG)
POST 5 THRU 10 (72" LONG)



⑨ CONCRETE BACKUP

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD ELITE M10 SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374.
2. SEE THE RECENT QUADGUARD ELITE M10 PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS AND THE DRAWING PACKAGE FOR THE NARROW 24" SYSTEM BEFORE INSTALLING THE QUADGUARD ELITE M10 AT ANY GIVEN LOCATION.
3. FOR BI-DIRECTIONAL TRAFFIC: THE LOCATION AND OR WIDTH OF THE QUADGUARD ELITE M10 IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD ELITE M10, THE QUADGUARD ELITE M10 SHOULD NOT EXTEND FURTHER INTO THE TRAFFIC-SIDE OF THE BARRIER THAN THE OBSTACLE. ANY TRANSITION INSTALLED MUST EITHER BE TANGENT TO BOTH QUADGUARD ELITE M10 AND OBSTACLE OR MUST ANGLE TOWARD FIELD SIDE OF THE BARRIER.
4. SYSTEM TRANSITION: APPROPRIATE TRANSITION PANELS OR SIDE PANELS WILL BE REQUIRED FOR PROPER IMPACT PERFORMANCE. THE CORRECT PANEL(S) TO USE WILL DEPEND ON THE DIRECTION OF TRAFFIC FLOW AND WHAT TYPE OF BARRIER OR ROAD FEATURE THE QUADGUARD ELITE M10 SYSTEM IS SHIELDING. SEE THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
5. COMPONENTS FOR THE QUADGUARD ELITE (M10) BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
6. CONCRETE PAD SHALL BE 6" MIN. REINFORCED 28MPa [4,000 PSI] (P.C.) OR 8" MIN. NON-REINFORCED 28MPa [4,000 PSI] CONCRETE ROADWAY MEASURING AT LEAST 12'-0" WIDE BY 50'-0" LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE, E.G. CONCRETE WALL.
7. IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
8. THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS,OR DEPRESSIONS.
9. THE QUADGUARD ELITE M10 SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
10. FOR THE TENSION STRUT BACKUP THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
11. TXDOT HAS ONLY APPROVED THE 24" WIDE QUADGUARD ELITE M10 SYSTEM. THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION AND ASSEMBLY MANUAL INCLUDES SYSTEM WIDTH OF 24". ONLY THE 24" SYSTEM IS ALLOWED TO BE INSTALLED ON TEXAS ROADWAYS.

FOUNDATION & ANCHORING REQUIREMENTS FOUNDATION TYPES: A, B, C, & D	
FOUNDATION TYPE: A	REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	6" MINIMUM DEPTH (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: B	ASPHALT OVER P.C.C.
FOUNDATION:	3" MIN. (A.C.) OVER 3" MIN. (P.C.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½"
FOUNDATION TYPE: C	ASPHALT OVER SUBBASE
FOUNDATION:	6" MIN. (A.C.) OVER 6" MIN. (C.S.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: D	ASPHALT ONLY
FOUNDATION:	8" MIN. (A.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE

KEY:
ASPHALT CONCRETE (A.C.)
COMPACTED SUBBASE (C.S.)
PORTLAND CEMENT CONCRETE (P.C.C.)

NOTE: SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR THE APPROVED ADHESIVE.

IF THE UNIT IS ANCHORED TO ASPHALTIC CONCRETE, IT SHOULD BE RELOCATED TO FRESH, UNDISTURBED ASPHALT AND RE-ANCHORED AFTER EACH IMPACT TO ENSURE ADEQUATE FUTURE PERFORMANCE.

TENSION STRUT BACKUP MAY BE USED IN CONSTRUCTION ZONES ON ASPHALT CONCRETE (A.C.) FOR TEMPORARY USE ONLY.

LOW MAINTENANCE

Texas Department of Transportation
Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD ELITE M10 (MASH TL-3)

QGELITE(M10)(N)-20

FILE: qgelitem10n20.dgn	DN: TxDOT	CK: KM	DW: VP	CK: AG
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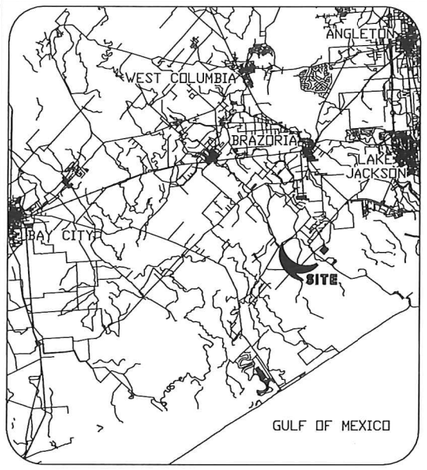
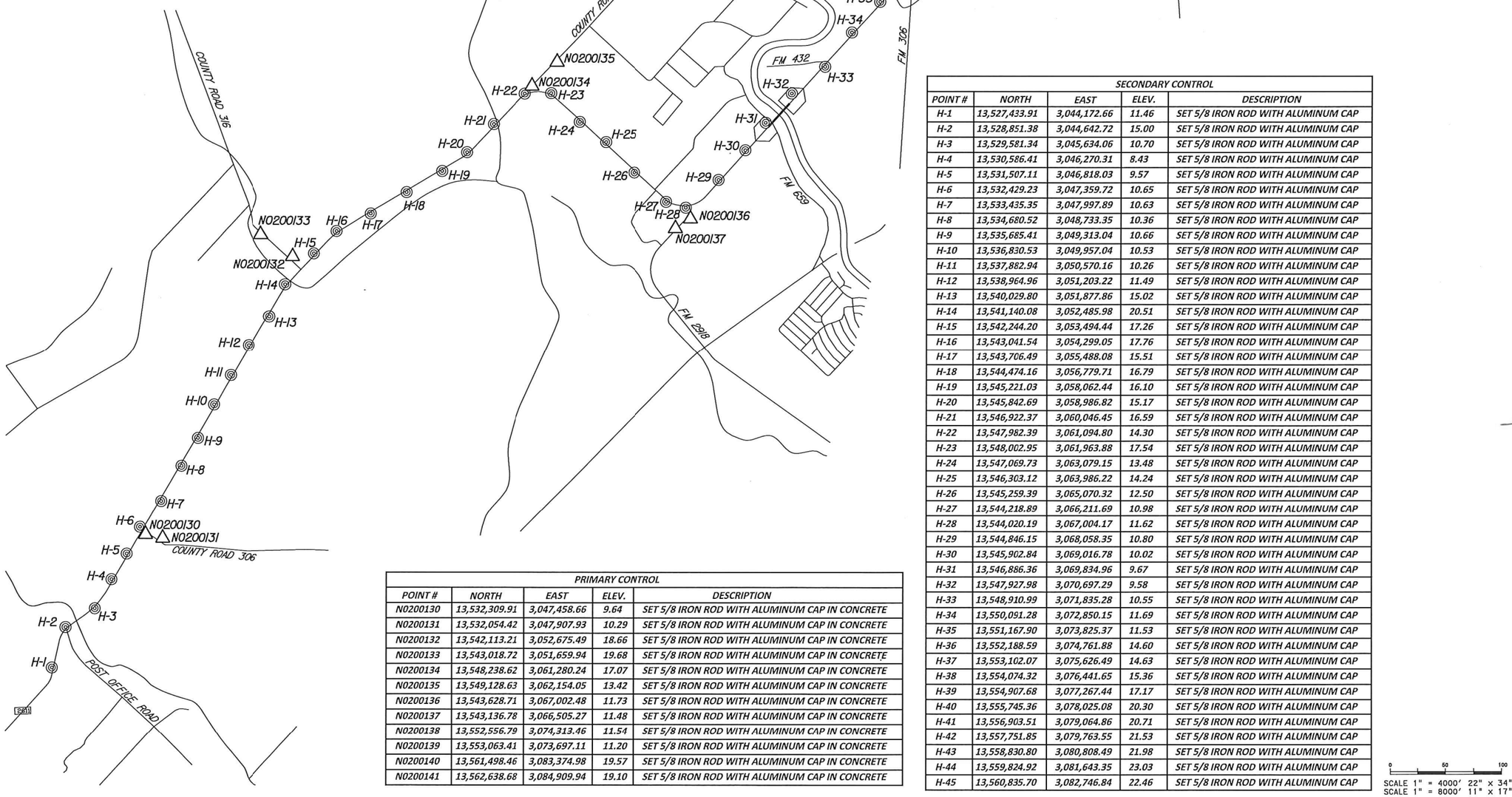


VICINITY MAP
NOT TO SCALE



NOTES:

1.) PRIMARY CONTROL (HORIZONTAL) WAS ESTABLISHED USING GPS METHODS CONFORMING TO THE "TxDOT SURVEY MANUAL 2016-1". HOLDING THE COORS STATIONS: CITYPORT & 877 2683C.

2.) BEARINGS ARE BASED ON GRID NORTH, TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS SOUTH CENTRAL ZONE 4204, NAD83 (2011) EPOCH: 2010.0000.

3.) COORDINATES AND DISTANCES SHOWN ARE SURFACE COORDINATES BASED ON A PROJECT COORDINATE SYSTEM ESTABLISHED BY APPLYING A SURFACE ADJUSTMENT FACTOR OF 1.00013 TO STATE PLANE GRID COORDINATES NAD83 (2011) EPOCH: 2010.0000, TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL 4204, U.S. SURVEY FEET.

PROJECT COORDINATES = GRID COORDINATES x 1.00013

4.) THE VERTICAL VALUES ARE BASED ON NAVD88 USING DIGITAL LEVELS HOLDING THE GPS ELEVATION OF CONTROL POINT N0200141.

LEGEND

- PRIMARY CONTROL POINT
- SECONDARY CONTROL POINT
- POWER POLE
- SIGN
- TELEPHONE PEDESTAL

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

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E. 12/22/2020

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

STATE OF TEXAS
REGISTERED
R. CLAY SWETMAN
5397
PROFESSIONAL LAND SURVEYOR

8/21/2019

R. CLAY SWETMAN
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 5397 — DATE

CDS muery
ENGINEERS • SURVEYORS
3411 MAGIC DRIVE • SAN ANTONIO • TEXAS • (210)581-1111
TBPE NO. F-1733 • TBPLS NO. 100495-00

2017 Texas Department of Transportation

FM 2611
SURVEY CONTROL INDEX SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		79

STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025	FM 2611

PRIMARY CONTROL

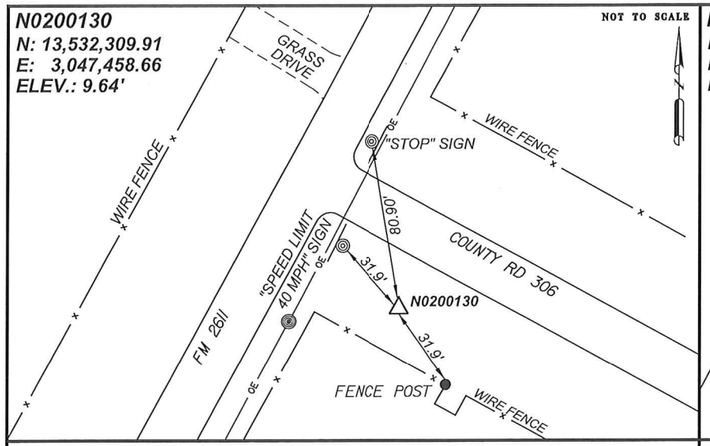
POINT #	NORTH	EAST	ELEV.	DESCRIPTION
N0200130	13,532,309.91	3,047,458.66	9.64	SET 5/8 IRON ROD WITH ALUMINUM CAP IN CONCRETE
N0200131	13,532,054.42	3,047,907.93	10.29	SET 5/8 IRON ROD WITH ALUMINUM CAP IN CONCRETE
N0200132	13,542,113.21	3,052,675.49	18.66	SET 5/8 IRON ROD WITH ALUMINUM CAP IN CONCRETE
N0200133	13,543,018.72	3,051,659.94	19.68	SET 5/8 IRON ROD WITH ALUMINUM CAP IN CONCRETE
N0200134	13,548,238.62	3,061,280.24	17.07	SET 5/8 IRON ROD WITH ALUMINUM CAP IN CONCRETE
N0200135	13,549,128.63	3,062,154.05	13.42	SET 5/8 IRON ROD WITH ALUMINUM CAP IN CONCRETE
N0200136	13,543,628.71	3,067,002.48	11.73	SET 5/8 IRON ROD WITH ALUMINUM CAP IN CONCRETE
N0200137	13,543,136.78	3,066,505.27	11.48	SET 5/8 IRON ROD WITH ALUMINUM CAP IN CONCRETE
N0200138	13,552,556.79	3,074,313.46	11.54	SET 5/8 IRON ROD WITH ALUMINUM CAP IN CONCRETE
N0200139	13,553,063.41	3,073,697.11	11.20	SET 5/8 IRON ROD WITH ALUMINUM CAP IN CONCRETE
N0200140	13,561,498.46	3,083,374.98	19.57	SET 5/8 IRON ROD WITH ALUMINUM CAP IN CONCRETE
N0200141	13,562,638.68	3,084,909.94	19.10	SET 5/8 IRON ROD WITH ALUMINUM CAP IN CONCRETE

SECONDARY CONTROL

POINT #	NORTH	EAST	ELEV.	DESCRIPTION
H-1	13,527,433.91	3,044,172.66	11.46	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-2	13,528,851.38	3,044,642.72	15.00	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-3	13,529,581.34	3,045,634.06	10.70	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-4	13,530,586.41	3,046,270.31	8.43	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-5	13,531,507.11	3,046,818.03	9.57	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-6	13,532,429.23	3,047,359.72	10.65	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-7	13,533,435.35	3,047,997.89	10.63	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-8	13,534,680.52	3,048,733.35	10.36	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-9	13,535,685.41	3,049,313.04	10.66	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-10	13,536,830.53	3,049,957.04	10.53	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-11	13,537,882.94	3,050,570.16	10.26	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-12	13,538,964.96	3,051,203.22	11.49	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-13	13,540,029.80	3,051,877.86	15.02	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-14	13,541,140.08	3,052,485.98	20.51	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-15	13,542,244.20	3,053,494.44	17.26	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-16	13,543,041.54	3,054,299.05	17.76	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-17	13,543,706.49	3,055,488.08	15.51	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-18	13,544,474.16	3,056,779.71	16.79	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-19	13,545,221.03	3,058,062.44	16.10	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-20	13,545,842.69	3,058,986.82	15.17	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-21	13,546,922.37	3,060,046.45	16.59	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-22	13,547,982.39	3,061,094.80	14.30	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-23	13,548,002.95	3,061,963.88	17.54	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-24	13,547,069.73	3,063,079.15	13.48	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-25	13,546,303.12	3,063,986.22	14.24	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-26	13,545,259.39	3,065,070.32	12.50	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-27	13,544,218.89	3,066,211.69	10.98	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-28	13,544,020.19	3,067,004.17	11.62	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-29	13,544,846.15	3,068,058.35	10.80	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-30	13,545,902.84	3,069,016.78	10.02	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-31	13,546,886.36	3,069,834.96	9.67	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-32	13,547,927.98	3,070,697.29	9.58	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-33	13,548,910.99	3,071,835.28	10.55	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-34	13,550,091.28	3,072,850.15	11.69	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-35	13,551,167.90	3,073,825.37	11.53	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-36	13,552,188.59	3,074,761.88	14.60	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-37	13,553,102.07	3,075,626.49	14.63	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-38	13,554,074.32	3,076,441.65	15.36	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-39	13,554,907.68	3,077,267.44	17.17	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-40	13,555,745.36	3,078,025.08	20.30	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-41	13,556,903.51	3,079,064.86	20.71	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-42	13,557,751.85	3,079,763.55	21.53	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-43	13,558,830.80	3,080,808.49	21.98	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-44	13,559,824.92	3,081,643.35	23.03	SET 5/8 IRON ROD WITH ALUMINUM CAP
H-45	13,560,835.70	3,082,746.84	22.46	SET 5/8 IRON ROD WITH ALUMINUM CAP

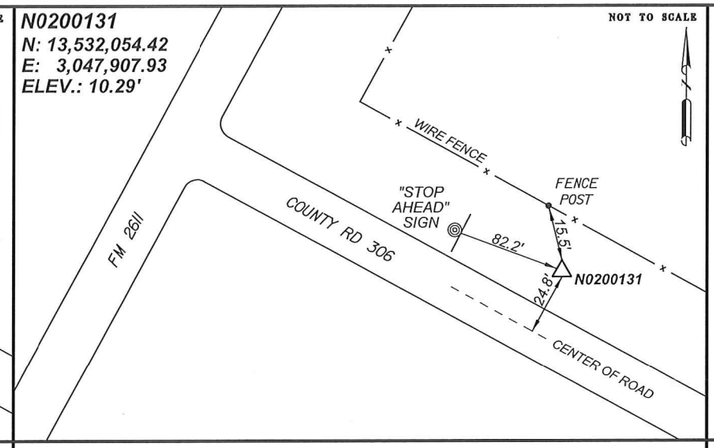
0 50 100
SCALE 1" = 4000' 22" x 34"
SCALE 1" = 8000' 11" x 17"

N0200130
N: 13,532,309.91
E: 3,047,458.66
ELEV.: 9.64'



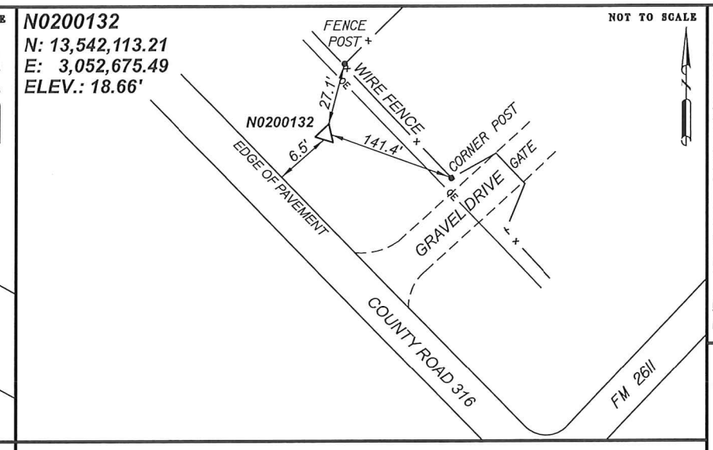
N0200130 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET IN CONCRETE ON THE SOUTH SIDE OF COUNTY ROAD 306 AT THE SOUTHEAST CORNER OF FM 2611 AND COUNTY ROAD 306.

N0200131
N: 13,532,054.42
E: 3,047,907.93
ELEV.: 10.29'



N0200131 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET IN CONCRETE ON THE NORTH SIDE OF COUNTY ROAD 306 APPROXIMATELY 0.1 OF A MILE SOUTHEAST OF THE INTERSECTION OF FM 2611 AND COUNTY ROAD 306.

N0200132
N: 13,542,113.21
E: 3,052,675.49
ELEV.: 18.66'



N0200132 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET IN CONCRETE ON THE EAST SIDE OF COUNTY ROAD 316 APPROXIMATELY 0.1 OF A MILE NORTHWEST OF THE INTERSECTION OF FM 2611 AND COUNTY ROAD 316.

NOTES:

1.) PRIMARY CONTROL (HORIZONTAL) WAS ESTABLISHED USING GPS METHODS CONFORMING TO THE "TXDOT SURVEY MANUAL 2016-1", HOLDING THE COORS STATIONS: CITYPORT & 877 2683C.

2.) BEARINGS ARE BASED ON GRID NORTH, TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS SOUTH CENTRAL ZONE 4204, NAD83 (2011) EPOCH: 2010.0000.

3.) COORDINATES AND DISTANCES SHOWN ARE SURFACE COORDINATES BASED ON A PROJECT COORDINATE SYSTEM ESTABLISHED BY APPLYING A SURFACE ADJUSTMENT FACTOR OF 1.00013 TO STATE PLANE GRID COORDINATES NAD83 (2011) EPOCH: 2010.0000, TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL 4204, U.S. SURVEY FEET.

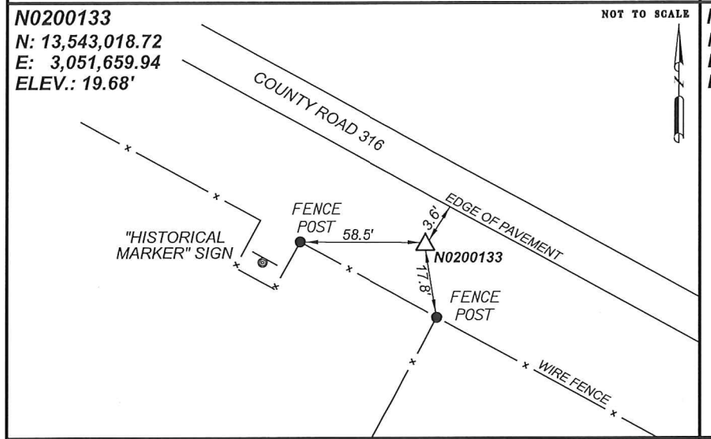
PROJECT COORDINATES = GRID COORDINATES x 1.00013

4.) THE VERTICAL VALUES ARE BASED ON NAVD88 USING DIGITAL LEVELS HOLDING THE GPS ELEVATION OF CONTROL POINT N0200141.

LEGEND

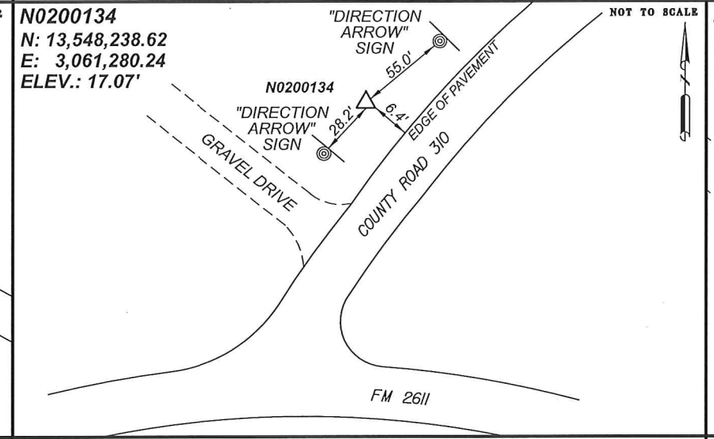
- PRIMARY CONTROL POINT
- SECONDARY CONTROL POINT
- POWER POLE
- SIGN
- TELEPHONE PEDESTAL

N0200133
N: 13,543,018.72
E: 3,051,659.94
ELEV.: 19.68'



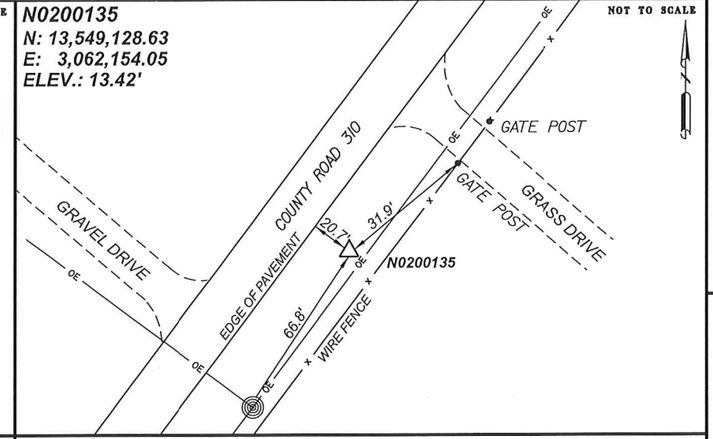
N0200133 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET IN CONCRETE ON THE WEST SIDE OF COUNTY ROAD 316 APPROXIMATELY 0.4 OF A MILE NORTHWEST OF THE INTERSECTION OF FM 2611 AND COUNTY ROAD 316.

N0200134
N: 13,548,238.62
E: 3,061,280.24
ELEV.: 17.07'



N0200134 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET IN CONCRETE ON THE NORTHWEST SIDE OF COUNTY ROAD 310 APPROXIMATELY 260 FEET NORTHEAST OF THE INTERSECTION OF FM 2611 AND COUNTY ROAD 310.

N0200135
N: 13,549,128.63
E: 3,062,154.05
ELEV.: 13.42'



N0200135 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET IN CONCRETE ON THE SOUTHEAST SIDE OF COUNTY ROAD 310 APPROXIMATELY 0.3 OF A MILE NORTHEAST OF THE INTERSECTION OF FM 2611 AND COUNTY ROAD 310.

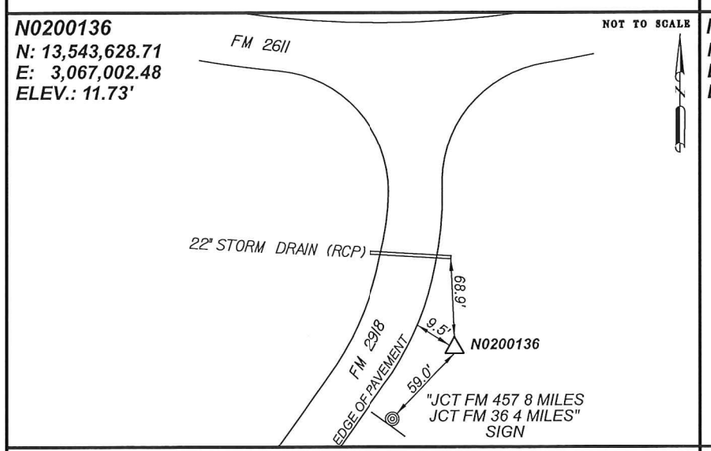
THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E. 12/22/2020

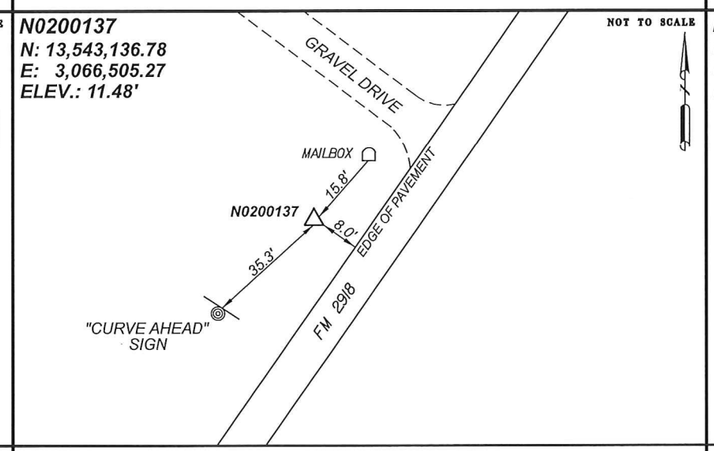
THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

N0200136
N: 13,543,628.71
E: 3,067,002.48
ELEV.: 11.73'



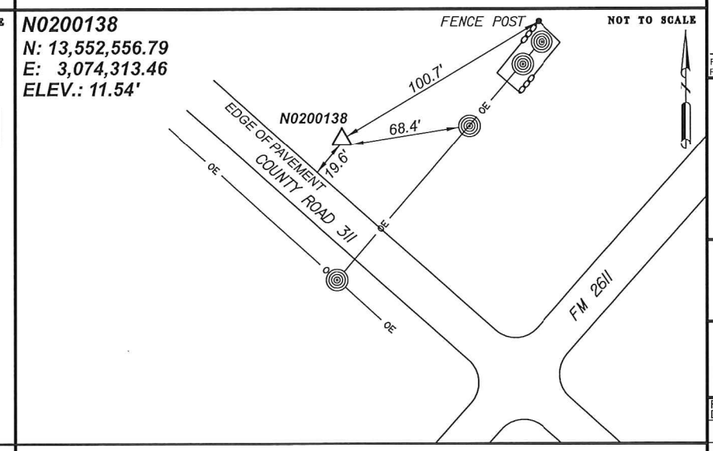
N0200136 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET IN CONCRETE ON THE EAST SIDE OF FM 2918 APPROXIMATELY 0.1 OF A MILE SOUTHWEST OF THE INTERSECTION OF FM 2611 AND FM 2918.

N0200137
N: 13,543,136.78
E: 3,066,505.27
ELEV.: 11.48'



N0200137 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET IN CONCRETE ON THE NORTHWEST SIDE OF FM 2918 APPROXIMATELY 0.2 OF A MILE SOUTHWEST OF THE INTERSECTION OF FM 2611 AND FM 2918.

N0200138
N: 13,552,556.79
E: 3,074,313.46
ELEV.: 11.54'



N0200138 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET IN CONCRETE ON THE NORTHEAST SIDE OF COUNTY ROAD 311 APPROXIMATELY 0.1 OF A MILE NORTHWEST OF THE INTERSECTION OF FM 2611 AND COUNTY ROAD 311.

STATE OF TEXAS
REGISTERED
R. CLAY SWETMAN
5397
PROFESSIONAL LAND SURVEYOR

8/21/2019

R. CLAY SWETMAN — DATE
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 5397

CDS muery
ENGINEERS • SURVEYORS
3411 MAGIC DRIVE • SAN ANTONIO • TEXAS • (210)581-1111
TBPE NO. F-1733 • TBPLS NO. 100495-00

2017 Texas Department of Transportation

FM 2611 HORIZONTAL & VERTICAL CONTROL SHEET

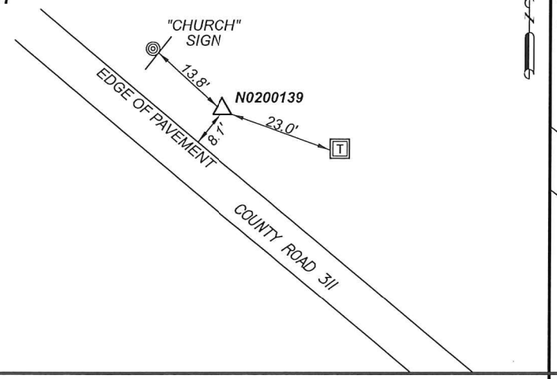
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		80

STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025	FM 2611

N0200139

N: 13,553,063.41
E: 3,073,697.11
ELEV.: 11.20'

NOT TO SCALE

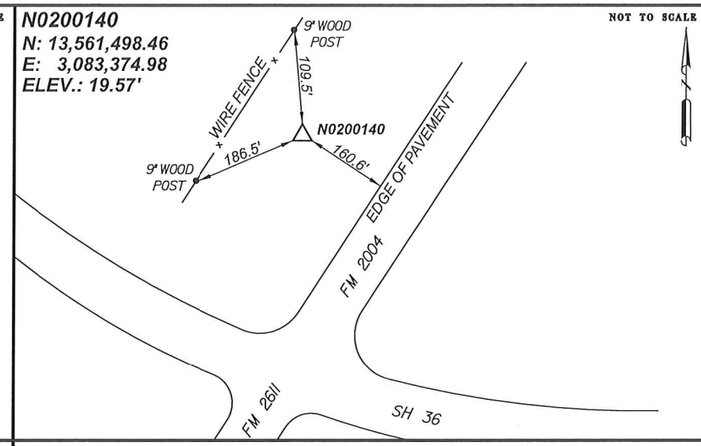


N0200139 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET IN CONCRETE ON THE NORTHEAST SIDE OF COUNTY ROAD 311 APPROXIMATELY 0.3 OF A MILE NORTHWEST OF THE INTERSECTION OF FM 2611 AND COUNTY ROAD 311.

N0200140

N: 13,561,498.46
E: 3,083,374.98
ELEV.: 19.57'

NOT TO SCALE

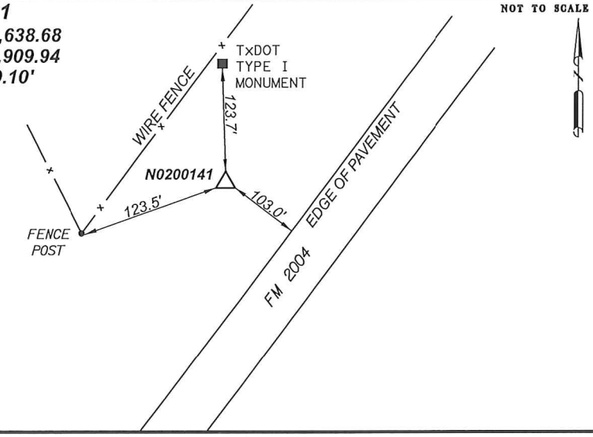


N0200140 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET IN CONCRETE ON THE NORTH SIDE OF FM 2004 APPROXIMATELY 0.2 OF A MILE NORTHEAST OF THE INTERSECTION OF SH 36 AND FM 2004.

N0200141

N: 13,562,638.68
E: 3,084,909.94
ELEV.: 19.10'

NOT TO SCALE



N0200141 IS A 5/8" IRON ROD WITH ALUMINUM CAP SET IN CONCRETE ON THE NORTH SIDE OF FM 2004 APPROXIMATELY 0.6 OF A MILE NORTHEAST OF THE INTERSECTION OF SH 36 AND FM 2004.

NOTES:

1.) PRIMARY CONTROL (HORIZONTAL) WAS ESTABLISHED USING GPS METHODS CONFORMING TO THE "TxDOT SURVEY MANUAL 2016-1". HOLDING THE COORS STATIONS: CITYPORT & 877 2683C.

2.) BEARINGS ARE BASED ON GRID NORTH, TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS SOUTH CENTRAL ZONE 4204, NAD83 (2011) EPOCH: 2010.0000.

3.) COORDINATES AND DISTANCES SHOWN ARE SURFACE COORDINATES BASED ON A PROJECT COORDINATE SYSTEM ESTABLISHED BY APPLYING A SURFACE ADJUSTMENT FACTOR OF 1.00013 TO STATE PLANE GRID COORDINATES NAD83 (2011) EPOCH: 2010.0000, TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL 4204, U.S. SURVEY FEET.

PROJECT COORDINATES = GRID COORDINATES x 1.00013

4.) THE VERTICAL VALUES ARE BASED ON NAVD88 USING DIGITAL LEVELS HOLDING THE GPS ELEVATION OF CONTROL POINT N0200141.

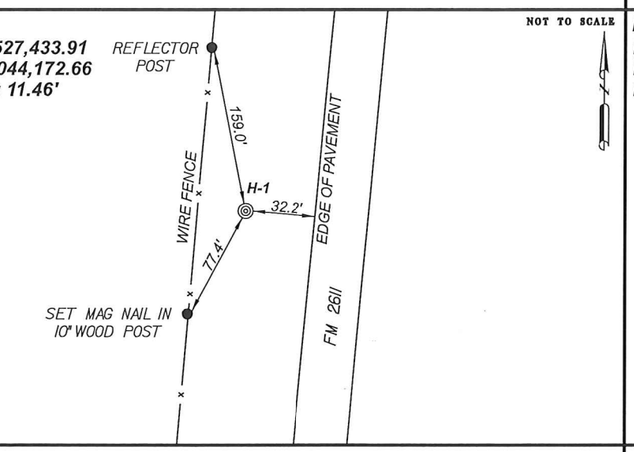
LEGEND

- PRIMARY CONTROL POINT
- SECONDARY CONTROL POINT
- POWER POLE
- SIGN
- TELEPHONE PEDESTAL

H-1

N: 13,527,433.91
E: 3,044,172.66
ELEV.: 11.46'

NOT TO SCALE

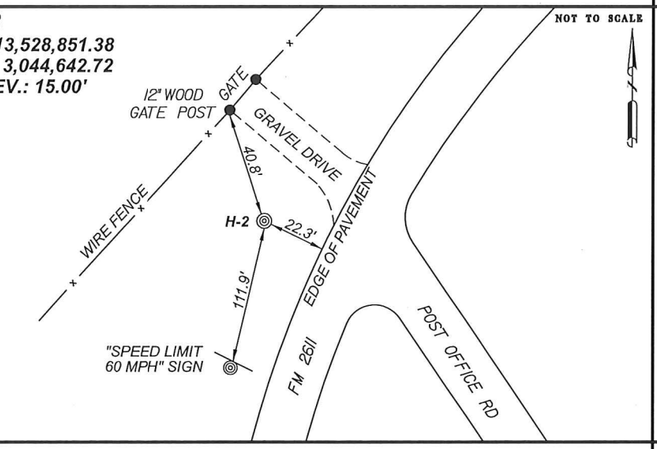


H-1 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE WEST SIDE OF FM 2611 APPROXIMATELY 0.30 OF A MILE SOUTHWEST OF THE INTERSECTION OF POST OFFICE ROAD AND FM 2611.

H-2

N: 13,528,851.38
E: 3,044,642.72
ELEV.: 15.00'

NOT TO SCALE

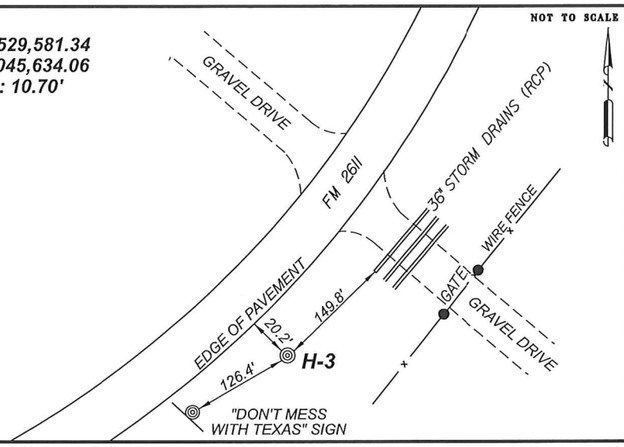


H-2 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 AT THE INTERSECTION OF POST OFFICE ROAD AND FM 2611.

H-3

N: 13,529,581.34
E: 3,045,634.06
ELEV.: 10.70'

NOT TO SCALE

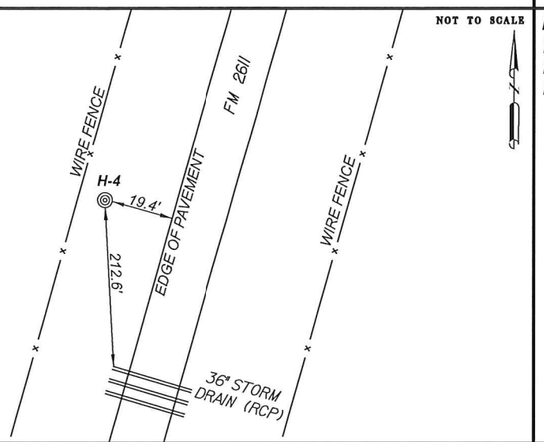


H-3 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTHEAST SIDE OF FM 2611 APPROXIMATELY 0.2 OF A MILE OF THE NORTHEAST INTERSECTION OF POST OFFICE ROAD AND FM 2611.

H-4

N: 13,530,586.41
E: 3,046,270.31
ELEV.: 8.43'

NOT TO SCALE

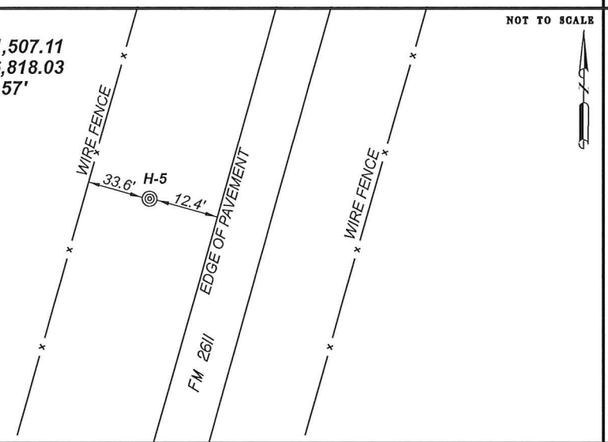


H-4 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 0.4 OF A MILE SOUTHWEST OF THE INTERSECTION OF COUNTY ROAD 306 AND FM 2611.

H-5

N: 13,531,507.11
E: 3,046,818.03
ELEV.: 9.57'

NOT TO SCALE

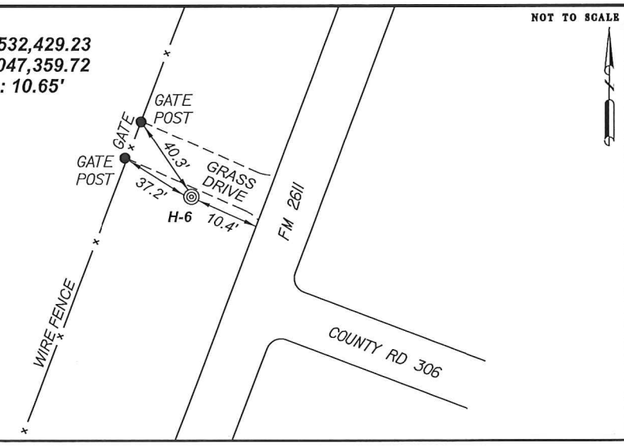


H-5 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 0.2 OF A MILE SOUTHWEST OF THE INTERSECTION OF COUNTY ROAD 306 AND FM 2611.

H-6

N: 13,532,429.23
E: 3,047,359.72
ELEV.: 10.65'

NOT TO SCALE



H-6 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 AT THE INTERSECTION OF COUNTY ROAD 306 AND FM 2611.

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

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E. 12/22/2020

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

STATE OF TEXAS
REGISTERED
R. CLAY SWETMAN
5397
PROFESSIONAL LAND SURVEYOR

8/21/2019

R. CLAY SWETMAN — DATE
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 5397

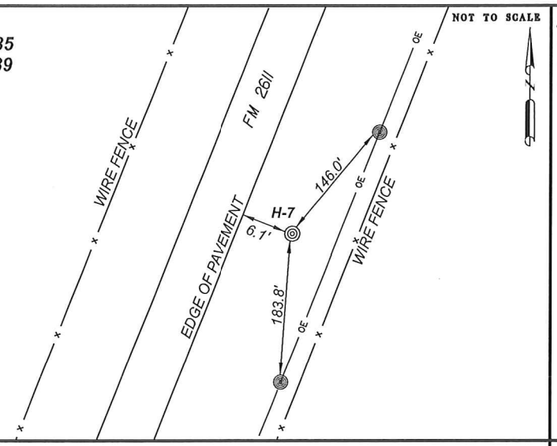
CDS muery
ENGINEERS • SURVEYORS
3411 MAGIC DRIVE • SAN ANTONIO • TEXAS • (210)581-1111
TBPE NO. F-1733 • TBPLS NO. 100495-00

2017 Texas Department of Transportation

FM 2611
HORIZONTAL & VERTICAL CONTROL SHEET

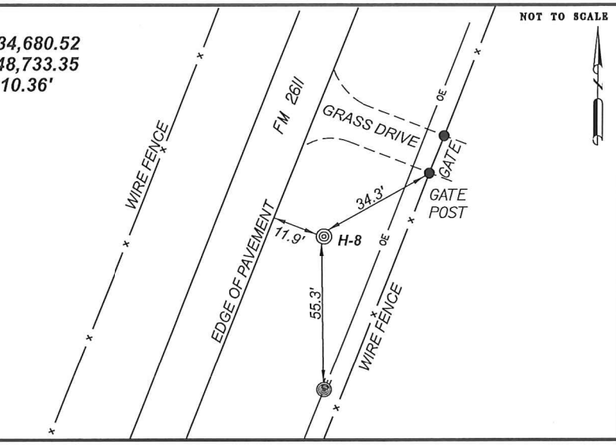
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			81
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025	FM 2611

H-7
N: 13,533,435.35
E: 3,047,997.89
ELEV.: 10.63'



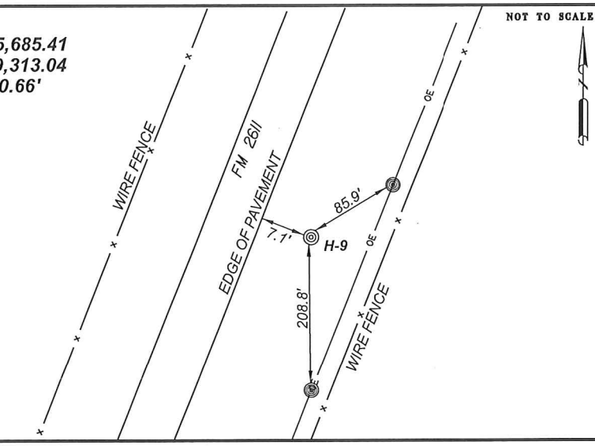
H-7 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTHEAST SIDE OF FM 2611 APPROXIMATELY 0.2 OF A MILE NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 306 AND FM 2611.

H-8
N: 13,534,680.52
E: 3,048,733.35
ELEV.: 10.36'



H-8 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTHEAST SIDE OF FM 2611 APPROXIMATELY 0.5 OF A MILE NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 306 AND FM 2611.

H-9
N: 13,535,685.41
E: 3,049,313.04
ELEV.: 10.66'



H-9 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTHEAST SIDE OF FM 2611 APPROXIMATELY 0.7 OF A MILE NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 306 AND FM 2611.

NOTES:

1.) PRIMARY CONTROL (HORIZONTAL) WAS ESTABLISHED USING GPS METHODS CONFORMING TO THE "TxDOT SURVEY MANUAL 2016-1". HOLDING THE CORS STATIONS: CITYPORT & 877 2683C.

2.) BEARINGS ARE BASED ON GRID NORTH, TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS SOUTH CENTRAL ZONE 4204, NAD83 (2011) EPOCH: 2010.0000.

3.) COORDINATES AND DISTANCES SHOWN ARE SURFACE COORDINATES BASED ON A PROJECT COORDINATE SYSTEM ESTABLISHED BY APPLYING A SURFACE ADJUSTMENT FACTOR OF 1.00013 TO STATE PLANE GRID COORDINATES NAD83 (2011) EPOCH: 2010.0000, TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL 4204, U.S. SURVEY FEET.

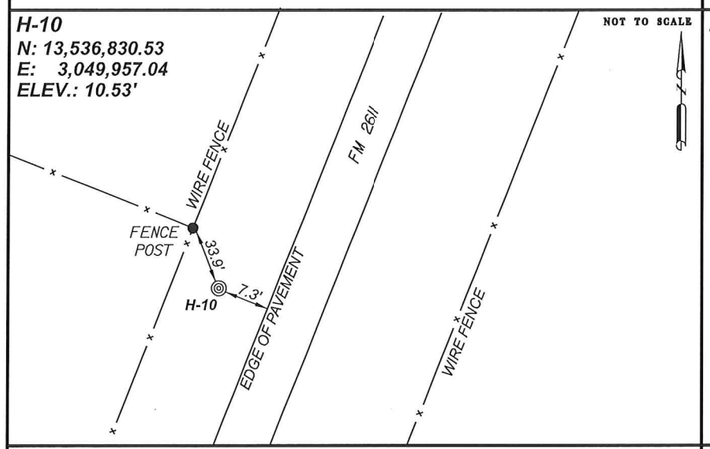
PROJECT COORDINATES = GRID COORDINATES x 1.00013

4.) THE VERTICAL VALUES ARE BASED ON NAVD88 USING DIGITAL LEVELS HOLDING THE GPS ELEVATION OF CONTROL POINT NO200141.

LEGEND

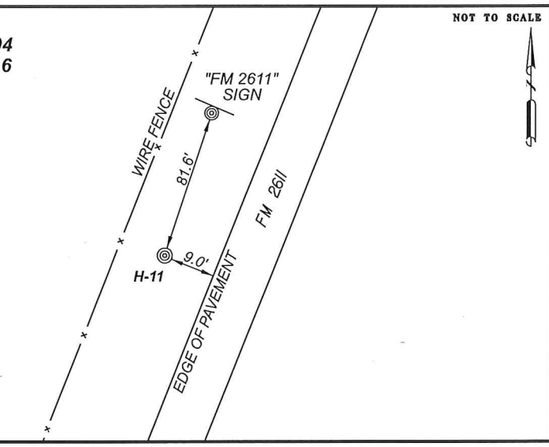
- PRIMARY CONTROL POINT
- SECONDARY CONTROL POINT
- POWER POLE
- SIGN
- TELEPHONE PEDESTAL

H-10
N: 13,536,830.53
E: 3,049,957.04
ELEV.: 10.53'



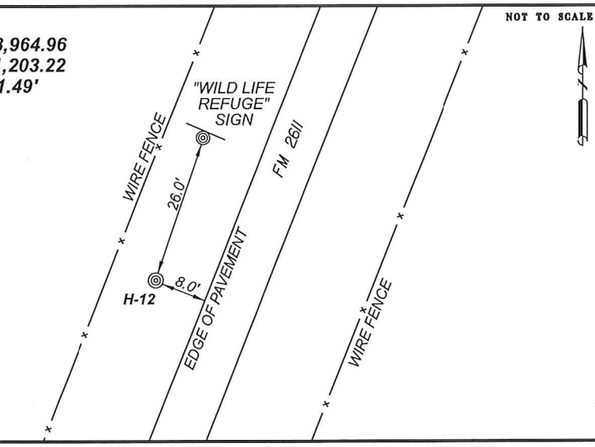
H-10 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 1.0 MILE NORTHWEST OF THE INTERSECTION OF COUNTY ROAD 306 AND FM 2611.

H-11
N: 13,537,882.94
E: 3,050,570.16
ELEV.: 10.26'



H-11 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 1.2 MILES NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 306 AND FM 2611.

H-12
N: 13,538,964.96
E: 3,051,203.22
ELEV.: 11.49'



H-12 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 1.4 MILES NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 306 AND FM 2611.

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

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E. 12/22/2020

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

STATE OF TEXAS
REGISTERED
R. CLAY SWETMAN
5397
PROFESSIONAL
LAND SURVEYOR

8/21/2019
R. CLAY SWETMAN DATE
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 5397

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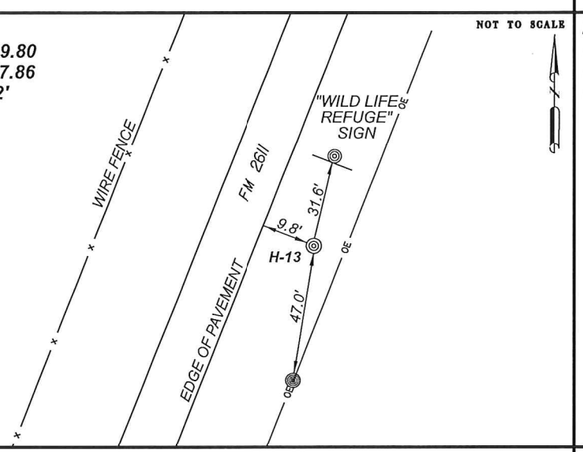
3411 MAGIC DRIVE • SAN ANTONIO • TEXAS • (210)581-1111
TBPE NO. F-1733 • TBPLS NO. 100495-00

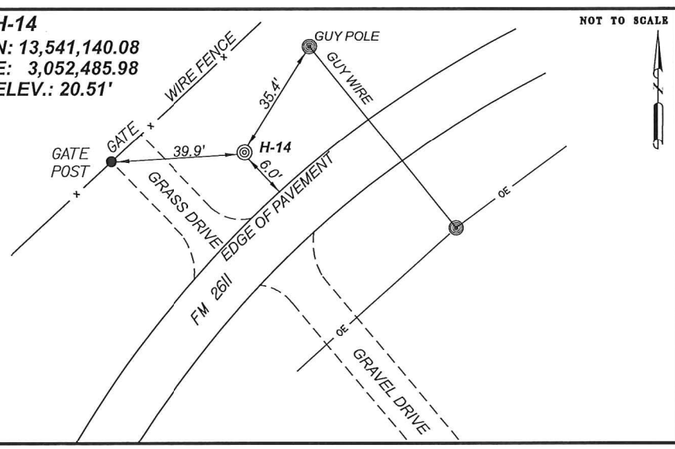
2017 Texas Department of Transportation

H-13
N: 13,540,029.80
E: 3,051,877.86
ELEV.: 15.02'



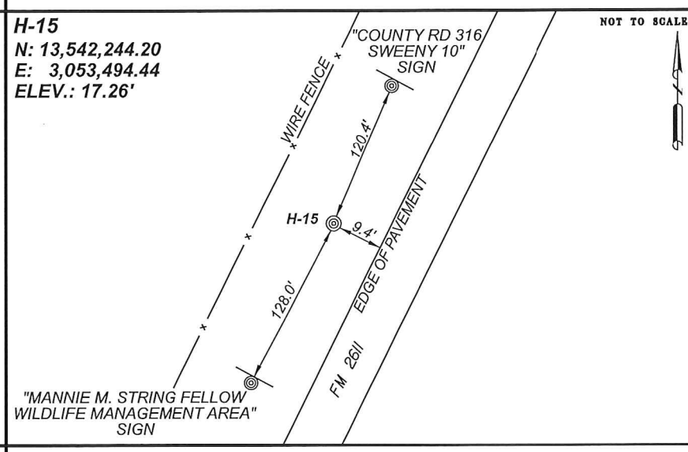
H-13 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTHEAST SIDE OF FM 2611 APPROXIMATELY 1.7 MILES NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 306 AND FM 2611.

H-14
N: 13,541,140.08
E: 3,052,485.98
ELEV.: 20.51'



H-14 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 0.2 OF A MILE SOUTHWEST OF THE INTERSECTION OF COUNTY ROAD 316 AND FM 2611.

H-15
N: 13,542,244.20
E: 3,053,494.44
ELEV.: 17.26'



H-15 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 0.1 OF A MILE NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 316 AND FM 2611.

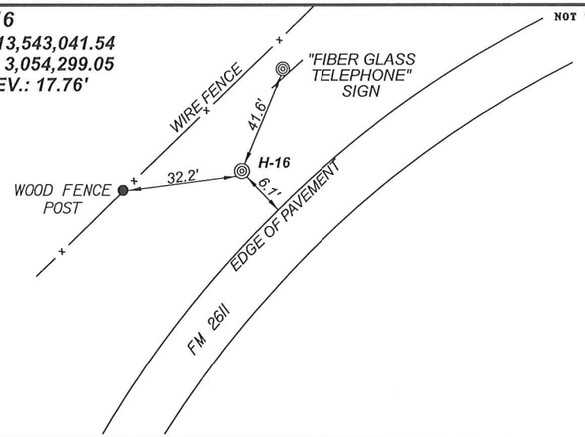
FM 2611
HORIZONTAL & VERTICAL CONTROL SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		82

STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025	FM 2611

H-16

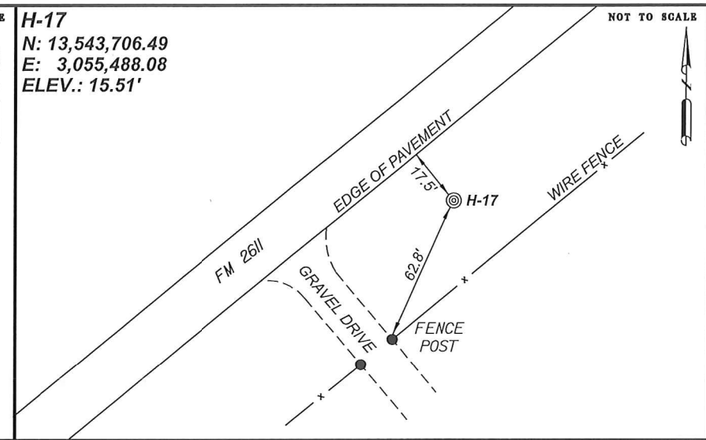
N: 13,543,041.54
E: 3,054,299.05
ELEV.: 17.76'



H-16 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 0.3 OF A MILE NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 316 AND FM 2611.

H-17

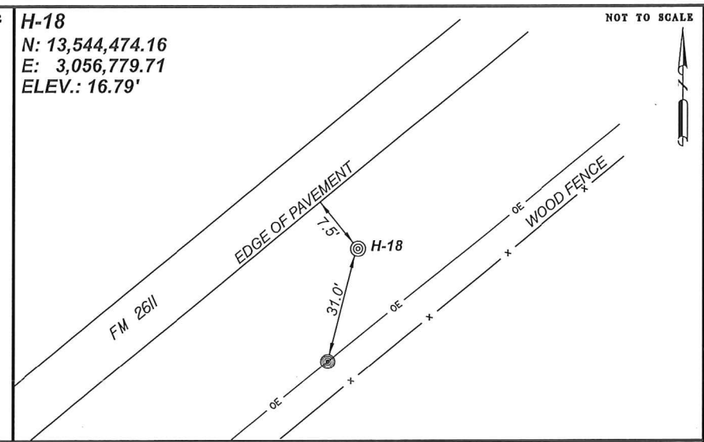
N: 13,543,706.49
E: 3,055,488.08
ELEV.: 15.51'



H-17 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTH SIDE OF FM 2611 APPROXIMATELY 0.6 OF A MILE NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 316 AND FM 2611.

H-18

N: 13,544,474.16
E: 3,056,779.71
ELEV.: 16.79'



H-18 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTH SIDE OF FM 2611 APPROXIMATELY 0.9 OF A MILE NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 316 AND FM 2611.

NOTES:

1.) PRIMARY CONTROL (HORIZONTAL) WAS ESTABLISHED USING GPS METHODS CONFORMING TO THE "TxDOT SURVEY MANUAL 2016-1". HOLDING THE CORS STATIONS: CITYPORT & 877 2683C.

2.) BEARINGS ARE BASED ON GRID NORTH, TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS SOUTH CENTRAL ZONE 4204, NAD83 (2011) EPOCH: 2010.0000.

3.) COORDINATES AND DISTANCES SHOWN ARE SURFACE COORDINATES BASED ON A PROJECT COORDINATE SYSTEM ESTABLISHED BY APPLYING A SURFACE ADJUSTMENT FACTOR OF 1.00013 TO STATE PLANE GRID COORDINATES NAD83 (2011) EPOCH: 2010.0000, TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL 4204, U.S. SURVEY FEET.

PROJECT COORDINATES = GRID COORDINATES x 1.00013

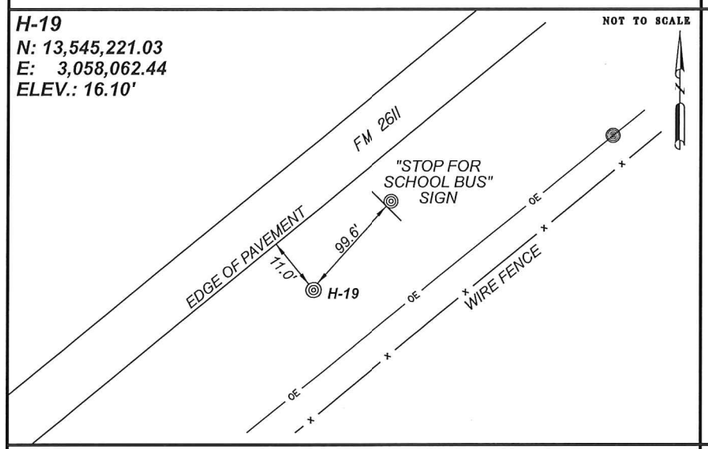
4.) THE VERTICAL VALUES ARE BASED ON NAVD88 USING DIGITAL LEVELS HOLDING THE GPS ELEVATION OF CONTROL POINT NO200141.

LEGEND

- PRIMARY CONTROL POINT
- SECONDARY CONTROL POINT
- POWER POLE
- SIGN
- TELEPHONE PEDESTAL

H-19

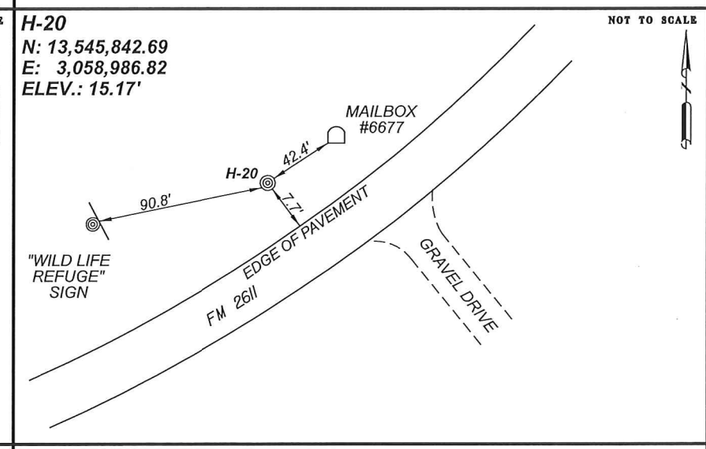
N: 13,545,221.03
E: 3,058,062.44
ELEV.: 16.10'



H-19 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTHEAST SIDE OF FM 2611 APPROXIMATELY 1.2 MILES NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 316 AND FM 2611.

H-20

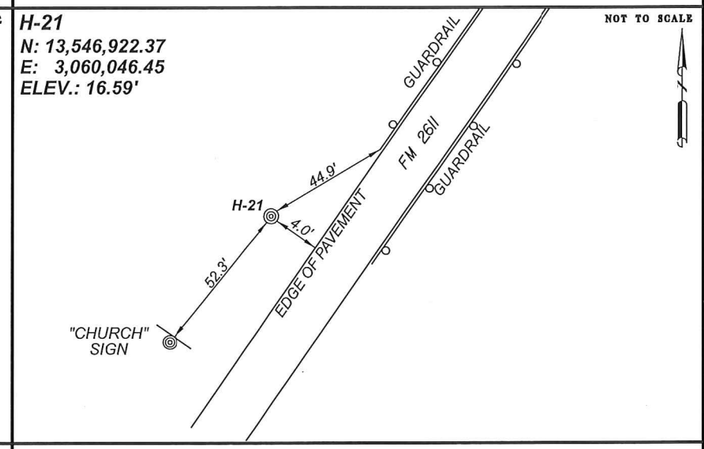
N: 13,545,842.69
E: 3,058,986.82
ELEV.: 15.17'



H-20 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTH SIDE OF FM 2611 APPROXIMATELY 1.4 MILES NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 316 AND FM 2611.

H-21

N: 13,546,922.37
E: 3,060,046.45
ELEV.: 16.59'



H-21 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 1.7 MILES NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 316 AND FM 2611.

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

STATE OF TEXAS
EUGENE AMPOMAH
126289
PROFESSIONAL LICENSED ENGINEER

Eugene Ampomah, P.E. 12/22/2020

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

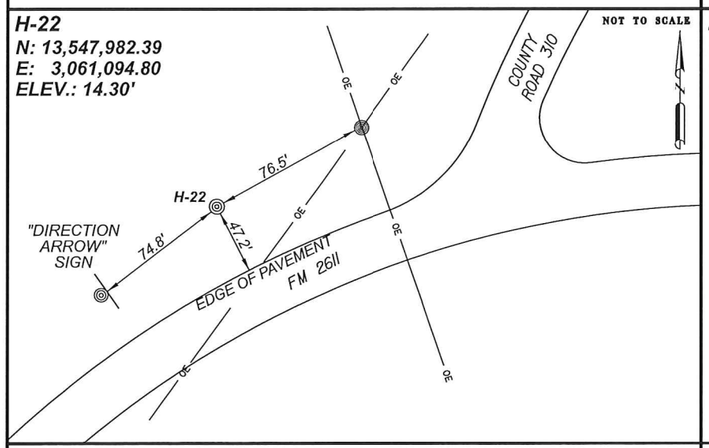
STATE OF TEXAS
REGISTERED
R. CLAY SWETMAN
5397
PROFESSIONAL LAND SURVEYOR

8/21/2019

R. CLAY SWETMAN DATE
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 5397

H-22

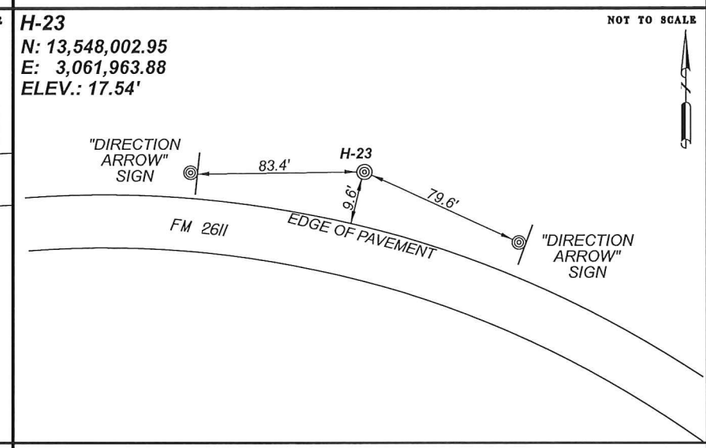
N: 13,547,982.39
E: 3,061,094.80
ELEV.: 14.30'



H-22 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTH SIDE OF FM 2611 APPROXIMATELY 170 FEET WEST OF THE INTERSECTION OF COUNTY ROAD 310 AND FM 2611.

H-23

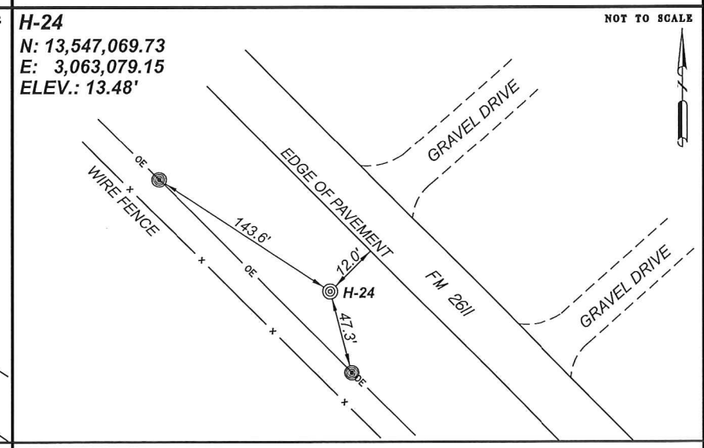
N: 13,548,002.95
E: 3,061,963.88
ELEV.: 17.54'



H-23 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTH SIDE OF FM 2611 APPROXIMATELY 0.1 OF A MILE NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 310 AND FM 2611.

H-24

N: 13,547,069.73
E: 3,063,079.15
ELEV.: 13.48'



H-24 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE WEST SIDE OF FM 2611 APPROXIMATELY 0.4 OF A MILE SOUTHEAST OF THE INTERSECTION OF COUNTY ROAD 310 AND FM 2611.

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TBPE NO. F-1733 • TBPLS NO. 100495-00

2017 Texas Department of Transportation

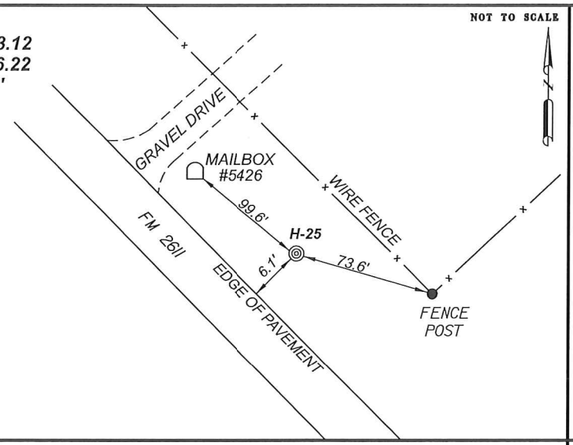
FM 2611
HORIZONTAL & VERTICAL CONTROL SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			83

STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025	FM 2611

H-25
N: 13,546,303.12
E: 3,063,986.22
ELEV.: 14.24'

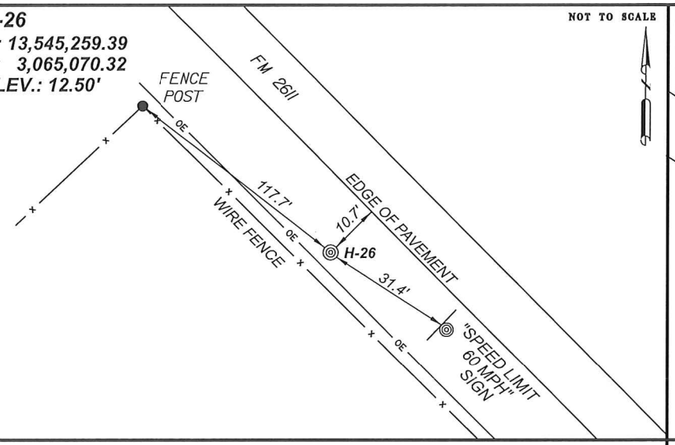
NOT TO SCALE



H-25 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE EAST SIDE OF FM 2611 APPROXIMATELY 0.5 OF A MILE NORTHWEST OF THE INTERSECTION OF RIVERWOOD ROAD AND FM 2611.

H-26
N: 13,545,259.39
E: 3,065,070.32
ELEV.: 12.50'

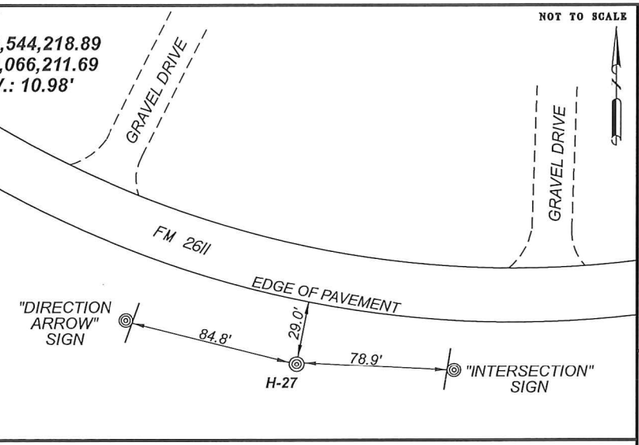
NOT TO SCALE



H-26 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE WEST SIDE OF FM 2611 APPROXIMATELY 0.2 OF A MILE NORTHWEST OF THE INTERSECTION OF RIVERWOOD ROAD AND FM 2611.

H-27
N: 13,544,218.89
E: 3,066,211.69
ELEV.: 10.98'

NOT TO SCALE



H-27 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTH SIDE OF FM 2611 APPROXIMATELY 0.2 OF A MILE NORTHWEST OF THE INTERSECTION OF FM 2918 AND FM 2611.

NOTES:

1.) PRIMARY CONTROL (HORIZONTAL) WAS ESTABLISHED USING GPS METHODS CONFORMING TO THE "TxDOT SURVEY MANUAL 2016-1". HOLDING THE COORS STATIONS: CITYPORT & 877 2683C.

2.) BEARINGS ARE BASED ON GRID NORTH, TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS SOUTH CENTRAL ZONE 4204, NAD83 (2011) EPOCH: 2010.0000.

3.) COORDINATES AND DISTANCES SHOWN ARE SURFACE COORDINATES BASED ON A PROJECT COORDINATE SYSTEM ESTABLISHED BY APPLYING A SURFACE ADJUSTMENT FACTOR OF 1.00013 TO STATE PLANE GRID COORDINATES NAD83 (2011) EPOCH: 2010.0000, TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL 4204, U.S. SURVEY FEET.

PROJECT COORDINATES = GRID COORDINATES x 1.00013

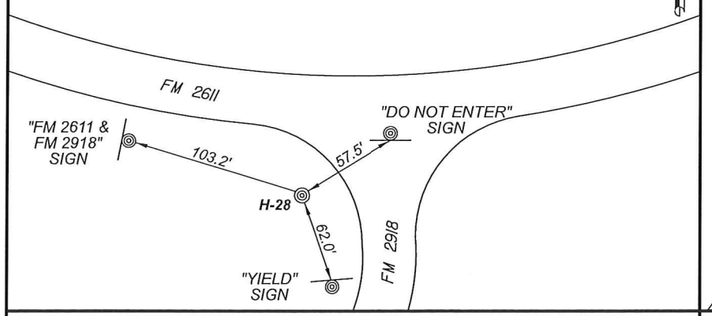
4.) THE VERTICAL VALUES ARE BASED ON NAVD88 USING DIGITAL LEVELS HOLDING THE GPS ELEVATION OF CONTROL POINT NO200141.

LEGEND

- △ PRIMARY CONTROL POINT
- ◎ SECONDARY CONTROL POINT
- ⊗ POWER POLE
- SIGN
- T TELEPHONE PEDESTAL

H-28
N: 13,544,020.19
E: 3,067,004.17
ELEV.: 11.62'

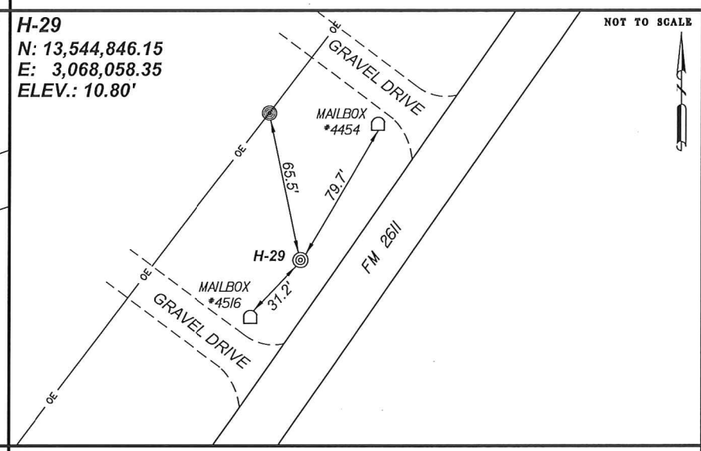
NOT TO SCALE



H-28 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTH SIDE OF FM 2611. POINT IS AT THE SOUTHWEST CORNER OF THE INTERSECTION OF FM 2918 AND FM 2611.

H-29
N: 13,544,846.15
E: 3,068,058.35
ELEV.: 10.80'

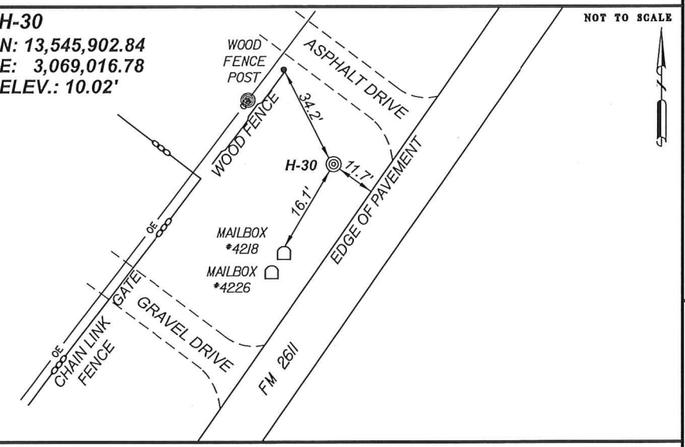
NOT TO SCALE



H-29 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 0.2 OF A MILE NORTHEAST OF THE INTERSECTION OF FM 2918 AND FM 2611.

H-30
N: 13,545,902.84
E: 3,069,016.78
ELEV.: 10.02'

NOT TO SCALE



H-30 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 0.3 OF A MILE ON THE SOUTHWEST SIDE OF THE INTERSECTION OF COUNTY ROAD 659 AND FM 2611.

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

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E. 12/22/2020

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

STATE OF TEXAS
REGISTERED
R. CLAY SWETMAN
5397
PROFESSIONAL LAND SURVEYOR

8/21/2019

R. CLAY SWETMAN DATE
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 5397

CDS muery
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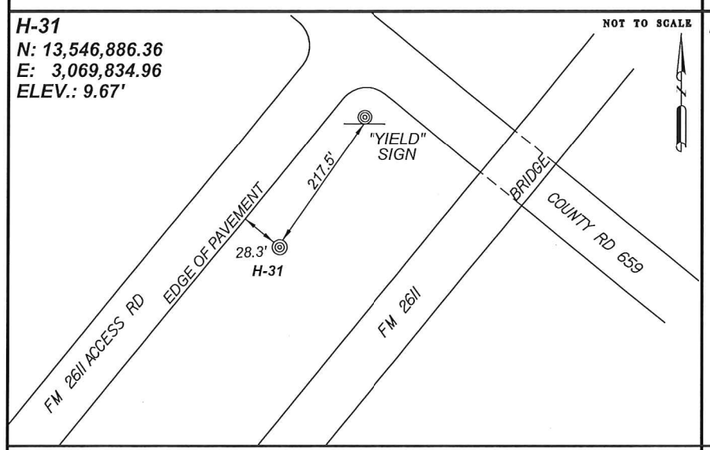
TBPE NO. F-1733 • TBPLS NO. 100495-00

2017 Texas Department of Transportation

H-31
N: 13,546,886.36
E: 3,069,834.96
ELEV.: 9.67'

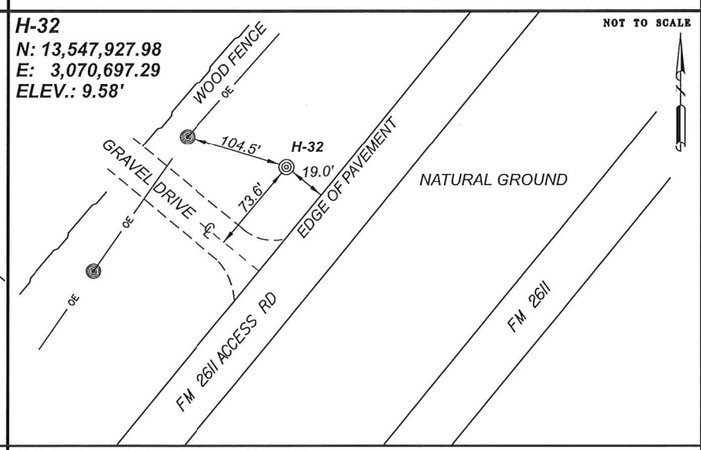
NOT TO SCALE



H-31 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 260 FEET SOUTHWEST OF THE INTERSECTION OF COUNTY ROAD 659 AND FM 2611.

H-32
N: 13,547,927.98
E: 3,070,697.29
ELEV.: 9.58'

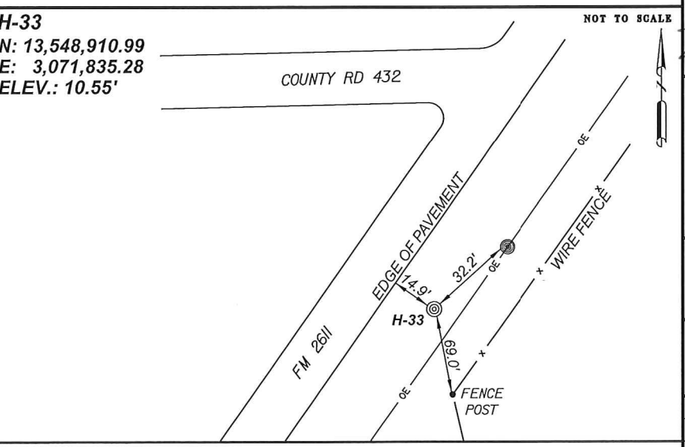
NOT TO SCALE



H-32 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 ACCESS ROAD APPROXIMATELY 0.4 OF A MILE SOUTHWEST OF THE INTERSECTION OF COUNTY ROAD 432 AND FM 2611.

H-33
N: 13,548,910.99
E: 3,071,835.28
ELEV.: 10.55'

NOT TO SCALE



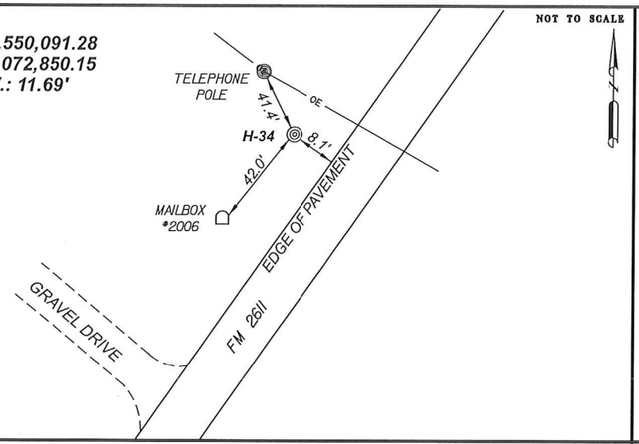
H-33 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTHEAST SIDE OF FM 2611 APPROXIMATELY 0.1 OF A MILE SOUTHWEST OF THE INTERSECTION OF COUNTY ROAD 432 AND FM 2611.

FM 2611
HORIZONTAL & VERTICAL CONTROL SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		84

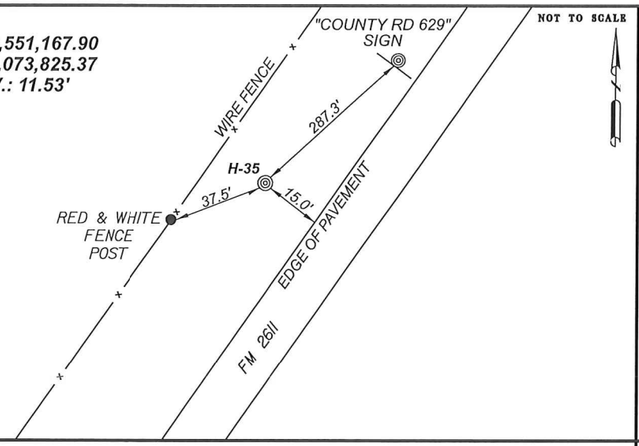
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025	FM 2611

H-34
N: 13,550,091.28
E: 3,072,850.15
ELEV.: 11.69'



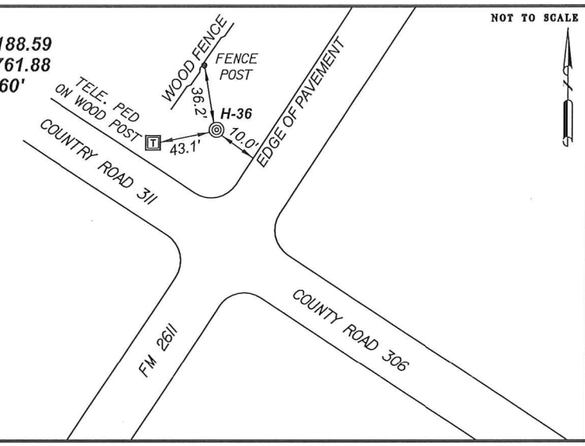
H-34 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 0.2 OF A MILE SOUTHWEST OF THE INTERSECTION OF COUNTY ROAD 629 AND FM 2611.

H-35
N: 13,551,167.90
E: 3,073,825.37
ELEV.: 11.53'



H-35 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 0.1 OF A MILE NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 629 AND FM 2611.

H-36
N: 13,552,188.59
E: 3,074,761.88
ELEV.: 14.60'



H-36 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 AT THE NORTHEAST CORNER OF THE INTERSECTION OF COUNTY ROAD 311 AND FM 2611.

NOTES:

1.) PRIMARY CONTROL (HORIZONTAL) WAS ESTABLISHED USING GPS METHODS CONFORMING TO THE "TxDOT SURVEY MANUAL 2016-1". HOLDING THE COORS STATIONS: CITYPORT & 877 2683C.

2.) BEARINGS ARE BASED ON GRID NORTH, TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS SOUTH CENTRAL ZONE 4204, NAD83 (2011) EPOCH: 2010.0000.

3.) COORDINATES AND DISTANCES SHOWN ARE SURFACE COORDINATES BASED ON A PROJECT COORDINATE SYSTEM ESTABLISHED BY APPLYING A SURFACE ADJUSTMENT FACTOR OF 1.00013 TO STATE PLANE GRID COORDINATES NAD83 (2011) EPOCH: 2010.0000, TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL 4204, U.S. SURVEY FEET.

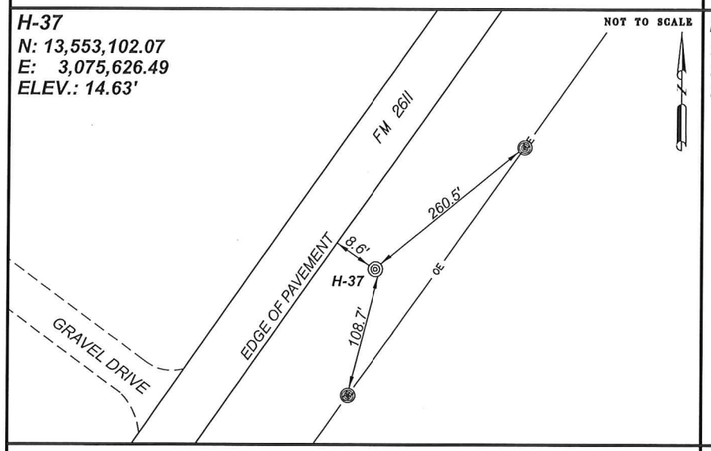
PROJECT COORDINATES = GRID COORDINATES x 1.00013

4.) THE VERTICAL VALUES ARE BASED ON NAVD88 USING DIGITAL LEVELS HOLDING THE GPS ELEVATION OF CONTROL POINT NO200141.

LEGEND

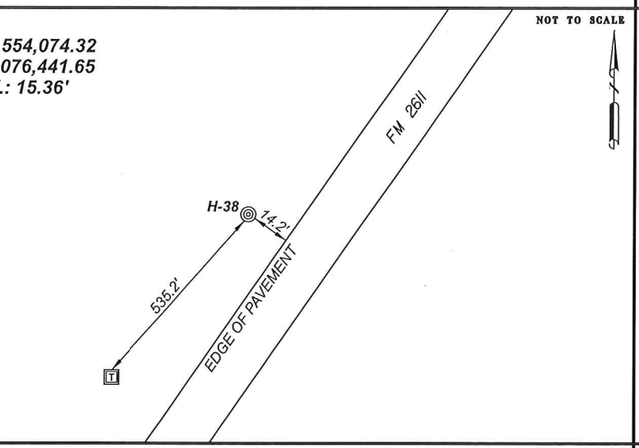
- PRIMARY CONTROL POINT
- SECONDARY CONTROL POINT
- POWER POLE
- SIGN
- T TELEPHONE PEDESTAL

H-37
N: 13,553,102.07
E: 3,075,626.49
ELEV.: 14.63'



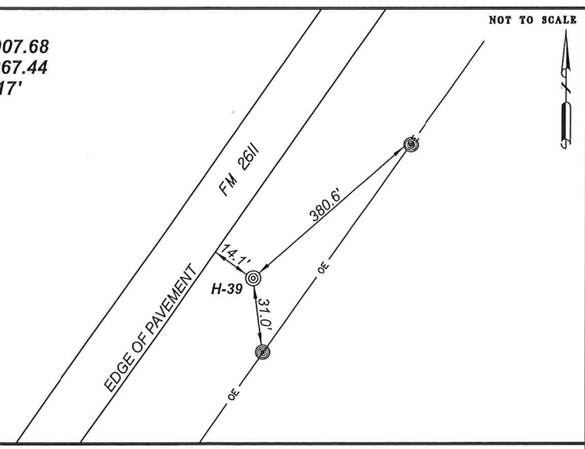
H-37 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON SOUTHEAST SIDE OF FM 2611 APPROXIMATELY 0.3 OF A MILE NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 311 AND FM 2611.

H-38
N: 13,554,074.32
E: 3,076,441.65
ELEV.: 15.36'



H-38 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON NORTHWEST SIDE OF FM 2611 APPROXIMATELY 0.5 OF A MILE NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 311 AND FM 2611.

H-39
N: 13,554,907.68
E: 3,077,267.44
ELEV.: 17.17'



H-39 IS AN 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON SOUTHEAST SIDE OF FM 2611 APPROXIMATELY 0.7 OF A MILE NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 311 AND FM 2611.

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

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E. 12/22/2020

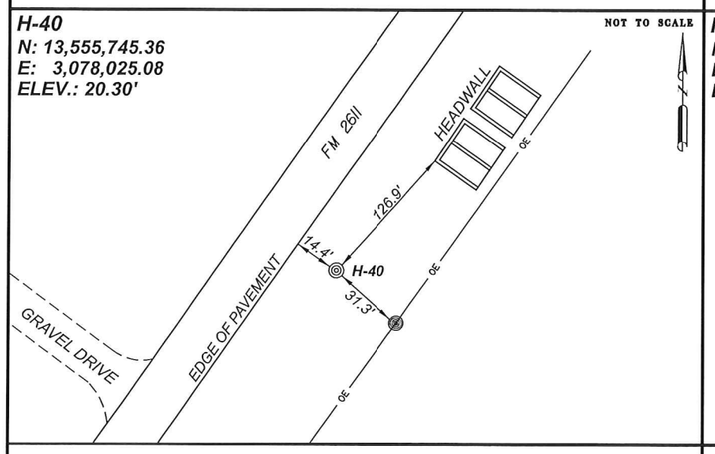
THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS
REGISTERED
R. CLAY SWETMAN
5397
PROFESSIONAL LAND SURVEYOR

8/21/2019

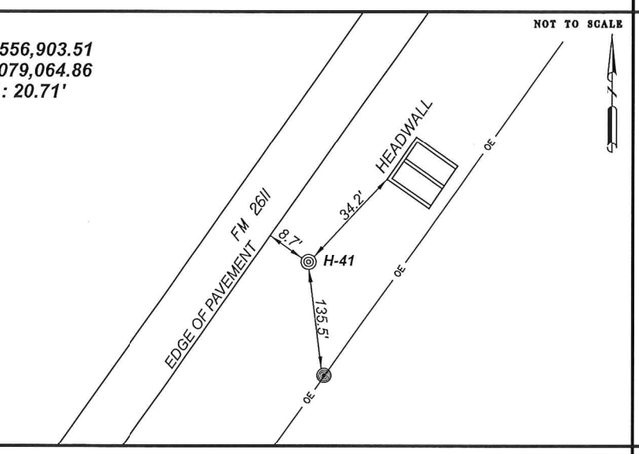
R. CLAY SWETMAN — DATE
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 5397

H-40
N: 13,555,745.36
E: 3,078,025.08
ELEV.: 20.30'



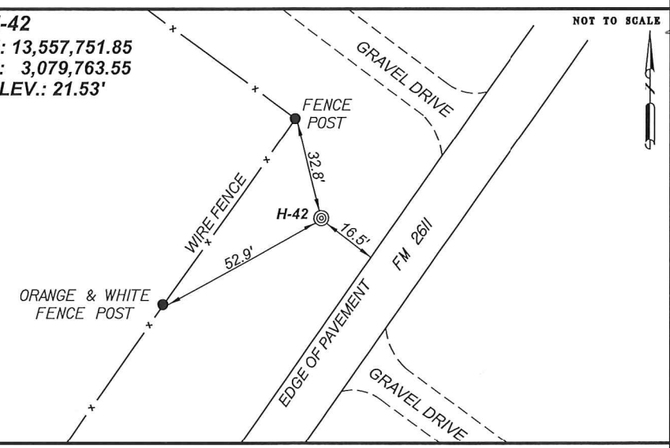
H-40 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTHEAST SIDE OF FM 2611 APPROXIMATELY 0.9 OF A MILE NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 311 AND FM 2611.

H-41
N: 13,556,903.51
E: 3,079,064.86
ELEV.: 20.71'



H-41 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTHEAST SIDE OF FM 2611 APPROXIMATELY 1.2 MILES NORTHEAST OF THE INTERSECTION OF COUNTY ROAD 311 AND FM 2611.

H-42
N: 13,557,751.85
E: 3,079,763.55
ELEV.: 21.53'



H-42 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 0.8 OF A MILE SOUTHWEST OF THE INTERSECTION OF STATE HIGHWAY 36 AND FM 2611.

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TBPE NO. F-1733 • TBPLS NO. 100495-00

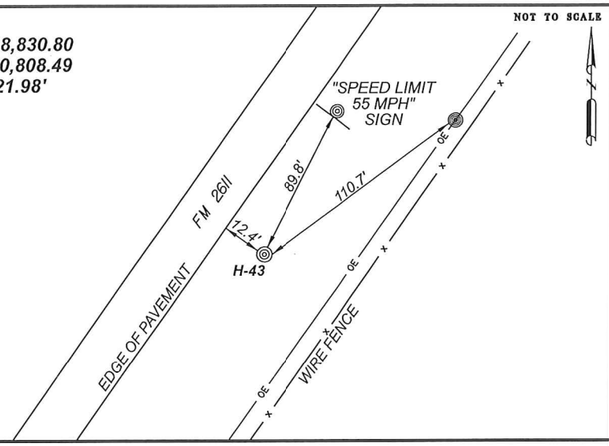
2017 Texas Department of Transportation

FM 2611
HORIZONTAL & VERTICAL CONTROL SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		85

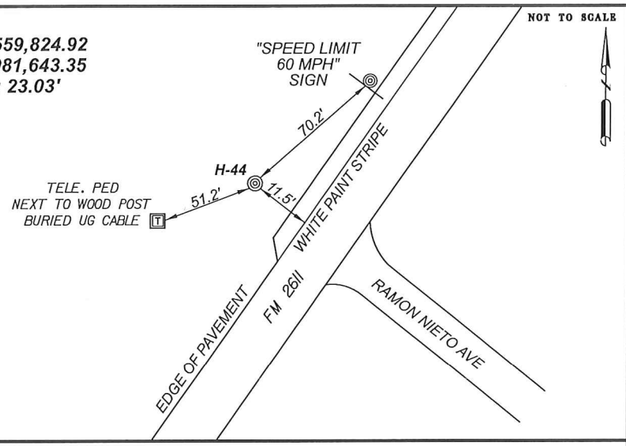
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025	FM 2611

H-43
N: 13,558,830.80
E: 3,080,808.49
ELEV.: 21.98'



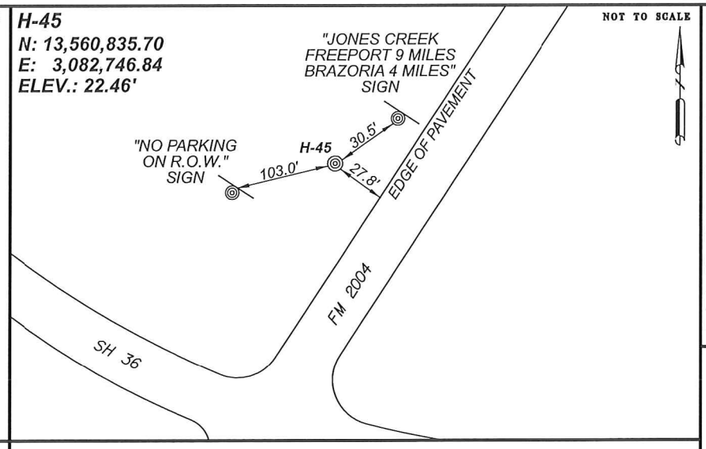
H-43 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE SOUTHEAST SIDE OF FM 2611 APPROXIMATELY 0.5 OF A MILE SOUTHWEST OF THE INTERSECTION OF STATE HIGHWAY 36 AND FM 2611.

H-44
N: 13,559,824.92
E: 3,081,643.35
ELEV.: 23.03'



H-44 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2611 APPROXIMATELY 0.2 OF A MILE SOUTHWEST OF THE INTERSECTION OF STATE HIGHWAY 36 AND FM 2611.

H-45
N: 13,560,835.70
E: 3,082,746.84
ELEV.: 22.46'



H-45 IS A 5/8" X 36" IRON ROD WITH TxDOT ALUMINUM CAP SET ON THE NORTHWEST SIDE OF FM 2004 APPROXIMATELY 260 FEET NORTHEAST OF THE INTERSECTION OF FM 2004 AND STATE HIGHWAY 36.

NOTES:

1.) PRIMARY CONTROL (HORIZONTAL) WAS ESTABLISHED USING GPS METHODS CONFORMING TO THE "TxDOT SURVEY MANUAL 2016-1". HOLDING THE COORS STATION CITYPORT & 877 2683C.

2.) BEARINGS ARE BASED ON GRID NORTH, TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS SOUTH CENTRAL ZONE 4204, NAD83 (2011) EPOCH: 2010.0000.

3.) COORDINATES AND DISTANCES SHOWN ARE SURFACE COORDINATES BASED ON A PROJECT COORDINATE SYSTEM ESTABLISHED BY APPLYING A SURFACE ADJUSTMENT FACTOR OF 1.00013 TO STATE PLANE GRID COORDINATES NAD83 (2011) EPOCH: 2010.0000, TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL 4204, U.S. SURVEY FEET.

PROJECT COORDINATES = GRID COORDINATES x 1.00013

4.) THE VERTICAL VALUES ARE BASED ON NAVD88 USING DIGITAL LEVELS HOLDING THE GPS ELEVATION OF CONTROL POINT N0200141.

LEGEND

- PRIMARY CONTROL POINT
- SECONDARY CONTROL POINT
- POWER POLE
- SIGN
- T TELEPHONE PEDESTAL

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

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E. 12/22/2020

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

STATE OF TEXAS
REGISTERED
R. CLAY SWETMAN
5397
PROFESSIONAL
LAND SURVEYOR

8/21/2019

R. CLAY SWETMAN — DATE
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 5397

CDS muery
ENGINEERS • SURVEYORS
3411 MAGIC DRIVE • SAN ANTONIO • TEXAS • (210)581-1111
TBPE NO. F-1733 • TBPLS NO. 100495-00

2017 Texas Department of Transportation

FM 2611
HORIZONTAL & VERTICAL CONTROL SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			86
STATE	DIST.	COUNTY	
TEXAS	HOU	BRAZORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025	FM 2611

Alignment Name:	FM2611_BL		
Alignment Description:			
Alignment Style:	Road_Centerline		
	Station	Northing	Easting
Element: Linear			
POB ( )	150+87.0000 R1	13529024.45596	3044871.93472
PI ( )	154+61.5352 R1	13529248.09262	3045172.37312
Tangential Direction:	N 53°20'13.9" E		
Tangential Length:	374.5352		
Element: Linear			
PI ( )	154+61.5352 R1	13529248.09262	3045172.37312
PC ( )	156+93.9861 R1	13529388.39321	3045357.70841
Tangential Direction:	N 52°52'26.1" E		
Tangential Length:	232.4509		
Element: Circular			
PC ( )	156+93.9861 R1	13529388.39321	3045357.70841
PI ( )	162+50.1515 R1	13529724.07842	3045801.14429
CC ( )		13531620.85946	3043667.71006
PT ( )	167+92.0250 R1	13530203.75410	3046082.62463
Radius:	2800.0000		
Delta:	22.5	Left	
Degree of Curvature (Arc):	2.0		
Length:	1098.0389		
Tangent:	556.1654		
Chord:	1091.0165		
Middle Ordinate:	53.6532		
External:	54.7014		
Tangent Direction:	N 52°52'26.1" E		
Radial Direction:	S 37°07'33.9" E		
Chord Direction:	N 41°38'22.1" E		
Radial Direction:	S 59°35'42.0" E		
Tangent Direction:	N 30°24'18.0" E		
Element: Linear			
PT ( )	167+92.0250 R1	13530203.75410	3046082.62463
PI ( )	192+92.9594 R1	13532360.73366	3047348.37015
Tangential Direction:	N 30°24'18.0" E		
Tangential Length:	2500.9343		
Element: Linear			
PI ( )	192+92.9594 R1	13532360.73366	3047348.37015
PC ( )	237+65.1005 R1	13536222.60068	3049603.59288
Tangential Direction:	N 30°17'01.5" E		
Tangential Length:	4472.1411		
Element: Circular			
PC ( )	237+65.1005 R1	13536222.60068	3049603.59288
PI ( )	238+85.9302 R1	13536326.94177	3049664.52516
CC ( )		13533333.23819	3054551.36748
PT ( )	240+06.7240 R1	13536428.62129	3049729.80211
Radius:	5729.6500		
Delta:	2.4	Right	
Degree of Curvature (Arc):	1.0		
Length:	241.6235		
Tangent:	120.8297		
Chord:	241.6056		
Middle Ordinate:	1.2736		
External:	1.2739		
Tangent Direction:	N 30°17'01.5" E		
Radial Direction:	S 59°42'58.5" E		
Chord Direction:	N 31°29'30.6" E		
Radial Direction:	S 57°18'00.2" E		
Tangent Direction:	N 32°41'59.8" E		
Element: Linear			
PT ( )	240+06.7240 R1	13536428.62127	3049729.80210
PC ( )	242+14.2387 R1	13536603.24724	3049841.90973
Tangential Direction:	N 32°41'59.8" E		
Tangential Length:	207.5147		
Element: Circular			
PC ( )	242+14.2387 R1	13536603.24724	3049841.90973
PI ( )	243+32.8306 R1	13536703.04367	3049905.97775
CC ( )		13539698.63034	3045020.34436
PT ( )	244+51.3886 R1	13536805.40564	3049965.86152
Radius:	5729.6500		
Delta:	2.4	Left	
Degree of Curvature (Arc):	1.0		
Length:	237.1499		
Tangent:	118.5919		
Chord:	237.1330		
Middle Ordinate:	1.2269		
External:	1.2272		
Tangent Direction:	N 32°41'59.8" E		
Radial Direction:	S 57°18'00.2" E		
Chord Direction:	N 31°30'51.1" E		
Radial Direction:	S 59°40'17.5" E		
Tangent Direction:	N 30°19'42.5" E		
Element: Linear			
PT ( )	244+51.3886 R1	13536805.40564	3049965.86152

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E.

12.22.2020

FM 2611 HORIZONTAL DATA SHEET

Texas Department of Transportation
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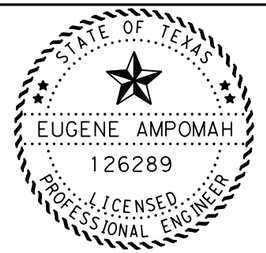
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		87

SCALE N.T.S.
SHEET 1 OF 4

12/21/2020
pw:\\txdot.projectwiseonline.com:TXD0T3\Documents\12 - HOU\Design Projects\2524020025\4 - Design\Plan Set\3. Roadway\Alignment data.dgn

PC	( )	293+33.9280 R1	13541019.74376	3052431.33211
Tangential Direction:		N 30°19'42.5" E		
Tangential Length:		4882.5394		
Element: Circular				
PC	( )	293+33.9280 R1	13541019.74376	3052431.33211
PI	( )	294+93.3316 R1	13541157.33211	3052511.82400
CC	( )		13540296.44894	3053667.69198
PT	( )	296+51.4288 R1	13541273.85833	3052620.59504
Radius:		1432.3900		
Delta:		12.7	Right	
Degree of Curvature (Arc):		4.0		
Length:		317.5008		
Tangent:		159.4036		
Chord:		316.8512		
Middle Ordinate:		8.7881		
External:		8.8423		
Tangent Direction:		N 30°19'42.5" E		
Radial Direction:		S 59°40'17.5" E		
Chord Direction:		N 36°40'42.6" E		
Radial Direction:		S 46°58'17.2" E		
Tangent Direction:		N 43°01'42.8" E		
Element: Linear				
PT	( )	296+51.4288 R1	13541273.85833	3052620.59504
PC	( )	315+88.1978 R1	13542689.66331	3053942.17380
Tangential Direction:		N 43°01'42.8" E		
Tangential Length:		1936.7690		
Element: Circular				
PC	( )	315+88.1978 R1	13542689.66331	3053942.17380
PI	( )	320+34.9536 R1	13543016.24803	3054247.02329
CC	( )		13540608.45733	3056171.76607
PT	( )	324+75.4002 R1	13543241.68177	3054632.73097
Radius:		3050.0000		
Delta:		16.7	Right	
Degree of Curvature (Arc):		1.9		
Length:		887.2024		
Tangent:		446.7558		
Chord:		884.0778		
Middle Ordinate:		32.2025		
External:		32.5462		
Tangent Direction:		N 43°01'42.8" E		
Radial Direction:		S 46°58'17.2" E		

Chord Direction:		N 51°21'42.5" E		
Radial Direction:		S 30°18'17.7" E		
Tangent Direction:		N 59°41'42.3" E		
Element: Linear				
PT	( )	324+75.4002 R1	13543241.68177	3054632.73097
PI	( )	349+72.9597 R1	13544501.95444	3056789.00460
Tangential Direction:		N 59°41'42.3" E		
Tangential Length:		2497.5594		
Element: Linear				
PI	( )	349+72.9597 R1	13544501.95444	3056789.00460
PC	( )	371+70.7042 R1	13545612.96756	3058685.24579
Tangential Direction:		N 59°38'01.8" E		
Tangential Length:		2197.7445		
Element: Circular				
PC	( )	371+70.7042 R1	13545612.96655	3058685.24407
PI	( )	375+90.3855 R1	13545825.12562	3059047.35029
CC	( )		13548084.86368	3057236.95250
PT	( )	380+04.1389 R1	13546132.23104	3059333.38987
Radius:		2864.9300		
Delta:		16.7	Left	
Degree of Curvature (Arc):		2.0		
Length:		833.4347		
Tangent:		419.6813		
Chord:		830.4990		
Middle Ordinate:		30.2533		
External:		30.5762		
Tangent Direction:		N 59°38'01.8" E		
Radial Direction:		S 30°21'58.2" E		
Chord Direction:		N 51°17'59.7" E		
Radial Direction:		S 47°02'02.5" E		
Tangent Direction:		N 42°57'57.5" E		
Element: Linear				
PT	( )	380+04.1389 R1	13546132.23104	3059333.38987
PC	( )	401+04.4026 R1	13547669.11720	3060764.85361
Tangential Direction:		N 42°57'57.5" E		
Tangential Length:		2100.2637		
Element: Circular				
PC	( )	401+04.4025 R1	13547669.11717	3060764.85358
PI	( )	412+42.7039 R1	13548502.07905	3061540.67859
CC	( )		13546883.95565	3061607.83957
PT	( )	419+00.1795 R1	13547736.27334	3062382.86121
Radius:		1152.0000		
Delta:		89.3	Right	



Eugene Ampomah, P.E.

12.22.2020

FM 2611 HORIZONTAL DATA SHEET

Texas Department of Transportation

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
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Degree of Curvature (Arc):		5.0		
Length:		1795.7769		
Tangent:		1138.3013		
Chord:		1619.4007		
Middle Ordinate:		332.5555		
External:		467.5166		
Tangent Direction:		N 42°57'57.5" E		
Radial Direction:		S 47°02'02.5" E		
Chord Direction:		N 87°37'23.8" E		
Radial Direction:		S 42°16'50.1" W		
Tangent Direction:		S 47°43'09.9" E		
Element: Linear				
PT	( )	419+00.1795 R1	13547736.27334	3062382.86121
PI	( )	440+93.1182 R1	13546260.94786	3064005.32691
Tangential Direction:		S 47°43'09.9" E		
Tangential Length:		2192.9387		
Element: Linear				
PI	( )	440+93.1182 R1	13546260.94786	3064005.32691
PI	( )	469+08.9012 R1	13544364.06837	3066086.30788
Tangential Direction:		S 47°38'59.4" E		
Tangential Length:		2815.7829		
Element: Linear				
PI	( )	469+08.9012 R1	13544364.06837	3066086.30788
PC	( )	469+93.5813 R1	13544311.55266	3066152.73691
Tangential Direction:		S 51°40'18.2" E		
Tangential Length:		84.6801		
Element: Circular				
PC	( )	469+93.5813 R1	13544311.55266	3066152.73690
PI	( )	480+68.0437 R1	13543645.20747	3066995.62098
CC	( )		13545215.26268	3066867.16828
PT	( )	487+22.9332 R1	13544439.69416	3067718.98836
Radius:		1152.0000		
Delta:		86.0	Left	
Degree of Curvature (Arc):		5.0		
Length:		1729.3519		
Tangent:		1074.4624		
Chord:		1571.4846		
Middle Ordinate:		309.5553		
External:		423.3011		
Tangent Direction:		S 51°40'18.2" E		
Radial Direction:		S 38°19'41.8" W		

Chord Direction:		N 85°19'22.1" E		
Radial Direction:		S 47°40'57.5" E		
Tangent Direction:		N 42°19'02.5" E		
Element: Linear				
PT	( )	487+22.9332 R1	13544439.69416	3067718.98836
EQNBK		489+00.0000 R1	13544570.62218	3067838.19623
EQNAHD		343+36.1200 R2	13544570.62218	3067838.19623
PI	( )	343+36.1220 R2	13544570.62363	3067838.19755
Tangential Direction:		N 42°19'02.5" E		
Tangential Length:		177.0688		
Element: Linear				
PI	( )	343+36.1220 R2	13544570.62363	3067838.19755
PI	( )	347+58.7935 R2	13544884.33700	3068121.45565
Tangential Direction:		N 42°04'46.3" E		
Tangential Length:		422.6715		
Element: Linear				
PI	( )	347+58.7935 R2	13544884.33700	3068121.45565
PI	( )	359+06.0912 R2	13545732.17101	3068894.41722
Tangential Direction:		N 42°21'18.4" E		
Tangential Length:		1147.2977		
Element: Linear				
PI	( )	359+06.0912 R2	13545732.17101	3068894.41722
PI	( )	374+66.5762 R2	13546884.16487	3069947.04412
Tangential Direction:		N 42°25'09.5" E		
Tangential Length:		1560.4849		
Element: Linear				
PI	( )	374+66.5762 R2	13546884.16487	3069947.04412
PI	( )	386+46.7387 R2	13547756.89350	3070741.48004
Tangential Direction:		N 42°18'40.6" E		
Tangential Length:		1180.1626		
Element: Linear				
PI	( )	386+46.7387 R2	13547756.89350	3070741.48004
PI	( )	436+53.1147 R2	13551449.51221	3074122.06689
Tangential Direction:		N 42°28'26.6" E		
Tangential Length:		5006.3760		
Element: Linear				
PI	( )	436+53.1147 R2	13551449.51221	3074122.06689
PI	( )	446+06.9705 R2	13552155.86230	3074763.08989
Tangential Direction:		N 42°13'27.1" E		
Tangential Length:		953.8558		
Element: Linear				
PI	( )	457+83.8178 R2	13553038.92119	3075541.02074
Tangential Direction:		N 41°22'42.4" E		
Tangential Length:		1176.8472		
Element: Linear				
PI	( )	457+83.8178 R2	13553038.92119	3075541.02074
PI	( )	521+25.5602 R2	13557742.97599	3079794.20366

SCALE N.T.S.
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FM 2611 HORIZONTAL DATA SHEET

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2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		89

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Tangential Direction:		N 42°07'06.2" E		
Tangential Length:		6341.7424		
Element: Linear				
PI	( )	521+25.5602 R2	13557742.97599	3079794.20366
PI	( )	540+00.2445 R2	13559135.64557	3081049.15896
Tangential Direction:		N 42°01'20.9" E		
Tangential Length:		1874.6843		
Element: Linear				
PI	( )	540+00.2445 R2	13559135.64557	3081049.15896
PC	( )	551+51.4971 R2	13559987.29694	3081823.80238
Tangential Direction:		N 42°17'20.3" E		
Tangential Length:		1151.2526		
Element: Circular				
PC	( )	551+51.4971 R2	13559987.29694	3081823.80238
PI	( )	554+29.0793 R2	13560192.64134	3082010.57915
CC	( )		13557777.01289	3084253.81260
PT	( )	557+05.3457 R2	13560363.73109	3082229.16592
Radius:		3284.8600		
Delta:		9.7	Right	
Degree of Curvature (Arc):		1.7		
Length:		553.8486		
Tangent:		277.5822		
Chord:		553.1928		
Middle Ordinate:		11.6659		
External:		11.7075		
Tangent Direction:		N 42°17'20.3" E		
Radial Direction:		S 47°42'39.7" E		
Chord Direction:		N 47°07'09.1" E		
Radial Direction:		S 38°03'02.1" E		
Tangent Direction:		N 51°56'57.9" E		
Element: Linear				
PT	( )	557+05.3457 R2	13560363.73109	3082229.16592
POE	( )	561+51.5688 R2	13560638.76387	3082580.55182
Tangential Direction:		N 51°56'57.9" E		
Tangential Length:		446.2231		

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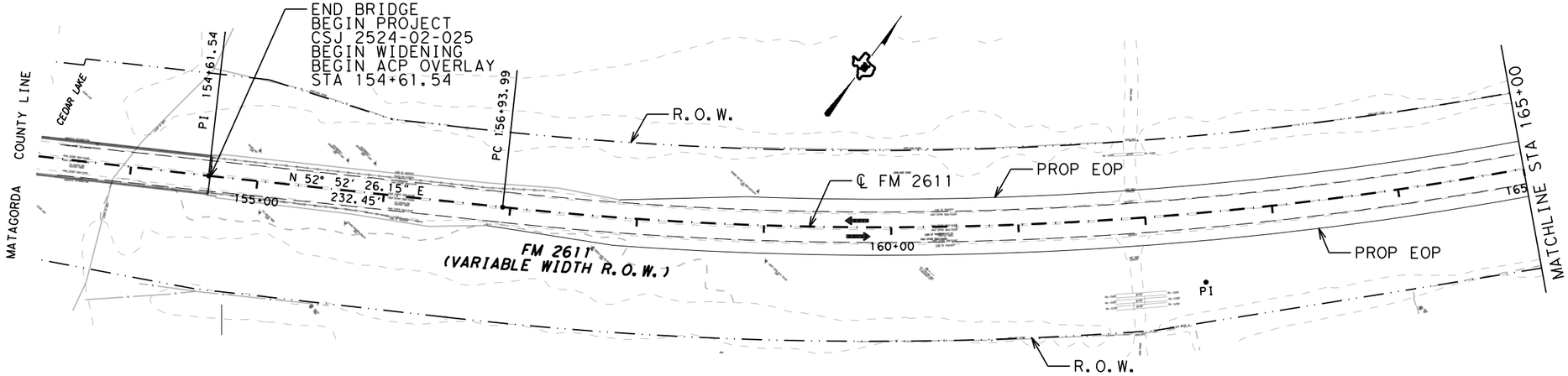
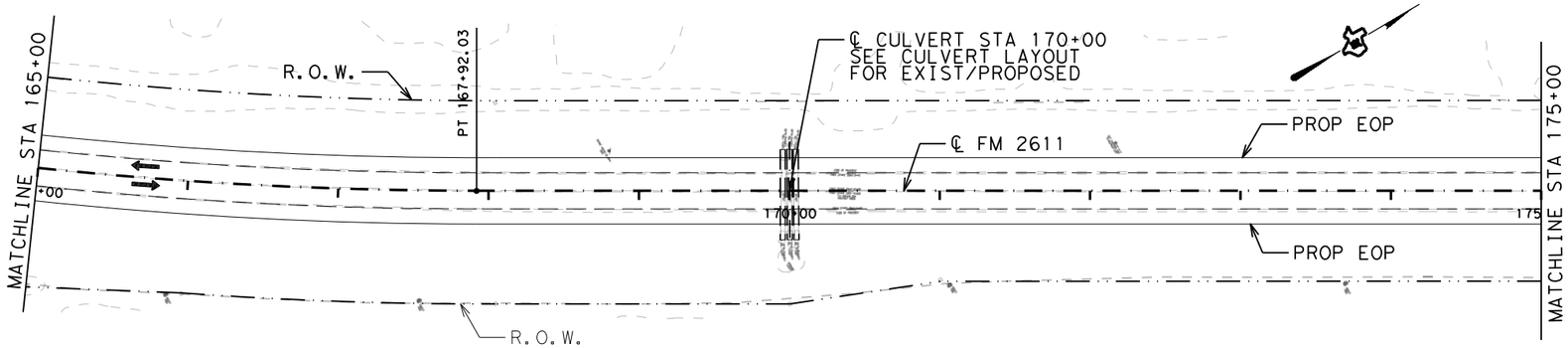
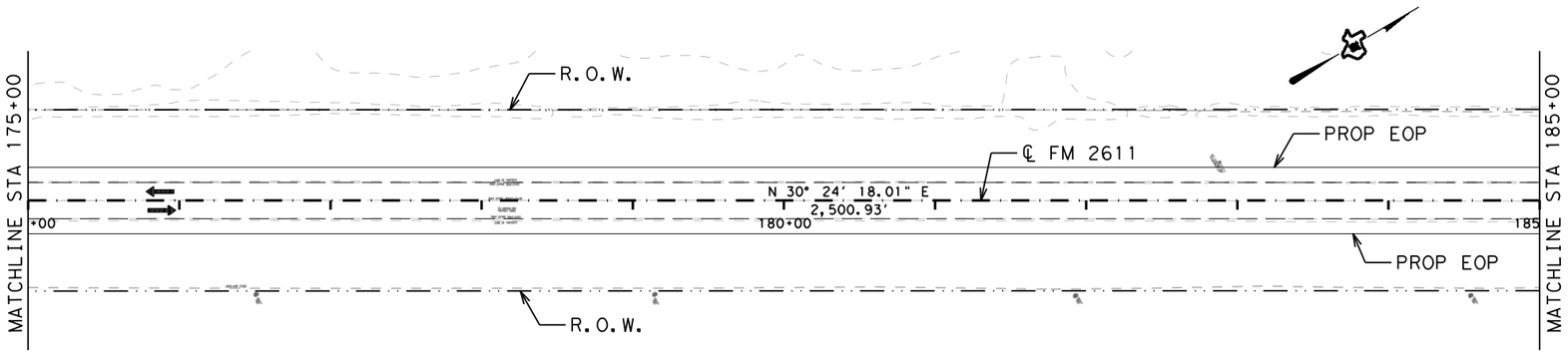
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		90

SCALE N.T.S.
SHEET 4 OF 4



PI STATION = 162+50.15
DELTA = 22° 28' 08.14" (LT)
DEGREE OF CURVE = 2° 02' 46.60"
TANGENT = 556.17
LENGTH = 1,098.04
RADIUS = 2,800.00
PC STATION = 156+93.99
PT STATION = 167+92.03





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DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		91

SCALE 1"=100'
SHEET 1 OF 20

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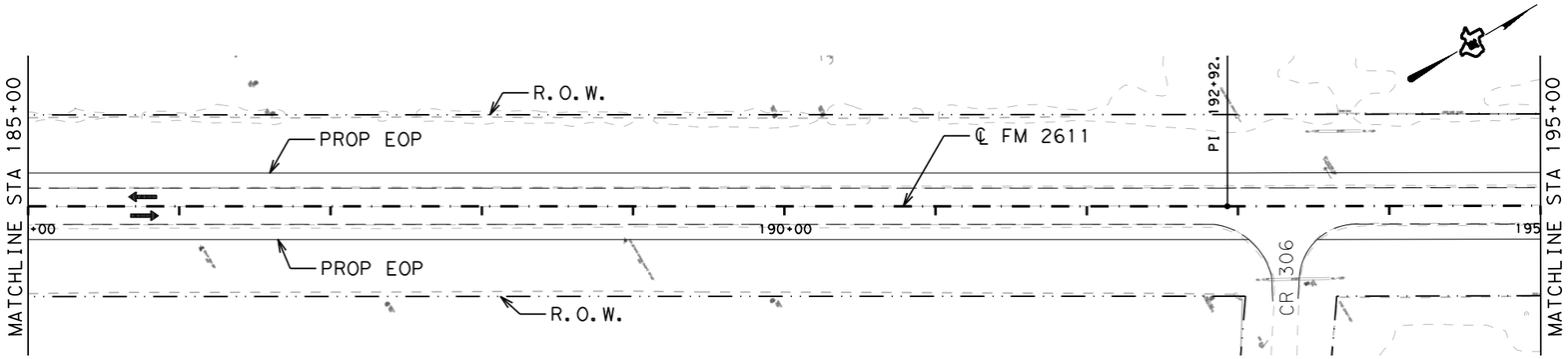

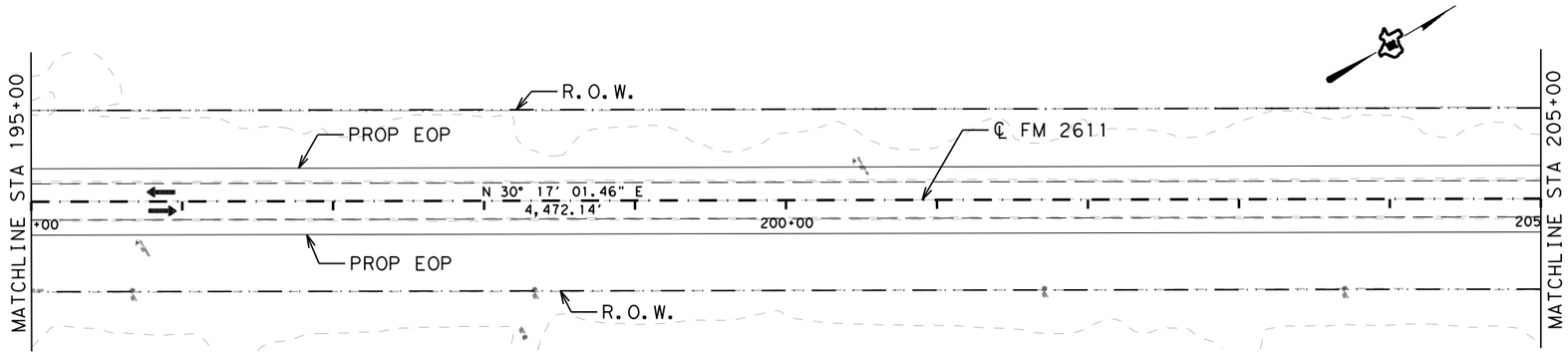

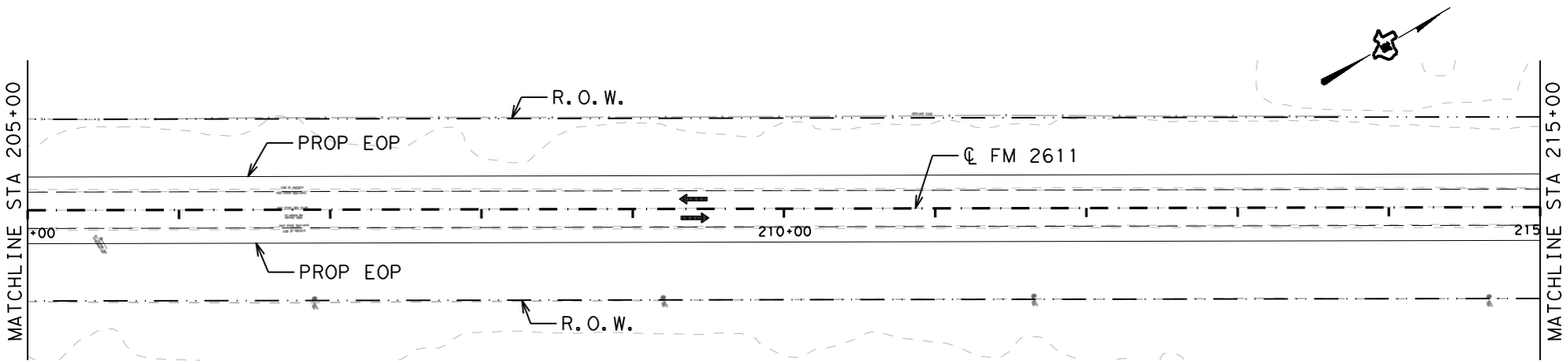

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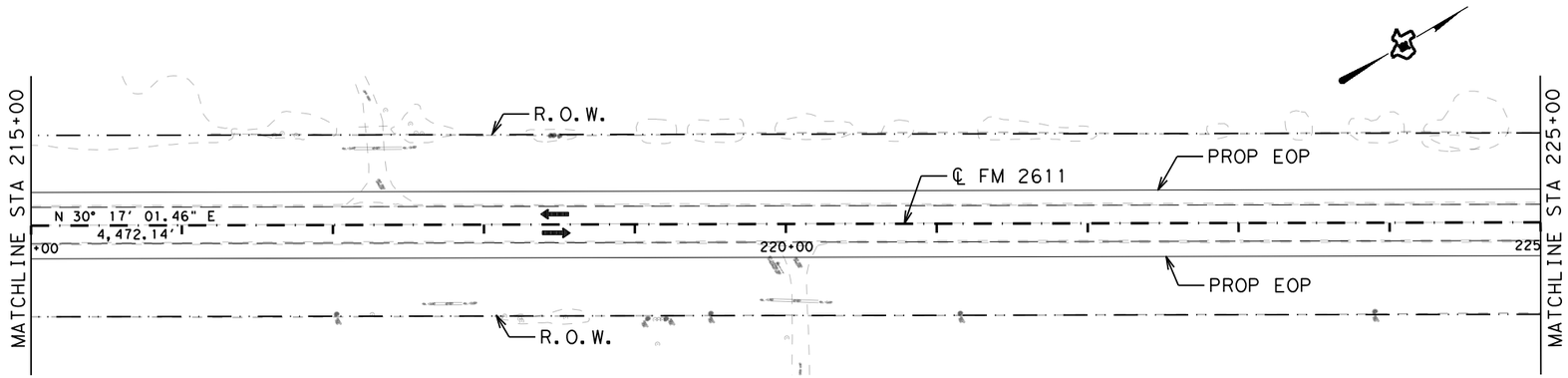
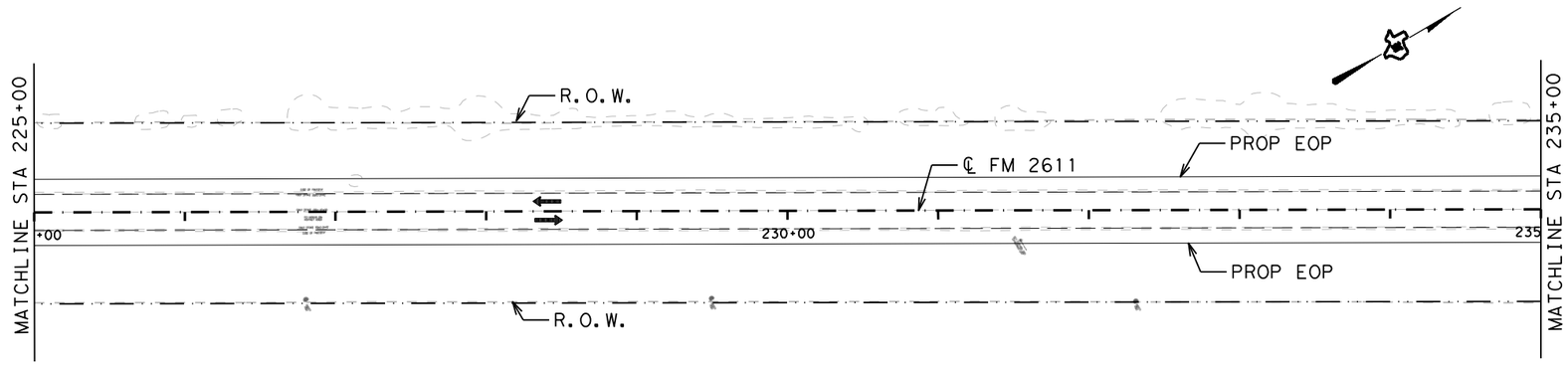
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		92

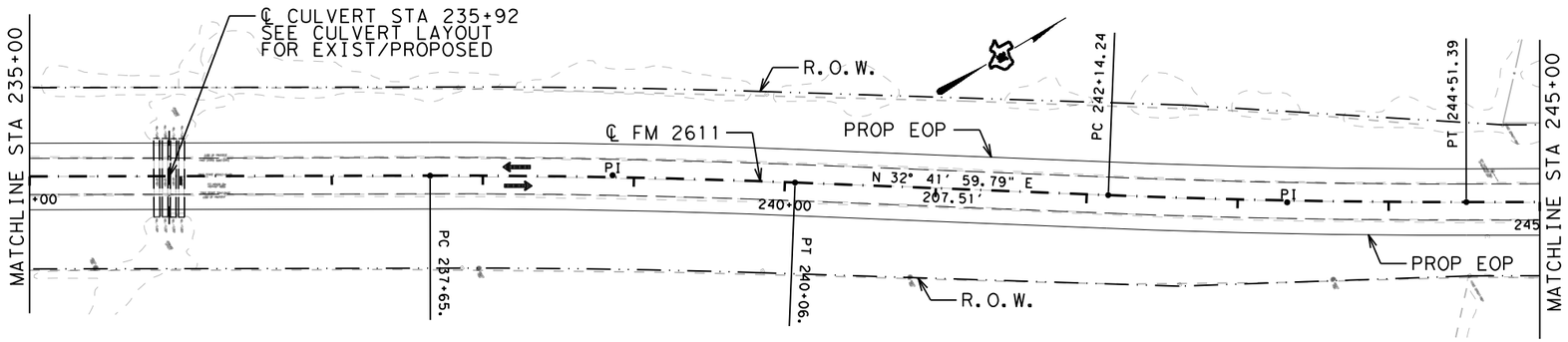
SCALE 1"=100'
SHEET 2 OF 20



PI STATION = 238+85.93
DELTA = 2° 24' 58.34" (RT)
DEGREE OF CURVE = 0° 59' 59.95"
TANGENT = 120.83
LENGTH = 241.62
RADIUS = 5,729.65
PC STATION = 237+65.10
PT STATION = 240+06.72



PI STATION = 243+32.83
DELTA = 2° 22' 17.29" (LT)
DEGREE OF CURVE = 0° 59' 59.95"
TANGENT = 118.59
LENGTH = 237.15
RADIUS = 5,729.65
PC STATION = 242+14.24
PT STATION = 244+51.39



SCALE 1"=100'
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2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		93

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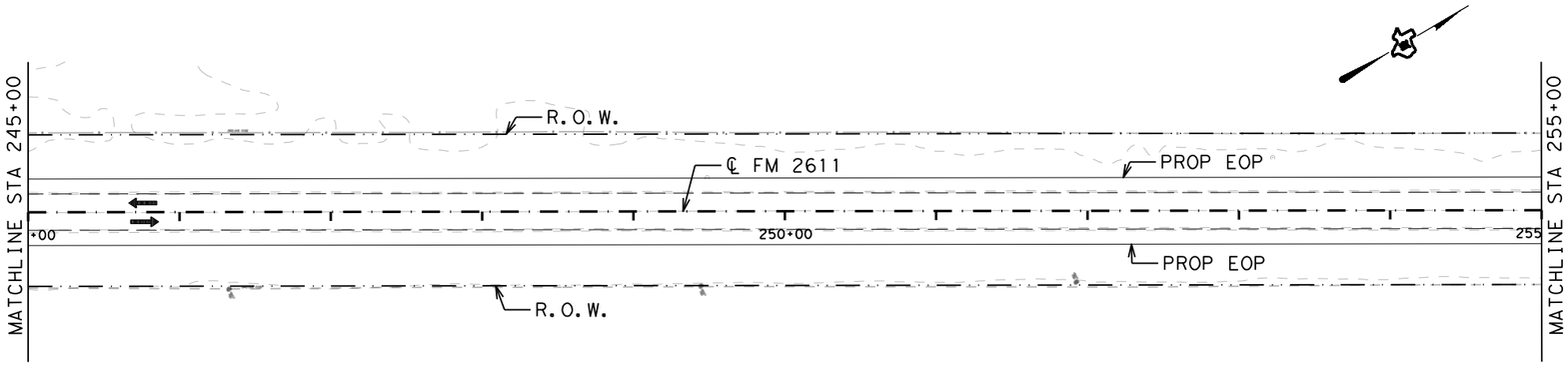

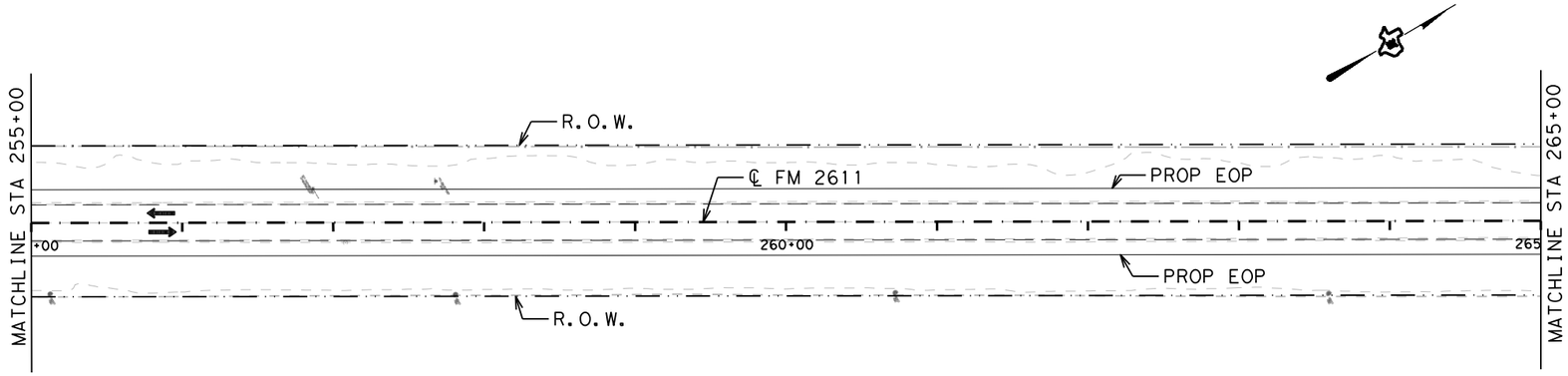

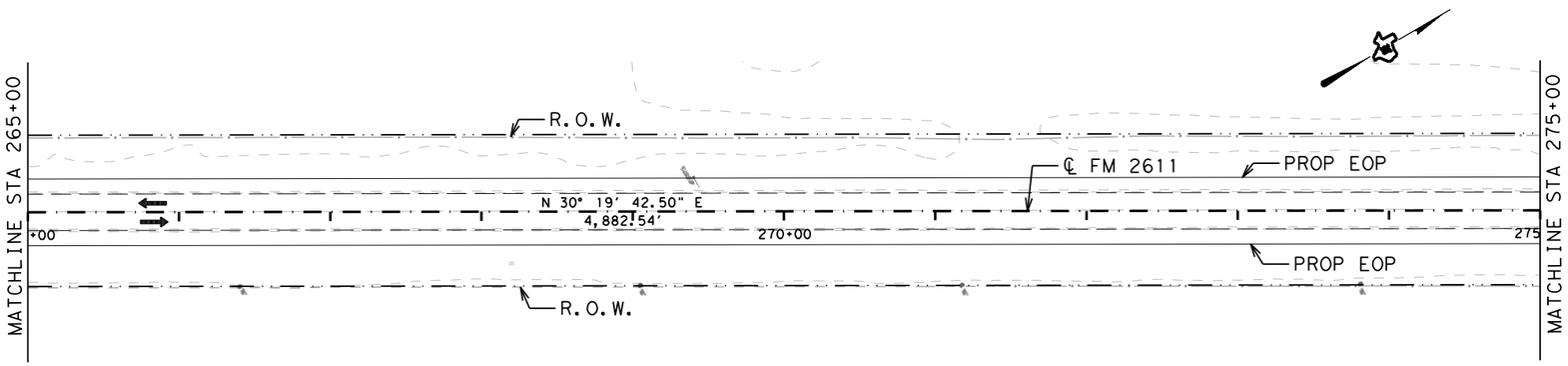

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DIST.	COUNTY		SHEET NO.
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SCALE 1"=100'
SHEET 4 OF 20

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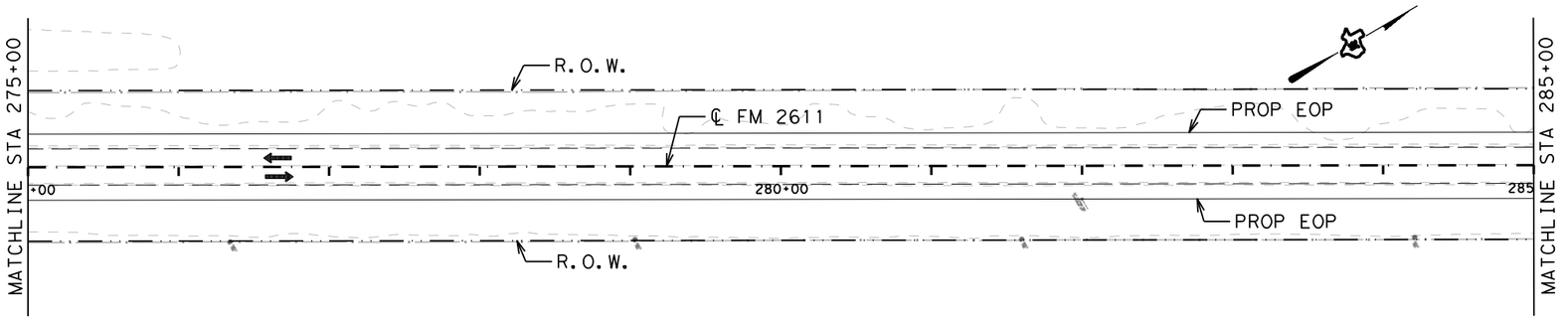

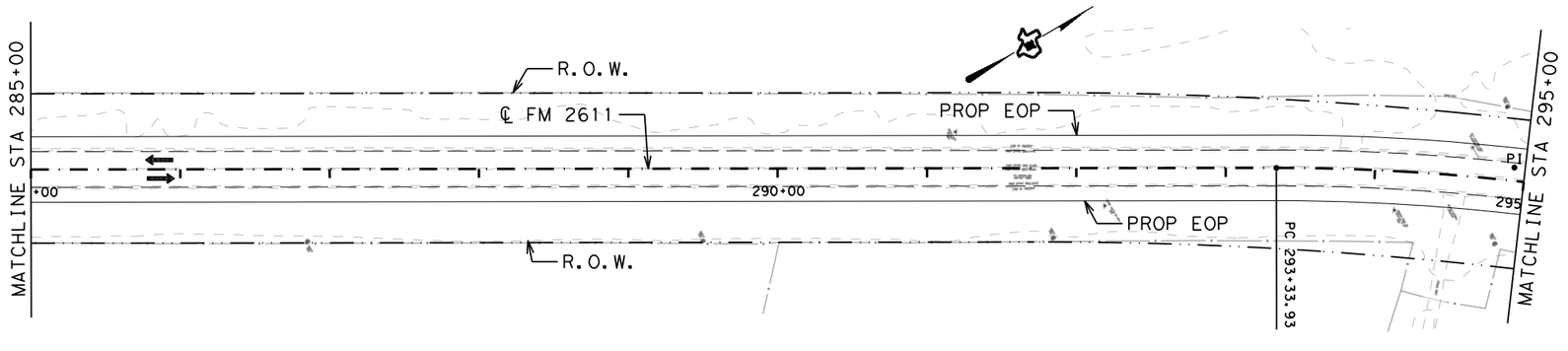

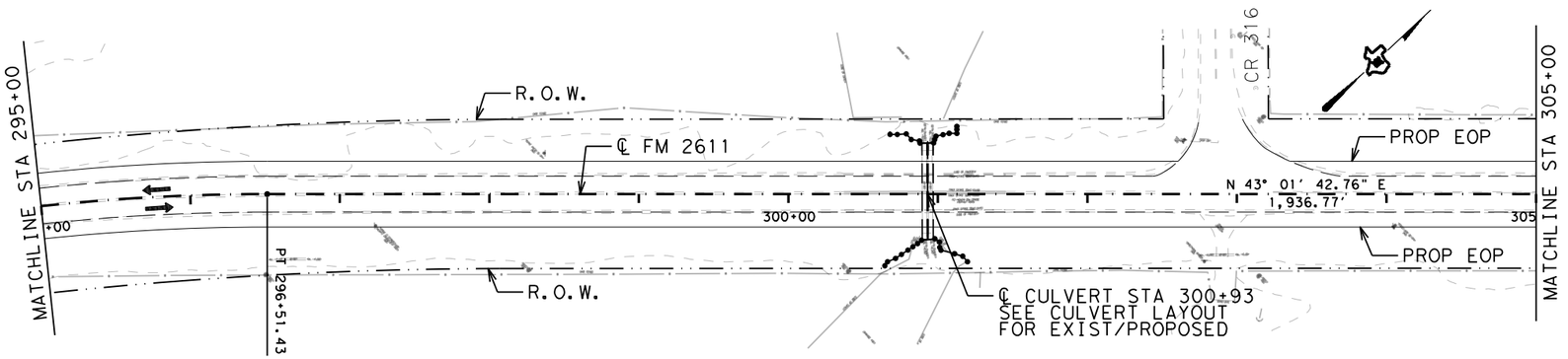

PI STATION	= 294+93.33
DELTA	= 12° 42' 00.25" (RT)
DEGREE OF CURVE	= 4° 00' 00.05"
TANGENT	= 159.40
LENGTH	= 317.50
RADIUS	= 1,432.39
PC STATION	= 293+33.93
PT STATION	= 296+51.43

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2524	02	025, ETC	FM 2611
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SCALE 1"=100'
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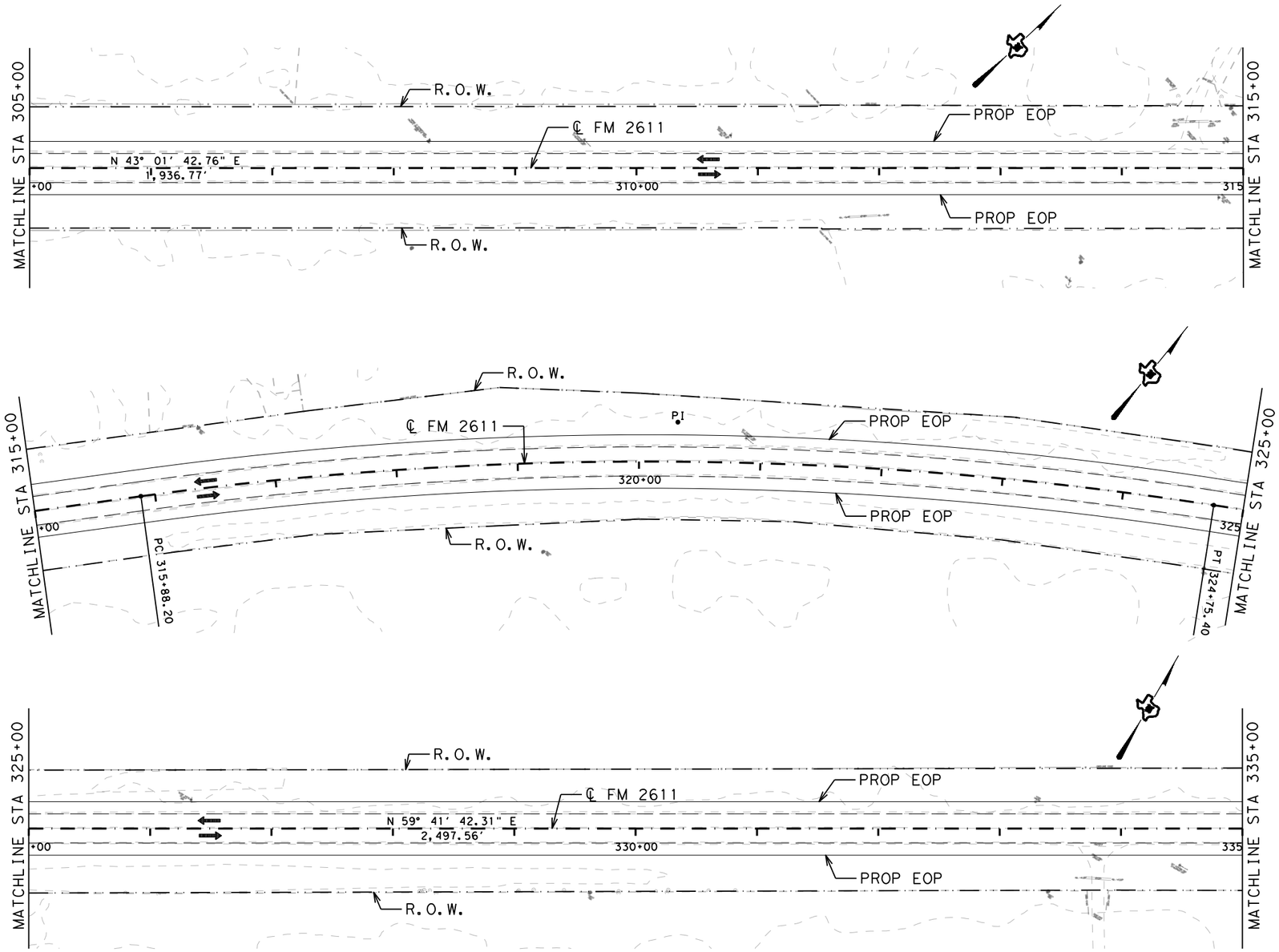

PI STATION = 320+34.95
DELTA = 16° 39' 59.55" (RT)
DEGREE OF CURVE = 1° 52' 42.78"
TANGENT = 446.76
LENGTH = 887.20
RADIUS = 3,050.00
PC STATION = 315+88.20
PT STATION = 324+75.40

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2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		96

SCALE 1"=100'
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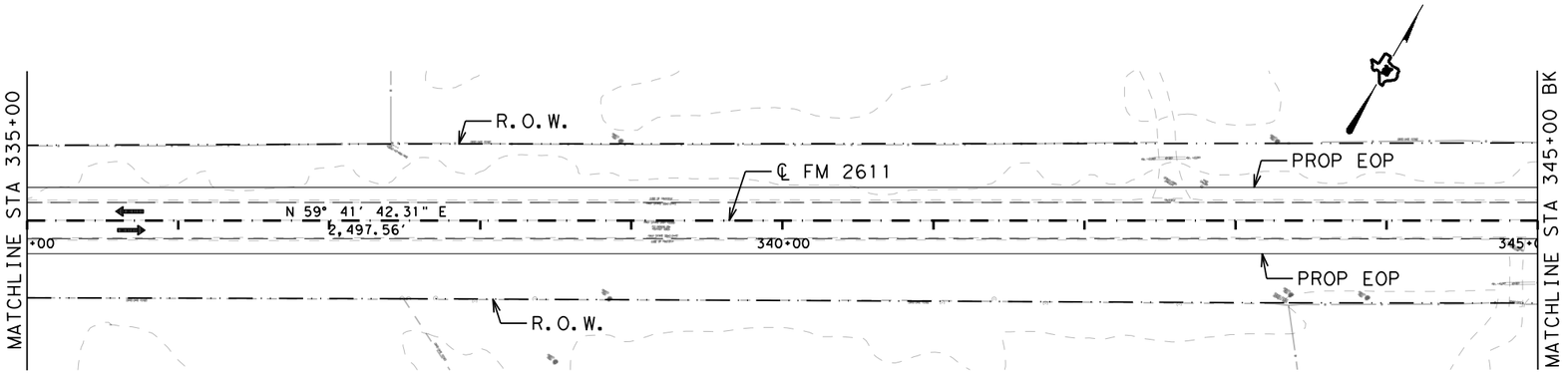

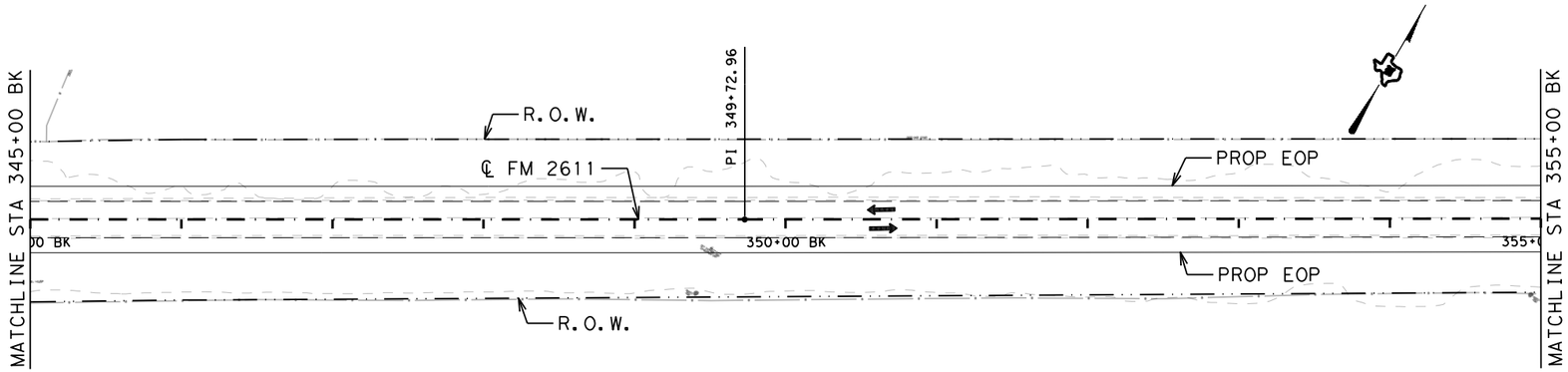

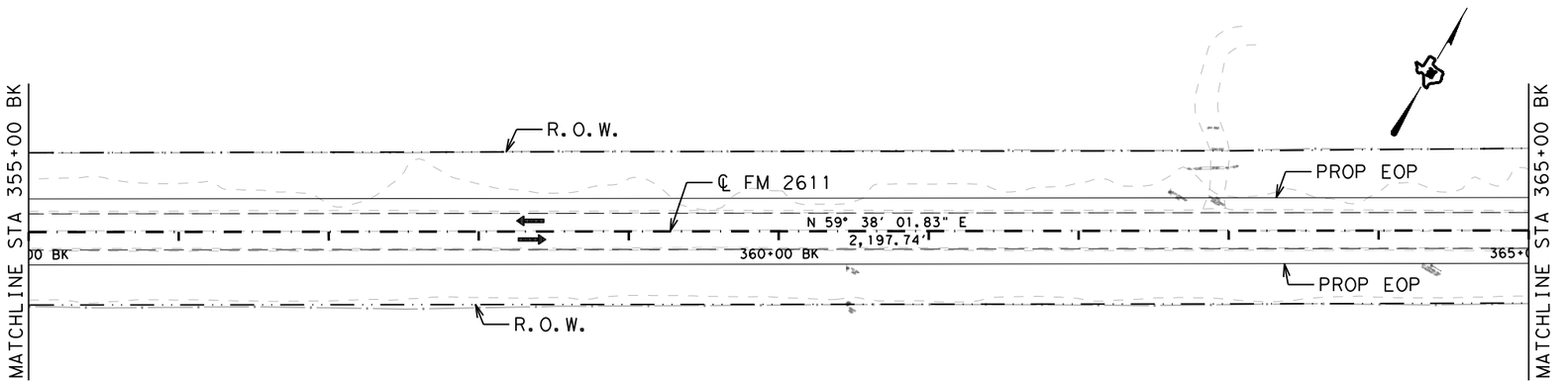

SCALE 1"=100'
SHEET 7 OF 20

STATE OF TEXAS
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2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		97

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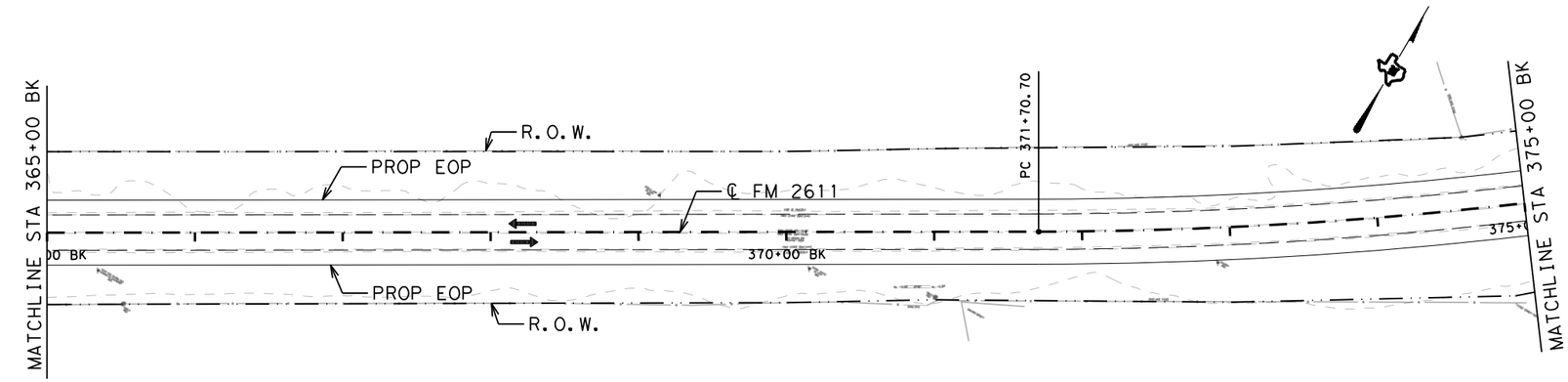

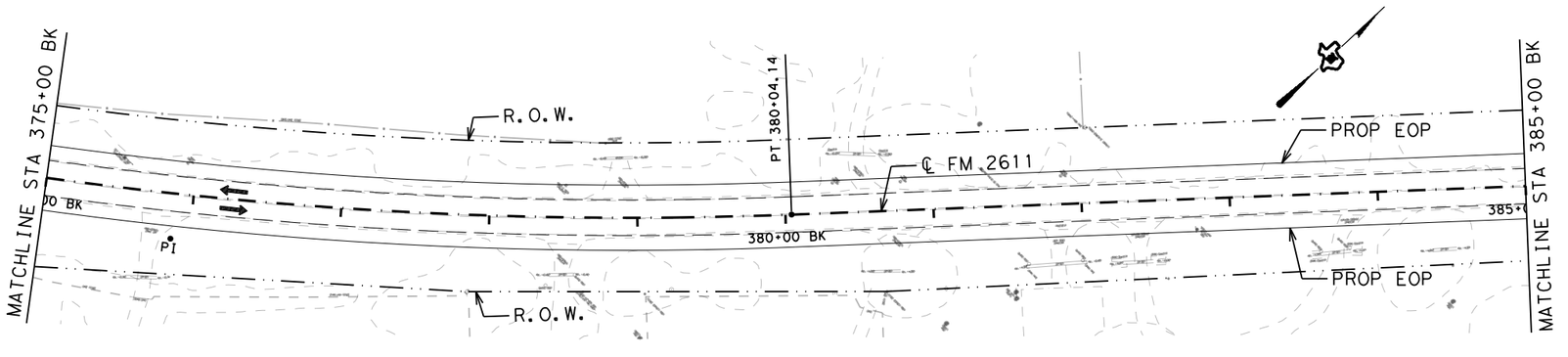

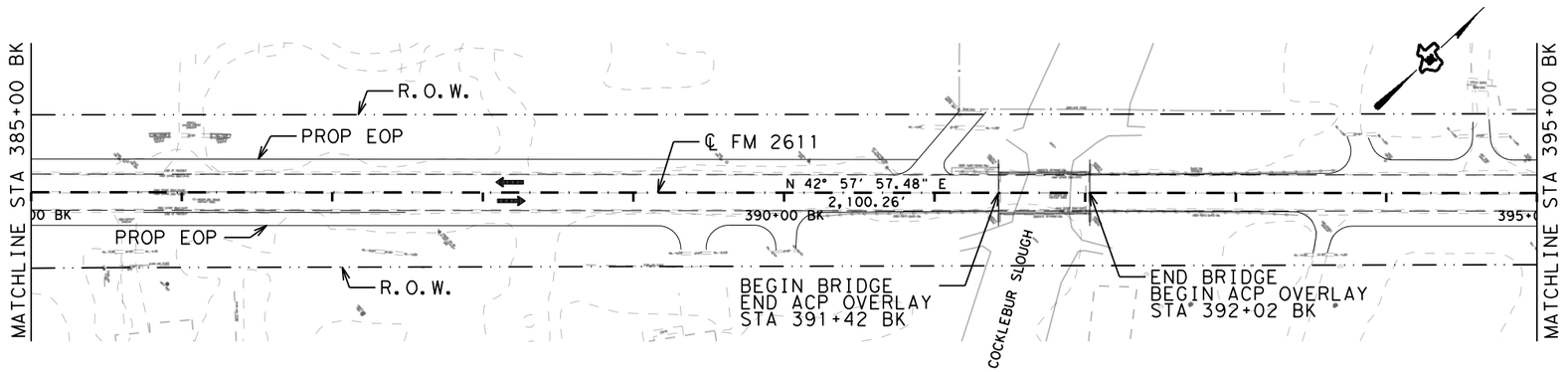

PI STATION = 375+90.38
DELTA = 16° 40' 04.35" (LT)
DEGREE OF CURVE = 1° 59' 59.65"
TANGENT = 419.68
LENGTH = 833.43
RADIUS = 2,864.93
PC STATION = 371+70.70
PT STATION = 380+04.14

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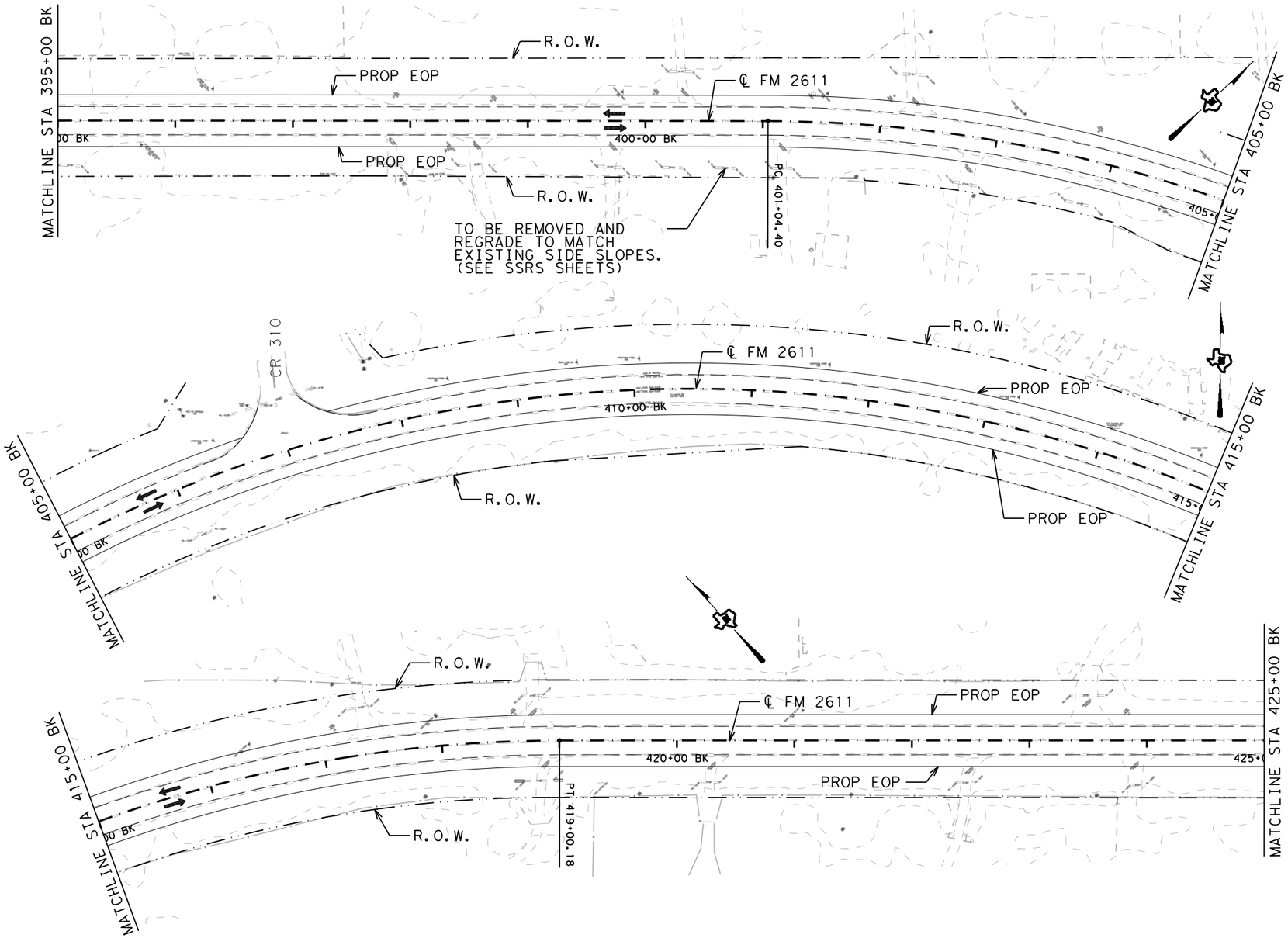
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		98

SCALE 1"=100'
SHEET 8 OF 20

12/21/2020
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\2524020025\4 - Design\Plan Set\3. Roadway\PLNSHT08



PI STATION = 412+42.70
DELTA = 89° 18' 52.62" (RT)
DEGREE OF CURVE = 4° 58' 24.93"
TANGENT = 1,138.30
LENGTH = 1,795.78
RADIUS = 1,152.00
PC STATION = 401+04.40
PT STATION = 419+00.18

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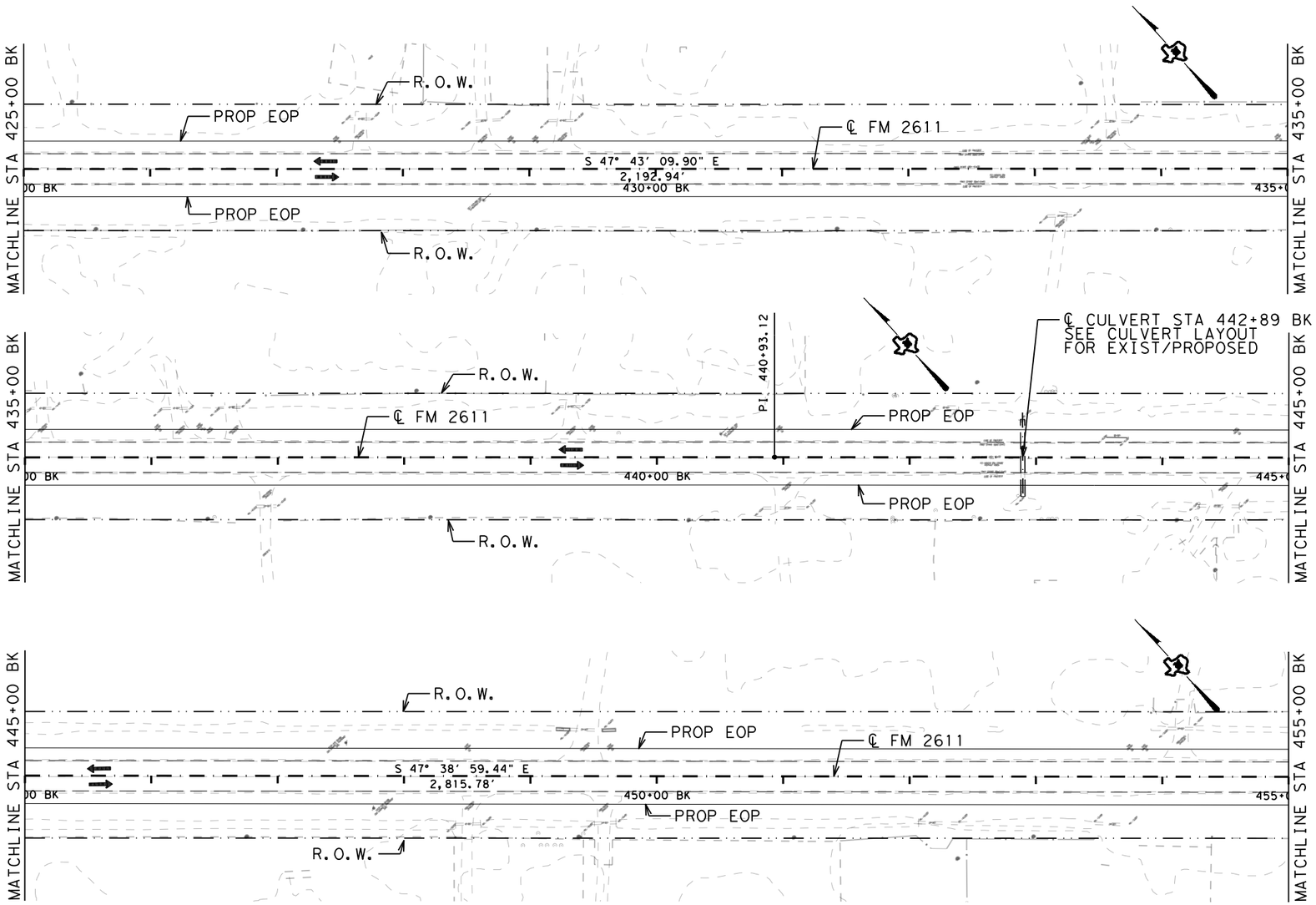
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		99

SCALE 1"=100'
SHEET 9 OF 20

12/21/2020
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\252402025\4 - Design\Plan Set\3. Roadway\PLNSHT09



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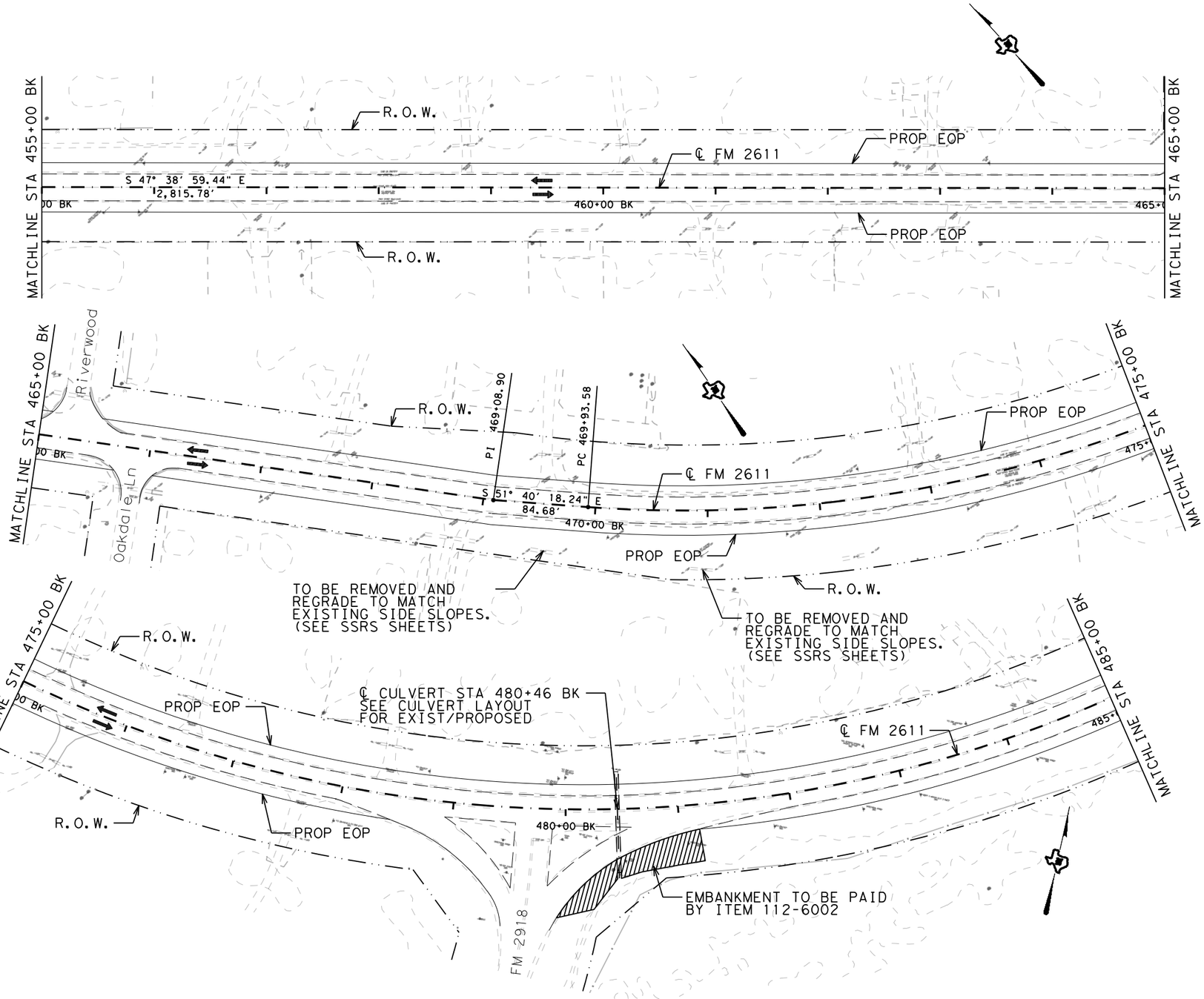
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		100

SCALE 1"=100'
SHEET 10 OF 20



PI STATION = 480+68.04
DELTA = 86° 00' 39.27" (LT)
DEGREE OF CURVE = 4° 58' 24.93"
TANGENT = 1,074.46
LENGTH = 1,729.35
RADIUS = 1,152.00
PC STATION = 469+93.58
PT STATION = 487+22.93

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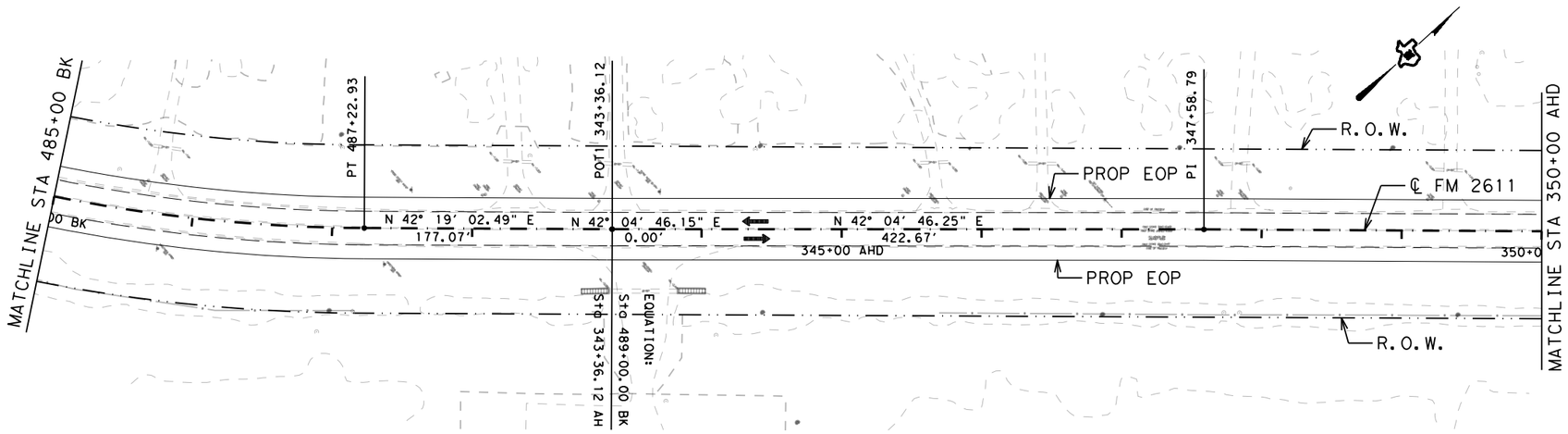
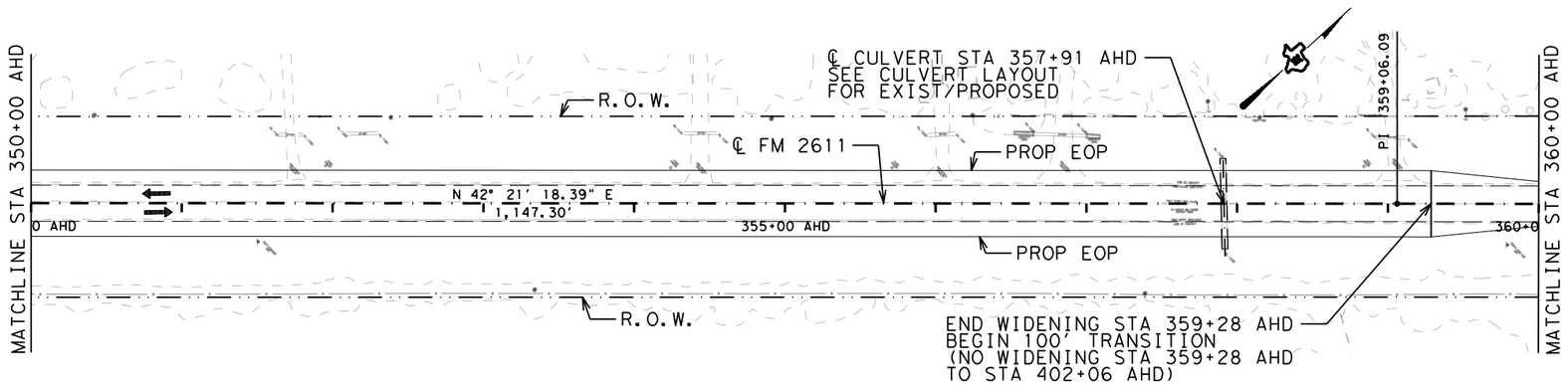
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		101

SCALE 1"=100'
SHEET 11 OF 20

12/21/2020
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\252402025\4 - Design\Plan Set\3. Roadway\PLNSHT11





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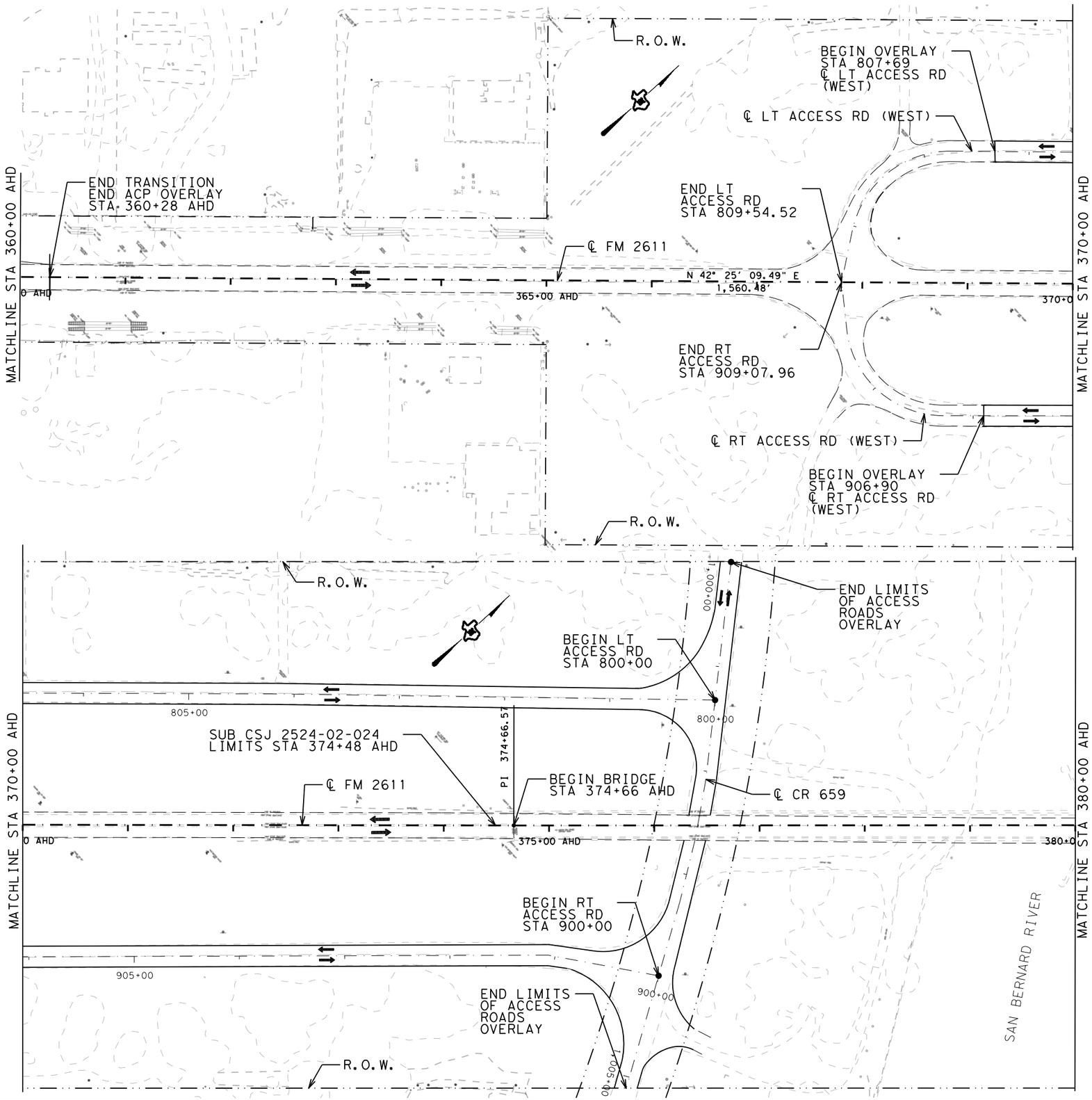
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		102

SCALE 1"=100'
SHEET 12 OF 20

12/21/2020
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\252402025\4 - 025\4 - Design\Plan Set\3. Roadway\PLNSHT12



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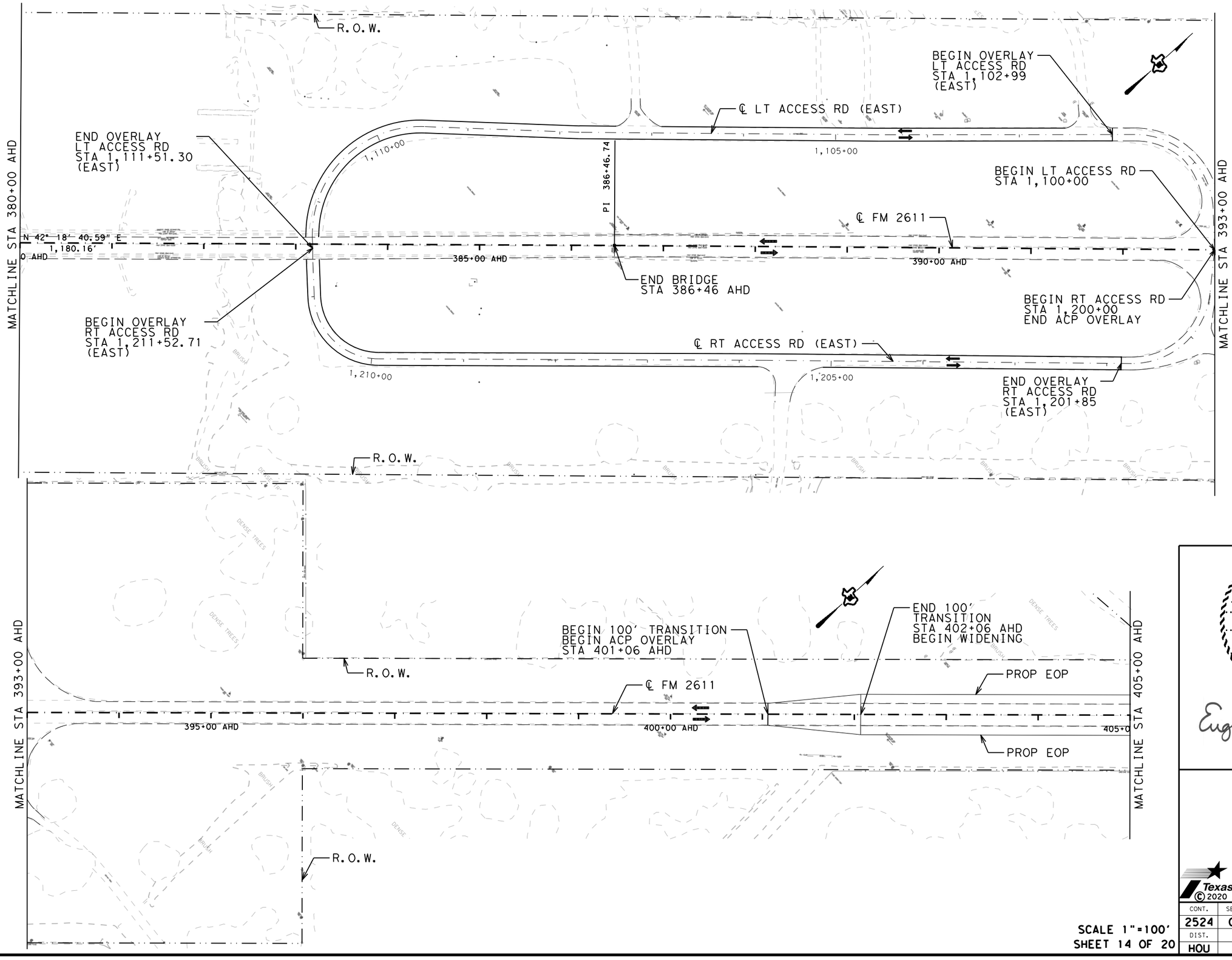
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		103

SCALE 1"=100'
SHEET 13 OF 20

12/21/2020
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\2524020025\4 - Design\Plan Set\3. Roadway\PLNSHT13



SCALE 1"=100'
SHEET 14 OF 20

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2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		104

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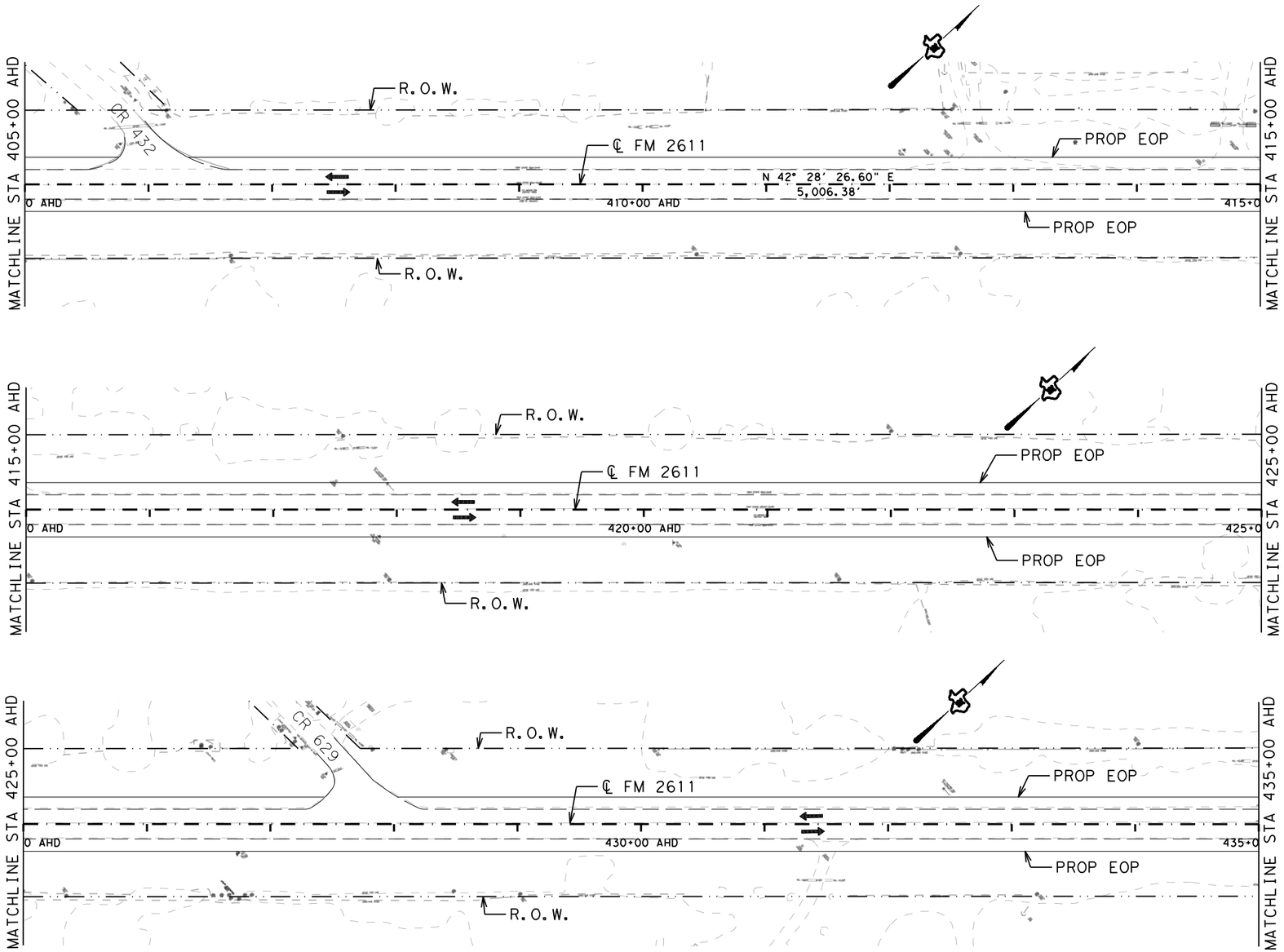
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\252402025\4 - Design\Plan Set\3. Roadway\PLNSHT14



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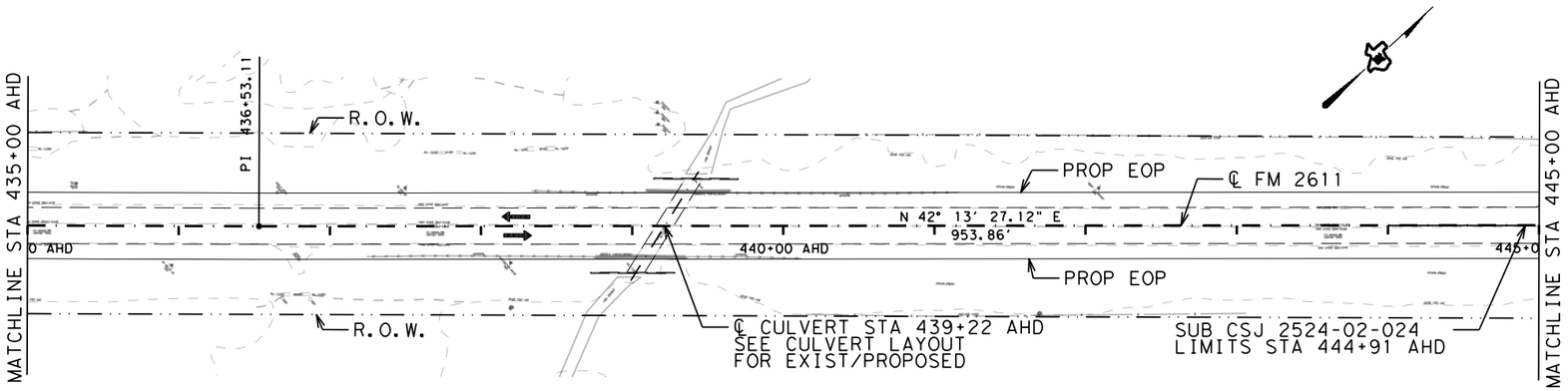
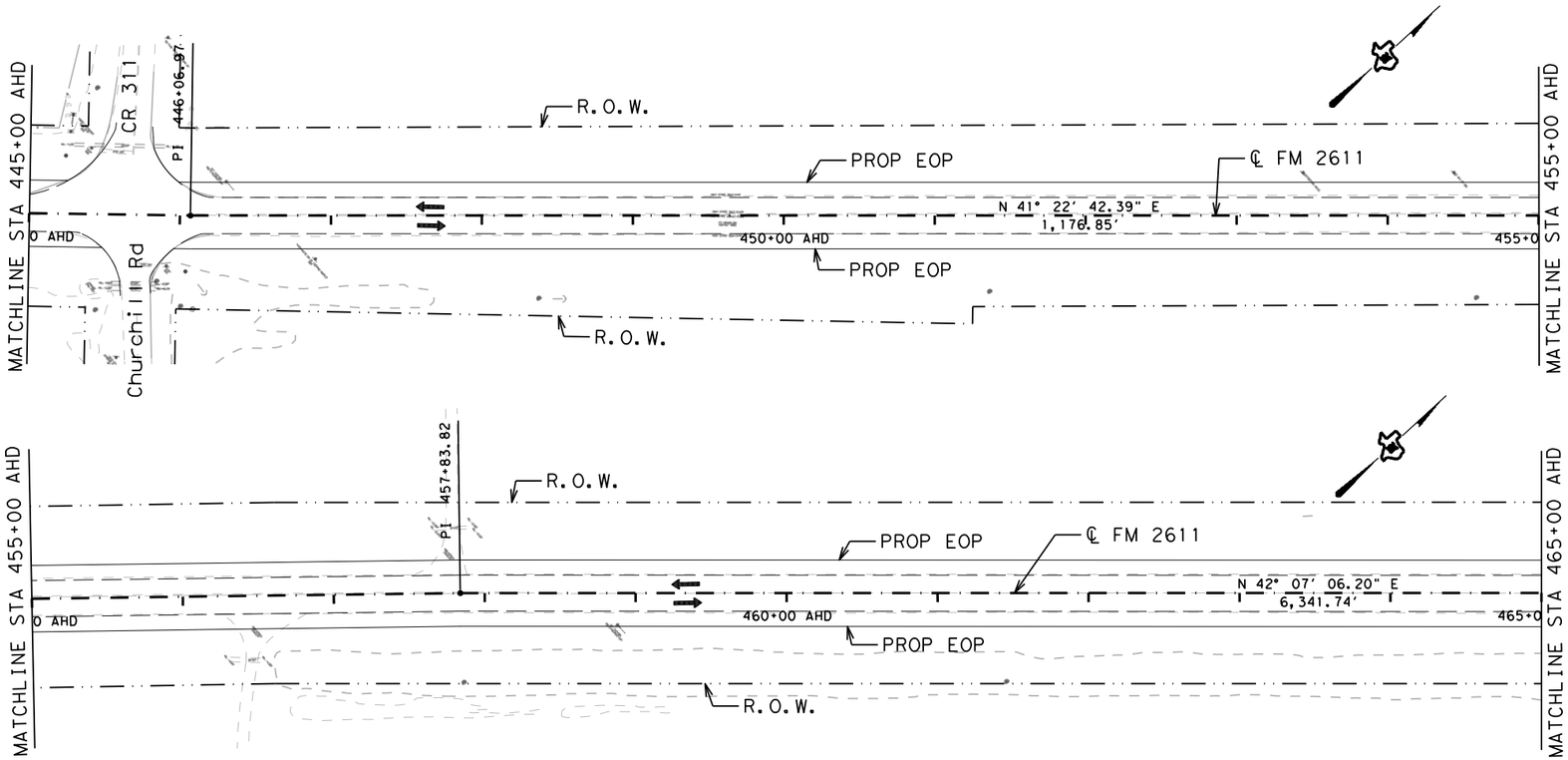
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		105

SCALE 1"=100'
SHEET 15 OF 20

12/21/2020
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\2524020025\4 - Design\Plan Set\3. Roadway\PLNSHT15





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2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		106

SCALE 1"=100'
SHEET 16 OF 20

12/21/2020
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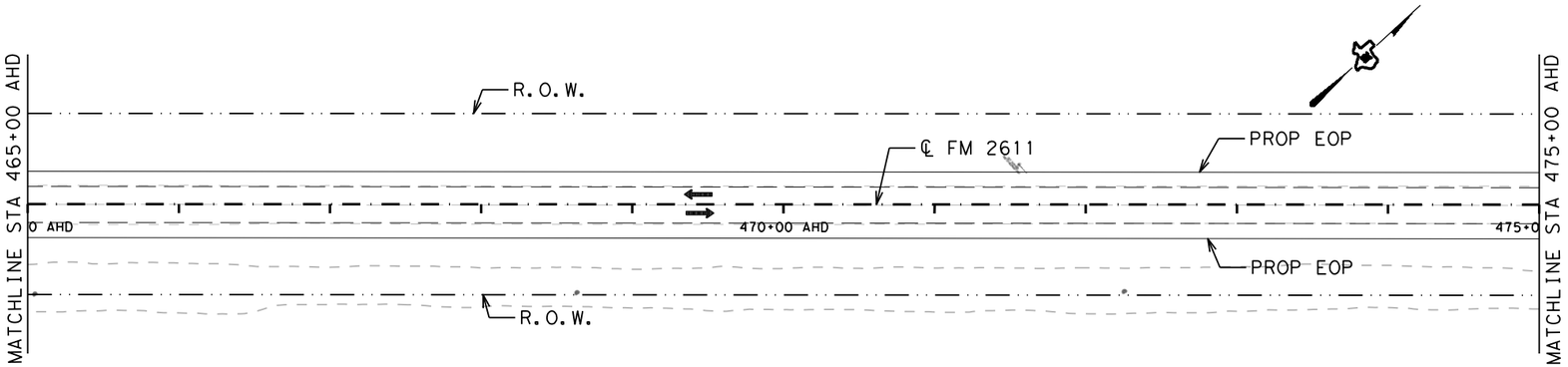

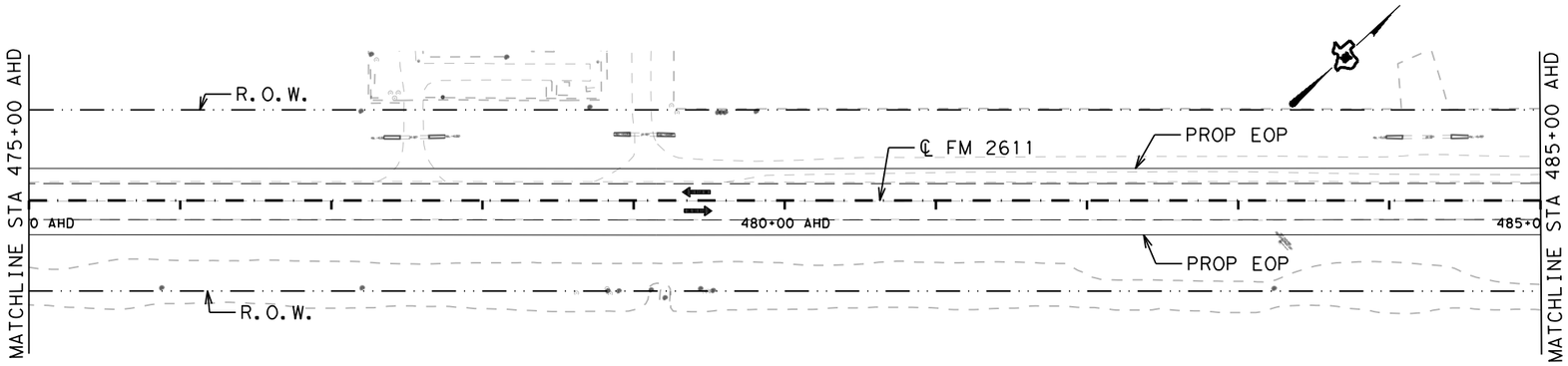

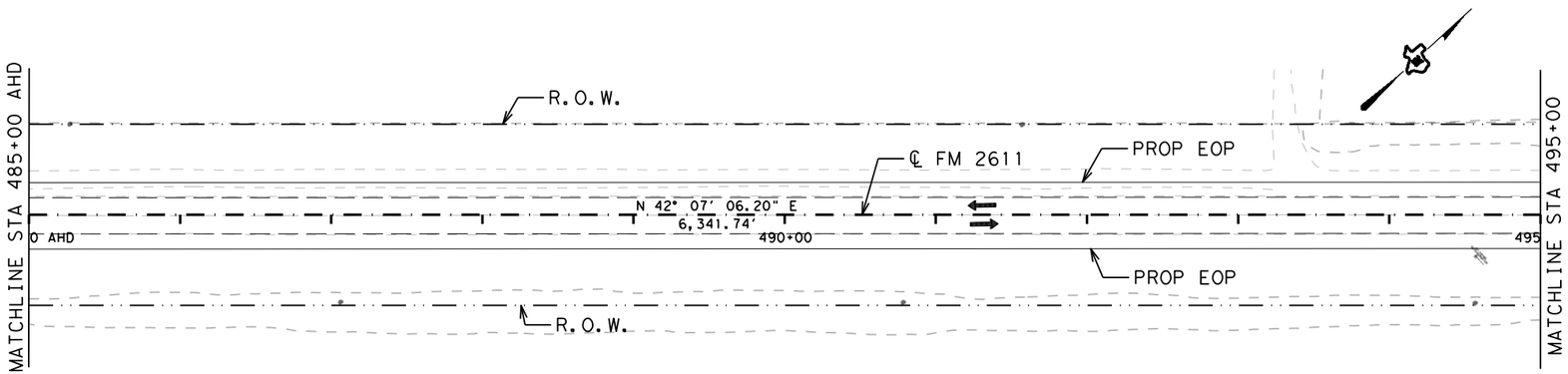

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2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		107

SCALE 1"=100'
SHEET 17 OF 20

12/21/2020
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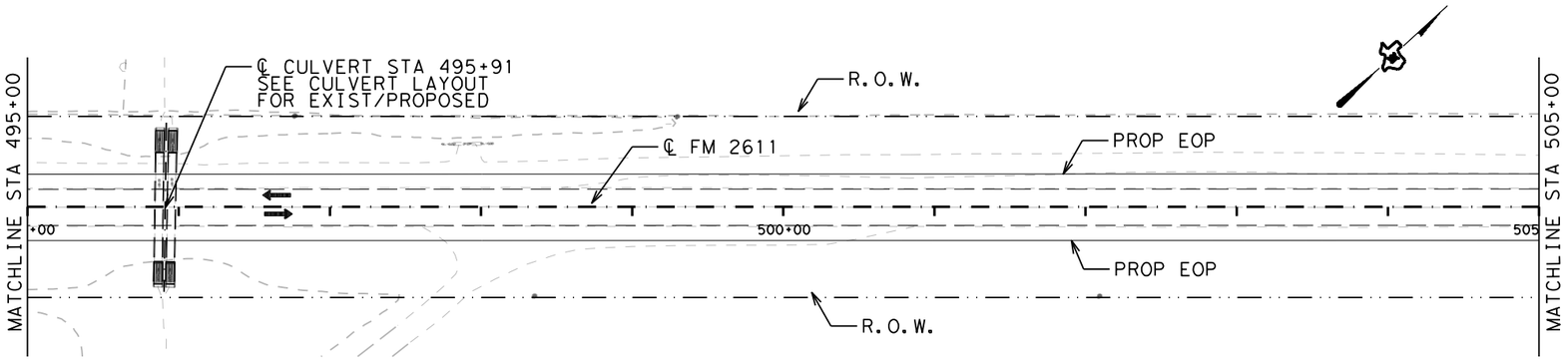

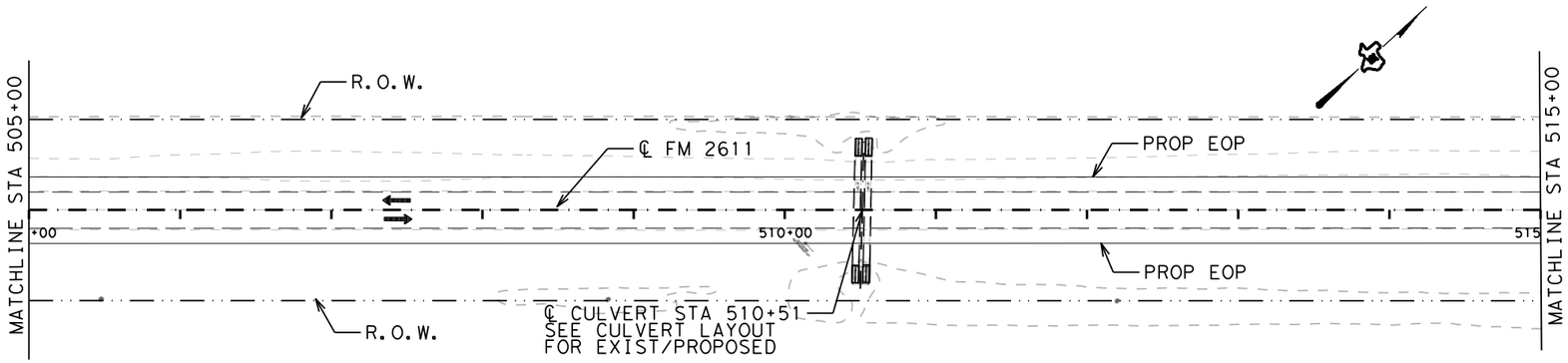

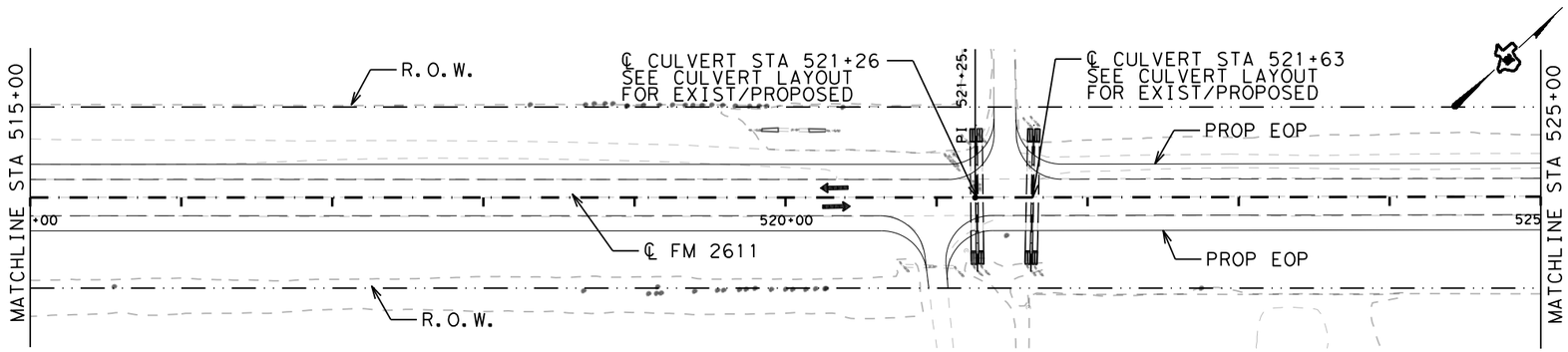

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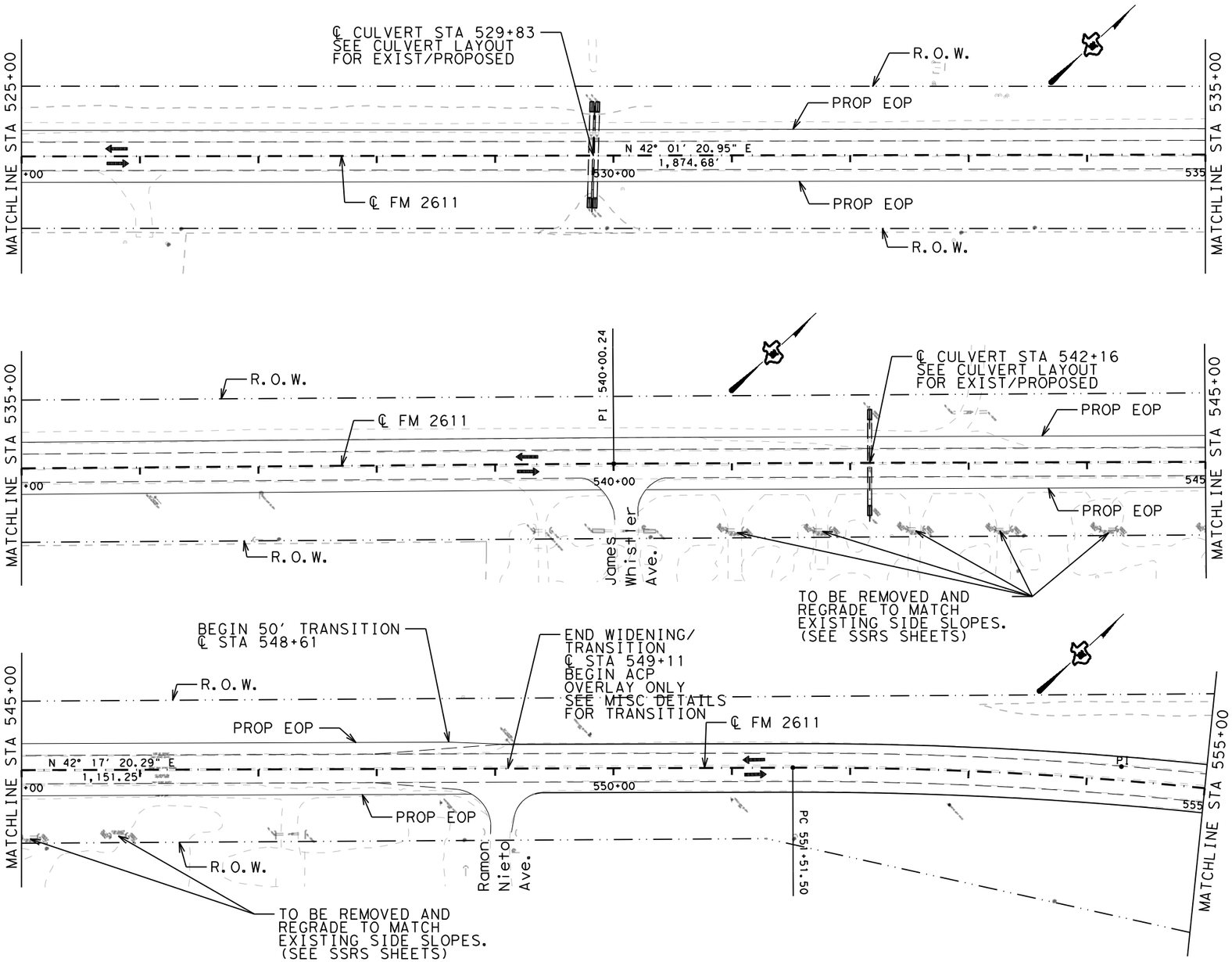
PLAN LAYOUTS

Texas Department of Transportation

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		108

SCALE 1"=100'
SHEET 18 OF 20



PI STATION	= 554+29.08
DELTA	= 9° 39' 37.58" (RT)
DEGREE OF CURVE	= 1° 44' 39.26"
TANGENT	= 277.58
LENGTH	= 553.85
RADIUS	= 3,284.86
PC STATION	= 551+51.50
PT STATION	= 557+05.34

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PLAN LAYOUTS

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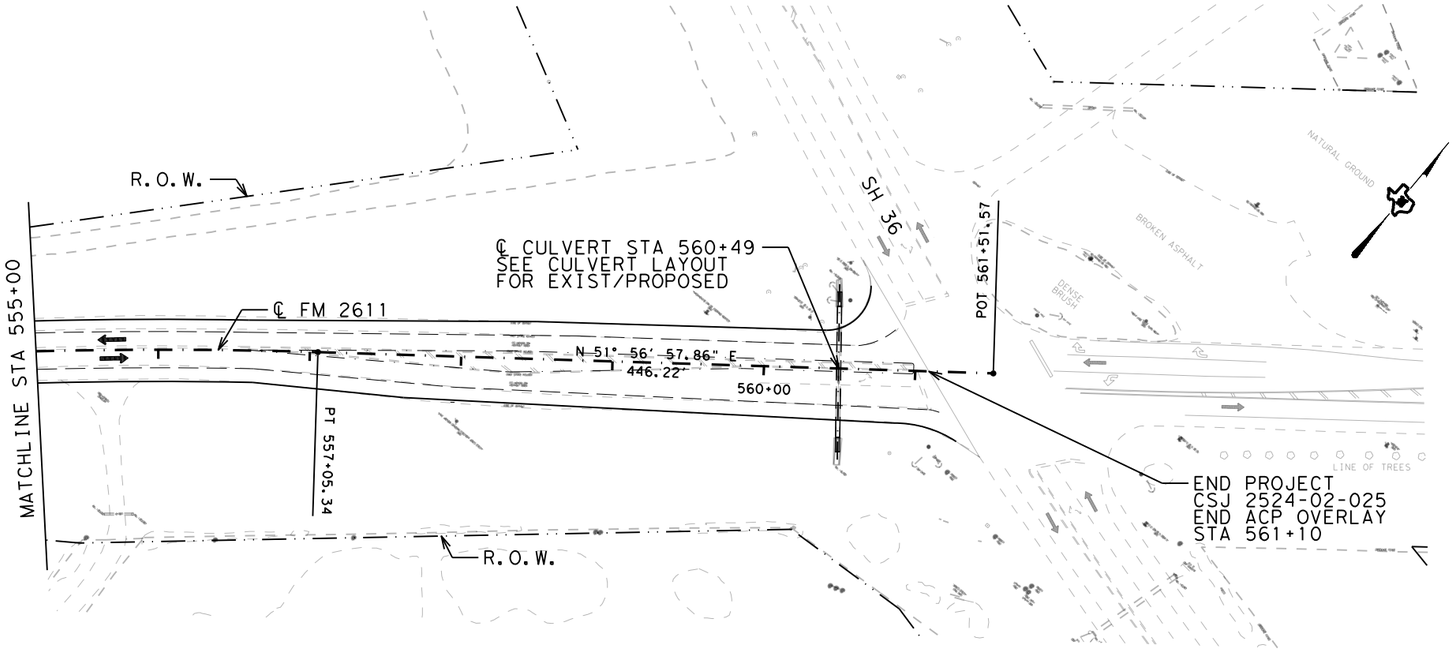
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		109

SCALE 1"=100'
SHEET 19 OF 20



NOTE:

FOR CONTRACTOR'S INFO
FUTURE WIDENING PROJECT
ENDS AT ℄ STA 556+13

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PLAN LAYOUTS

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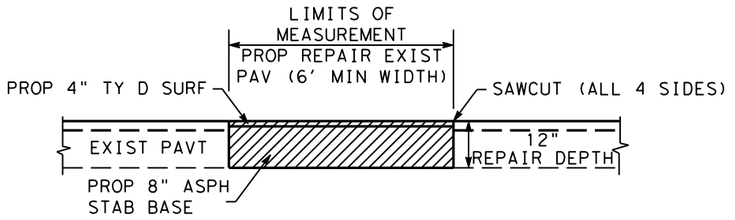
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		110

SCALE 1"=100'
SHEET 20 OF 20



12" FLEX PAV REPAIR DETAIL
ITEM 351

PAVEMENT REPAIR NOTES:

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

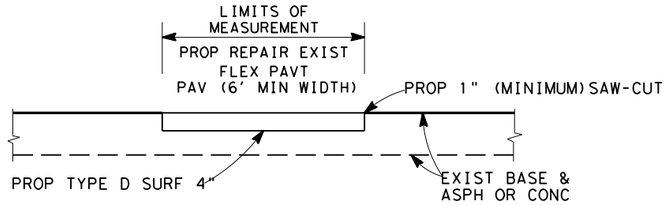
ALL BASE REPAIR SHALL BE PERFORMED IN ACCORDANCE WITH ITEM 351.

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

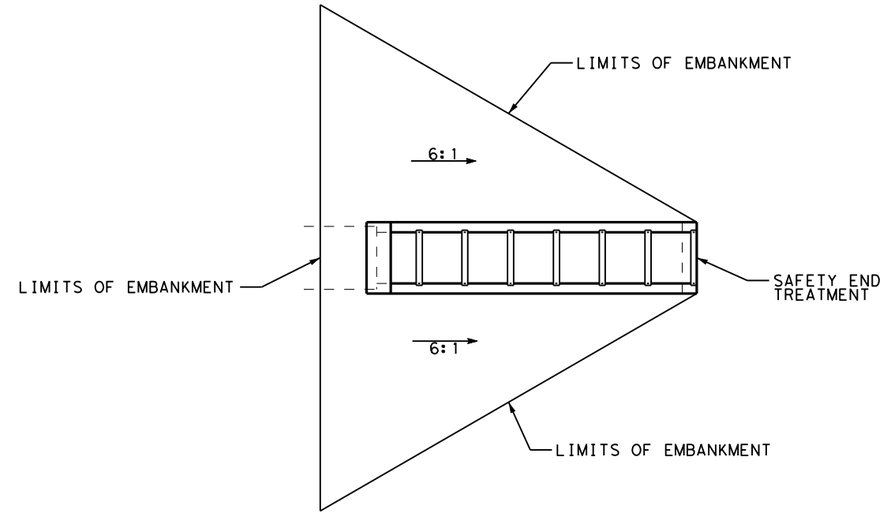
SAWCUTS SHALL BE INCIDENTAL TO ITEM 351.

ASPH STAB BASE SHALL MEET THE REQUIREMENTS OF ITEM 292.

ASPH CONC PAV SHALL MEET THE REQUIREMENTS OF ITEM 3076.

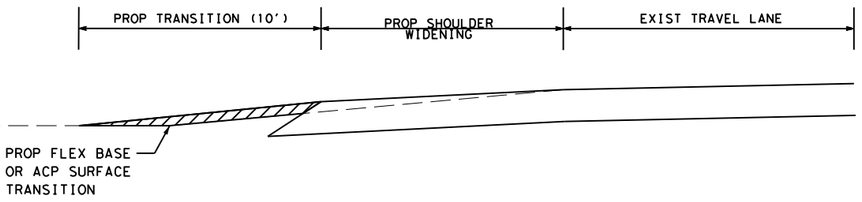


4" FLEX PAV REPAIR DETAIL
ITEM 351



ITEM 132 EMBANKMENT FOR FILL AROUND SAFETY END TREATMENT IS SUBSIDIARY TO ITEM 467 SAFETY END TREATMENT.

SAFETY END TREATMENT DETAIL

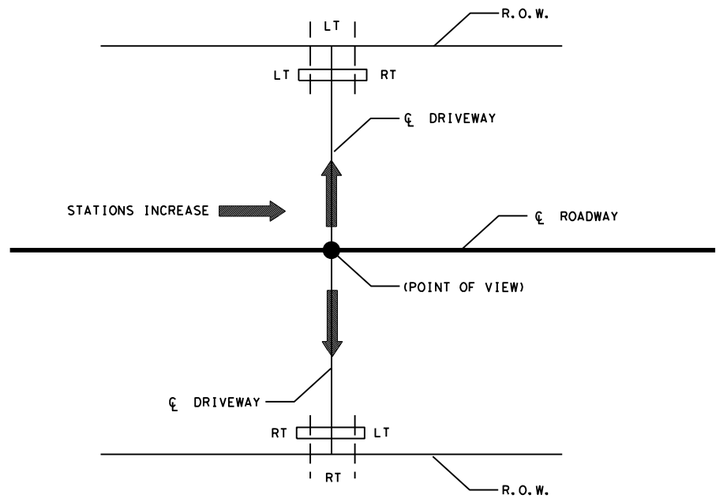


NOTES:
*MATCH EXISTING MATERIAL AND WIDTH.

RADIUS WILL BE AS FOLLOWS:
15' FOR PRIVATE DRIVEWAYS
25' FOR COMMERICAL DRIVEWAYS

TRANSITIONS SHALL NOT BE PAID FOR SEPERATELY, WILL BE INCIDENTAL TO OTHER PERTINENT ITEMS.

DRIVEWAY TRANSITION DETAIL



METHOD FOR LOCATING DRIVEWAYS

SCALE N.T.S.
SHEET 1 OF 2

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MISCELLANEOUS DETAILS

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CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		111

12/21/2020
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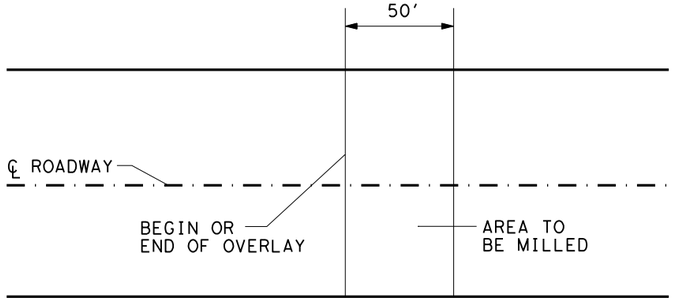
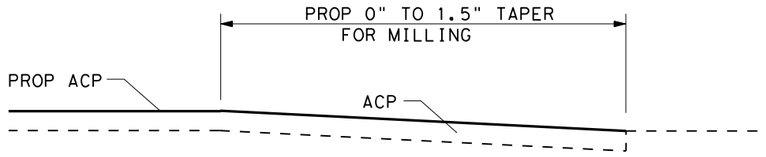


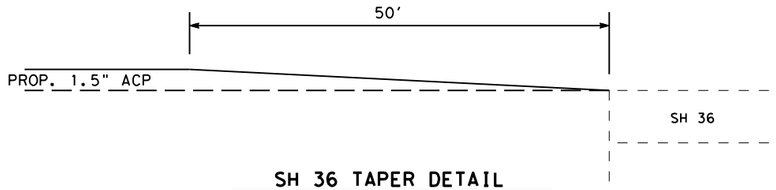
NOTE: CONTRACTOR TO MILL ROADWAY
AT BEGINNING OF PROJECT AND
AT BEGINNING AND END OF BRIDGES.

TYPICAL PLAN
MILLING TAPER



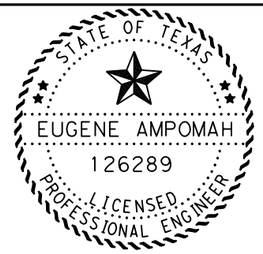
TYPICAL PROFILE
MILLING TAPER

MILLING TAPER SHALL NOT BE PAID FOR SEPERATELY,
WILL BE INCIDENTAL TO OTHER PERTINENT ITEMS.



SH 36 TAPER DETAIL
NOT TO SCALE

EDGELINE PATTERN DETAIL
TO BE PLACED IN AREAS WHERE THERE IS NO EXISTING
RUMBLE STRIPS/JIGGLE BARS/PROF PAV MRKS.



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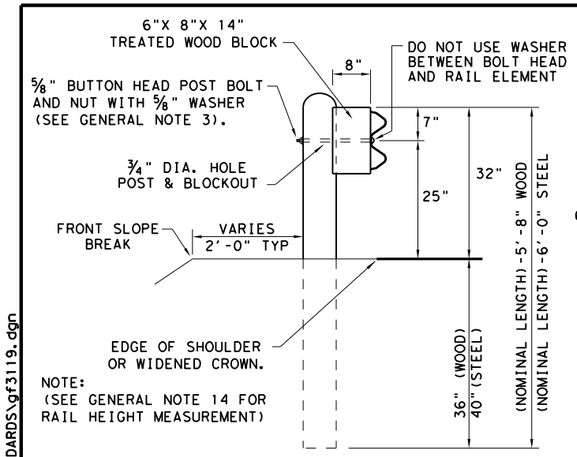
MISCELLANEOUS DETAILS

Texas Department of Transportation

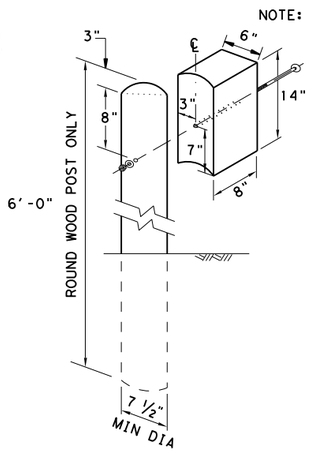
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		112

SCALE N.T.S.
SHEET 2 OF 2

DATE: 12/21/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\252402025\4 - Design\Plan Set\3. Roadway\STANDARDS\gf3119.dgn

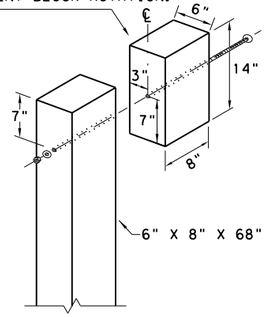


TYPICAL POST PLACEMENT

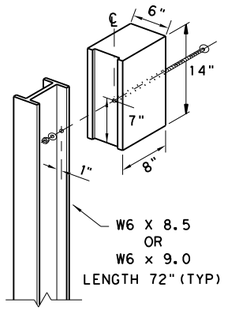


WOOD BLOCK TO ROUND WOOD POST

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

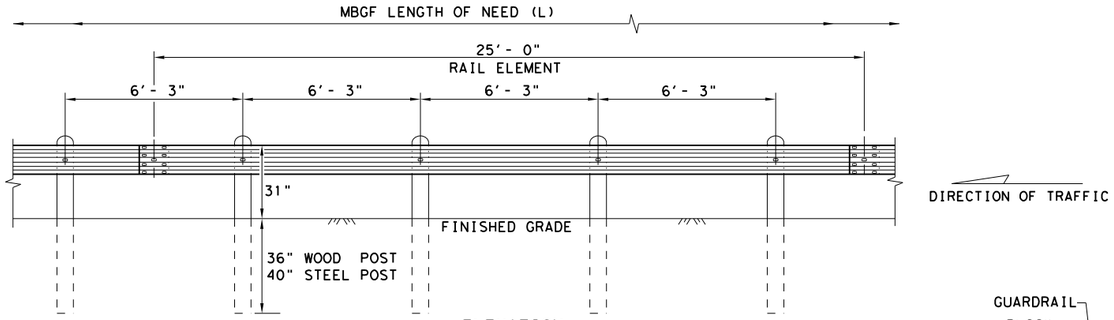


WOOD BLOCK TO RECTANGULAR WOOD POST



ROUTED WOOD BLOCK TO I-BEAM STEEL POST

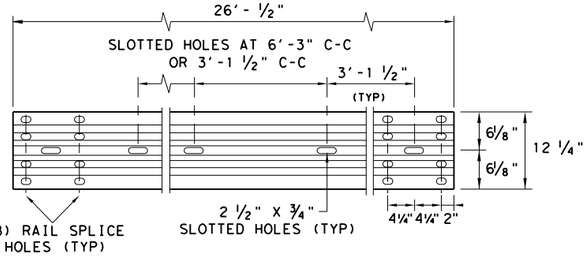
NOTE: ** "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



DIRECTION OF TRAFFIC

ELEVATION
MID-SPAN RAIL SPLICE

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



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

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

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

SPLICE BOLT LENGTH → VARIES

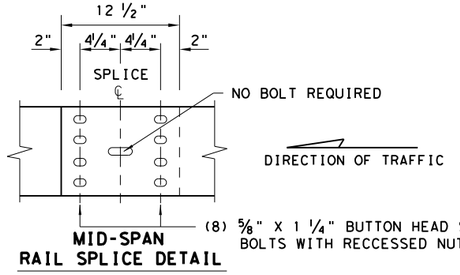
FBB01 = 1 ¼"
FBB02 = 2"

⅝"

POST & BLOCK LENGTH
FBB03 = 10"
FBB04 = 18"

BUTTON HEAD BOLT

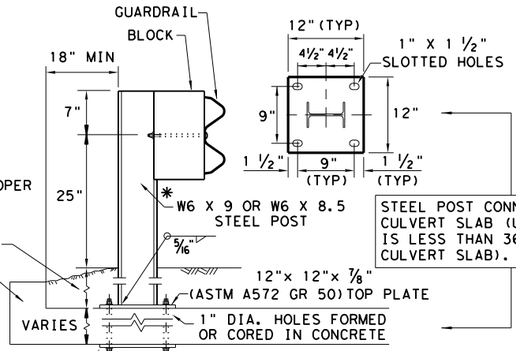
NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



DIRECTION OF TRAFFIC

MID-SPAN RAIL SPLICE DETAIL

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



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

STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

12" X 12" X ¼" (ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

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

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

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13.

Texas Department of Transportation

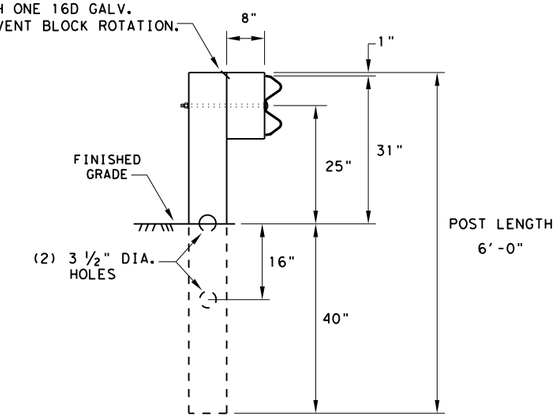
Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		113

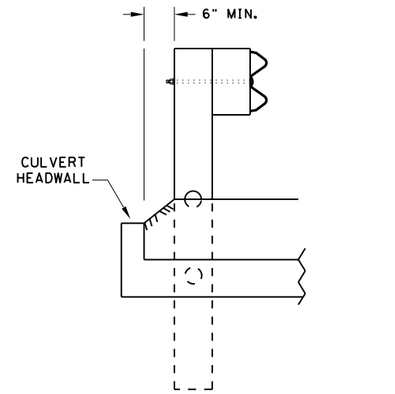
DATE: 12/21/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\252402025\4 - Design\Plan Set\3. Roadway\STANDARDS\gf31ls19.dgn

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

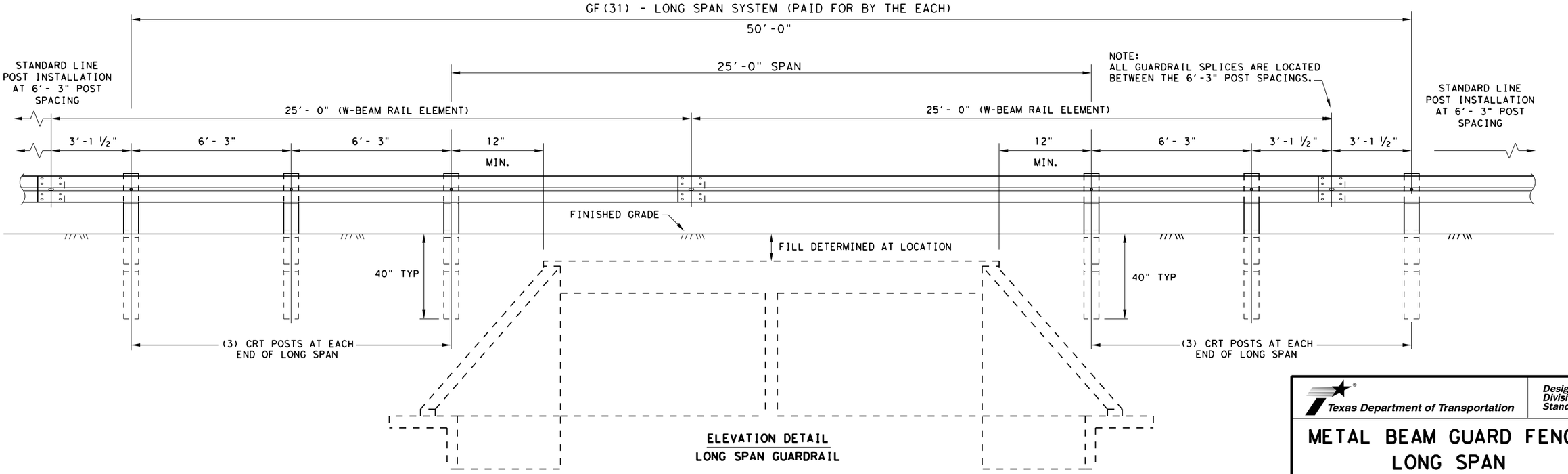
GENERAL NOTES

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 ½" 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 ⅝" 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.

DIRECTION OF TRAFFIC

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

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



ELEVATION DETAIL LONG SPAN GUARDRAIL

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT

GF(31)LS-19

FILE: gf31ls19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025, ETC	FM 2611
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		114

DATE: 12/21/2020
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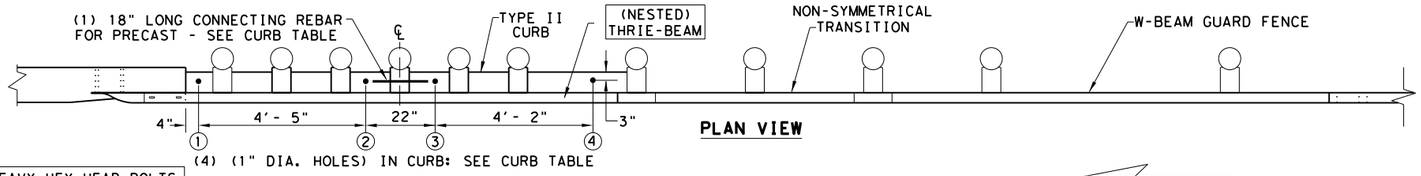


PLAN VIEW

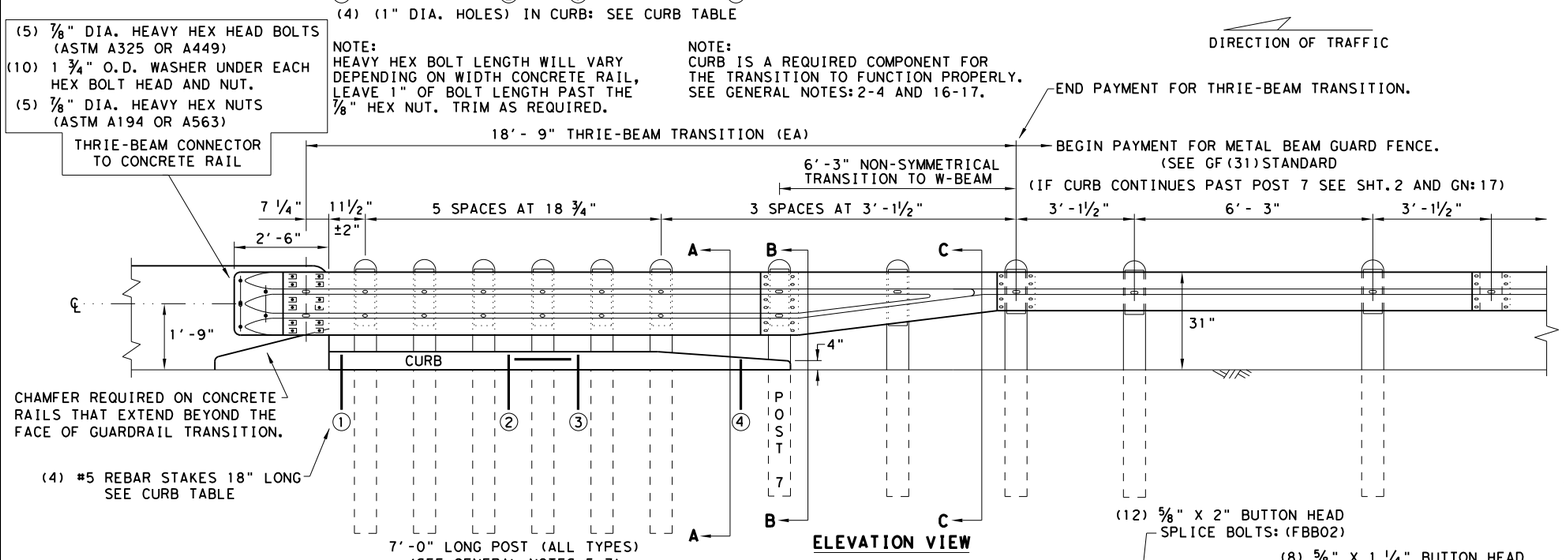
DIRECTION OF TRAFFIC

(5) ⅞" DIA. HEAVY HEX HEAD BOLTS (ASTM A325 OR A449)
(10) 1 ¾" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
(5) ⅞" DIA. HEAVY HEX NUTS (ASTM A194 OR A563)

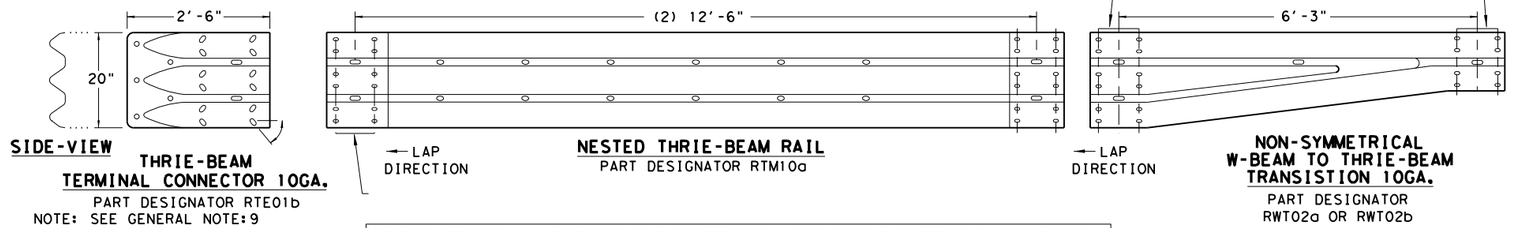
THRIE-BEAM CONNECTOR TO CONCRETE RAIL

NOTE: HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE ⅞" 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.



ELEVATION VIEW



SIDE-VIEW

THRIE-BEAM TERMINAL CONNECTOR 10GA.
PART DESIGNATOR RTE01b
NOTE: SEE GENERAL NOTE: 9

← LAP DIRECTION

NESTED THRIE-BEAM RAIL
PART DESIGNATOR RTM10a

← LAP DIRECTION

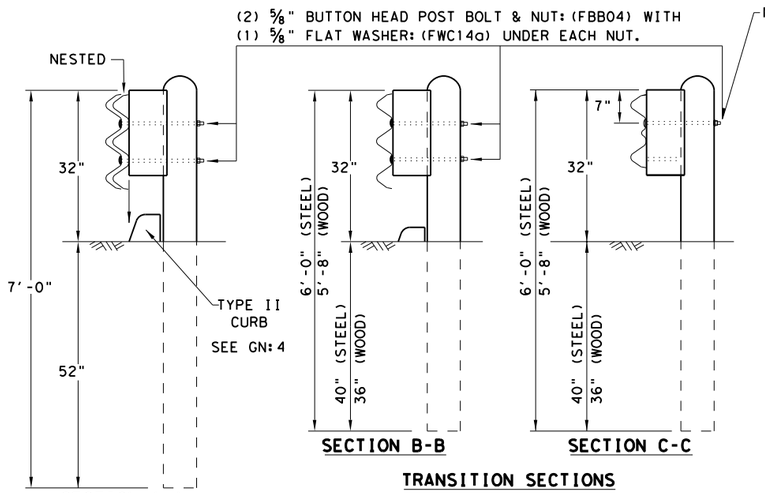
NON-SYMMETRICAL W-BEAM TO THRIE-BEAM TRANSISTION 10GA.
PART DESIGNATOR RWT02a OR RWT02b

PLATE WASHER INSTRUCTIONS

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.

(2) ⅝" BUTTON HEAD POST BOLT & NUT: (FBB04) WITH (1) ⅝" FLAT WASHER: (FWC14a) UNDER EACH NUT.

NOTE: ONLY (1) ⅝" BOLT REQUIRED AT THIS POST LOCATION.



SECTION A-A

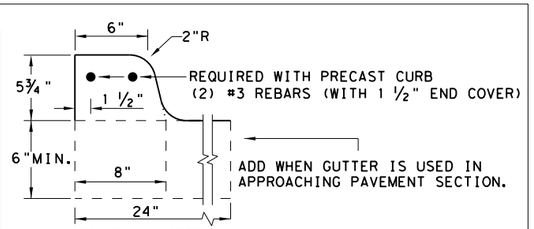
SECTION B-B

SECTION C-C

TRANSITION SECTIONS
NOTE: ALL POST TYPES, SEE GENERAL NOTE: 5 & 6

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

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 FOUR (1" DIA. HOLES), SEE BOTH VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

NOTE: OPTIONS FOR TYPE II CURB:
1. PRECAST
2. CAST-IN-PLACE

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

TYPE II CURB DETAILS

GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- ¾") HEIGHT; SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST ⅝" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S CONSTRUCTION DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-19

FILE: gf31tr*1319.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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REVISIONS	2524	02	025,ETC	FM 2611
	DIST	COUNTY		SHEET NO.
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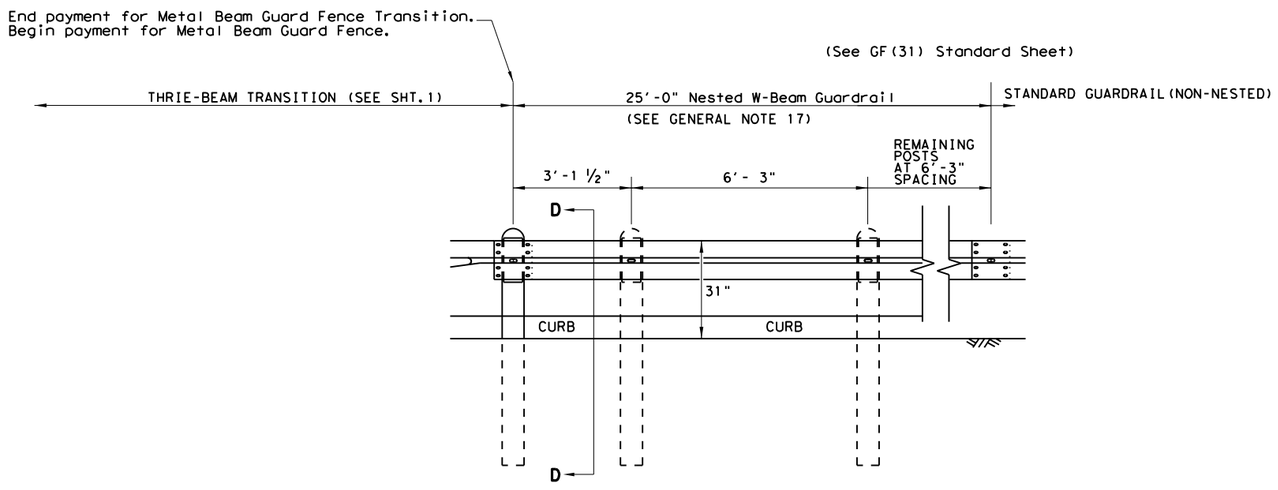
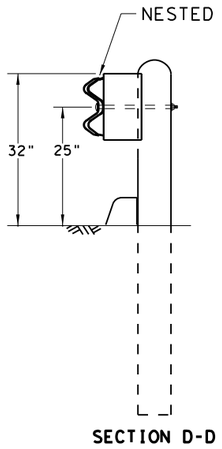
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)





SECTION D-D

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation

Design Division Standard

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

GF(31)TR TL3-19

FILE: gf31trt1319.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
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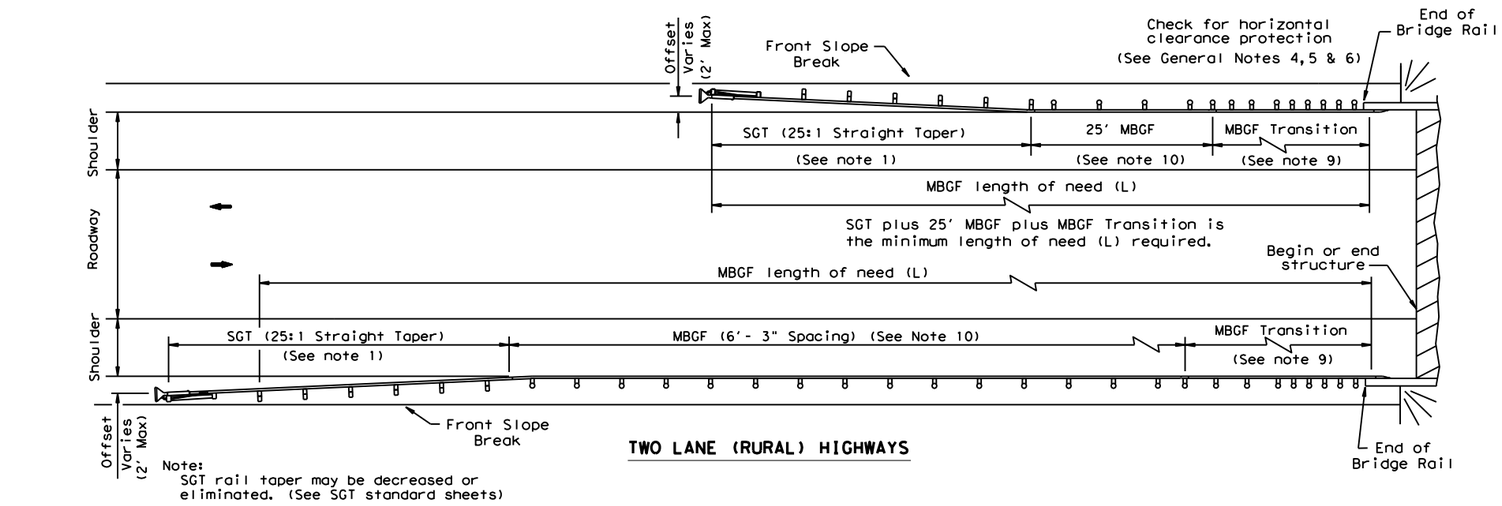
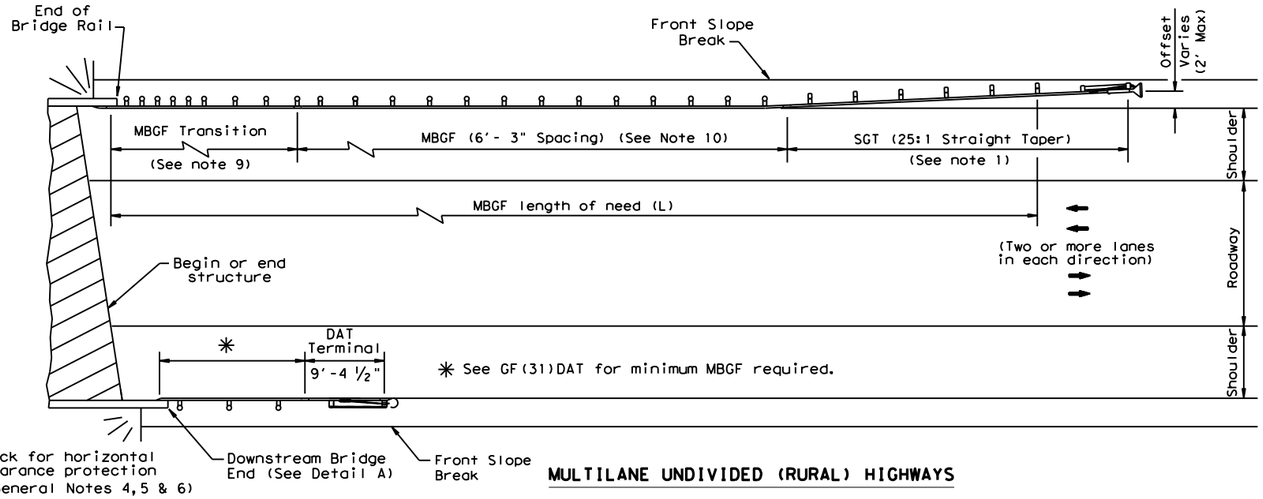
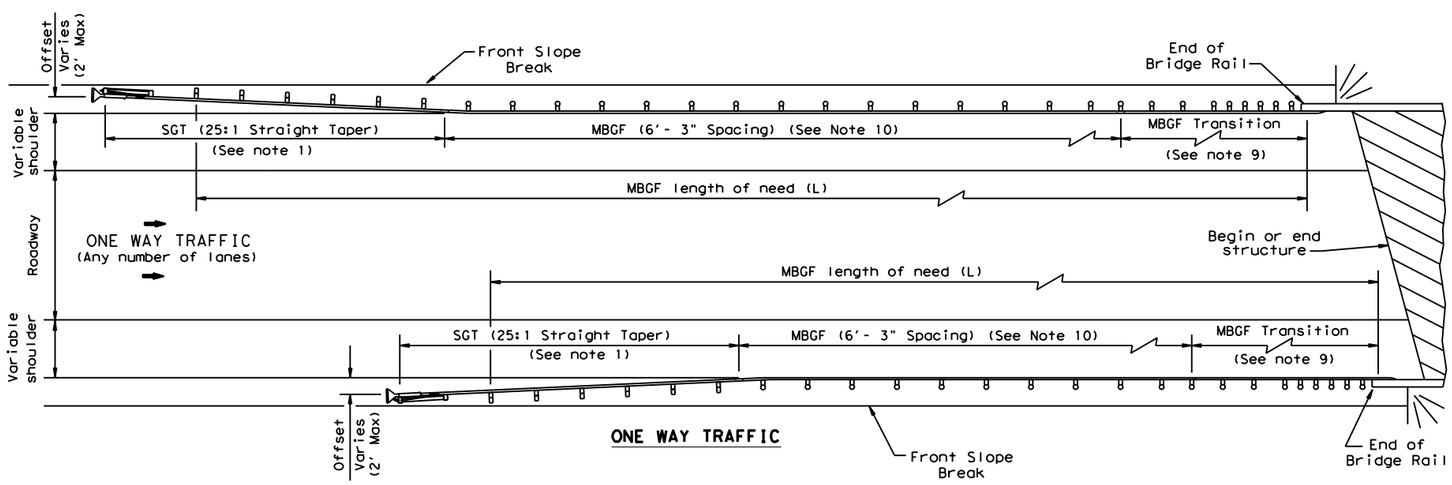


TWO LANE (RURAL) HIGHWAYS

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



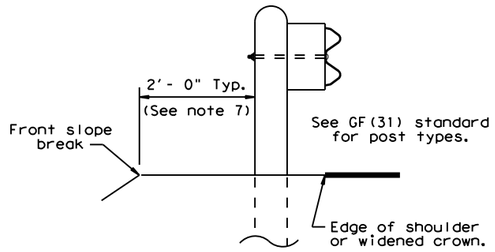
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



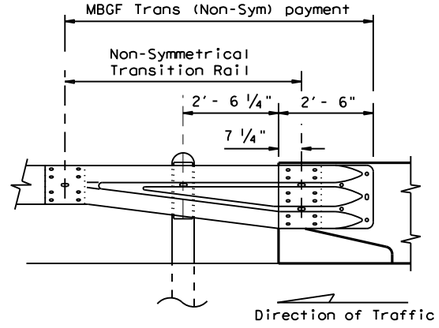
ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF



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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		117

DATE: 12/21/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\252402025\4 - Design\Plan Set\3. Roadway\STANDARDS\sgt10s3116.dgn

NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN: 533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN: 4076B
AT (POSTS 2 THRU 8)

⅝" X 10" HGR BOLT PN: 3500G
⅝" HGR NUT PN: 3340G

LINE AT THE BACK OF POST #2 THRU #8

FROM THE CENTERLINE OF POST(1) & POST(0)

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) POST(1) POST(0)

PLAN VIEW

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

BEGIN LENGTH OF NEED

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

TRAFFIC FLOW

50'-9 ½" STANDARD INSTALLATION LENGTH (MASH TL-3 SoftStop)

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

ANCHOR RAIL WITH SLOTS - (THREADED THRU HEAD)
SEE SoftStop MANUAL FOR COMPLETE DETAILS

MIDDLE SLOT CUTOUT
(1) 1 ¾" X 6'-10 ¼"

OUTSIDE SLOTS CUTOUT
(2) 1½" X 6'-9 ⅝"

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

25'-0" DOWNSTREAM W-BEAM GUARDRAIL PN: 61G

SoftStop ANCHOR RAIL (12GA) PN: 15215G

SoftStop FACE SEE GN(3) & NOTE: B

3'-1 ½"(+/-) 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 5'-8" 4'-7"

SEE NOTE: C

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

POST 32" HEIGHT

31" RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

(8) ⅝"× 1- ¼" GR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

(8) ⅝"× 1- ¼" HGR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

SEE DETAIL 3

6'-1 ⅜"

POST 40" DEPTH (TYP 1-8)

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) POST(1) POST(0)

POST(2) 6'-0" (SYTP) PN: 15000G

POST(1) 4'-9 ½" SYTP PN: 15203G

POST(0) 6'-5 ⅜" PN: 15205A

ELEVATION VIEW

HARDWARE FOR POST(2) THRU POST(8)
(1) ⅝"× 10" HGR BOLT PN: 3500G
(1) ⅝" HGR HEX NUT PN: 3340G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

4" X 7 ½" X 14" BLOCKOUT COMPOSITE PN: 6777B

6" X 8" X 14" BLOCKOUT WOOD PN: 4076B

NOTE: DO NOT BOLT ANCHOR RAIL TO POST(2)

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" X 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

(1) ⅝" × 1- ½" HEX HD BOLT-GR-5 PN: 105286

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

(2) ⅝" × 2 ½" HEX HD BOLT GR-5 PN: 105285G

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

1" NUT PN: 3908G SHALL BE SECURELY TIGHTENED AFTER FINAL ASSEMBLY, BUT NOT DEFORMING THE KEEPER PLATE.

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

(2) ¾" × 2 ½" HEX BOLT (TYP) PN: 3717G

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

6'-5 ⅜" (W6 X 15) I-BEAM POST PN: 15205A

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

LINE POST (3, 4, 5, 6, 7 & 8)

SECTION VIEW B-B

6'-0" (W6 X 8.5) I-BEAM POST PN: 533G

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

POST(2)

SECTION VIEW A-A

6'-0" (W6 X 8.5) (SYTP) I-BEAM POST PN: 15000G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

POST 17"- ½" HEIGHT

4'-9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

4'-9 ½" (W6 X 8.5) (SYTP) I-BEAM POST PN: 15203G

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX. RAIL OFFSET

APPROACH GRADING (1V:10H OR FLATTER) SEE PRODUCT ASSEMBLY MANUAL FOR ADDITIONAL GUIDANCE.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

NOTE: A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE: C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅞")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	¾" × 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR.DH
3360G	16	⅝" × 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" × 10" HGR POST BOLT A307
3391G	1	⅝" × 1 ¾" HEX HD BOLT A325
4489G	1	⅝" × 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" × 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" × 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

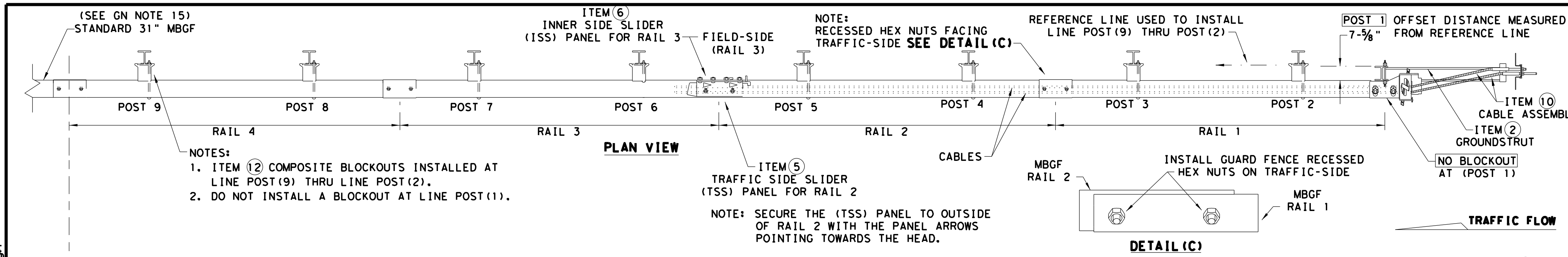
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SoftStop END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

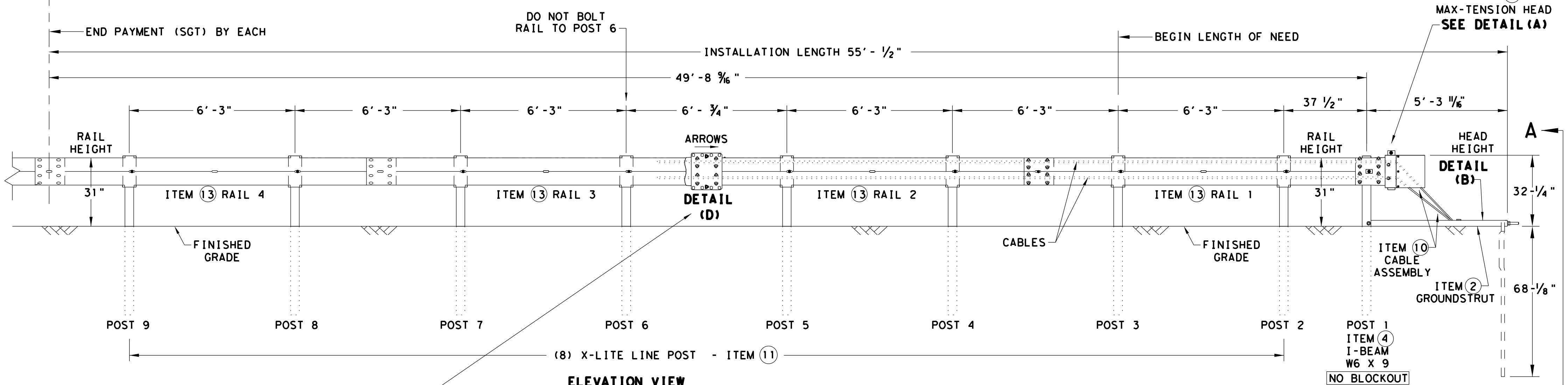
Texas Department of Transportation

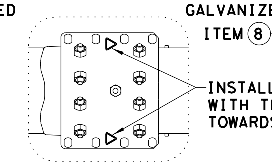
Design Division Standard

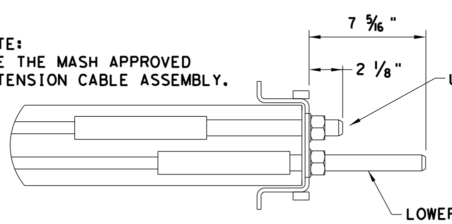
TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT(10S)31-16

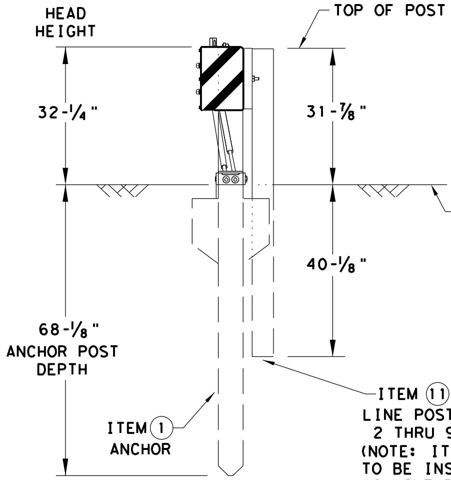
FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		118

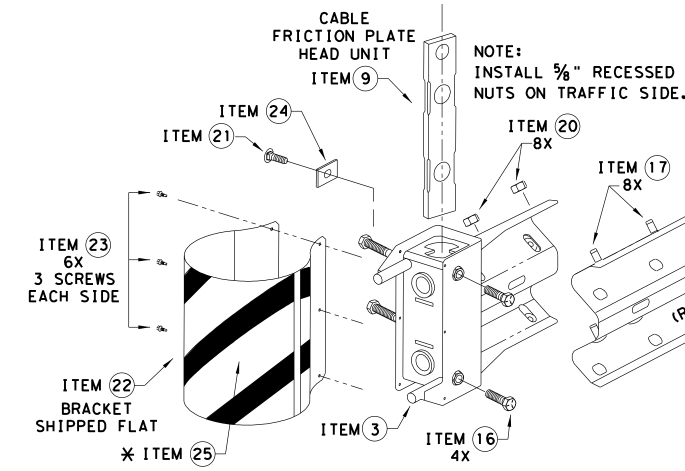












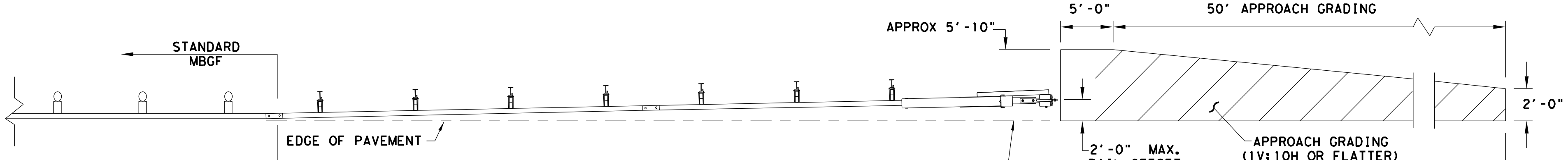
GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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



NOTE: 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 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
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	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	119

DATE: 12/21/2020
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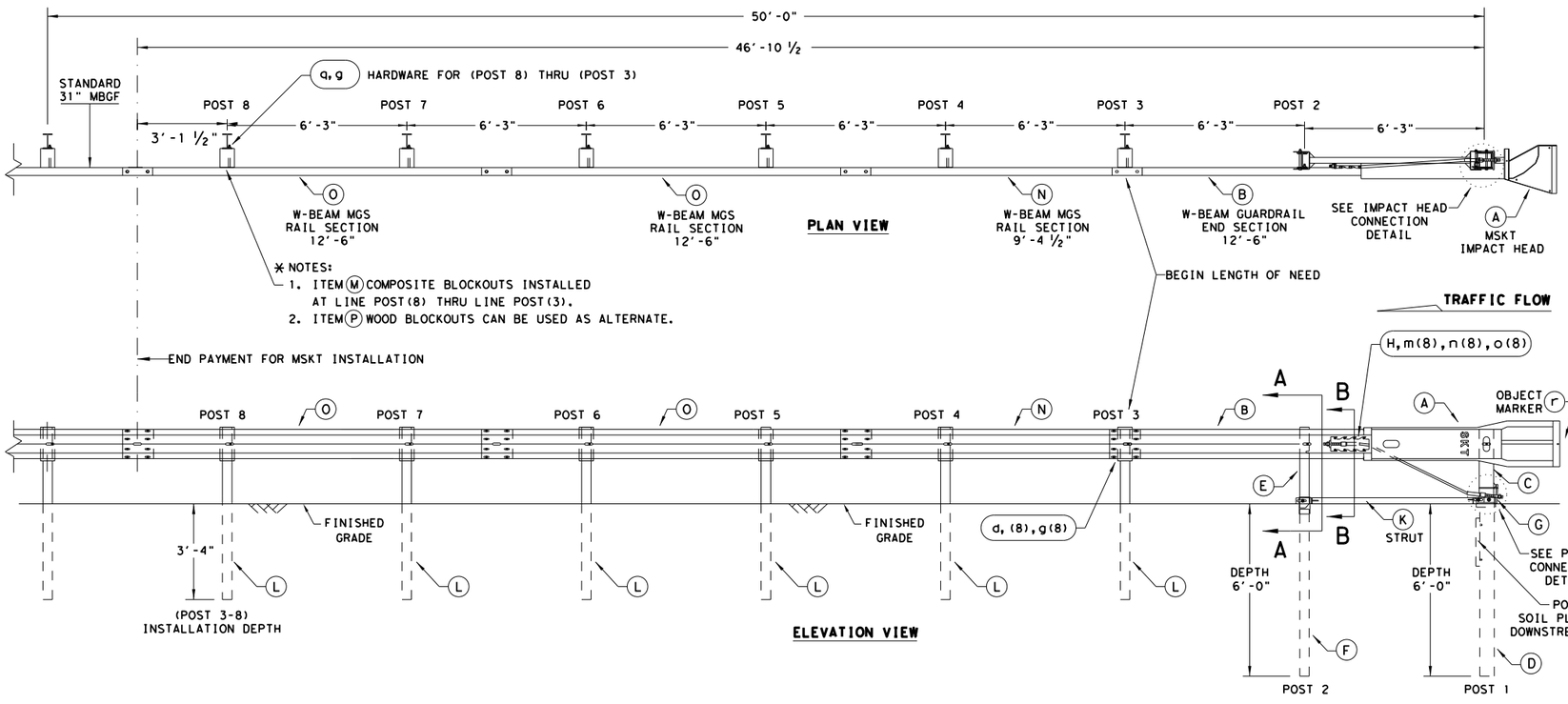


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

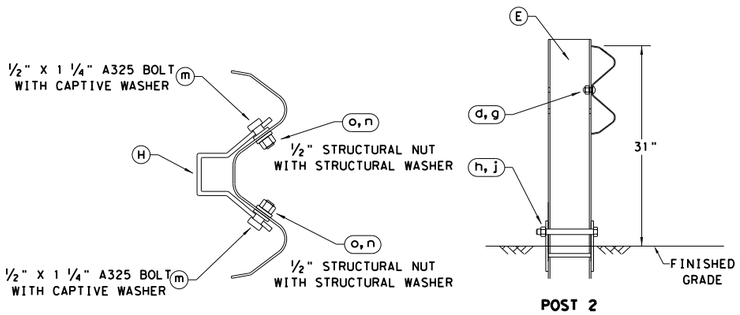
GENERAL NOTES

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 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	5/16" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/16" WASHER	W0516
c	2	5/16" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" 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 5/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

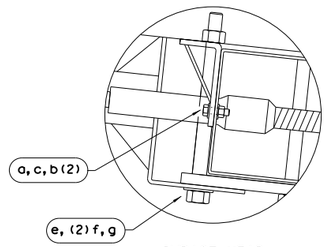
SEE NOTES: *

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

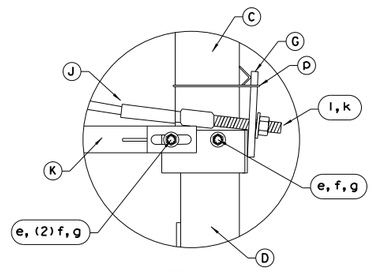


SECTION B-B
ANCHOR BRACKET

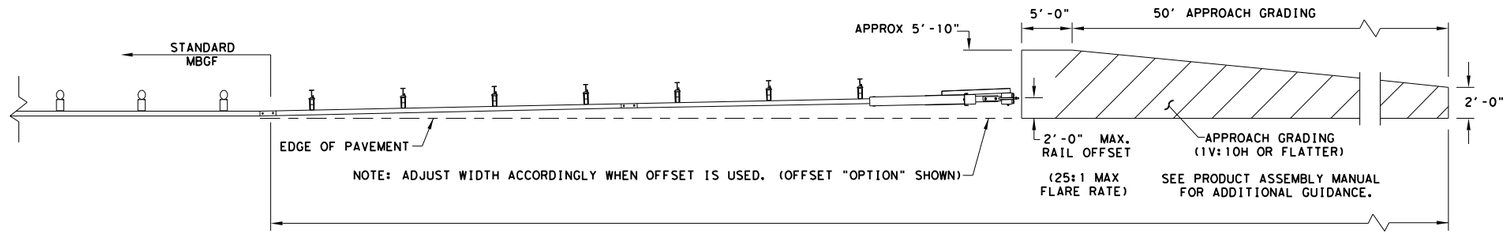
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

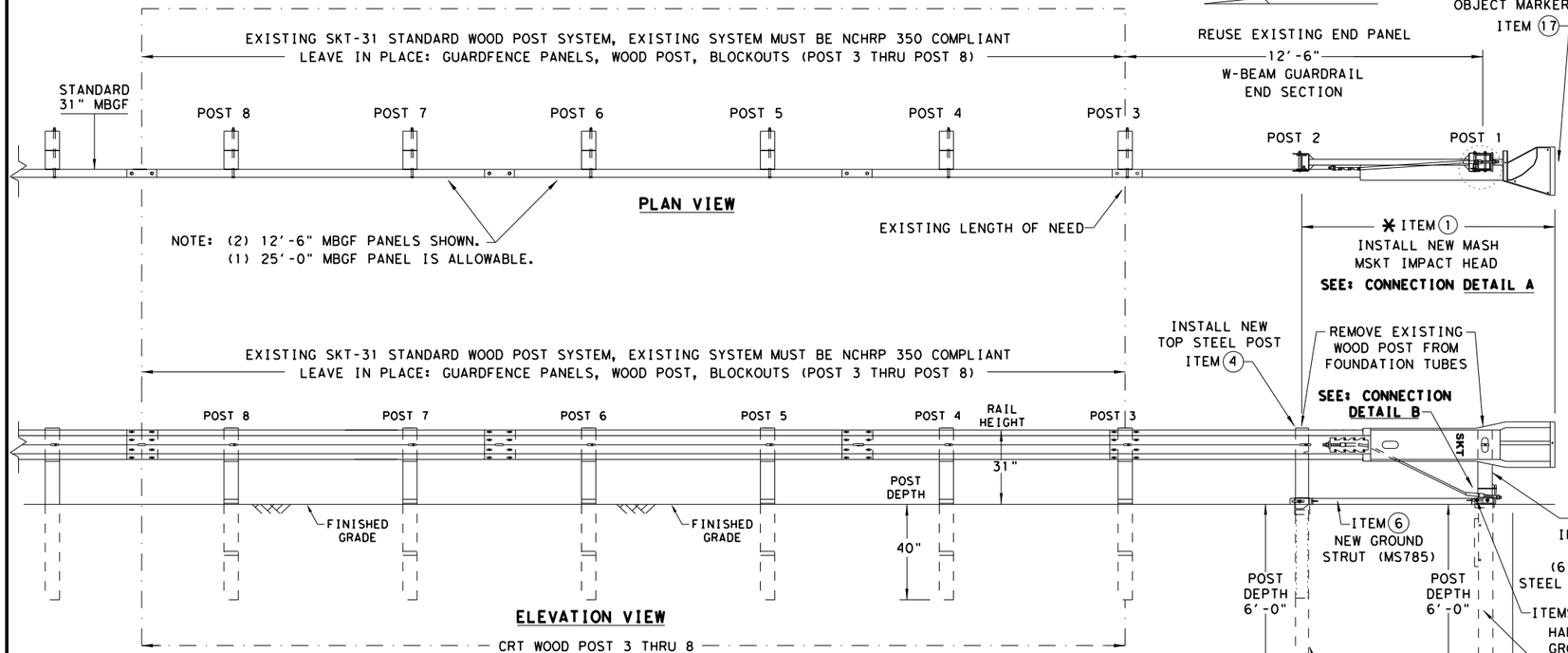
Texas Department of Transportation

Design Division Standard

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

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL			
© TxDOT: APRIL 2018	CONT	SECT	JOB		HIGHWAY		
REVISIONS	2524	02	025, ETC		FM 2611		
	DIST	COUNTY			SHEET NO.		
	HOU	BRAZORIA			120		

DATE:
FILE:



** NOTE: EXTRA SOIL COMPACTION WILL BE NEEDED AROUND NEW (POSTS 1 & 2) DUE TO THE REMOVAL OF THE STEEL FOUNDATION TUBES.

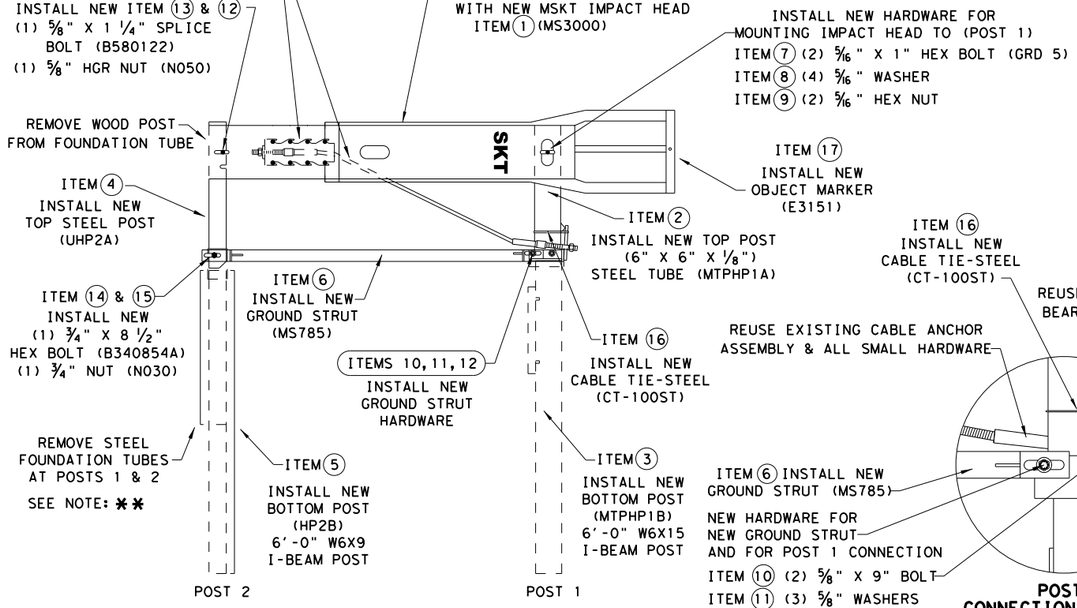
GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. THE EXISTING SKT 31" STANDARD WOOD POST SYSTEM MUST BE THOROUGHLY INSPECTED, AND DETERMINED TO BE INTACT, AND FREE OF ANY DAMAGE OR DEFECTS BEFORE RETROFITTING. THIS INSPECTION INCLUDES COMPLETING THE MSKT RETROFIT INSPECTION CHECKLIST FOR THE EXISTING SKT 31" WOOD POST NCHRP 350 SYSTEM. ALL EXISTING, AND REUSABLE PARTS MUST BE FREE OF ANY DAMAGE FOR A MASH COMPLIANT RETROFIT.
9. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
10. 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.
11. SPECIAL DRIVING CAP TO BE USED WHEN DRIVING (LOWER POSTS 1 & 2) TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEMS	QTY	MAIN SYSTEM COMPONENTS	PART NUMBERS
1	1	MSKT IMPACT HEAD	MS3000
2	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
3	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
4	1	POST 2 - ASSEMBLY TOP	UHP2A
5	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
6	1	GROUND STRUT	MS785
7	2	5/16" X 1" HEX BOLT (GRD 5)	B516014A
8	4	5/16" WASHERS	W0516
9	2	5/16" HEX NUT	N0516
10	2	5/8" X 9" HEX BOLT (GRD A449)	B580904A
11	3	5/8" WASHERS	W050
12	3	5/8" H.G.R NUT	N050
13	1	5/8" X 1 1/4" SPLICE BOLT	B580122
14	1	3/4" X 8 1/2" HEX BOLT (GRD 5)	B340854A
15	1	3/4" HEX NUT	N030
16	1	CABLE TIE-STEEL	CT-100ST
* 17	1	OBJECT MARKER 18" X 18"	E3151

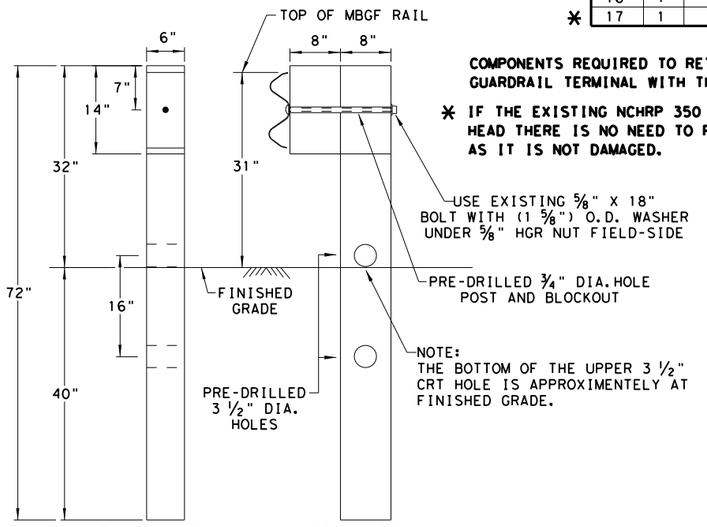
COMPONENTS REQUIRED TO RETROFIT: EXISTING 31" WOOD POST (NCHRP 350 SKT) GUARDRAIL TERMINAL WITH THE NEW 31" (MASH COMPLIANT MSKT IMPACT HEAD).

*** IF THE EXISTING NCHRP 350 (31" WOOD POST SKT) ALREADY HAS THE MSKT IMPACT HEAD THERE IS NO NEED TO REPLACE THE IMPACT HEAD OR OBJECT MARKER AS LONG AS IT IS NOT DAMAGED.**



CONNECTION DETAIL A
IMPACT HEAD (POST 1 & POST 2)

POST 1
CONNECTION DETAIL B



EXISTING WOOD POSTS 3-8
CONTROLLED RELEASE TERMINAL (CRT)

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

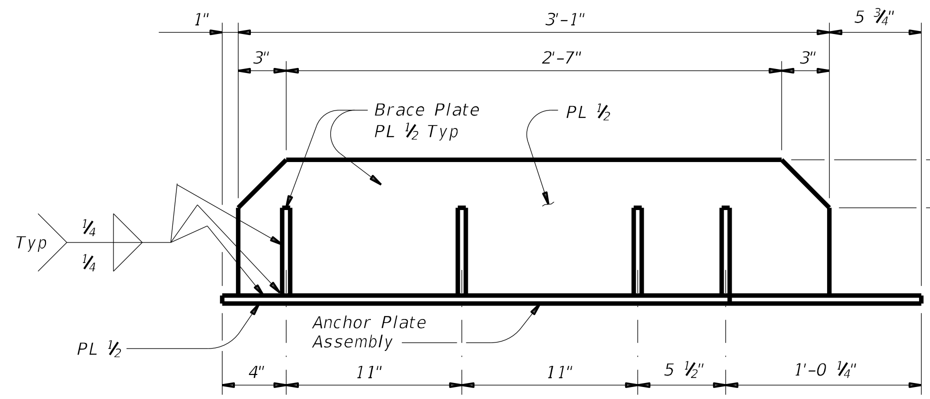
Texas Department of Transportation

Design Division Standard

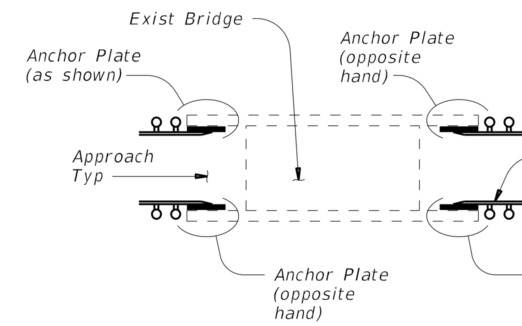
RETROFIT STANDARD SKT 31" WOOD POST SYSTEM TO MASH MSKT

SGT(14W)31-18

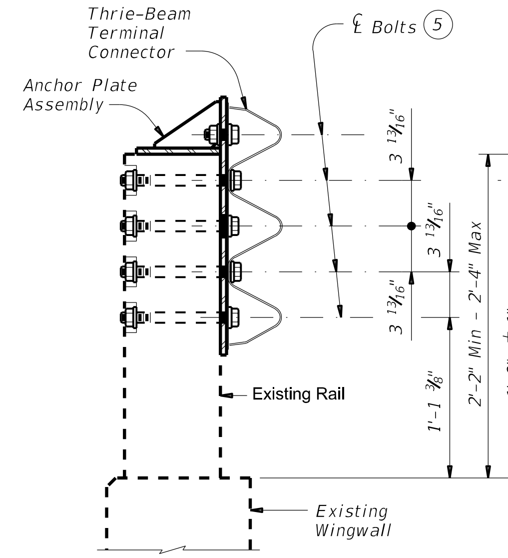
FILE: sgt14w3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL
©TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025, ETC	FM 2611
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		121



PLAN

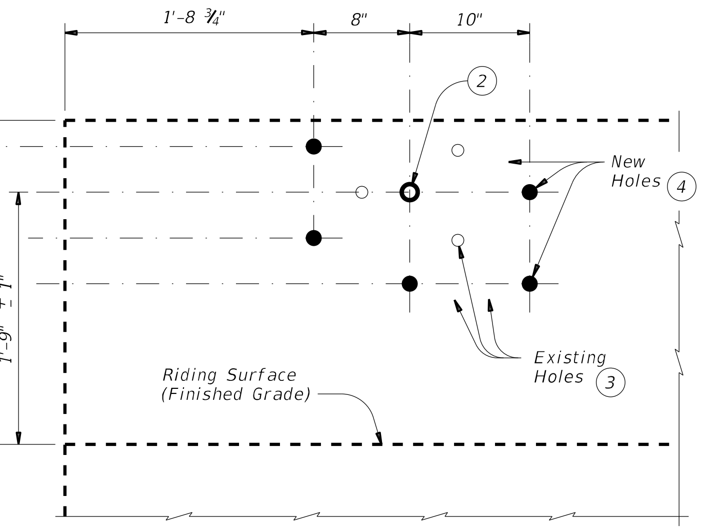


LOCATION DETAILS



SECTION

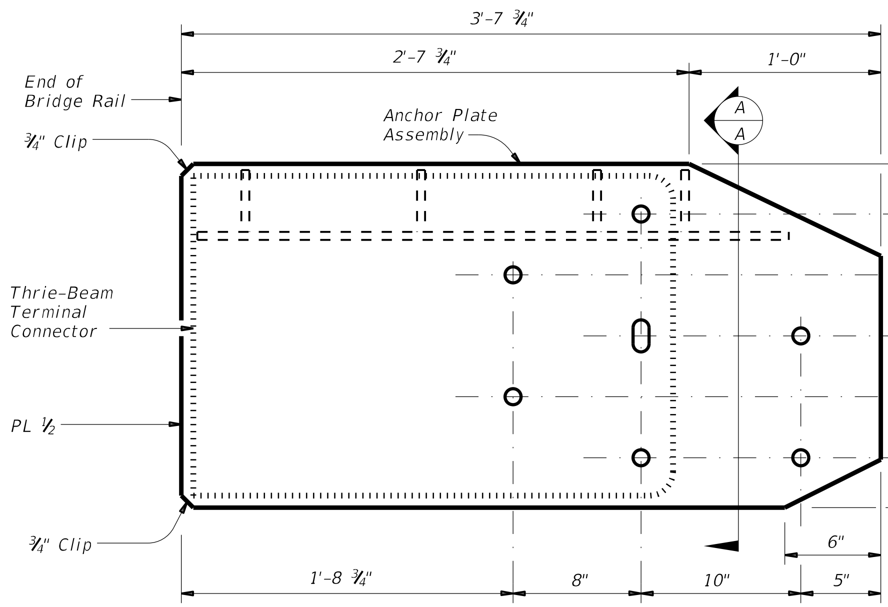
Showing completed installation



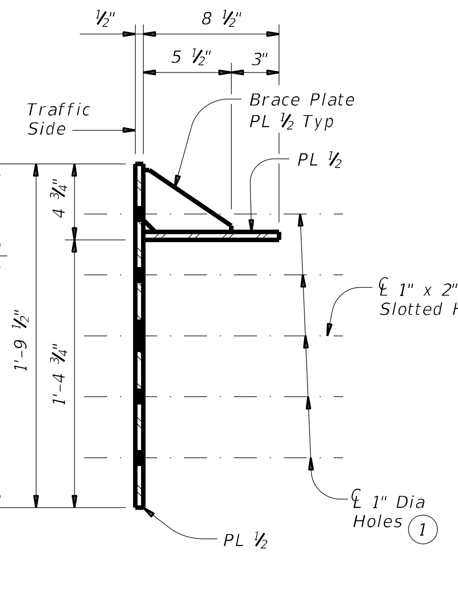
ROADSIDE ELEVATION

Anchor Plate assembly and Thrie-Beam Terminal Connector not shown for clarity

THRIE-BEAM TERMINAL CONNECTION DETAILS (1)



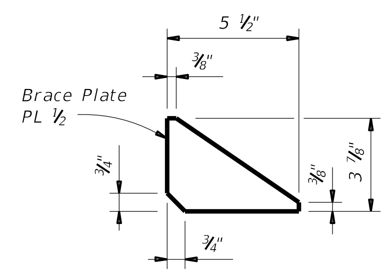
ROADSIDE ELEVATION



SECTION A-A

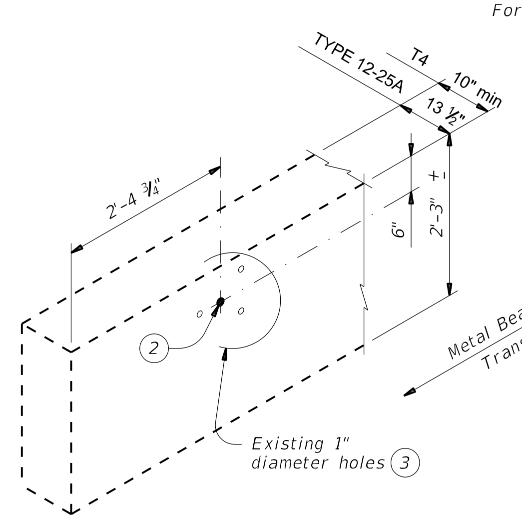
ANCHOR PLATE DETAILS

Anchor Plate shown is detailed for one end of one side of rail only. For other side, Anchor Plate must be built opposite hand.



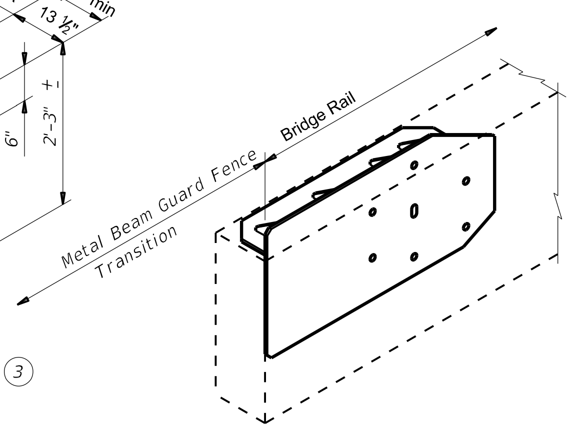
BRACE PLATE DETAIL

The effective height of the existing rail (at the Anchor Plate location) above the finished riding surface must be between 2'-2" and 2'-4" .



EXISTING PARAPET

Shown after removal of existing MBGF Transition connector and prior to coring new bolt holes



ANCHOR PLATE PLACEMENT

INSTALLATION DETAILS

(1) The Contractor must verify that locations of bolt holes match those in the Thrie-Beam Terminal Connector to be installed in that location, prior to fabrication of Anchor Plate assembly and prior to coring bolt holes in the existing parapet.

(2) If the existing holes are aligned as expected, use the indicated existing 1" diameter hole in the installation of the Anchor Plate assembly and the Thrie-Beam Terminal Connector.

(3) If the existing holes are not aligned as expected, holes that cannot be utilized in the installation and are within 3" of a new bolt hole must be filled with epoxy grout prior to coring new holes.

(4) Drill new 1" diameter holes, each with a 2 ½" diameter x 1" deep recess, through existing railing parapet. Note that recesses are only required when pedestrian sidewalks are adjacent to back of rail unless directed otherwise by the Engineer. Holes should be perpendicular to the roadside face of the parapet. Drill holes and recesses with coring type equipment. Percussion drilling is not allowed. Patch spalls, when directed by the Engineer, in accordance with Item 429, "Concrete Structure Repair", at the Contractor's expense.

(5) 7 ~ ⅞" diameter A325 Hex Head Anchor Bolts each with 2 ~ 1 ¾" O.D. washers. Place washer under each head and nut. Provide bolts of sufficient length to extend a minimum of ½" beyond nut. Cut excess bolt length and paint cut surface with zinc-rich paint if directed by the Engineer.

CONSTRUCTION NOTES:

Remove any MBGF (W-beam) and attachment hardware, from the face of rail if present, prior to installation of new MBGF Transition. Dispose of these materials as directed by the Engineer. Plugging of newly exposed existing bolt holes is not necessary except as stated here in or otherwise indicated on the plans. This work is considered subsidiary to the pertinent bid items.

Attach the MBGF Transition to the existing parapet using the Anchor Plate assembly and the Thrie-Beam Terminal Connection. Splice the Thrie-Beam Terminal Connection and Thrie-Beam with the normal 12 connection bolts. Refer to Metal Beam Guard Fence Transition and Metal Beam Guard Fence detail sheets for additional details and information not shown herein.

MATERIAL NOTES:

Fabricate Anchor Plate assembly with steel conforming to either ASTM A36 or A572 Gr 50. Anchor Plate assembly must be free of burrs, sharp edges and weld splatter. Grind edges and corners to a ⅙" flat or radius. Hot-dip galvanize Anchor Plate assembly in accordance with Item 445, "Galvanizing". Anchor bolts, nuts, and washers must conform to Item 449, "Anchor Bolts".

GENERAL NOTES:

These details are for retrofitting existing rails only, not new construction, with a Thrie-Beam Terminal Connection.

Shop drawings are not required for this installation.

Materials, fabrication and installation of this assembly are to be included in the price bid for "Metal Beam Guard Fence Transition".

Estimated weight of a single Anchor Plate assembly, including bolts, nuts, and washers, but not including the Thrie-Beam Terminal Connector = 190 Lbs.

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED
PROFESSIONAL ENGINEER

Eugene Ampomah, P.E.
12/22/2020

Texas Department of Transportation — Bridge Division Standard

TYPE 12-25A/T4 TRANSITION
RETROFIT GUIDE

TYPE 12-25A/T4

FILE:	rlstd025.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	July 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		2524	02	025, ETC	FM 2611
		DIST		COUNTY	SHEET NO.
		HOU		BRAZORIA	122

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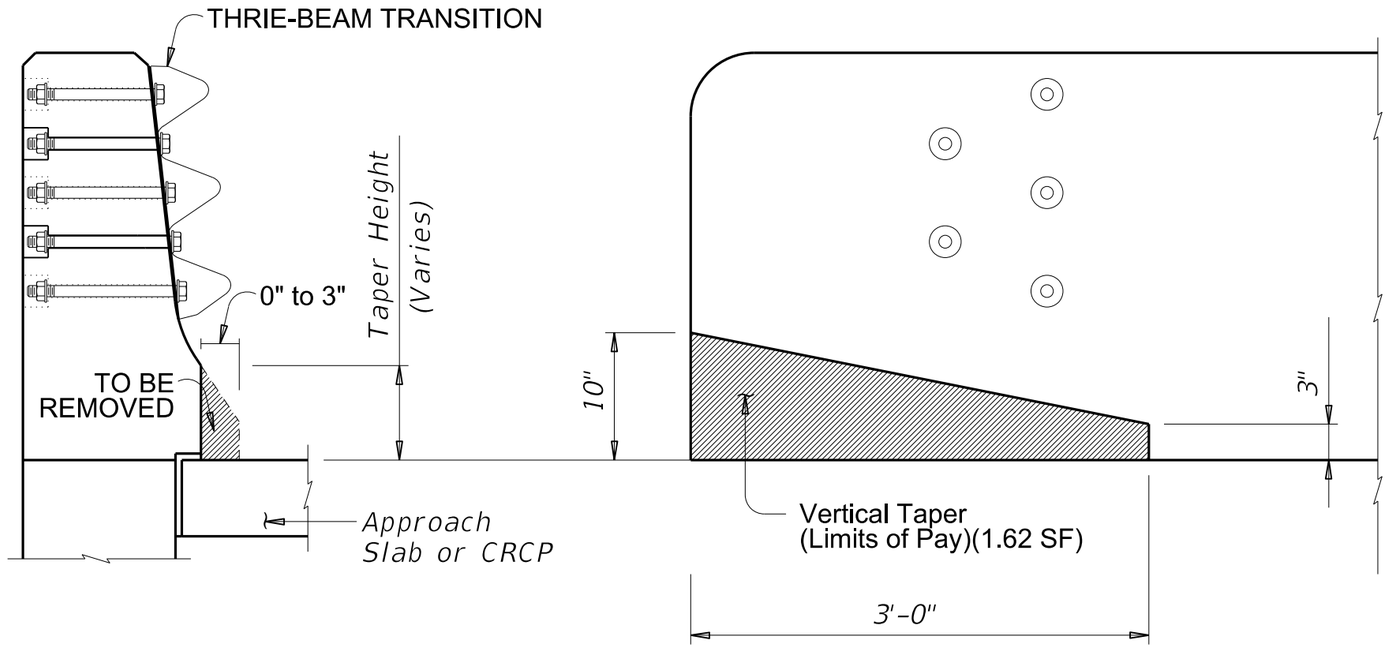


SECTION *ELEVATION*

RAIL MODIFICATION DETAIL

TO BE PAID FOR AS ITEM 429-6009 CONC STR REPAIR (STANDARD) SF

LOCATION	QUANTITY
COCKLEBURR SLOUGH	3 @ 1.62 SF = 4.86 SF
TOTAL	4.86 SF

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED
PROFESSIONAL ENGINEER

Eugene Ampomah, P.E.

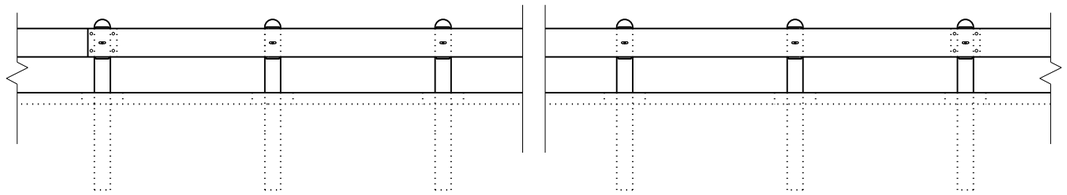
12.22.2020

RAIL MODIFICATION DETAIL

Texas Department of Transportation®

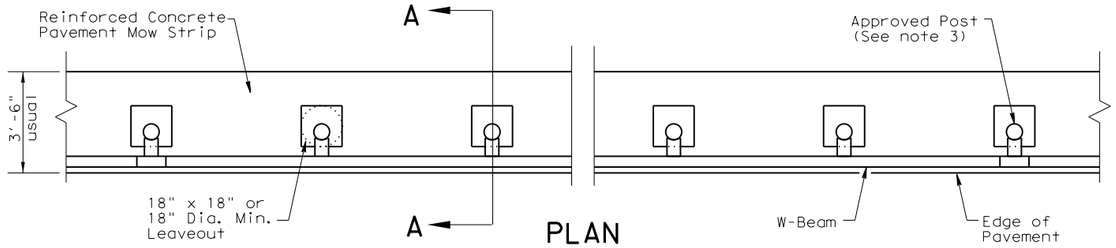
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		123

SCALE = N.T.S.
SHEET 1 OF 1



ELEVATION

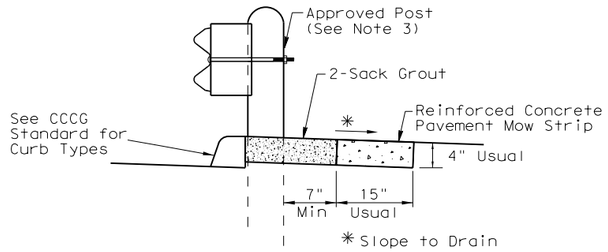
TRAFFIC



PLAN

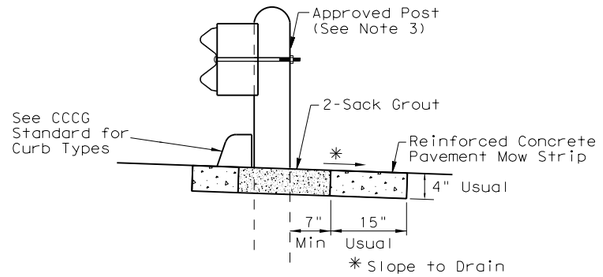
GENERAL NOTES

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



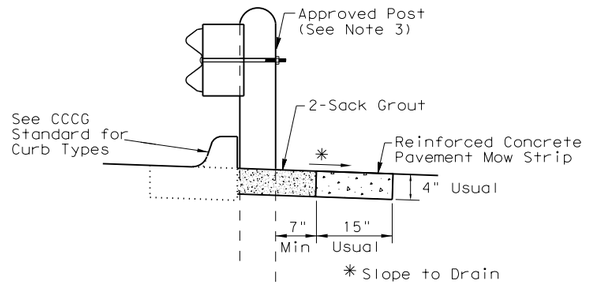
CURB OPTION (1)

Shown at Curbed Location

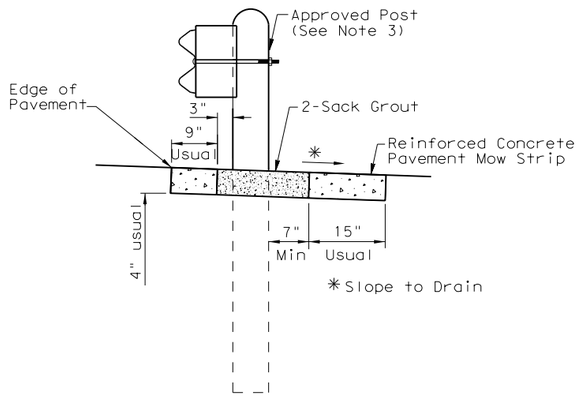


CURB OPTION (2)

Curb Shown on Top of Mow Strip

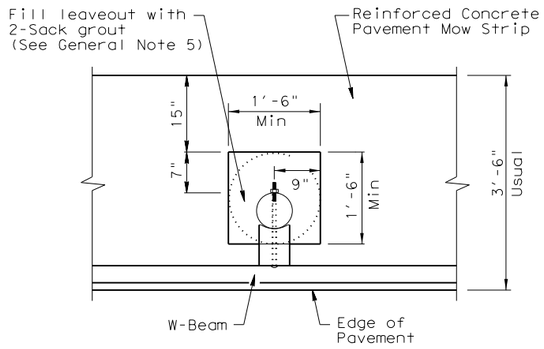


CURB OPTION (3)



SECTION A-A

Typical



MOW STRIP DETAIL

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

Texas Department of Transportation
Houston District

MOW STRIP

MS

FILE:	DN:	CK:	DW:	CK:	
© TxDOT 2014	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS	12	6			124
03/15 2014 SPECS	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	BRAZORIA	2524	Ø2	Ø25,ETC	FM 2611

STDE5.DGN

DATE: 12/21/2020 2:26:22 PM
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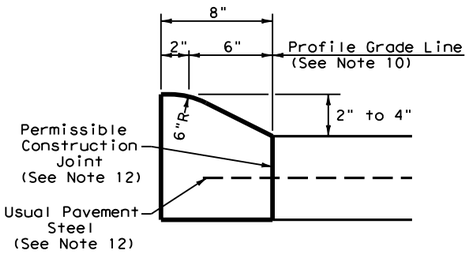
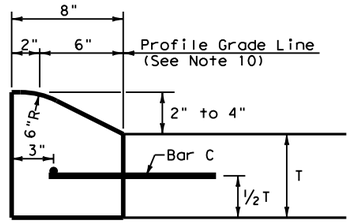
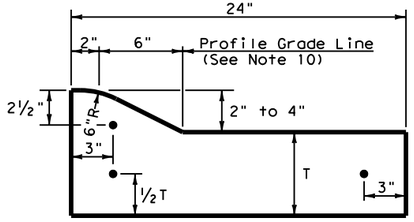


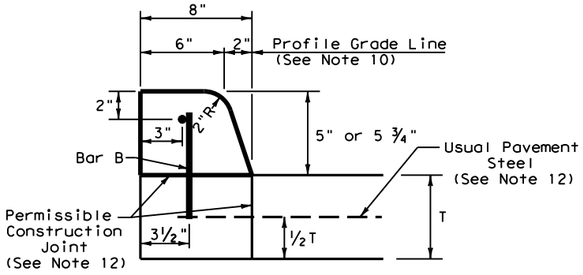
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



TYPE I CURB
2" - 4" HEIGHT



TYPE I CURB AND GUTTER
2" - 4" HEIGHT



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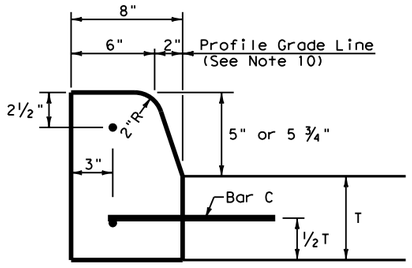
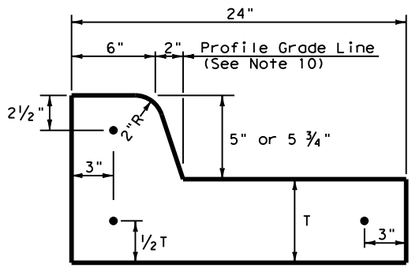
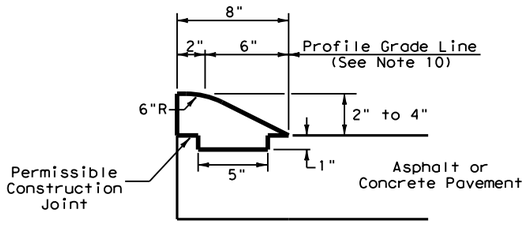
5" - 5 ¾" HEIGHT



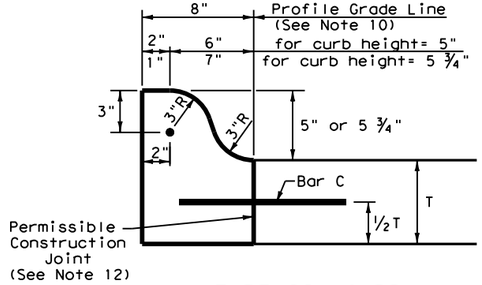
TYPE II CURB
5" - 5 ¾" HEIGHT



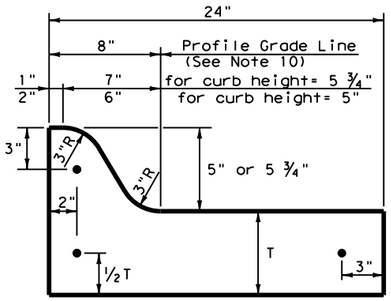
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



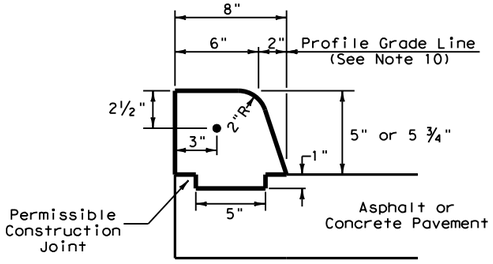
TYPE III CURB (KEYED)
2" - 4" HEIGHT



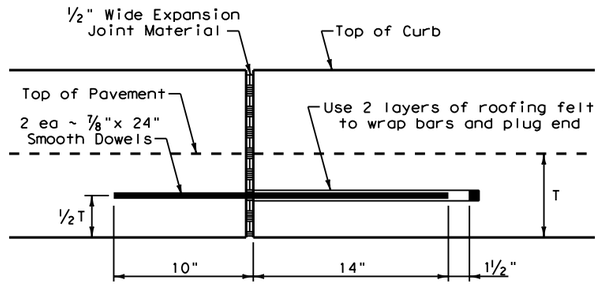
TYPE IIa CURB
5" - 5 ¾" HEIGHT



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

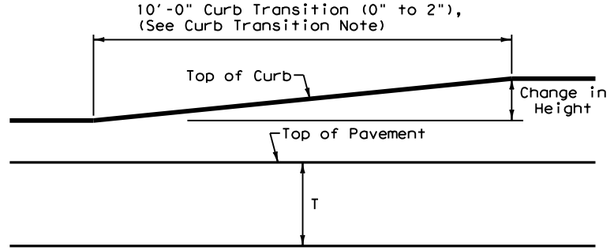


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

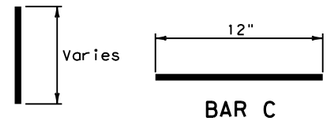
Curb Transition Note:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

General Notes

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



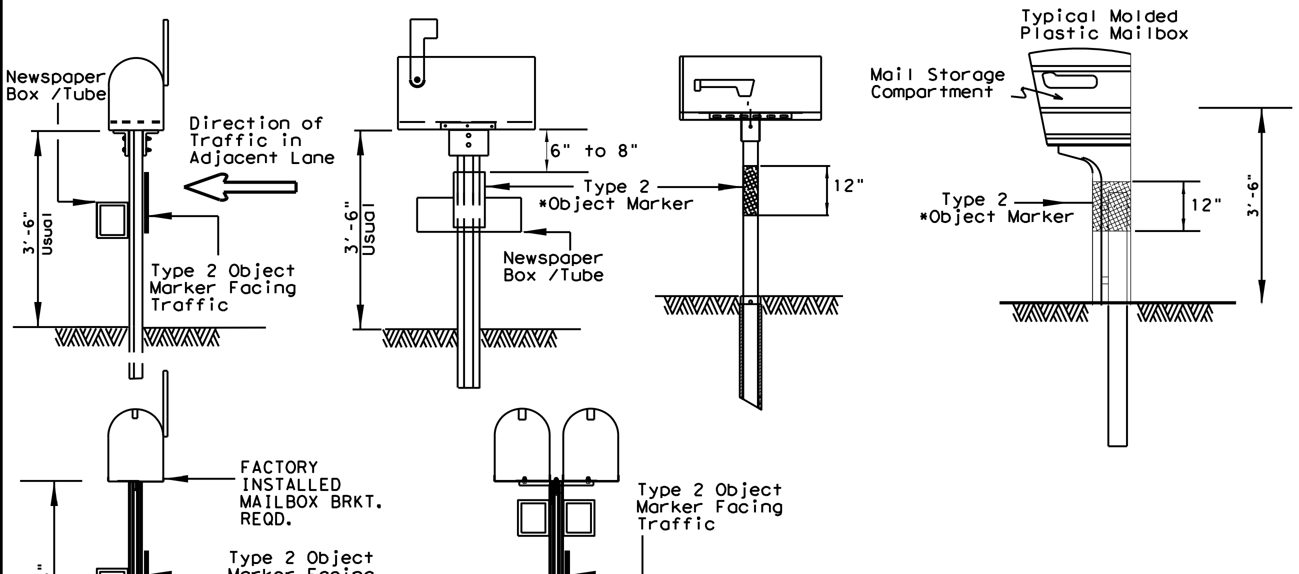
BAR B
BAR C

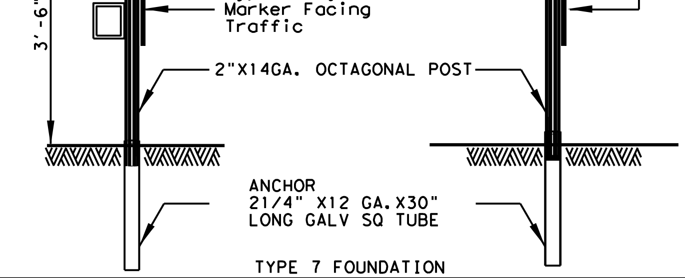
Texas Department of Transportation
Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-12

FILE: cccg12.dgn	DN: TxDOT	CK: AM	DW: VP	CK: VP
© TxDOT: 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS UPDATED 2012 - VP	2524	02	025,ETC	FM 2611
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		125





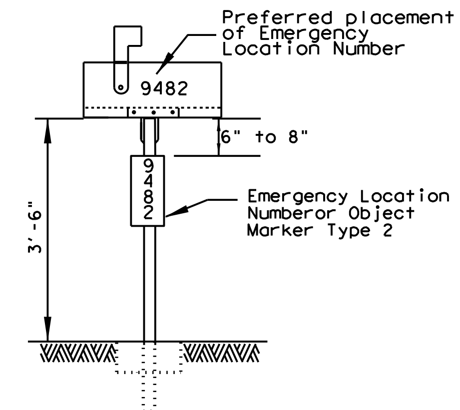
SINGLE AND DOUBLE MAILBOX MOUNT

FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4

* Type 2 object marker in accordance with Traffic Engineering standard Delineators & Object Markers - Installation D&OM (1) or tube type post wrapped with 12 " Conformable Reflective Sheeting in accordance with DMS 8300 for tubular post needed to produce a smooth wrap around tube, DHT 161812 or 3 each of 3" x 4" Conformable Reflective Sheeting tabs (DHT 165382) or 1 each of 3" x 12" Reflective Sheeting.

Note: Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Pedestrian Facilities Curb ramps standard *PED-XX for pedestrian facilities.

*PED-XX: XX is the standard year for example PED- 12 , PED-13,etc.



PLACEMENT OF EMERGENCY LOCATION NUMBER

Location Number shall be placed on: 1. A yellow, type A plate with class 1 flat surface reflective sheeting in accordance with DMS 8600. The color of numbers shall be black. or 2: A green or blue plate with white numbers attached to post beside the object marker. Other contrasting color configuration, as approved , may be used. (Use Same type plate as used for the type 2 Object Marker. Recommended sign size is 6" by 15")

TYPICAL MAILBOX SIZE				LIGHT WEIGHT MATERIAL	
				SHEET METAL	**PLASTIC
	LENGTH	WIDTH	HEIGHT	MAXIMUM WEIGHT	
SIZE	INCHES			POUNDS	
SMALL	19 ½	6	7	5	5
MEDIUM	22 ½	8	11 ½	7	7
LARGE	23 ½*	11 ½*	13 ½*	10	10

* Maximum allowed dimensions for mailbox
** Excluding Molded Plastic on 4 X 4 Post

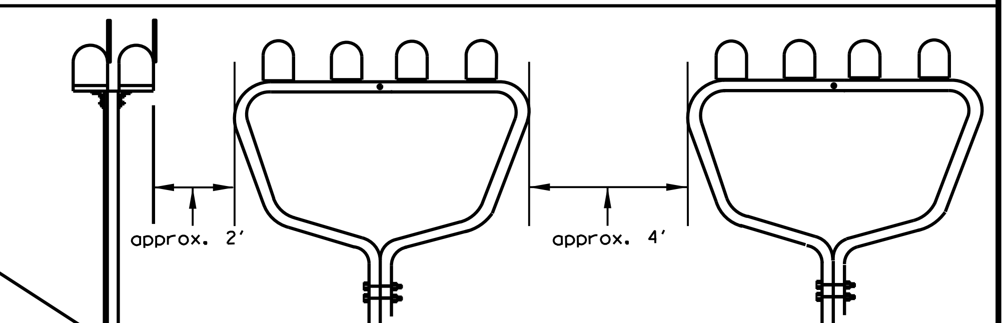
LOCKABLE ARCHITECTURAL MAILBOX SIZE (INCHES)					
VIEW	TOP	BOTTOM	FRONT SIDE	BACK SIDE	WEIGHT
SIDE	18	15	18.3	15	(POUNDS)
BACK	11 ½	11 ½		15	22.4

SEE TOP RIGHT CORNER OF SHEET 2 OF 4

MAILBOX SIZES

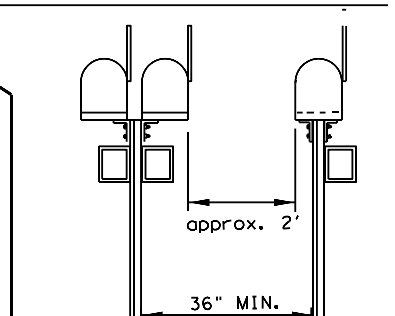
Mailboxes shall be made of light weight sheet metal or light weight plastic.
Lockable architectural mailboxes shall meet the requirements of the above table.

Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.



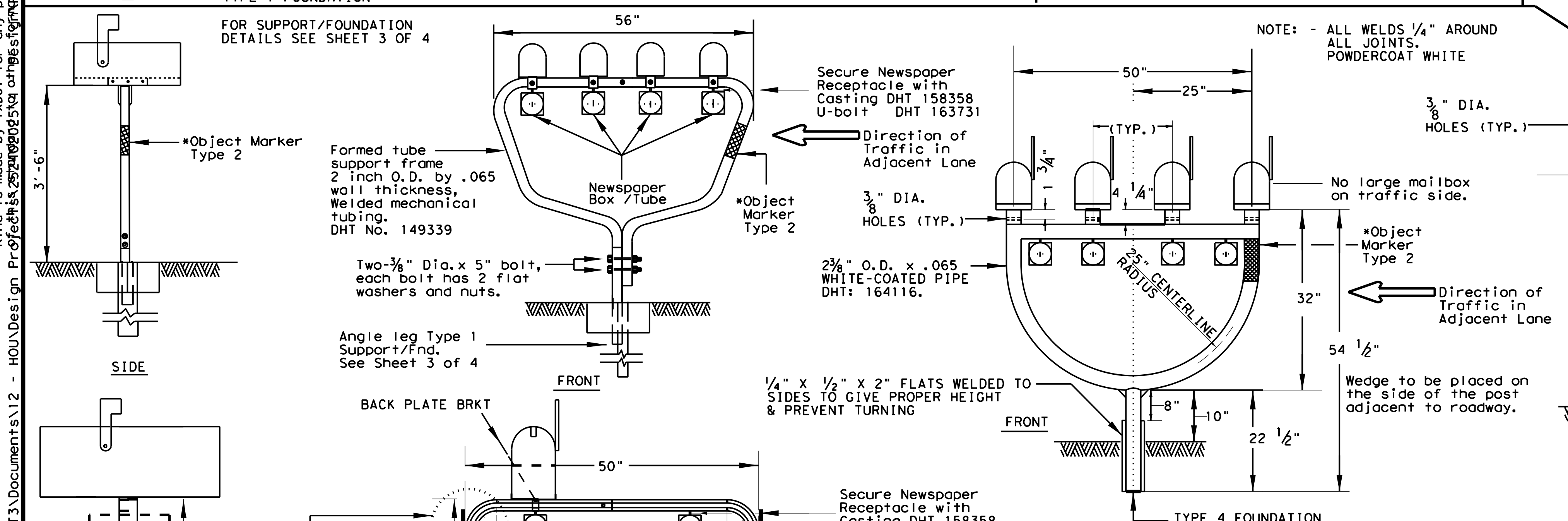
4' Clear Distance between multiple installations and 2' clearance between double or single installations and the multiple installation. DHT #'s 164116 or 149339.

MULTIPLE MAILBOX PLACEMENT

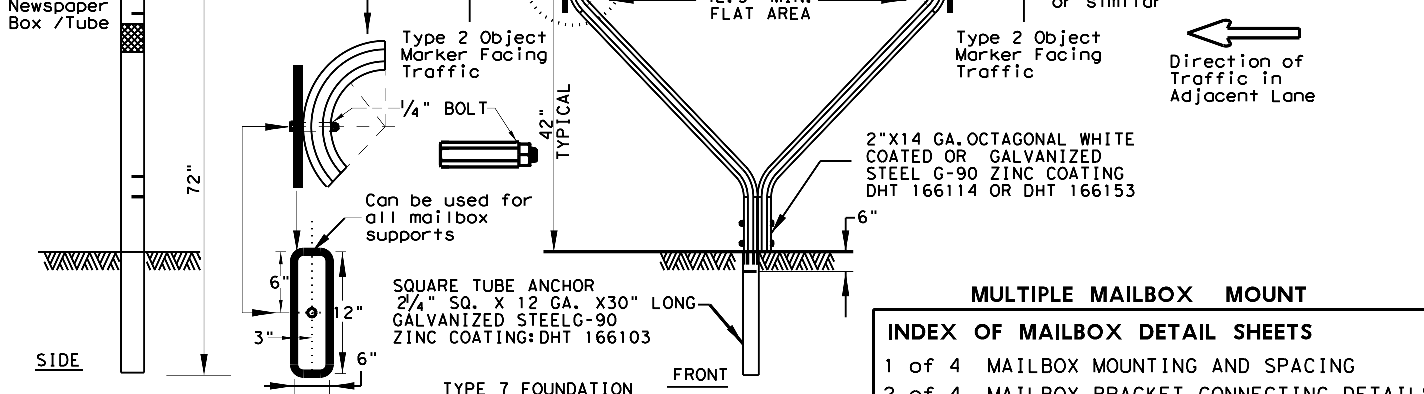


Clear Distance between single or double mounted posts. (Normally when 3 or more mailboxes are in one location, a multiple support is used).

SINGLE & DOUBLE MAILBOX PLACEMENT



DOUBLE AND MULTIPLE MAILBOX MOUNT



MULTIPLE MAILBOX MOUNT

FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4
FOR DHT NUMBERS SEE SHEET 4 OF 4

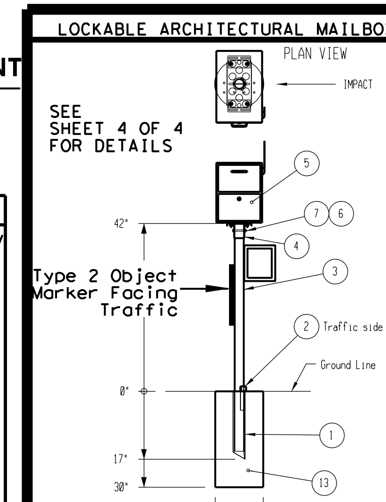
INDEX OF MAILBOX DETAIL SHEETS

NEWSPAPER RECEPTACLE

A light weight receptacle for newspaper delivery can be attached to mailbox posts as shown on this page if the receptacle:

- Does not touch the mailbox.
- Does not present a hazard to traffic or delivery of the mail.
- Does not extend beyond the front of the mailbox.
- Does not display advertising, except the publication title.
- Newspaper receptacles on separate supports are prohibited.

LOCKABLE ARCHITECTURAL MAILBOX

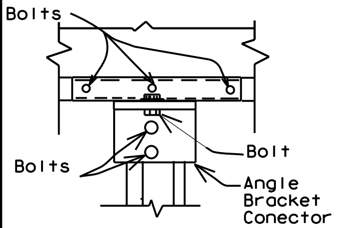


Texas Department of Transportation — Maintenance Division Standard

MAILBOX MOUNTING AND SPACING

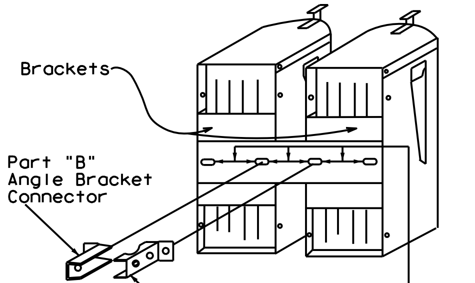
MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK: JEO	DW:	CK:
© TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS: Added additional newspaper receptacle for double mailbox support	2524	02	025,ETC	FM 2611
	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	126



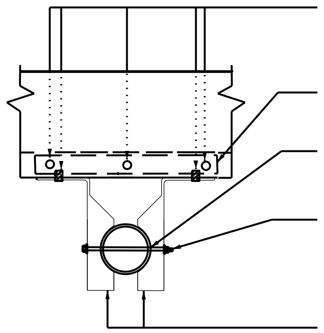
For bolt sizes see details below for "SMALL MAILBOX" and "MEDIUM AND LARGE MAILBOXES"

SINGLE MAILBOX

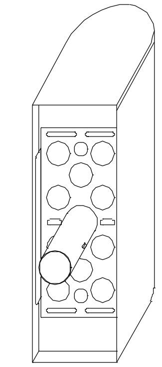


(Not permitted for Large Mailboxes)

DOUBLE MAILBOX

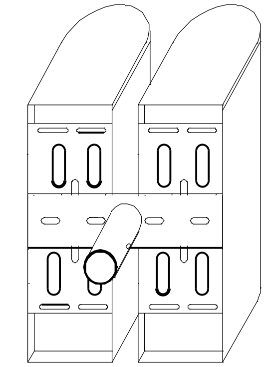


MULTIPLE MAILBOX



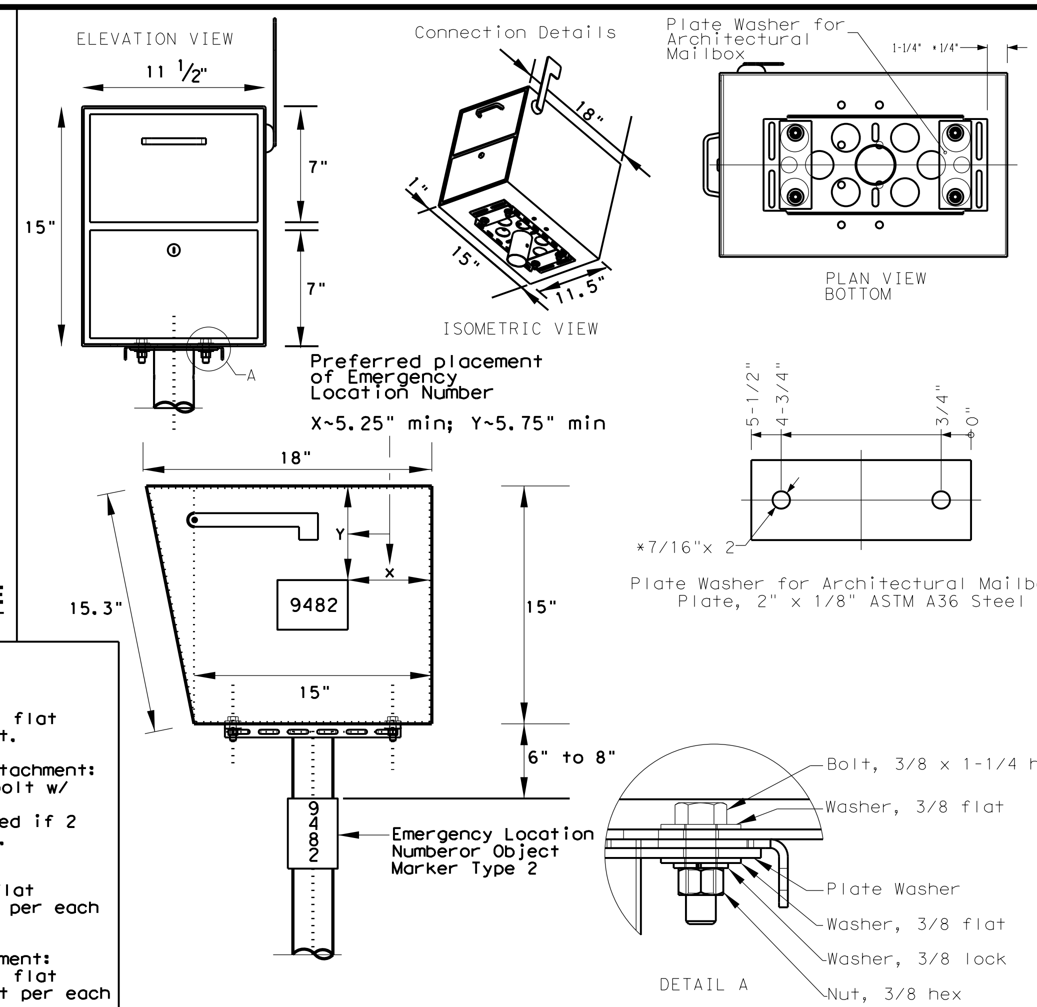
To be used with 2 3/8" OD RR or thinwall Steel posts.

WELDED SINGLE MAILBOXBRACKET

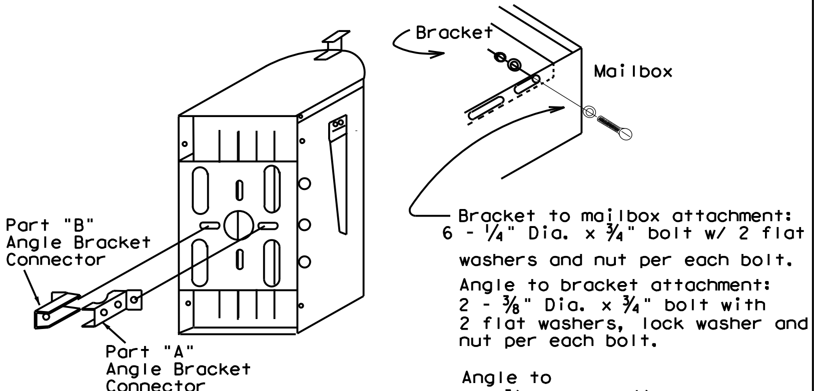


To be used with thinwall Steel posts. Not to be used with RR posts.

WELDED DOUBLE MAILBOX BRACKET WITHADAPTER PLATE



LOCKABLE ARCHITECTURAL MAILBOX CONNECTION DETAILS

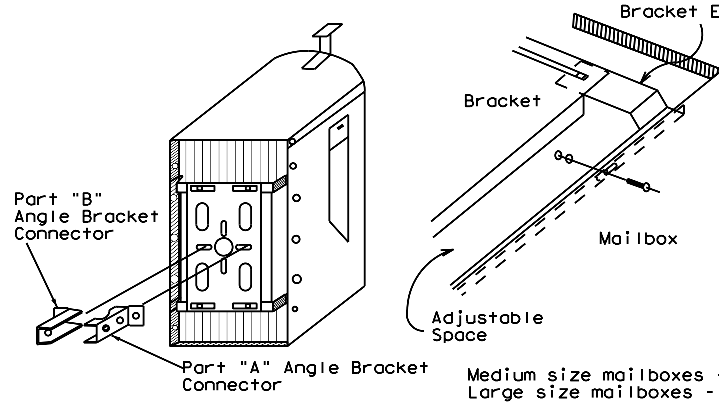


Bracket to mailbox attachment:
6 - 1/4" Dia. x 3/4" bolt w/ 2 flat washers and nut per each bolt.

Angle to bracket attachment:
2 - 3/8" Dia. x 3/4" bolt with 2 flat washers, lock washer and nut per each bolt.

Angle to
2 - 3/8" Dia. x 2 1/2" bolt with 2 flat washers, lock washer and nut per each bolt.

SMALL MAILBOX



Use both Parts "A" and "B" Angle Bracket Connectors for Winged Channel Posts

Bracket to mailbox attachment:
6 - 1/4" Dia. x 3/4" bolt w/2 flat washers and nut per each bolt.

Bracket to bracket extension attachment:
2 - 1/4" Dia. x 3/4" carriage bolt w/ flat washer, lock washer and nut per bolt (4 bolts required if 2 bracket extensions are used).

Angle to bracket attachment:
2 - 3/8" Dia. x 3/4" bolt w/2 flat washers, lock washer and nut per each bolt.

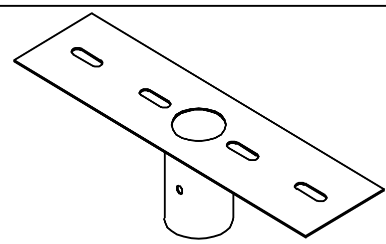
Angle to mailbox support attachment:
2 - 3/8" Dia. x 2 1/2" bolt w/2 flat washers, lock washer, and nut per each bolt.

Medium size mailboxes - one extension bracket
Large size mailboxes - two extension brackets

MEDIUM AND LARGE MAILBOXES

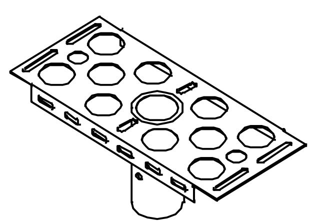
GENERAL NOTES

1. Connecting hardware detailed on this sheet is for the hardware that the Department stocks at the Regional Warehouses. This hardware is available to the contractor only when so stated elsewhere in the plans or specification.
2. Hardware for mounting mailboxes to the support/foundation furnished by industry should be used when shown on the Maintenance Divisions "Approved Products List." Only mailbox hardware that have been crash tested in accordance with NCHRP Report 350, will be on the approved list.
3. Hardware furnished by industry shall be erected in accordance with the manufacturer's recommendation.
4. Bracket and bracket extension shall be constructed of 14 gauge galvanized steel sheet metal.
5. The angles, brackets and adapter plates shall be constructed of 12 gauge galvanized steel sheet metal.
6. Items with evidence of damage to the galvanized coating or wet storage stains (white rust) will not be accepted.



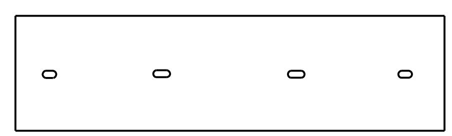
DHT 162323

For use with galvanized thinwall steel posts DHT # 143426 or powder-coated thinwall steel post DHT # 162911.



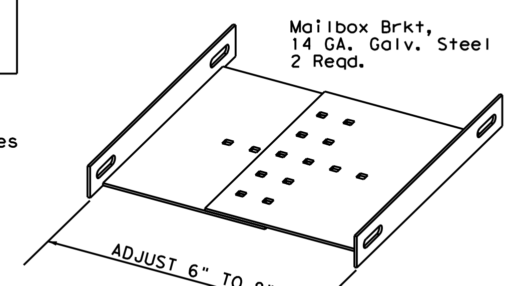
DHT 161443

For use with RCR post DHT # 161442 or galvanized thinwall steel post DHT # 143426 or powder-coated thinwall steel post. DHT # 162911.

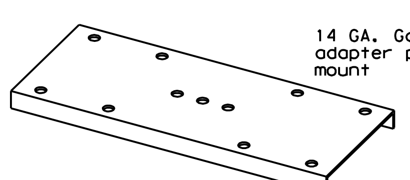


DHT #3789

Used for mounting two Mailboxes on the same post.



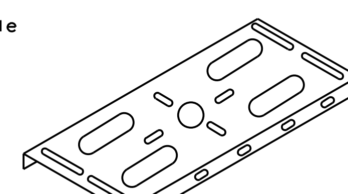
DHT 166105



DHT 166108

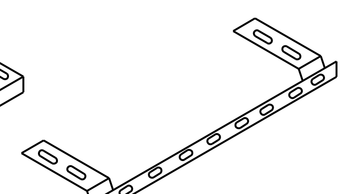
HARDWARE AT TXDOT REGIONAL WAREHOUSES

Brackets and adapter plate shown in this section should be available to the Contractor when stated elsewhere in plans or specifications.



DHT 148939

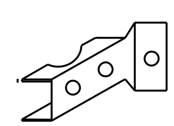
Mailbox Bracket



DHT 148938

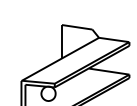
Used for extending 6" wide bracket to attach larger mailboxes.

Bracket Extension



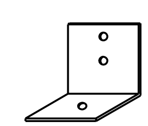
DHT 159489

Part "A" Angle Bracket Connector



DHT 159490

Part "B" Angle Bracket Connector



DHT 2917

Angle Bracket For Temporary Mailbox

See Table of Applicable DHT Numbers on sheet 4 of 4 for DHT description and unit of measure.

Texas Department of Transportation

Maintenance Division Standard

MAILBOX BRACKET CONNECTING DETAILS

MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK:	DW: JEO	CK:
© TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS: ADDED DHT 163730	2524	02	025,ETC	FM 2611
	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	127

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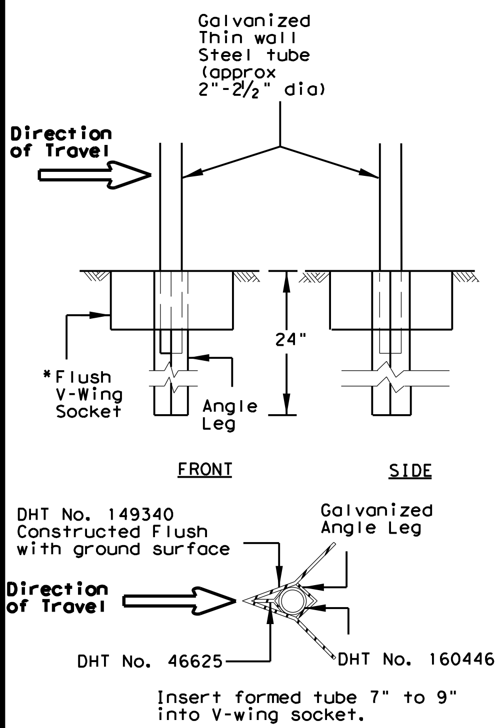
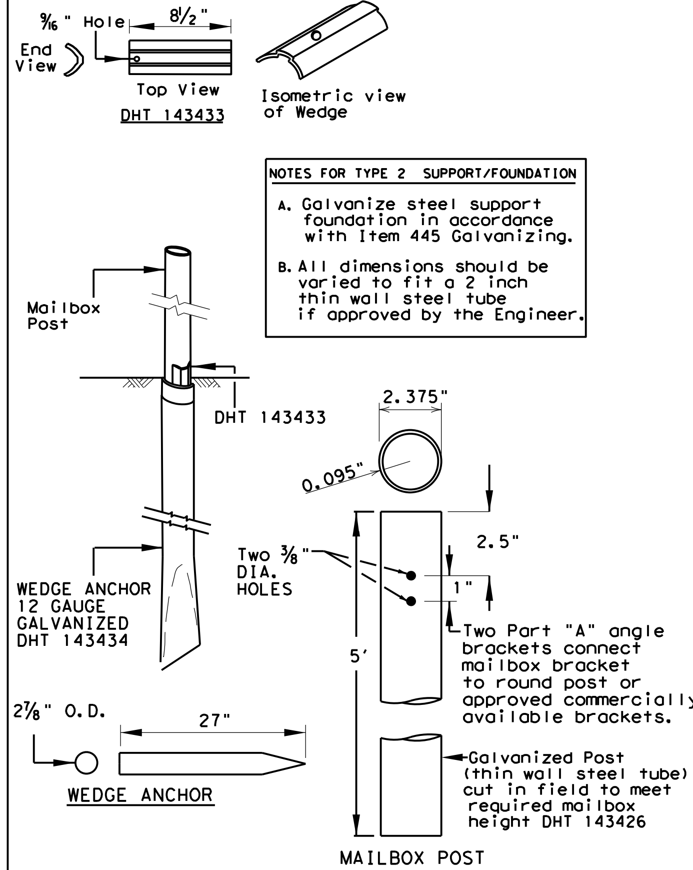
12/21/2020 2:26:32 PM
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\...



TYPE 1 SUPPORT/FOUNDATION

THIN WALL STEEL TUBE w/ V-LOC ANCHORAGE



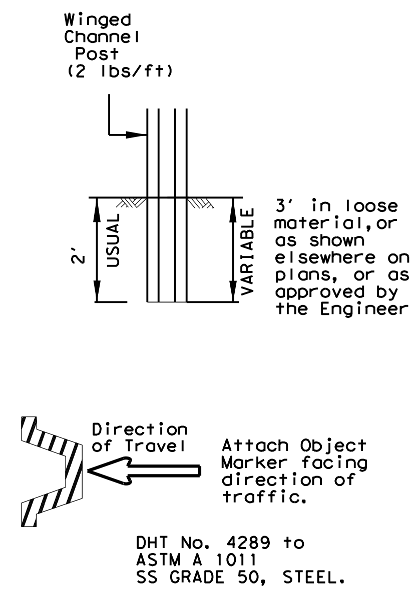
NOTES FOR TYPE 2 SUPPORT/FOUNDATION

A. Galvanize steel support foundation in accordance with Item 445 Galvanizing.

B. All dimensions should be varied to fit a 2 inch thin wall steel tube if approved by the Engineer.

TYPE 2 SUPPORT/FOUNDATION

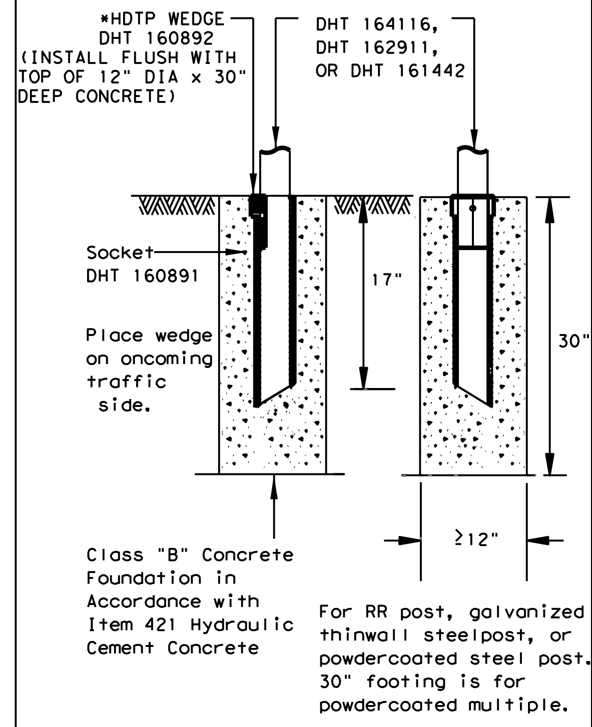
THIN WALL STEEL TUBE w/ WEDGE ANCHOR SYSTEM



TYPE 3 SUPPORT/FOUNDATION

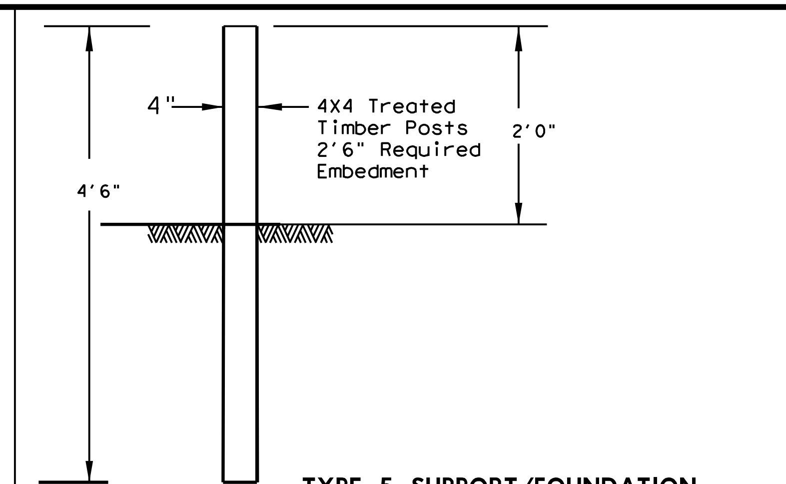
WINGED CHANNEL POST

Note on DHT Number
See Table of Applicable DHT Numbers on this sheet 4 for DHT description.



TYPE 4 SUPPORT/FOUNDATION

FOR WHITECOATED STEEL POST, MULTIPLE POST, AND RECYCLED RUBBER.

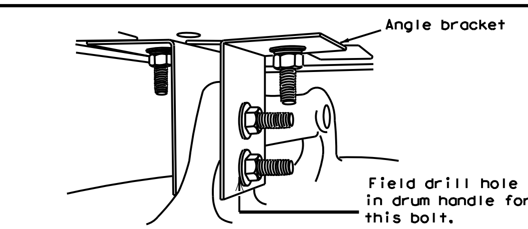


TYPE 5 SUPPORT/FOUNDATION

FOR ONE PIECE MOLDED PLASTIC MAILBOX

ONE PIECE MOLDED PLASTIC MAILBOXES

Molded Plastic Mailboxes shall be installed on 4"x4" treated timber posts only. The use of steel pipe or structural tubing in place of timber post is prohibited.



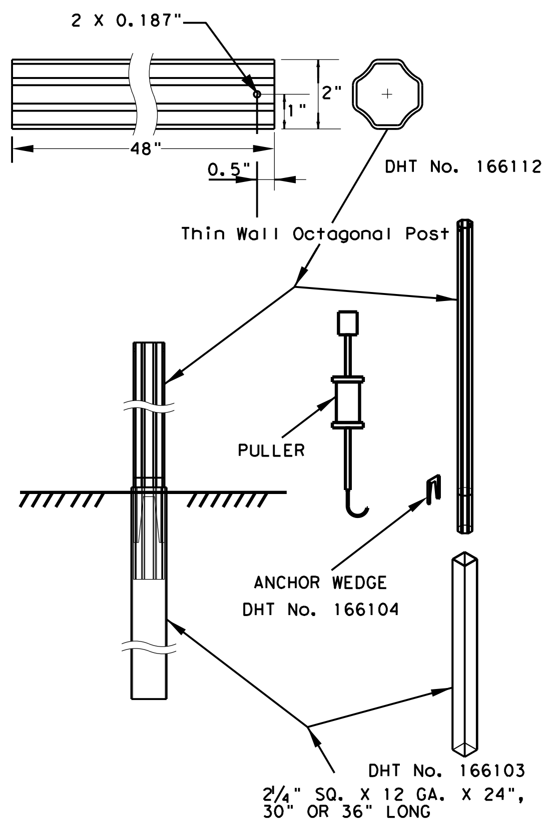
Placed on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD). Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

TYPE 6 TEMPORARY MAILBOX SUPPORT

CONNECTION DETAIL

GENERAL NOTES

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. type 1, 2, 3, 4 or 7 supports or foundation can be used for single or double mailbox installations. The RCR post should be used only for a single installation with a small mailbox. The Type 5 support/foundation is used for the single molded plastic mailbox. The Type 4 support/foundation is used for the 2.375" O.D. RR post, thin wall steel post, and white multiple mailbox post.
4. The Type 1 or type 7 support/foundation can be used for a multiple mailbox mount.
5. The Type 4 support should be used with thin wall steel pipe for the medium, large and double mailbox installations.
6. 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.



TYPE 7 MAILBOX SUPPORT/FOUNDATION

CONNECTION DETAIL

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

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- SP = Single 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
- Ty 7 = Wedge Anchor

Type of Bracket
- AB = Angle Bracket.
- TB = 2.375" Tube Bracket

DOUBLE AND LARGE MAILBOXES MUST BE ON STEEL POST.

*HDTP: High density thermoplastic polyesters

Texas Department of Transportation — Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK:	DW: JEO	CK:
© TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025, ETC	FM 2611
	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	128

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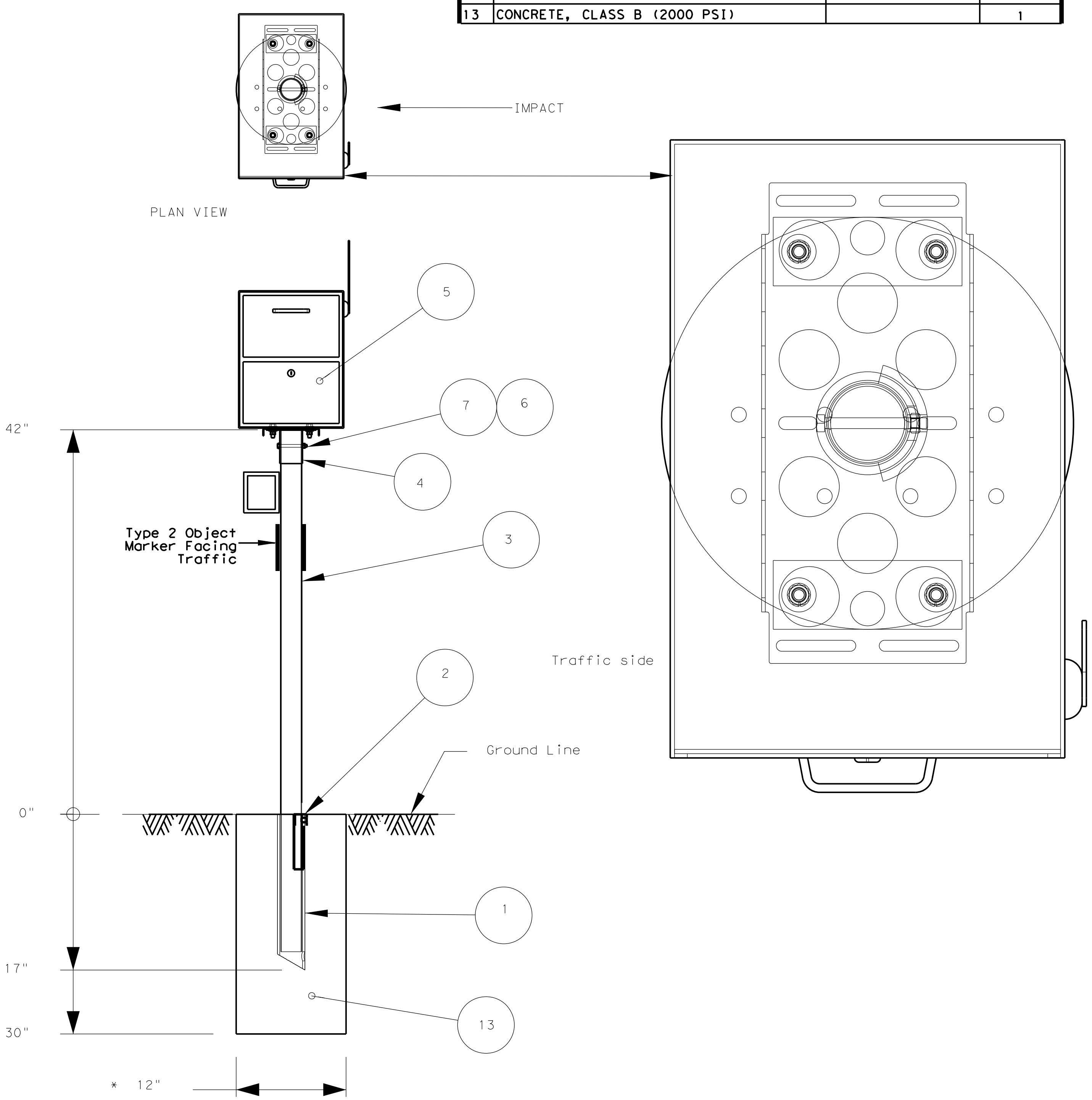
LOCKABLE ARCHITECTURAL MAILBOX

SINGLE-MOUNT INSTALLATION PARTS

#	PART NAME	PART/DHT #	QTY
1	SOCKET, TYPE 4 FOUNDATION	160891	1
2	WEDGE FOR TYPE 4 FOUNDATION	160892	1
3	THIN-WALL WHITE STEEL TUBE 2.375 OD	162911	1
4	BRACKET FOR ATTACHING MAILBOX	161443	1
5	ARCHITECTURAL MAILBOX	SEE NOTE	1
6	NUT, 5/16" HEX	NUT, 5/16" HEX	1
7	BOLT, 5/16 X 3 HEX	GRADE 5	1
8	PLATE WASHER FOR ARCHITECTURAL MAILBOX	SEE SEE SHEET 2	2
9	WASHER, 3/8 FLAT		8
10	WASHER, 3/8 LOCK		4
11	NUT, 3/8 HEX		4
12	BOLT, 3/8 X 1-1/4 HEX	GRADE 5	4
13	CONCRETE, CLASS B (2000 PSI)		1

LOCKABLE ARCHITECTURAL MAILBOX DETAILS



ELEVATION VIEW

TABLE OF APPLICABLE DHT NUMBERS

DHT NUMBER	DESCRIPTION
	FOUNDATIONS
46625	WEDGE FOR V-WING SOCKET FOR TYPE 1 FOUNDATION
149340	V-WING SOCKET FOR TYPE 1 FOUNDATION
143433	WEDGE FOR TYPE 2 FOUNDATION
143434	ANCHOR FOR TYPE 2 FOUNDATION
166103	ANCHOR FOR TYPE 7 FOUNDATION
160891	SOCKET FOR TYPE 4 FOUNDATION
160892	WEDGE FOR TYPE 4 FOUNDATION
166104	WEDGE FOR TYPE 7 FOUNDATION
	POSTS
4289	WINGED CHANNEL MAILBOX POST
149339	MULTIPLE MAILBOX POST (GALVANIZED TUBING)
164116	MULTIPLE MAILBOX POST (WHITE COATED)
166114	MULTIPLE MAILBOX POST (WHITE COATED OCTAGONAL)
166153	MULTIPLE MAILBOX POST (GALVANIZED OCTAGONAL)
161442	RECYCLED RUBBER POST. FOR SMALL MAILBOX ONLY
143426	THIN-WALL GALVANIZED STEEL TUBE 2.375" OUTER DIAMETER
162911	THINWALL WHITE STEEL TUBE 2.375" OUTER DIAMETER
166152	SINGLE OR DOUBLE THIN-WALL MAILBOX POST GALVANIZED 2" OCTAGONAL
166112	SINGLE OR DOUBLE THIN-WALL MAILBOX POST WHITECOATED 2" OCTAGONAL
	REFLECTIVE SHEETING
161812	REFLECTIVE SHEETING FOR EMERGENCY LOCATION NUMBER PANEL
	CONNECTING HARDWARE
2917	ANGLE BRACKET USED FOR TEMPORARY MAILBOX SUPPORT
166105	BRACKET FOR SINGLE MOUNTING OF MAILBOXES (MOUNTING KIT)
3789	PLATE FOR DOUBLE MOUNTING OF MAILBOXES
166108	BRACKET FOR DOUBLE MOUNTING OF MAILBOXES (MOUNTING KIT)
166111	BRACKET FOR MULTIPLE MOUNTING OF MAILBOXES (MOUNTING KIT)
148939	BRACKET FOR ATTACHING SMALL OR MEDIUM SIZE MAIL BOX
148938	EXTENDER TO BRACKET FOR ATTACHING LARGE MAILBOX
159489	ANGLE BRACKET PART A
159490	ANGLE BRACKET PART B
162323	BRACKET FOR DOUBLE MOUNTING OF MAILBOXES ON THINWALL STEEL POST, GALVANIZED OR POWDERCOATED.
161443	BRACKET FOR ATTACHING MAILBOX TO RECYCLED RUBBER POST AND TO MULTIPLE WHITE MAILBOX POST
158358	CASTING (NEWSPAPER RECEPTACLE BRACKET)
163731	U-BOLT (NEWSPAPER RECEPTACLE BRACKET)
160698	BOLT;HEX HEAD, GALV;3/8"DIA X 3/4"L HD, W/2-FLAT WASHERS
163750	BOLT;HEX HEAD, GALV;3/8" X 1-1/2, 16 NC, W/WASHERS
160701	BOLT;HEX HEAD, GALV;3/8"DIA X 2-1/2"L, HD, W/2-FLAT WASHERS
163730	BOLT;HEX HEAD, GALV;3/8" X 3-1/2", NC, W/NUT, 2 FLAT WASHERS
160699	BOLT;HEX HEAD, GALV;3/8"DIA X 3-3/4"L HD, W/2-FLAT WASHERS
160700	BOLT;HEX HEAD, GALV;3/8"DIA X 4"L HD, W/2-FLAT WASHERS

Texas Department of Transportation — Maintenance Division Standard

DHT NUMBERS TABLE

MB-15(1)

FILE: MB14(1).DGN	DN:	CK:	DW:	CK:
© TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		129

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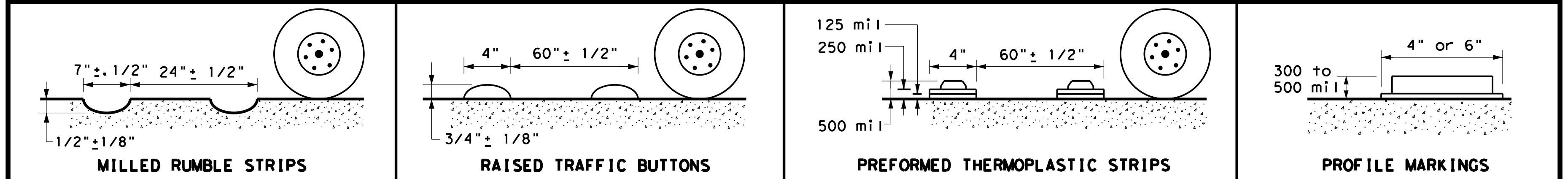
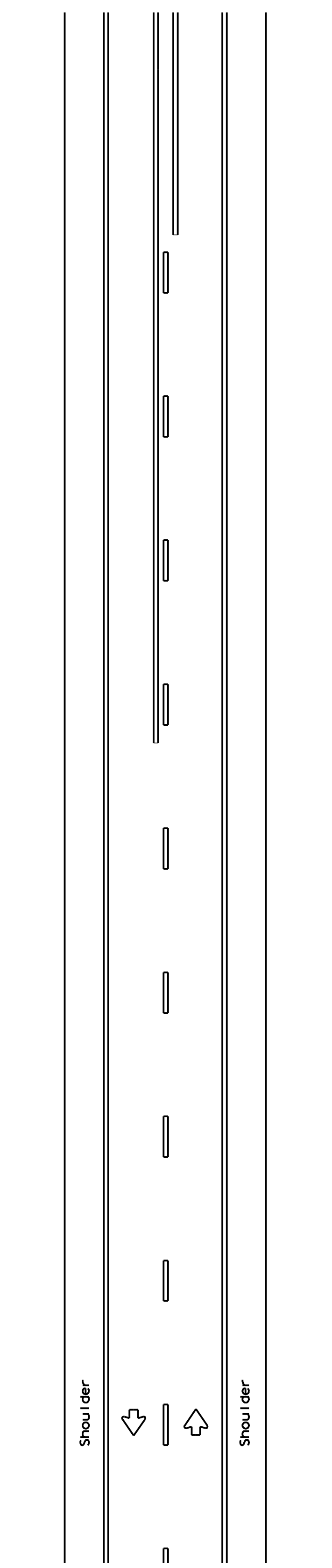
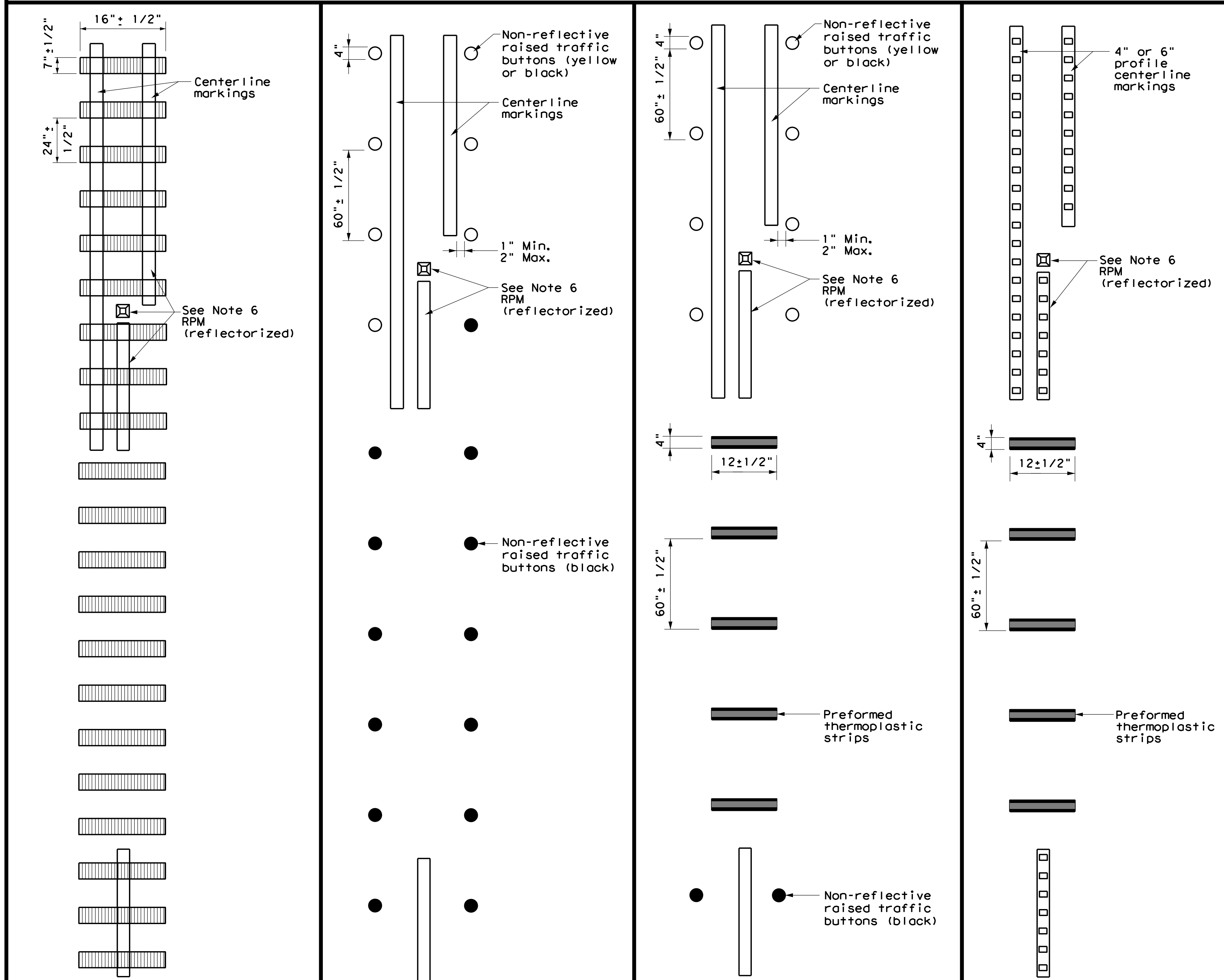
CENTERLINE RUMBLE STRIPS



PROFILE VIEW





TWO LANE TWO-WAY ROADWAYS

PLAN VIEW
OPTION 1
MILLED CENTERLINE RUMBLE STRIPS

PLAN VIEW
OPTION 2
RAISED CENTERLINE RUMBLE STRIPS

PLAN VIEW
OPTION 3
RAISED CENTERLINE RUMBLE STRIPS AND PREFORMED THERMOPLASTIC STRIPS

PLAN VIEW
OPTION 4
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).

Texas Department of Transportation®
Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS

RS(3)-13

FILE: rs(3)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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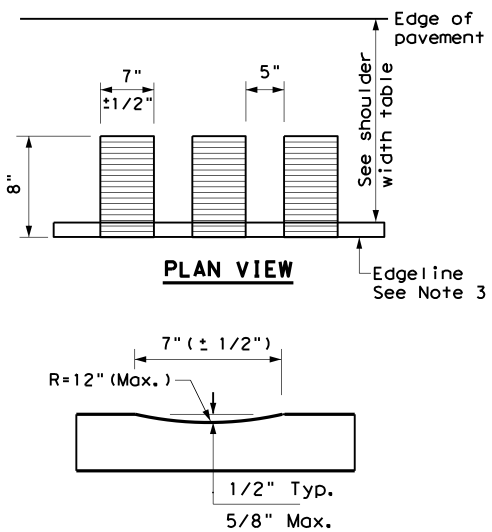
REVISIONS	DIST HOU		COUNTY BRAZORIA	SHEET NO. 130

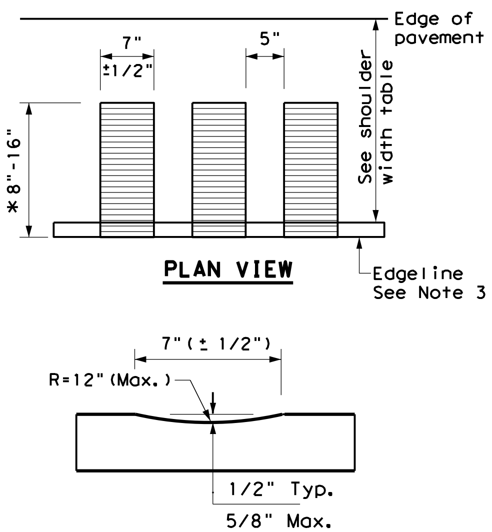


PLAN VIEW

PROFILE VIEW

OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



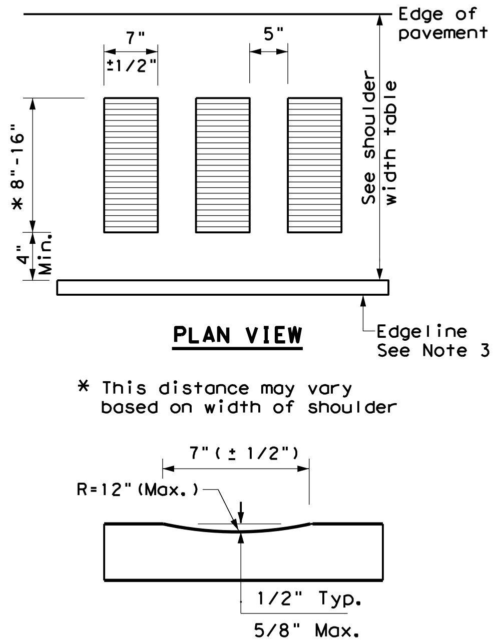
PLAN VIEW

* This distance may vary based on width of shoulder

PROFILE VIEW

OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



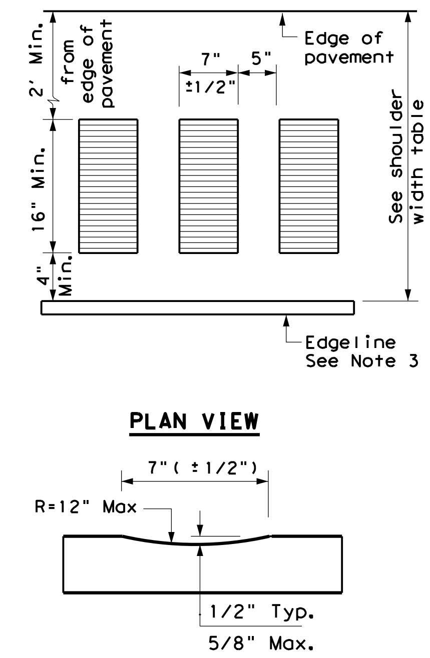
PLAN VIEW

* This distance may vary based on width of shoulder

PROFILE VIEW

OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

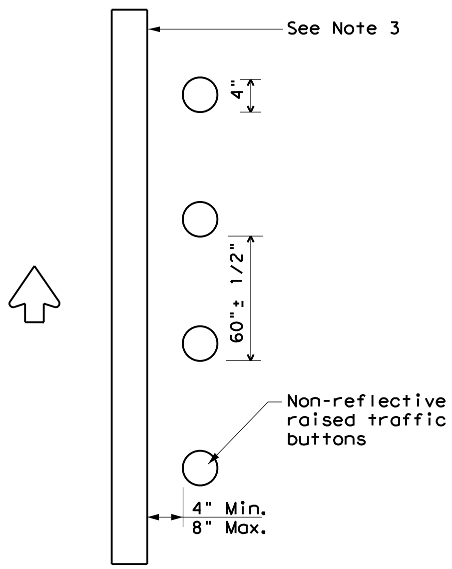


PLAN VIEW

PROFILE VIEW

OPTION 4

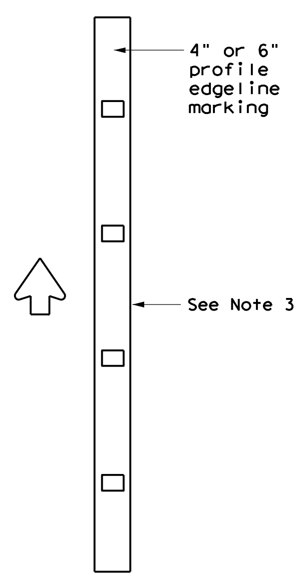
CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW

OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW

OPTION 6

PROFILE EDGELINE MARKINGS

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

GENERAL NOTES

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

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

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

WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

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

Texas Department of Transportation

Traffic Operations Division Standard

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

FILE: rs(4)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	DIST HOU		COUNTY BRAZORIA	SHEET NO. 131

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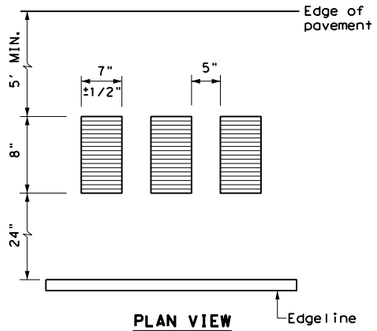
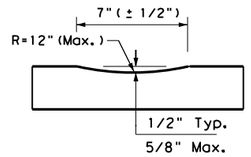


PLAN VIEW



PROFILE VIEW

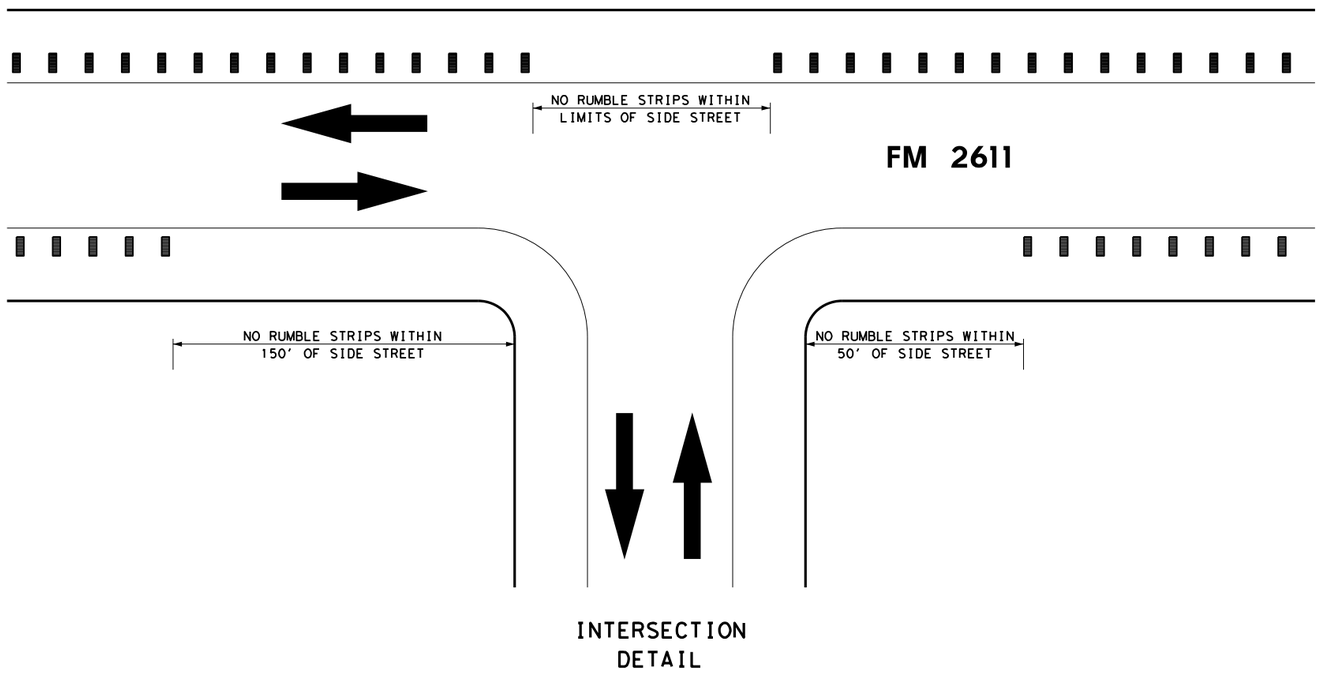
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

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.



INTERSECTION DETAIL

SCALE N.T.S.
SHEET 1 OF 1

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

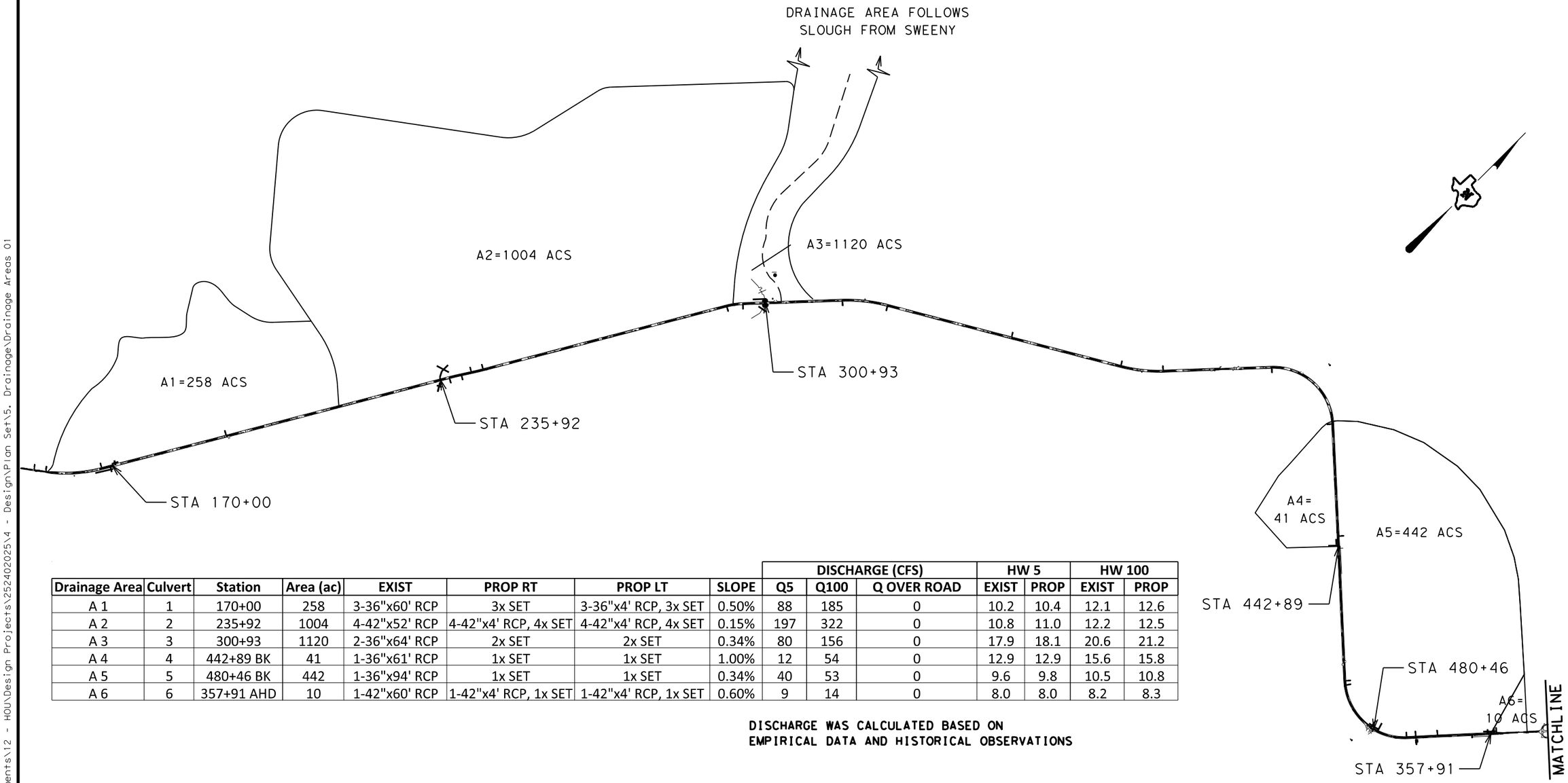
Eugene Ampomah, P.E.

12.22.2020

EDGLINE RUMBLE STRIPS DETAIL

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		132



Drainage Area	Culvert	Station	Area (ac)	EXIST	PROP RT	PROP LT	SLOPE	DISCHARGE (CFS) Q5	Q100	Q OVER ROAD	HW 5 EXIST	HW 5 PROP	HW 100 EXIST	HW 100 PROP
A 1	1	170+00	258	3-36"x60' RCP	3x SET	3-36"x4' RCP, 3x SET	0.50%	88	185	0	10.2	10.4	12.1	12.6
A 2	2	235+92	1004	4-42"x52' RCP	4-42"x4' RCP, 4x SET	4-42"x4' RCP, 4x SET	0.15%	197	322	0	10.8	11.0	12.2	12.5
A 3	3	300+93	1120	2-36"x64' RCP	2x SET	2x SET	0.34%	80	156	0	17.9	18.1	20.6	21.2
A 4	4	442+89 BK	41	1-36"x61' RCP	1x SET	1x SET	1.00%	12	54	0	12.9	12.9	15.6	15.8
A 5	5	480+46 BK	442	1-36"x94' RCP	1x SET	1x SET	0.34%	40	53	0	9.6	9.8	10.5	10.8
A 6	6	357+91 AHD	10	1-42"x60' RCP	1-42"x4' RCP, 1x SET	1-42"x4' RCP, 1x SET	0.60%	9	14	0	8.0	8.0	8.2	8.3

DISCHARGE WAS CALCULATED BASED ON
EMPIRICAL DATA AND HISTORICAL OBSERVATIONS

DRAINAGE AREA MAP

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		133

SCALE 1"=2000'
SHEET 1 OF 1

Comments: Prop 170+00

Analysis Component					
Storm Event	Design	Discharge	88.00	cfs	
Peak Discharge Method: User-Specified					
Design Discharge	88.00	cfs	Check Discharge	185.00	cfs
Tailwater properties: Irregular Channel					

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+13	0+75	0.025

Natural Channel Points

Station (ft)	Elevation (ft)
0+13	12.15
0+40	8.55
0+58	6.94
0+64	7.45
0+73	9.20
0+75	10.46

Tailwater conditions for Design Storm.

Discharge	88.00 cfs	Actual Depth	1.60 ft
Velocity	3.46 ft/s		

Name	Description	Discharge	HW Elev.	Velocity	
Culvert-1	3-36 inch Circular	88.00 cfs	10.44 ft	7.03 ft/s	
Weir	Not Considered	N/A	N/A	N/A	

Component:Culvert-1

Culvert Summary

Computed Headwater Elevation	10.44	ft	Discharge	88.00	cfs
Inlet Control HW Elev.	10.24	ft	Tailwater Elevation	8.54	ft
Outlet Control HW Elev.	10.44	ft	Control Type	Entrance Control	
Headwater Depth/Height	0.95				

Grades

Upstream Invert	7.60	ft	Downstream Invert	7.28	ft
Length	64.00	ft	Constructed Slope	0.005000	ft/ft

Hydraulic Profile

Profile	S2		Depth, Downstream	1.71	ft
Slope Type	Steep		Normal Depth	1.71	ft
Flow Regime	Supercritical		Critical Depth	1.75	ft
Velocity Downstream	7.03 ft/s		Critical Slope	0.004645	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.00	ft
Section Size Number Sections	3	36 inch	Rise	3.00	ft

Outlet Control Properties

Outlet Control HW Elev.	10.44	ft	Upstream Velocity Head	0.73	ft
Ke	0.50		Entrance Loss	0.36	ft

Inlet Control Properties

Inlet Control HW Elev.	10.24	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	21.2	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Comments: Prop 170+00

Analysis Component					
Storm Event	Check	Discharge	185.00	cfs	
Peak Discharge Method: User-Specified					
Design Discharge	88.00	cfs	Check Discharge	185.00	cfs
Tailwater properties: Irregular Channel					

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+13	0+75	0.025

Natural Channel Points

Station (ft)	Elevation (ft)
0+13	12.15
0+40	8.55
0+58	6.94
0+64	7.45
0+73	9.20
0+75	10.46

Tailwater conditions for Check Storm.

Discharge	185.00 cfs	Actual Depth	2.14 ft
Velocity	4.28 ft/s		

Name	Description	Discharge	HW Elev.	Velocity	
Culvert-1	3-36 Inch Circular	185.00 cfs	12.63 ft	9.69 ft/s	
Weir	Not Considered	N/A	N/A	N/A	

Component:Culvert-1

Culvert Summary

Computed Headwater Elevation	12.63	ft	Discharge	185.00	cfs
Inlet Control HW Elev.	12.63	ft	Tailwater Elevation	9.08	ft
Outlet Control HW Elev.	12.35	ft	Control Type	Inlet Control	
Headwater Depth/Height	1.68				

Grades

Upstream Invert	7.60	ft	Downstream Invert	7.28	ft
Length	64.00	ft	Constructed Slope	0.005000	ft/ft

Hydraulic Profile

Profile Slope Type	M2		Depth, Downstream Normal Depth	2.53	ft ft
Flow Regime	Mild Subcritical		Critical Depth	N/A 2.53	
Velocity Downstream	9.69 ft/s		Critical Slope	0.008144	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.00	ft
Section Size Number Sections	3	36 inch	Rise	3.00	ft

Outlet Control Properties

Outlet Control HW Elev.	12.35	ft	Upstream Velocity Head	1.19	ft
Ke	0.50		Entrance Loss	0.59	ft

Inlet Control Properties

Inlet Control HW Elev.	12.63	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	21.2	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

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12/22/2020

Culvert 170+00 HYDRAULIC DATA

Texas Department of Transportation
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CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		134

SHEET 1 OF 6

12/21/2020
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Comments: Prop 235+92

Analysis Component

Storm Event	Design	Discharge	197.00	cfs

Peak Discharge Method: User-Specified

Design Discharge	197.00	cfs	Check Discharge	322.00	cfs

Tailwater properties: Irregular Channel

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+33	0+78	0.025

Natural Channel Points

Station (ft)	Elevation (ft)
0+33	7.90
0+41	7.70
0+59	6.84
0+78	7.88

Tailwater conditions for Design Storm.

Discharge	197.00 cfs	Actual Depth	1.70 ft
Velocity	3.85 ft/s		

Name	Description	Discharge	HW Elev.	Velocity	
Culvert-1	4-42 inch Circular	197.00 cfs	10.99 ft	7.76 ft/s	
Weir	Not Considered	N/A	N/A	N/A	

Component:Culvert-1

Culvert Summary

Computed Headwater Elevation	10.99 ft	Discharge	197.00 cfs
Inlet Control HW Elev.	10.67 ft	Tailwater Elevation	8.54 ft
Outlet Control HW Elev.	10.99 ft	Control Type	Outlet Control
Headwater Depth/Height	1.02		

Grades

Upstream Invert	7.43 ft	Downstream Invert	7.34 ft
Length	60.00 ft	Constructed Slope	0.001500 ft/ft

Hydraulic Profile

Profile Slope Type	M2	Depth, Downstream Normal Depth	2.19 ft ft ft
Flow Regime	Mild Subcritical	Critical Depth	N/A 2.19
Velocity Downstream	7.76 ft/s	Critical Slope	0.004661 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013	
Section Material	Concrete	Span		3.50 ft
Section Size Number Sections	42 inch 4	Rise		3.50 ft

Outlet Control Properties

Outlet Control HW Elev.	10.99 ft	Upstream Velocity Head	0.64 ft
Ke	0.50	Entrance Loss	0.32 ft

Inlet Control Properties

Inlet Control HW Elev.	10.67 ft	Flow Control	Unsubmerged
Inlet Type	Groove end projecting	Area Full	38.5 ft²
K	0.00450	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	3
C	0.03170	Equation Form	1
Y	0.69000		

Comments: Prop 235+92

Analysis Component

Storm Event	Check	Discharge	322.00	cfs

Peak Discharge Method: User-Specified

Design Discharge	197.00	cfs	Check Discharge	322.00	cfs

Tailwater properties: Irregular Channel

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+33	0+78	0.025

Natural Channel Points

Station (ft)	Elevation (ft)
0+33	7.90
0+41	7.70
0+59	6.84
0+78	7.88

Tailwater conditions for Check Storm.

Discharge	322.00 cfs	Actual Depth	2.10 ft
Velocity	4.65 ft/s		

Name	Description	Discharge	HW Elev.	Velocity	
Culvert-1	4-42 inch Circular	322.00 cfs	12.51 ft	9.75 ft/s	
Weir	Not Considered	N/A	N/A	N/A	

Component:Culvert-1

Culvert Summary

Computed Headwater Elevation	12.51 ft	Discharge	322.00 cfs
Inlet Control HW Elev.	12.06 ft	Tailwater Elevation	8.94 ft
Outlet Control HW Elev.	12.51 ft	Control Type	Outlet Control
Headwater Depth/Height	1.45		

Grades

Upstream Invert	7.43 ft	Downstream Invert	7.34 ft
Length	60.00 ft	Constructed Slope	0.001500 ft/ft

Hydraulic Profile

Profile Slope Type	M2	Depth, Downstream Normal Depth	2.80 ft ft ft
Flow Regime	Mild Subcritical	Critical Depth	N/A 2.80
Velocity Downstream	9.75 ft/s	Critical Slope	0.006690 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013	
Section Material	Concrete	Span		3.50 ft
Section Size Number Sections	42 inch 4	Rise		3.50 ft

Outlet Control Properties

Outlet Control HW Elev.	12.51 ft	Upstream Velocity Head	1.10 ft
Ke	0.50	Entrance Loss	0.55 ft

Inlet Control Properties

Inlet Control HW Elev.	12.06 ft	Flow Control	N/A
Inlet Type	Groove end projecting	Area Full	38.5 ft²
K	0.00450	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	3
C	0.03170	Equation Form	1
Y	0.69000		

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12/22/2020

Culvert 235+92 HYDRAULIC DATA

Texas Department of Transportation

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		135

Comments: Prop 300+93

Analysis Component

Storm Event	Design	Discharge	80.00 cfs

Peak Discharge Method: User-Specified

Design Discharge	80.00	cfs	Check Discharge	156.00	cfs

Tailwater properties: Irregular Channel

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+42	1+41	0.070

Natural Channel Points

Station (ft)	Elevation (ft)
0+42	17.00
0+45	15.10
0+97	14.10
1+20	14.10
1+33	15.20
1+41	15.95

Tailwater conditions for Design Storm.

Discharge	80.00 cfs	Actual Depth	2.42 ft
Velocity	0.42 ft/s		

Name	Description	Discharge	HW Elev.	Velocity	
Culvert-1	2-36 inch Circular	80.00 cfs	18.13 ft	7.73 ft/s	
Weir	Not Considered	N/A	N/A	N/A	

Component:Culvert-1

Culvert Summary

Computed Headwater Elevation	18.13	ft	Discharge		80.00 cfs
Inlet Control HW Elev.	17.85	ft	Tailwater Elevation		16.52 ft
Outlet Control HW Elev.	18.13	ft	Control Type	Outlet Control	
Headwater Depth/Height	1.14				

Grades

Upstream Invert	14.72 ft		Downstream Invert		14.50 ft
Length	64.00 ft		Constructed Slope	0.003438	ft/ft

Hydraulic Profile

Profile	M2		Depth, Downstream		2.06 ft
Slope Type	Mild		Normal Depth		2.53 ft
Flow Regime	Subcritical		Critical Depth		2.06 ft
Velocity Downstream	7.73	ft/s	Critical Slope	0.005404	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span		3.00 ft
Section Size Number Sections	2		36 inch Rise		3.00 ft

Outlet Control Properties

Outlet Control HW Elev.	18.13	ft	Upstream Velocity Head		0.72 ft
Ke	0.50		Entrance Loss		0.36 ft

Inlet Control Properties

Inlet Control HW Elev.	17.85	ft	Flow Control	Unsubmerged	
Inlet Type	Groove end projecting		Area Full		14.1 ft²
K	0.00450		HDS 5 Chart		1
M	2.00000		HDS 5 Scale		3
C	0.03170		Equation Form		1
Y	0.69000				

Comments: Prop 300+93

Analysis Component

Storm Event	Check	Discharge	156.00 cfs

Peak Discharge Method: User-Specified

Design Discharge	80.00	cfs	Check Discharge	156.00	cfs

Tailwater properties: Irregular Channel

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+42	1+41	0.070

Natural Channel Points

Station (ft)	Elevation (ft)
0+42	17.00
0+45	15.10
0+97	14.10
1+20	14.10
1+33	15.20
1+41	15.95

Tailwater conditions for Check Storm.

Discharge	156.00 cfs	Actual Depth	3.39 ft
Velocity	0.55 ft/s		

Name	Description	Discharge	HW Elev.	Velocity	
Culvert-1	2-36 inch Circular	156.00 cfs	21.21 ft	11.04 ft/s	
Weir	Not Considered	N/A	N/A	N/A	

Component:Culvert-1

Culvert Summary

Computed Headwater Elevation	21.21	ft	Discharge		156.00 cfs
Inlet Control HW Elev.	20.64	ft	Tailwater Elevation		17.49 ft
Outlet Control HW Elev.	21.21	ft	Control Type	Outlet Control	
Headwater Depth/Height	2.16				

Grades

Upstream Invert	14.72 ft		Downstream Invert		14.50 ft
Length	64.00 ft		Constructed Slope	0.003438	ft/ft

Hydraulic Profile

Profile	CompositeM2Pressure		Profile Slope Type		Depth, Downstream Normal Depth 2.99 ft ft ft
Mild					Critical Depth N/A 2.75
Flow Regime	Subcritical				
Velocity Downstream	11.04	ft/s	Critical Slope	0.011892	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span		3.00 ft
Section Size Number Sections	2		36 inch Rise		3.00 ft

Outlet Control Properties

Outlet Control HW Elev.	21.21	ft	Upstream Velocity Head		1.89 ft
Ke	0.50		Entrance Loss		0.95 ft

Inlet Control Properties

Inlet Control HW Elev.	20.64	ft	Flow Control	N/A	
Inlet Type	Groove end projecting		Area Full		14.1 ft²
K	0.00450		HDS 5 Chart		1
M	2.00000		HDS 5 Scale		3
C	0.03170		Equation Form		1
Y	0.69000				

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12/22/2020

Culvert 300+93 HYDRAULIC DATA

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CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		136

SHEET 3 OF 6

Comments: Prop 442+89 BK

Analysis Component

Storm Event	Design	Discharge	12.00 cfs

Peak Discharge Method: User-Specified

Design Discharge	12.00	cfs	Check Discharge		54.00 cfs

Tailwater properties: Irregular Channel

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+20	0+81	0.025

Natural Channel Points

Station (ft)	Elevation (ft)
0+20	14.60
0+37	10.80
0+52	12.20
0+81	12.60

Tailwater conditions for Design Storm.

Discharge	12.00 cfs	Actual Depth	2.05 ft
Velocity	0.28 ft/s		

Name	Description	Discharge	HW Elev.	Velocity	
Culvert-1	1-36 inch Circular	12.00 cfs	12.94 ft	1.70 ft/s	
Weir	Not Considered	N/A	N/A	N/A	

Component:Culvert-1

Culvert Summary

Computed Headwater Elevation	12.94	ft	Discharge		12.00 cfs
Inlet Control HW Elev.	12.85	ft	Tailwater Elevation		12.85 ft
Outlet Control HW Elev.	12.94	ft	Control Type	Outlet Control	
Headwater Depth/Height	0.91				

Grades

Upstream Invert	10.20 ft		Downstream Invert		9.59 ft
Length	61.00 ft		Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	CompositePressureProfileS1		Depth, Downstream		3.26 ft
Slope Type	N/A		Normal Depth		0.86 ft
Flow Regime	Subcritical		Critical Depth		1.10 ft
Velocity Downstream	1.70	ft/s	Critical Slope	0.003937	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span		3.00 ft
Section Size Number Sections	1		36 inch Rise		3.00 ft

Outlet Control Properties

Outlet Control HW Elev.	12.94	ft	Upstream Velocity Head		0.05 ft
Ke	0.50		Entrance Loss		0.03 ft

Inlet Control Properties

Inlet Control HW Elev.	12.85 ft		Flow Control	Unsubmerged	
Inlet Type	Groove end projecting		Area Full		7.1 ft²
K	0.00450		HDS 5 Chart		1
M	2.00000		HDS 5 Scale		3
C	0.03170		Equation Form		1
Y	0.69000				

Comments: Prop 442+89 BK

Analysis Component

Storm Event	Check	Discharge	54.00 cfs

Peak Discharge Method: User-Specified

Design Discharge	12.00	cfs	Check Discharge		54.00 cfs

Tailwater properties: Irregular Channel

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+20	0+81	0.025

Natural Channel Points

Station (ft)	Elevation (ft)
0+20	14.60
0+37	10.80
0+52	12.20
0+81	12.60

Tailwater conditions for Check Storm.

Discharge	54.00 cfs	Actual Depth	3.27 ft
Velocity	0.49 ft/s		

Name	Description	Discharge	HW Elev.	Velocity	
Culvert-1	1-36 inch Circular	54.00 cfs	15.83 ft	7.64 ft/s	
Weir	Not Considered	N/A	N/A	N/A	

Component:Culvert-1

Culvert Summary

Computed Headwater Elevation	15.83	ft	Discharge		54.00 cfs
Inlet Control HW Elev.	14.11	ft	Tailwater Elevation		14.07 ft
Outlet Control HW Elev.	15.83	ft	Control Type	Outlet Control	
Headwater Depth/Height	1.88				

Grades

Upstream Invert	10.20 ft		Downstream Invert		9.59 ft
Length	61.00 ft		Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	PressureProfile		Depth, Downstream		4.48 ft
Slope Type	N/A		Normal Depth		2.05 ft
Flow Regime	N/A		Critical Depth		2.39 ft
Velocity Downstream	7.64 ft/s		Critical Slope	0.006936	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span		3.00 ft
Section Size Number Sections	1		36 inch Rise		3.00 ft

Outlet Control Properties

Outlet Control HW Elev.	15.83	ft	Upstream Velocity Head		0.91 ft
Ke	0.50		Entrance Loss		0.45 ft

Inlet Control Properties

Inlet Control HW Elev.	14.11 ft		Flow Control	N/A	
Inlet Type	Groove end projecting		Area Full		7.1 ft²
K	0.00450		HDS 5 Chart		1
M	2.00000		HDS 5 Scale		3
C	0.03170		Equation Form		1
Y	0.69000				

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12/22/2020

Culvert 442+89 BK
HYDRAULIC DATA

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		137

SHEET 4 OF 6

Comments: Prop 480+46 BK

Analysis Component			
Storm Event	Design	Discharge	40.10 cfs
Peak Discharge Method: User-Specified			
Design Discharge	40.10 cfs	Check Discharge	52.70 cfs
Tailwater properties: Irregular Channel			

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+36	0.025

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	9.00
0+06	6.60
0+09	5.50
0+26	5.50
0+36	7.90

Tailwater conditions for Design Storm.

Discharge	40.10 cfs	Actual Depth	0.94 ft
Velocity	2.10 ft/s		

Name	Description	Discharge	HW Elev.	Velocity	
Culvert-1	1-36 Inch Circular	40.10 cfs	9.77 ft	7.74 ft/s	
Weir	Not Considered	N/A		N/A	N/A

Component:Culvert-1

Culvert Summary

Computed Headwater Elevation	9.77 ft	Discharge	40.10 cfs
Inlet Control HW Elev.	9.33 ft	Tailwater Elevation	6.44 ft
Outlet Control HW Elev.	9.77 ft	Control Type	Outlet Control
Headwater Depth/Height	1.30		

Grades

Upstream Invert	5.88 ft	Downstream Invert	6.19 ft
Length	94.00 ft	Constructed Slope	-0.003298 ft/ft

Hydraulic Profile

Profile	CompositeA2PressureProfile	Depth, Downstream	2.06 ft
Slope Type	Adverse	Normal Depth	0.00 ft
Flow Regime	Subcritical	Critical Depth	2.06 ft
Velocity Downstream	7.74 ft/s	Critical Slope	0.005412 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size Number Sections	36 inch 1	Rise	3.00 ft

Outlet Control Properties

Outlet Control HW Elev.	9.77 ft	Upstream Velocity Head	0.50 ft
Ke	0.50	Entrance Loss	0.25 ft

Inlet Control Properties

Inlet Control HW Elev.	9.33 ft	Flow Control	Unsubmerged
Inlet Type	Groove end projecting	Area Full	7.1 ft²
K	0.00450	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	3
C	0.03170	Equation Form	1
Y	0.69000		

Comments: Prop 480+46 BK

Analysis Component			
Storm Event	Check	Discharge	52.70 cfs
Peak Discharge Method: User-Specified			
Design Discharge	40.10 cfs	Check Discharge	52.70 cfs
Tailwater properties: Irregular Channel			

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+36	0.025

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	9.00
0+06	6.60
0+09	5.50
0+26	5.50
0+36	7.90

Tailwater conditions for Check Storm.

Discharge	52.70 cfs	Actual Depth	1.10 ft
Velocity	2.30 ft/s		

Name	Description	Discharge	HW Elev.	Velocity	
Culvert-1	1-36 inch Circular	52.70 cfs	10.76 ft	8.84 ft/s	
Weir	Not Considered	N/A		N/A	N/A

Component:Culvert-1

Culvert Summary

Computed Headwater Elevation	10.76 ft	Discharge	52.70 cfs
Inlet Control HW Elev.	10.03 ft	Tailwater Elevation	6.60 ft
Outlet Control HW Elev.	10.76 ft	Control Type	Outlet Control
Headwater Depth/Height	1.63		

Grades

Upstream Invert	5.88 ft	Downstream Invert	6.19 ft
Length	94.00 ft	Constructed Slope	-0.003298 ft/ft

Hydraulic Profile

Profile	CompositeA2PressureProfile Slope Type	Depth, Downstream Normal Depth	2.36 ft ft ft
Flow Regime	Adverse Subcritical	Critical Depth	N/A 2.36
Velocity Downstream	8.84 ft/s	Critical Slope	0.006761 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size Number Sections	36 inch 1	Rise	3.00 ft

Outlet Control Properties

Outlet Control HW Elev.	10.76 ft	Upstream Velocity Head	0.86 ft
Ke	0.50	Entrance Loss	0.43 ft

Inlet Control Properties

Inlet Control HW Elev.	10.03 ft	Flow Control	N/A
Inlet Type	Groove end projecting	Area Full	7.1 ft²
K	0.00450	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	3
C	0.03170	Equation Form	1
Y	0.69000		

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12/22/2020

Culvert 480+46 BK HYDRAULIC DATA

Texas Department of Transportation

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		138

Comments: Prop 357+91 AHD

Analysis Component			
Storm Event	Design	Discharge	9.00 cfs
Peak Discharge Method: User-Specified			
Design Discharge	9.00 cfs	Check Discharge	14.00 cfs

Tailwater properties: Irregular Channel

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+35	0+76	0.025

Natural Channel Points	
Station (ft)	Elevation (ft)
0+35	12.00
0+50	8.50
0+61	6.90
0+76	8.70

Tailwater conditions for Design Storm.

Discharge	9.00 cfs	Actual Depth	1.01 ft
Velocity	1.16 ft/s		

Name	Description	Discharge	HW Elev.	Velocity	
Culvert-1	1-42 inch Circular	9.00 cfs	8.00 ft	1.57 ft/s	
Weir	Not Considered	N/A	N/A	N/A	

Component:Culvert-1

Culvert Summary					
Computed Headwater Elevation	8.00 ft	Discharge		9.00 cfs	
Inlet Control HW Elev.	7.91 ft	Tailwater Elevation		7.91 ft	
Outlet Control HW Elev.	8.00 ft	Control Type	Outlet Control		
Headwater Depth/Height	0.48				

Grades					
Upstream Invert	6.31 ft	Downstream Invert		5.90 ft	
Length	68.00 ft	Constructed Slope	0.006029		ft/ft

Hydraulic Profile					
Profile	S1	Depth, Downstream		2.01 ft	
Slope Type	Steep	Normal Depth		0.80 ft	
Flow Regime	Subcritical	Critical Depth		0.91 ft	
Velocity Downstream	1.57 ft/s	Critical Slope	0.003714		ft/ft

Section				
Section Shape	Circular	Mannings Coefficient	0.013	
Section Material	Concrete	Span		3.50 ft
Section Size Number Sections	42 inch Rise 1	Rise		3.50 ft

Outlet Control Properties			
Outlet Control HW Elev.	8.00 ft	Upstream Velocity Head	0.07 ft
Ke	0.50	Entrance Loss	0.03 ft

Inlet Control Properties				
Inlet Control HW Elev.	7.91 ft	Flow Control	Unsubmerged	
Inlet Type	Groove end projecting	Area Full		9.6 ft²
K	0.00450	HDS 5 Chart		1
M	2.00000	HDS 5 Scale		3
C	0.03170	Equation Form		1
Y	0.69000			

Comments: Prop 357+91 AHD

Analysis Component			
Storm Event	Check	Discharge	14.00 cfs
Peak Discharge Method: User-Specified			
Design Discharge	9.00 cfs	Check Discharge	14.00 cfs

Tailwater properties: Irregular Channel

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+35	0+76	0.025

Natural Channel Points	
Station (ft)	Elevation (ft)
0+35	12.00
0+50	8.50
0+61	6.90
0+76	8.70

Tailwater conditions for Check Storm.

Discharge	14.00 cfs	Actual Depth	1.19 ft
Velocity	1.29 ft/s		

Name	Description	Discharge	HW Elev.	Velocity	
Culvert-1	1-42 inch Circular	14.00 cfs	8.27 ft	2.21 ft/s	
Weir	Not Considered	N/A	N/A	N/A	

Component:Culvert-1

Culvert Summary					
Computed Headwater Elevation	8.27 ft	Discharge		14.00 cfs	
Inlet Control HW Elev.	8.09 ft	Tailwater Elevation		8.09 ft	
Outlet Control HW Elev.	8.27 ft	Control Type	Outlet Control		
Headwater Depth/Height	0.56				

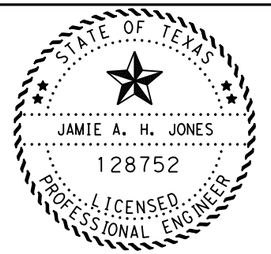
Grades					
Upstream Invert	6.31 ft	Downstream Invert		5.90 ft	
Length	68.00 ft	Constructed Slope	0.006029		ft/ft

Hydraulic Profile					
Profile	S1	Depth, Downstream		2.19 ft	
Slope Type	Steep	Normal Depth		1.00 ft	
Flow Regime	Subcritical	Critical Depth		1.14 ft	
Velocity Downstream	2.21 ft/s	Critical Slope	0.003705		ft/ft

Section				
Section Shape	Circular	Mannings Coefficient	0.013	
Section Material	Concrete	Span		3.50 ft
Section Size Number Sections	42 inch Rise 1	Rise		3.50 ft

Outlet Control Properties			
Outlet Control HW Elev.	8.27 ft	Upstream Velocity Head	0.13 ft
Ke	0.50	Entrance Loss	0.06 ft

Inlet Control Properties				
Inlet Control HW Elev.	8.09 ft	Flow Control	N/A	
Inlet Type	Groove end projecting	Area Full		9.6 ft²
K	0.00450	HDS 5 Chart		1
M	2.00000	HDS 5 Scale		3
C	0.03170	Equation Form		1
Y	0.69000			

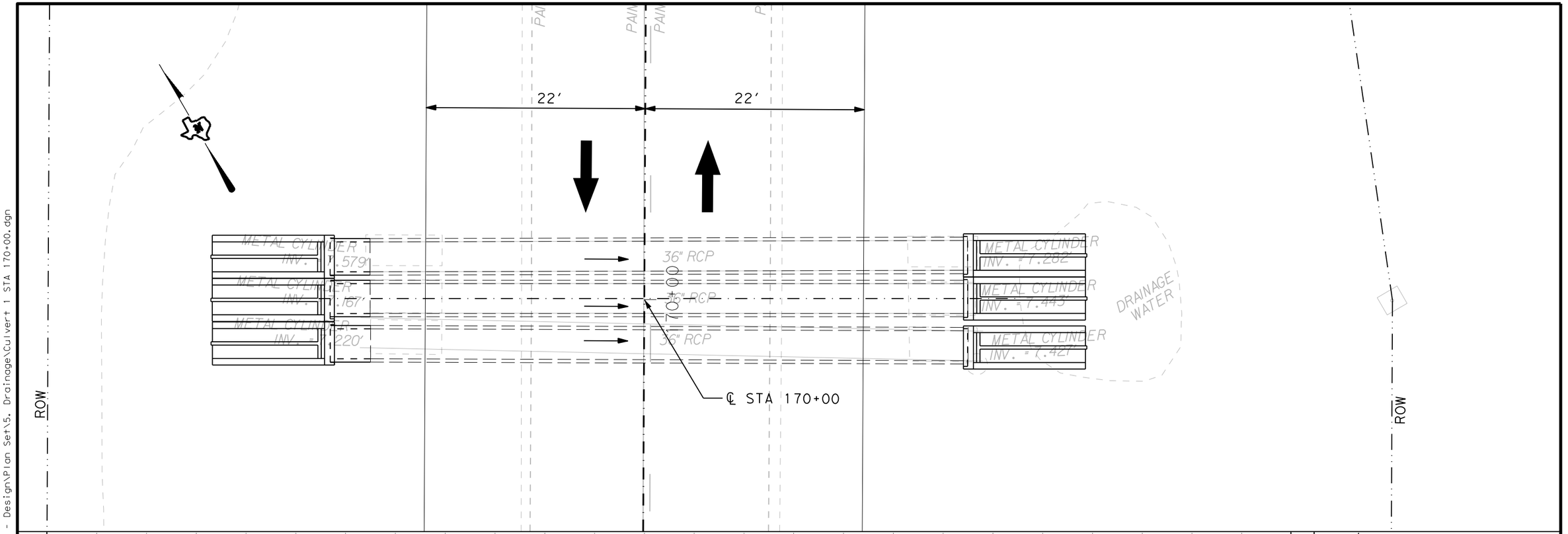


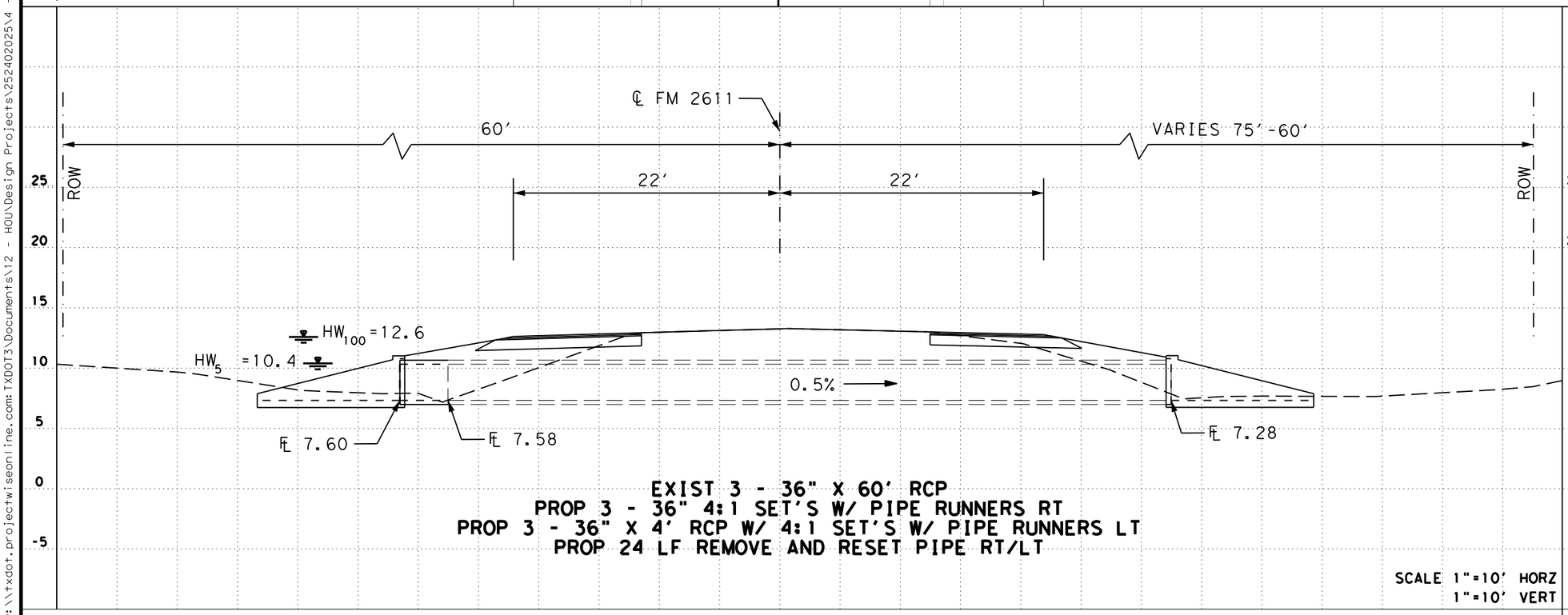
Jamie A.H. Jones, P.E.

12/22/2020

Culvert 357+91 AHD HYDRAULIC DATA

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		139





EXIST 3 - 36" X 60′ RCP
PROP 3 - 36" 4:1 SET'S W/ PIPE RUNNERS RT
PROP 3 - 36" X 4′ RCP W/ 4:1 SET'S W/ PIPE RUNNERS LT
PROP 24 LF REMOVE AND RESET PIPE RT/LT

SCALE 1"=10′ HORZ
1"=10′ VERT

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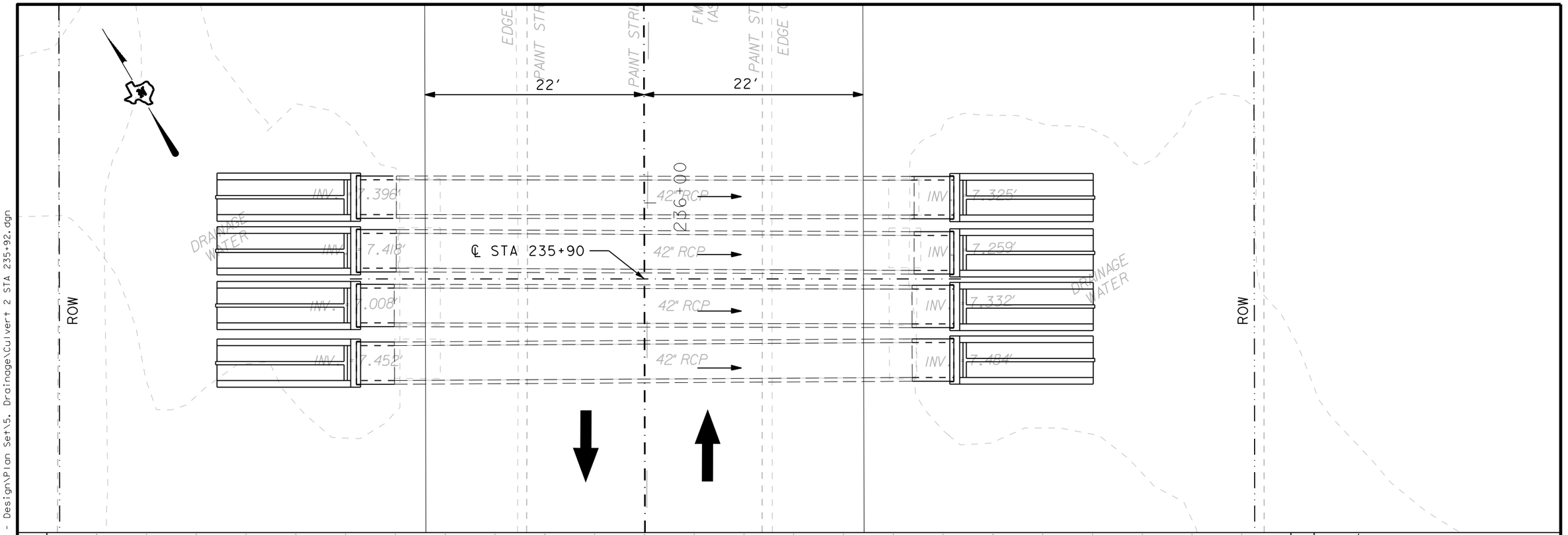
SHEET 1 OF 14

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		140



EXIST 4 - 42" X 52' RCP
PROP 4 - 42" X 4' RCP W/ 4:1 SET'S W/ PIPE RUNNERS LT
PROP 4 - 42" X 4' RCP W/ 4:1 SET'S W/ PIPE RUNNERS RT

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

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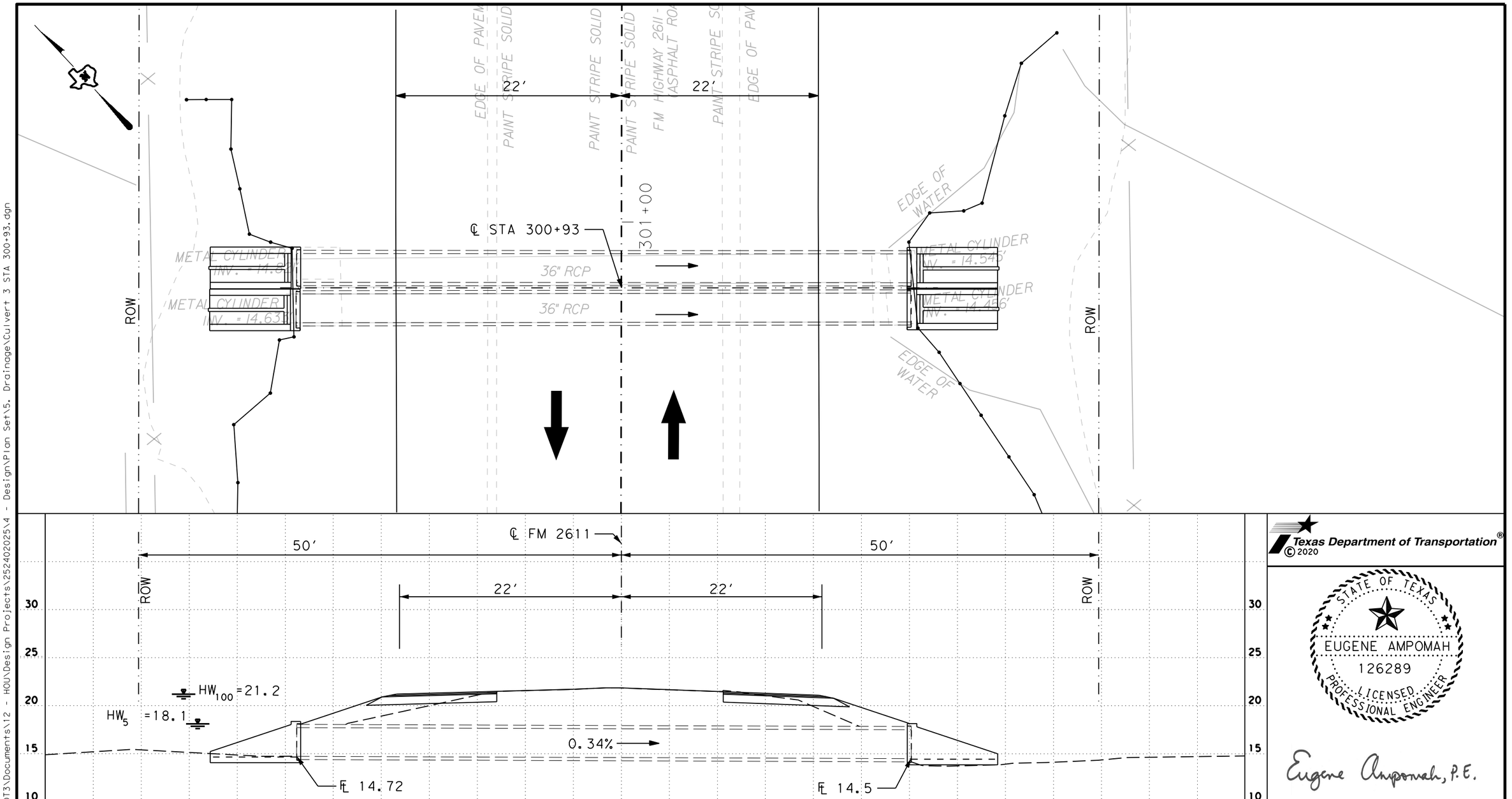
SHEET 2 OF 14

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		141



EXIST 2 - 36" X 64' RCP
PROP 2 - 3:1 SET'S W/ PIPE RUNNERS LT
PROP 2 - 3:1 SET'S W/ PIPE RUNNERS RT
PROP 16 LF REMOVE AND RESET PIPE RT/LT

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

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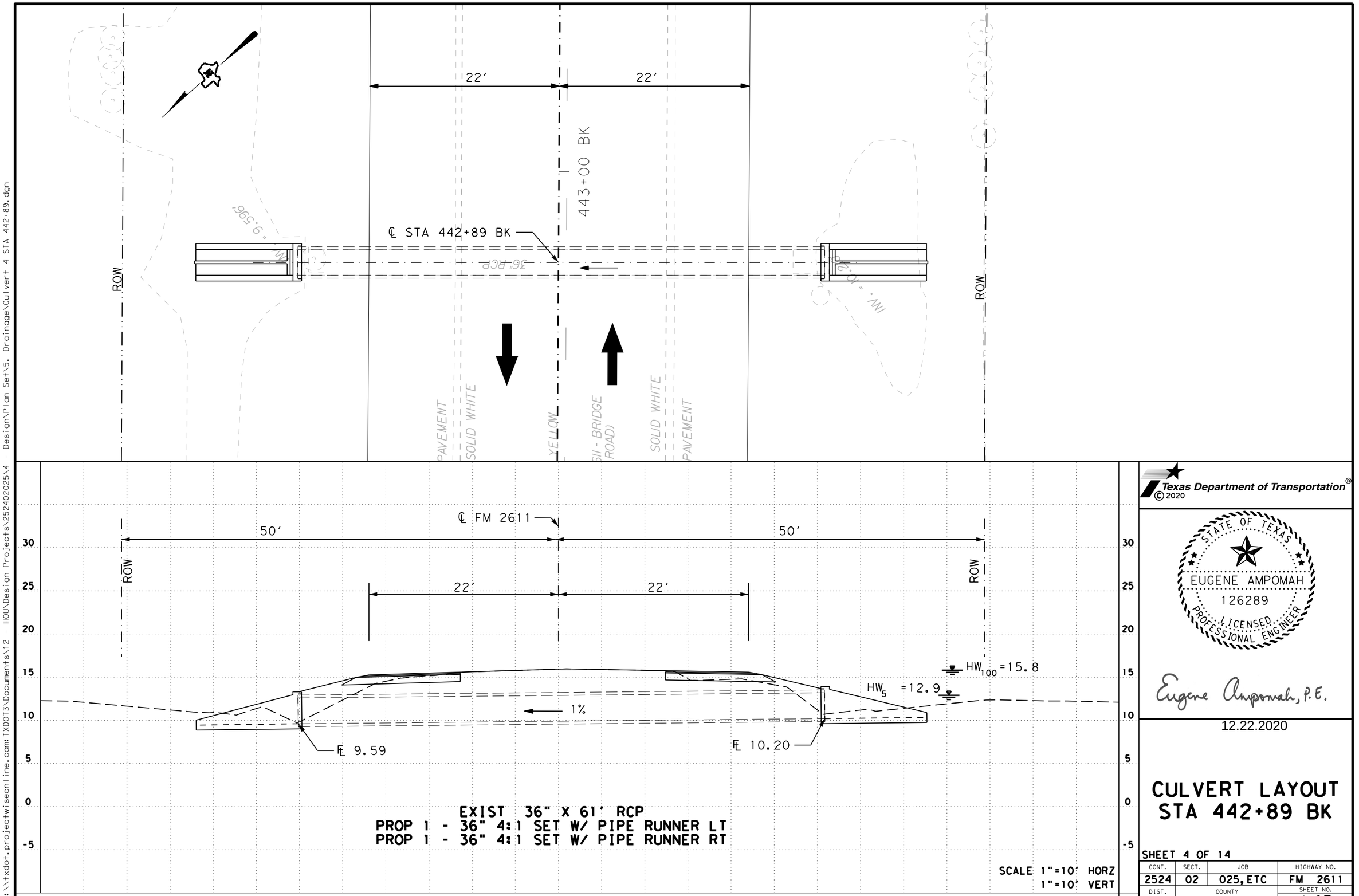
CULVERT LAYOUT STA 300+93

SHEET 3 OF 14

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		142



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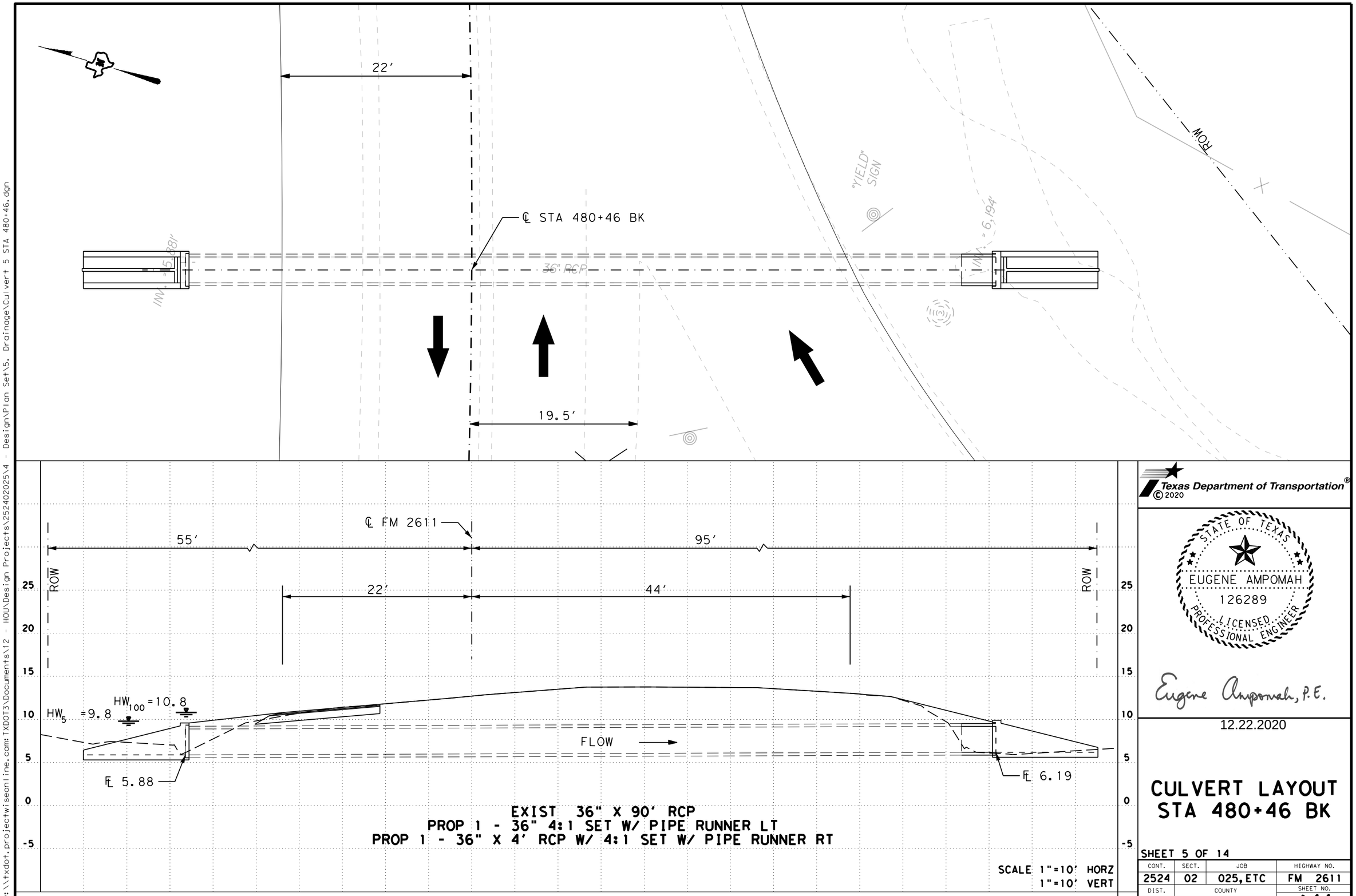
CULVERT LAYOUT STA 442+89 BK

SHEET 4 OF 14

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		143



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CULVERT LAYOUT STA 480+46 BK

SHEET 5 OF 14

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		144

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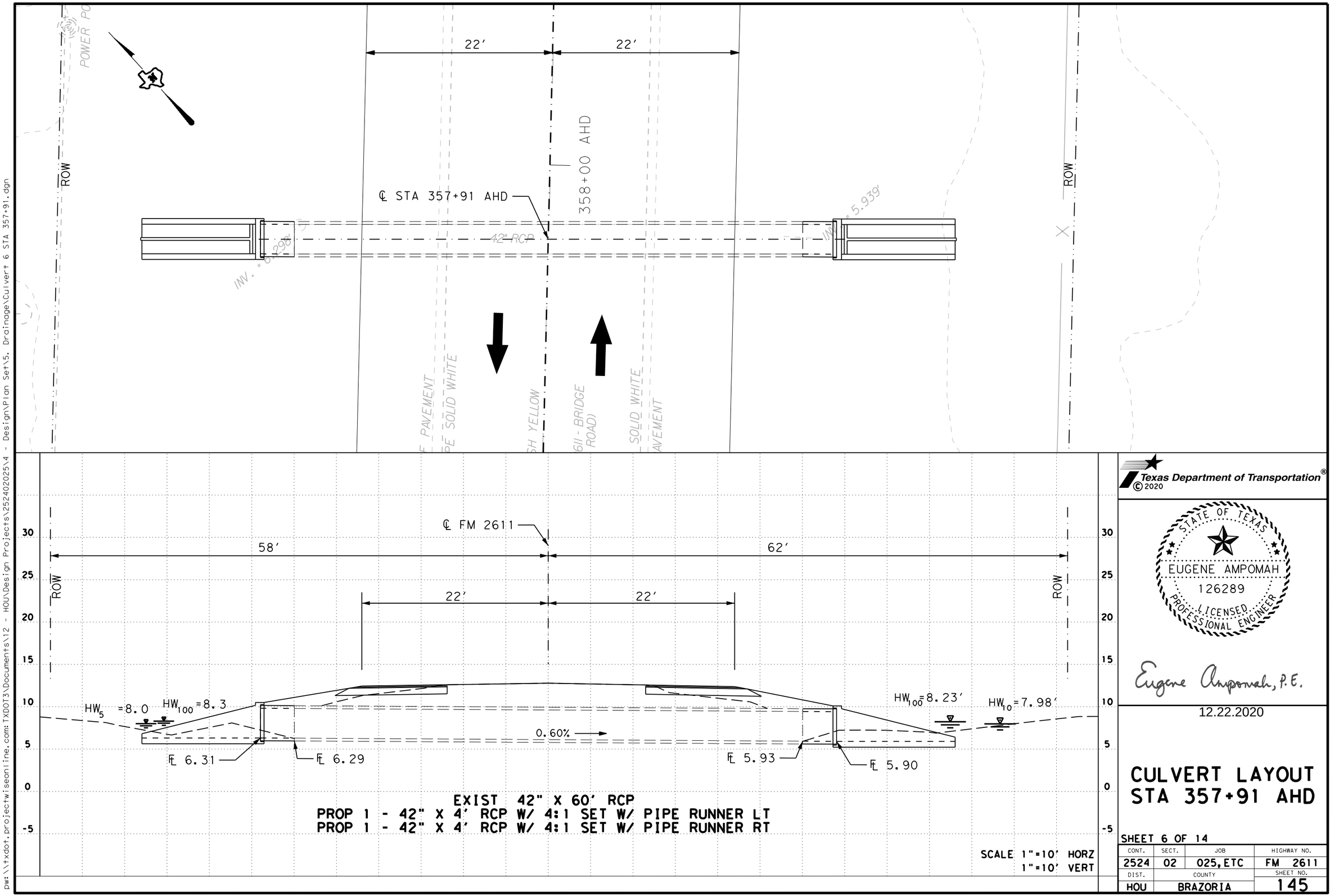

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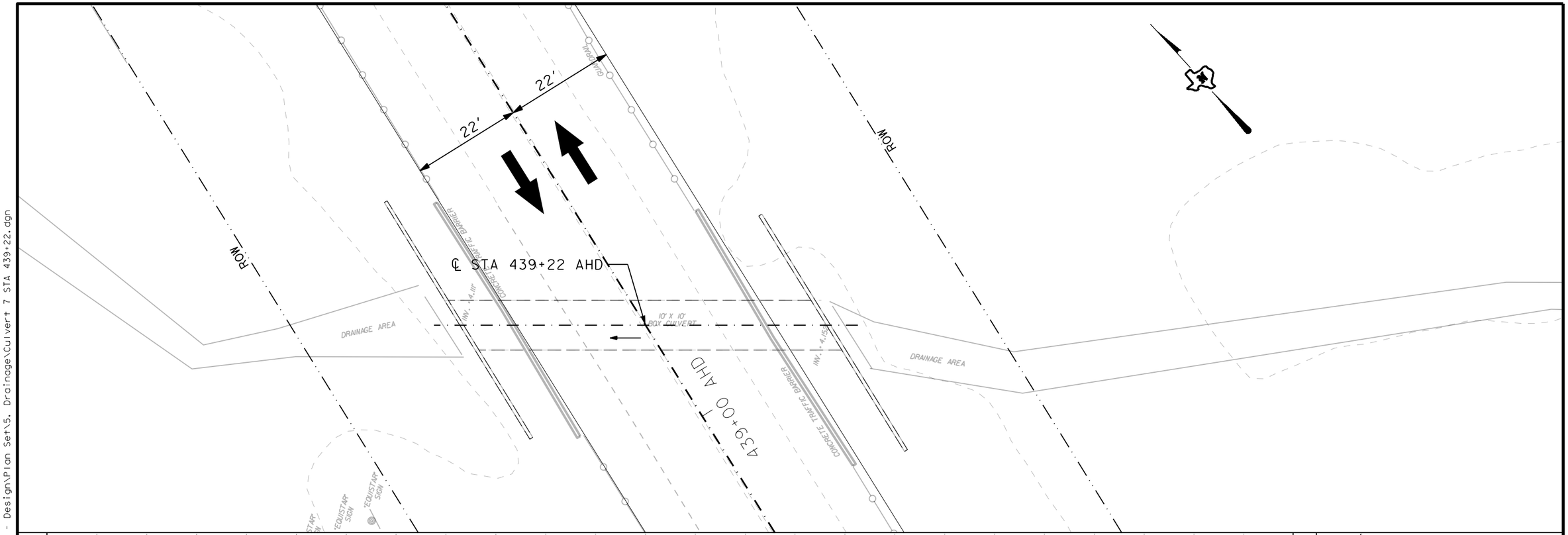
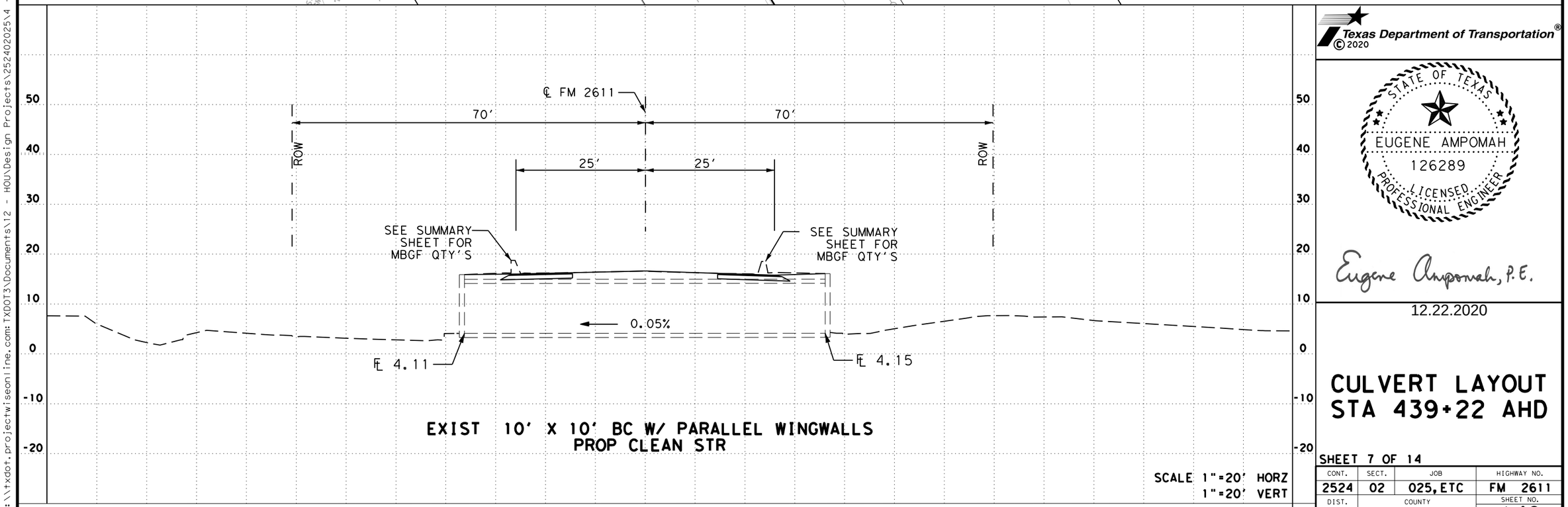
CULVERT LAYOUT STA 357+91 AHD

SHEET 6 OF 14

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		145





EXIST 10' X 10' BC W/ PARALLEL WINGWALLS
PROP CLEAN STR

SCALE 1"=20' HORZ
1"=20' VERT

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CULVERT LAYOUT
STA 439+22 AHD

SHEET 7 OF 14

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		146

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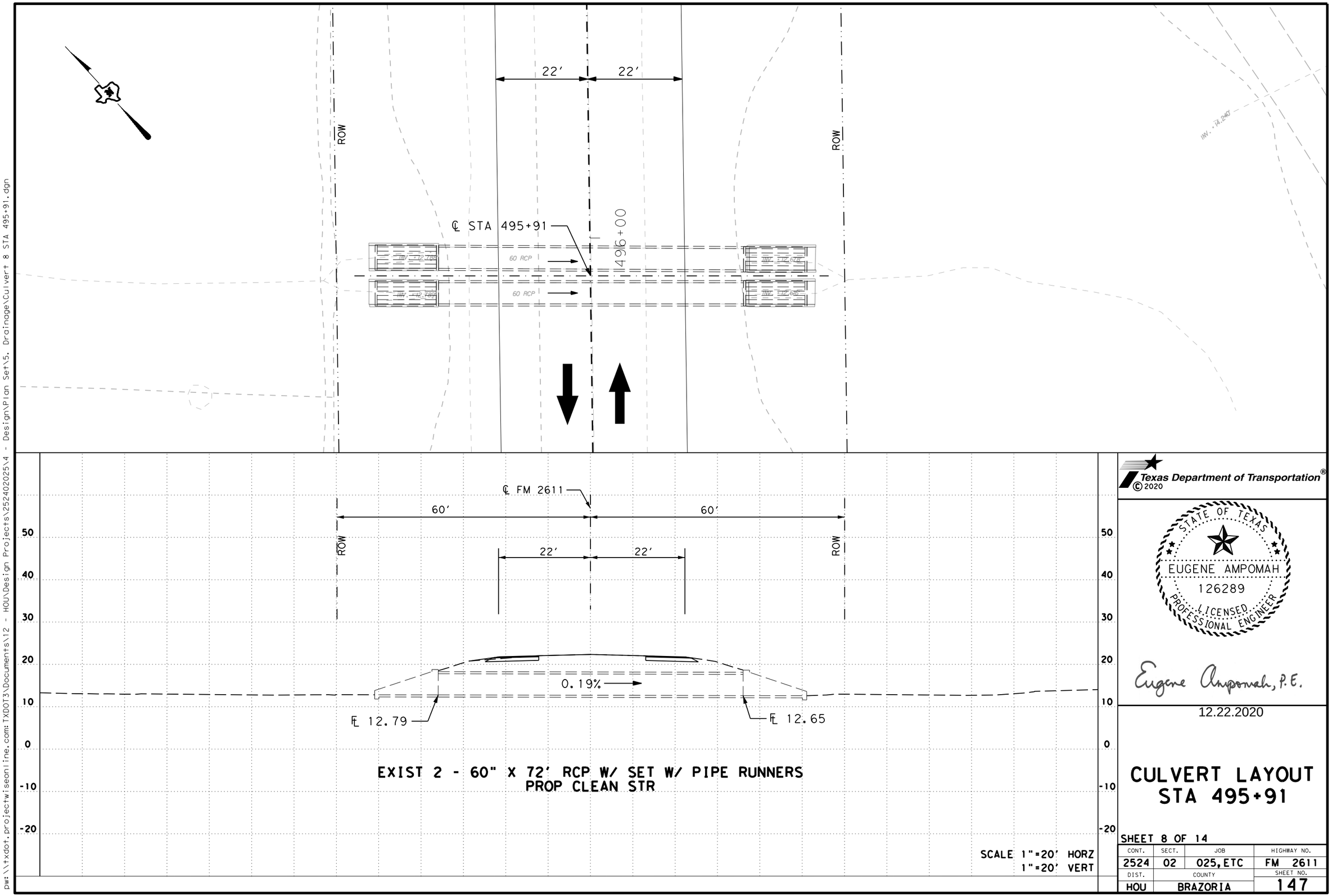

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CULVERT LAYOUT STA 495+91

SHEET 8 OF 14

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		147

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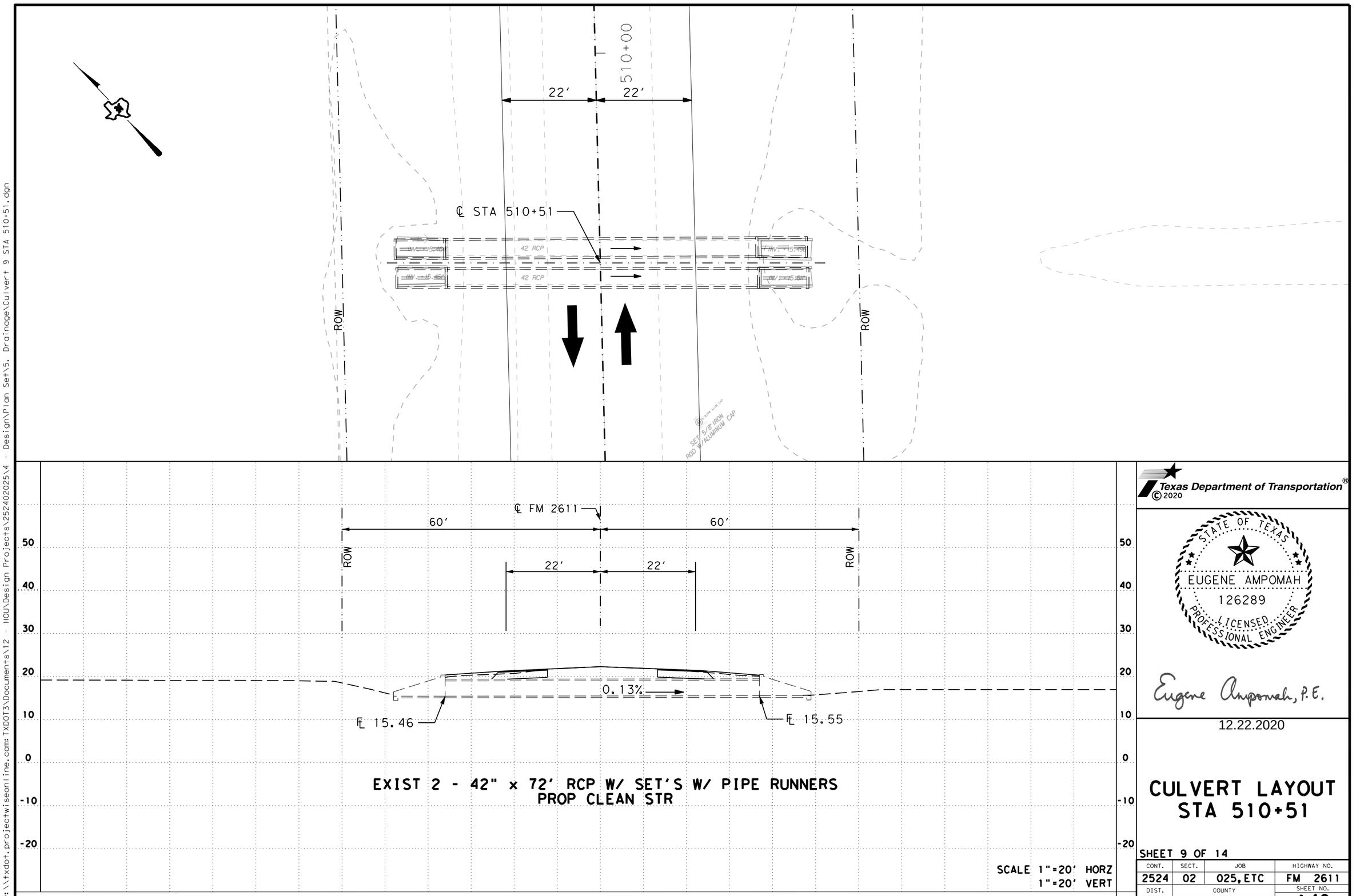

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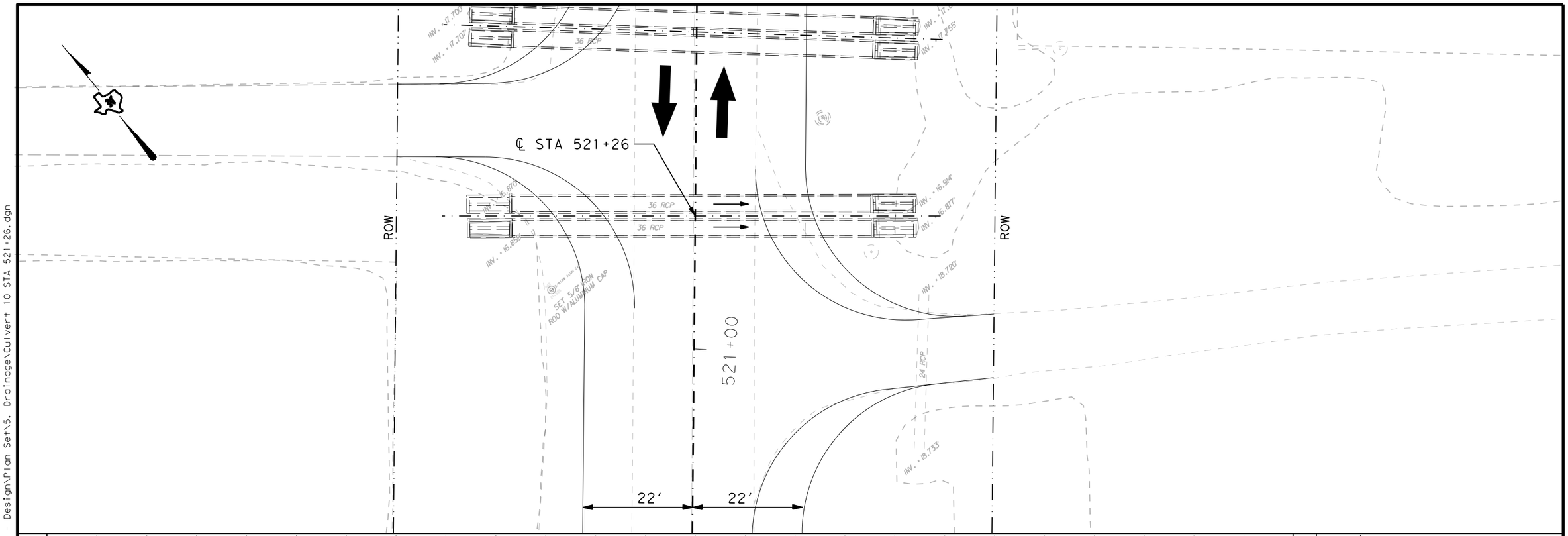
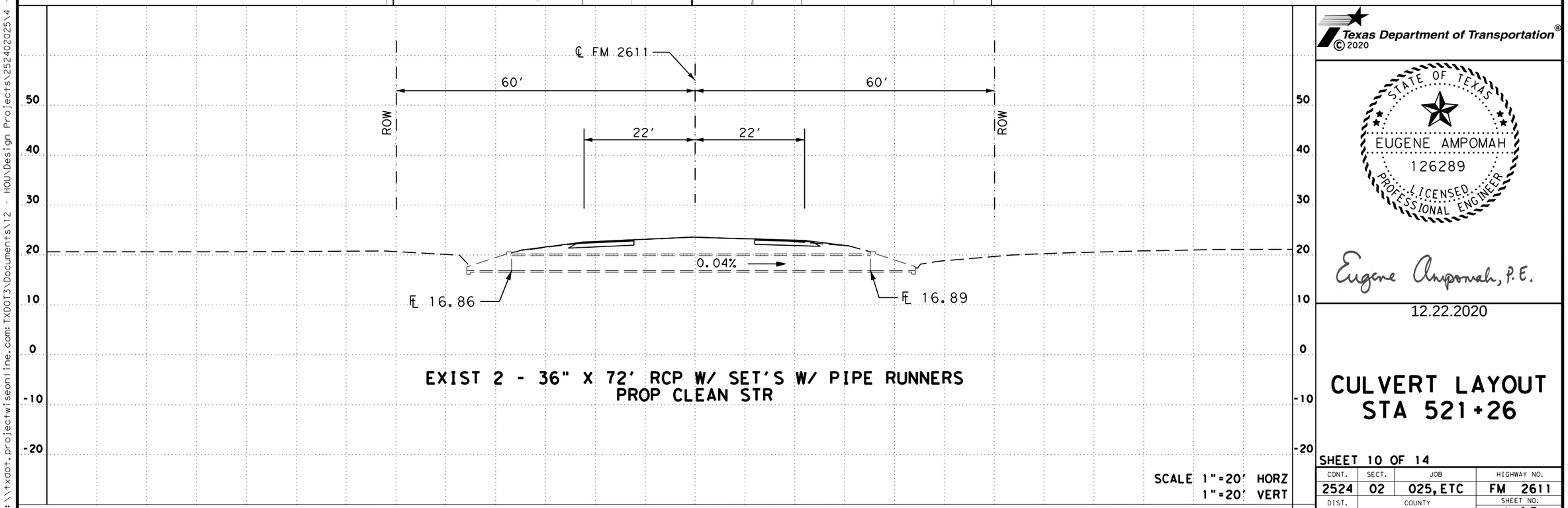
CULVERT LAYOUT STA 510+51

SHEET 9 OF 14

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		148





EXIST 2 - 36" X 72' RCP W/ SET'S W/ PIPE RUNNERS
PROP CLEAN STR

SCALE 1"=20' HORZ
1"=20' VERT

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CULVERT LAYOUT STA 521+26

SHEET 10 OF 14

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		149

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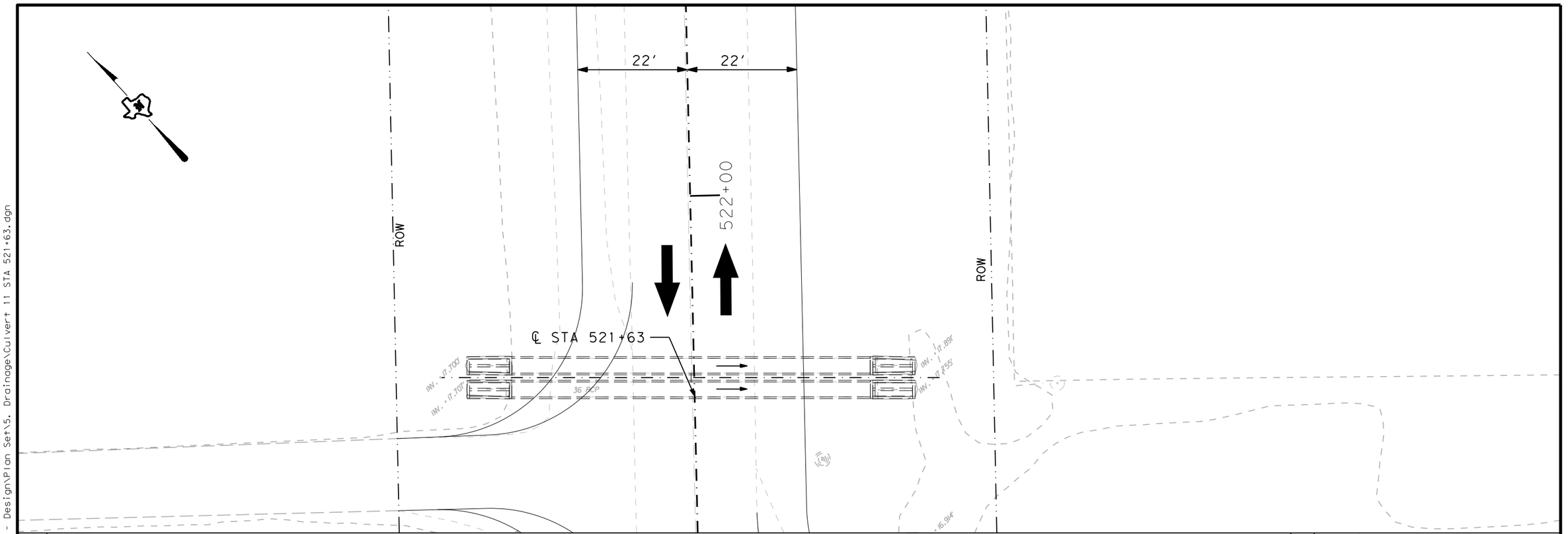

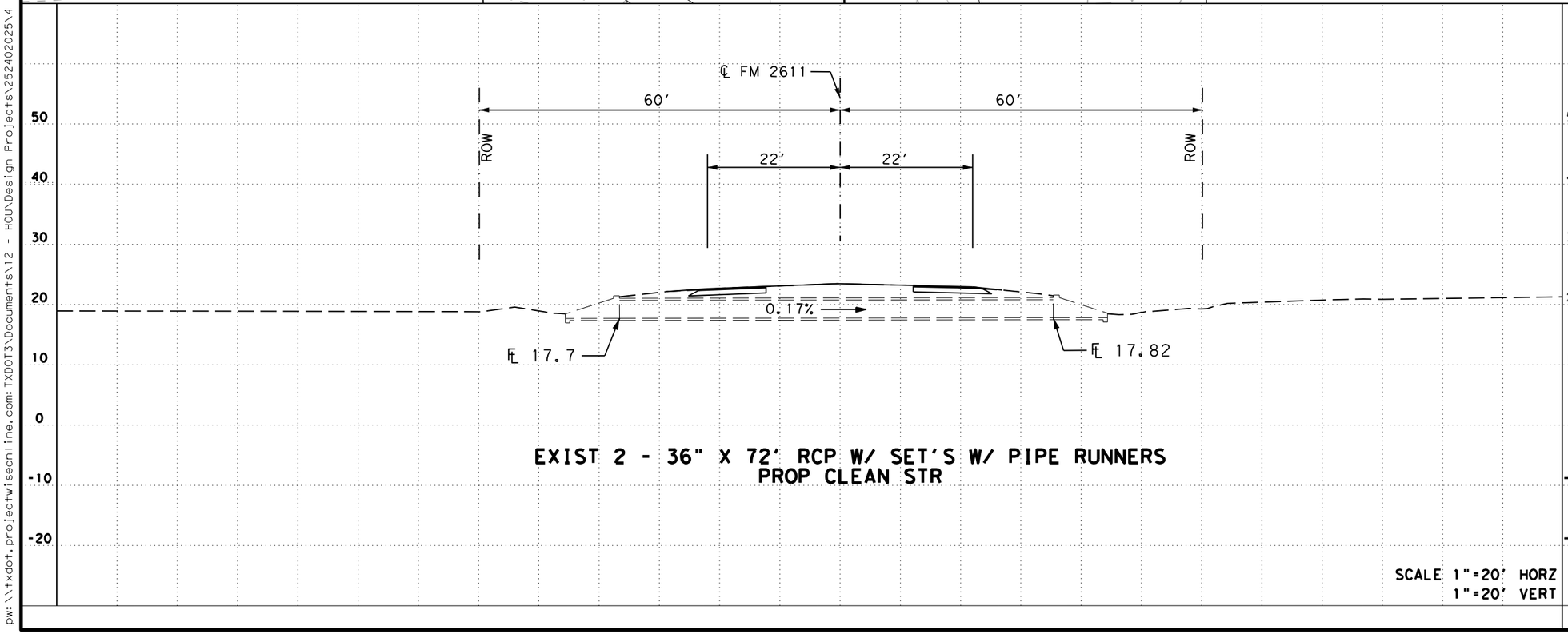

EXIST 2 - 36" X 72' RCP W/ SET'S W/ PIPE RUNNERS
PROP CLEAN STR

SCALE 1"=20' HORZ
1"=20' VERT

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CULVERT LAYOUT STA 521+63

SHEET 11 OF 14

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		150

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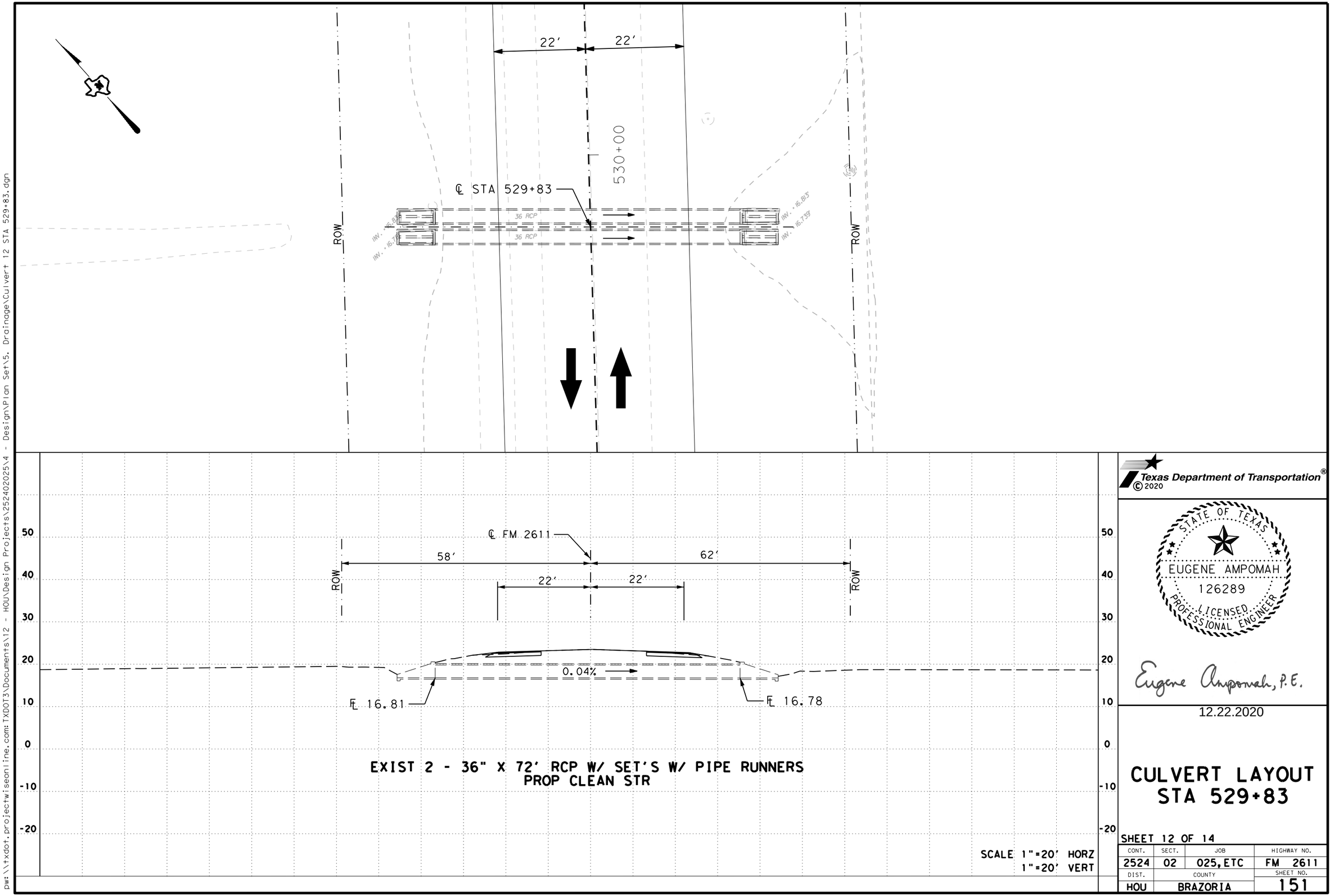

EXIST 2 - 36" X 72' RCP W/ SET'S W/ PIPE RUNNERS
PROP CLEAN STR

SCALE 1"=20' HORZ
1"=20' VERT

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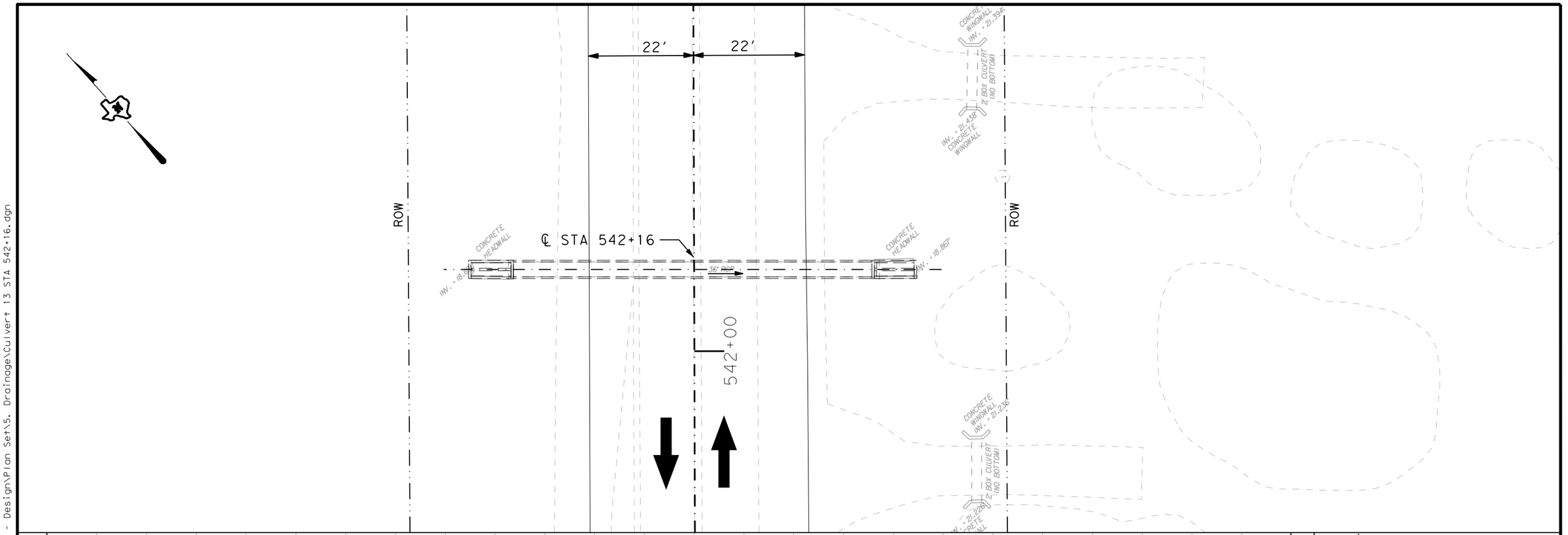
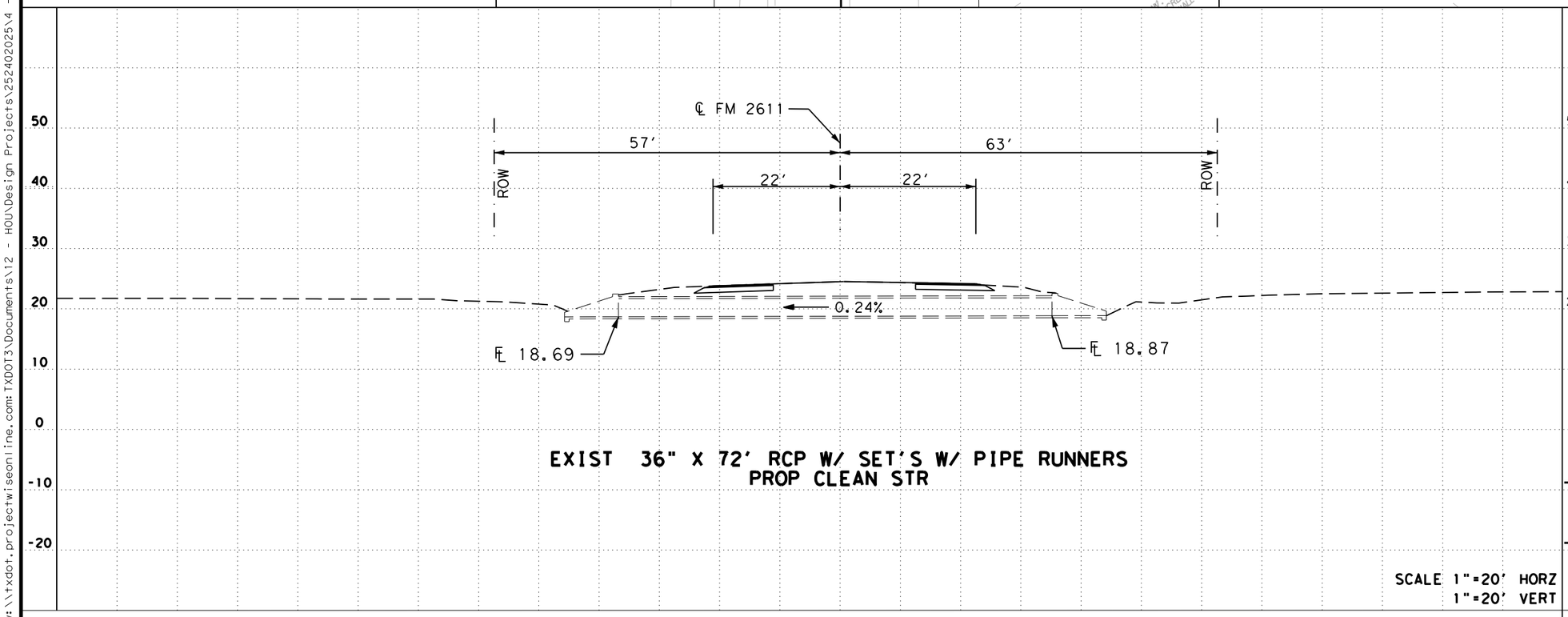
CULVERT LAYOUT STA 529+83

SHEET 12 OF 14

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		151





EXIST 36" X 72' RCP W/ SET'S W/ PIPE RUNNERS
PROP CLEAN STR

SCALE 1"=20' HORZ
1"=20' VERT

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CULVERT LAYOUT STA 542+16

SHEET 13 OF 14

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		152

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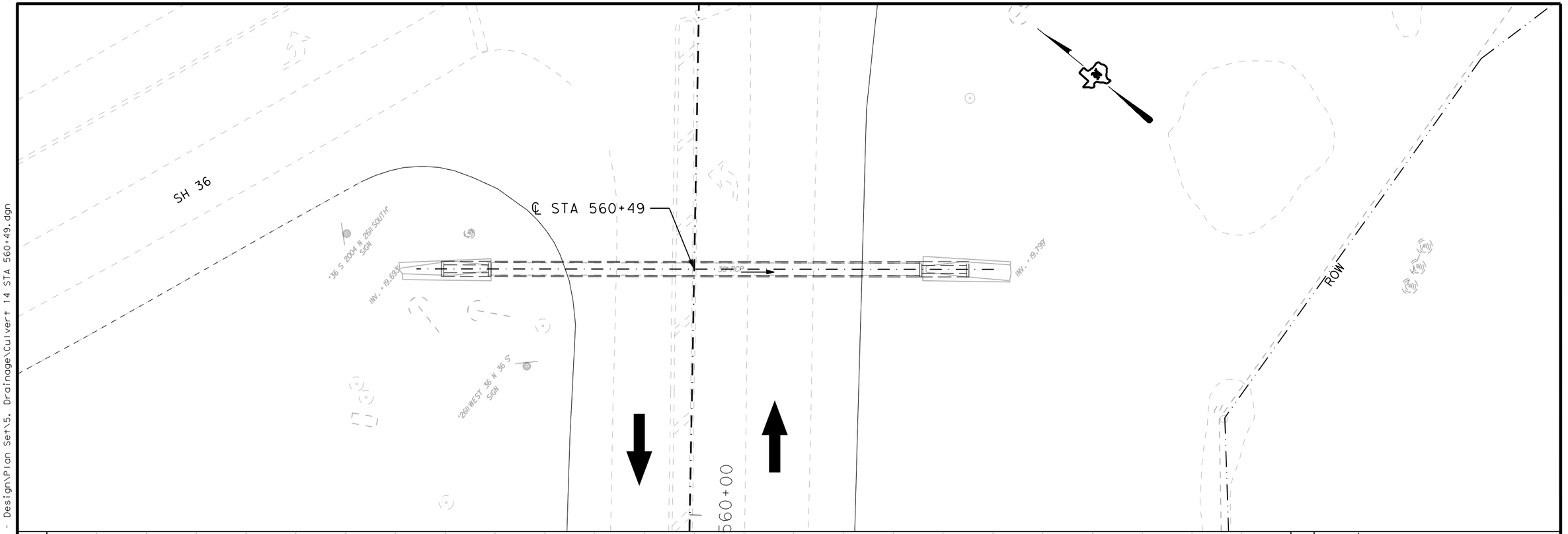

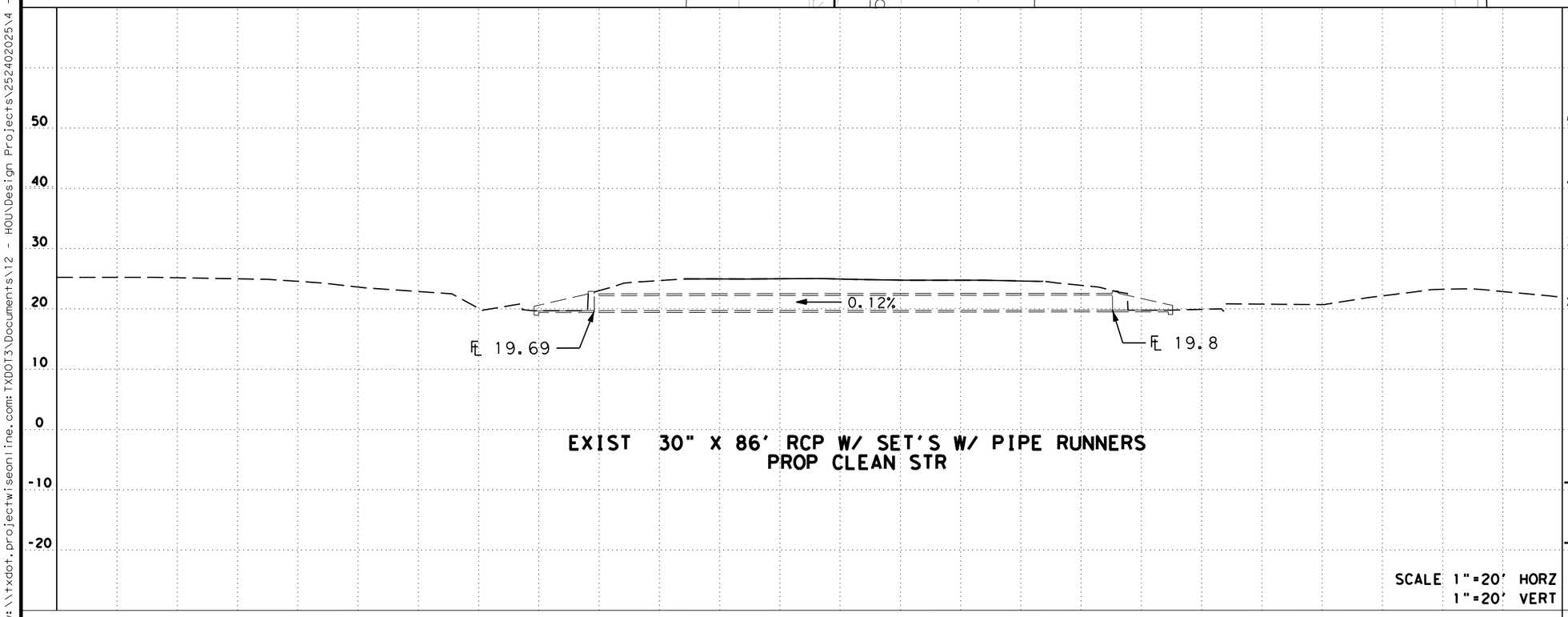

EXIST 30" X 86' RCP W/ SET'S W/ PIPE RUNNERS
PROP CLEAN STR

SCALE 1"=20' HORZ
1"=20' VERT

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CULVERT LAYOUT STA 560+49

SHEET 14 OF 14

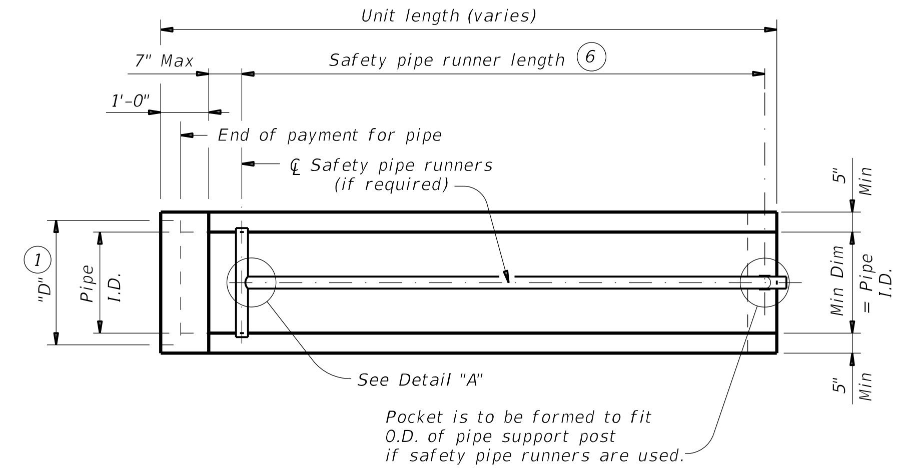
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		153

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe Skew	Single Pipe: Pipe Runners Required	Multiple Pipes Skew	Multiple Pipes: Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' - 11"	≤ 45°	No	≤ 45°	No
				4:1	3' - 6"				
				6:1	4' - 9"				
15"	2 1/4"	1.30"	20.50"	3:1	3' - 8"	≤ 45°	No	≤ 45°	No
				4:1	4' - 7"				
				6:1	6' - 5"				
18"	2 1/2"	1.60"	24.00"	3:1	4' - 6"	≤ 45°	No	≤ 45°	No
				4:1	5' - 8"				
				6:1	8' - 0"				
24"	3"	1.95"	31.00"	3:1	6' - 2"	≤ 45°	No	= 30°	No
				4:1	7' - 10"			> 30°	Yes
				6:1	11' - 3"				
30"	3 1/2"	2.65"	38.50"	3:1	7' - 10"	= 15°	No	= 15°	No
				4:1	10' - 1"	> 15°	Yes	> 15°	Yes
				6:1	14' - 8"				
36"	4"	2.75"	45.50"	3:1	9' - 5"	= 0°	No	≥ 0°	Yes
				4:1	12' - 3"	> 0°	Yes		
				6:1	17' - 11"				
42"	4 1/2"	N/A	52.50"	3:1	11' - 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' - 5"				
				6:1	21' - 2"				

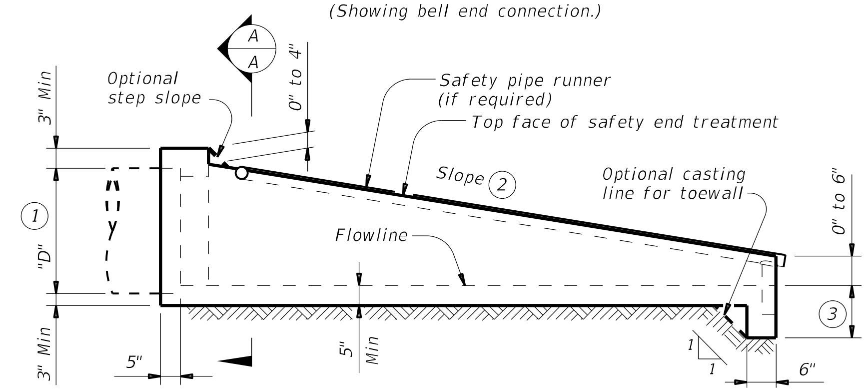
SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size: Pipe Size	Pipe O.D.	Pipe I.D.
11' - 2"	3" STD	3.500"	3.068"
15' - 6"	3 1/2" STD	4.000"	3.548"
20' - 10"	4" STD	4.500"	4.026"
35' - 4"	5" STD	5.563"	5.047"



PLAN

(Showing bell end connection.)



LONGITUDINAL ELEVATION

(Showing bell end connection.)

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Measured along slope.

(7) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(8) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

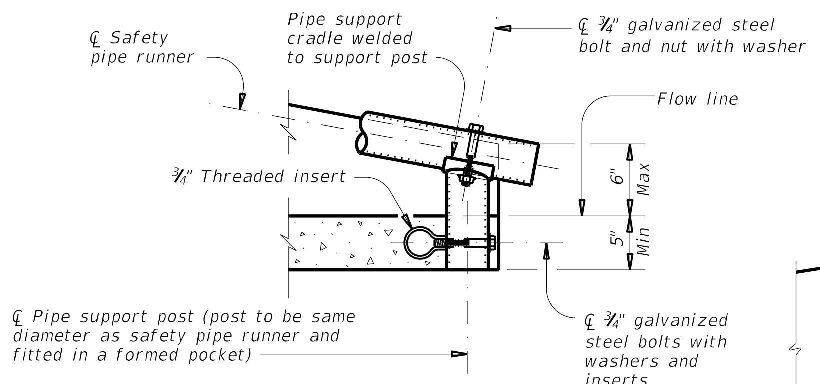
At the option and expense of the Contractor, the next larger size of safety end treatment may be furnished as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

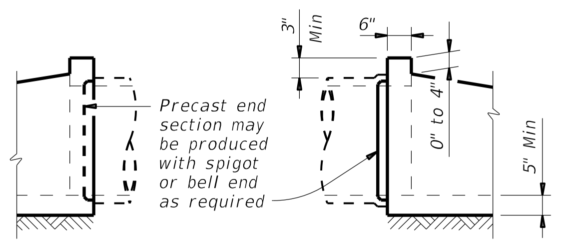
Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464 "Reinforced Concrete Pipe". Connect TP by grouting. See PBGC standard for grouted connections with TP and precast safety end treatment.



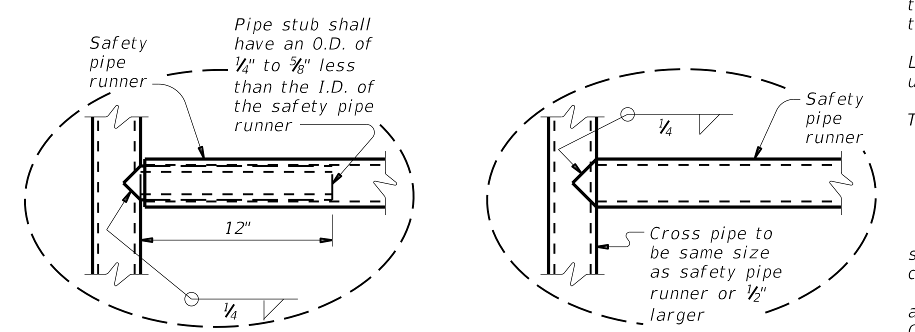
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)

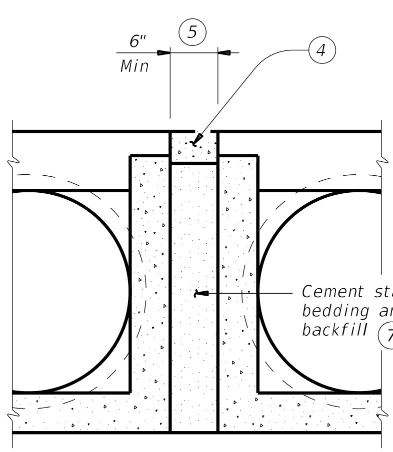


OPTION A

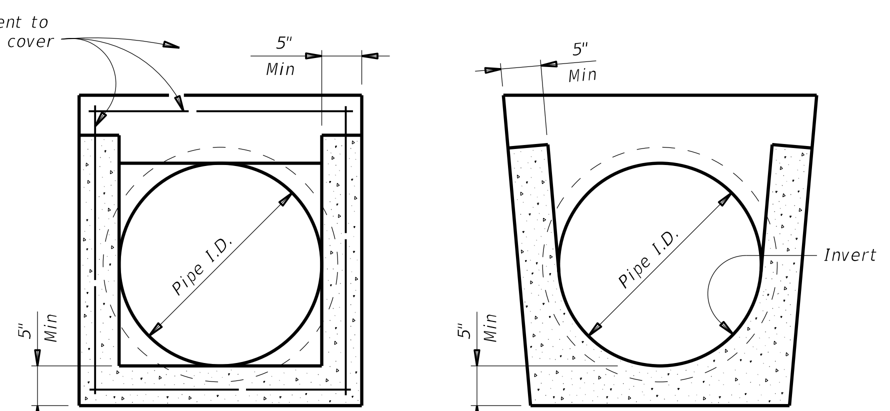
DETAIL A

OPTION B

(If required)



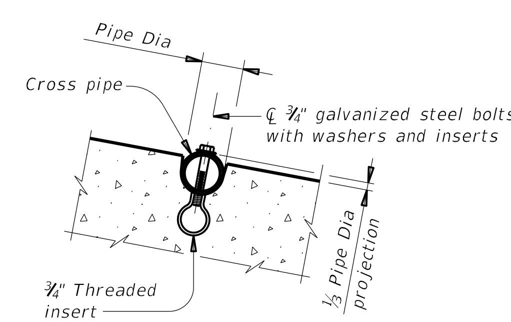
MULTIPLE PIPE INSTALLATION



OPTION WITH SQUARE BOTTOM

OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

DATE: 12/21/2020 2:52:54 PM
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Texas Department of Transportation — Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-SC

FILE: psetscss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT 2524	SECT 02	JOB 025,ETC	HIGHWAY FM 2611
REVISIONS	DIST HOU	COUNTY BRAZORIA		SHEET NO. 154

DATE: 12/21/2020 2:53:07 PM
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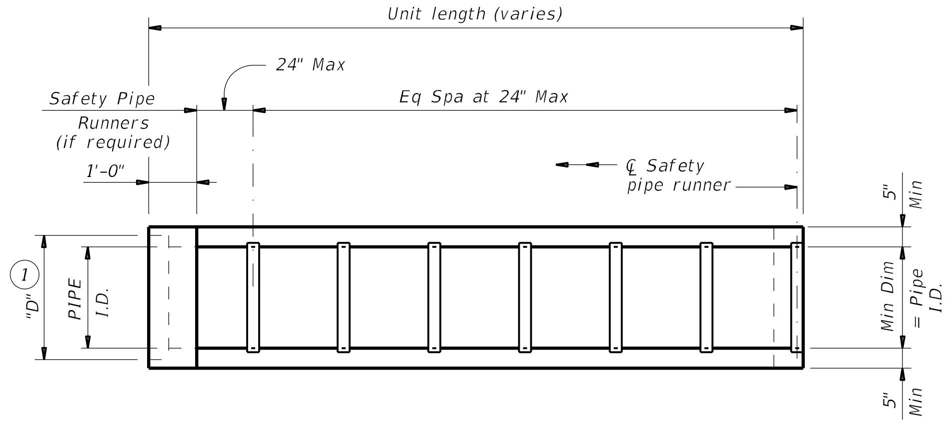
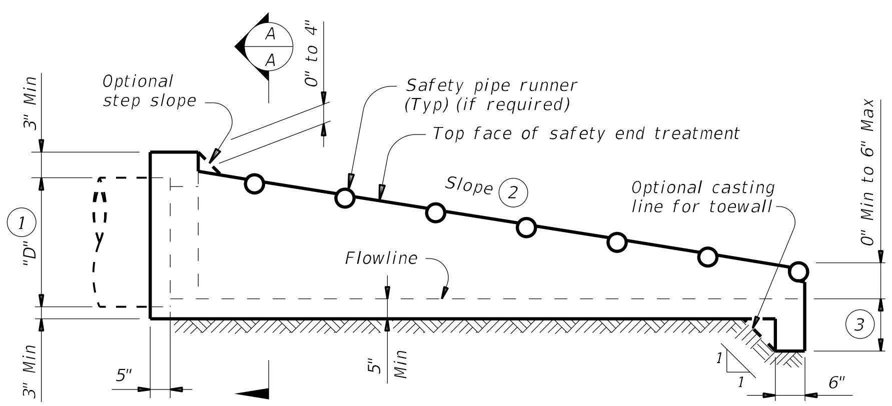


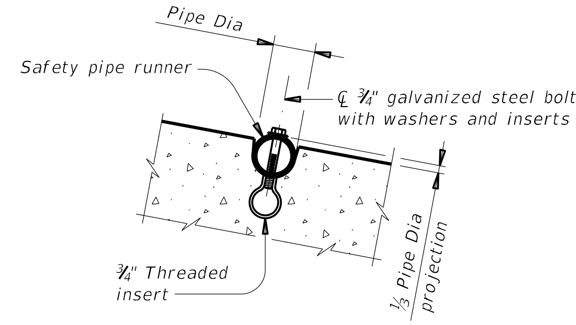
PLAN

(Showing bell end connection.)



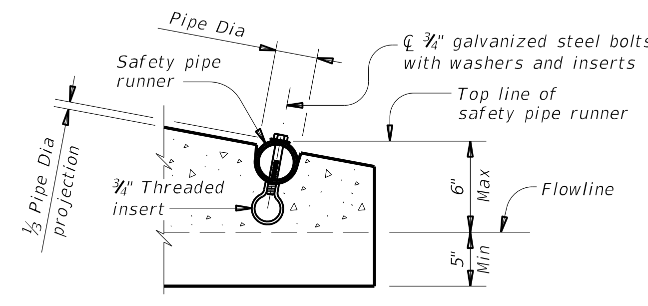
LONGITUDINAL ELEVATION

(Showing bell end connection.)

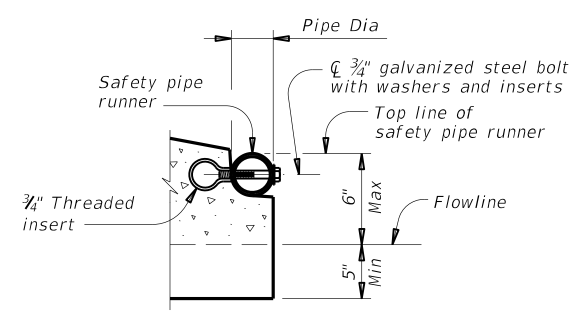


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



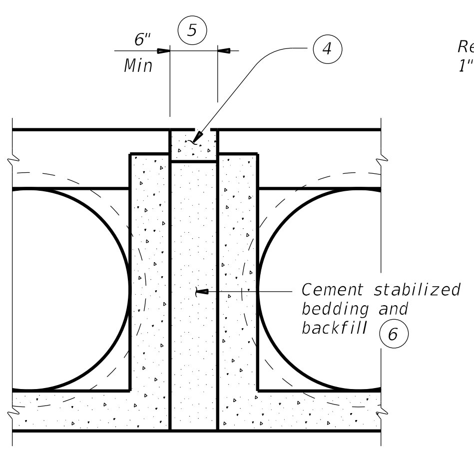
OPTION A



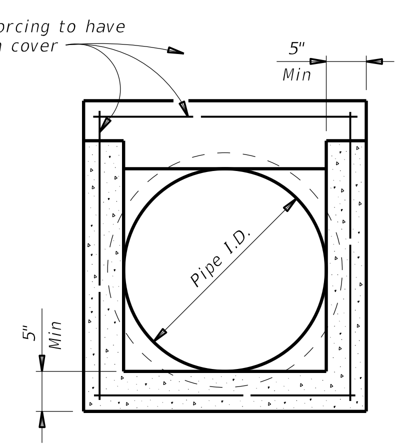
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

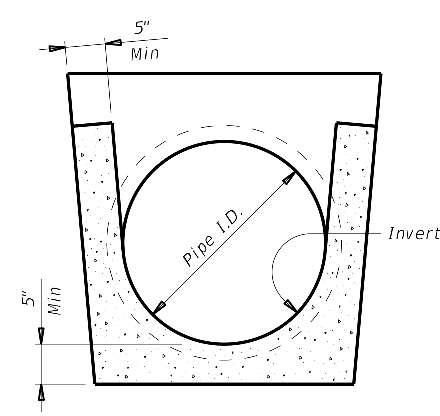
(If required)



MULTIPLE PIPE INSTALLATION

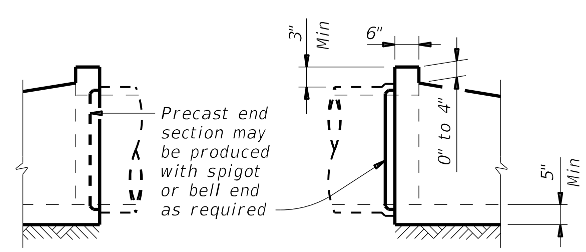


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' - 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' - 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' - 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' - 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' - 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' - 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	N/A	52.50"	6:1	21' - 2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe". Connect TP by grouting. See PBGC standard for grouted connections with TP and precast safety end treatment.

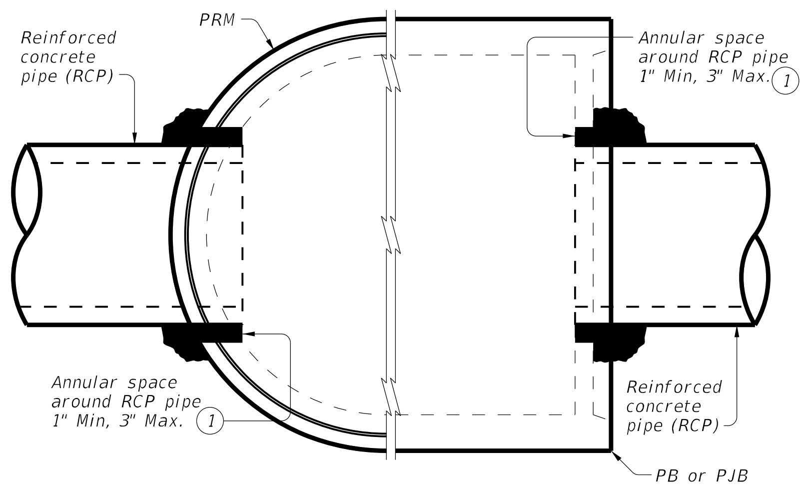
Texas Department of Transportation — Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

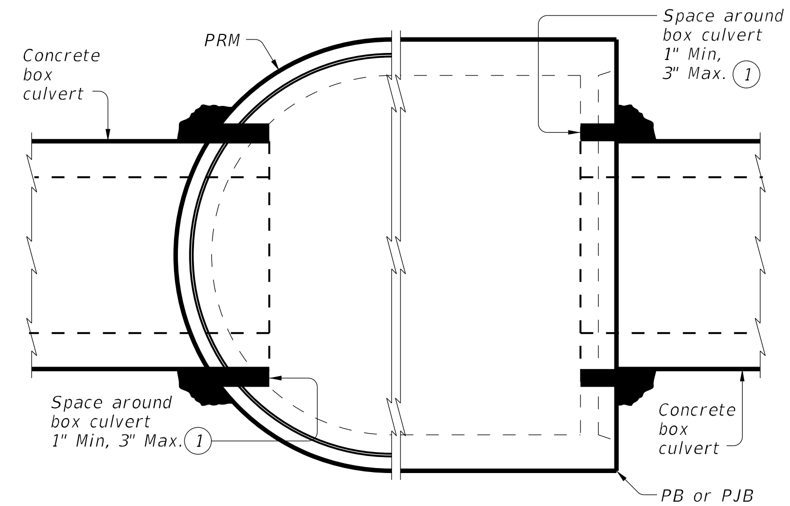
FILE: psetspss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT 2524	SECT 02	JOB 025,ETC	HIGHWAY FM 2611
REVISIONS	DIST HOU	COUNTY BRAZORIA		SHEET NO. 155



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

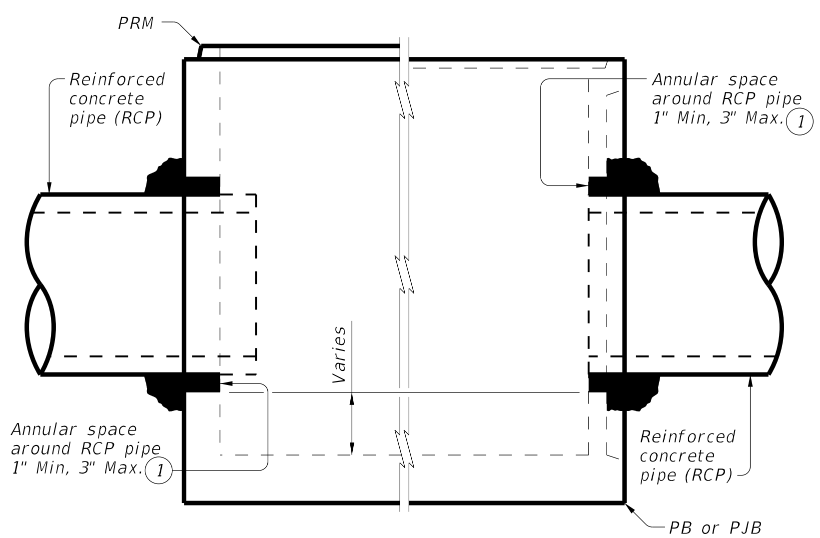
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

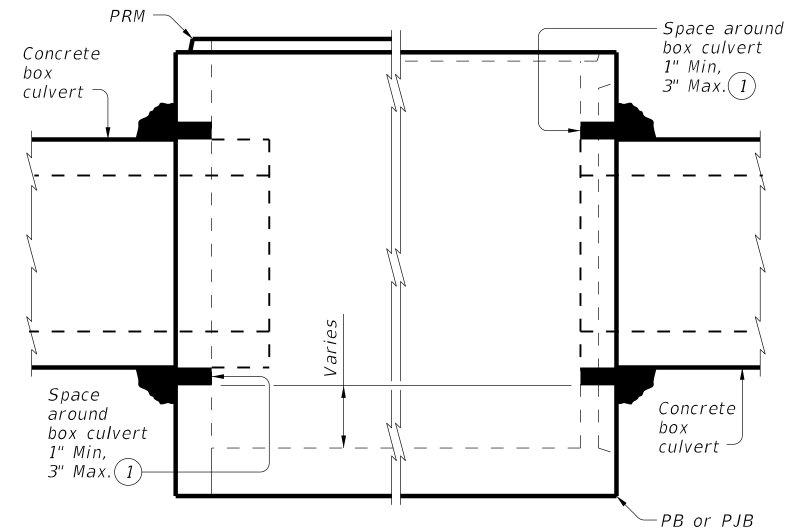
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

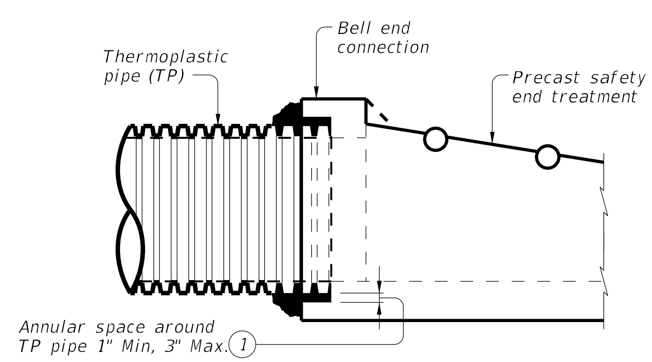
TYPICAL HALF ELEVATION



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF ELEVATION



TYPICAL PARTIAL ELEVATION OF PRECAST SAFETY END TREATMENTS

Showing square PSET for parallel drainage, cross drainage shown similar.

(1) Completely fill the void between the precast structure and the connecting pipe or box with cementitious grouts and mortars in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

CONSTRUCTION NOTES:

Do not grout rubber gasket joints without Manufacturer's recommendations.

Do not use bricks, masonry blocks, native stone, or similar materials in conjunction with grouted connections when filling void spaces around pipes or box culverts.

MATERIAL NOTES:

Provide grouted connections in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

GENERAL NOTES:

See applicable standards for notes and details not shown:
- Precast Base (PB)
- Precast Junction Box (PJB)
- Precast Round Manhole (PRM)
- Precast Safety End Treatments C/D Square (PSET-SC)
- Precast Safety End Treatments P/D Square (PSET-SP)

Provide Concrete Box Culverts in accordance with Item 462 "Concrete Box Culverts and Drains".

Provide Reinforced Concrete Pipe (RCP) in accordance with Item 464 "Reinforced Concrete Pipe".

Provide Thermoplastic Pipe (TP) in accordance with Special Specification Thermoplastic Pipe.

Payment for grouted connections is considered subsidiary to other bid Items.

Texas Department of Transportation — Bridge Division Standard

PIPE AND BOX GROUTED CONNECTIONS FOR PRECAST STRUCTURES

PBGC

FILE: pbgcstd1-20.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR	
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	2524	02	025,ETC	FM 2611	
	DIST	COUNTY		SHEET NO.	
	HOU	BRAZORIA		156	

DATE: 12/21/2020 2:53:19 PM
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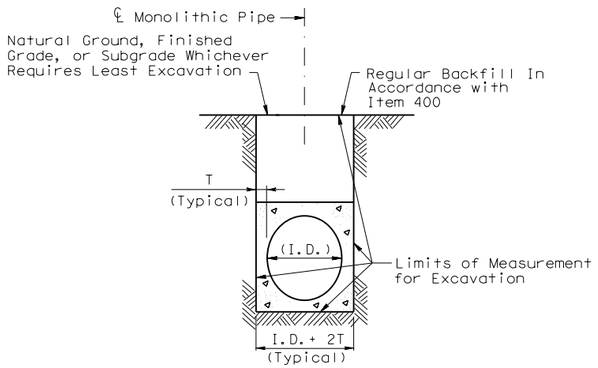
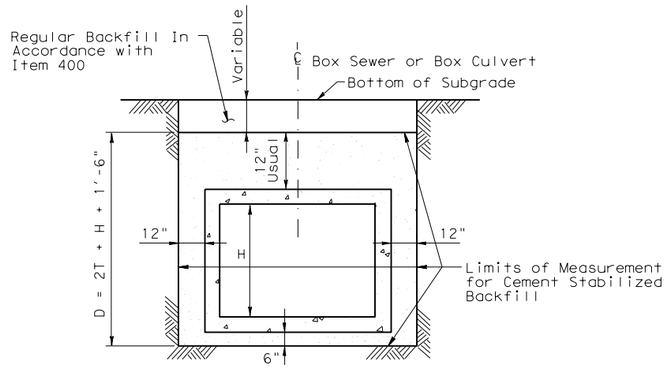


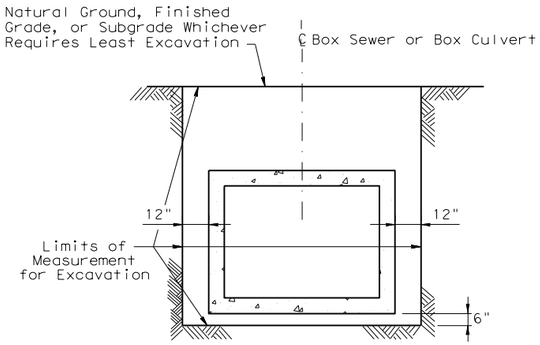
EXCAVATION DETAIL

MONOLITHIC PIPE
IN A PAVED OR GRADED AREA



BACKFILL DETAIL

BOX CULVERTS
IN A GRADED OR PAVED AREA
INCLUDING DETOURS *



EXCAVATION DETAIL

BOX CULVERTS
IN A GRADED AREA

REINFORCED CONCRETE PIPE

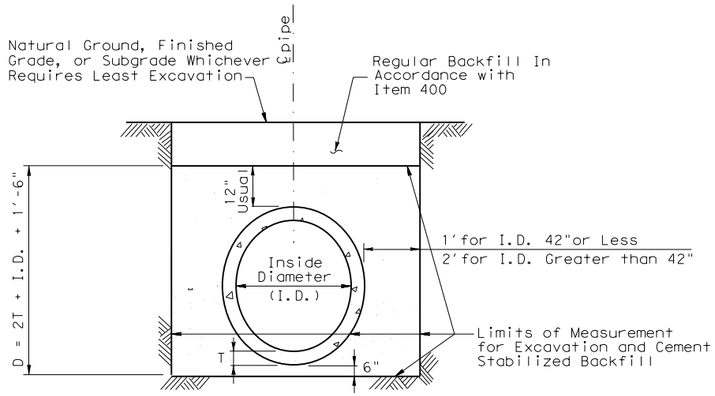
EXCAVATION AND BACKFILL QUANTITIES

PIPE DIA. IN.	T FT.	CULVERT OR SEWER EXCAVATION IN A PAVED OR GRADED AREA C.Y. PER L.F. PER FT. OF DEPTH	CEMENT STABILIZED BACKFILL IN A PAVED OR GRADED AREA C.Y. PER L.F. OF PIPE
18	0.19	0.144	0.383
24	0.23	0.165	0.478
30	0.29	0.188	0.586
36	0.33	0.210	0.692
42	0.38	0.231	0.808
48	0.42	0.327	1.394
54	0.46	0.349	1.560
60	0.50	0.370	1.731
66	0.54	0.392	1.907
72	0.58	0.414	2.088
78	0.62	0.435	2.275
84	0.67	0.457	2.474

MONOLITHIC PIPE

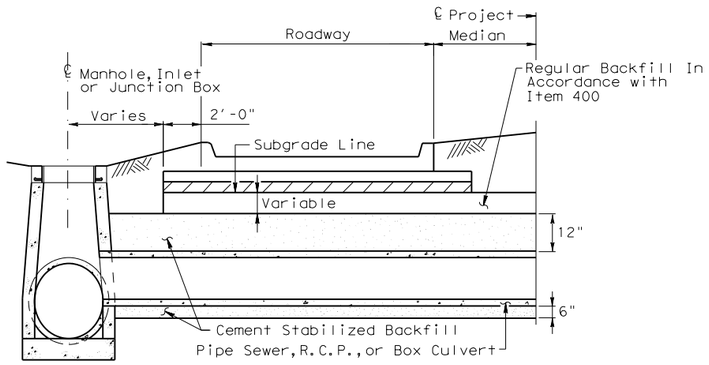
EXCAVATION QUANTITIES

PIPE DIA. IN.	T FT.	EXCAVATION C.Y. PER L.F. PER FT. OF DEPTH
36	0.417	0.142
42	0.458	0.164
48	0.458	0.182
54	0.500	0.204
60	0.583	0.228
66	0.583	0.247
72	0.625	0.269
78	0.625	0.287
84	0.625	0.306



EXCAVATION & BACKFILL DETAIL

REINFORCED CONCRETE PIPE
IN A GRADED OR PAVED AREA
INCLUDING DETOURS



BACKFILL DETAIL

AT MANHOLE, INLET OR JUNCTION BOX

D = Depth
H = Height
T = Thickness
R = Radius
Dia = Diameter

NOTE:

Cement stabilized backfill may be omitted in private driveways as indicated elsewhere in the plans.

Rubber gaskets shall be required for all joints on proposed cross drainage, pipe culverts and proposed storm sewer systems, unless otherwise shown in the plans.

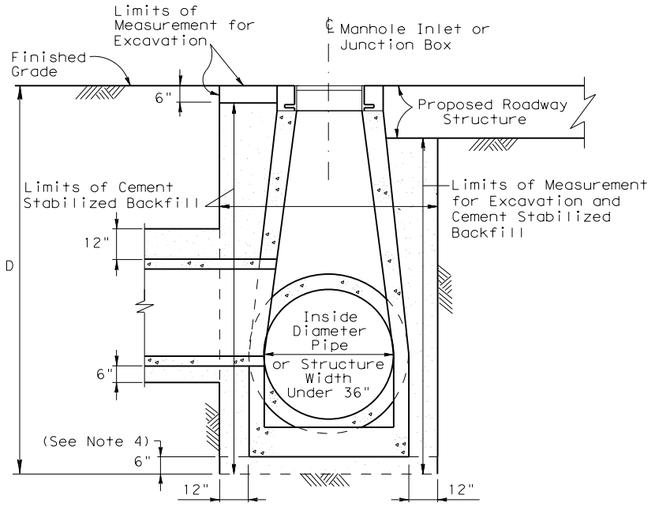
* Backfill with cement stabilized material will be required for all structures under detours unless noted otherwise in the General Notes.

Texas Department of Transportation
Houston District

EXCAVATION AND BACKFILL DIAGRAMS

E&BD

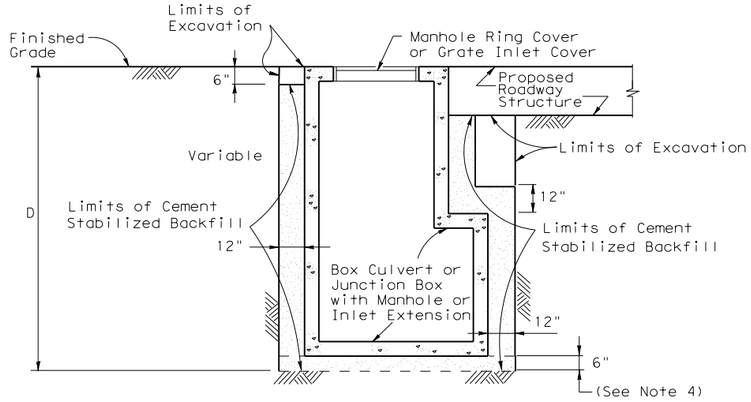
FILE: STDE1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT FEB 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS REVISED 11/05 REVISED 2/2010 Added note to Table 1, Sht 2 of 2. REVISED 6/12 REVISED 9/14	HOUSTON	6		157
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	BRAZORIA	2524	02 025,ETC	FM 2611



EXCAVATION AND BACKFILL DETAIL

MANHOLES SMALLER THAN 36 IN.
IN A PAVED OR GRADED AREAS

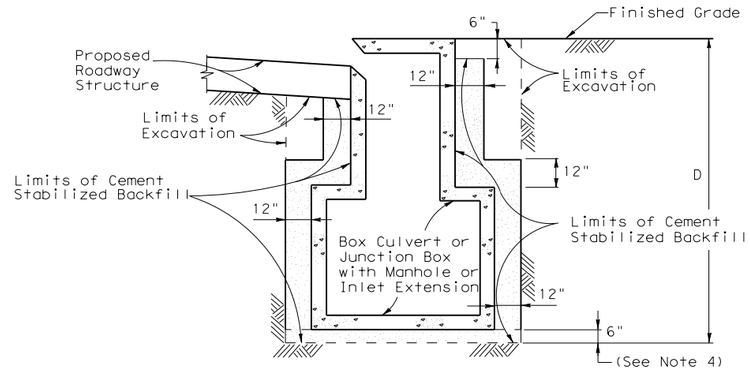
N.T.S.



EXCAVATION AND BACKFILL DETAIL

JUNCTION BOXES IN A
PAVED OR GRADED AREA

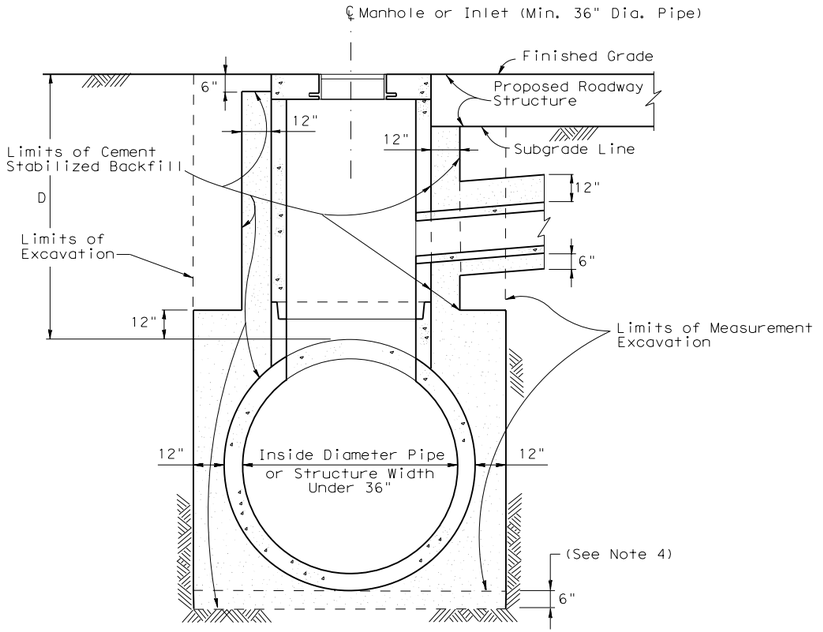
N.T.S.



EXCAVATION AND BACKFILL DETAIL

INLET EXTENSIONS ON A BOX CULVERT
IN A PAVED OR GRADED AREA

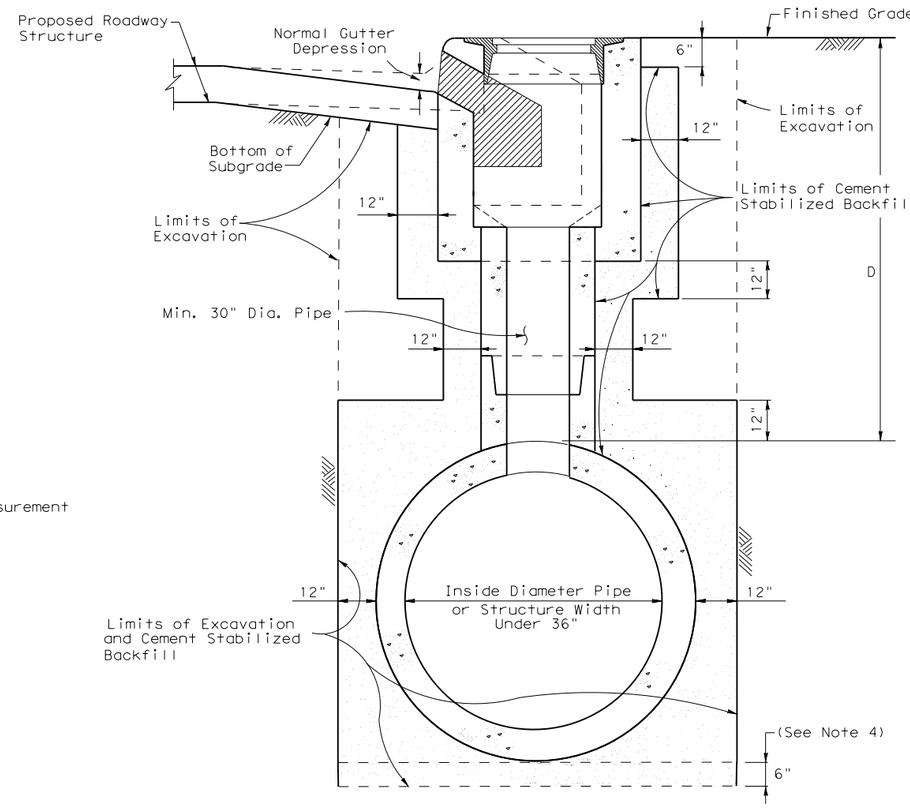
N.T.S.



EXCAVATION AND BACKFILL DETAIL

MANHOLES 36 IN. AND GREATER
IN A PAVED OR GRADED AREA

N.T.S.



EXCAVATION AND BACKFILL DETAIL

CURB INLETS IN A PAVED OR GRADED AREA

N.T.S.

D = Depth
H = Height
T = Thickness
R = Radius
Dia = Diameter

TABLE I

SCHEDULE FOR PAY QUANTITIES OF CEMENT STABILIZED BACKFILL (SEE NOTE 1)

MANHOLE OR INLET DEPTH (D) IN FEET	CEMENT STABILIZED BACKFILL IN CUBIC YARDS
0 through 5	5.75
> 5 through 10	8.25
greater than 10	12.75

TO BE PAID UNDER ITEM 400-6009 CEMENT STABILIZED BACKFILL (INLET OR MANHOLE)

NOTES:

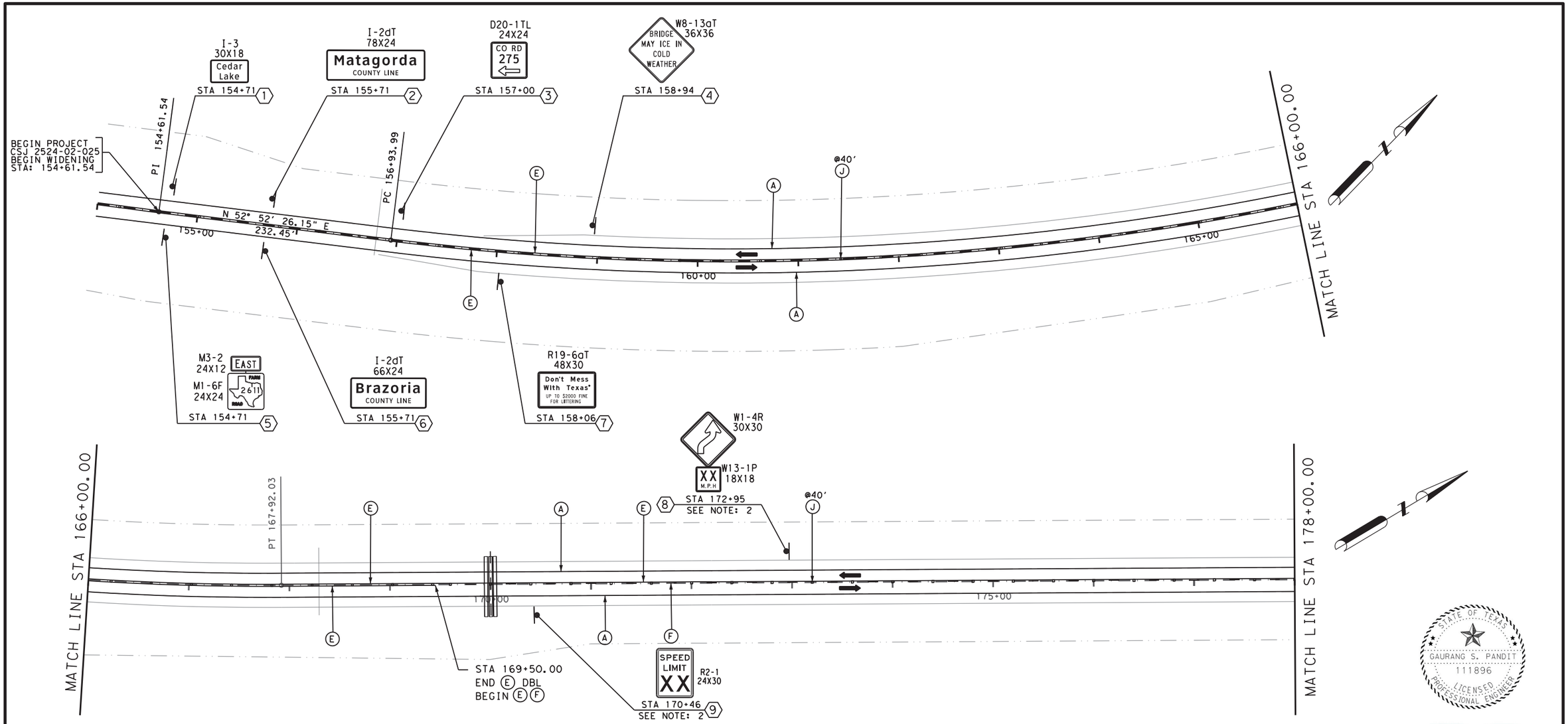
1. The Contractor is paid a fixed estimated amount for cement stabilized backfill based on depth (D) and Table. 1.
2. Proposed roadway structure includes pavement, base and any subgrade.
3. For backfill of intersecting pipes and box culverts, see "Excavation and Backfill Diagram for Pipes and Box Culverts."
4. 6" cement stabilized backfill will be required only for precast units.

Texas Department of Transportation
Houston District

EXCAVATION AND BACKFILL DIAGRAMS

E&BD

FILE: STDE1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT FEB 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS REVISED 2/2010 Added note to Table 1. REVISED 6/12 REVISED 9/14 REVISED 3/15	HOUSTON	6		158
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	BRAZORIA	2524	02 025,ETC	FM 2611



NOTES:

1. REMOVAL OF ALL EXISTING SMALL SIGNS WITHIN THE RIGHT OF WAY AND DESIGNATED EASEMENTS FOR CONSTRUCTION THAT ARE NOT SHOWN ON THE PLANS WILL BE PAID UNDER THE BID CODE 0644-6076.
2. SPEED LIMIT WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY. FOR FURTHER CLARIFICATION, REFER GENERAL NOTES ITEM# 644.

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (E) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y) 6" (BRK)(100MIL)
- (G) REFL PAV MRK TY I (Y) 24" (SLD)(100MIL)
- (H) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (I) REFL PAV MRKR TY I-C
- (J) REFL PAV MRKR TY II-A-A
- (K) PREFAB PAV MRK TY C (W)(ARROW)
- (L) PREFAB PAV MRK TY C (W)(WORD)
- (A1) REF PROF PAV MRK TY I (W) 6" (SLD)(100MIL)
- PROPOSED SMALL SIGN
- (X-) REMOVE SMALL SIGN ASSEMBLY
- (S-) RELOCATE SMALL SIGN ASSEMBLY
- EXIST SIGN TO REMAIN
- DIRECTION OF TRAVEL

STATE OF TEXAS
GAURANG S. PANDIT
111896
LICENSED
PROFESSIONAL ENGINEER

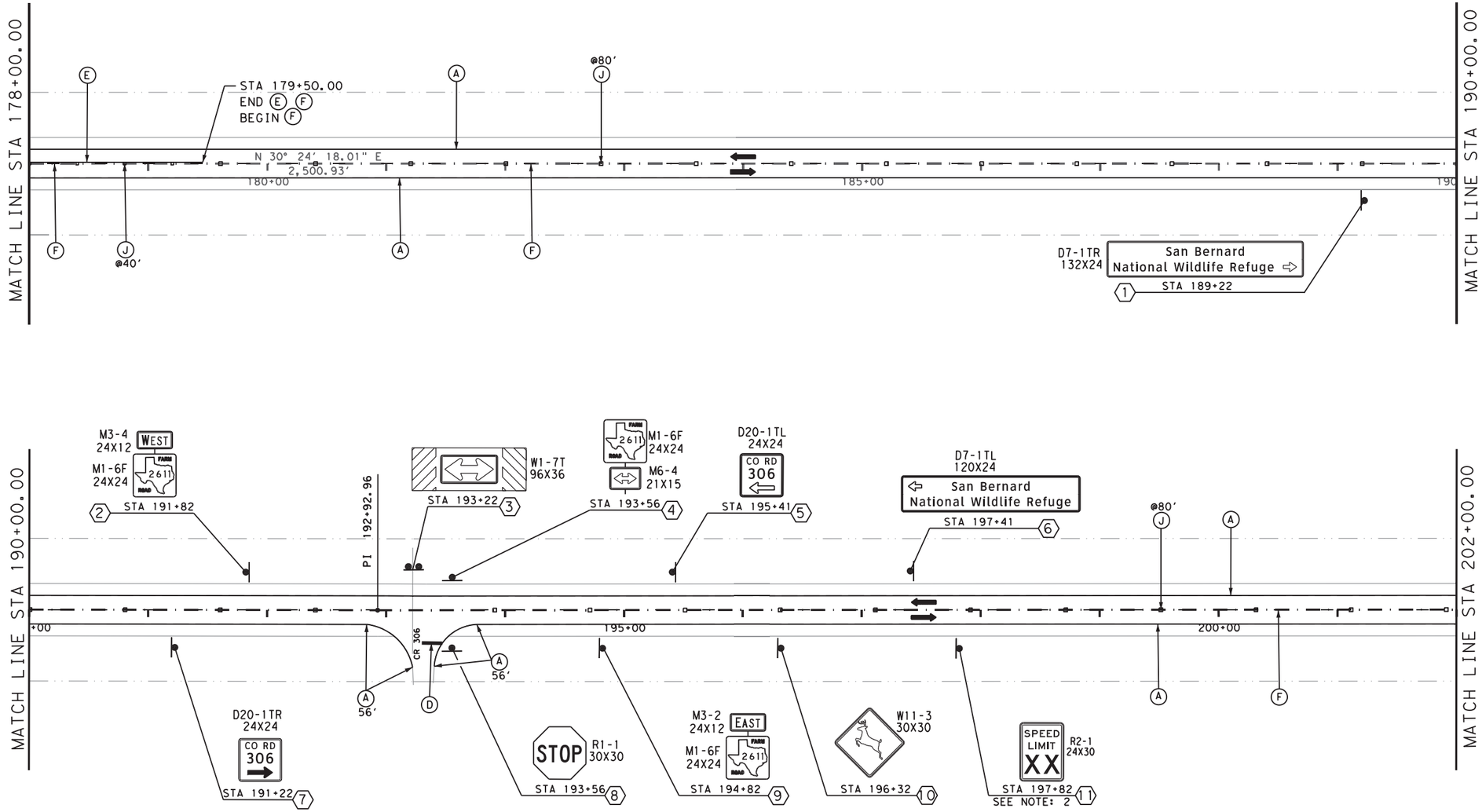
12/17/2020

FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 1 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		159

$DATE$
$FILE$



NOTES:

1. REMOVAL OF ALL EXISTING SMALL SIGNS WITHIN THE RIGHT OF WAY AND DESIGNATED EASEMENTS FOR CONSTRUCTION THAT ARE NOT SHOWN ON THE PLANS WILL BE PAID UNDER THE BID CODE 0644-6076.

2. SPEED LIMIT WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY. FOR FURTHER CLARIFICATION, REFER GENERAL NOTES ITEM# 644.

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (E) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y) 6" (BRK)(100MIL)
- (G) REFL PAV MRK TY I (Y) 24" (SLD)(100MIL)
- (H) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (I) REFL PAV MRKR TY I-C
- (J) REFL PAV MRKR TY II-A-A
- (K) PREFAB PAV MRK TY C (W)(ARROW)
- (L) PREFAB PAV MRK TY C (W)(WORD)
- (A1) REF PROF PAV MRK TY I (W) 6" (SLD)(100MIL)
- (X-) REMOVE SMALL SIGN ASSEMBLY
- (S-) RELOCATE SMALL SIGN ASSEMBLY
- EXIST SIGN TO REMAIN
- DIRECTION OF TRAVEL

STATE OF TEXAS
GAURANG S. PANDIT
111896
LICENSED
PROFESSIONAL ENGINEER

12/17/2020

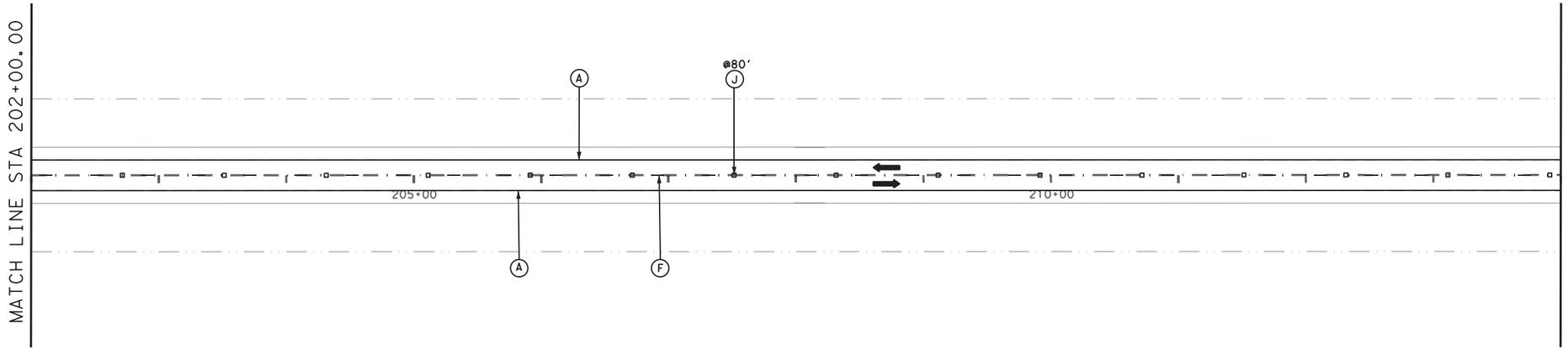
Texas Department of Transportation®

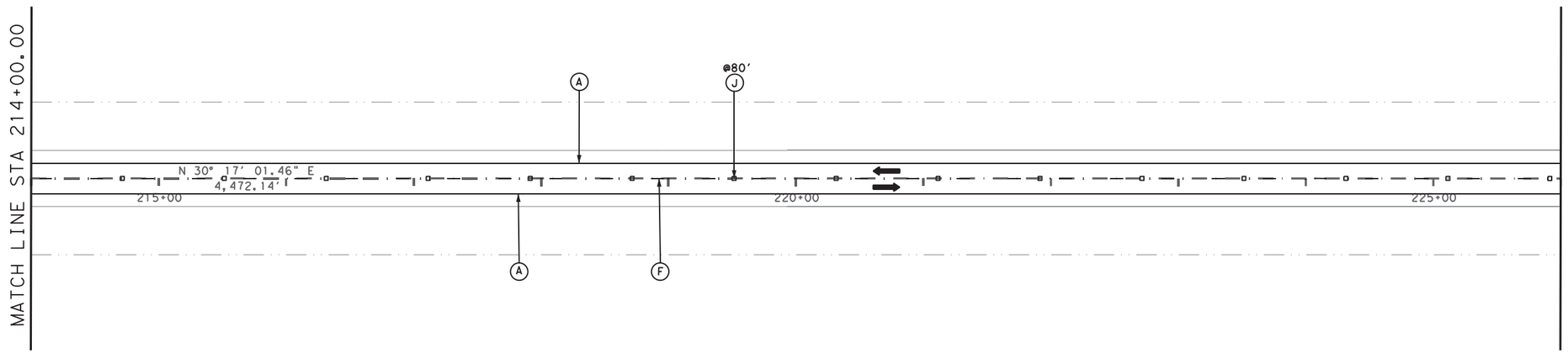
FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 2 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		160

$DATE$
$FILE$





NOTES:

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- (D) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
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STATE OF TEXAS
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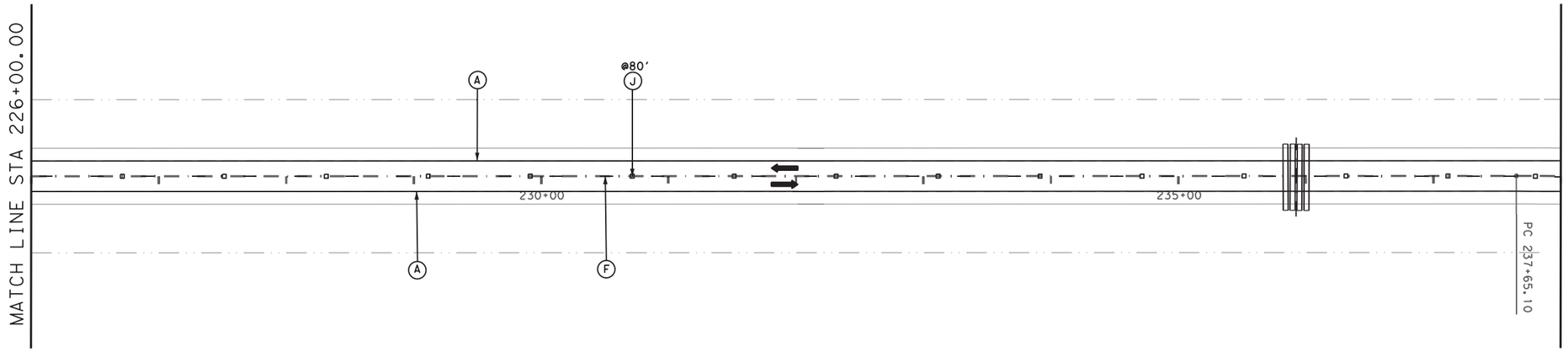
12/17/2020

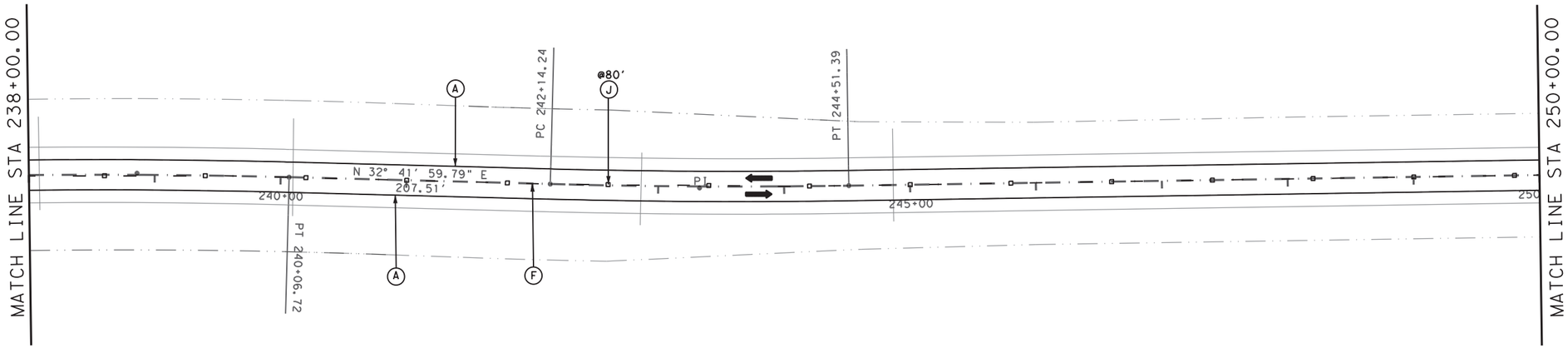
FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 3 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		161

$DATE$
$FILE$





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LEGEND:

- (A) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
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- (C) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (E) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y) 6" (BRK)(100MIL)
- (G) REFL PAV MRK TY I (Y) 24" (SLD)(100MIL)
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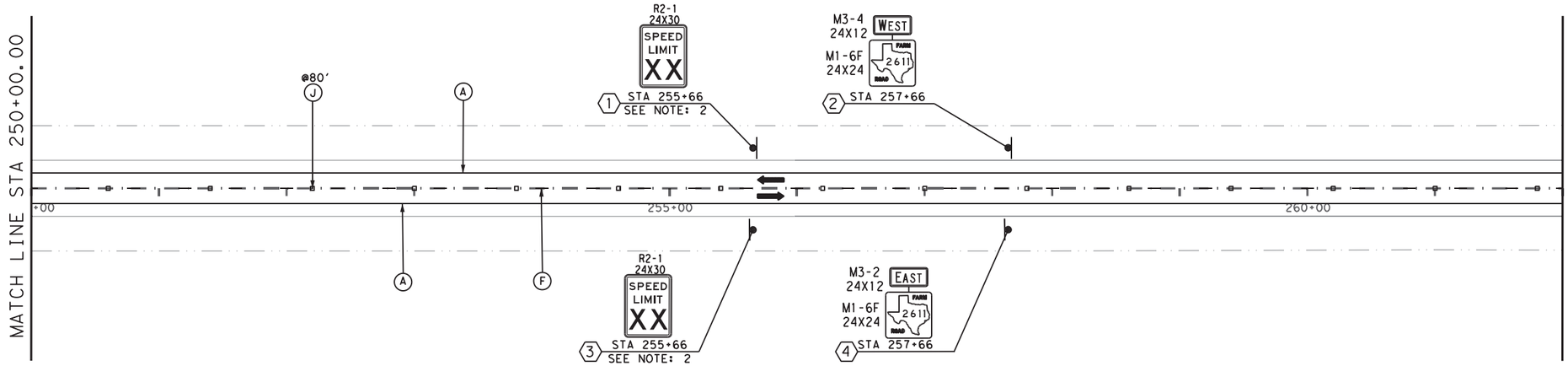
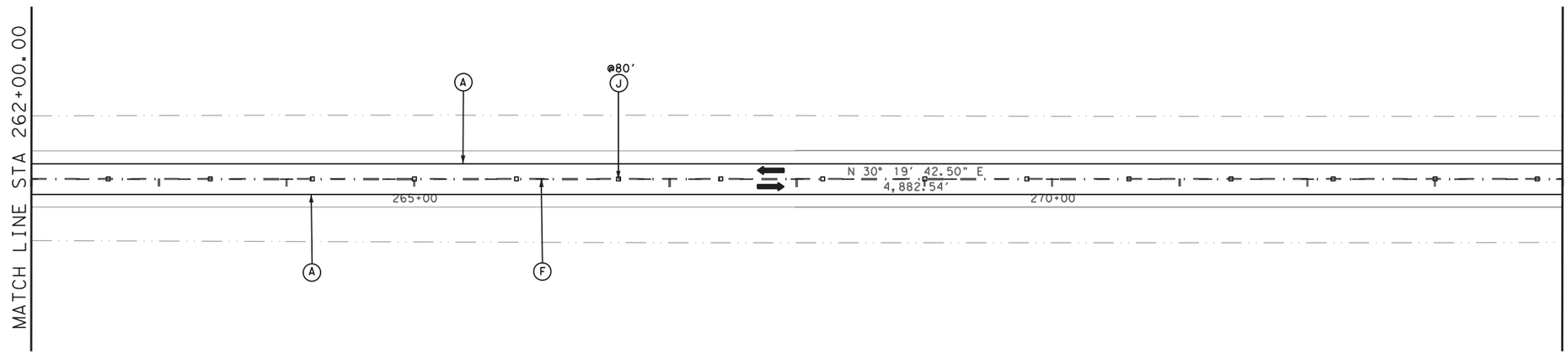
FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 4 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		162

$DATE$
$FILE$





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LEGEND:

- (A) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
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- (C) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (E) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
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- (H) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
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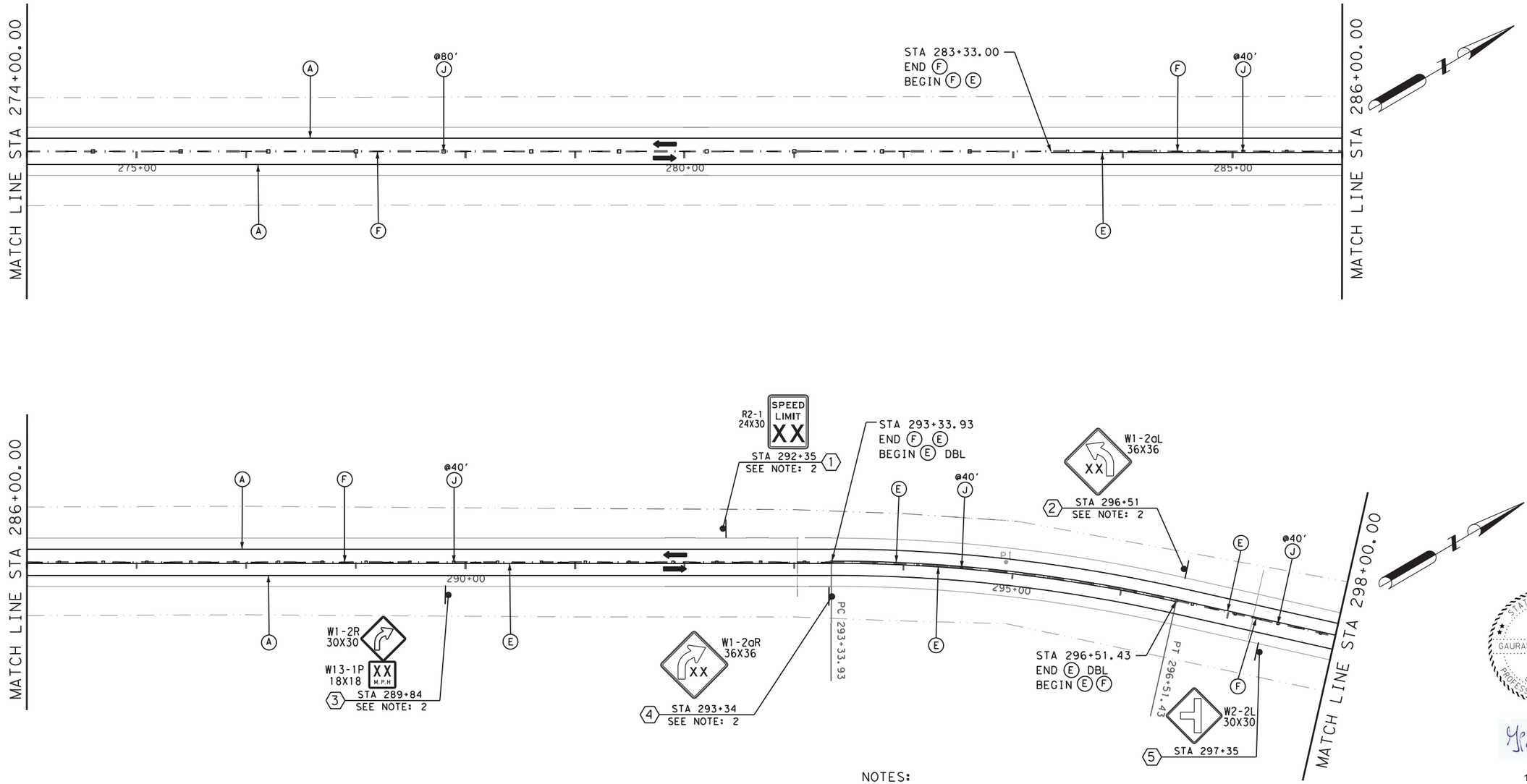
FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 5 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		163

$DATE$
$FILE$



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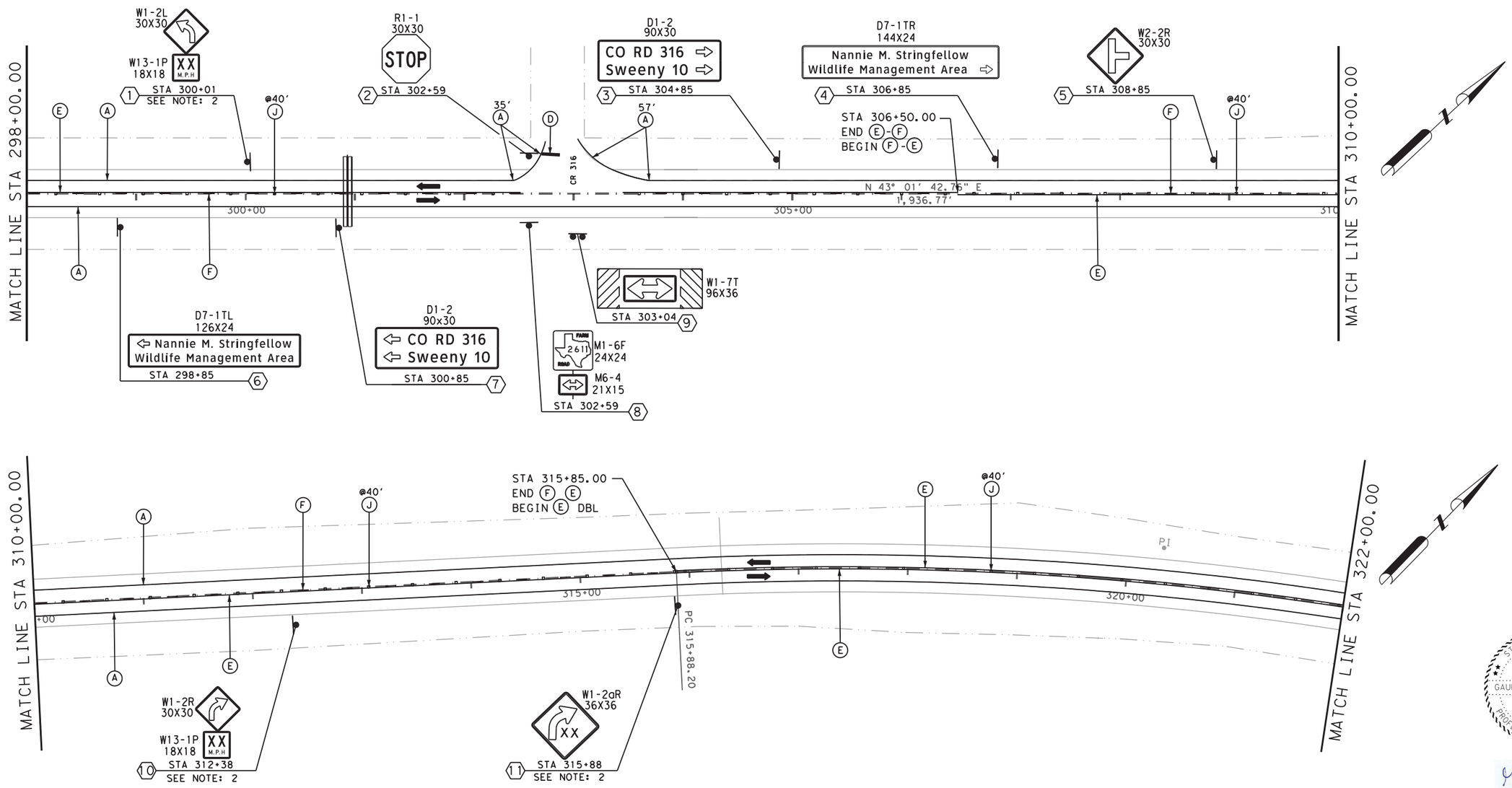
FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 6 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		164

$DATE$
$FILE$



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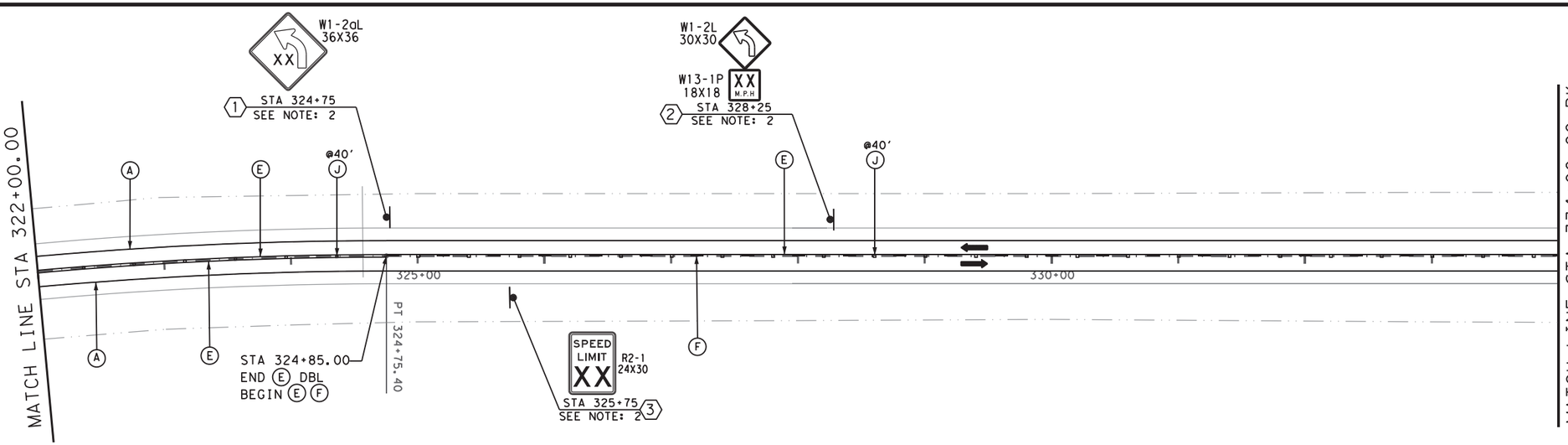
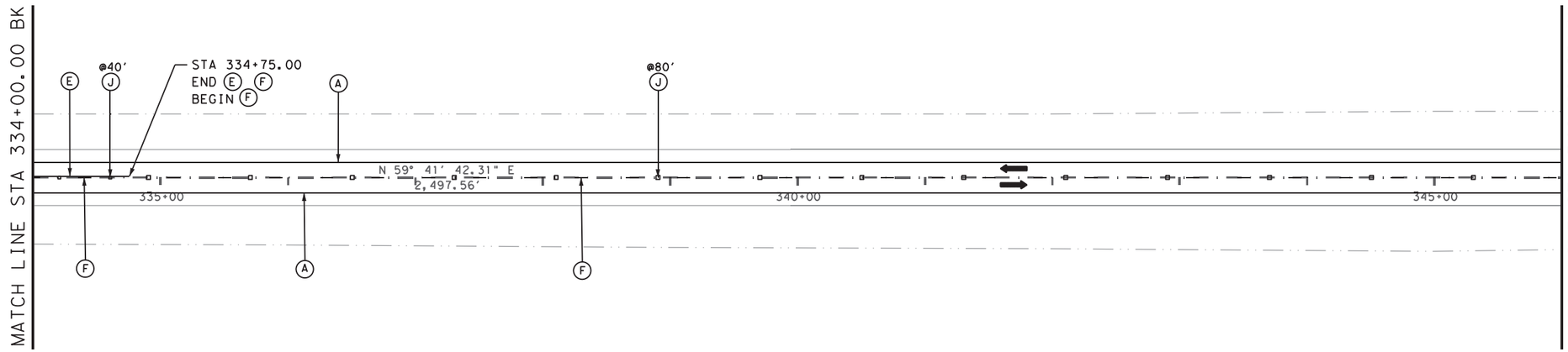
FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 7 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		165

$DATE$
$FILE$





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- (D) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
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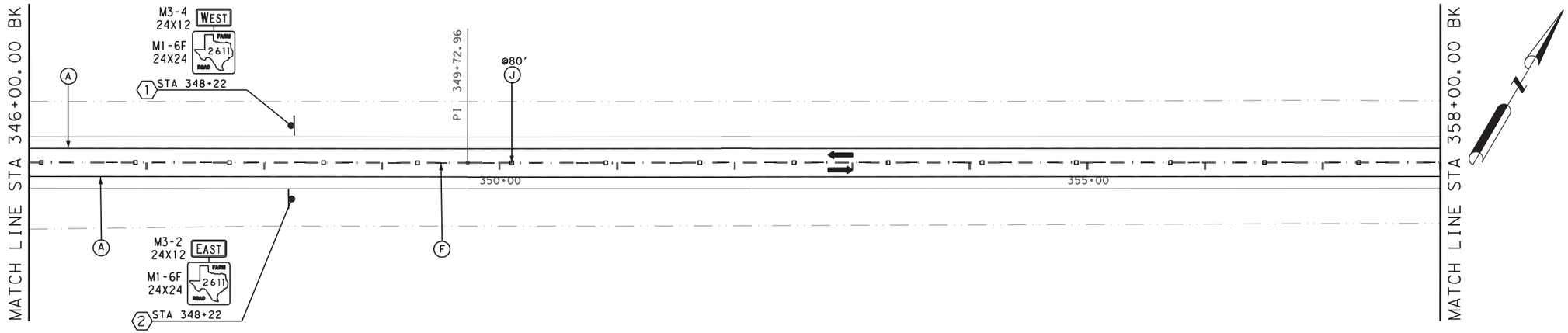
12/17/2020

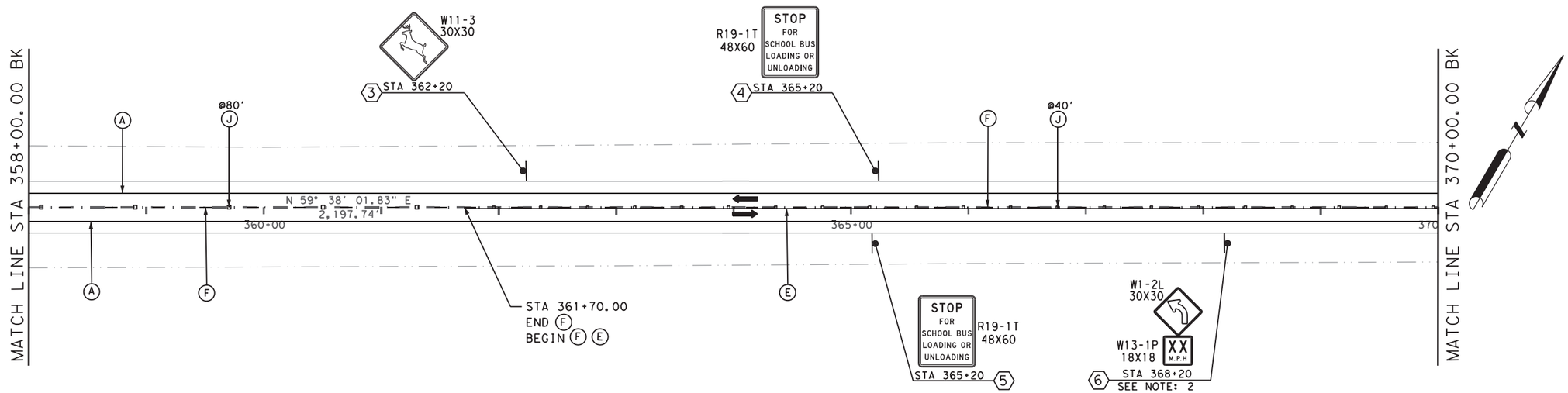
FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 8 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		166

$DATE$
$FILE$





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12/17/2020

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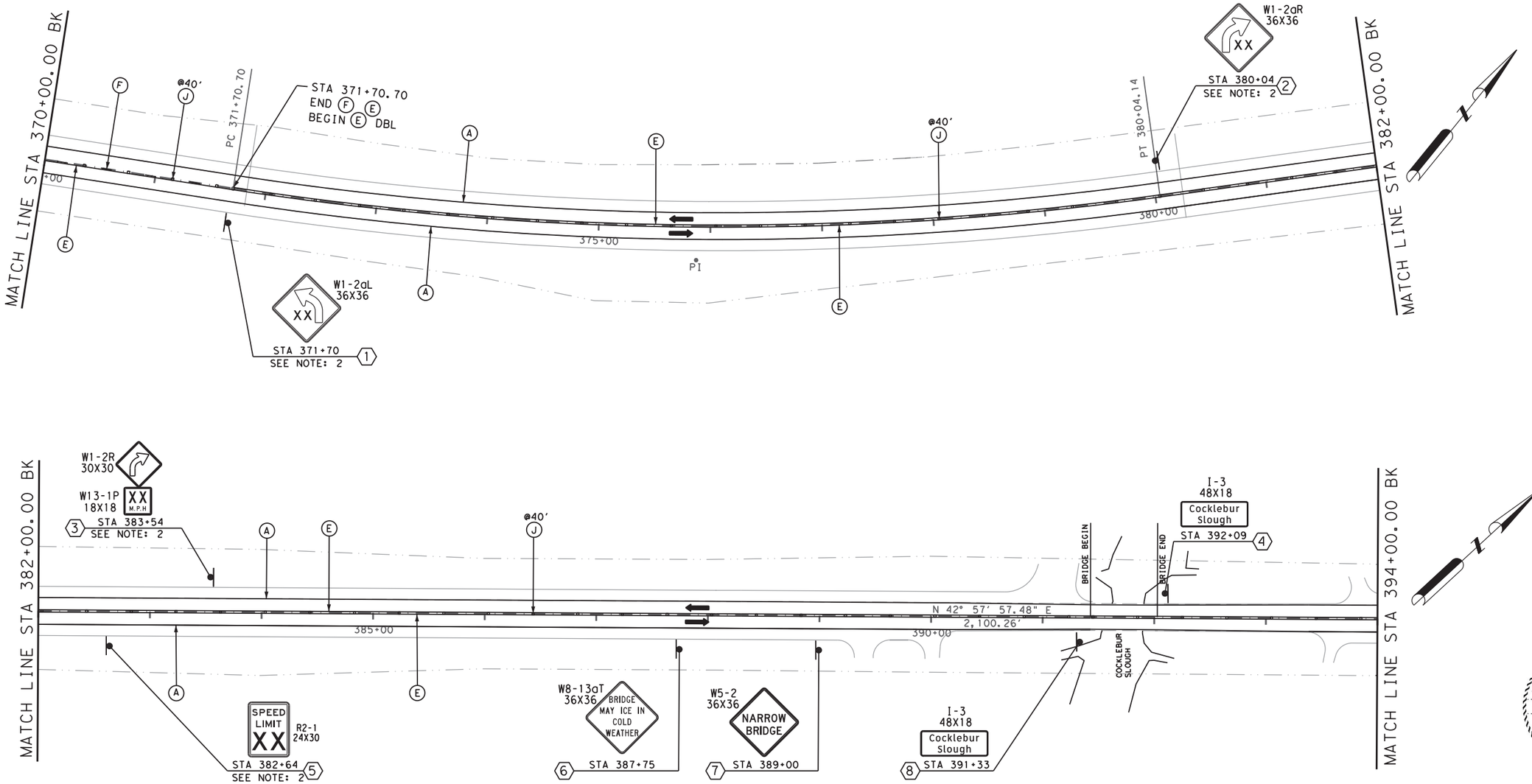
FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 9 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		167

$DATE$
$FILE$



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SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 10 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		168

$DATE$
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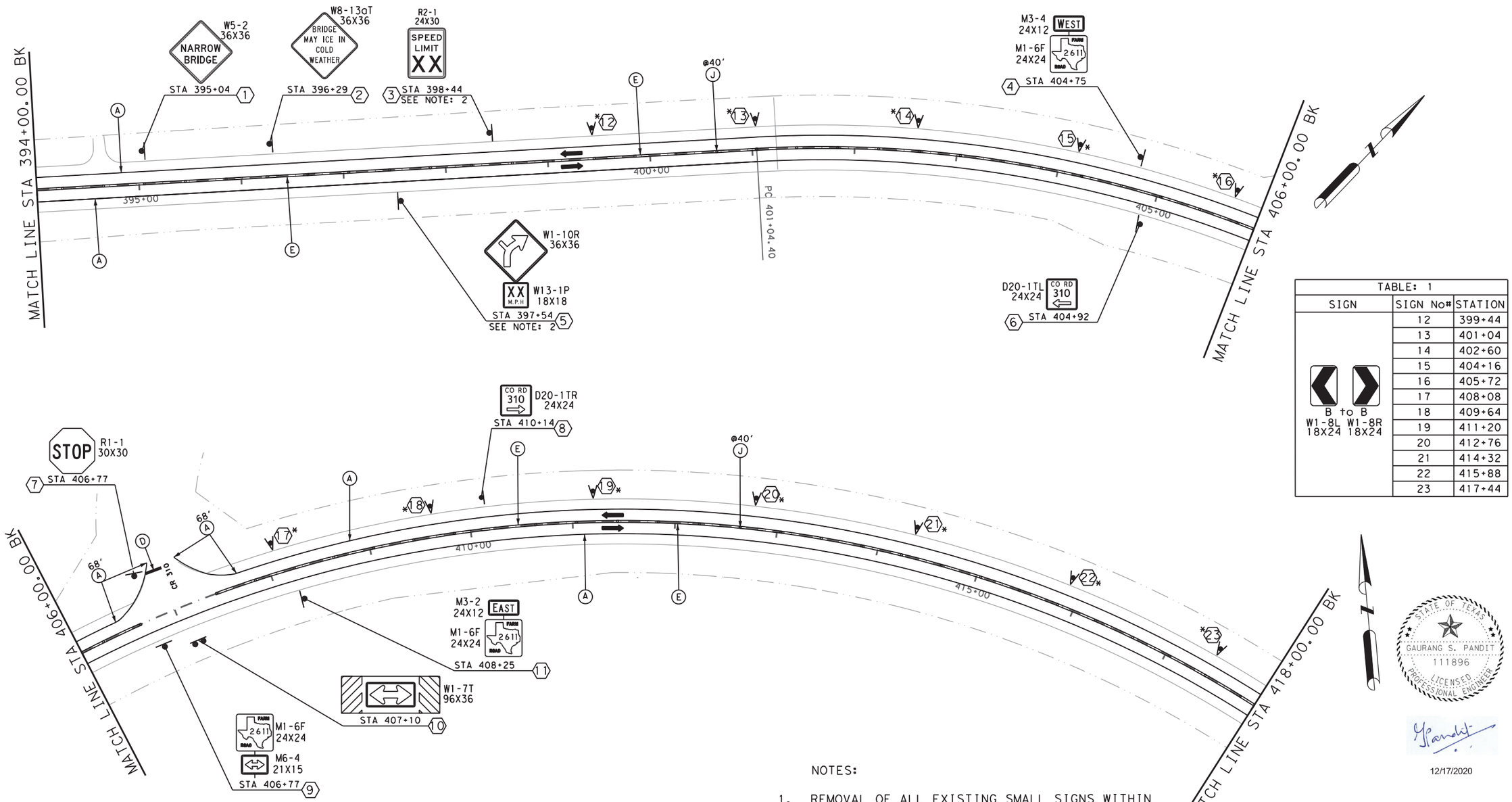

TABLE: 1		
SIGN	SIGN No#	STATION
B to B W1-8L W1-8R 18X24 18X24	12	399+44
	13	401+04
	14	402+60
	15	404+16
	16	405+72
	17	408+08
	18	409+64
	19	411+20
	20	412+76
	21	414+32
	22	415+88
	23	417+44

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* SEE TABLE 1 ON THIS SHEET.

LEGEND:

(A) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)	(G) REFL PAV MRK TY I (Y) 24" (SLD)(100MIL)	(A1) REF PROF PAV MRK TY I (W) 6" (SLD)(100MIL)
(B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)	(H) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)	PROPOSED SMALL SIGN
(C) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	(I) REFL PAV MRKR TY I-C	(X-) REMOVE SMALL SIGN ASSEMBLY
(D) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)	(J) REFL PAV MRKR TY II-A-A	(S-) RELOCATE SMALL SIGN ASSEMBLY
(E) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)	(K) PREFAB PAV MRK TY C (W)(ARROW)	EXIST SIGN TO REMAIN
(F) RE PM W/RET REQ TY I (Y) 6" (BRK)(100MIL)	(L) PREFAB PAV MRK TY C (W)(WORD)	DIRECTION OF TRAVEL

STATE OF TEXAS
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12/17/2020

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FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 11 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		169

$DATE$
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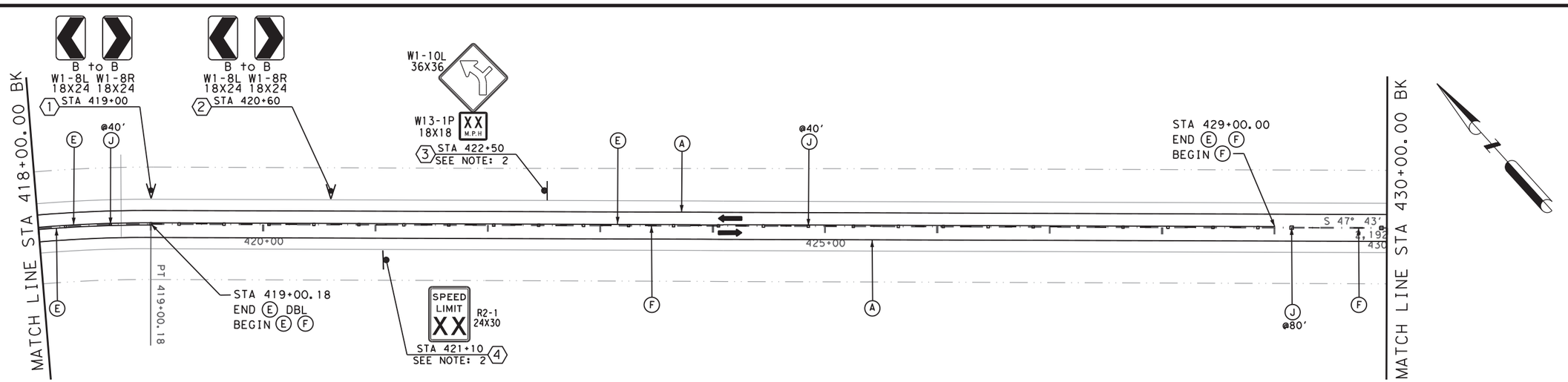

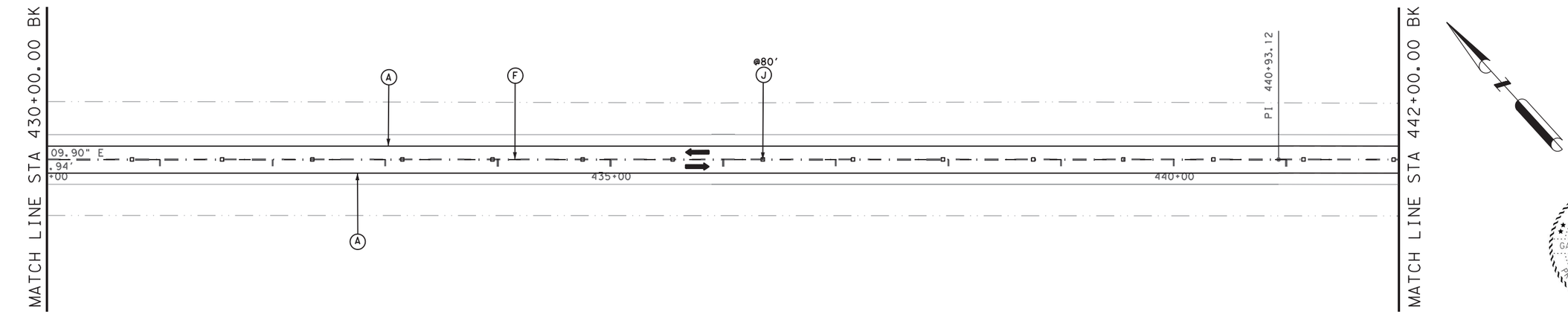

NOTES:

1. REMOVAL OF ALL EXISTING SMALL SIGNS WITHIN THE RIGHT OF WAY AND DESIGNATED EASEMENTS FOR CONSTRUCTION THAT ARE NOT SHOWN ON THE PLANS WILL BE PAID UNDER THE BID CODE 0644-6076.

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LEGEND:

- (A) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
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- (D) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
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- (H) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
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- (L) PREFAB PAV MRK TY C (W)(WORD)
- (A1) REF PROF PAV MRK TY I (W) 6" (SLD)(100MIL)
- PROPOSED SMALL SIGN
- (X-) REMOVE SMALL SIGN ASSEMBLY
- (S-) RELOCATE SMALL SIGN ASSEMBLY
- EXIST SIGN TO REMAIN
- DIRECTION OF TRAVEL

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

12/17/2020

FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 12 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		170

$DATE$
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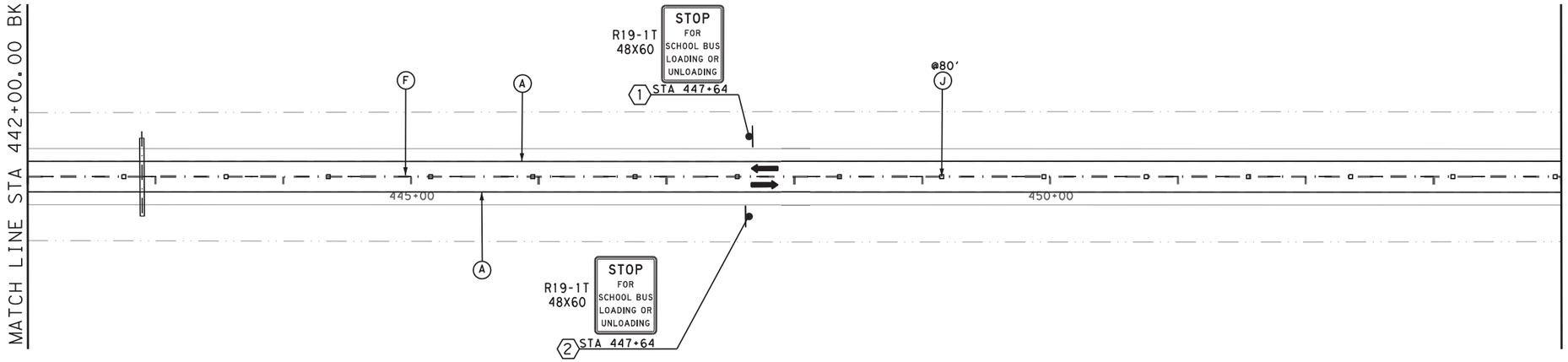

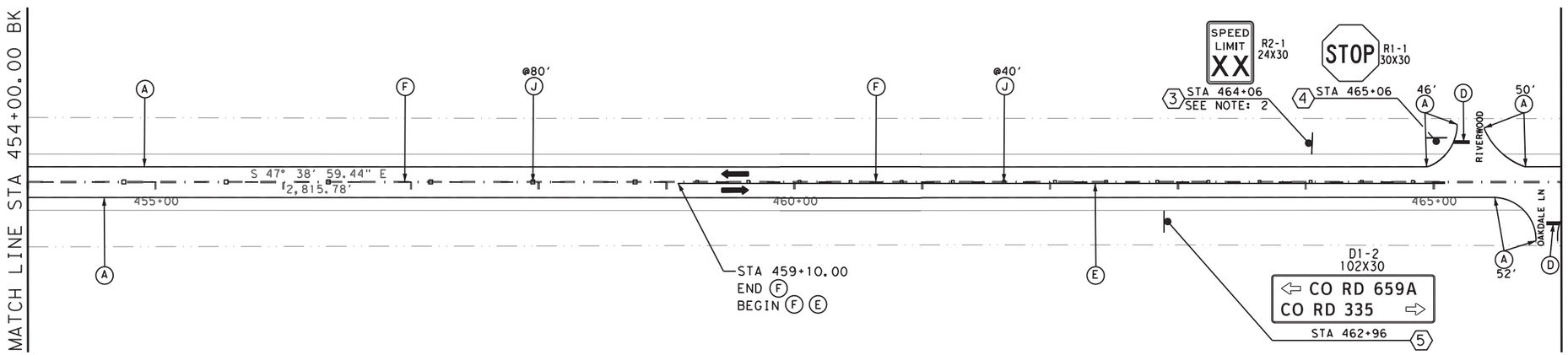

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- (D) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (E) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y) 6" (BRK)(100MIL)
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FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 13 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		171

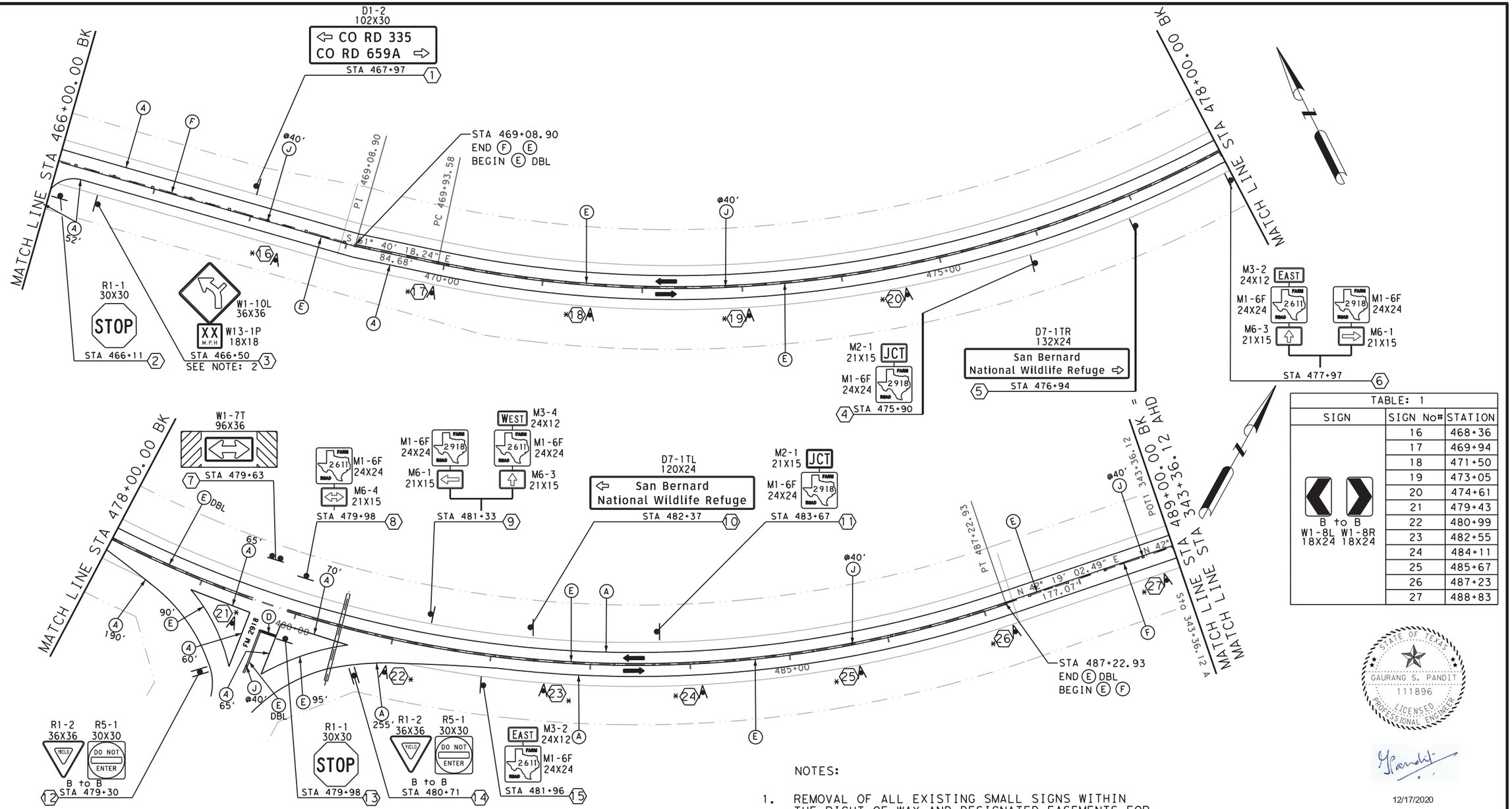

TABLE: 1		
SIGN	SIGN No#	STATION
B to B W1-8L W1-8R 18X24 18X24	16	468+36
	17	469+94
	18	471+50
	19	473+05
	20	474+61
	21	479+43
	22	480+99
	23	482+55
	24	484+11
	25	485+67
	26	487+23
	27	488+83

NOTES:

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* SEE TABLE 1 ON THIS SHEET.

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
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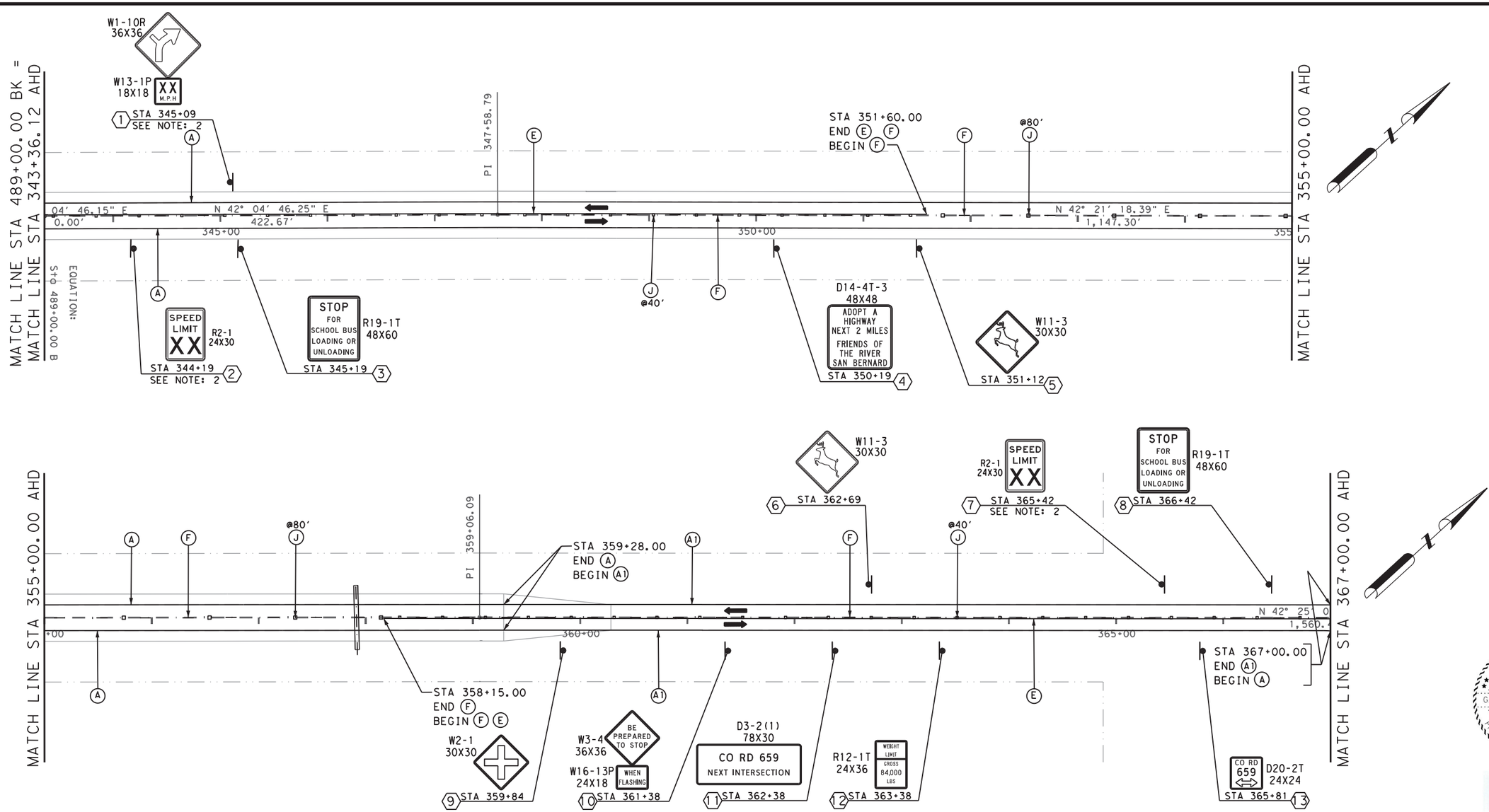
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 14 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		172

$DATE$
$FILE$



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SCALE: 1"=100' SHEET 15 OF 24

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2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		173

$DATE$
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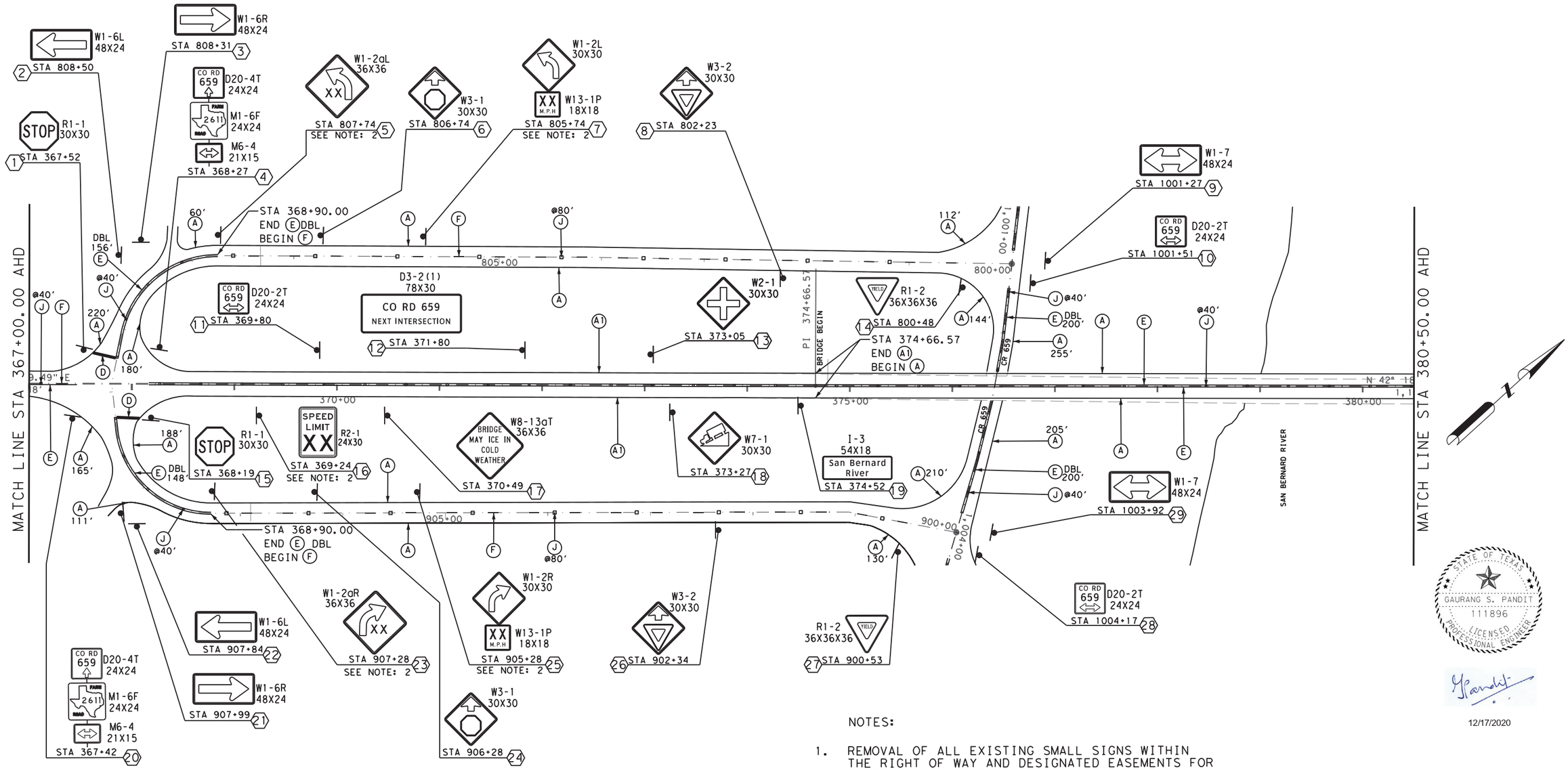

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FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 16 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		174

$DATE$
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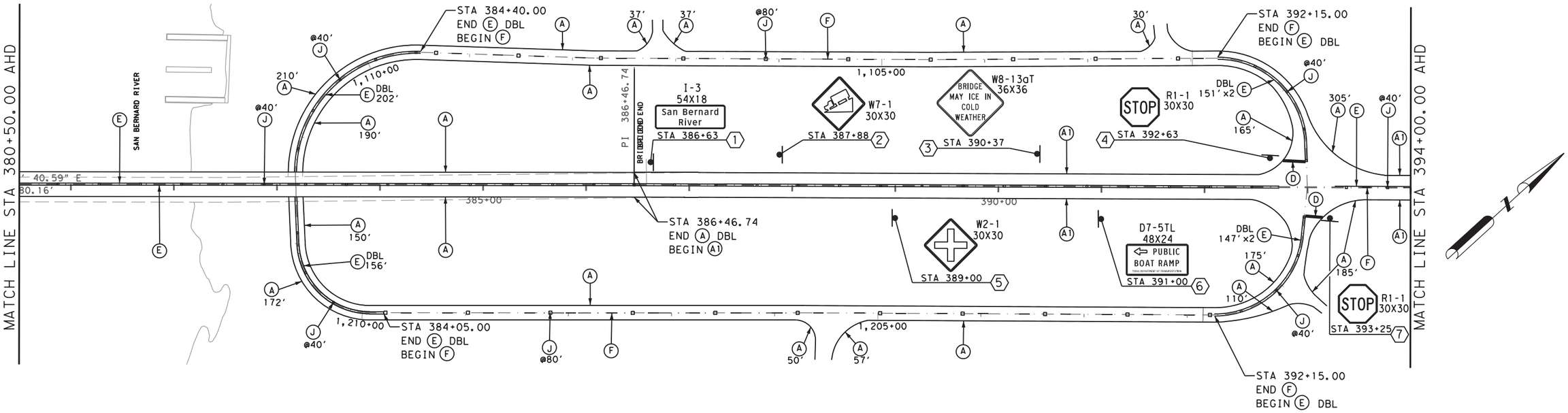

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SCALE: 1"=100' SHEET 17 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		175

$DATE$
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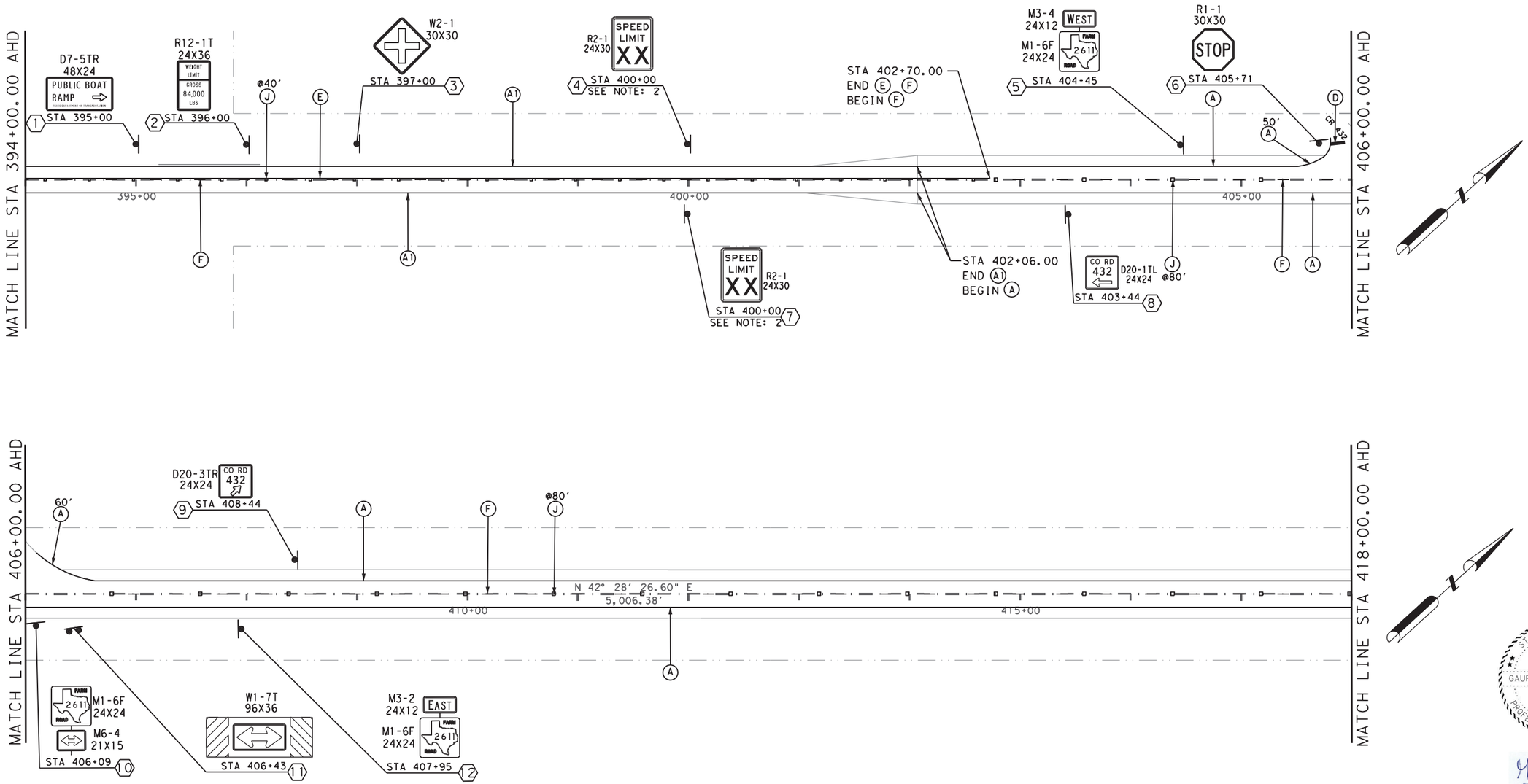

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SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 18 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		176

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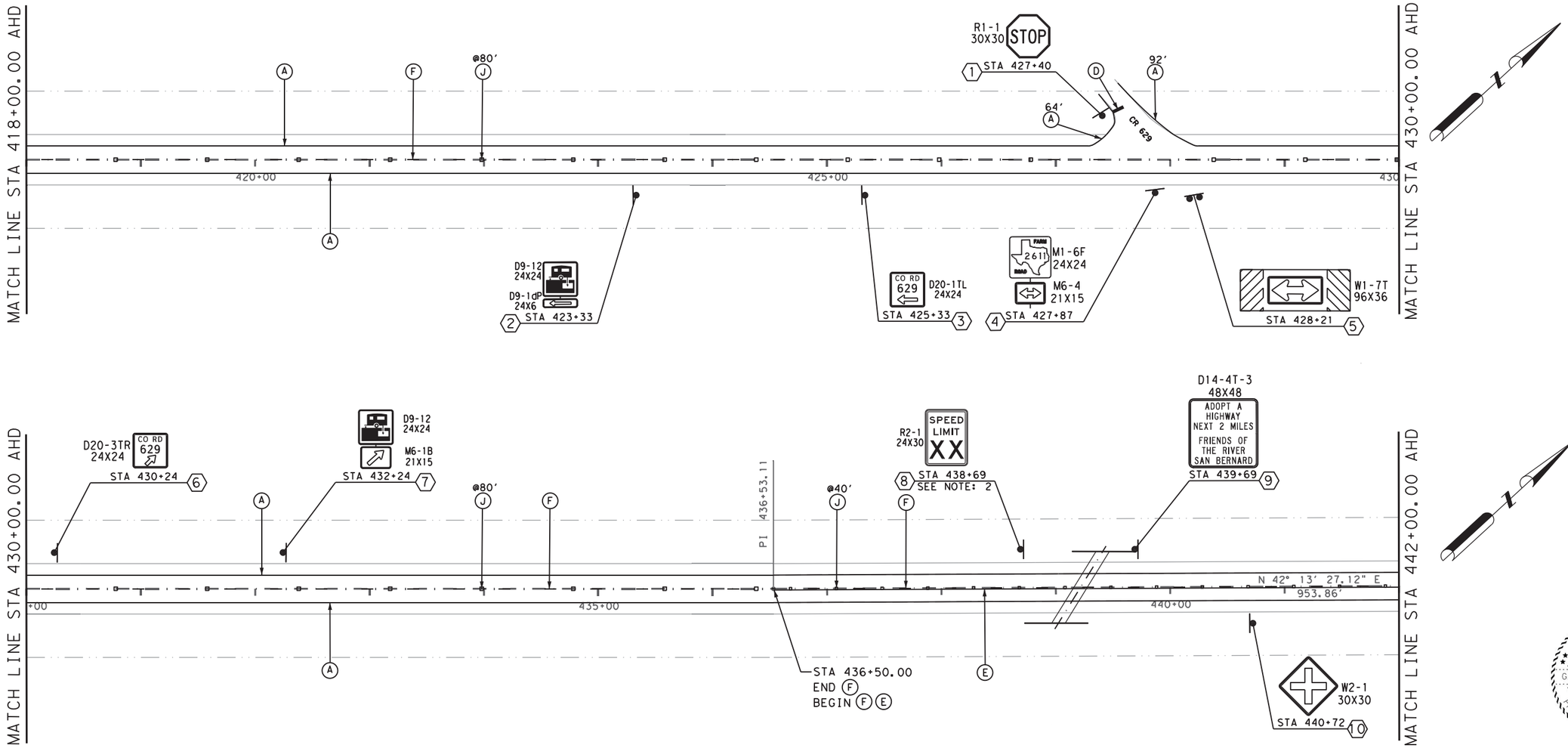

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SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 19 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		177

$DATE$
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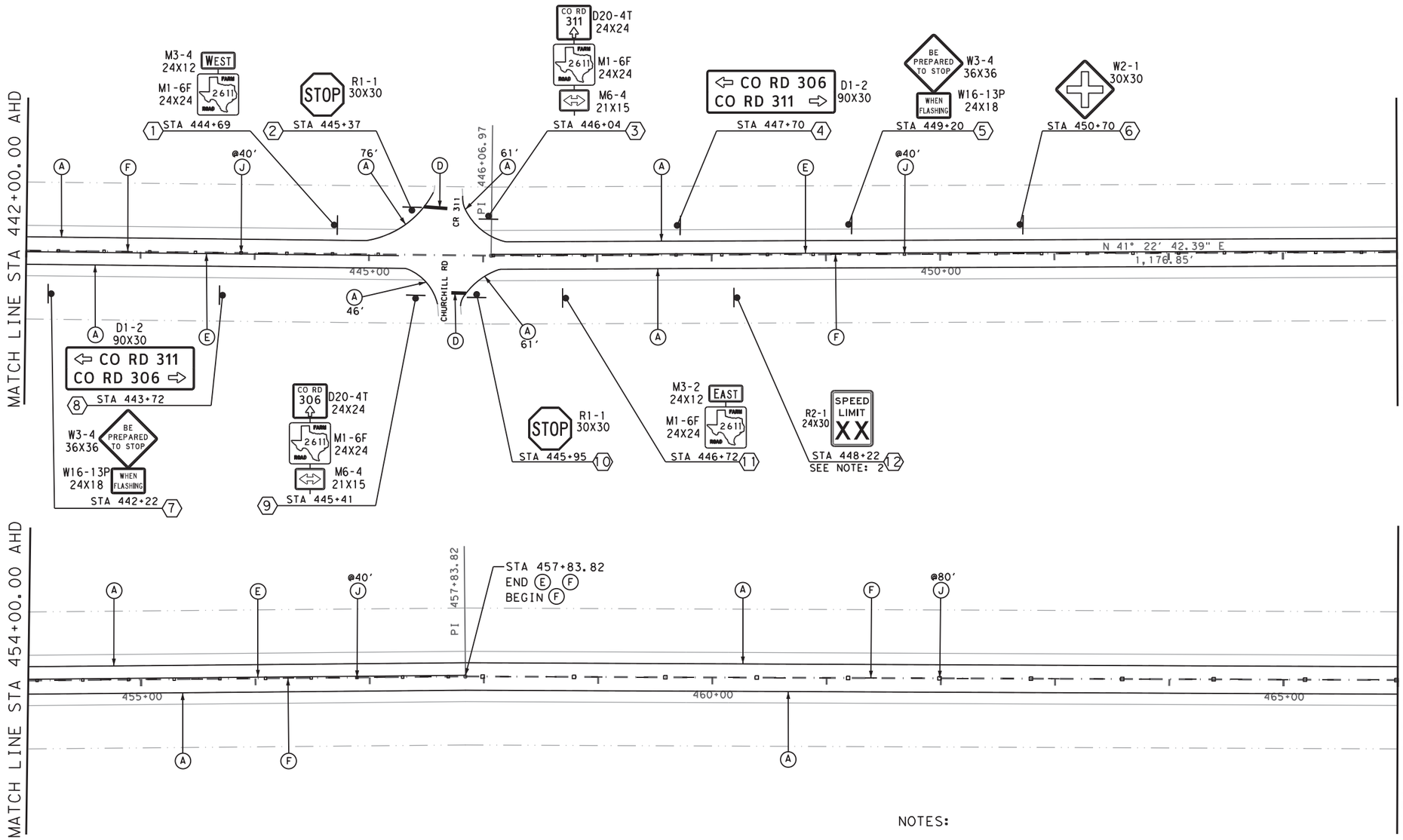

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SCALE: 1"=100′ SHEET 20 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
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DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		178

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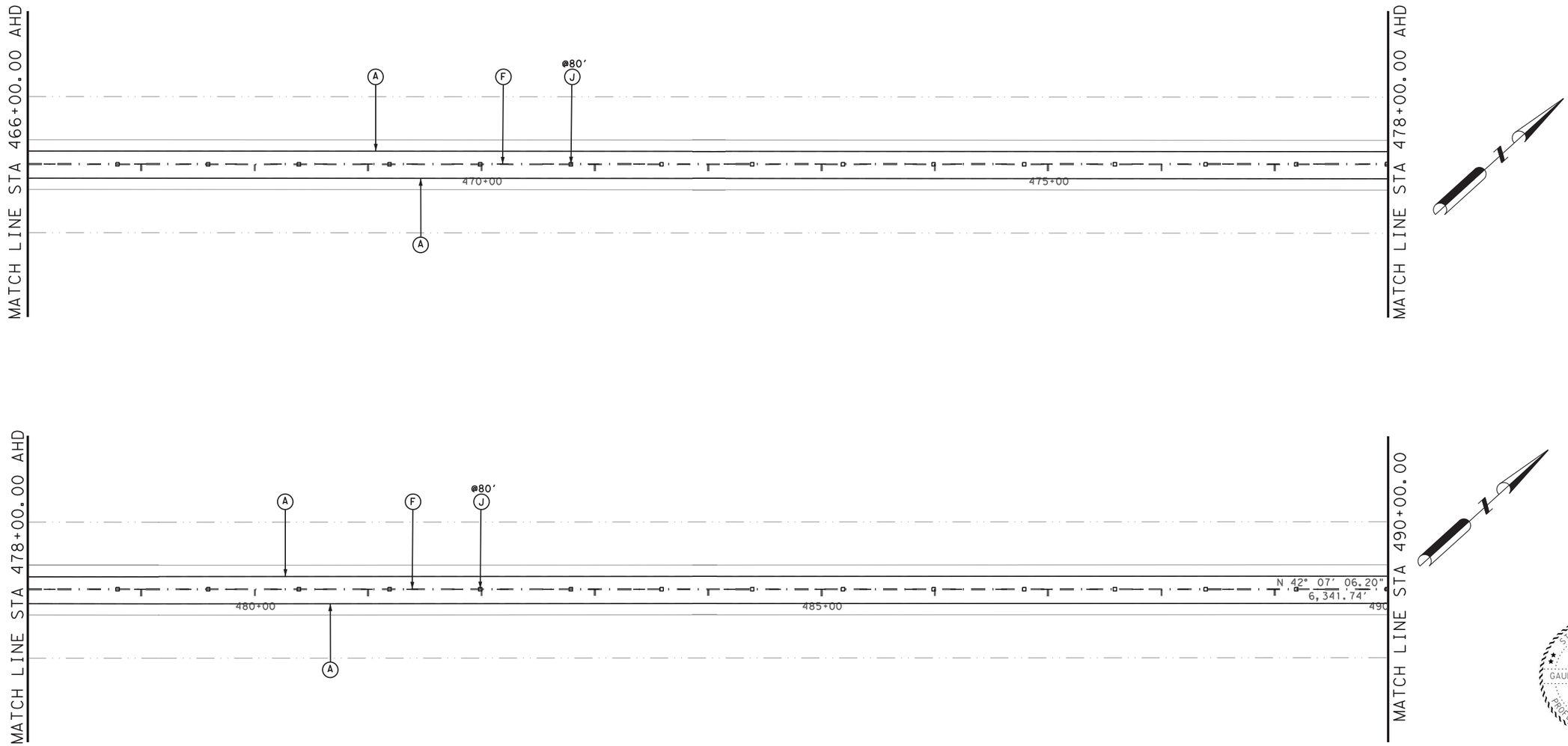

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LEGEND:

- (A) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (E) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y) 6" (BRK)(100MIL)
- (G) REFL PAV MRK TY I (Y) 24" (SLD)(100MIL)
- (H) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (I) REFL PAV MRKR TY I-C
- (J) REFL PAV MRKR TY II-A-A
- (K) PREFAB PAV MRK TY C (W)(ARROW)
- (L) PREFAB PAV MRK TY C (W)(WORD)
- (A1) REF PROF PAV MRK TY I (W) 6" (SLD)(100MIL)
- PROPOSED SMALL SIGN
- (X-) REMOVE SMALL SIGN ASSEMBLY
- (S-) RELOCATE SMALL SIGN ASSEMBLY
- EXIST SIGN TO REMAIN
- DIRECTION OF TRAVEL

STATE OF TEXAS
GAURANG S. PANDIT
111896
LICENSED
PROFESSIONAL ENGINEER

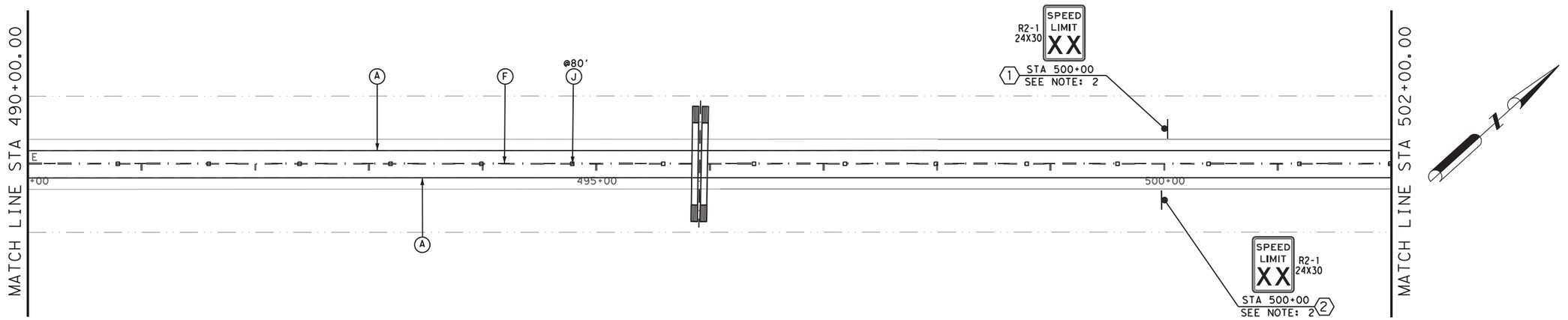
12/17/2020

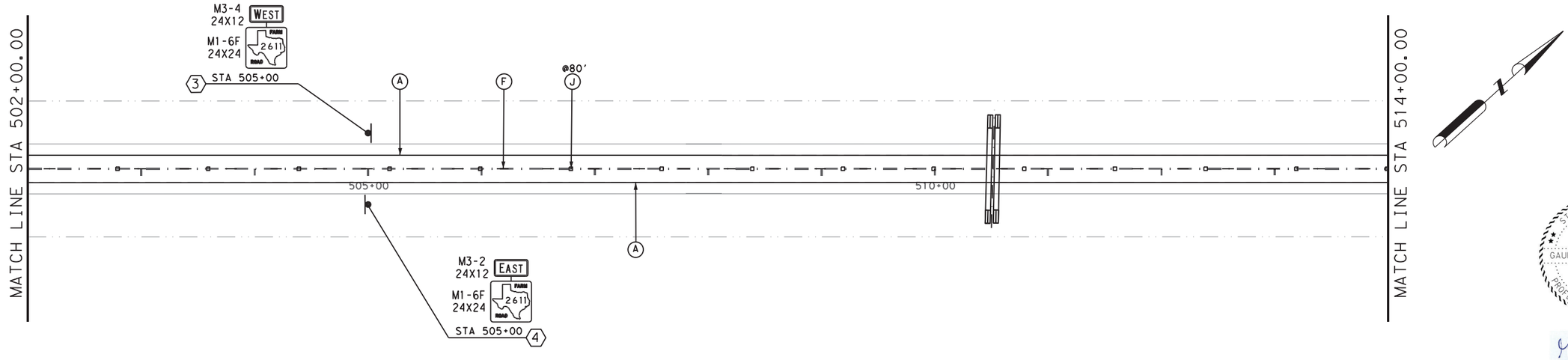
FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 21 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		179

$DATE$
$FILE$





12/17/2020

NOTES:

1. REMOVAL OF ALL EXISTING SMALL SIGNS WITHIN THE RIGHT OF WAY AND DESIGNATED EASEMENTS FOR CONSTRUCTION THAT ARE NOT SHOWN ON THE PLANS WILL BE PAID UNDER THE BID CODE 0644-6076.

2. SPEED LIMIT WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY. FOR FURTHER CLARIFICATION, REFER GENERAL NOTES ITEM# 644.

LEGEND:

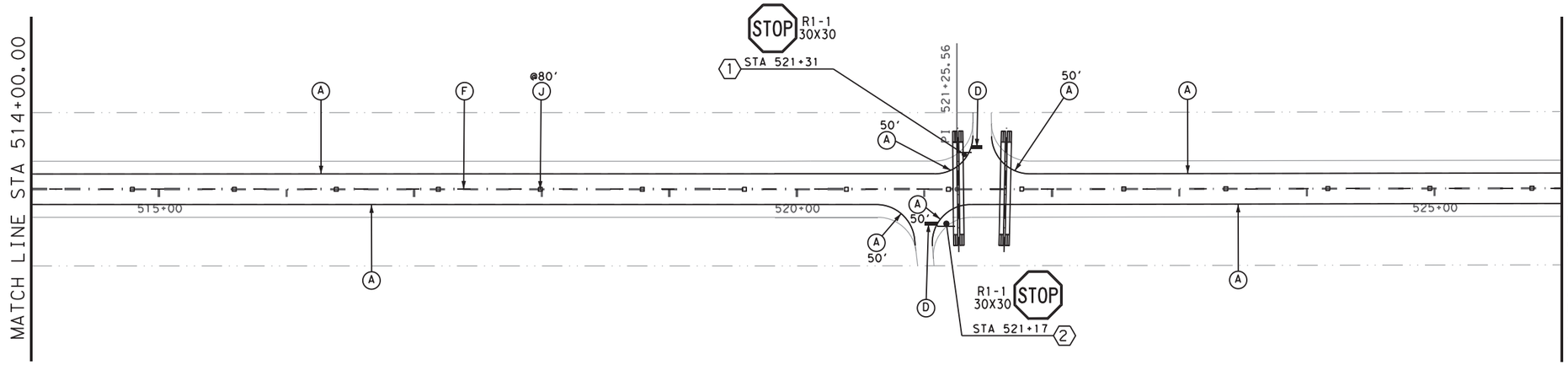
- (A) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (E) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y) 6" (BRK)(100MIL)
- (G) REFL PAV MRK TY I (Y) 24" (SLD)(100MIL)
- (H) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (I) REFL PAV MRKR TY I-C
- (J) REFL PAV MRKR TY II-A-A
- (K) PREFAB PAV MRK TY C (W)(ARROW)
- (L) PREFAB PAV MRK TY C (W)(WORD)
- (A1) REF PROF PAV MRK TY I (W) 6" (SLD)(100MIL)
- PROPOSED SMALL SIGN
- (X-) REMOVE SMALL SIGN ASSEMBLY
- (S-) RELOCATE SMALL SIGN ASSEMBLY
- EXIST SIGN TO REMAIN
- DIRECTION OF TRAVEL

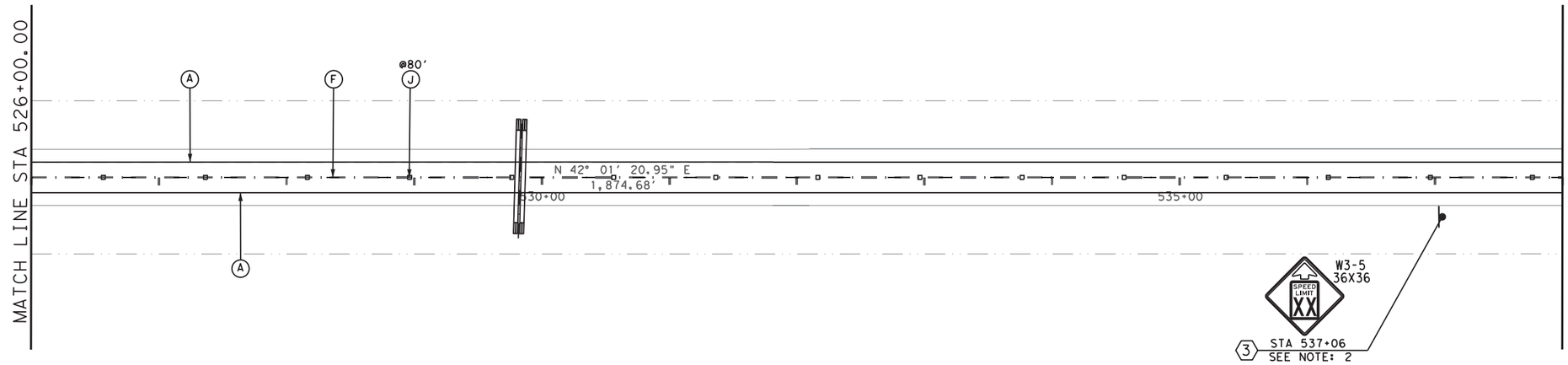
FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 22 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		180

$DATE$
$FILE$





NOTES:

1. REMOVAL OF ALL EXISTING SMALL SIGNS WITHIN THE RIGHT OF WAY AND DESIGNATED EASEMENTS FOR CONSTRUCTION THAT ARE NOT SHOWN ON THE PLANS WILL BE PAID UNDER THE BID CODE 0644-6076.

2. SPEED LIMIT WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY. FOR FURTHER CLARIFICATION, REFER GENERAL NOTES ITEM# 644.

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (E) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y) 6" (BRK)(100MIL)
- (G) REFL PAV MRK TY I (Y) 24" (SLD)(100MIL)
- (H) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (I) REFL PAV MRKR TY I-C
- (J) REFL PAV MRKR TY II-A-A
- (K) PREFAB PAV MRK TY C (W)(ARROW)
- (L) PREFAB PAV MRK TY C (W)(WORD)
- (A1) REF PROF PAV MRK TY I (W) 6" (SLD)(100MIL)
- PROPOSED SMALL SIGN
- (X-) REMOVE SMALL SIGN ASSEMBLY
- (S-) RELOCATE SMALL SIGN ASSEMBLY
- EXIST SIGN TO REMAIN
- DIRECTION OF TRAVEL

STATE OF TEXAS
GAURANG S. PANDIT
111896
LICENSED PROFESSIONAL ENGINEER

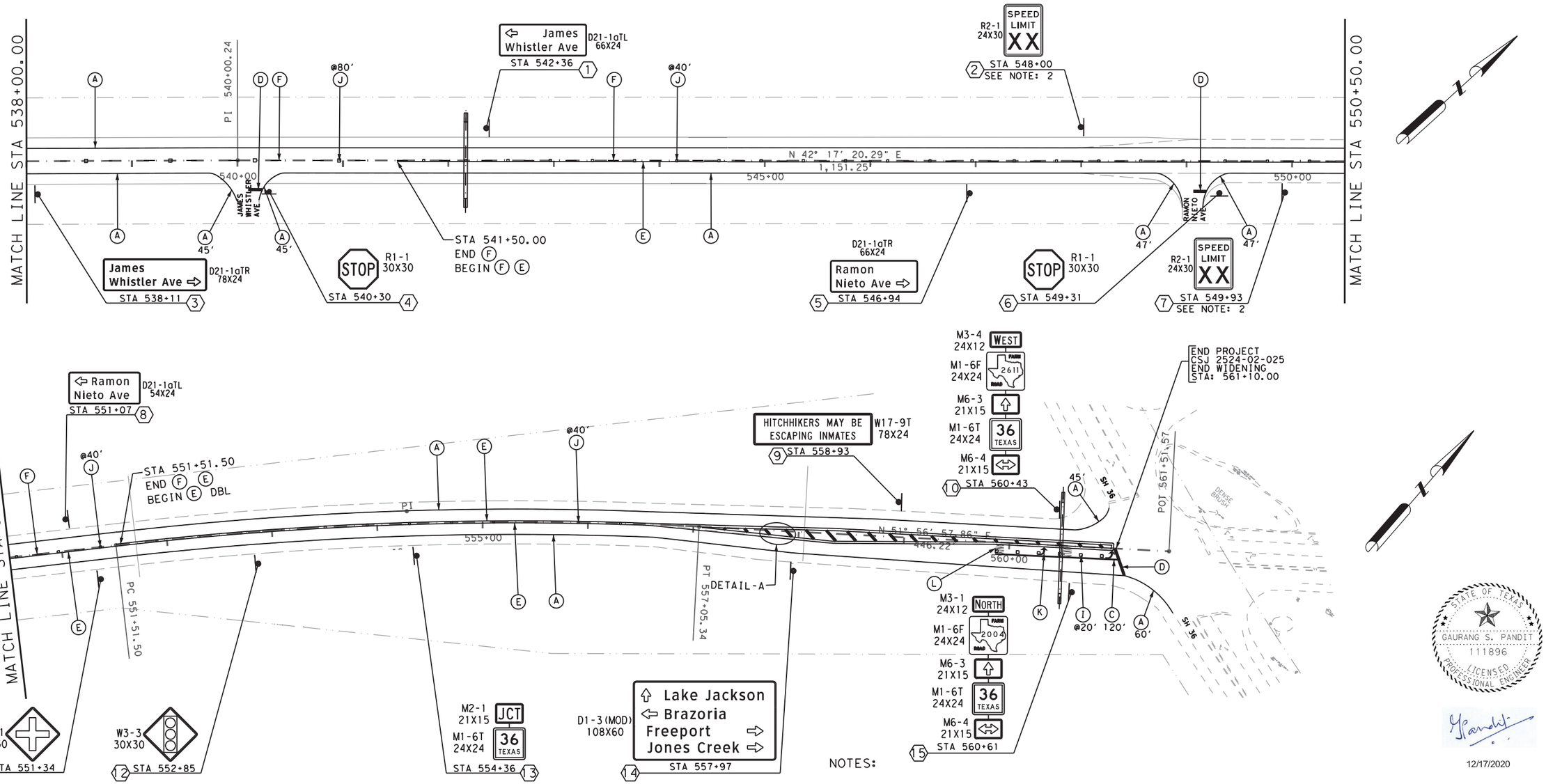
12/17/2020

FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 23 OF 24

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		181

$DATE$
$FILE$



NOTES:

1. REMOVAL OF ALL EXISTING SMALL SIGNS WITHIN THE RIGHT OF WAY AND DESIGNATED EASEMENTS FOR CONSTRUCTION THAT ARE NOT SHOWN ON THE PLANS WILL BE PAID UNDER THE BID CODE 0644-6076.
2. SPEED LIMIT WITH "XX" SHALL BE PROVIDED AFTER SPEED STUDY. FOR FURTHER CLARIFICATION, REFER GENERAL NOTES ITEM# 644.

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (E) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y) 6" (BRK)(100MIL)
- (G) REFL PAV MRK TY I (Y) 24" (SLD)(100MIL)
- (H) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (I) REFL PAV MRKR TY I-C
- (J) REFL PAV MRKR TY II-A-A
- (K) PREFAB PAV MRK TY C (W)(ARROW)
- (L) PREFAB PAV MRK TY C (W)(WORD)
- (A1) REF PROF PAV MRK TY I (W) 6" (SLD)(100MIL)
- PROPOSED SMALL SIGN
- (X-) REMOVE SMALL SIGN ASSEMBLY
- (S-) RELOCATE SMALL SIGN ASSEMBLY
- EXIST SIGN TO REMAIN
- DIRECTION OF TRAVEL

STATE OF TEXAS
GAURANG S. PANDIT
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LICENSED PROFESSIONAL ENGINEER

12/17/2020

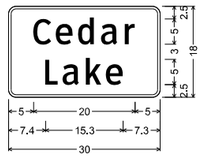
Texas Department of Transportation®
© 2020

FM 2611
SIGNING & PAVEMENT MARKING LAYOUT

SCALE: 1"=100' SHEET 24 OF 24

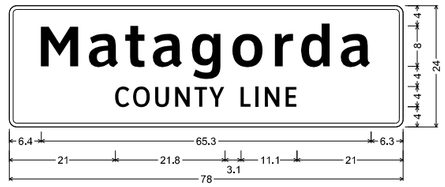
CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		182

$DATE$
$FILE$



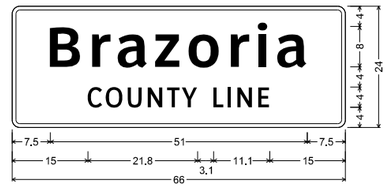
I-3 5in; 30x18
1.5" Radius, 0.5" Border, White on, Green;
"Cedar", ClearviewHwy-3-W;
"Lake", ClearviewHwy-3-W;

LAYOUT 1 OF 24: SIGN No: 1 - WB FM 2611 STA 154+71 GROUND MOUNTED



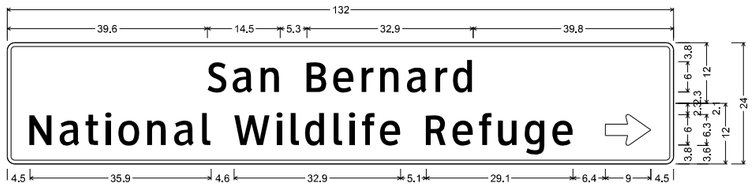
I-2dT 8in; 78x24
1.5" Radius, 0.8" Border, White on, Green;
"Matagorda", ClearviewHwy-5-W-R; "COUNTY LINE", ClearviewHwy-3-W;

LAYOUT 1 OF 24: SIGN No: 2 - WB FM 2611 STA 155+71 GROUND MOUNTED



I-2dT 8in; 66x24
1.5" Radius, 0.8" Border, White on, Green;
"Brazoria", ClearviewHwy-5-W-R;
"COUNTY LINE", ClearviewHwy-3-W;

LAYOUT 1 OF 24: SIGN No: 6 - EB FM 2611 STA 155+71 GROUND MOUNTED

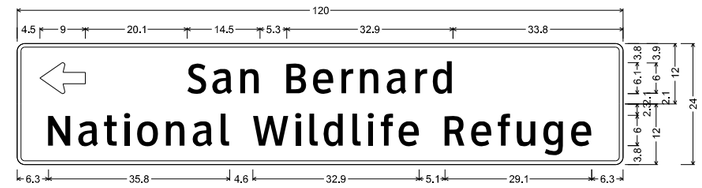


D7-1TR_132x24;

1.5" Radius, 0.8" Border, White on, Brown;
"San Bernard", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on, Brown;
"National Wildlife Refuge", ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.1" 0';

LAYOUT 2 OF 24: SIGN No: 1 - EB FM 2611 STA 189+22 GROUND MOUNTED
LAYOUT 14 OF 24: SIGN No: 5 - EB FM 2611 STA 476+94 GROUND MOUNTED

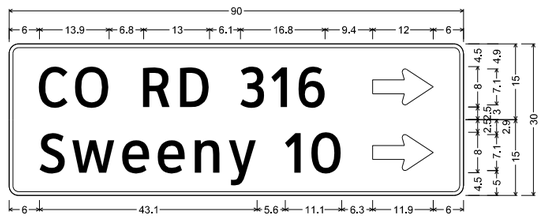


D7-1TL_120x24;

1.5" Radius, 0.8" Border, White on, Brown;
Standard Arrow Custom 9.0" X 6.1" 180"; "San Bernard", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on, Brown;
"National Wildlife Refuge", ClearviewHwy-3-W;

LAYOUT 2 OF 24: SIGN No: 6 - WB FM 2611 STA 197+41 GROUND MOUNTED
LAYOUT 14 OF 24: SIGN No: 10 - WB FM 2611 STA 482+37 GROUND MOUNTED

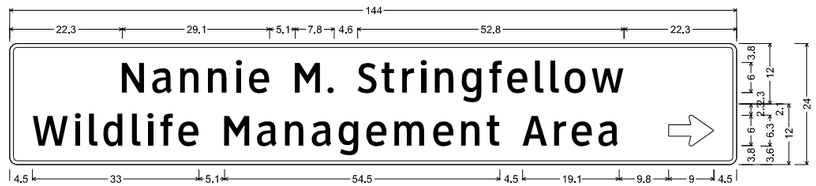


D1-2 8in RT-RT; 90x30

1.9" Radius, 0.8" Border, White on, Green;
"CO RD 316", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0';

1.9" Radius, 0.8" Border, White on, Green;
"Sweeny 10", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0';

LAYOUT 7 OF 24: SIGN No: 3 - WB FM 2611 STA 304+85 GROUND MOUNTED



D7-1TR_144x24;

1.5" Radius, 0.8" Border, White on, Brown;
"Nannie M. Stringfellow", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on, Brown;
"Wildlife Management Area", ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.1" 0';

LAYOUT 7 OF 24: SIGN No: 4 - WB FM 2611 STA 306+85 GROUND MOUNTED

TEXAS DEPARTMENT OF TRANSPORTATION

FM-2611
SMALL GUIDE SIGNS DETAILS

SCALE: NTS

SHEET 1 OF 3

ORIGINAL DRAWING DATE: DEC, 2020		STATE DISTRICT	FEDERAL REGION	PROJECT NO.			SHEET
Dn.: - xx	REVISIONS	HOU	06				183
Ck.: -		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
Dn.: -		BRAZORIA		2524	02	025, ETC	FM-2611
Ck.: -							

DATE: 11/24/2020 2:29:37 PM
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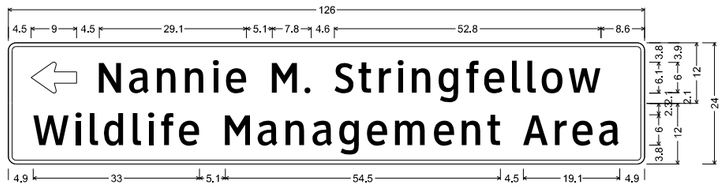
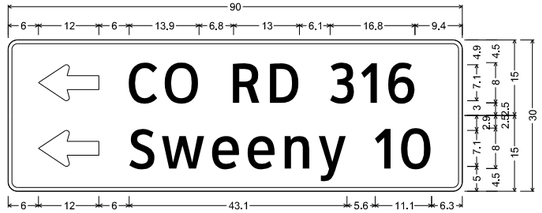


D7-1TL_126x24:

1.5" Radius, 0.8" Border, White on, Brown;
Standard Arrow Custom 9.0" X 6.1" 180°; "Nannie M. Stringfellow", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on, Brown;
"Wildlife Management Area", ClearviewHwy-3-W;

LAYOUT 7 OF 24: SIGN No: 6 - EB FM 2611 STA 298+85 GROUND MOUNTED

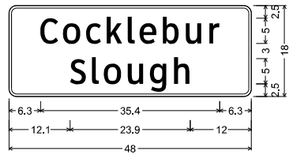


D1-2 8in LT-LT; 90x30

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180°; "CO RD 316", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180°; "Sweeny 10", ClearviewHwy-3-W;

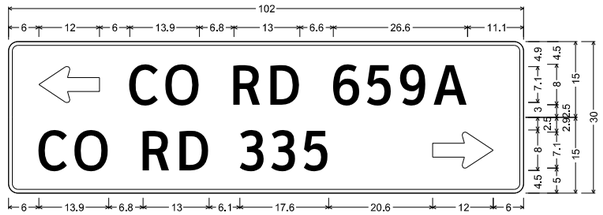
LAYOUT 7 OF 24: SIGN No: 7 - EB FM 2611 STA 300+85 GROUND MOUNTED



I-3 5in; 48x18
1.5" Radius, 0.5" Border, White on, Green;
"Cocklebur", ClearviewHwy-3-W;
"Slough", ClearviewHwy-3-W;

LAYOUT 10 OF 24: SIGN No: 4 - WB FM 2611 STA 392+09 GROUND MOUNTED

LAYOUT 10 OF 24: SIGN No: 8 - EB FM 2611 STA 391+33 GROUND MOUNTED



D1-2 8in LT-RT; 102x30

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180°; "CO RD 659A", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
"CO RD 335", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0°;

LAYOUT 13 OF 24: SIGN No: 5 - EB FM 2611 STA 462+96 GROUND MOUNTED

D1-2 8in LT-RT; 102x30

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180°; "CO RD 335", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
"CO RD 659A", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0°;

LAYOUT 14 OF 24: SIGN No: 1 - WB FM 2611 STA 467+97 GROUND MOUNTED

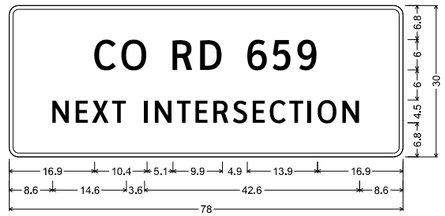
D14-4T-3_48x48;

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;
"FRIENDS OF", C; "THE RIVER", C;
"SAN BERNARD", C;

LAYOUT 15 OF 24: SIGN No: 4 - EB FM 2611 STA 350+19 GROUND MOUNTED

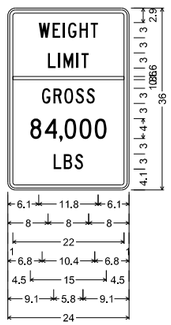
LAYOUT 19 OF 24: SIGN No: 9 - WB FM 2611 STA 439+69 GROUND MOUNTED



D3-2(1)_78x30;
1.9" Radius, 0.8" Border, White on, Green;
"CO RD 659", ClearviewHwy-3-W;
"NEXT INTERSECTION", ClearviewHwy-3-W;

LAYOUT 15 OF 24: SIGN No: 11 - EB FM 2611 STA 362+38 GROUND MOUNTED

LAYOUT 16 OF 24: SIGN No: 12 - WB FM 2611 STA 371+80 GROUND MOUNTED



R12-IT_24x36;
1.5" Radius, 0.6" Border, 0.4" Indent, Black on, White;
"WEIGHT", C;
"LIMIT", C;
"GROSS", C;
"84,000", C;
"LBS", C;

LAYOUT 15 OF 24: SIGN No: 12 - EB FM 2611 STA 363+38 GROUND MOUNTED

LAYOUT 18 OF 24: SIGN No: 2 - WB FM 2611 STA 396+00 GROUND MOUNTED

FM-2611
SMALL GUIDE SIGNS DETAILS

SCALE: NTS SHEET 2 OF 3

ORIGINAL DRAWING DATE: DEC, 2020		STATE DISTRICT	FEDERAL REGION	PROJECT NO.			SHEET
DN.: - XX	REVISIONS	HOU	06				184
CK.: -		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DN.: -		BRAZORIA		2524	02	025, ETC	FM-2611
CK.: -							

DATE: 11/24/2020 2:30:17 PM
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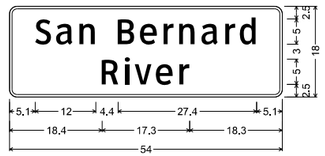
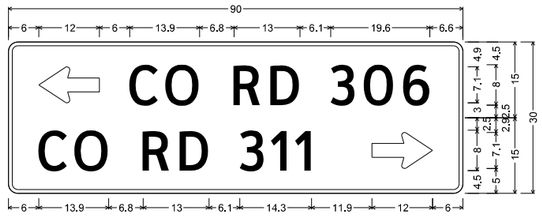


I-3 5in; 54x18
1.5" Radius, 0.5" Border, White on, Green;
"San Bernard", ClearviewHwy-3-W;
"River", ClearviewHwy-3-W;

LAYOUT 16 OF 24: SIGN No: 19 - EB FM 2611 STA 374+52 GROUND MOUNTED

LAYOUT 17 OF 24: SIGN No: 1 - WB FM 2611 STA 386+63 GROUND MOUNTED

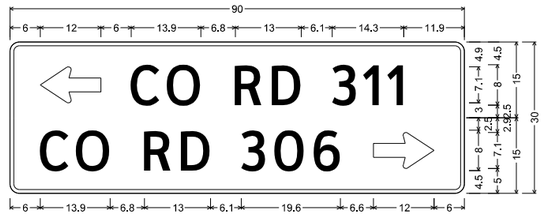


D1-2 8in LT-RT; 90x30

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180"; "CO RD 306", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
"CO RD 311", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0";

LAYOUT 20 OF 24: SIGN No: 4 - WB FM 2611 STA 447+70 GROUND MOUNTED

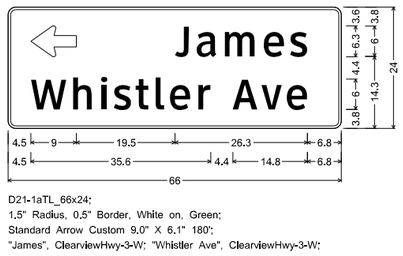


D1-2 8in LT-RT; 90x30

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180"; "CO RD 311", ClearviewHwy-3-W;

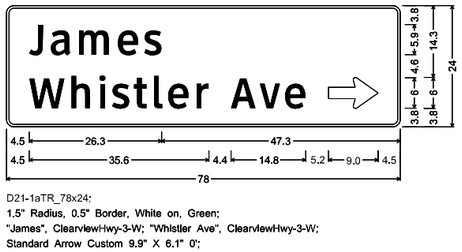
1.9" Radius, 0.8" Border, White on, Green;
"CO RD 306", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0";

LAYOUT 20 OF 24: SIGN No: 8 - EB FM 2611 STA 443+72 GROUND MOUNTED



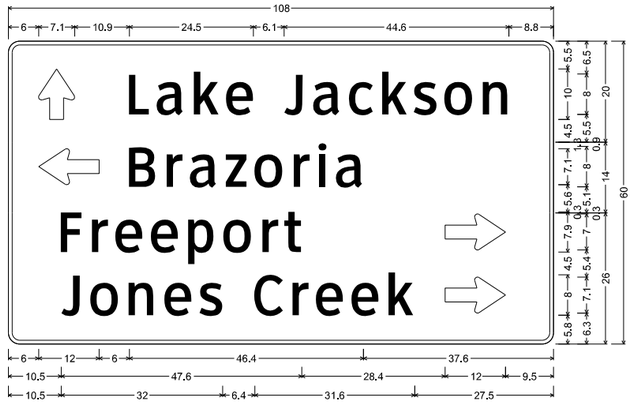
D21-1aTL_66x24;
1.5" Radius, 0.5" Border, White on, Green;
Standard Arrow Custom 9.0" X 6.1" 180";
"James", ClearviewHwy-3-W; "Whistler Ave", ClearviewHwy-3-W;

LAYOUT 24 OF 24: SIGN No: 1 - WB FM 2611 STA 542+36 GROUND MOUNTED



D21-1aTR_78x24;
1.5" Radius, 0.5" Border, White on, Green;
"James", ClearviewHwy-3-W; "Whistler Ave", ClearviewHwy-3-W;
Standard Arrow Custom 9.9" X 6.1" 0";

LAYOUT 24 OF 24: SIGN No: 3 - EB FM 2611 538+11 GROUND MOUNTED



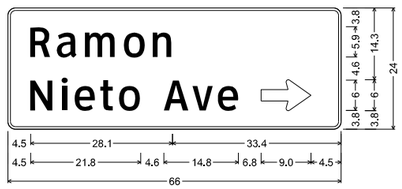
D1-3(MOD) 8in UP-LT-RT; 108x60

2.3" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 10.0" X 7.1" 90"; "Lake Jackson", ClearviewHwy-3-W;

2.3" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180"; "Brazoria", ClearviewHwy-3-W;

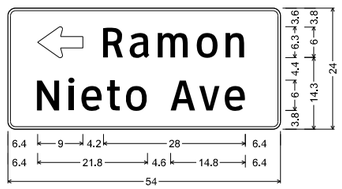
2.3" Radius, 0.8" Border, White on, Green;
"Freeport", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0";
"Jones Creek", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0";

LAYOUT 24 OF 24: SIGN No: 14 - EB FM 2611 STA 557+97 GROUND MOUNTED



D21-1aTR_66x24;
1.5" Radius, 0.5" Border, White on, Green;
"Ramon", ClearviewHwy-3-W; "Nieto Ave", ClearviewHwy-3-W;
Standard Arrow Custom 9.9" X 6.1" 0";

LAYOUT 24 OF 24: SIGN No: 5 - EB FM 2611 STA 546+94 GROUND MOUNTED



D21-1aTL_54x24;
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Standard Arrow Custom 9.0" X 6.1" 180";
"Ramon", ClearviewHwy-3-W;
"Nieto Ave", ClearviewHwy-3-W;

LAYOUT 24 OF 24: SIGN No: 8 - WB FM 2611 551+07 GROUND MOUNTED

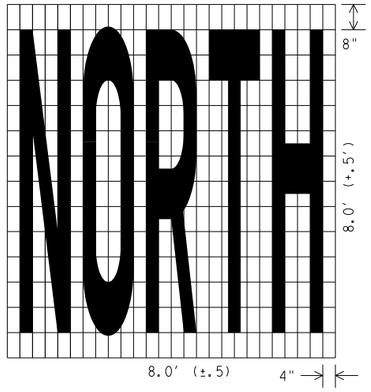
TEXAS DEPARTMENT OF TRANSPORTATION

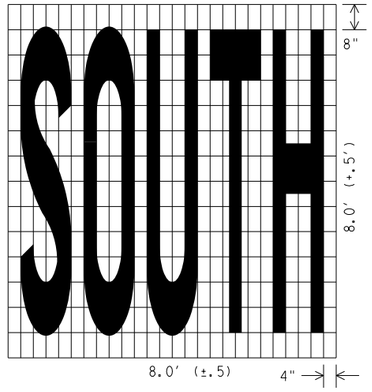
FM-2611
SMALL GUIDE SIGNS DETAILS

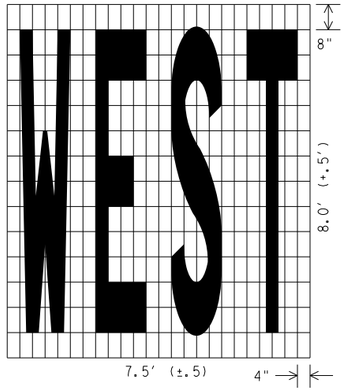
SCALE: NTS

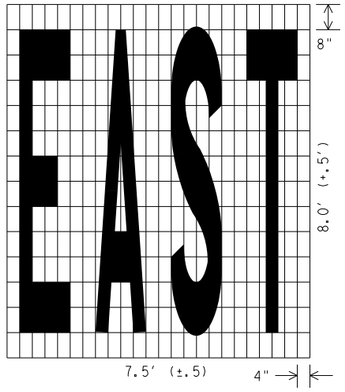
ORIGINAL DRAWING DATE: DEC, 2020		STATE DISTRICT	FEDERAL REGION	PROJECT NO.			SHEET
DN: TxDOT	REVISIONS	HOU	06				185
CK: TxDOT		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW: TxDOT		BRAZORIA		2524	02	025, ETC	FM-2611
CK: TxDOT							

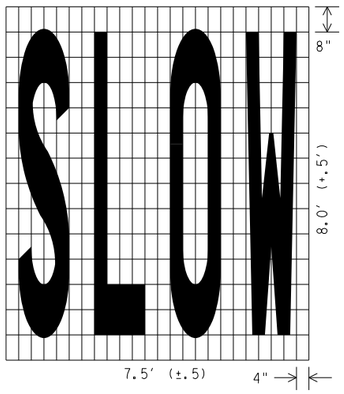
DATE: 11/24/2020 2:57:45 PM
FILE: H:\Trfsigning\FM-2611 CSJ 2524-02-025, ETC (Brazoria County)\Sign Layout\SMALL SIGN DETAILS.dgn

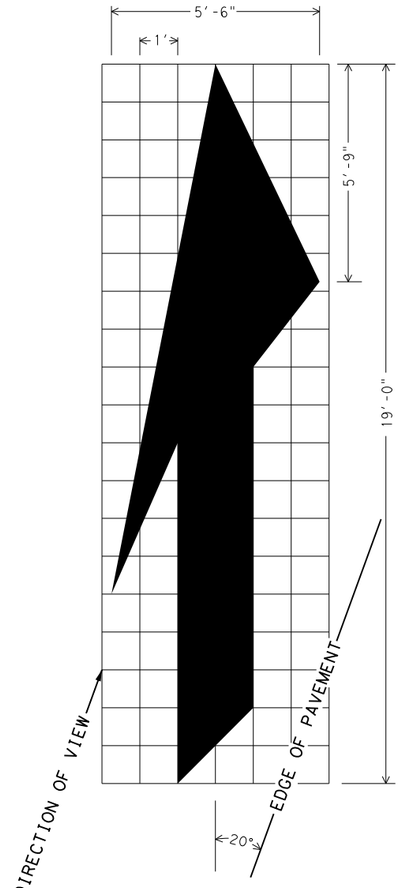






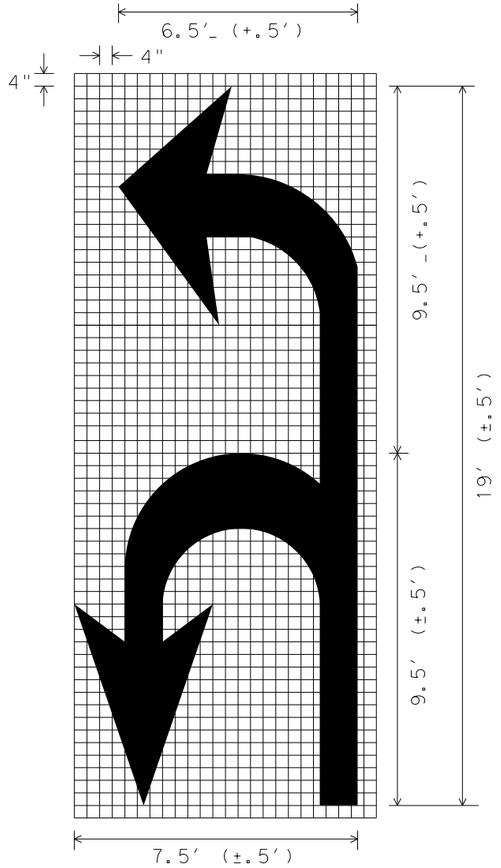




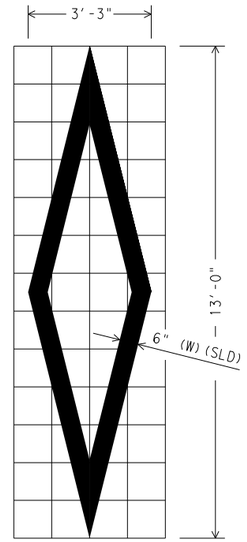


ISOMETRIC ARROW

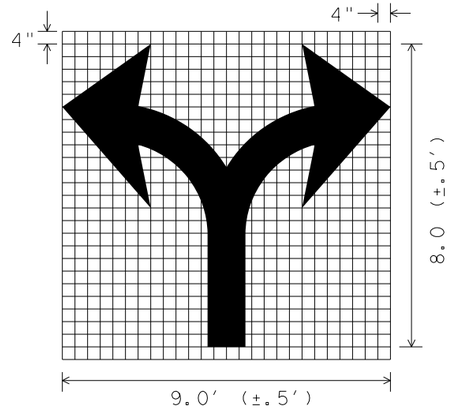
12 INCH GRID
AREA = 42 SQ. FT.
RIGHT LANE DROP ARROW
(FOR LEFT LANE, USE MIRROR IMAGE)



U-L ARROW



DIAMOND SYMBOL



SCALE 1/4" = 1′

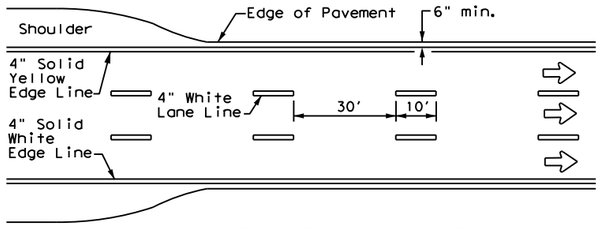
Texas Department of Transportation
Houston District

PAVEMENT MARKINGS (WORDS, ARROWS & SYMBOLS)

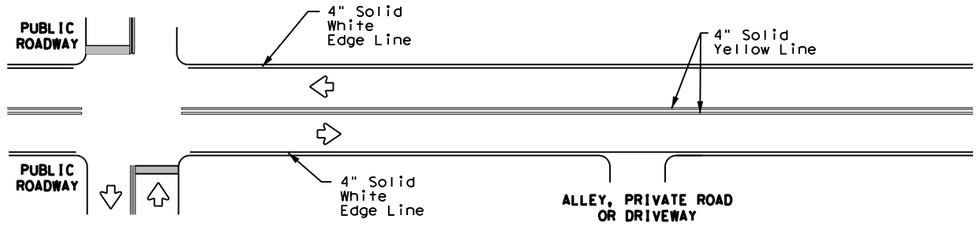
PM(WAS)-07

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 03-19-07	HOU	6		186
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	BRAZORIA	2524	02025,ETC	TM 2611

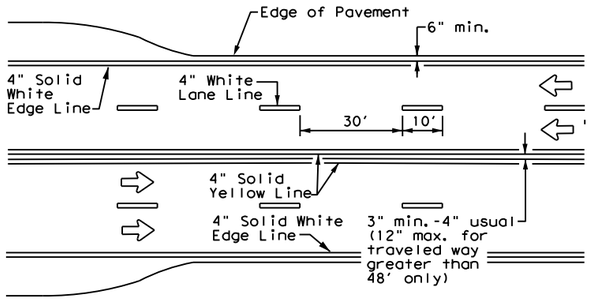
STD-N31



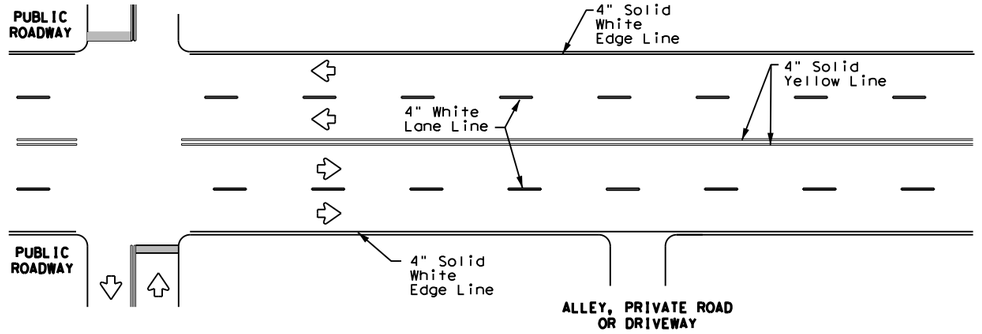
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



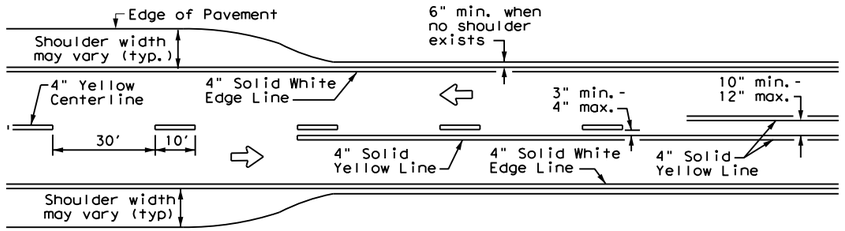
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



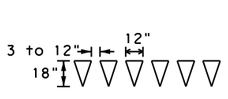
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



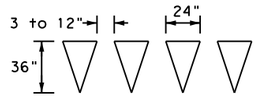
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

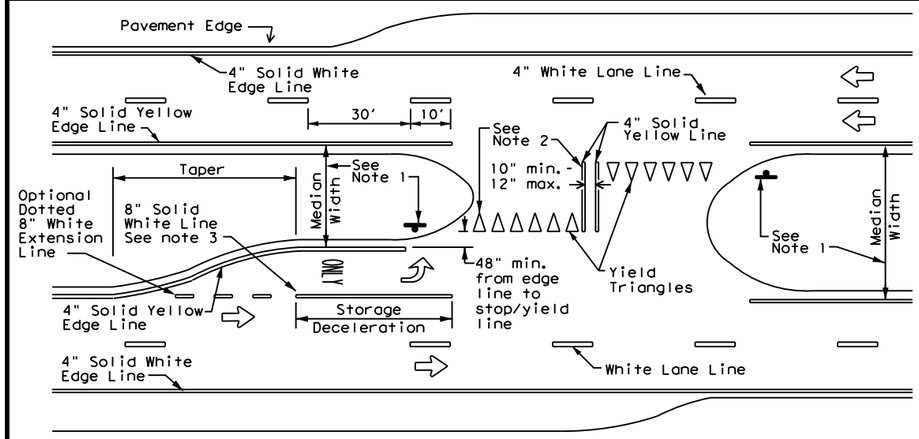


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTE:

1. Irrespective of shoulder, use 6in width lines (edge lines).
2. Use 4 in. width lines (edge and lane lines) when lane width is 10 ft. or less; and 6 in. width lines when lane width is greater than 10 ft.

NOTES

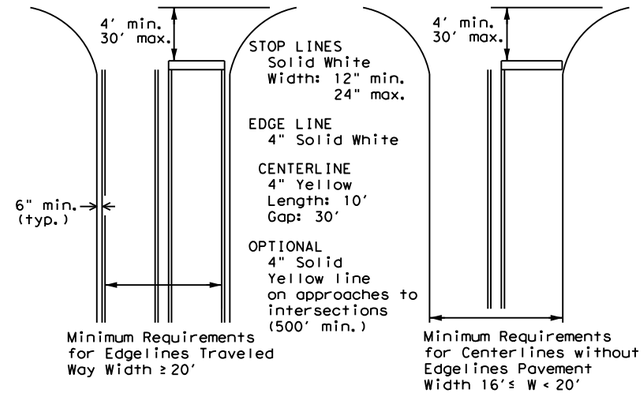
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

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

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation
HOUSTON DISTRICT STANDARD

TYPICAL STANDARD PAVEMENT MARKINGS

PM-20

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS: 8-95 2-12; 5-00 8-16; 8-00 7-20; 3-03

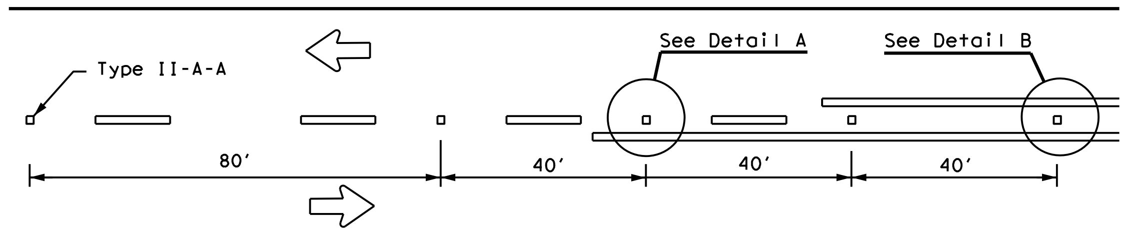
CONT	SECT	JOB	HIGHWAY
2524	02	025,ETC	FM 2611

DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	187

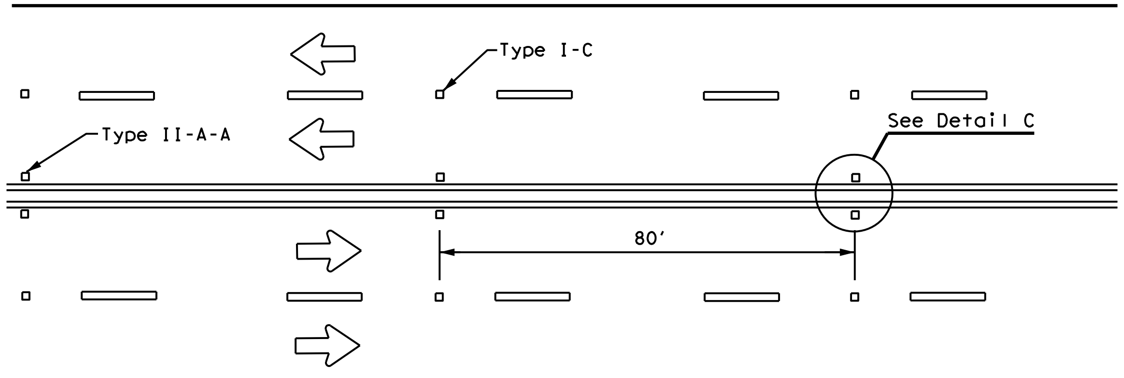
DATE:
FILE:

STD N-5a

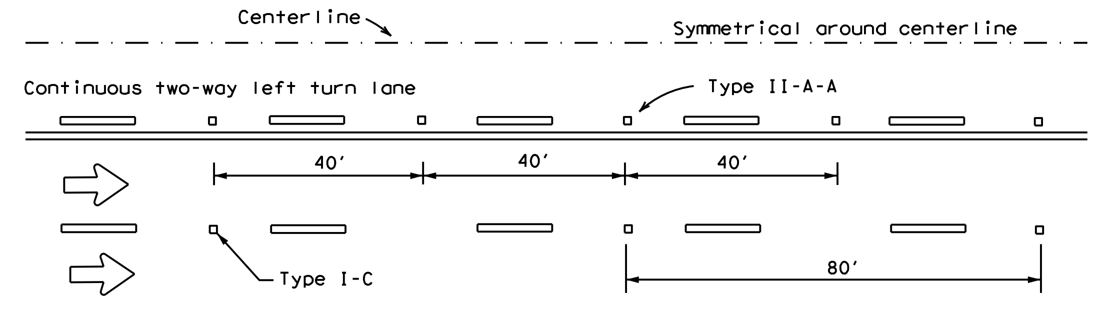
REFLECTIVE RAISED PAVEMENT MARKERS
FOR VEHICLE POSITIONING GUIDANCE



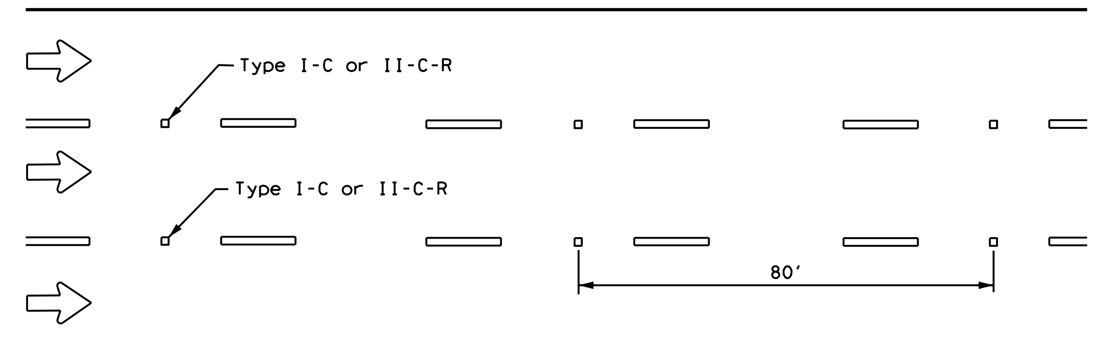
CENTERLINE FOR ALL TWO LANE ROADWAYS



CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS

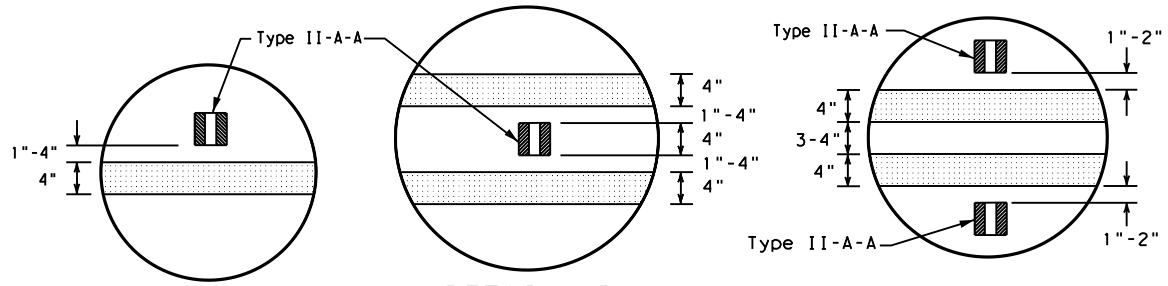


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

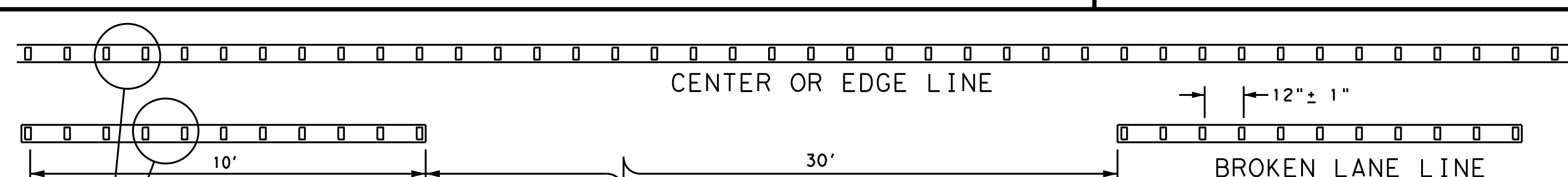


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

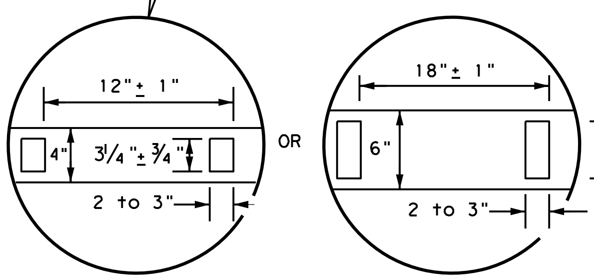


DETAIL "A" DETAIL "B" DETAIL "C"



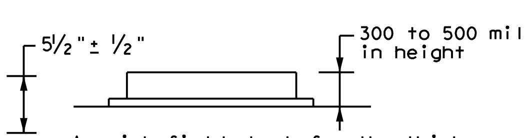
REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE



A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

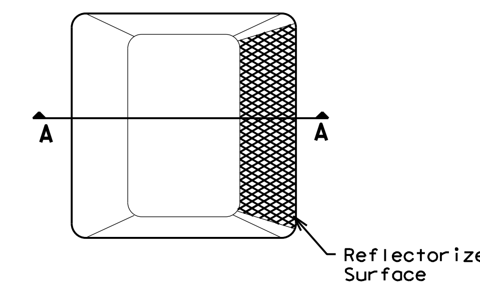
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

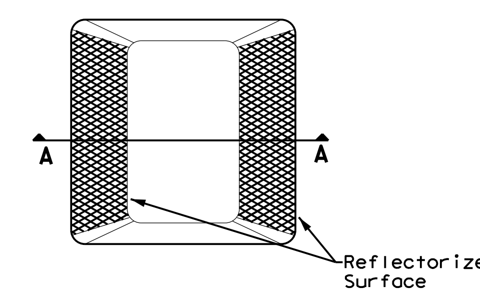
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

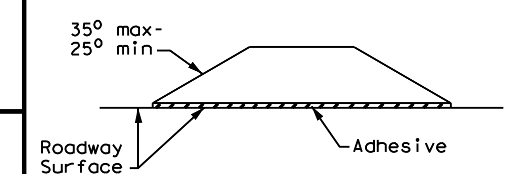
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

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

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	2524	02	025,ETC	FM 2611
	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	188

228

DATE: 12/21/2020 2:54:21 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\25240205\...

DATE: 12/21/2020 2:54:32 PM
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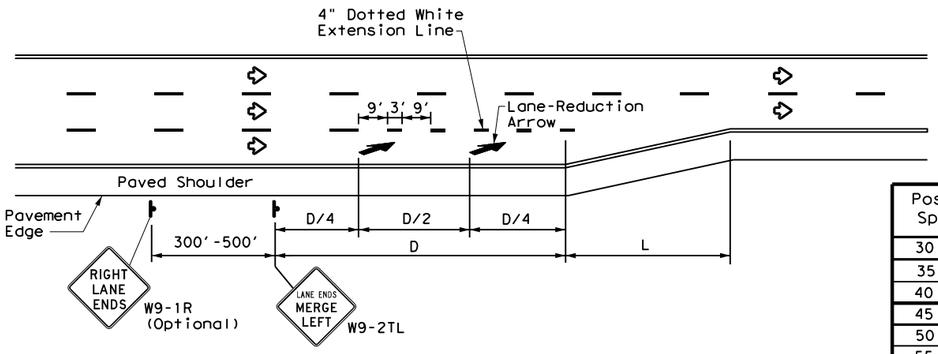
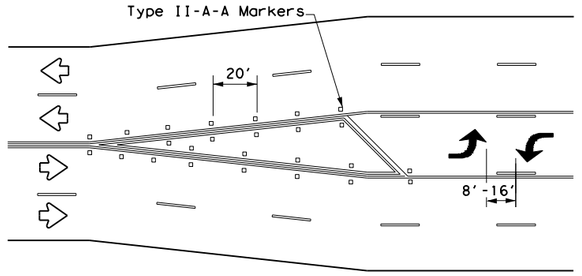


LANE REDUCTION

Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.



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

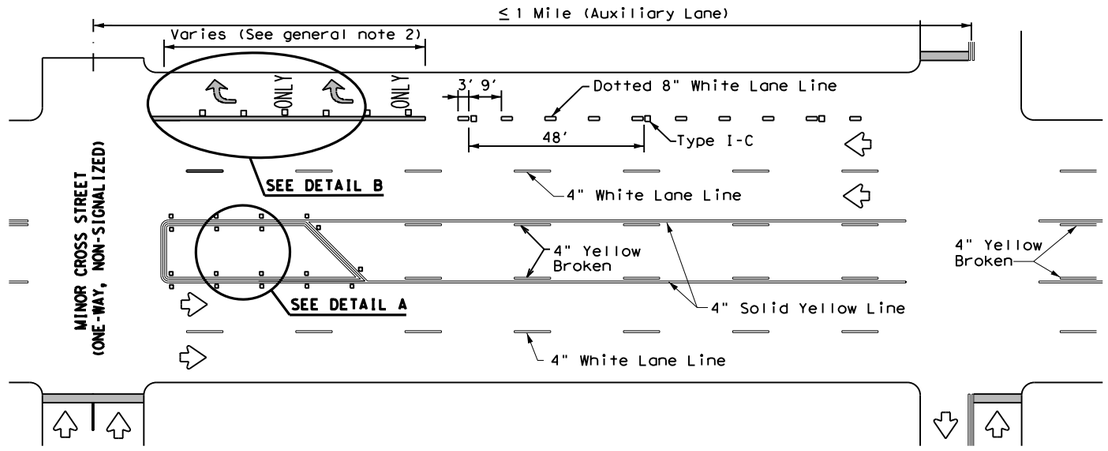
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

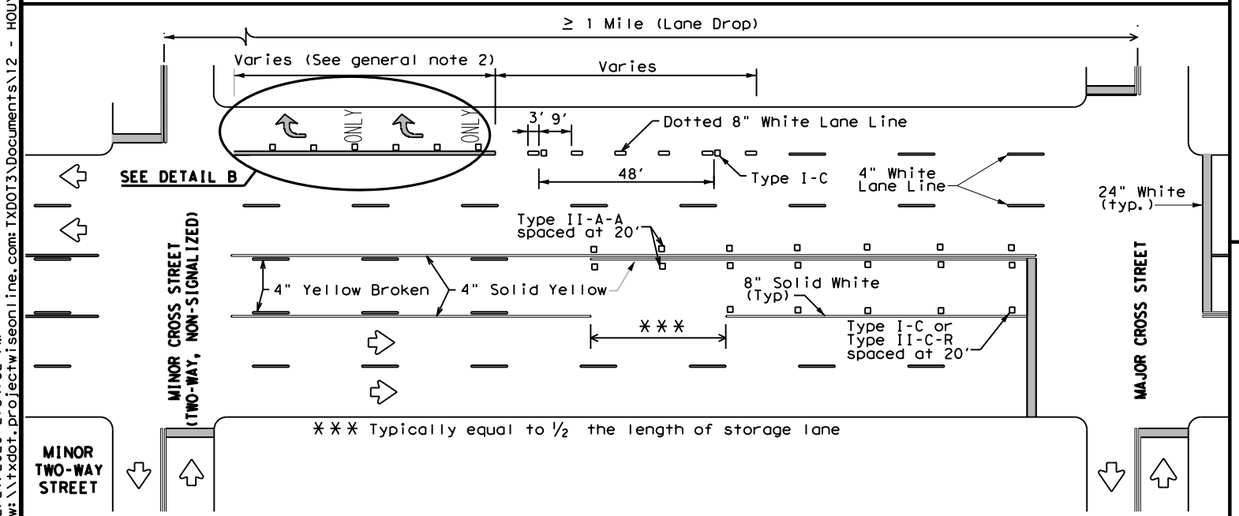
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

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

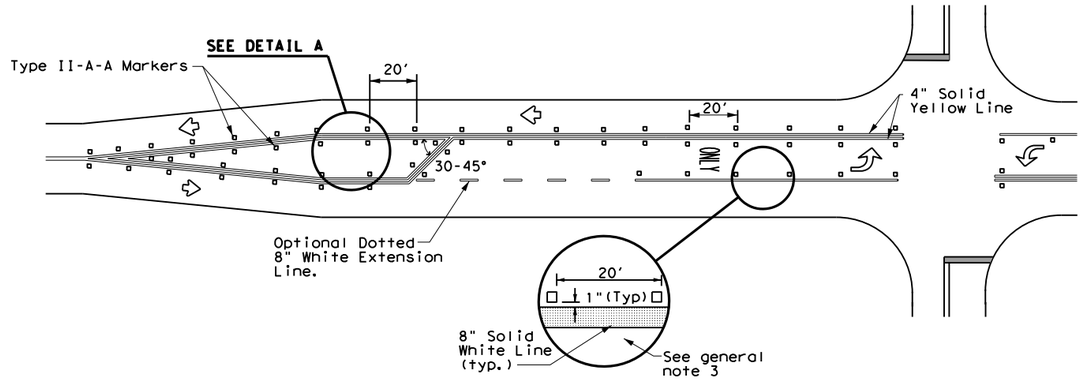
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



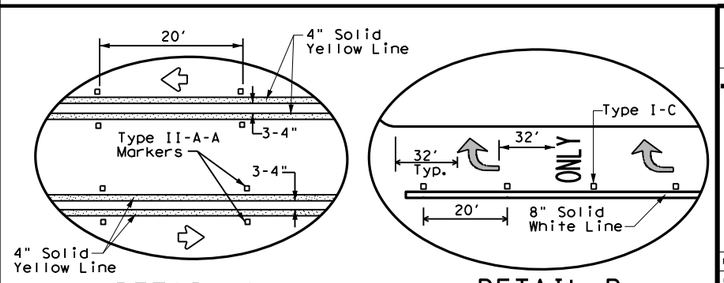
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



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



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



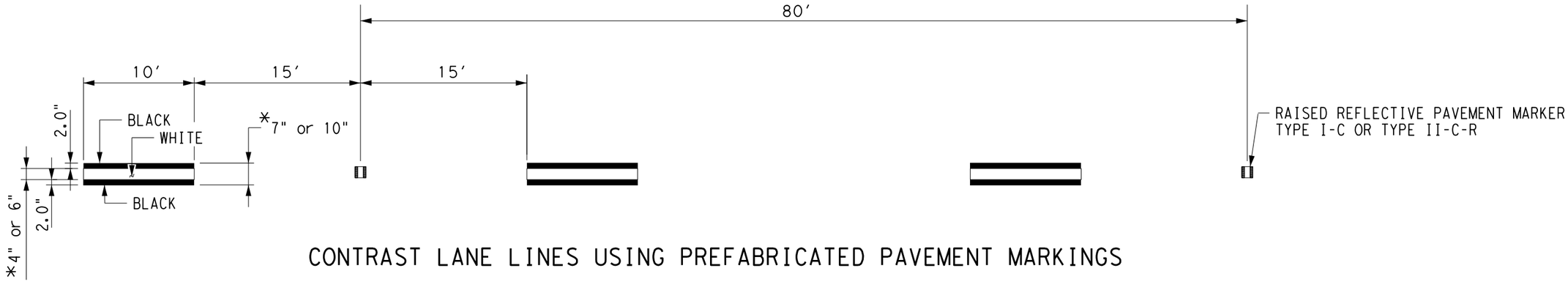
Texas Department of Transportation

Traffic Safety Division Standard

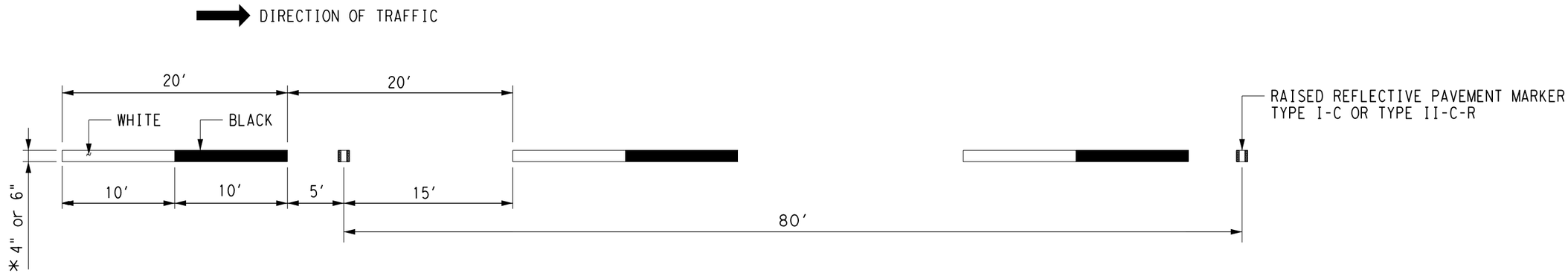
TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	HOU	BRAZORIA		189
3-03 6-20				

220



CONTRAST LANE LINES USING PREFABRICATED PAVEMENT MARKINGS



CONTRAST LANE LINES USING LIQUID APPLICATIONS
(MULTIPOLYMER, THERMOPLASTIC, ETC.)

✳ AS SHOWN ON THE PLANS.

Texas Department of Transportation
Houston District

PAVEMENT MARKINGS
(CONTRAST LANE LINES)

PM(CLL)-14

FILE:	DN:	CK:	DW:	CK:	
© TxDOT 2003	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 01-10-06 02-12-08 10-2019 9" to 10"	HOU	6			190
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	BRAZORIA		2524	025, ETC		FM 261

STD N-30

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DATE: 12/21/2020 2:54:50 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\2524020025\4 - Design\Plan Set\8. Traffic\standards\smdgen.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

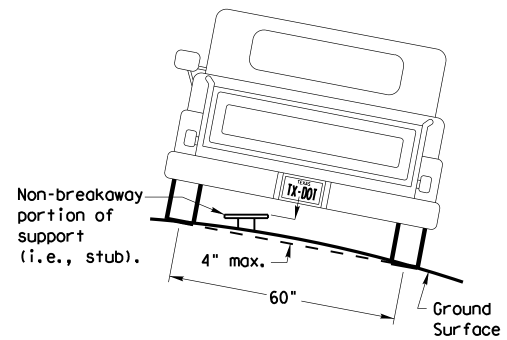
Anchor Type

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

Sign Mounting Designation

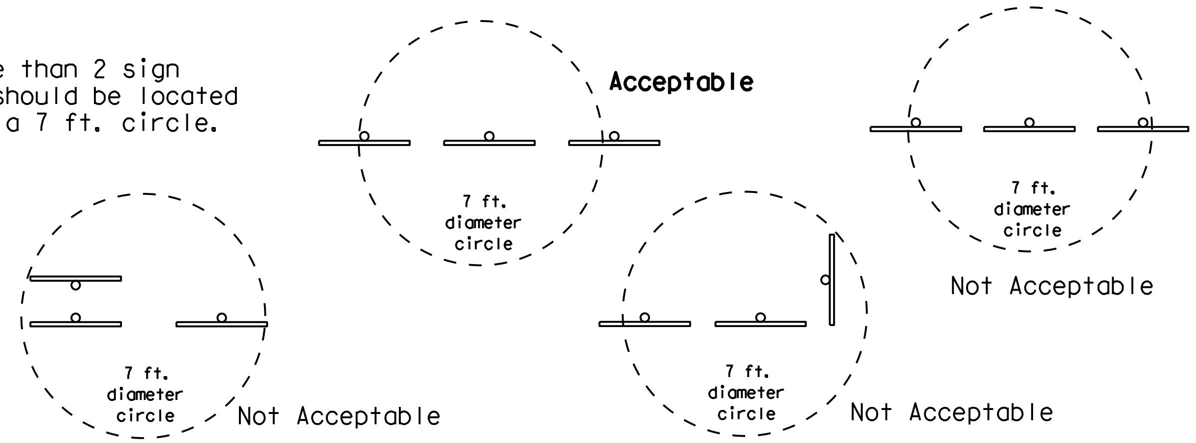
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



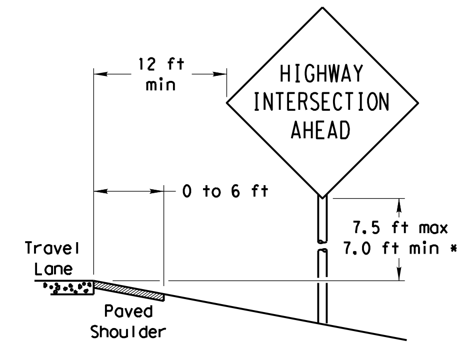
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

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



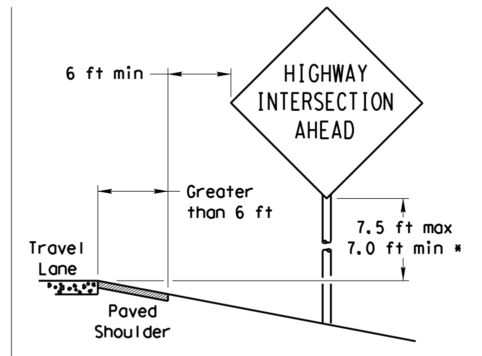
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

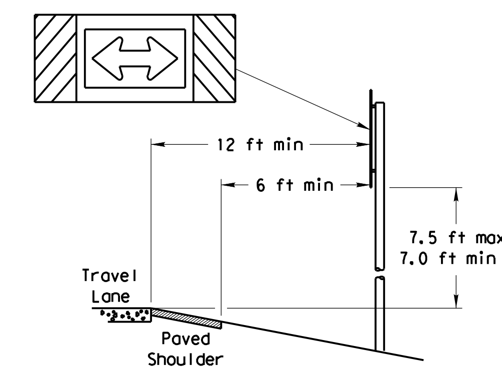
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



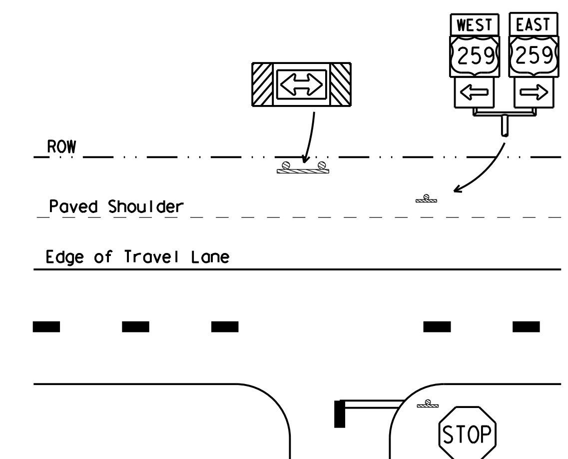
GREATER THAN 6 FT. WIDE

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

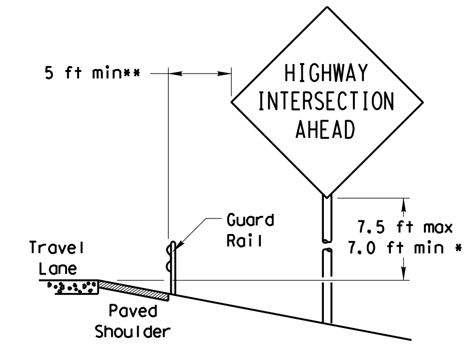
T-INTERSECTION



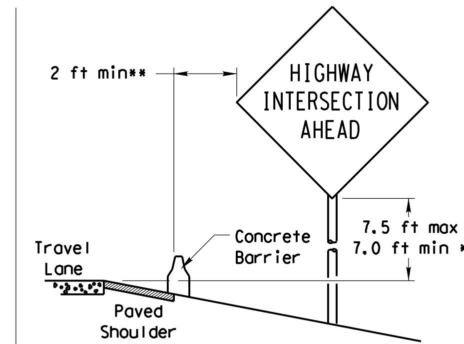
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

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

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

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

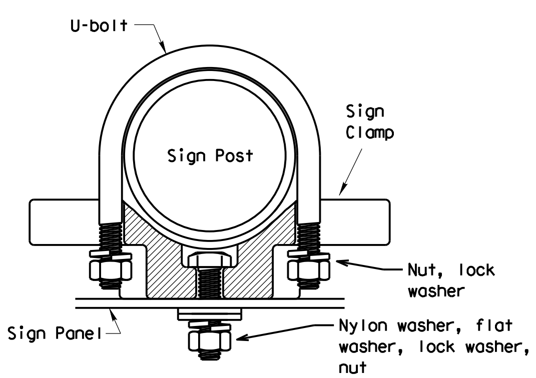
The maximum values may be increased when directed by the Engineer.

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

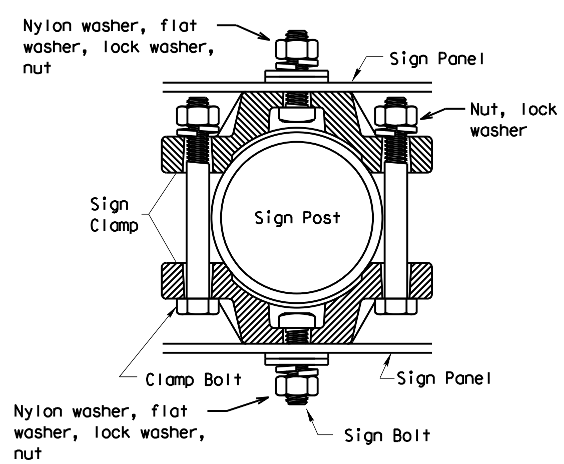
The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



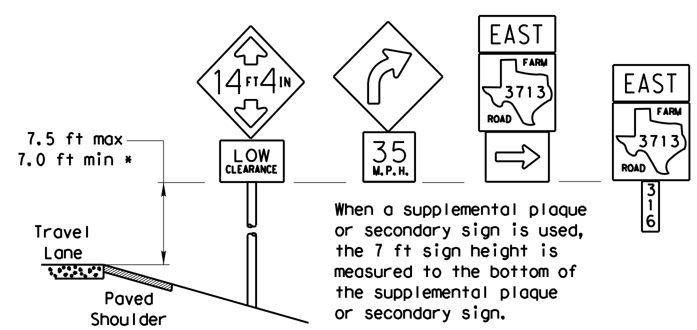
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

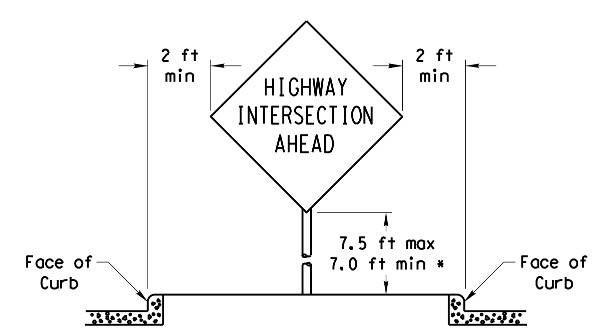
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



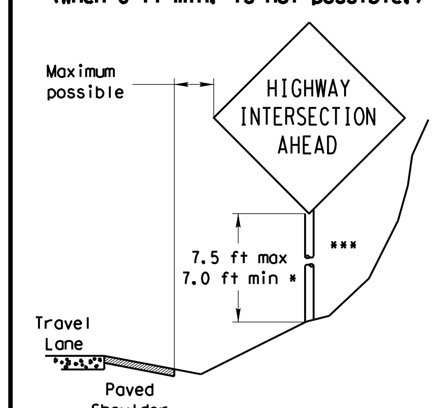
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

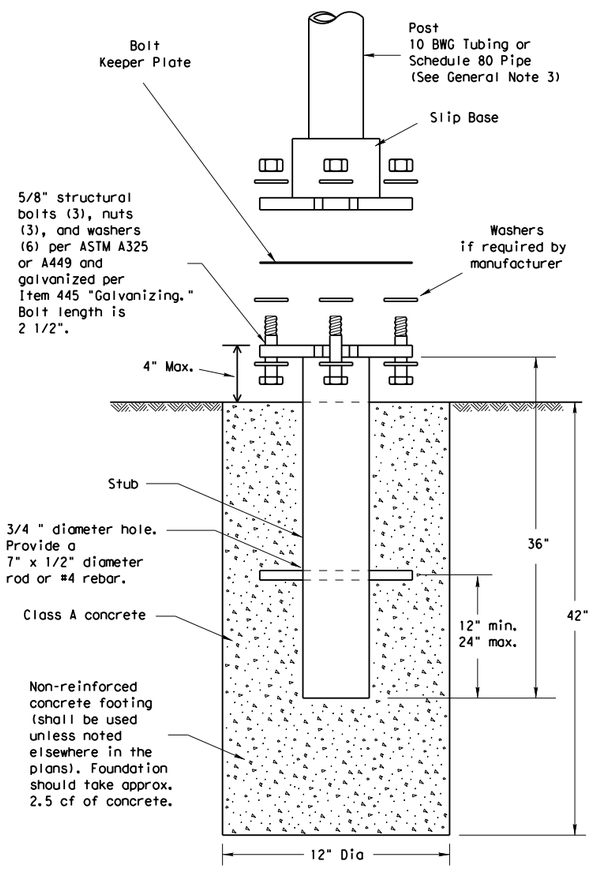
SMD(GEN)-08

©TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS 9-08	CONT 2524	SECT 02	JOB 025,ETC	HIGHWAY FM 2611
	DIST HOU	COUNTY BRAZORIA		SHEET NO. 191

26A

DATE: 12/21/2020 2:54:57 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\252402025\4 - Design\Plan Set\8. Traffic\standards\smdsl.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

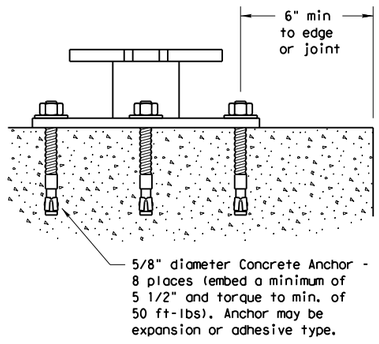
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

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

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

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
2524	02	025,ETC	FM 2611

DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	192

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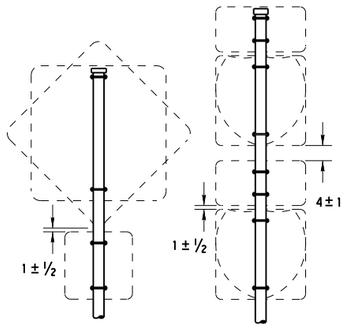

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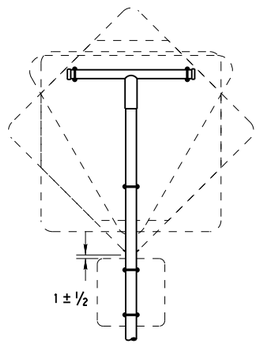

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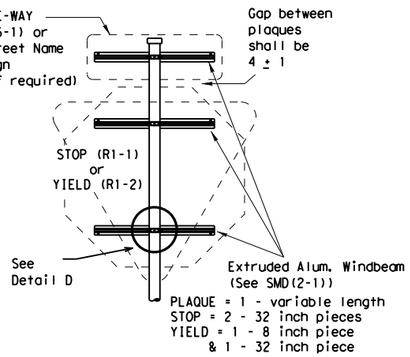

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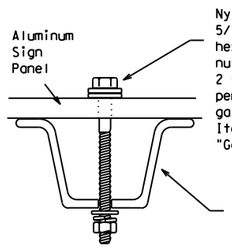
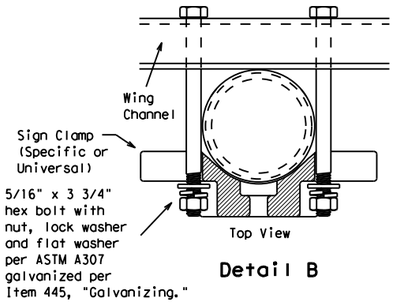
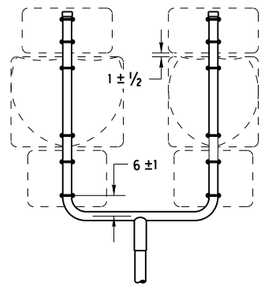


Detail A



Detail B



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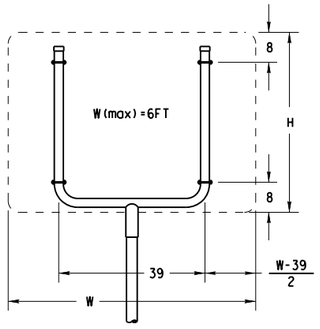

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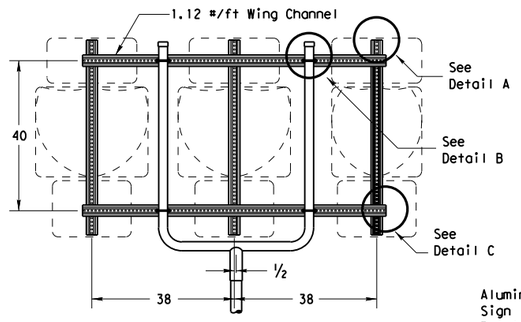

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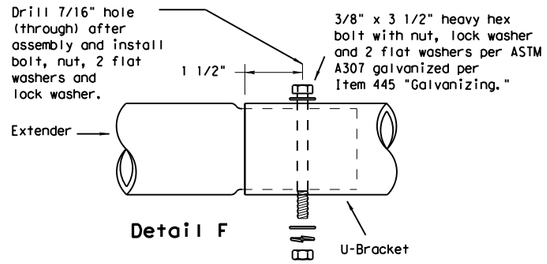
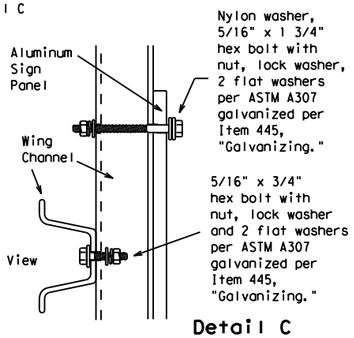
(See Note 11)

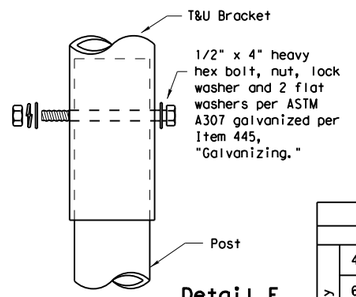


Detail F

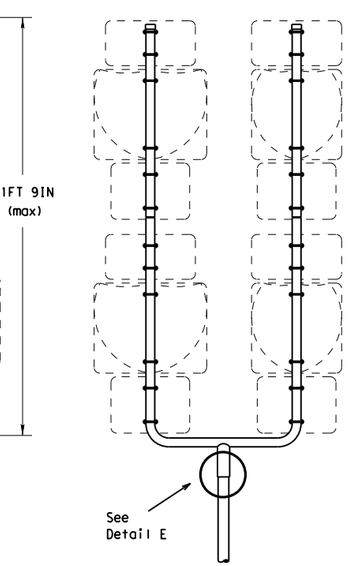
Splices shall only be allowed behind the sign substrate.



Detail C

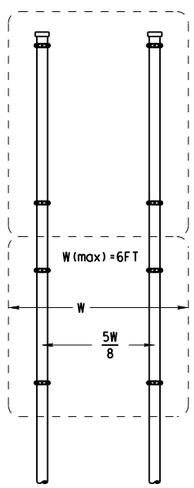


Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

SM RD SGN ASSM TY S80(1)XX(U-2EXT)



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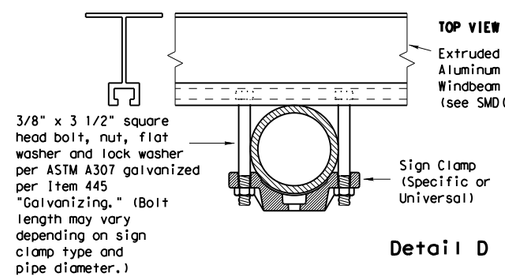
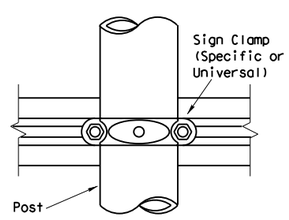


Detail D



GENERAL NOTES:

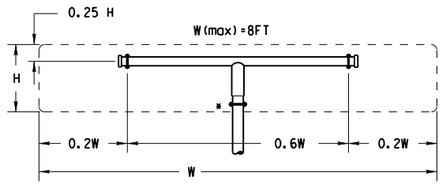
1.

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

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

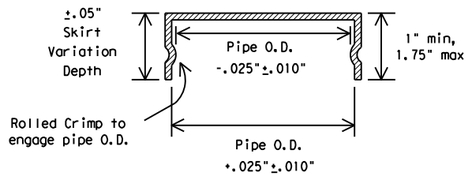
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs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



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

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	2524	02	025,ETC	FM 2611
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		193

DATE: 12/21/2020 2:55:13 PM
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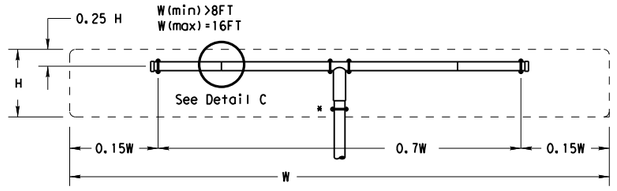
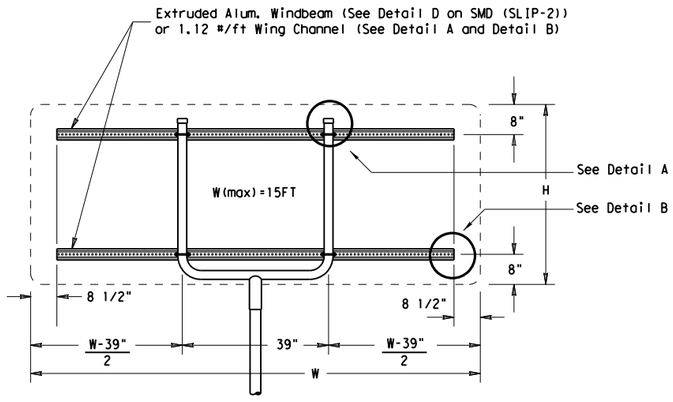
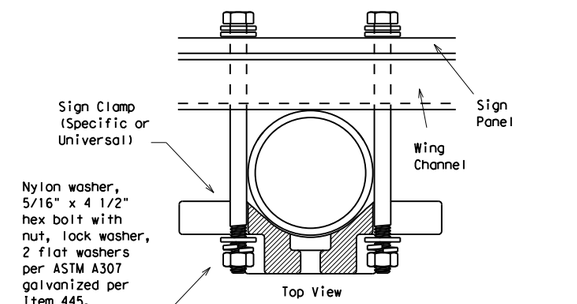


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)

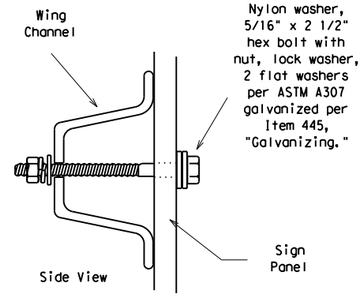


SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

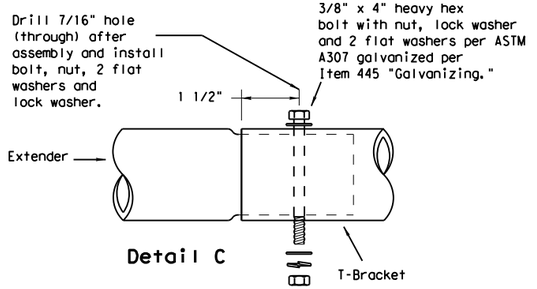


Top View

Detail A



Detail B



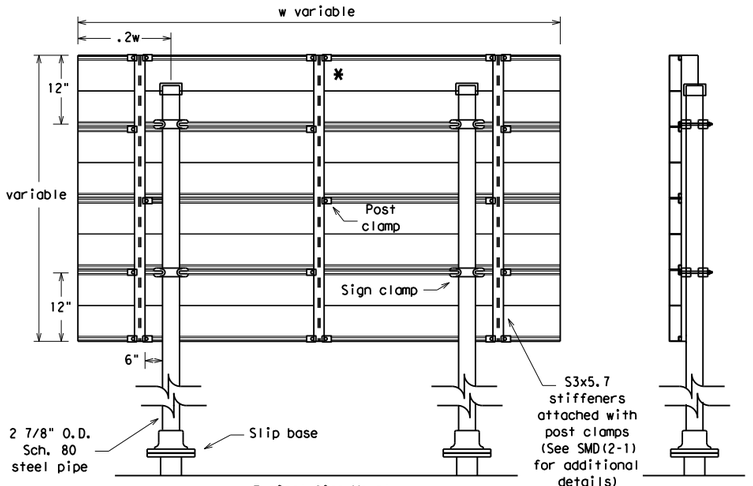
Detail C

Splices shall only be allowed behind the sign substrate.

GENERAL NOTES:

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

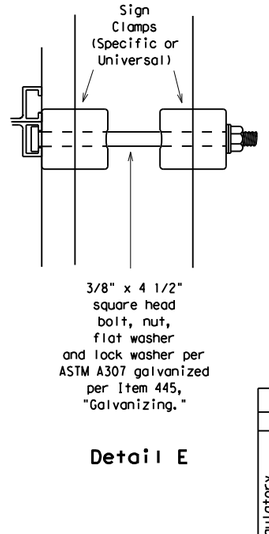
1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material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



Typical Sign Mount

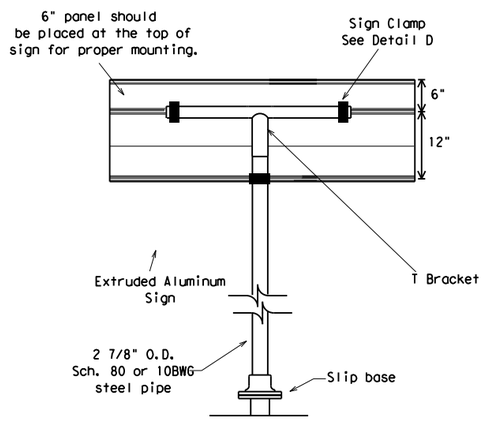
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

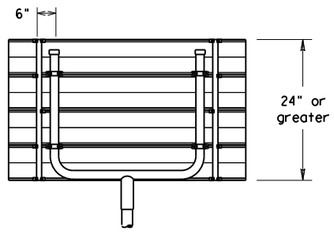


Detail E

See Detail E
for clamp installation



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

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)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

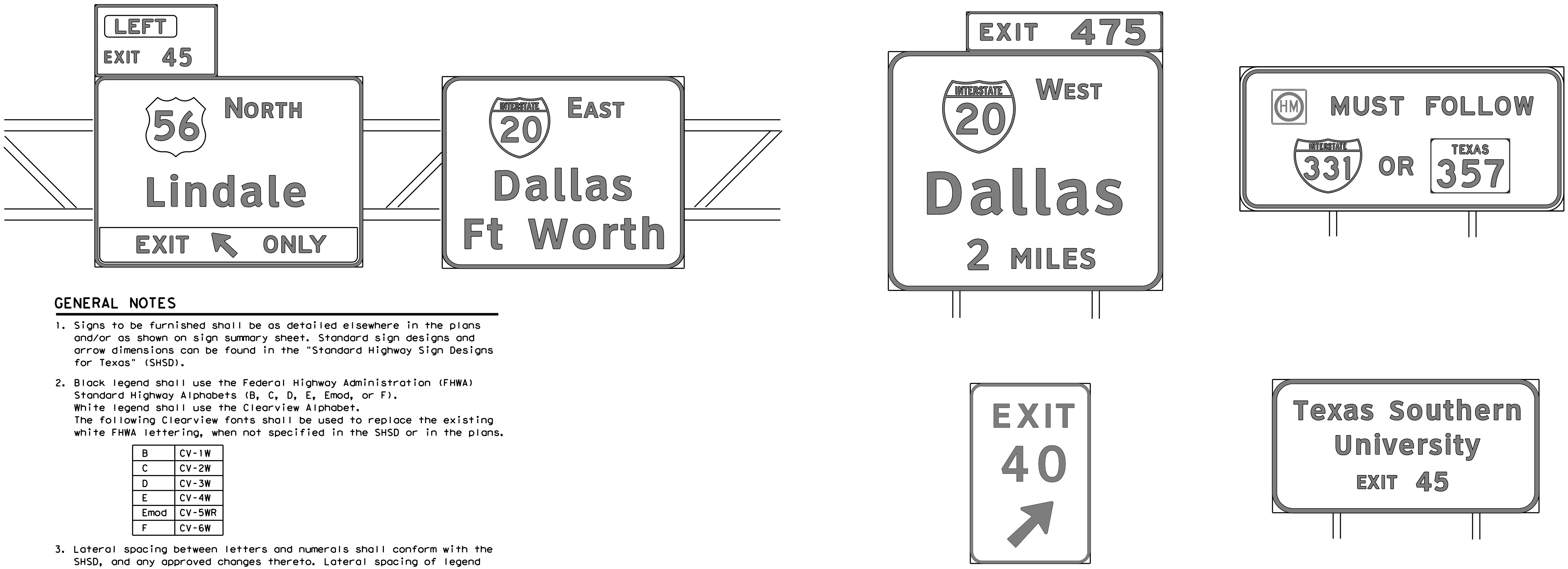
REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
2524	02	025,ETC	FM 2611

DIST	COUNTY	SHEET NO.
HOU	BRAZORIA	194

REQUIREMENTS FOR OVERHEAD AND LARGE GROUND-MOUNTED SIGNS

TYPICAL EXAMPLES



GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign summary sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Black legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod, or F). White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white FHWA lettering, 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. 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 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 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 need not be trimmed or rounded if fabricated from an extruded material.
7. Sign substrate for ground-mounted signs shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative. Sign substrate for overhead signs shall be any material that meets DMS-7110. Exit Number Panels attached above the parent sign shall be made with the same substrate and sheeting as the parent sign.
8. Mounting details of attachments to parent sign face are shown on Standard Plan Sheet TSR(5). Mounting details of exit number panels above parent sign are shown in the "SMD series" Standard Plan Sheets.
9. Background sheeting shall be applied to the substrate per sheeting manufacturer's recommendations. Sheeting will not be allowed to bridge the horizontal gap between panels.
10. Cut all legend, symbols, borders, and direct applied sign attachments at panel joints.

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/

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

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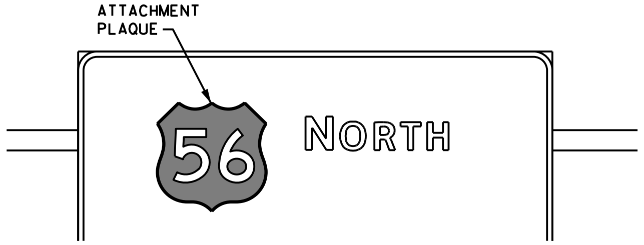
Texas Department of Transportation — Traffic Operations Division Standard

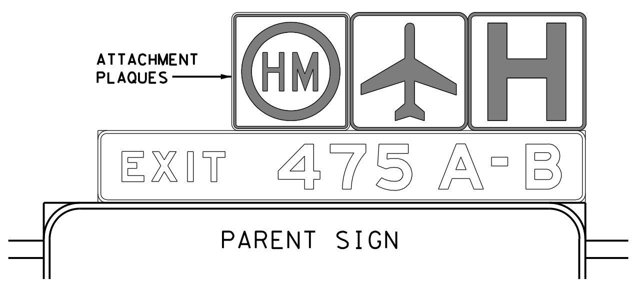
TYPICAL SIGN REQUIREMENTS

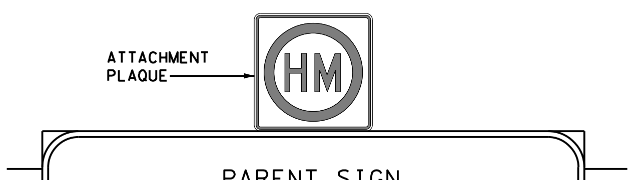
TSR(1)-13

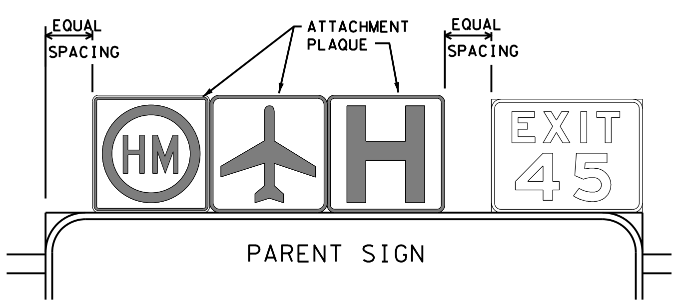
FILE: tsr1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
12-03 7-13 9-08	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	195

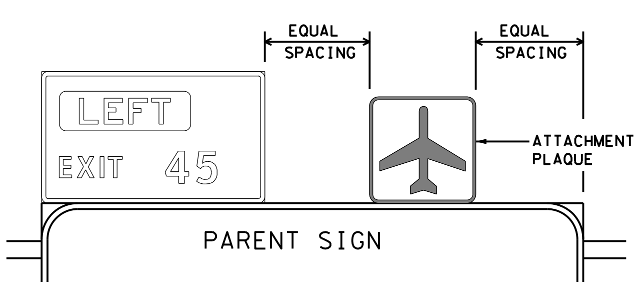
REQUIREMENTS FOR ATTACHMENTS TO OVERHEAD AND LARGE GROUND MOUNTED SIGNS









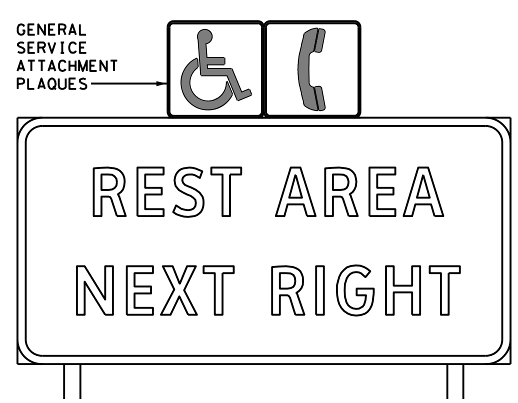


DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	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. Route Marker legends (ie. IH, US, SH and FM shields) 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 and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to white background sheeting, or combination thereof.
7. Route markers and other attachments within the parent sign face shall be direct applied unless otherwise specified in the plans. Attachments not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
8. General Service Plaques shall be 0.080 inch thick and Routing Plaques shall be 0.100 inch thick.
9. The priority for Routing Plaques shall be (left to right) Hazardous Material, Airport then Hospital. See examples for mounting location.
10. Mounting details of attachments to parent signs face are shown on Standard Plan Sheet TSR(5). Mounting details of sign plaque attachments above and below parent sign are shown in the "SMD series" Standard Plan Sheets.
11. Plaques shall be horizontally centered at the top of the parent sign. If an exit number panel exists, the plaque shall be centered between the edge of the parent sign and the edge of the exit number panel. The plaque may be placed above the exit number panel when there is insufficient space.

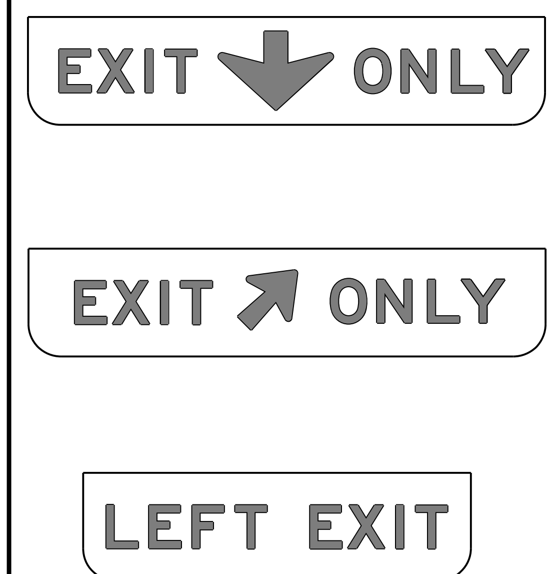


TYPICAL EXAMPLES

REQUIREMENTS FOR EXIT ONLY AND LEFT EXIT PANELS

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

SHEETING REQUIREMENTS FOR OVERHEAD EXIT PANELS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLUORESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND	BLACK	ACRYLIC NON-REFLECTIVE FILM



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). Individual panel sizes shown in the plans may be adjusted to fit actual parent sign sizes if necessary.
2. Exit Panel legend shall use the Federal Highway Administration (FHWA)Standard Highway Alphabets E Series.
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 shall be applied by screening process or cut-out acrylic non-reflective black film to yellow background sheeting, or combination thereof.
5. Exit Only and Left Exit panels within the parent sign face shall be direct applied unless otherwise specified in the plans. Panels not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
6. Mounting details of Exit Only and Left Exit panel attachments to parent signs face are shown on Standard Plan Sheet TSR(5).

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(2)-13

FILE: tsr2-13.dgn		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB		HIGHWAY
REVISIONS	2524	02	025,ETC		FM 2611
12-03 7-13	DIST		COUNTY		SHEET NO.
9-08	HOU		BRAZORIA		196

DATE: 12/21/2020 2:55:31 PM
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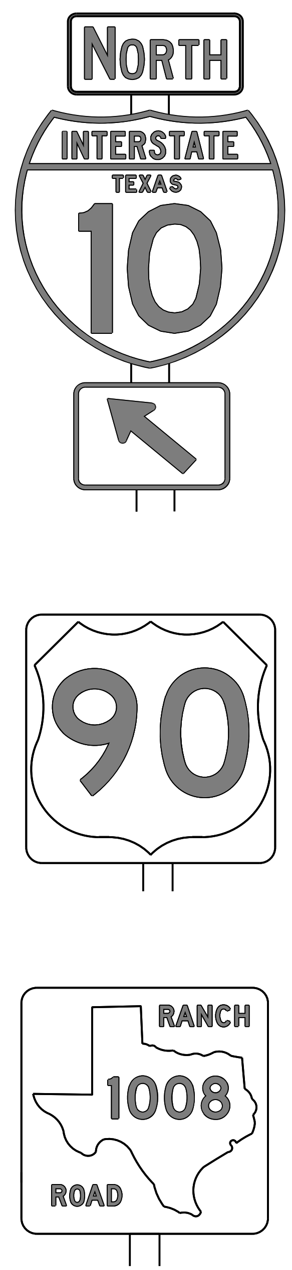
REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

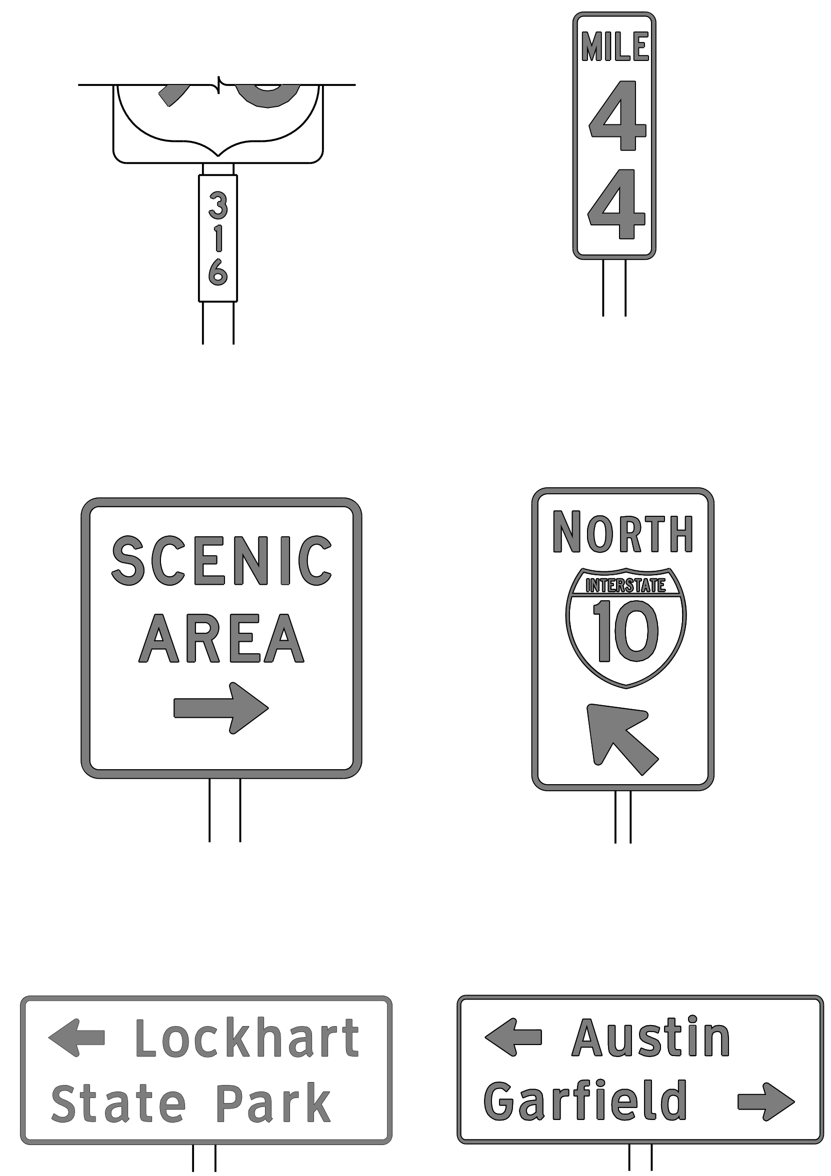
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

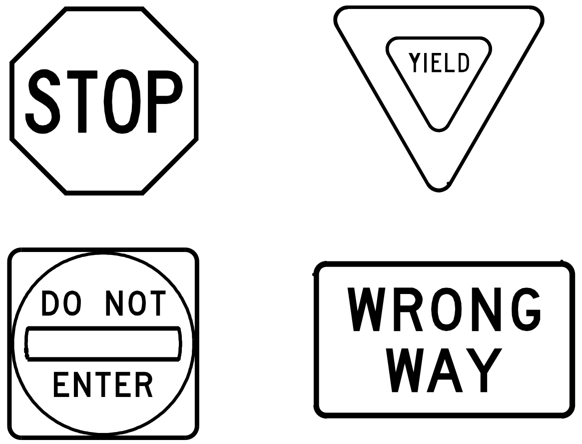
Texas Department of Transportation
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT			
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY			
REVISIONS	2524	02	025,ETC	FM 2611			
12-03 7-13 9-08	DIST	COUNTY	SHEET NO.				
	HOU	BRAZORIA	197				

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

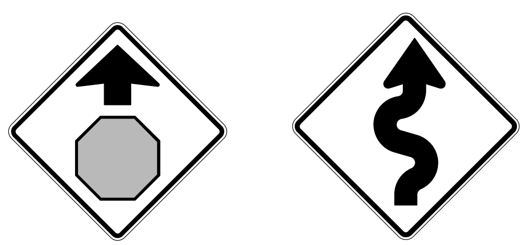
1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway 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

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Texas Department of Transportation — Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-03 7-13 9-08	2524	02	025, ETC	FM 2611
	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	198

DATE: 12/21/2020 2:55:56 PM
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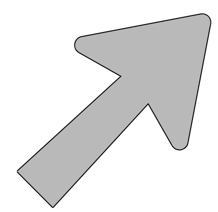
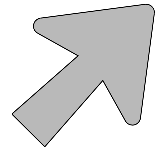
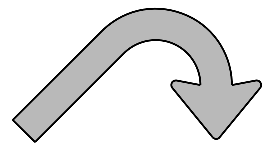
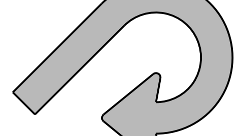
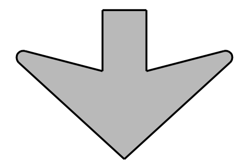
ARROW DETAILS
for Large Ground-Mounted and Overhead Guide Signs


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	

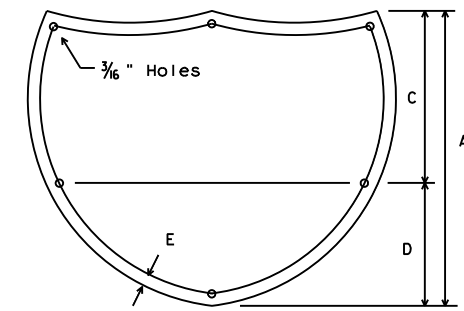
CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

NOTE

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

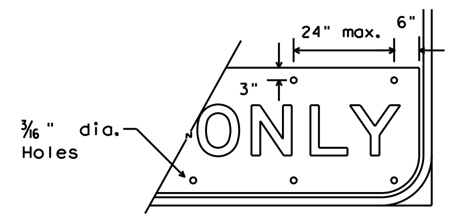
The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

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

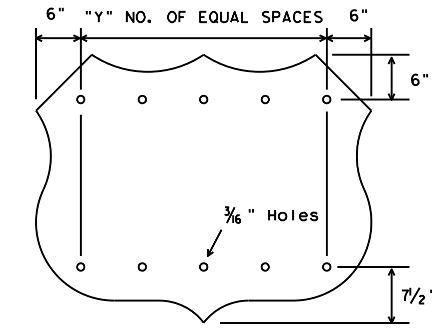


INTERSTATE ROUTE MARKERS

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

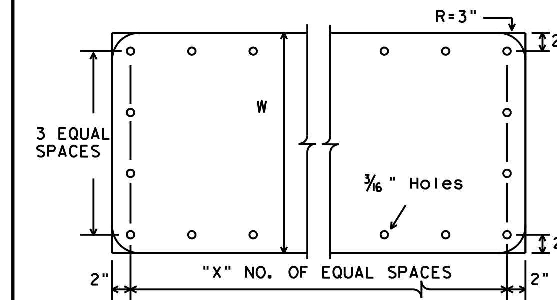


EXIT ONLY PANEL



U.S. ROUTE MARKERS

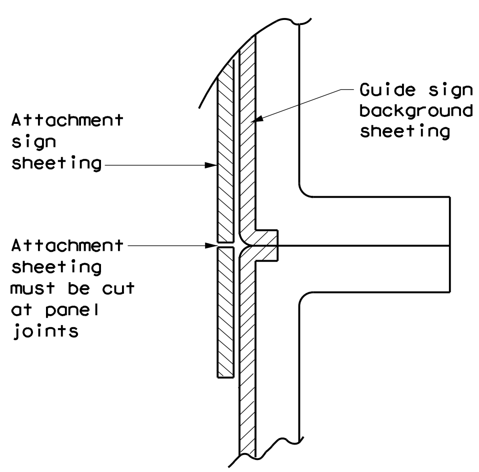
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



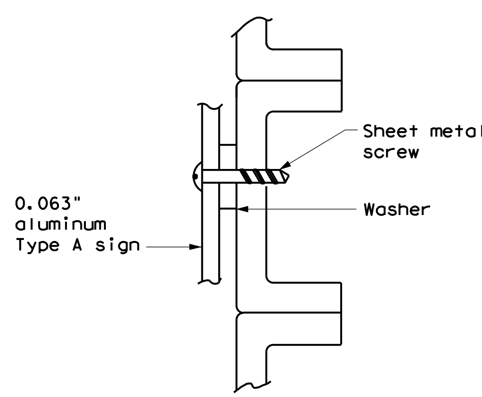
STATE ROUTE MARKERS

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

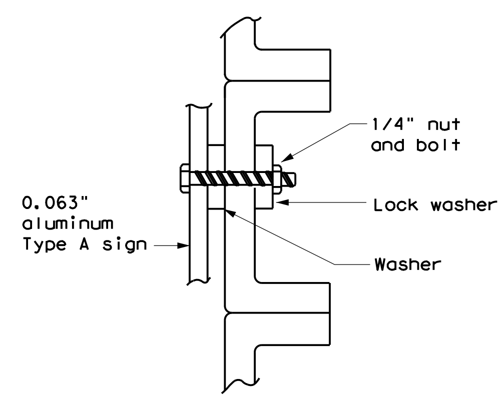
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

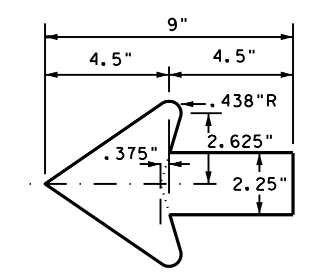
NOTE:

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

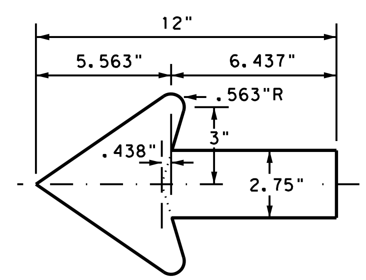
NOTE:

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

ARROW DETAILS
for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

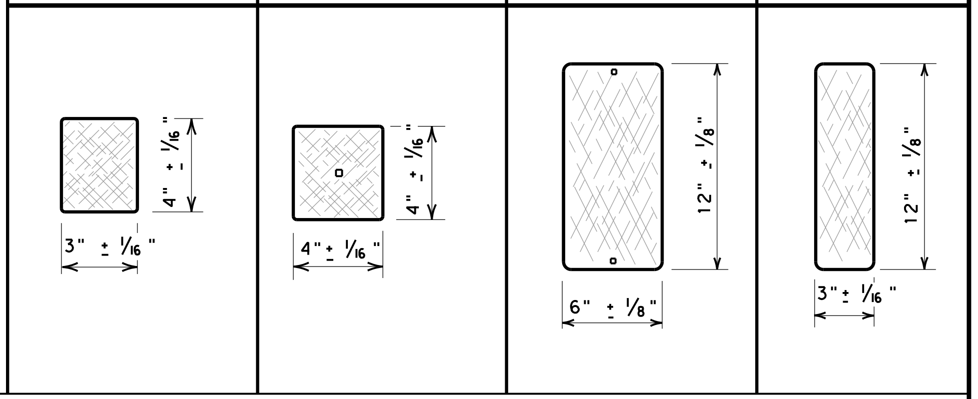
Texas Department of Transportation
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

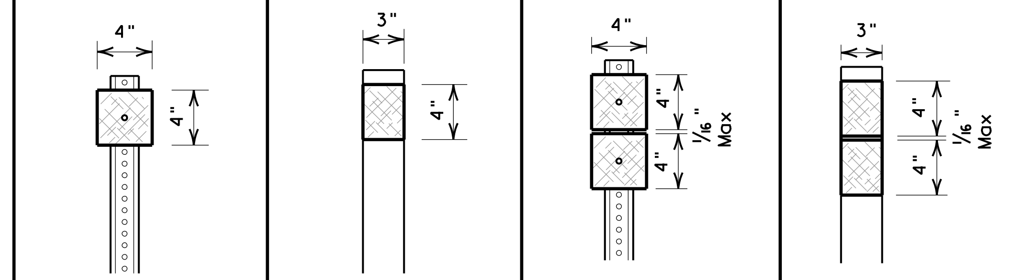
FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
12-03 7-13 9-08	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	199

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS



	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE	4" ± 1/16" × 3" ± 1/16"	4" ± 1/16" × 4" ± 1/16"	12" ± 1/8" × 6" ± 1/8"	12" ± 1/8" × 3" ± 1/16"
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS



	SINGLE		DOUBLE	
DEVICE	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

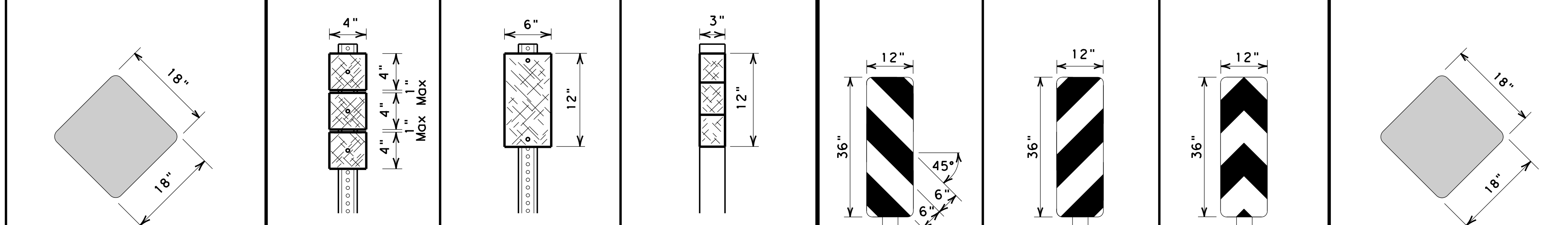
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

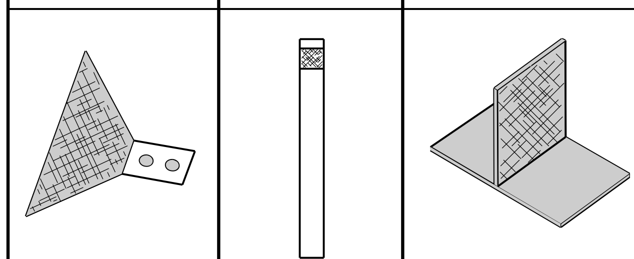


	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

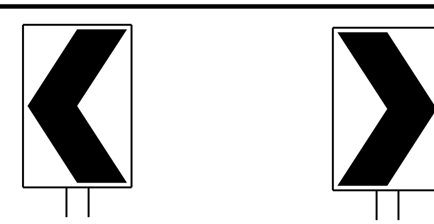
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)



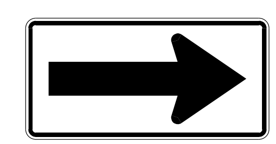
	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches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

CHEVRONS



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

ONE DIRECTION LARGE ARROW



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

NOTE

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

NOTE:

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

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	2524	02	025,ETC	FM 2611
10-09 3-15 4-10 7-20	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	200

20A

DATE: 12/21/2020 2:56:04 PM
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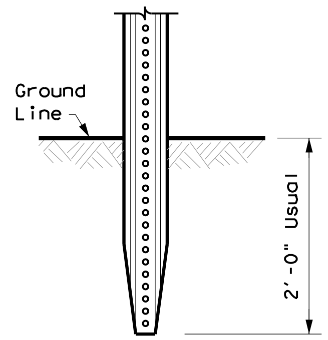
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

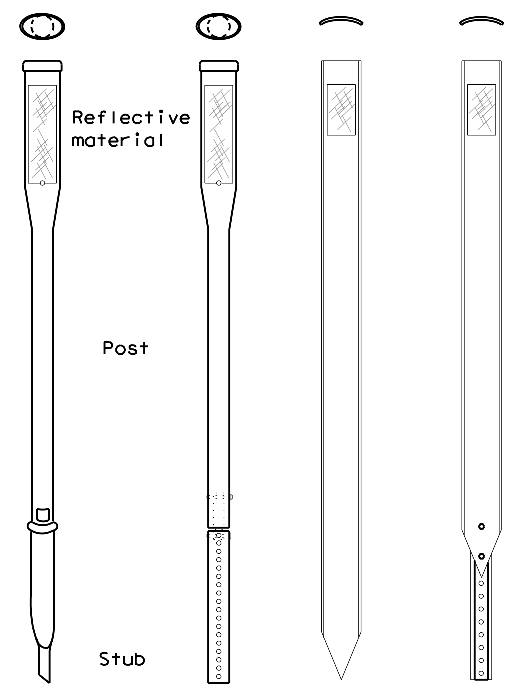


NOTES

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

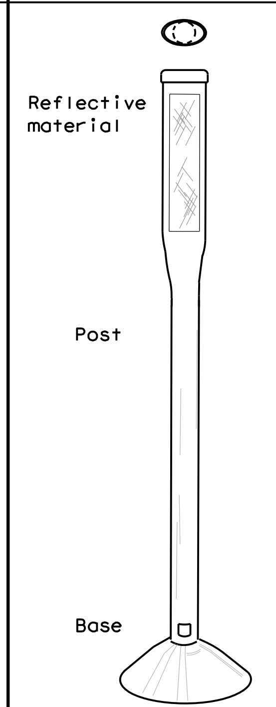
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



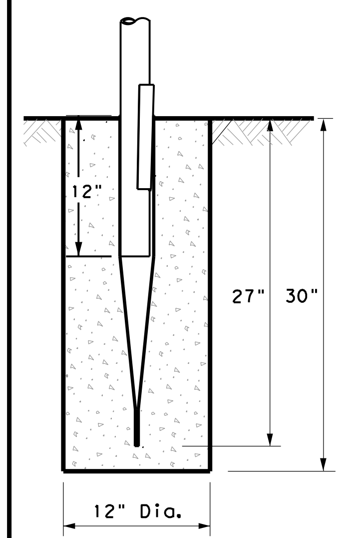
SURFACE MOUNT

NOTES

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

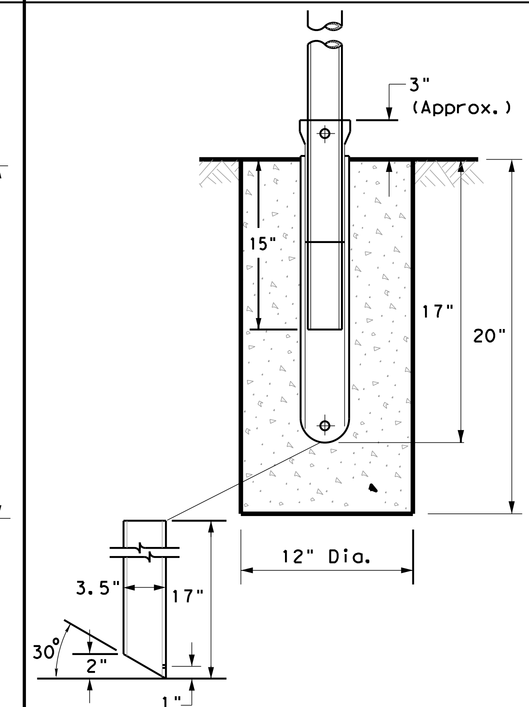
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

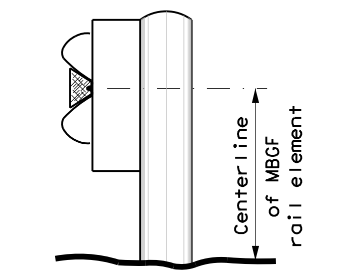
NOTE

1. Install per manufacturer's recommendations.

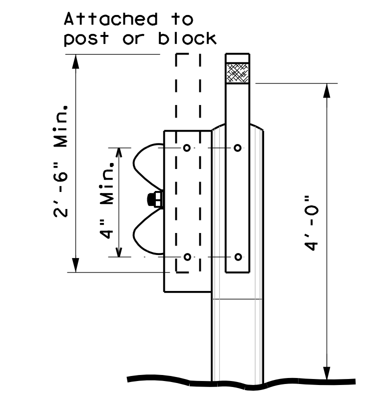
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

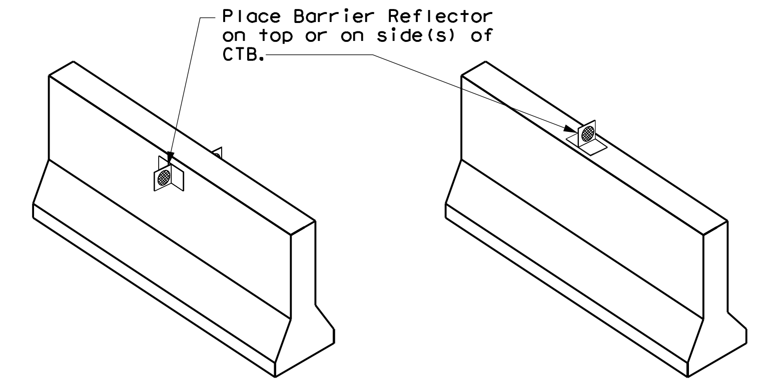
GF1



GF2



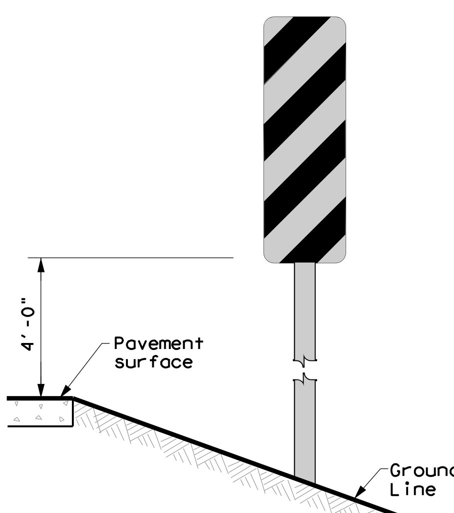
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

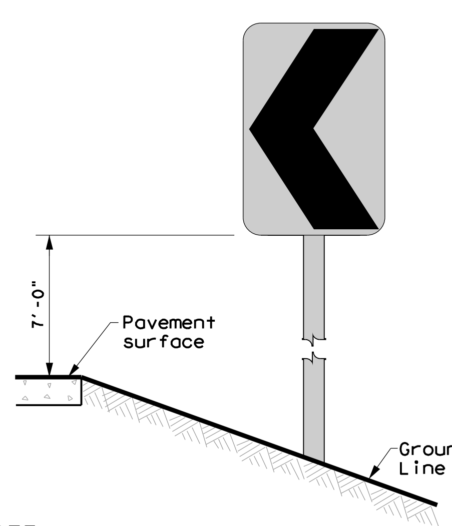
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

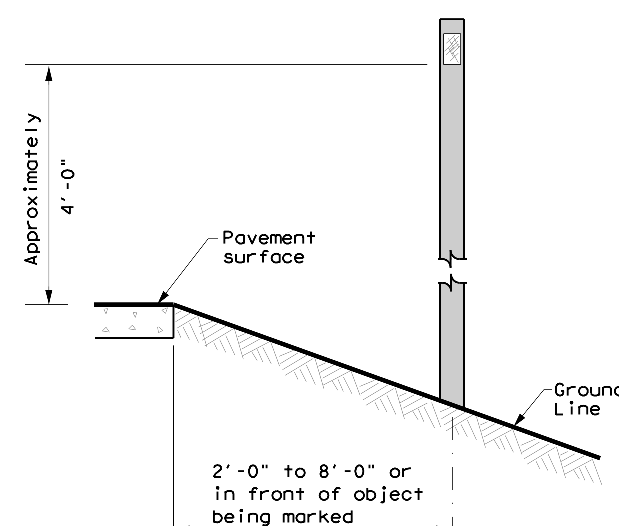
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

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Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn		DN: TXDOT	CK: TXDOT	DW: TXDOT		CK: TXDOT	
©TxDOT August 2004		CONT	SECT	JOB		HIGHWAY	
REVISIONS		2524	02	025,ETC		FM 2611	
10-09 3-15		DIST		COUNTY		SHEET NO.	
4-10 7-20		HOU		BRAZORIA		201	

20B

DATE: 12/21/2020 2:56:19 PM
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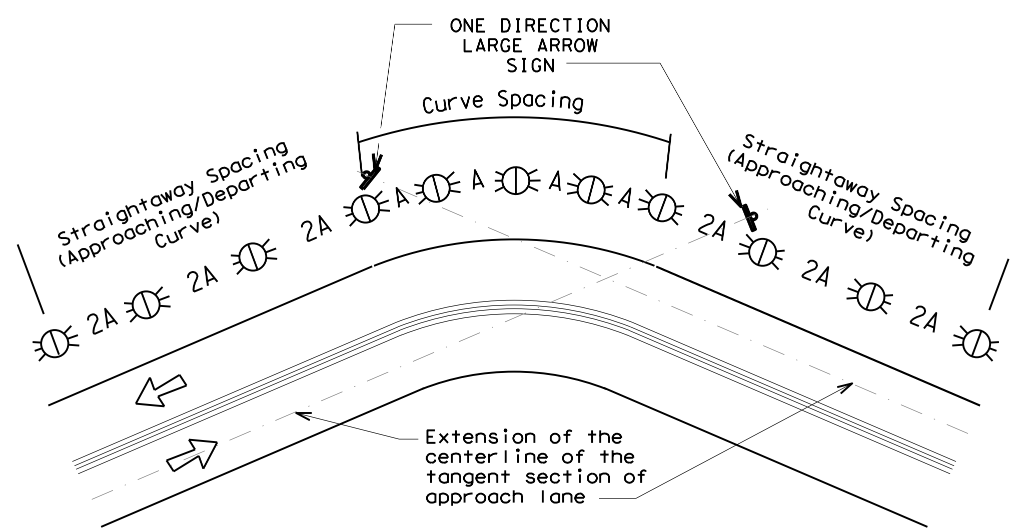
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

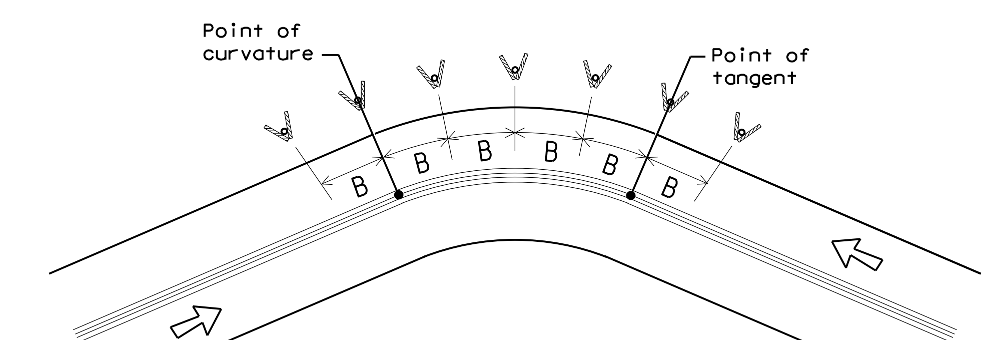
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

Symbol	Meaning
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation — Traffic Safety Division Standard

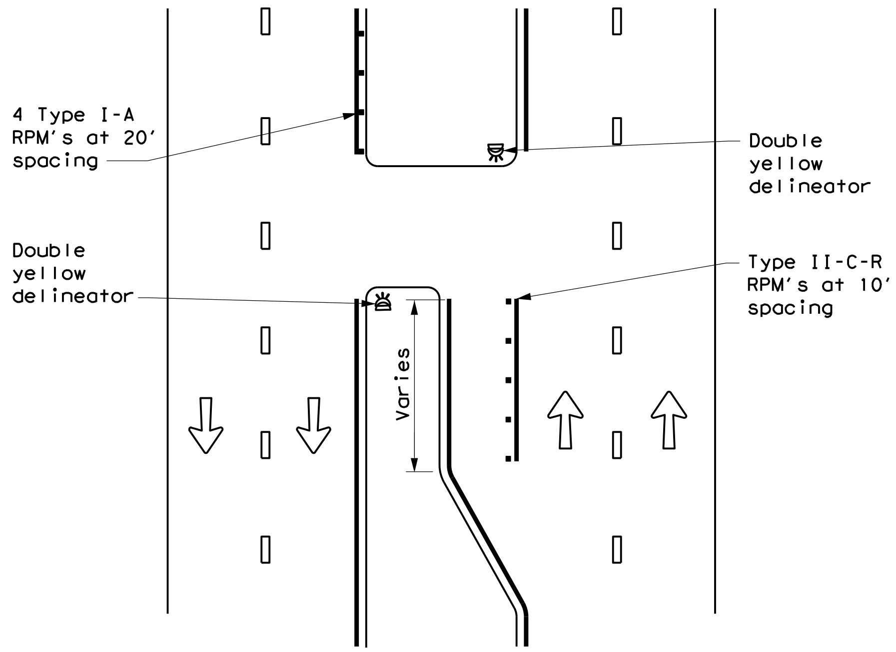
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT 2524	SECT 02	JOB 025,ETC	HIGHWAY FM 2611
REVISIONS 3-15 8-15 8-15 7-20	DIST HOU	COUNTY BRAZORIA		SHEET NO. 202

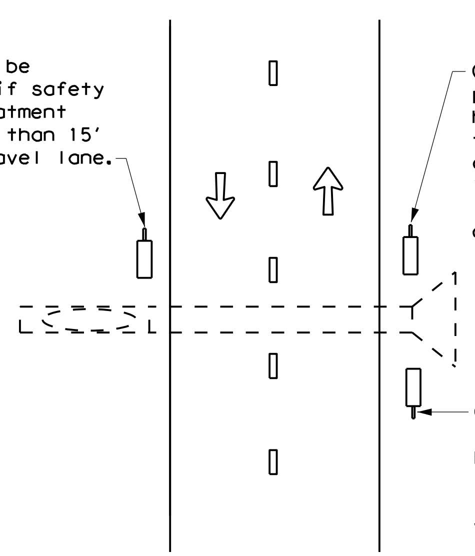
20C

CROSSOVERS



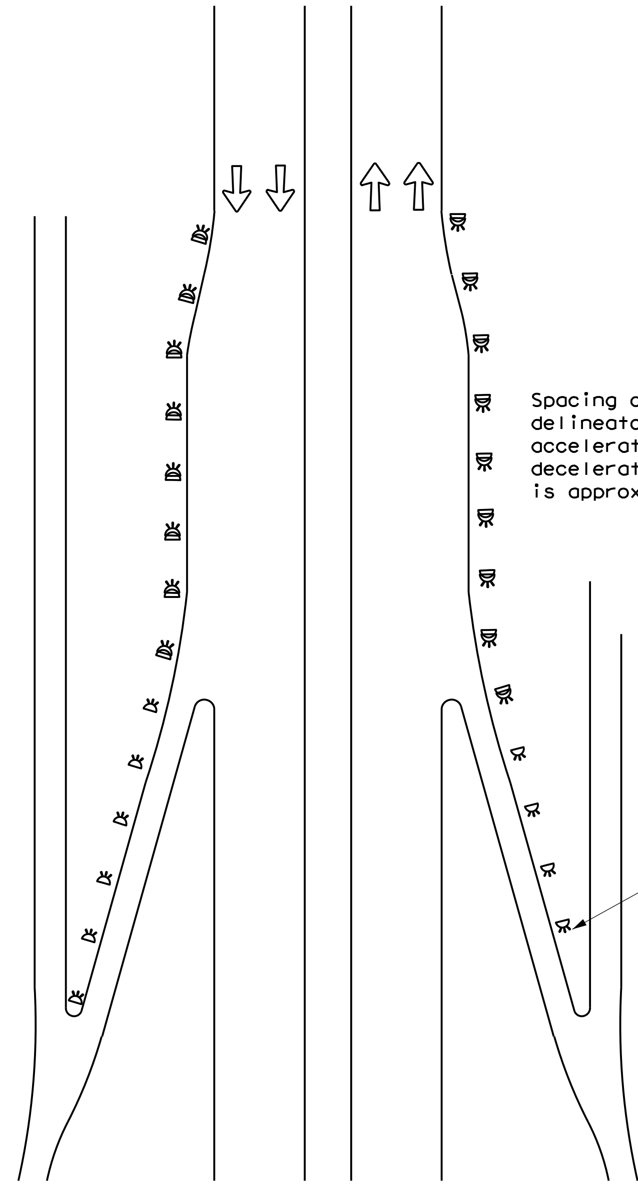
DETAIL 1

FOR CULVERTS WITHOUT MBGF



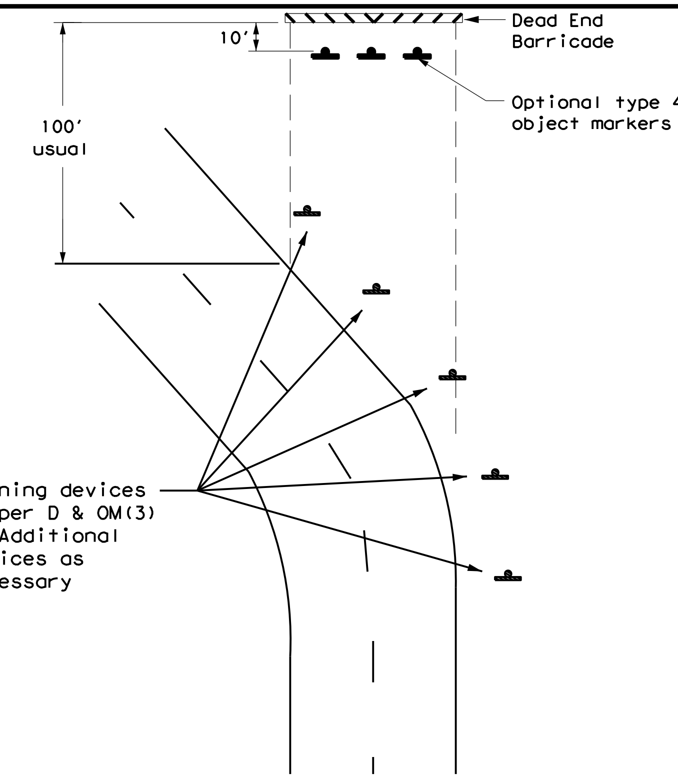
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



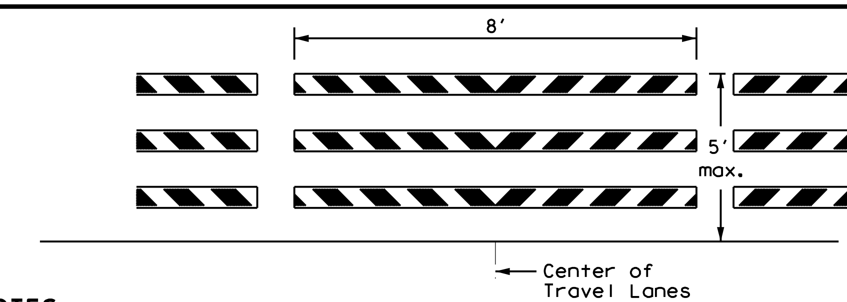
DETAIL 3

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

Symbol	Description
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation — Traffic Safety Division Standard

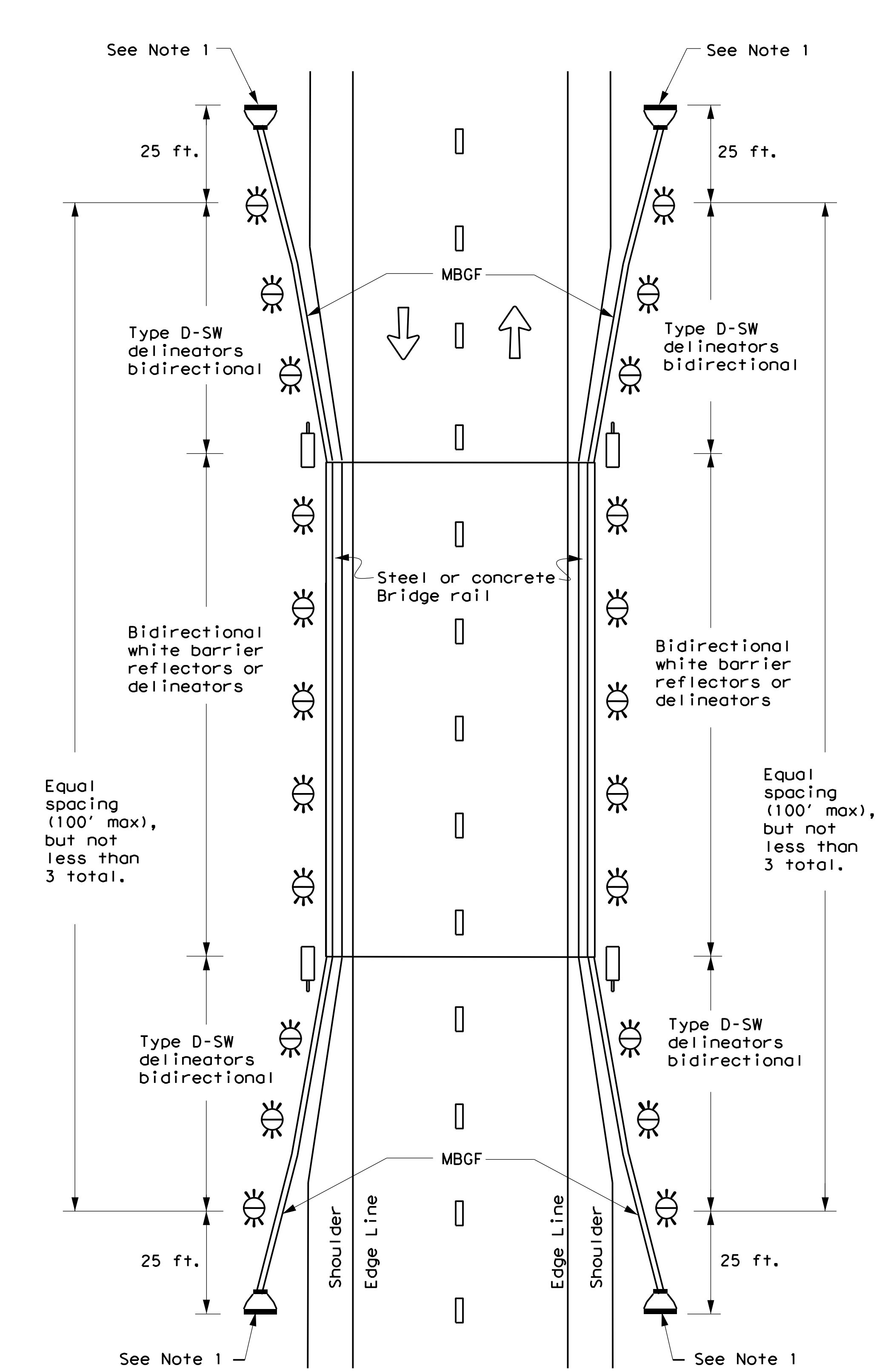
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 3-15 7-20	2524	02	025,ETC	FM 2611
	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	203

20D

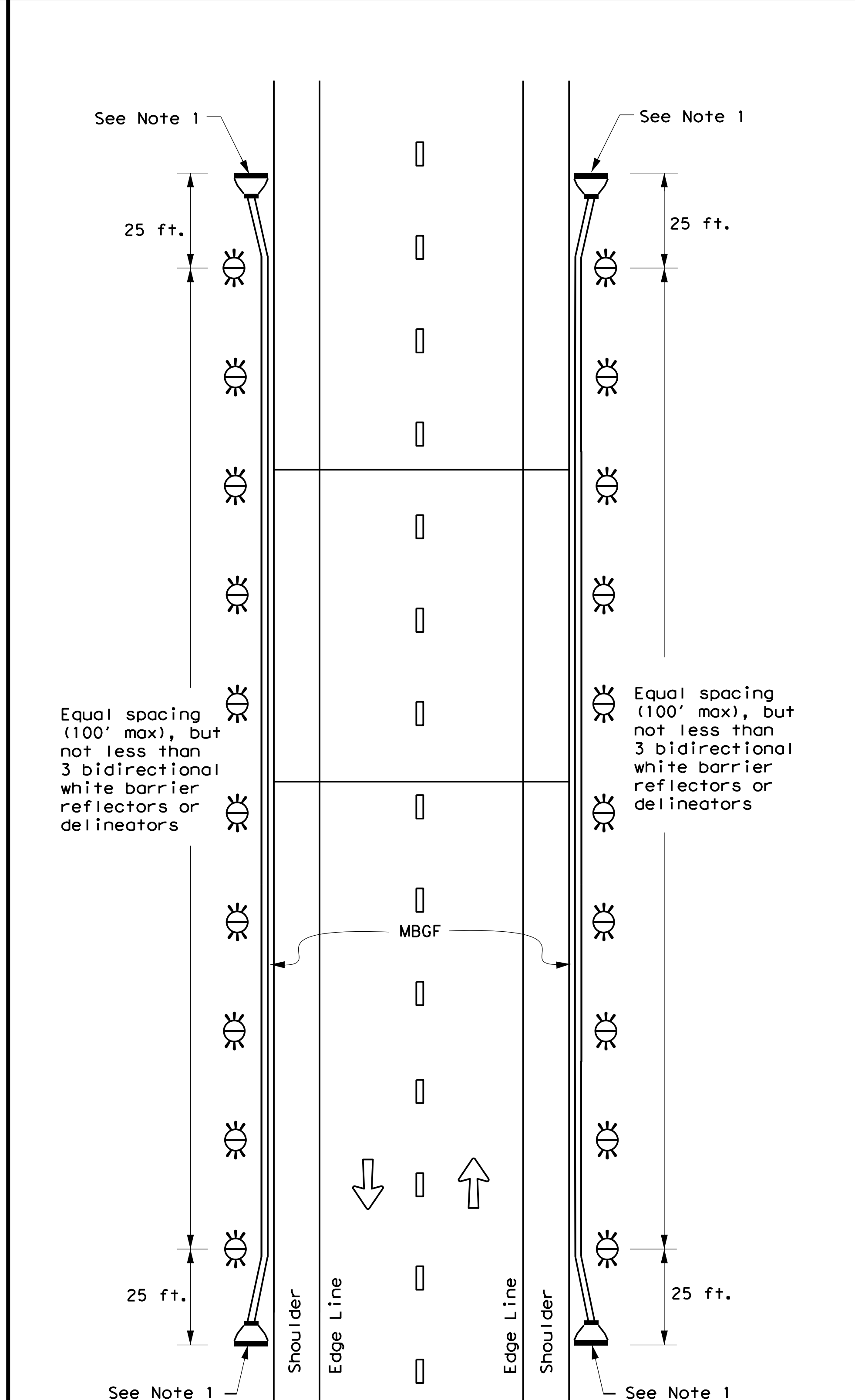
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

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

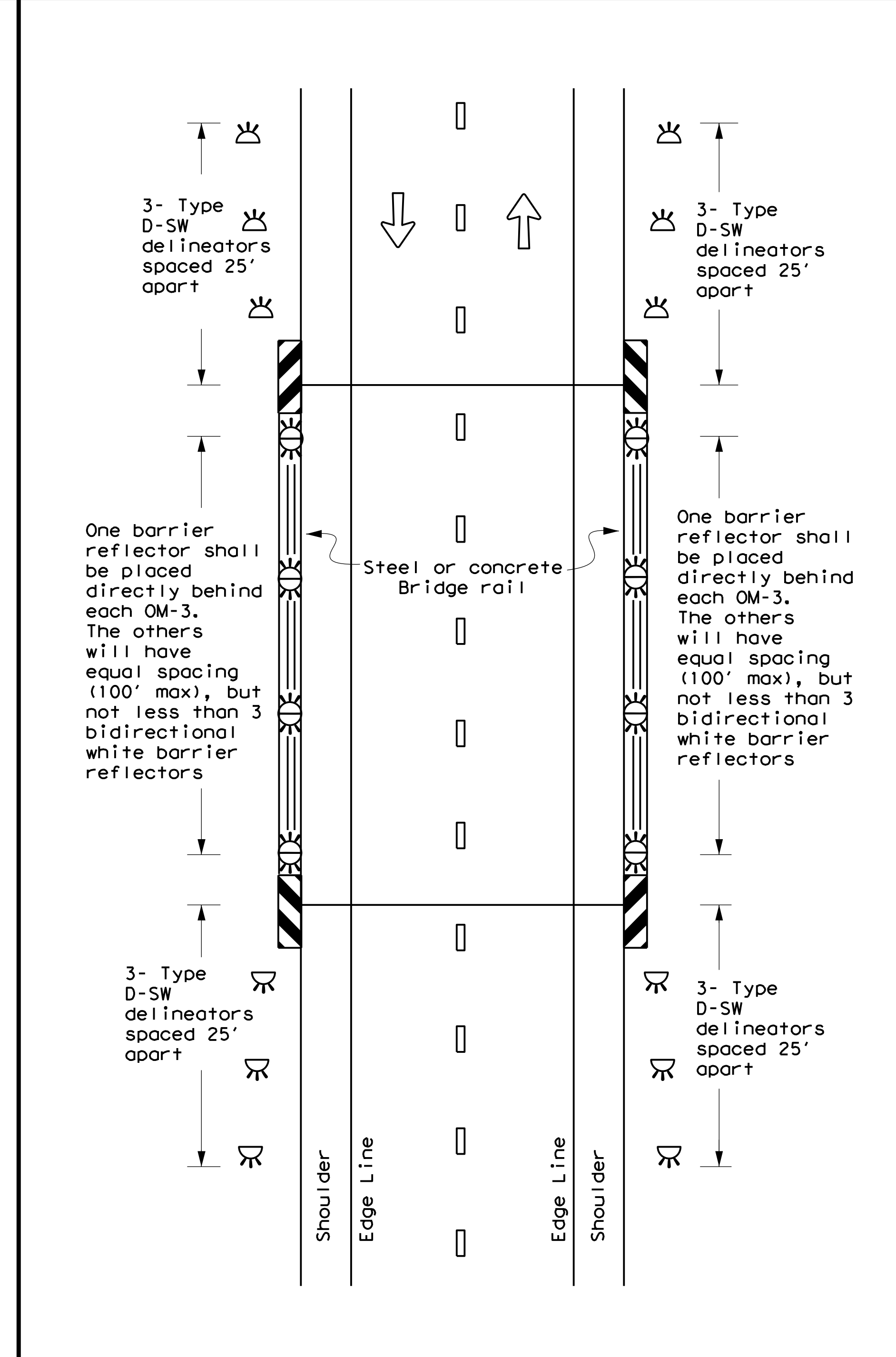
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

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

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



LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
7-20	DIST		COUNTY	SHEET NO.
	HOU		BRAZORIA	204

20E

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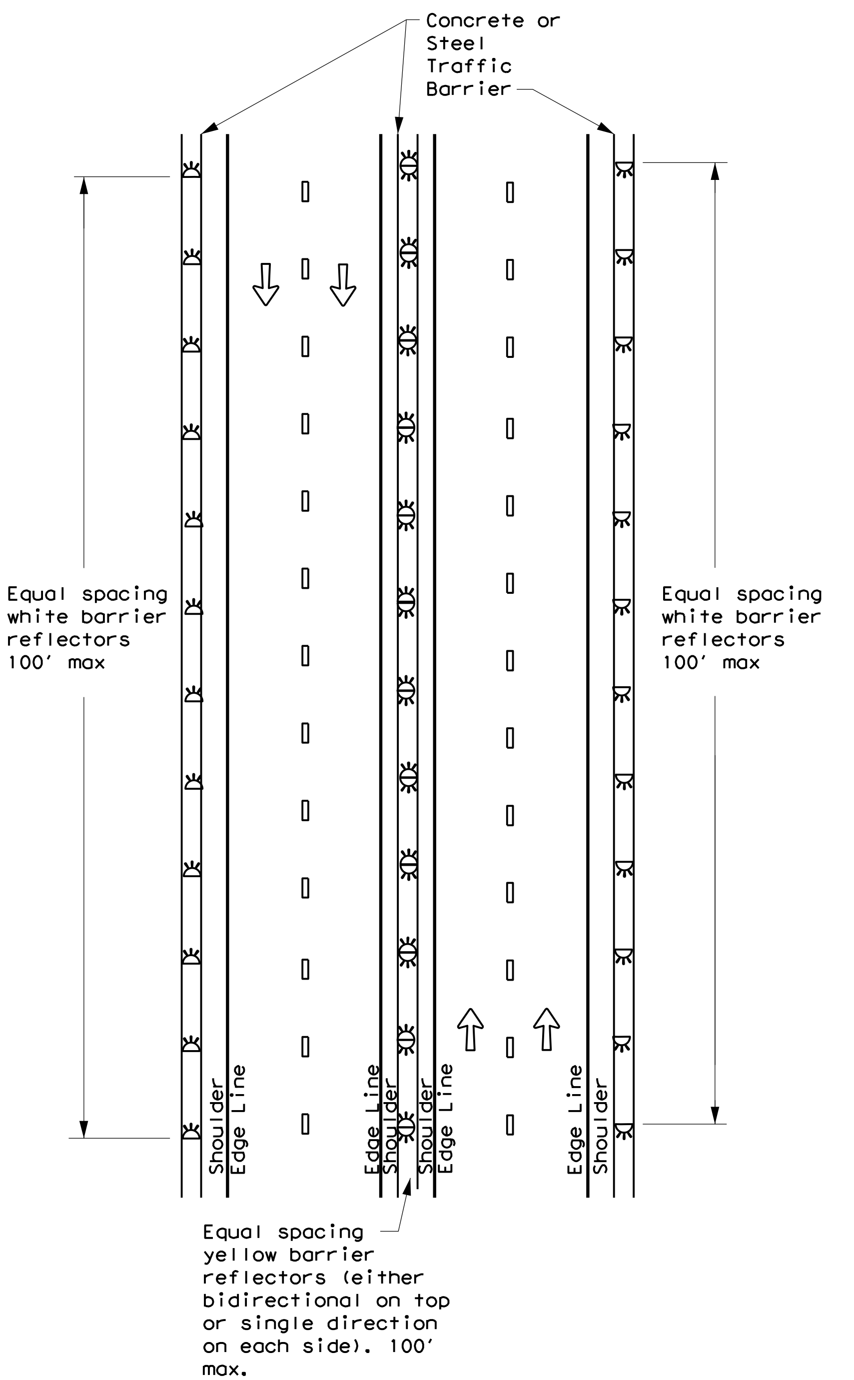
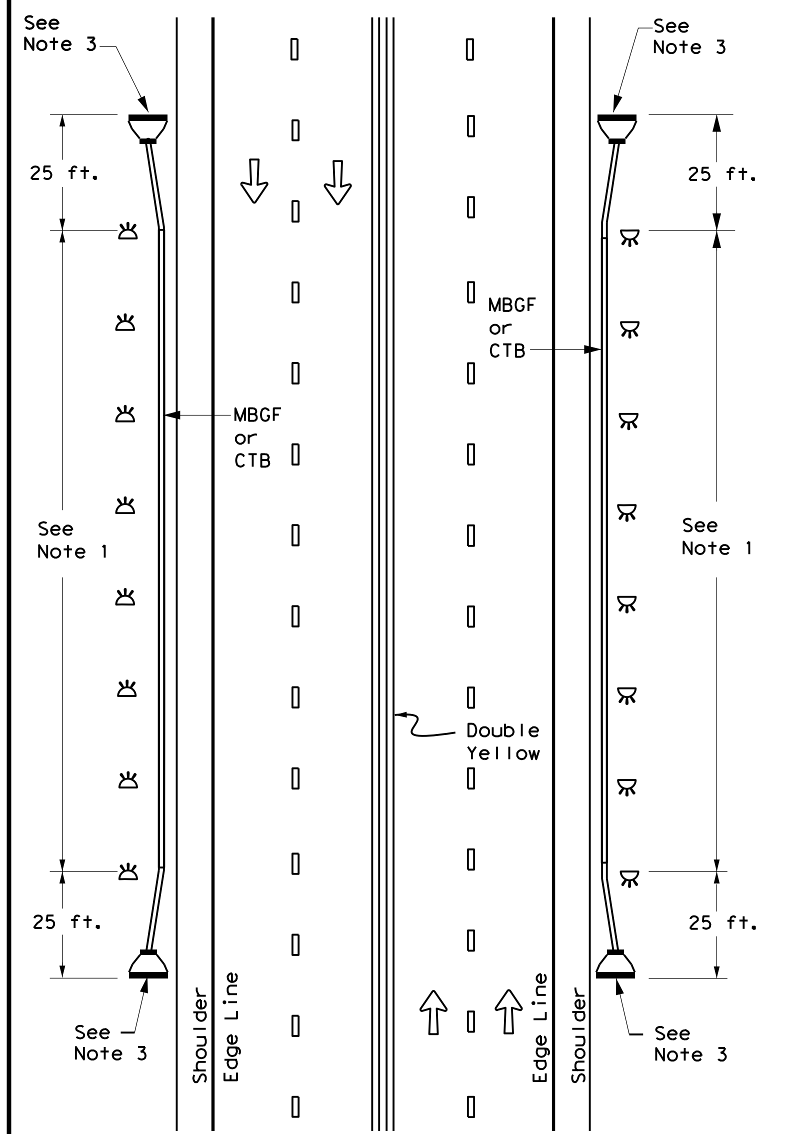
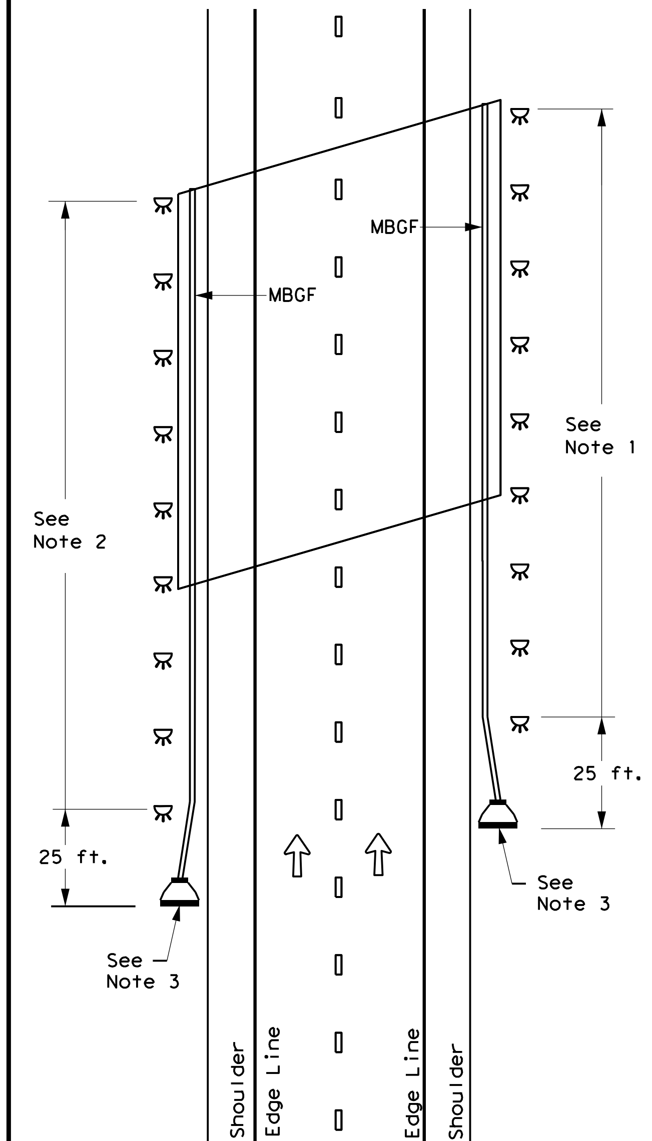
CONTINUOUS CONCRETE OR STEEL BARRIER



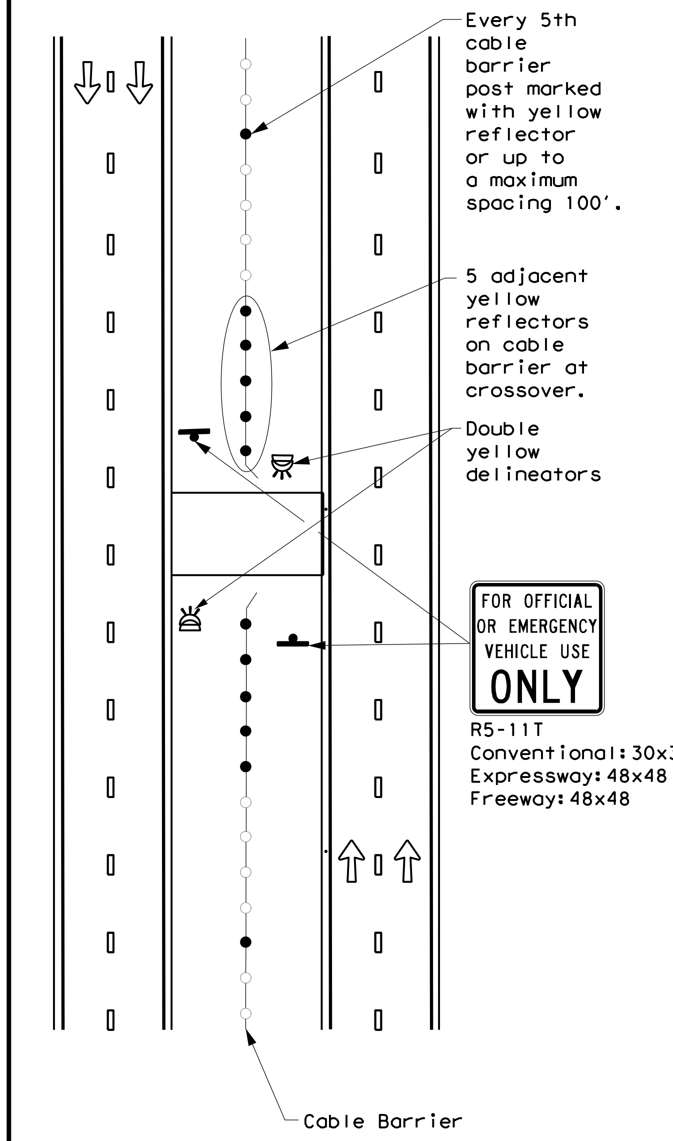
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100' max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100' max.)

2. Equal spacing (100' max), but not less than 3 single directional yellow barrier reflectors or delineators.

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

LEGEND

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

Texas Department of Transportation

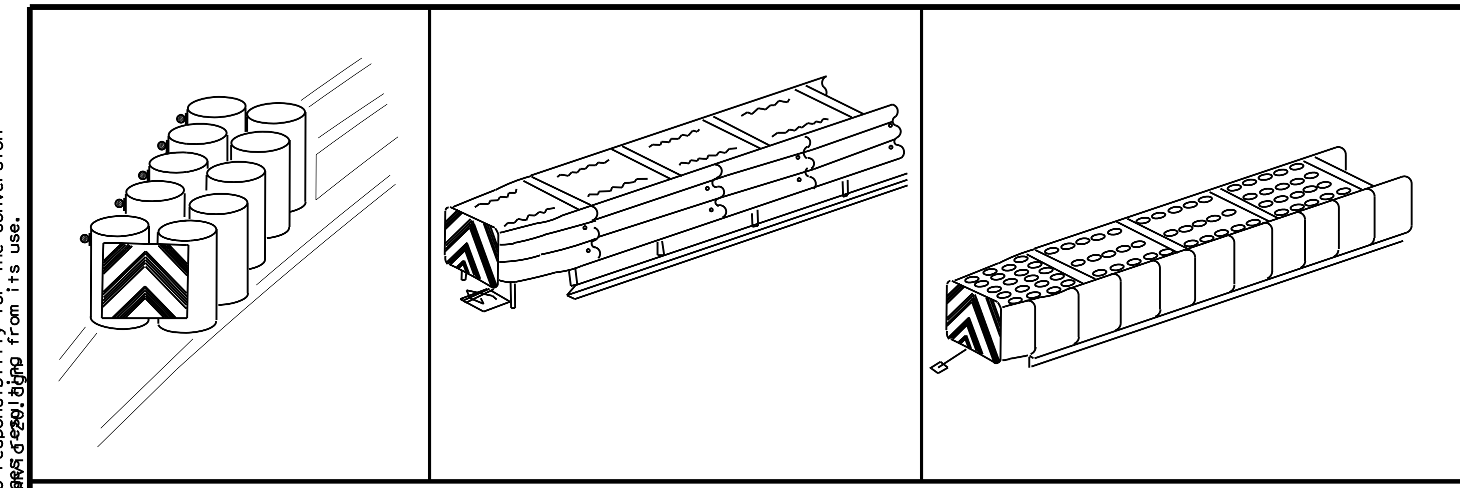
Traffic Safety Division Standard

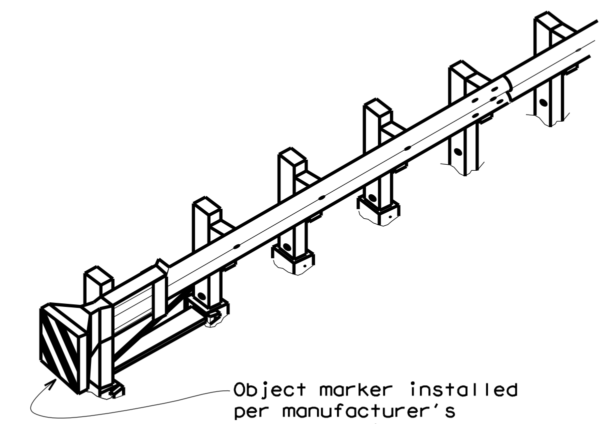
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

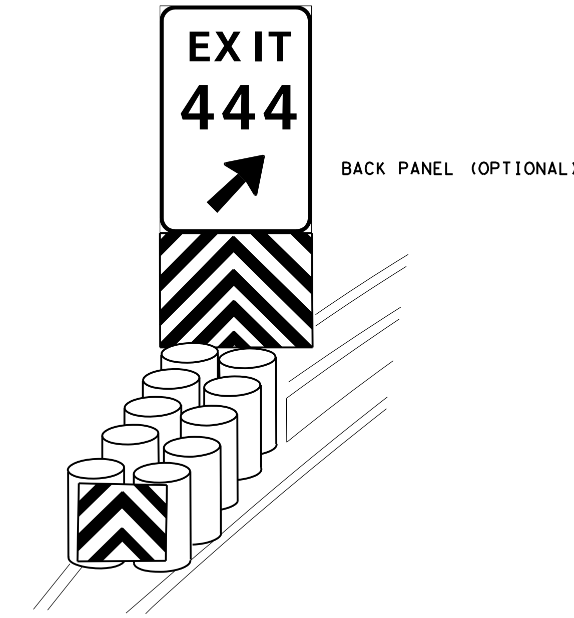
D & OM(6)-20

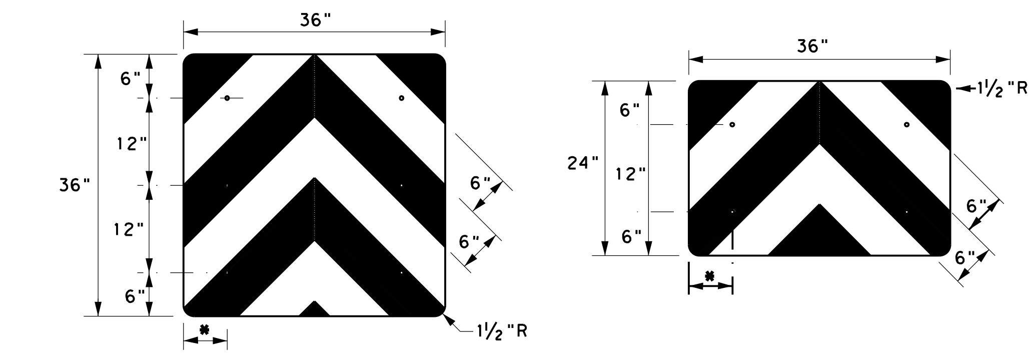
FILE:	dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB		HIGHWAY
REVISIONS	2524	02	025,ETC		FM 2611
7-20	DIST		COUNTY		SHEET NO.
	HOU		BRAZORIA		205

20F

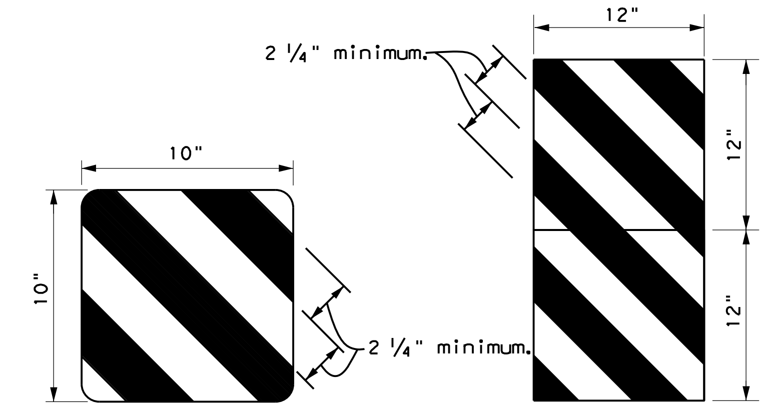




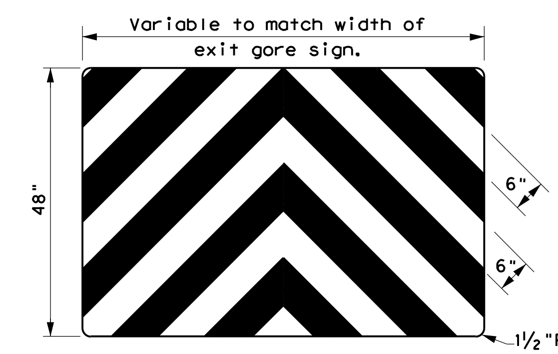


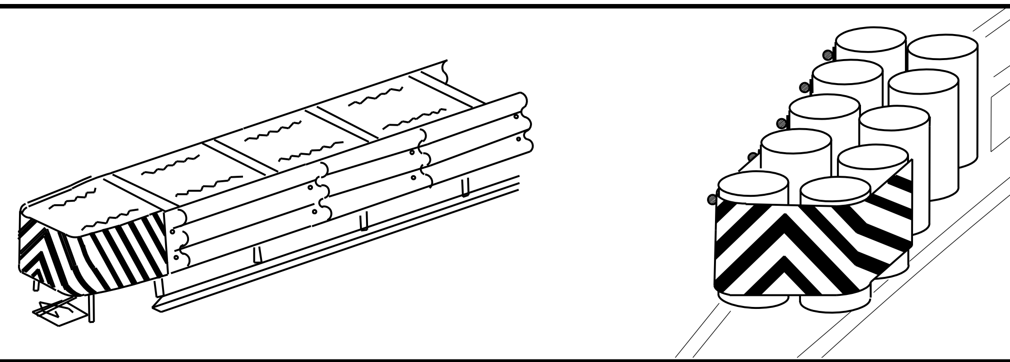


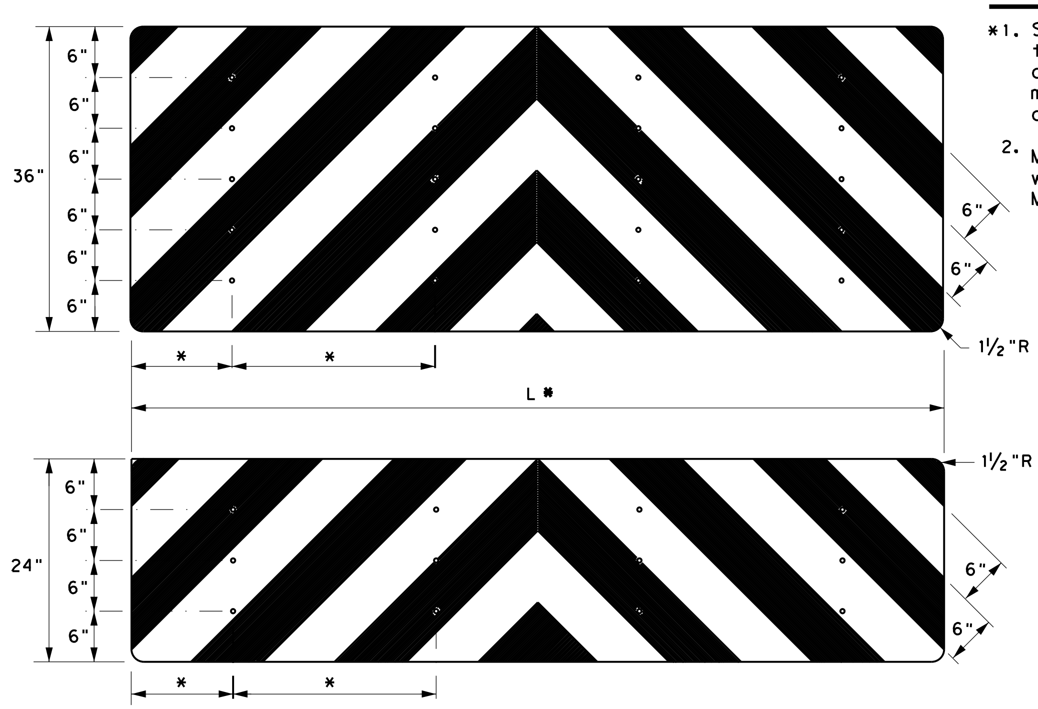
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer



OBJECT MARKERS SMALLER THAN 3 FT²







NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT 2524	SECT 02	JOB 025,ETC	HIGHWAY FM 2611
REVISIONS 4-92 8-04 / 8-95 3-15 / 4-98 7-20	DIST HOU		COUNTY BRAZORIA	SHEET NO. 206

206

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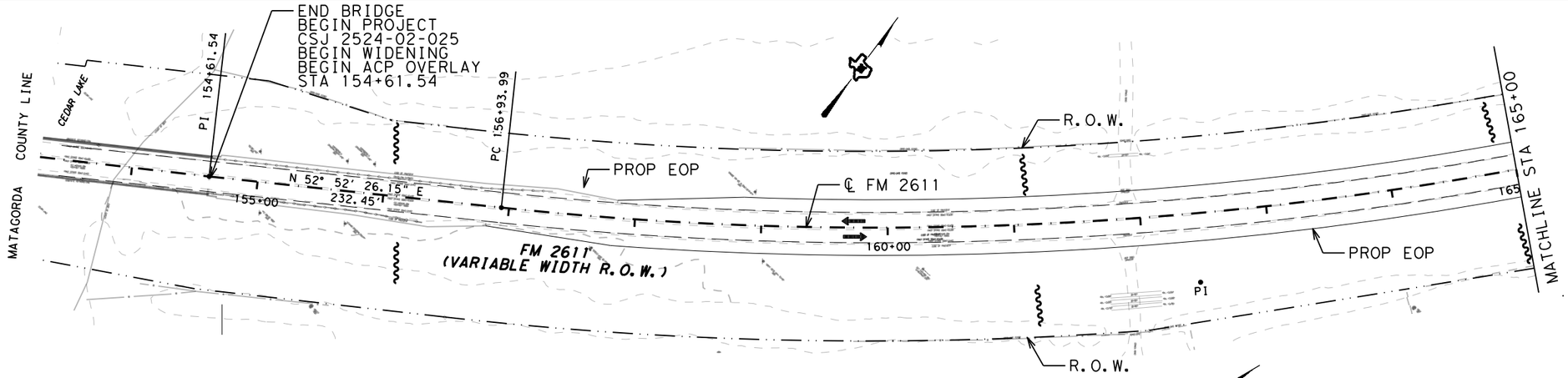
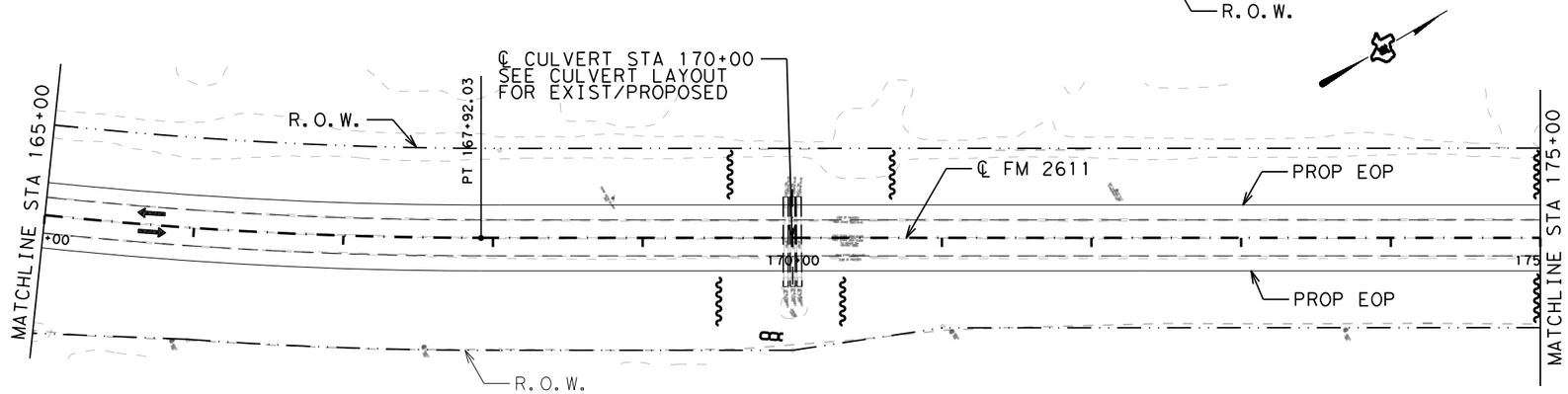
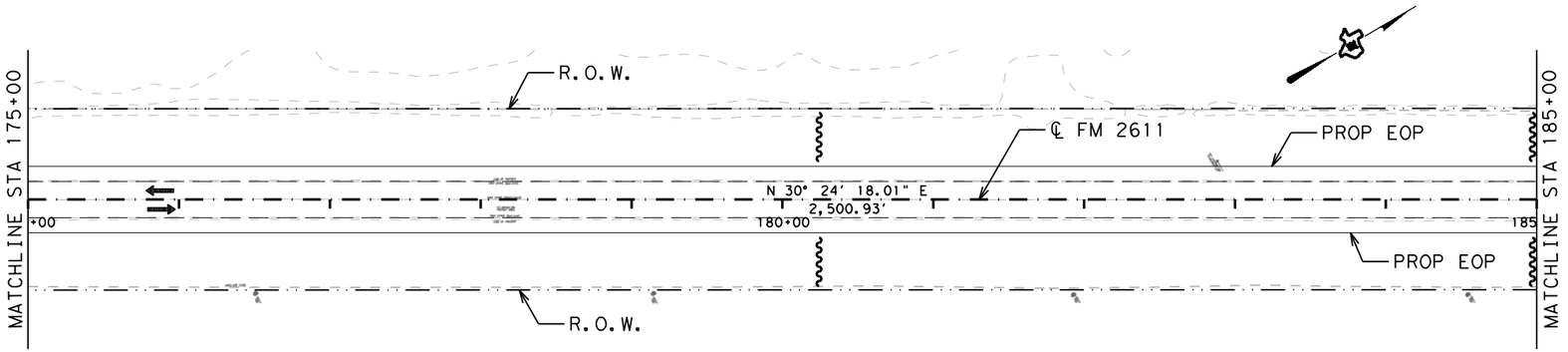






LEGEND

- PROP ROCK FILTER DAM
- PROP SILT FENCE

SWP3 NOTES:

1. CONSTRUCTION EXIT LOCATIONS TO BE DETERMINED IN THE FIELD AND APPROVED BY ENGINEER.
2. SILT FENCE WILL REMAIN IN PLACE UNTIL 90% VEGETATION IS ACHIEVED.
3. ALL DISTURBED AREA WILL BE SEEDED WITHIN 3 DAYS OF COMPLETION OF DIRT WORK.
4. SILT FENCE TO BE INSTALLED WHEN CONDITIONS WARRANT OR AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E.

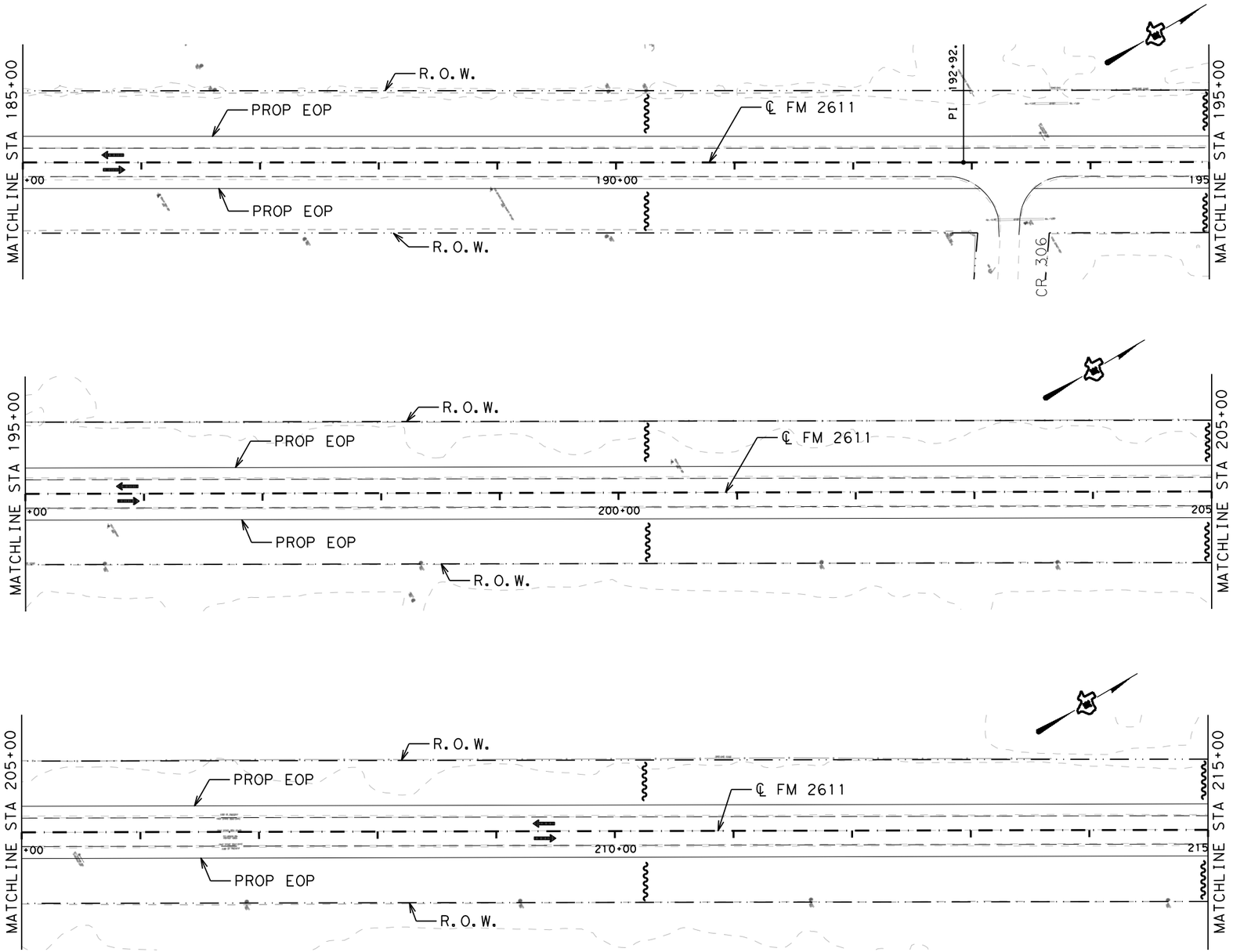
12.22.2020

STORMWATER POLLUTION PREVENTION PLAN

Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		207

SCALE 1"=100'
SHEET 1 OF 20



LEGEND

PROP ROCK FILTER DAM

PROP SILT FENCE

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STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E.

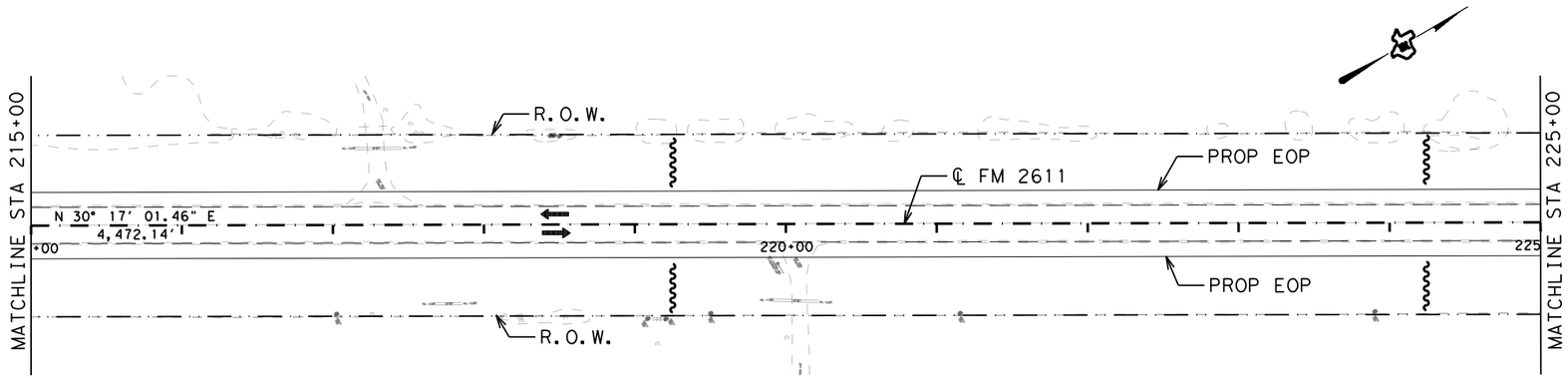
12.22.2020

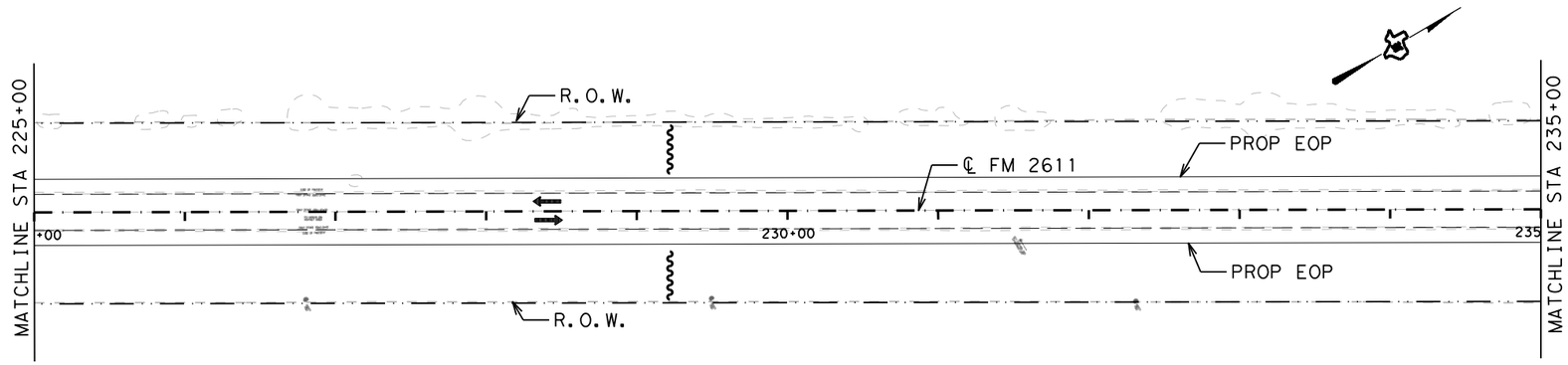
STORMWATER POLLUTION PREVENTION PLAN

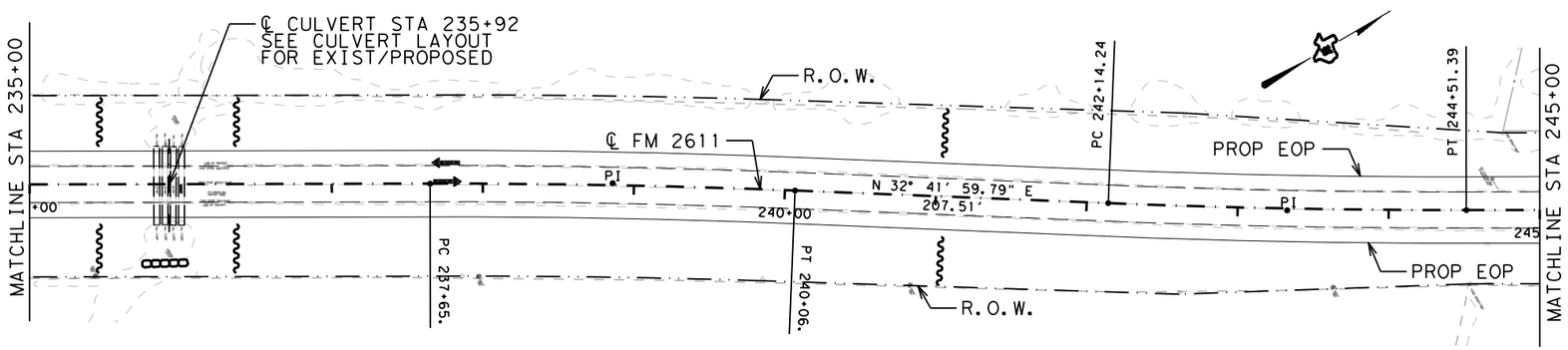
Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		208

SCALE 1"=100'
SHEET 2 OF 20







LEGEND

PROP ROCK FILTER DAM

PROP SILT FENCE

SWP3 NOTES:

1. CONSTRUCTION EXIT LOCATIONS TO BE DETERMINED IN THE FIELD AND APPROVED BY ENGINEER.
2. SILT FENCE WILL REMAIN IN PLACE UNTIL 90% VEGETATION IS ACHIEVED.
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4. SILT FENCE TO BE INSTALLED WHEN CONDITIONS WARRANT OR AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E.

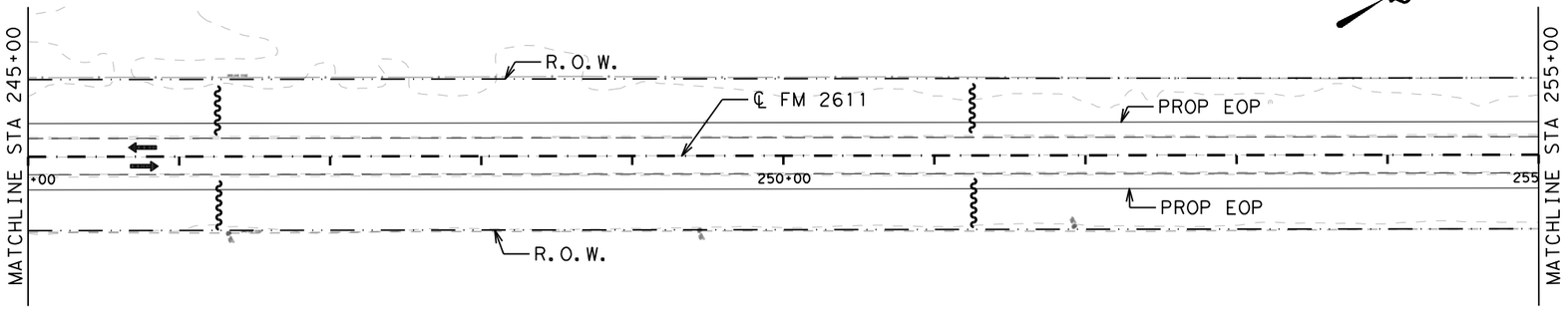
12.22.2020

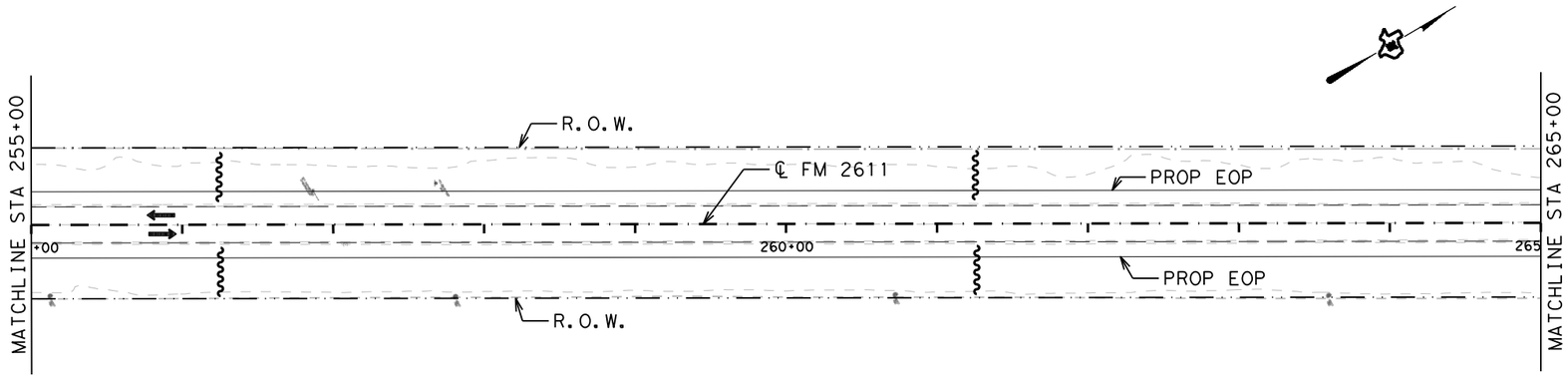
STORMWATER POLLUTION PREVENTION PLAN

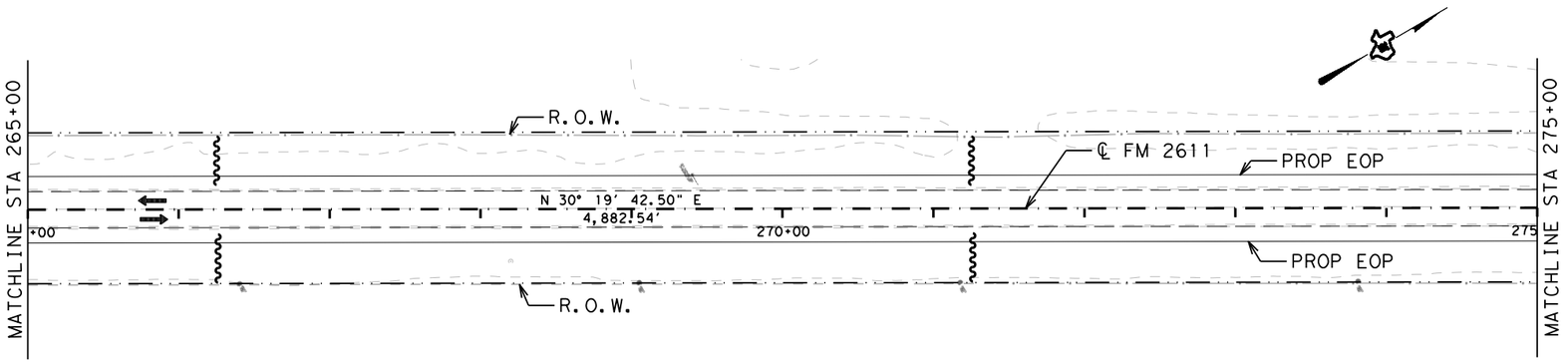
Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		209

SCALE 1"=100'
SHEET 3 OF 20







LEGEND

PROP ROCK FILTER DAM

PROP SILT FENCE

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1. CONSTRUCTION EXIT LOCATIONS TO BE DETERMINED IN THE FIELD AND APPROVED BY ENGINEER.
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STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

Eugene Ampomah, P.E.

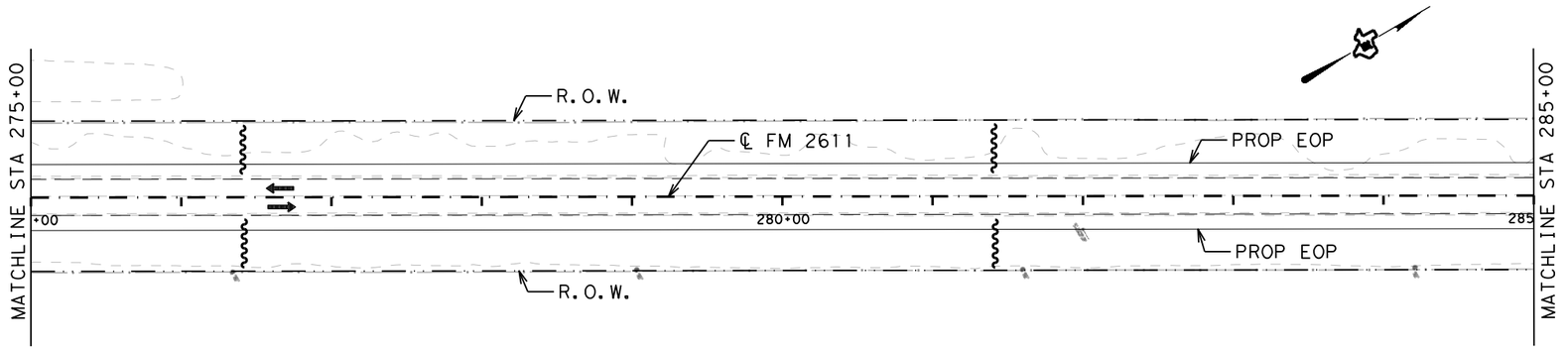
12.22.2020

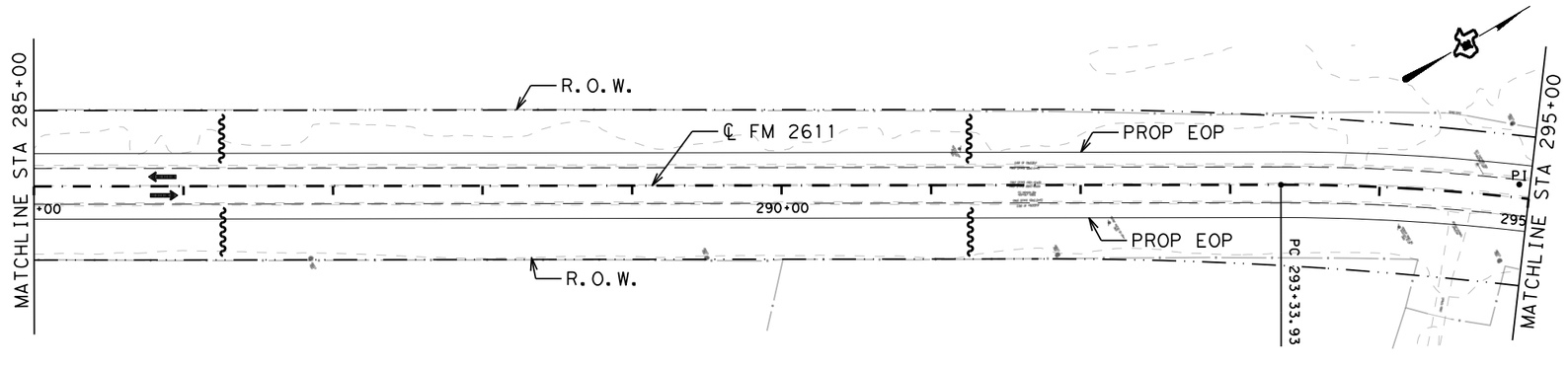
STORMWATER POLLUTION PREVENTION PLAN

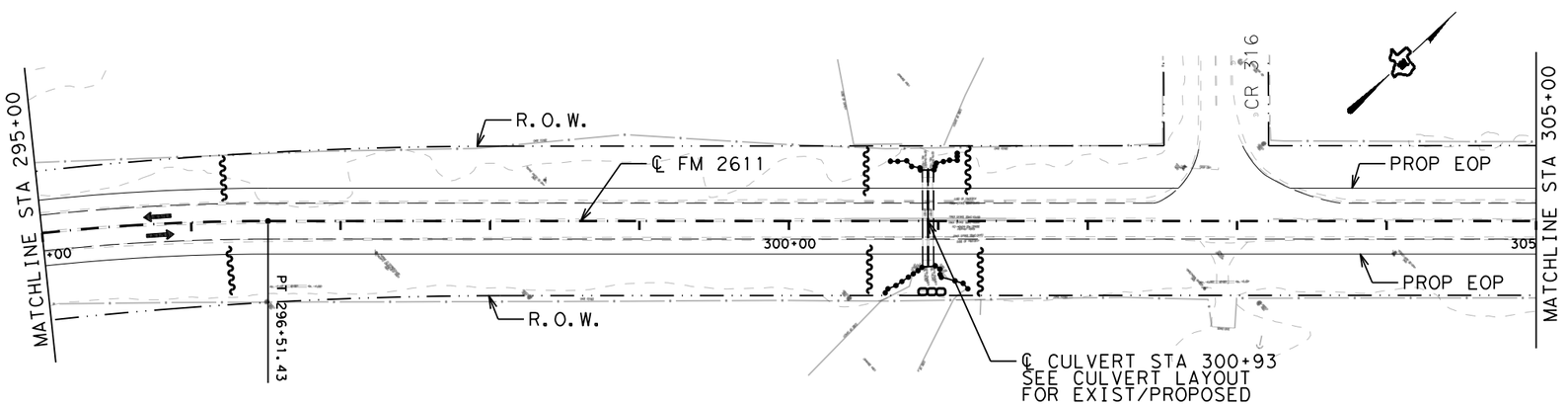
Texas Department of Transportation®

CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		210

SCALE 1"=100'
SHEET 4 OF 20







LEGEND

PROP ROCK FILTER DAM

PROP SILT FENCE

SWP3 NOTES:

1. CONSTRUCTION EXIT LOCATIONS TO BE DETERMINED IN THE FIELD AND APPROVED BY ENGINEER.
2. SILT FENCE WILL REMAIN IN PLACE UNTIL 90% VEGETATION IS ACHIEVED.
3. ALL DISTURBED AREA WILL BE SEEDED WITHIN 3 DAYS OF COMPLETION OF DIRT WORK.
4. SILT FENCE TO BE INSTALLED WHEN CONDITIONS WARRANT OR AS DIRECTED BY THE ENGINEER.

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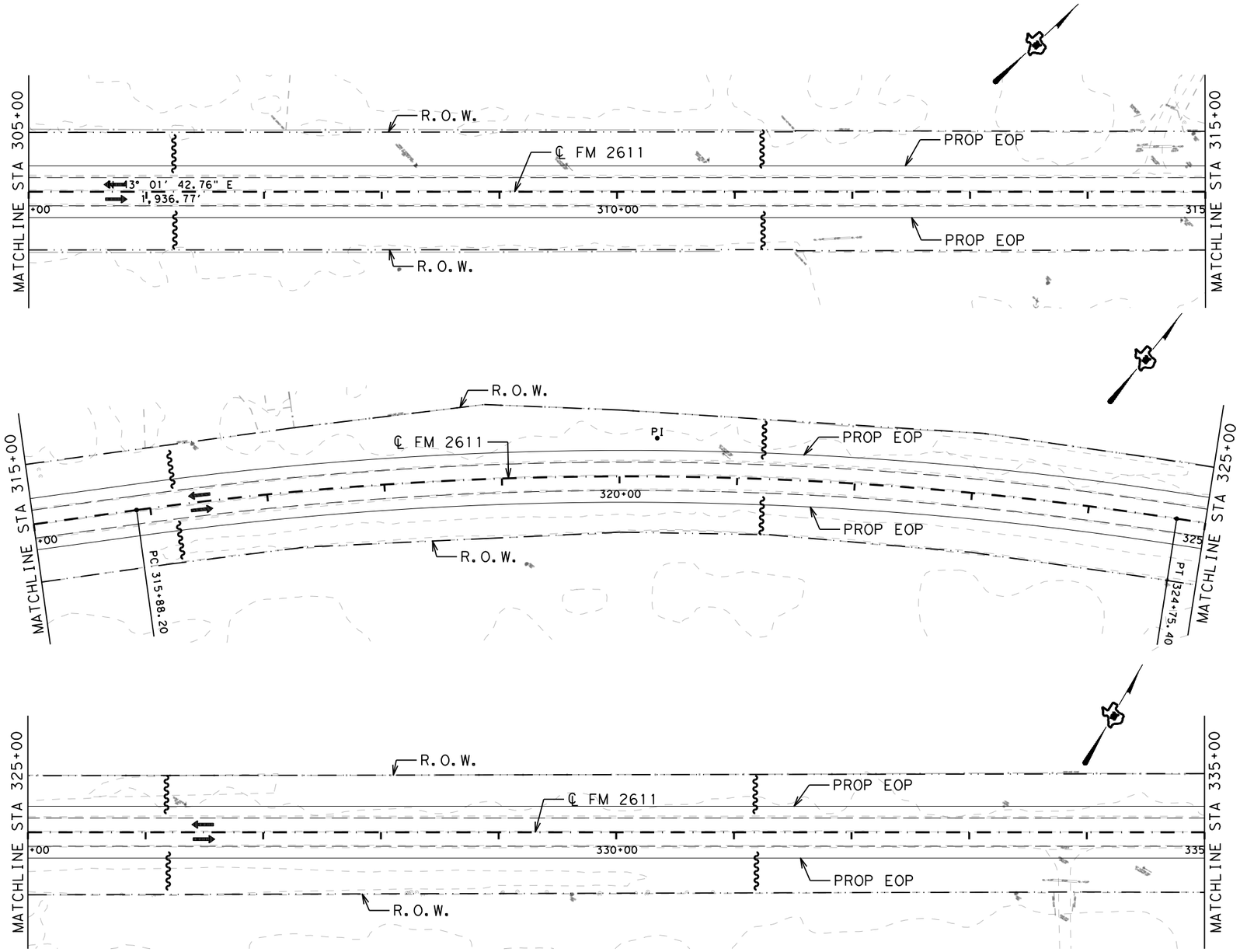
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		211

SCALE 1"=100'
SHEET 5 OF 20



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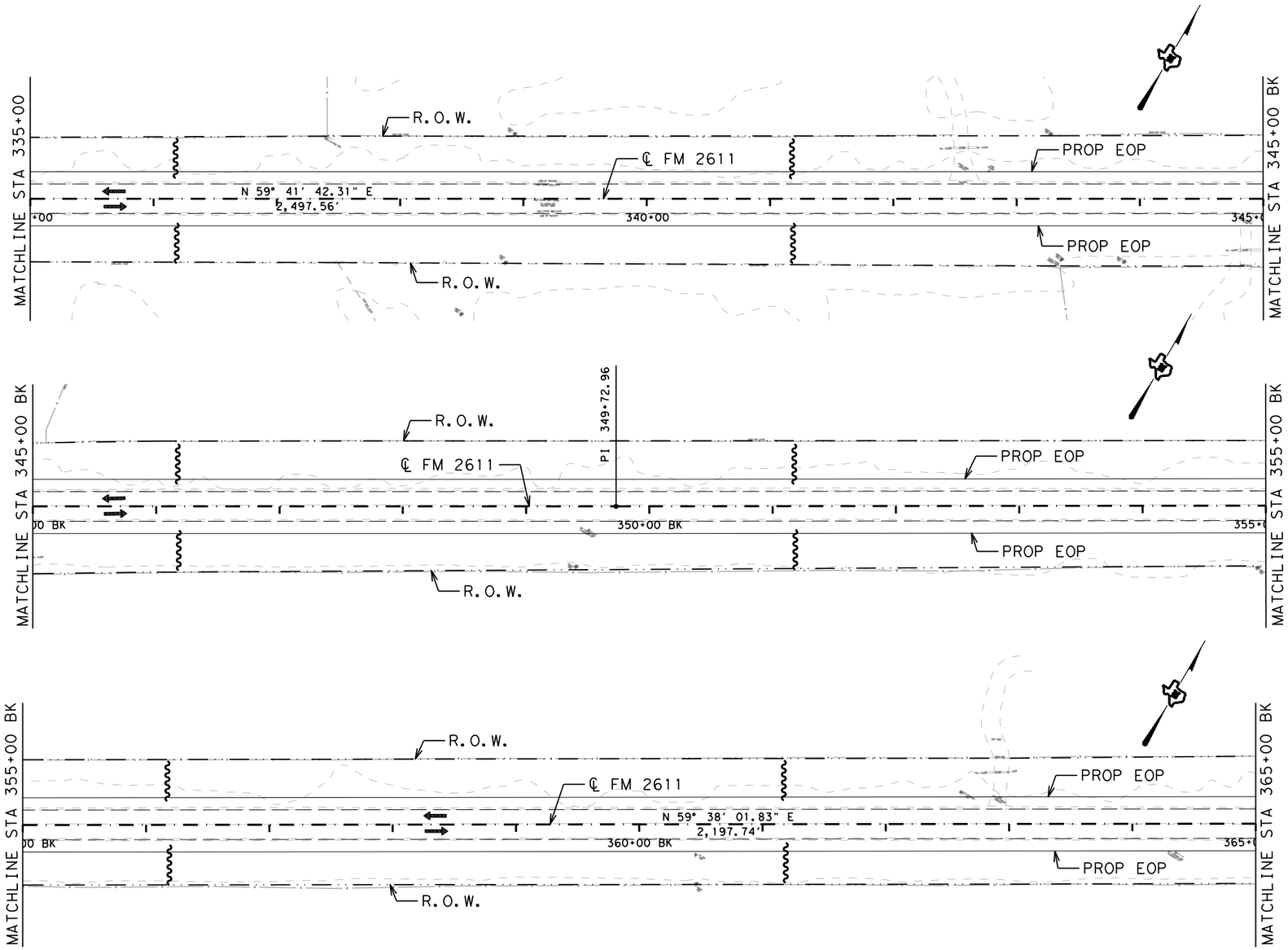
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		212

SCALE 1"=100'
SHEET 6 OF 20



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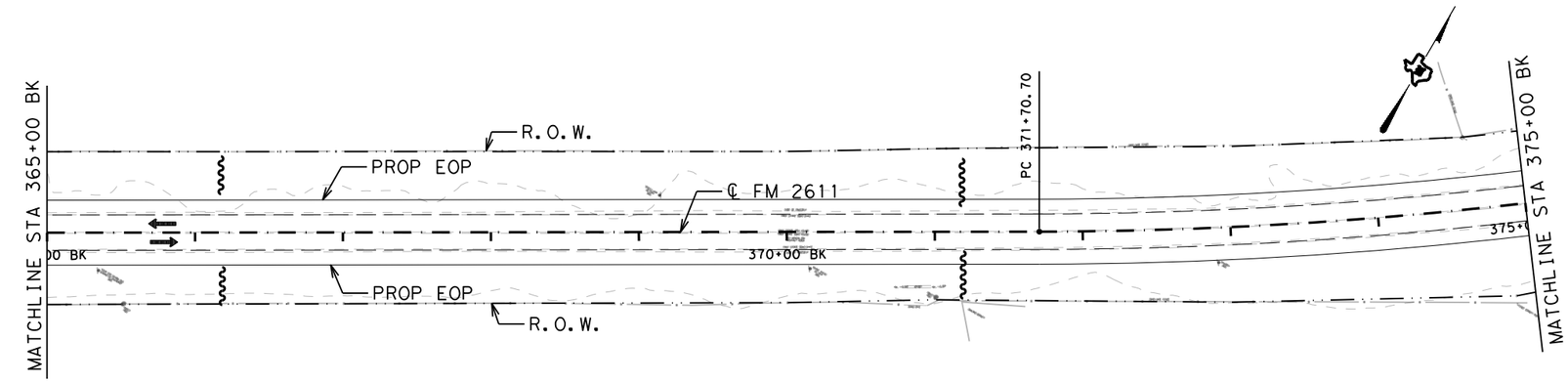
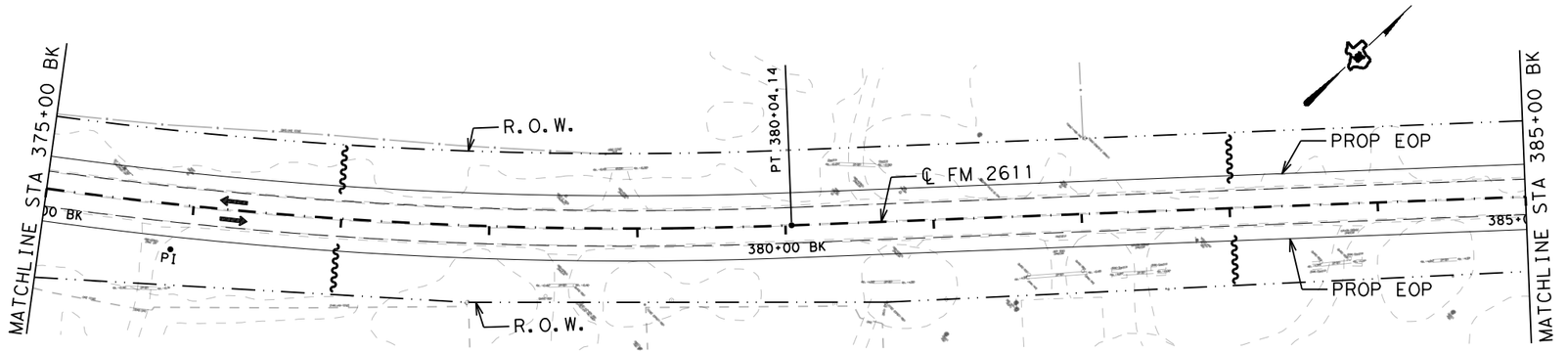
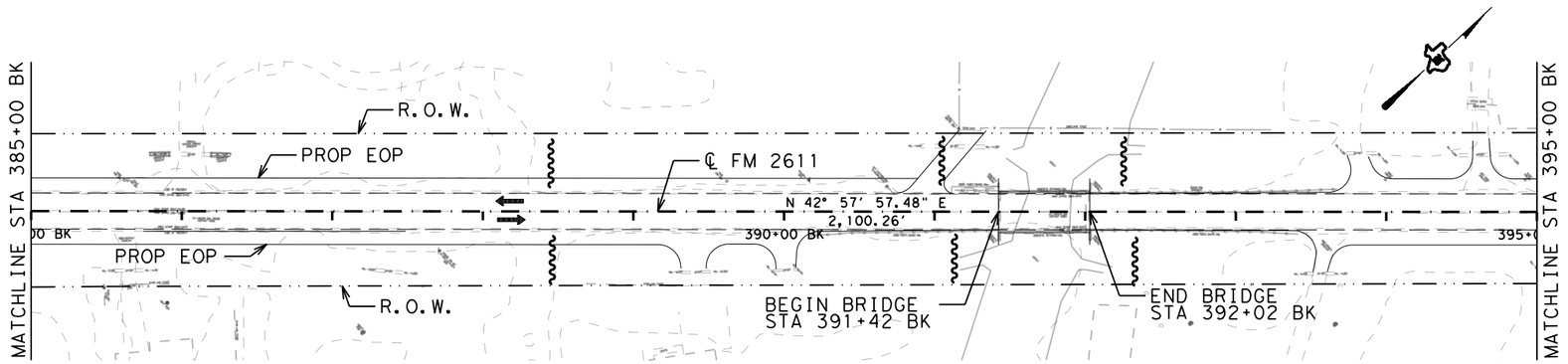
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		213

SCALE 1"=100'
SHEET 7 OF 20







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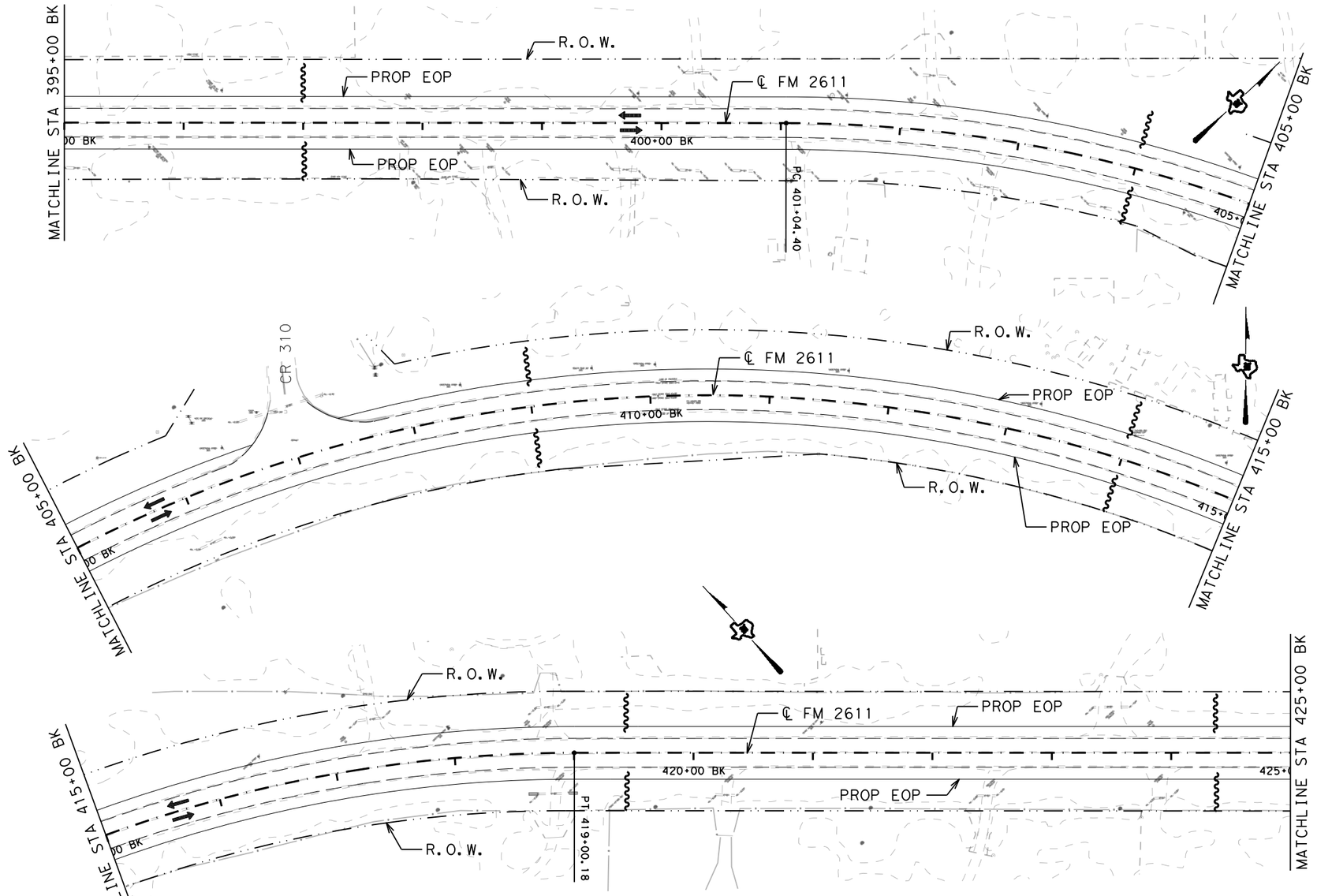
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		214

SCALE 1"=100'
SHEET 8 OF 20



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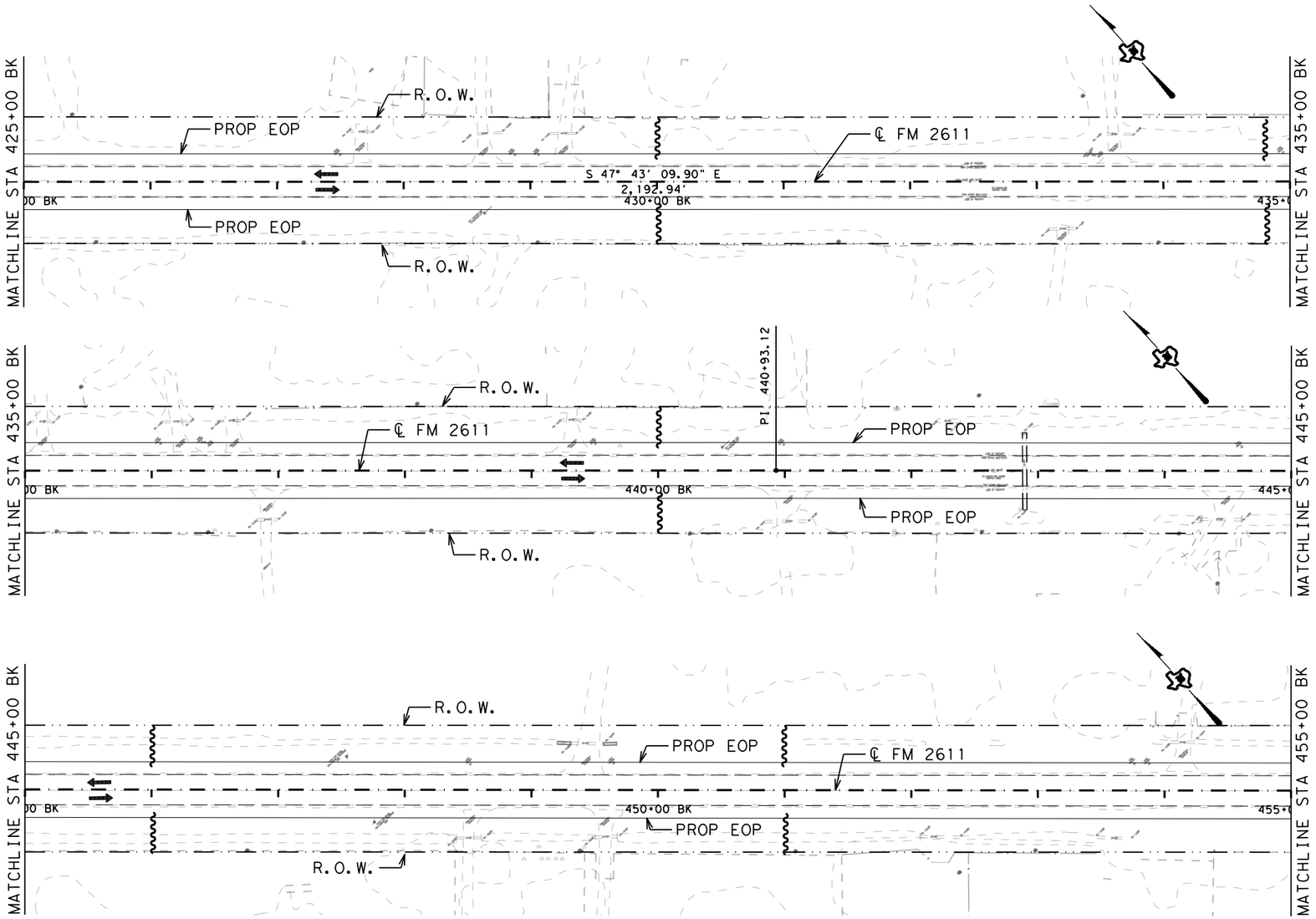
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		215

SCALE 1"=100'
SHEET 9 OF 20



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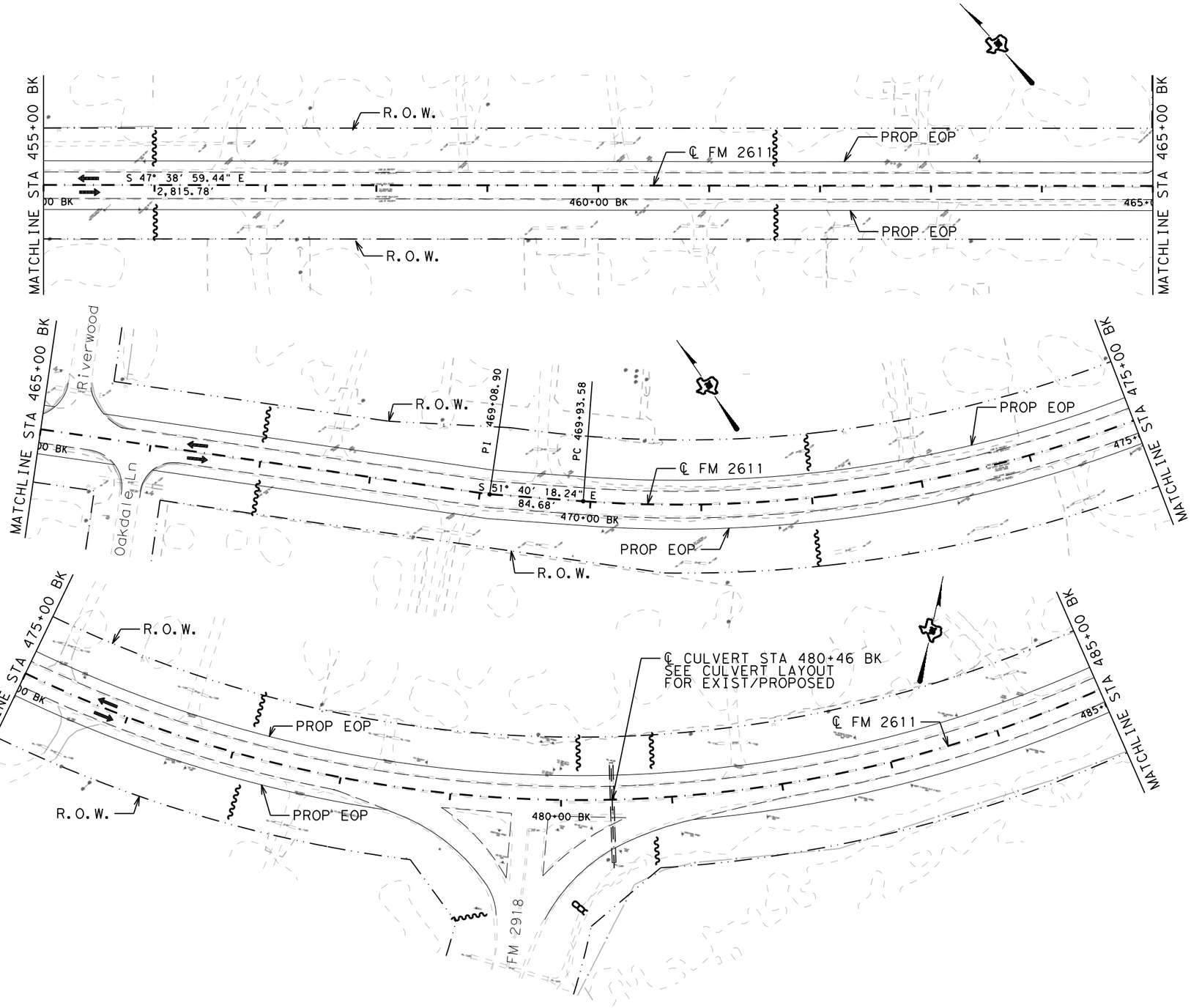
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		216

SCALE 1"=100'
SHEET 10 OF 20



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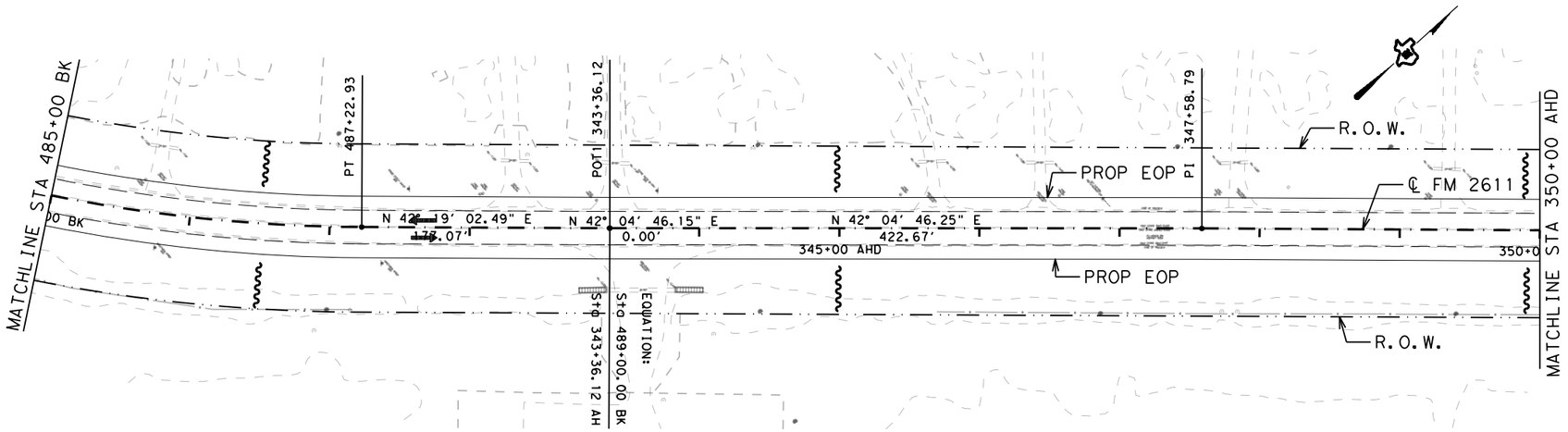
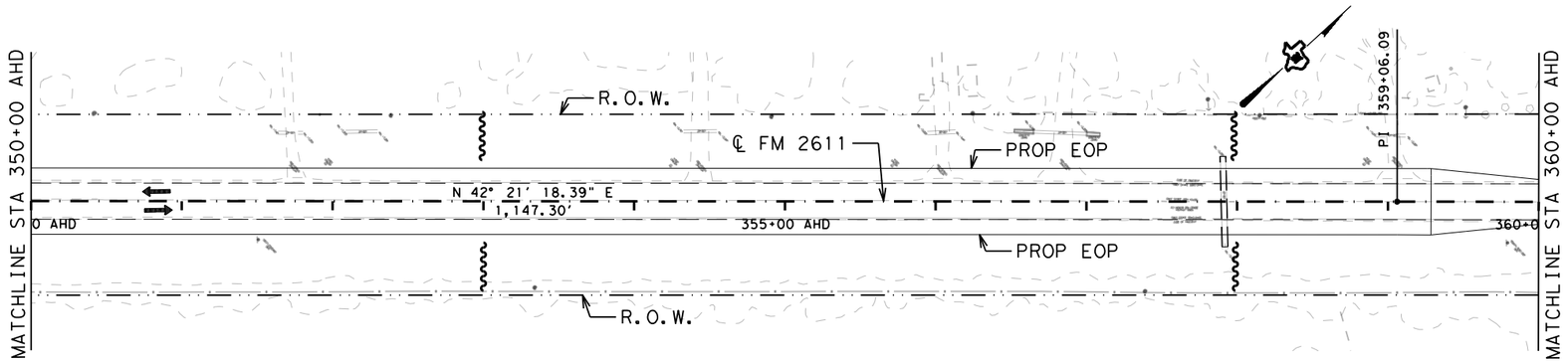
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		217

SCALE 1"=100'
SHEET 11 OF 20





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Texas Department of Transportation

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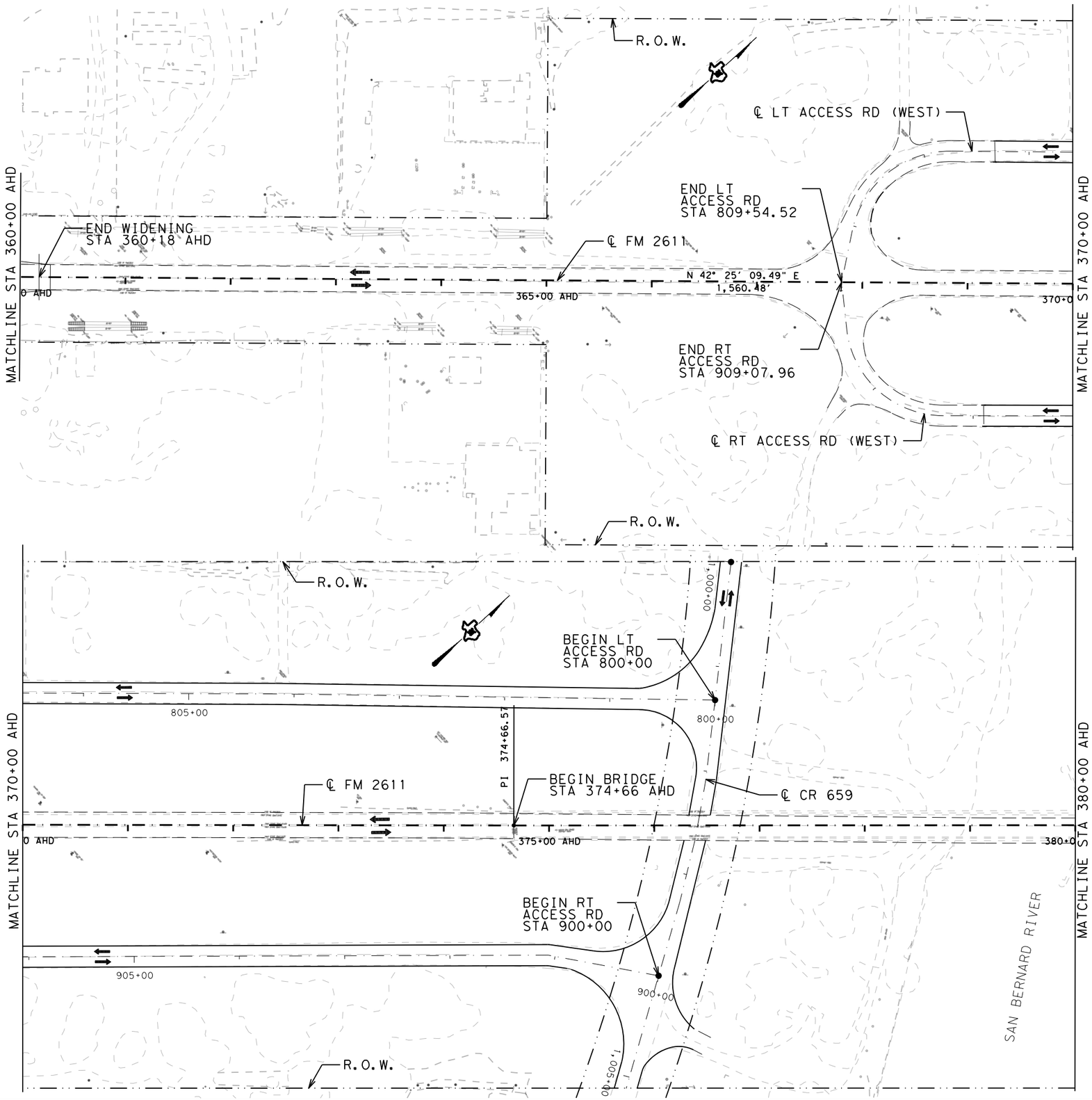
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		218

SCALE 1"=100'
SHEET 12 OF 20



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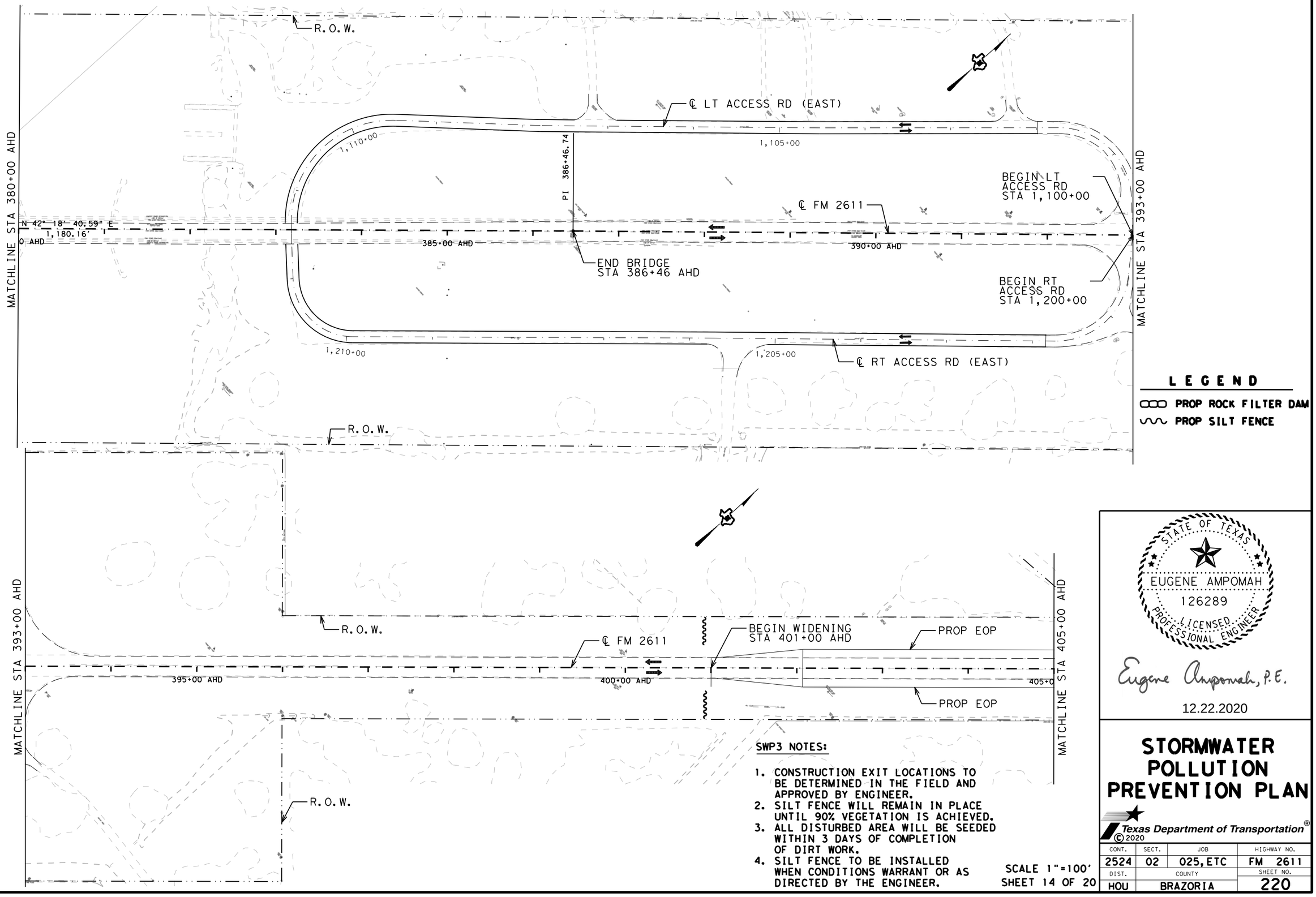
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		219

SCALE 1"=100'
SHEET 13 OF 20



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SHEET 14 OF 20

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STORMWATER POLLUTION PREVENTION PLAN

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CONT.	SECT.	JOB	HIGHWAY NO.
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		220

12/21/2020
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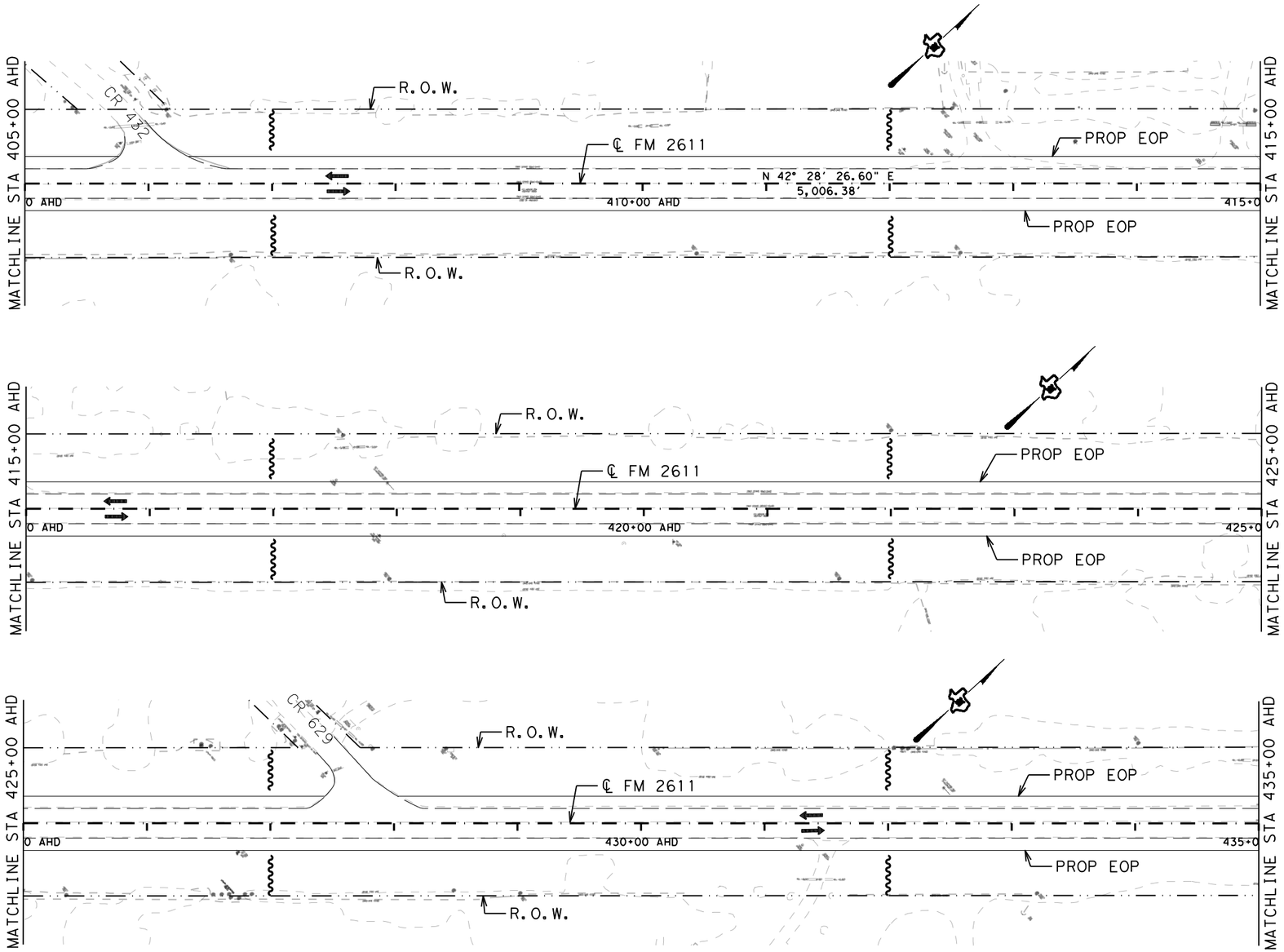

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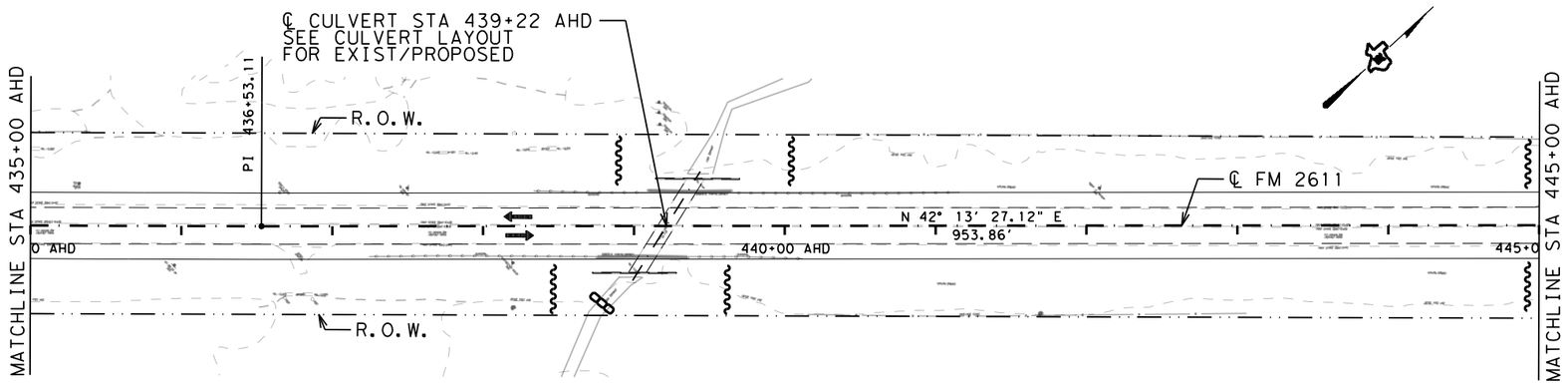
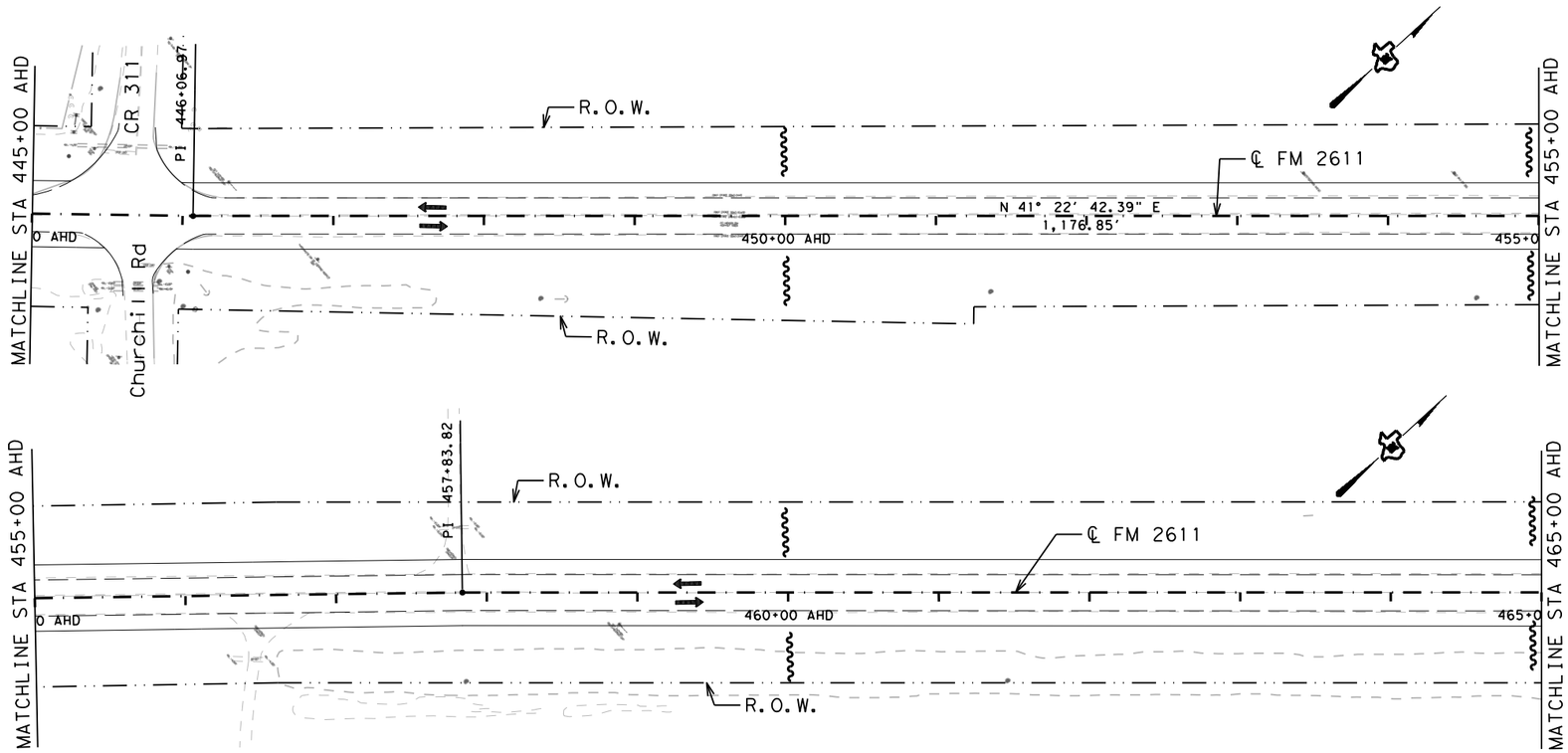
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		221

SCALE 1"=100'
SHEET 15 OF 20





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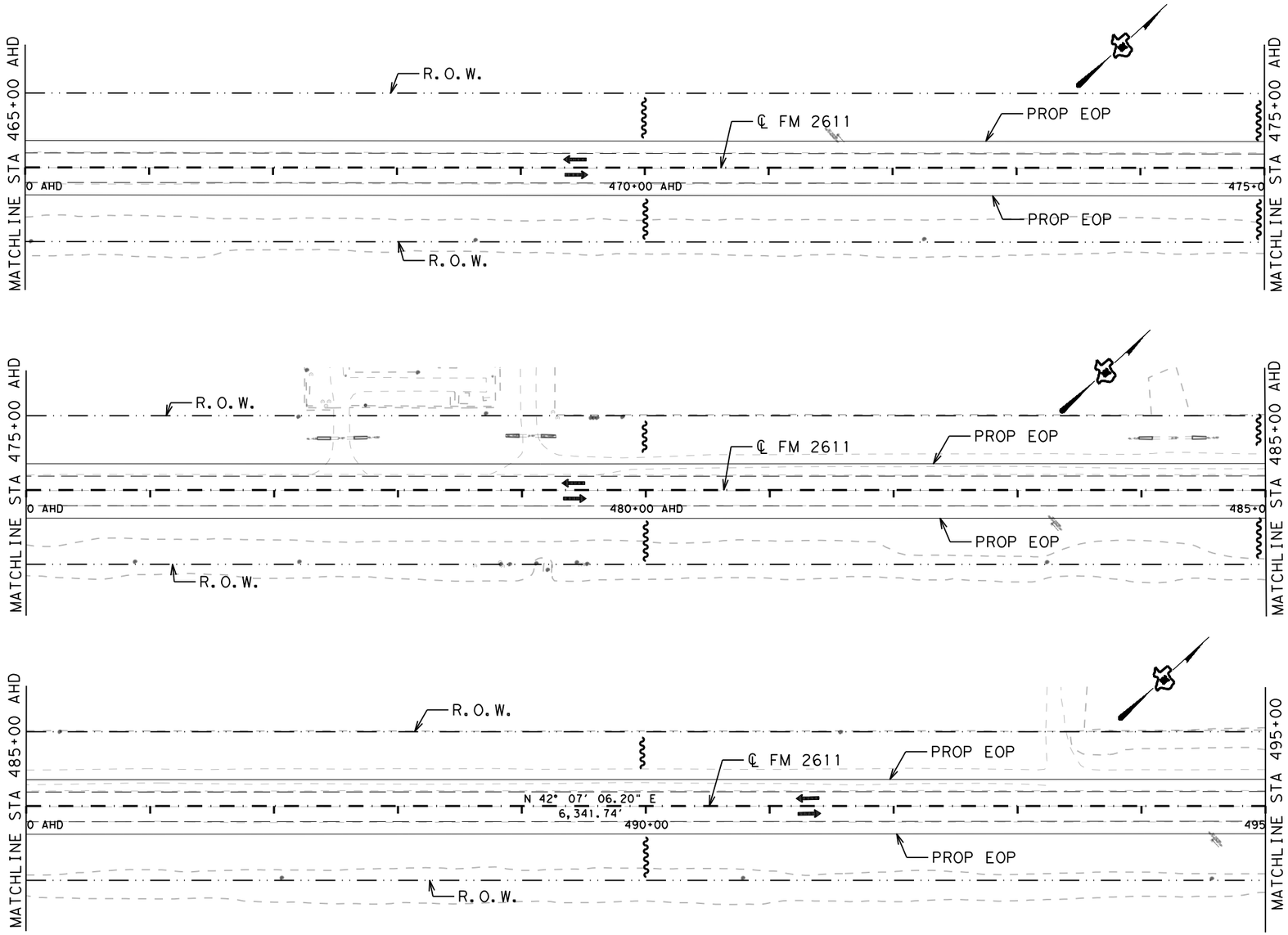
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		222

SCALE 1"=100'
SHEET 16 OF 20



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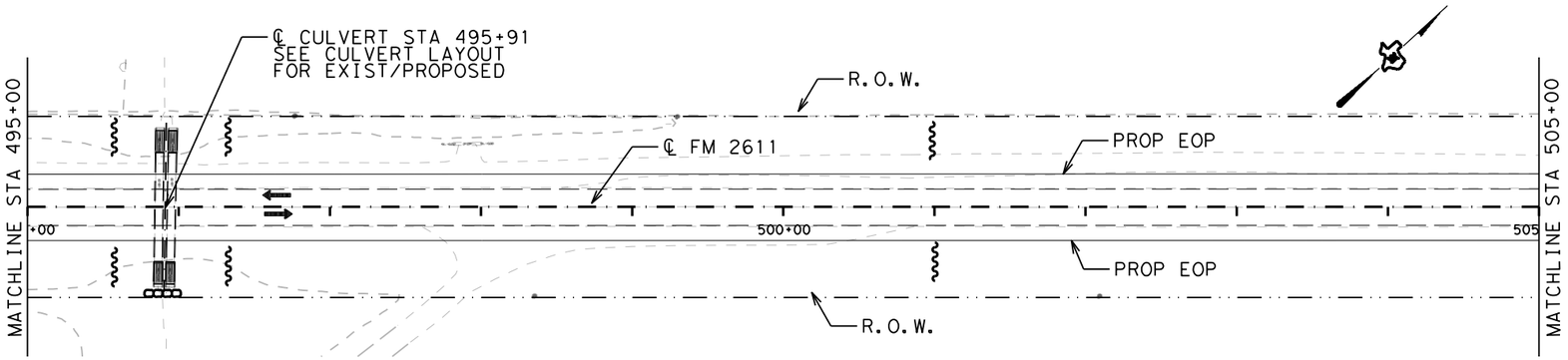
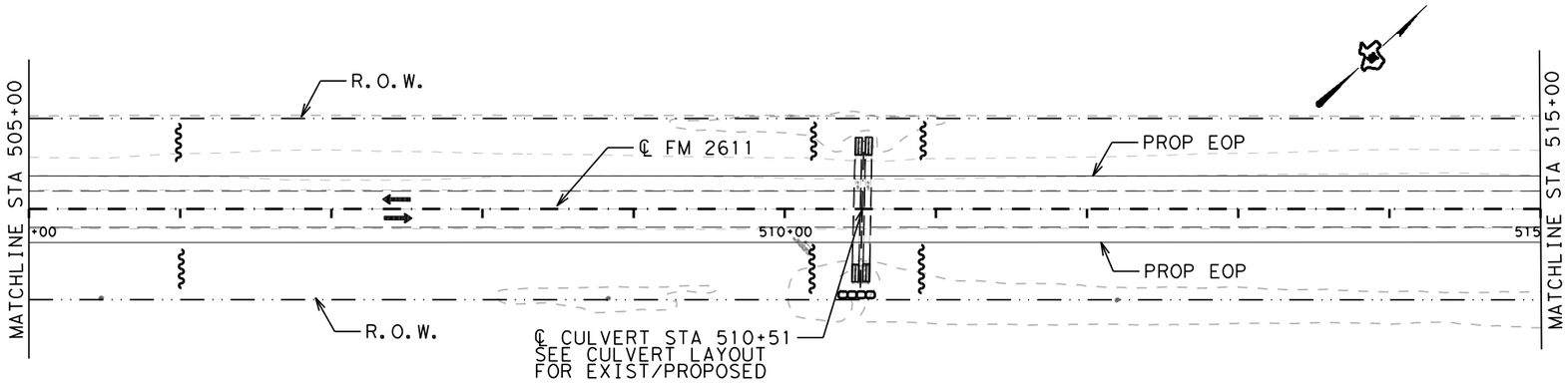
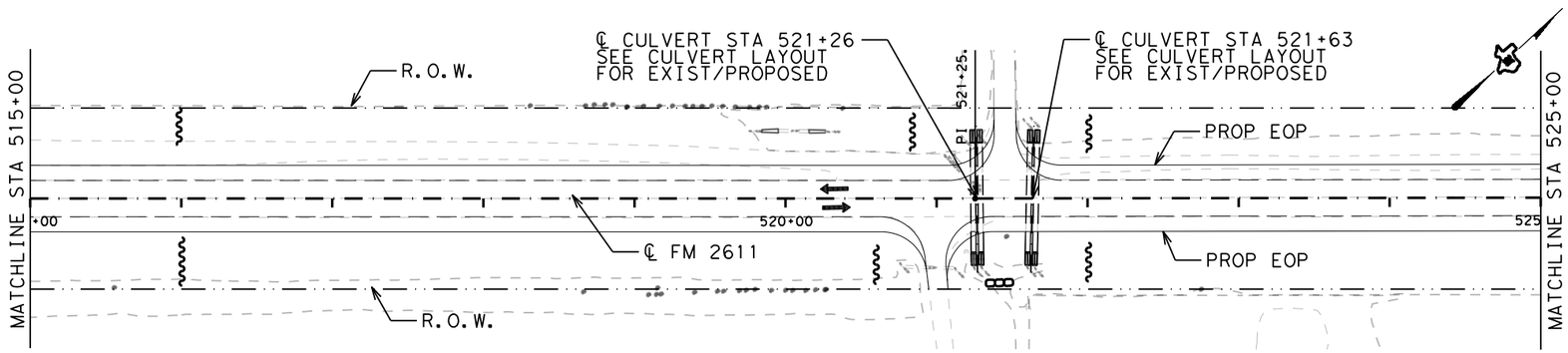
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		223

SCALE 1"=100'
SHEET 17 OF 20







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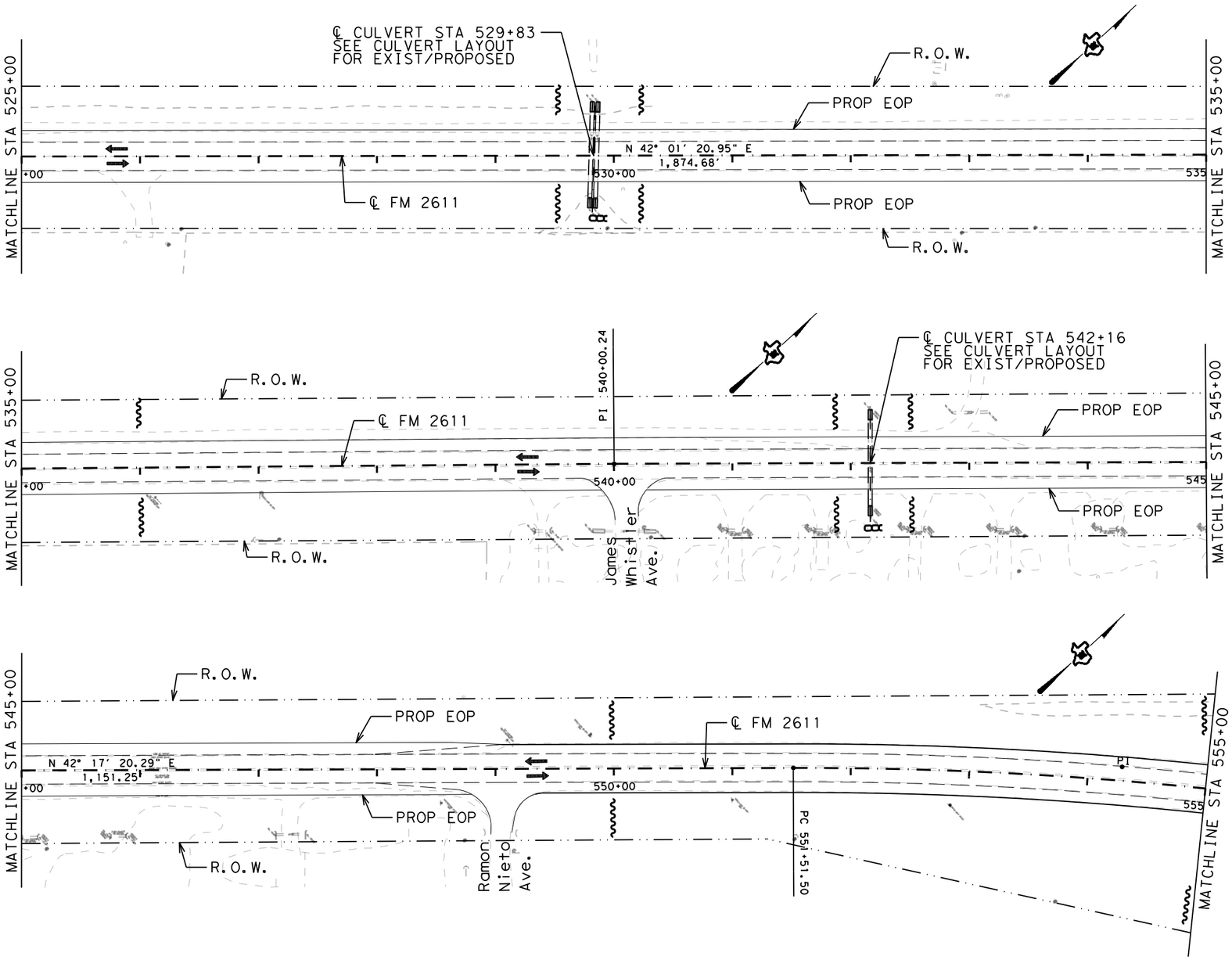
2524	02	025,ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		224

SCALE 1"=100'
SHEET 18 OF 20



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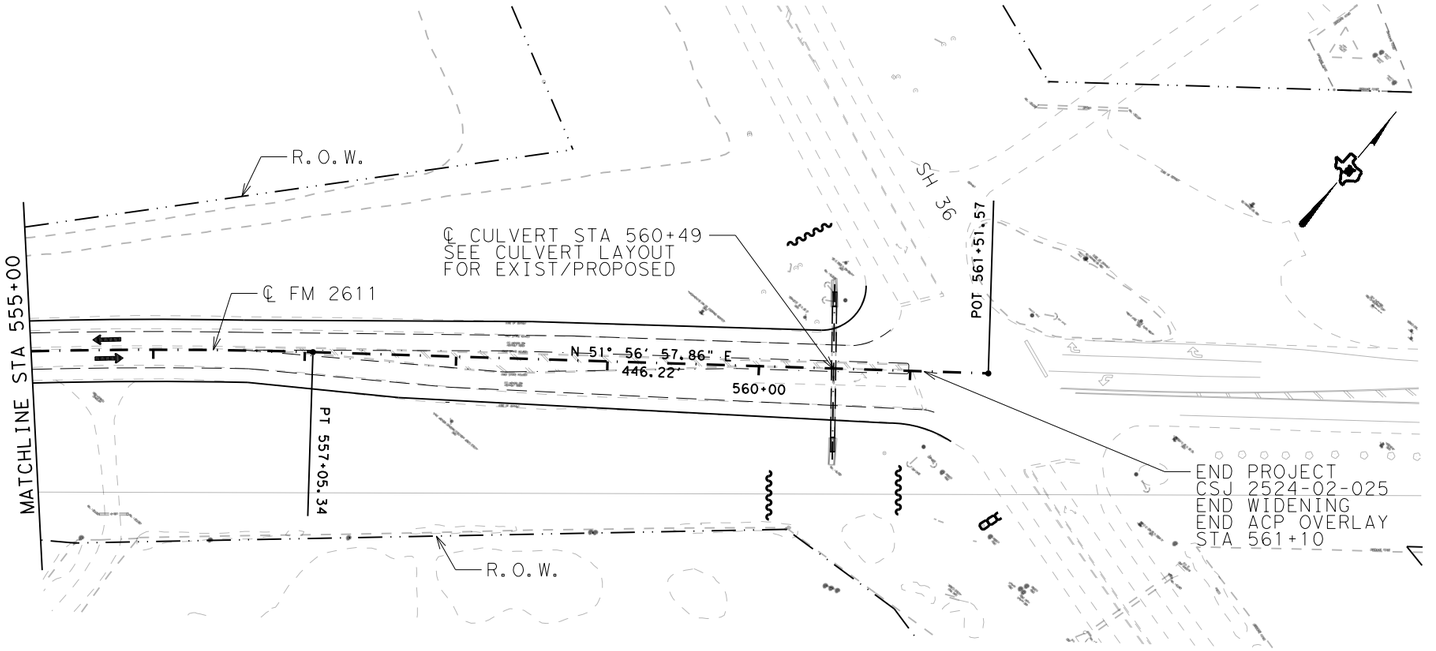
2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		225

SCALE 1"=100'
SHEET 19 OF 20



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2524	02	025, ETC	FM 2611
DIST.	COUNTY		SHEET NO.
HOU	BRAZORIA		226

SCALE 1"=100'
SHEET 20 OF 20

SITE DESCRIPTION

PROJECT LIMITS: FROM MATAGORDA COUNTY LINE TO SH 36

PROJECT DESCRIPTION: SUBGRADE WIDENING, ASPHALT STABILIZED BASE, CULVERT EXTENSIONS, BASE REPAIRS, ASPHALT CONCRETE OVERLAY, SIGNING, AND PAVEMENT MARKINGS.

MAJOR SOIL DISTURBING ACTIVITIES: SOIL DISTURBING ACTIVITIES WILL INCLUDE EXCAVATING AND SUBGRADE WIDENING. CULVERT EXTENSION AND REGRADING FRONT SLOPES.

TOTAL PROJECT AREA: 116 ACRES

TOTAL AREA TO BE DISTURBED: 50 ACRES

WEIGHTED RUNOFF COEFFICIENT:
(AFTER CONSTRUCTION): 0.734

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER: 95% COVERAGE

NAME OF RECEIVING WATERS: VARIOUS SIDE ROAD DITCHES CARRY WATER TO CEDAR LAKE CREEK TO CEDAR LAKES (OYSTER WATER)(2442OW) TO THE GULF OF MEXICO(2501)

VARIOUS SIDE ROAD DITCHES CARRY WATER TO COCKLEBURR SLOUGH TO CEDAR LAKE CREEK TO CEDAR LAKES (OYSTERWATER)(2442OW) TO THE GULF OF MEXICO(2501)

VARIOUS SIDE ROAD DITCHES CARRY WATER TO SAN BERNARD RIVER(12146) TO THE GULF OF MEXICO(2501)

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

- [X] TEMPORARY SEEDING
- [X] PERMANENT PLANTING, SODDING, OR SEEDING
- [ ] MULCHING
- [ ] SOIL RETENTION BLANKET
- [ ] BUFFER ZONES
- [ ] PRESERVATION OF NATURAL RESOURCES

OTHER: N/A

STRUCTURAL PRACTICES:

- [X] SILT FENCES
- [ ] HAY BALES
- [X] ROCK BERMS
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- [ ] DIVERSION DIKE AND SWALE COMBINATIONS
- [ ] PIPE SLOPE DRAINS
- [ ] PAVED FLUMES
- [ ] 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: N/A

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

AFTER THE SIGNS AND BARRICADES HAVE BEEN INSTALLED:

1. INSTALL THE SILT FENCE.
2. INSTALL THE ROCK FILTER DAMS.
3. INSTALL CULVERT EXTENSIONS & PROP SET'S.
3. REGRADE THE SLOPES.
4. PERFORM PERMANENT SEEDING.
5. REMOVE THE SILT FENCE.

STORM WATER MANAGEMENT: ANY DEVICES REQUIRED TO MINIMIZE RUNOFF IN THE EVENT OF A STORM WILL BE PLACED IN POSITION BEFORE CONSTRUCTION BEGINS. THE STORM WATER DRAINAGE WILL BE PROVIDED BY THE EXISTING SYSTEMS ALREADY IN PLACE. WATER WITHIN THE RIGHT OF WAY WILL BE CARRIED BY DITCHES WHERE IT WILL OUTFALL INTO THE RECEIVING WATERS.

THERE WILL BE NO DEVICES INSTALLED DURING THE CONSTRUCTION PROCESS TO CONTROL STORM WATER DISCHARGES THAT WILL REMAIN AFTER CONSRUCTION 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.

STATE OF TEXAS
EUGENE AMPOMAH
126289
LICENSED
PROFESSIONAL ENGINEER

Eugene Ampomah, P.E.

12.22.2020

Texas Department of Transportation
Houston District

TxDOT STORM WATER POLLUTION PREVENTION PLAN

SWP3

FILE: STDG1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
© TxDOT JANUARY 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		227
9/2010 INSPECTION NOTE 9/2013 INSPECTION NOTE 11/2013 SW3P TO SWP3 03/2015 2014 SPECS	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	BRAZORIA	2524	02	025,ETC	FM 2611

STD G-1

I. STORMWATER POLLUTION PREVENTION

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506. Refer to Storm Water Pollution Prevention Plan (SWP3) Houston District standard plan.

No Additional Comments

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS

United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.

☐ No United States Army Corps (USACE) Permit Required

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set. The USACE general conditions are in the “General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) with a Pre-Construction Notification (PCN). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set. The USACE general conditions are in the “General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Individual Permit (IP). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set.

☒ Work would be authorized by the United States Army Corps of Engineers (USACE) permit. The project specific permit issued by the USACE will be provided to the contractor.

United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.

☒ No United States Coast Guard (USCG) Coordination Required

☐ United States Coast Guard (USCG) Permit

☐ United States Coast Guard (USCG) Exemption

Additional Comments

The NWP14 with PCN has not been approved yet & please note that the NWP14 with PCN pertains to the culvert located ONLY at FM 316 and FM 2611 (sta 300 + 93)

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the area and contact the Engineer immediately.

No Additional Comments

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.

No Additional Comments

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS

If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document “Avoiding Migratory Birds and Handling Potential Violations” found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

No Additional Comments

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor’s degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

No Additional Comments

VII. OTHER ENVIRONMENTAL ISSUES

Comments:

DATE: Dec 16, 2020
FILE:

Version 2.1

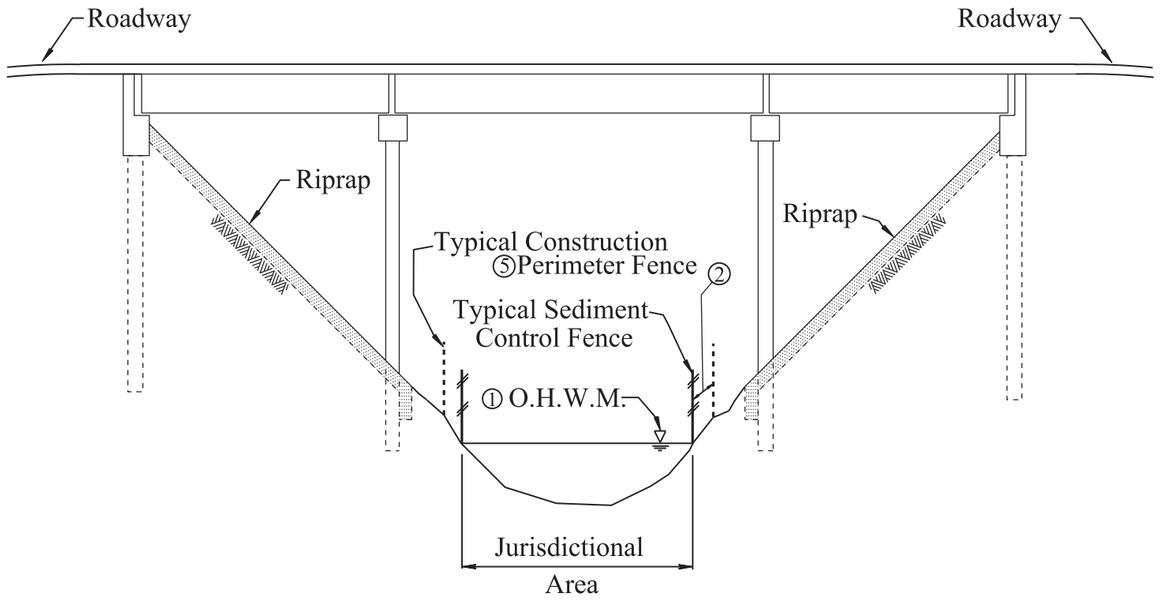
Texas Department of Transportation

TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

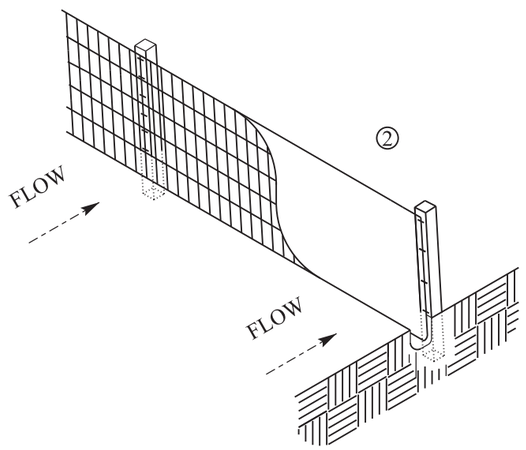
EPIC

FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025, ETC.	FM 2611
UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY		SHEET NO.
	12	Brazoria		228



TYPICAL RELATIONSHIP OF O.H.W.M., SEDIMENT CONTROL & CONSTRUCTION FENCING, PILING/DRILL SHAFT & RIPRAP TOE WALLS

N.T.S.



TEMPORARY SEDIMENT CONTROL FENCE

1.50" Radius, 0.50" Border, Black on White;
[WETLAND AREA] C; [DO NOT ENTER] C;
CIRCLE, DIAG LINE, RED

GENERAL DESIGN CONSIDERATIONS

1. Ordinary high water mark (elevation) (O.H.W.M.) is determined by the Environmental Project Manager and elevation is set by a Surveyor.

2. All non-permitted jurisdictional wetlands and waters within or adjacent to the project area shall be avoided and protected by signage and fencing, including both sediment control and construction fencing (see note 5). Construction equipment, materials/sediment are not allowed in the non-permitted wetlands/waters.

3. Any wetlands permitted for impacts/fill and non-permitted wetlands are shown elsewhere on plans or United States Army Corps of Engineers (USACE) permit.

4. The Contractor will be required to obtain the appropriate permits if she/he alters the construction method or deviates from the permit.

5. See item 506 for temporary sediment control fence and for construction perimeter fence. See item 502 for signs.

Texas Department of Transportation

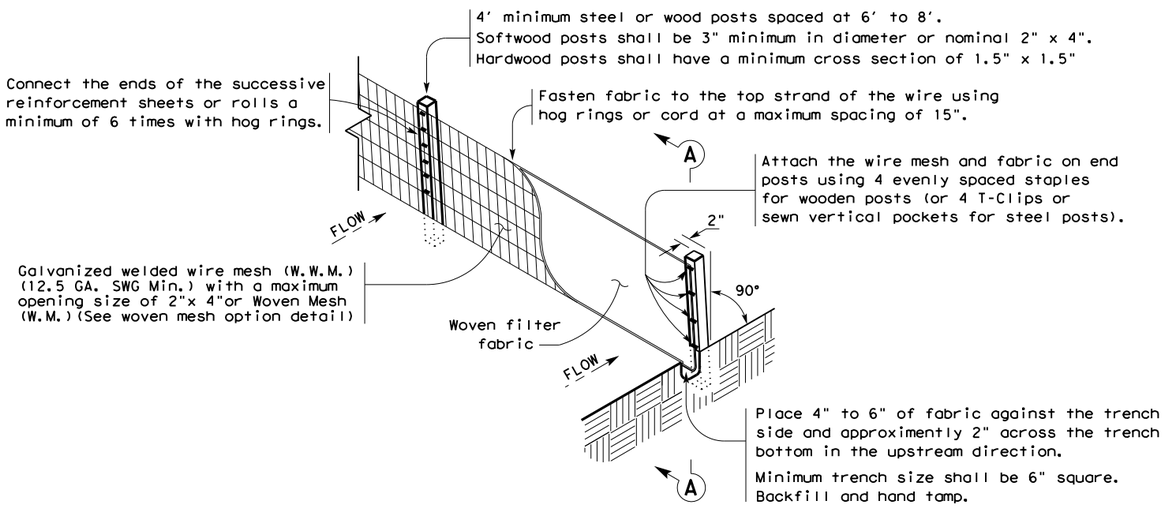
TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

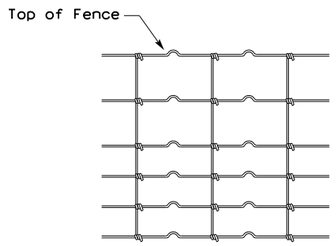
FILE: Wetland EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025, ETC.	FM 2611
ADDED construction fencing (06/17)	DIST	COUNTY		SHEET NO.
UPDATED typical relationship diagram (09/17)	12	Brazoria		229
UPDATED notes 2 and 5 (09/17)				
UPDATED note 5 (05/18)				

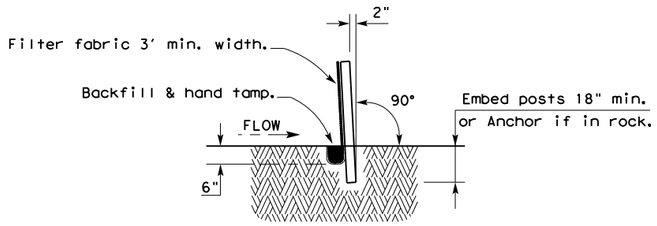
DATE:
FILE:



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

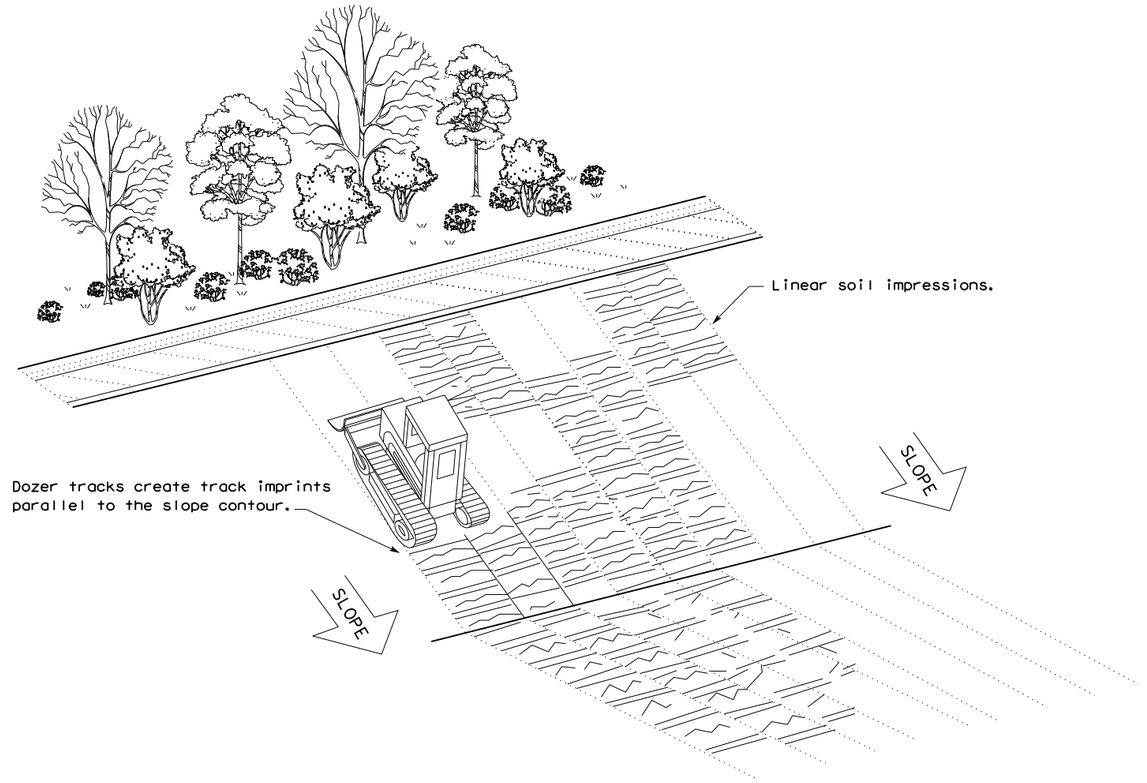
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

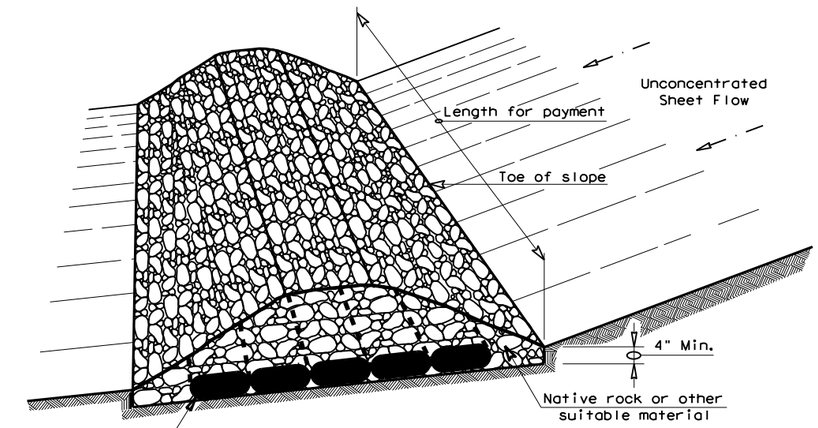
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

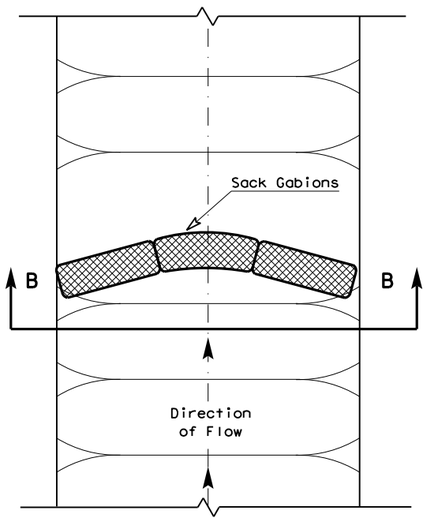
FILE: ec116	DN: TxDOT		CK: KM		DW: VP		DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	2524	02	025,ETC		FM 2611		
	DIST	COUNTY					SHEET NO.
	HOU	BRAZORIA					230

DATE: 12/21/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\252402025\4 - Design\Plan Set\9. Environmental\ec216.dgn

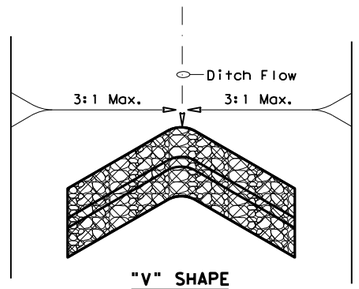


FILTER DAM AT TOE OF SLOPE

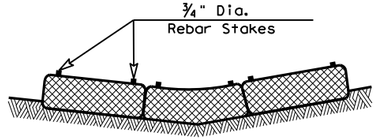
RFD1



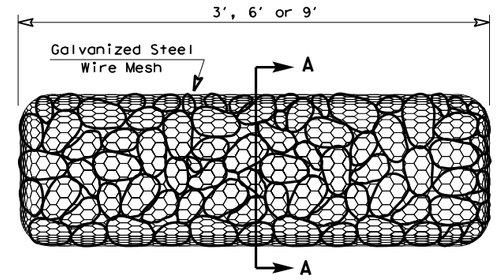
PLAN VIEW



"V" SHAPE PLAN VIEW

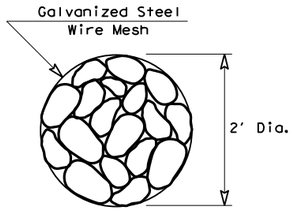


SECTION B-B

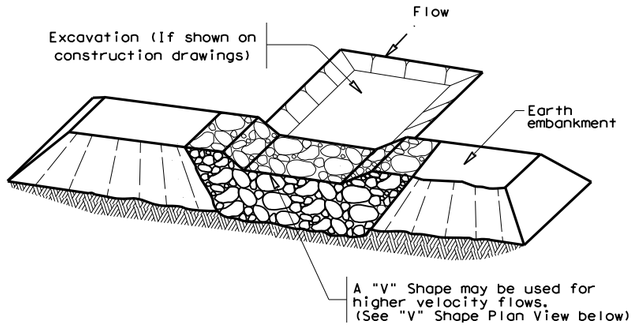


TYPE 4 (SACK GABIONS)

RFD4

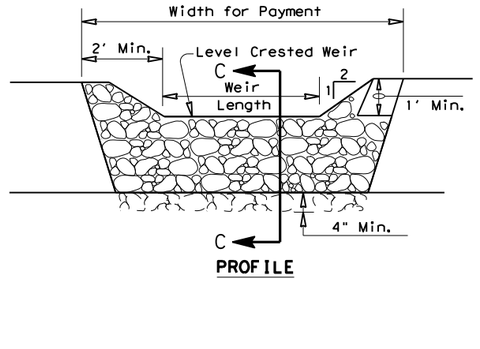


SECTION A-A

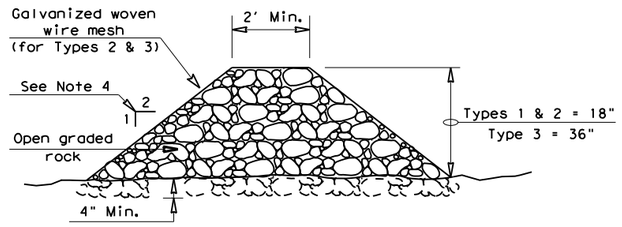


FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

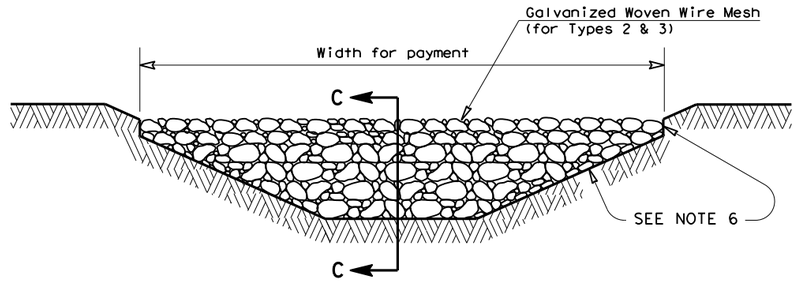
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation | Design Division Standard

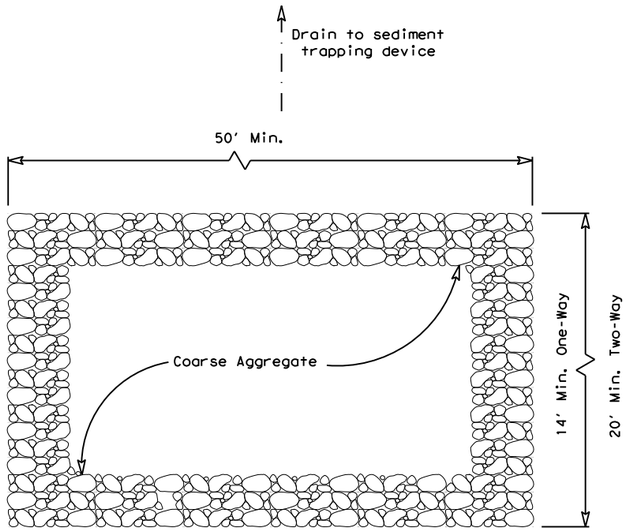
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

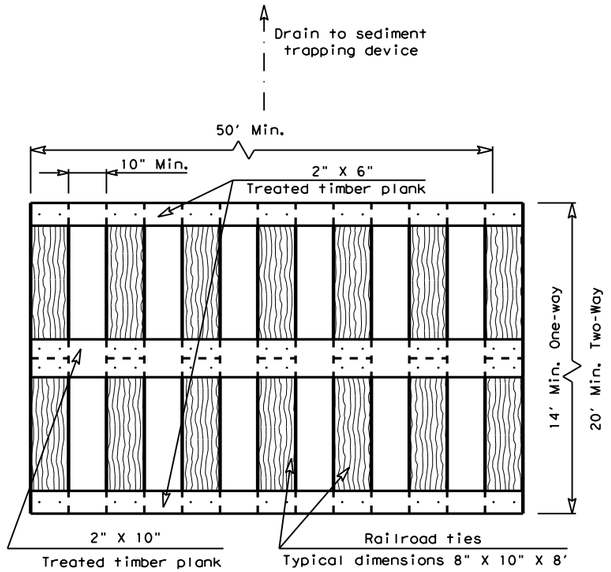
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025, ETC	FM 2611
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		231

DATE: 12/21/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\252402025\4 - Design\Plan Set\9. Environmental\ec316.dgn



PLAN VIEW



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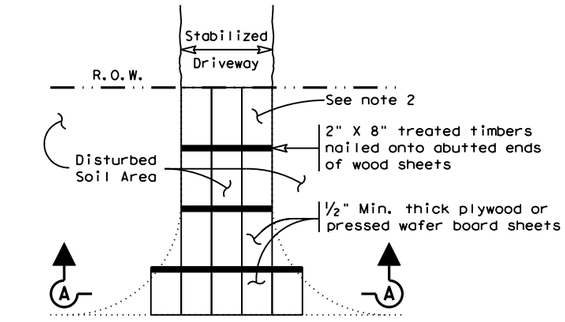

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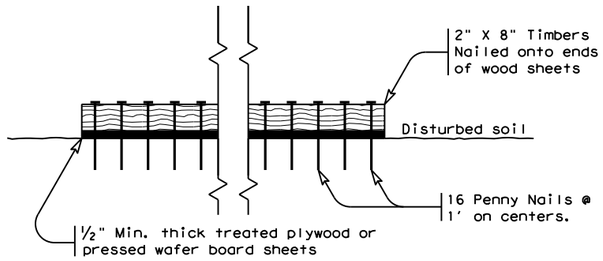
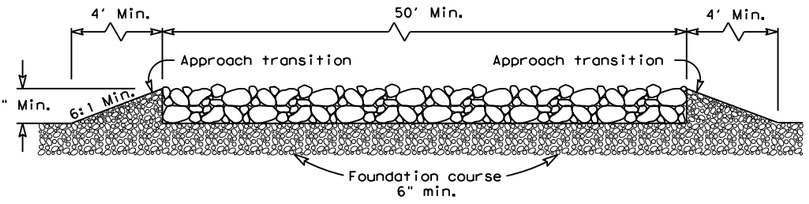


SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

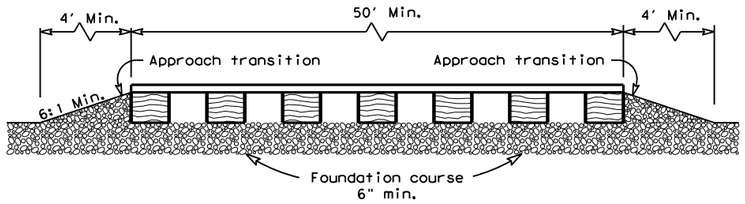
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	2524	02	025,ETC	FM 2611
	DIST	COUNTY		SHEET NO.
	HOU	BRAZORIA		232

TYPE OF WORK — ITEMS AND REQUIREMENTS FOR EACH TYPE OF WORK

SODDING	PERMANENT SEEDING	TEMPORARY SEEDING	Reference Item 161, 162, 164, 166, 168 of the Texas Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges 2014 for specifications, dimensions, volumes and measurements that are not shown. Use latest Houston District, Special Provisions for those items indicated.		
	✓		**161-6017 COMPOST MANUF TOPSOIL (BIP)(4") SY**	APPLICATION RATE Item 161.2.1. Compost Manufactured Topsoil (CMT)	Item 161.2. Materials. Submit quality control (QC) documentation to the Engineer. Compost producer's STA certification must be dated to meet STA requirements (certification must be within 30 or 90 days per STA requirements). Lab analysis performed by an STA-certified lab must be dated within 30 days before delivery of the compost.
✓			**162-6002 BLOCK SODDING SY**	GRASS SPECIES Item 162.2. Materials. Common Bermuda (Cynodon Dactylon)	Item 162.2.1. Block Sod. Use block palletized or roll type sod. **REMOVE PLASTIC BACKING FROM ROLL TYPE SOD.** Place sod within 48 hours of delivery to site. No exceptions. Place sod with joints alternating on each row to prevent continuous joint lines. Peg sod as needed with wood pegs to hold sod in place. Pegging sod is subsidiary to Item 162.
	✓		**164-6066 DRILL SEEDING(PERM)(WARM OR COOL) SY** Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH / SEED MIX March, April, May, June, July, August, September, October: Hulled - Bermudagrass (Cynodon dactylon) - 40.0 lbs PLS/acre Foxtail Millet (Setaria italica) - 34.0 lbs PLS/acre Green Sprangletop (Leptochloa dubia) - 4.0 lbs PLS/acre Sideoats Grama (Bouteloua curtipendula) - 3.2 lbs PLS/acre Little Bluestem (Schizachyrium scoparium) - 1.4 lbs PLS/acre November, December, January, February, Unhulled - Bermudagrass (Cynodon dactylon) - 40.0 lbs PLS/acre Oats (Avena sativa) - 72.0 lbs PLS/acre Green Sprangletop (Leptochloa dubia) - 4.0 lbs PLS/acre Sideoats Grama (Bouteloua curtipendula) - 3.2 lbs PLS/acre Little Bluestem (Schizachyrium scoparium) - 1.4 lbs PLS/acre	PLS (Pure Live Seed) Provide documentation of PLS requirements per Item 164.2.1. CONSTRUCTION. Cultivate the area to a depth of 4 inches before placing the seed unless otherwise directed. When performing permanent seeding after an established temporary seeding, cultivate the seedbed to a depth of 4 inches or mow the area before placement of the permanent seed. Plant the seed and place the straw or hay mulch after the area has been completed to lines and grades as shown on the plans. Drill Seeding. Plant seed or seed mixture uniformly over the area shown on the plans at a depth of 1/4 to 1/3 inch using a cultipacker(turfgrass) type seeder. Plant seed along the contour of the slopes. Use broadcast seeding method where site conditions prevent drill seeding method. Broadcast Seeding. Distribute the dry seed or dry seed mixture uniformly over the areas shown on the plans using hand or mechanical distribution on top of soil.
	✓		**164-6052 BROADCAST SEED(PERM)(SPECIAL MIX) SY** Item 164.1. Description Provide and install seeding as shown on District Standard		
		✓	**164-6051 DRILL SEED(TEMP)(WARM OR COOL) SY** Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH / SEED MIX March, April, May, June, July, August, September, October: Foxtail Millet (Setaria italica) - 34.0 lbs PLS/acre November, December, January, February, Oats (Avena sativa - 72.0 lbs PLS/acre	
		✓	**164-6009 BROADCAST SEED(TEMP)(WARM) SY** Item 164.1. Description Provide and install seeding as shown on District Standard		
	✓	✓	**162-6003 STRAW OR HAY MULCH SY**	APPLICATION RATE Immediately after planting the seed or seed mixture, apply straw or hay mulch uniformly over the seeded area. Apply straw or hay mulch at 2 tons per acre. Use tacking agent with straw or hay mulch as described on this sheet.	Use straw or hay mulch in conformance with Article 162.2.5, "Mulch." Use biodegradable tacking agents only applied at a rate in accordance with manufacturer's recommendations. Use the following products or an approved equal(see note this sheet): Conweb/Contac Guar Gum, Profile Products Corporation, (307) 655-9565, Ramtec/Procol/Viscol Guar Gum, Ramtec Corporation, (800) 366-1180
✓	✓	✓	**166-6001 FERTILIZER AC** Item 166.2. Materials Use fertilizer as shown on District Standard	APPLICATION RATE Deliver and evenly distribute fertilizer at a rate of 4000 lbs/acre.	Use a **NON-CHEMICAL** fertilizer which meets all the following criteria: (1) BRAND NAME must be registered with the Texas State Chemist as a commercial fertilizer. (2) Meets USEPA guidelines for unrestricted use. (3) Derived from biological sources such as, but not limited to: sewage sludge, manures, vegetation, etc. (4) In granular form and essentially dust free. Submit proof of registration and nutrient source to Engineer. Use the following products or an approved equal(see note this sheet): Sigma, SIGMA AgriScience, 281-851-6749 Sustanite-standard grade, Automation Nation, Inc., 713-675-4999 Milorganite, MMSD, 800-287-9645 Agricultural Organic P/L, Ag Org, INC., 713-523-4396
✓	✓	✓	**168-6001 VEGETATIVE WATERING MG**	APPLICATION RATE Item 168.3 Construction. 6000 gallons/acre per working day x 20 consecutive working days = 120,000 gallons total/acre	Begin watering immediately after installation of seed or sod. Replace, fertilize, and water any seed or sod in poor condition due to the failure to apply the specified amount of water within the time allowed at no expense to the Department.

SEQUENCE OF WORK

BLOCK SOD	PERMANENT SEEDING	TEMPORARY SEEDING
1. FERTILIZER 2. CULTIVATE SOIL (ITEM 162.3) 3. SOD 4. VEGETATIVE WATERING	1. FERTILIZER 2. COMPOST MANUFACTURED TOPSOIL 3. CULTIVATE SOIL (ITEMS 164.3 AND 161.3.1) 4. PERMANENT SEEDING 5. STRAW OR HAY MULCH 6. VEGETATIVE WATERING	1. FERTILIZER 2. CULTIVATE SOIL (PER ITEM 164.3) 3. TEMPORARY SEEDING 4. STRAW OR HAY MULCH 5. VEGETATIVE WATERING

Texas Department of Transportation

HOUSTON DISTRICT

FERTILIZER, SEED, SOD, STRAW, COMPOST, AND WATER

SHEET 1 OF 1

REVISIONS	FILE:	FED DIV	STATE	PROJECT NUMBER			SHEET
10/2014 UPDATED TO 2014 SPECS 3/2015 MINOR CORRECTIONS	OCT 2014	6	TEXAS				233
	ORIGINAL:	DIST	COUNTY	CONTROL	SECT	JOB	HIGHWAY
		12	BRAZORIA	2524	02	025,ETC	FM 2611

STD K-1