FM 510 (1057-03-045)

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. STP 2B23(055)

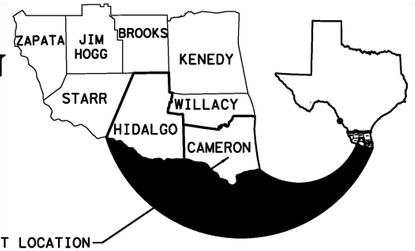
CSJ: 1057-03-045

FM 510
CAMERON COUNTY

FM 510

NET LENGTH OF ROADWAY = 40,075.82 FT. = 07.59 MI.
NET LENGTH OF BRIDGE = 135.00 FT. = 0.02 MI.
NET LENGTH OF PROJECT = 40,210.82 FT. = 07.61 MI.

LIMITS: FM 510
FROM: FM 3462 TO FM 1847



FHWA TEXAS DIVISION	PROJECT NO.		SHEET NO.
	STP 2B23(055)		1
STATE	DISTRICT	COUNTY	
TEXAS	PHR	CAMERON	
CONTROL	SECTION	JOB	HIGHWAY NO.
1057	03	045	FM 510

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

PROJECT DESCRIPTION

REHABILITATE EXISTING ROADWAY CONSISTING OF:
GRADING, LIME TREAT. SUBGRADE, GEOGRID, CEMENT TREAT. FLEXIBLE BASE,
SUPERPAVE, SIGNING, BRIDGE, PAVEMENT MARKINGS, AND IRRIGATION/DRAINAGE CROSSING IMPROVEMENTS

BEGIN PROJECT: FM 510
BEGIN CSJ: 1057-03-045
STA 01+00.00
Ref.MRK.= 726-1.453 (FM 3462)

END PROJECT: FM 510
END CSJ: 1057-03-045
STA 405+00.00
Ref.MRK.= 560+1.532

LOCAL ENTITIES

CAMERON COUNTY IRRIGATION DISTRICT #2 — DATE:
PLANS CONCURRENCE: NAME / TITLE

CAMERON COUNTY DRAINAGE DISTRICT #3 — DATE:
PLANS CONCURRENCE: NAME / TITLE

CAMERON COUNTY IRRIGATION DISTRICT #6 — DATE:
PLANS CONCURRENCE: NAME / TITLE

CAMERON COUNTY DRAINAGE DISTRICT #4 — DATE:
PLANS CONCURRENCE: NAME / TITLE

RECOMMENDED FOR LETTING: DATE: 7/7/2023

DocuSigned by: Pedro R. Alvarez
EABA335C2DAA48C...
PHARR DISTRICT ENGINEER

SUBMITTED FOR LETTING: DATE: 7/7/2023

DocuSigned by: Margil Maldonado Jr
75ECD3127D6F403...
ADVANCED PROJECT DELIVERY SUPERVISOR

FINAL PLAN DATA

FINAL CONTRACT PRICE: _____
CONTRACTORS NAME: _____
CONTRACTORS ADDRESS: _____
LETTING DATE: _____
DATE WORK BEGAN: _____
DATE WORK COMPLETED: _____
DATE OF ACCEPTANCE: _____

CHANGE ORDERS & SUPP. AGREEMENTS

ALL CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS SPECIFICATIONS AND CONTRACT. ALL PROPOSED CONSTRUCTION WAS COMPLETED UNLESS OTHERWISE NOTED.

ANDRES ESPINOZA, P.E.
AREA ENGINEER — DATE

T.D.L.R INSPECTION NOT REQUIRED

TRAFFIC DATA/DESIGN SPEED

FUNCTIONAL CLASS.: RURAL MAJOR COLLECTOR

FM 510

DESIGN SPEED = 40 MPH
ADT (2016) = 5533
ADT (2036) = 7377

PROJECT DATA

EXCEPTION: NONE

EQUATIONS: NONE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION ON NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT. REQUIRED CONTRACT PROVISIONS AND FEDERAL-AID CONTRACTS. (FORM FHWA 1273. JULY 2022)

RAILROAD CROSSINGS

FM 510
UNION PACIFIC RAILROAD @ ℄ FM 510 STA 338+05.95

COUNTY CAMERON
HWY. NO. FM 510
DATE ACCEPTED

PROJ. NO.
LETTING DATE

FILE: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\01 General\FM510#COVER.dgn
DATE: 6/27/2022 4:26:35 PM

SHEET NO.		DESCRIPTION
		I. GENERAL
1		TITLE SHEET
2		INDEX OF SHEETS
3-4		FM 510 SURVEY CONTROL LAYOUT
5-6		FM 510 HORIZONTAL & VERTICAL SURVEY CONTROL
7-10		FM 510 PROJECT LAYOUT
11-12		FM 510 EXISTING TYPICAL SECTIONS
13-14		FM 510 PROPOSED TYPICAL SECTIONS
14A-14C		ESTIMATE & QUANTITY SHEETS
15		SEALCOAT MATERIAL SELECTION TABLE "UNDERSEAL"
16-16I		GENERAL NOTES
17-22		FM 510 SUMMARY OF EARTHWORK QUANTITIES
23		FM 510 SUMMARY OF WORKZONE QUANTITIES
24		FM 510 SUMMARY OF ROADWAY QUANTITIES
25-33		FM 510 SUMMARY OF DRIVEWAY QUANTITIES
34		FM 510 SUMMARY OF CROSS CULVERT QUANTITIES
35		FM 510 SUMMARY OF PAVEMENT MARKING QUANTITIES
36-44		FM 510 SUMMARY OF SMALL SIGNS
45		FM 510 SUMMARY OF SIGNING AND MAILBOX QUANTITIES
46-48		FM 510 SUMMARY OF SW3P QUANTITIES
		II. TRAFFIC CONTROL PLAN
49		TRAFFIC CONTROL PLAN NOTES
50-52		FM 510 TRAFFIC CONTROL PLAN ADVANCE WARNING SIGNS (CSJ: 1057-03-045)
53		FM 510 TRAFFIC CONTROL PLAN FOR BRIDGE RAIL REPLACEMENT
54		FM 510 TRAFFIC CONTROL PLAN FOR BRIDGE RAIL REPLACEMENT
55		CRASH CUSHION SUMMARY SHEET
56		FM 510 CONSTRUCTION SEGMENTS
57-60		FM 510 DETOUR LAYOUT
61		FM 510 TYPICAL SEGMENT CLOSURE DETAIL
62		FM 510 TYPICAL INTERSECTION CLOSURE DETAIL
63		FM 510 FM 3462 INTERSECTION CLOSURE DETAIL
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76	#	CSB(4)-19
77	#	TCP(1-1)-18
78	#	TCP(1-2)-18
79	#	TCP(1-3)-18
80	#	TCP(1-6)-18
81	#	TCP(3-1)-13
82	#	TCP(3-3)-14
83	#	TCP(7-1)-13
84	#	WZ (BRK)-13
85	#	WZ (UL)-13
86	#	WZ (BTS-1)-13
87	#	WZ (BTS-2)-13
88	#	WZ (RCD)-13
89	#	WZ(RS)-16
90	#	WZ (STPM)-13
91	#	TREATMENT FOR VARIOUS EDGE CONDITIONS
		III. ROADWAY DETAILS
92		FM 510 HORIZONTAL ALIGNMENT DATA
93		FM 510 SUPERELEVATION DATA SHEET
94-128		FM 510 PLAN & PROFILE
129		FM 510 INTERSECTION PLAN & PROFILE
130		FM 510 INTERSECTION DETAIL
131-132		FM 510 METAL BEAM GUARD FENCE LAYOUT
133-134		FM 510 SSTR RAIL RETROFIT OVER DRAIN CROSSING
		ROADWAY DETAILS STANDARDS
135	#	DRIVEWAY PROFILE DETAILS
136	#	DRIVEWAY DETAILS PRIVATE (RESIDENTIAL - COMMERCIAL)
137	#	DRIVEWAY DETAILS PUBLIC (COUNTY ROAD- CITY STREET)
138	#	R.R. CROSSING MISCELLANEOUS DETAILS
139	#	GF(31)-19
140	#	GF(31)DAT-19
141-142	#	GF(31)TRTL3-20
143	#	GF(31)MS-19
144	#	BED -14
145	#	SGT(10S)31-16
146	#	SGT(11S)31-18
147	#	SGT(12S)31-18
148	#	TE(HMAC)-11
149-151	#	MB-14(2), MB-14(2A),MB-14(2B)
152-155	#	MB-15(1)
156-157	#	TRAFFIC RAIL TYPE T631LS
158-159	#	TRAFFIC RAIL SINGLE SLOPE TYPE SSTR
160	#	QGELITE (M10)(N)-20
		IV. DRAINAGE DETAILS
161		FM 510 CULVERT LAYOUT OVERVIEW
162-187		FM 510 CULVERT LAYOUTS
188		CULVERT LAYOUT MISCELLANEOUS DETAILS
		DRAINAGE STANDARDS
189	#	SAFETY END TREATMENT FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II PARALLEL DRAINAGE SETP-PD
190	#	PRECAST SAFETY END TREATMENT TYPE II PARALLEL DRAINAGE PSET-SP
191	#	PRECAST SAFETY END TREATMENT TYPE II PARALLEL DRAINAGE PSET-RP
192	#	PRECAST SAFETY END TREATMENT TYPE II RIPRAP DETAILS PSET-RR
193	#	SAFETY END TREATMENT DETAILS
		V. SIGNING AND PAVEMENT MARKING DETAILS
194-211		FM 510 SIGNING AND PAVEMENT MARKINGS LAYOUT
212-213		FM 510 SIGNING DETAILS
		SIGNING AND PAVEMENT MARKING DETAILS STANDARDS
214-216	#	PM(1)-22, PM(2)-22, & PM(3)-22
217	#	SMD(GEN)-08
218-220	#	SMD(SLIP-1)-08 THRU SMD(SLIP-3)-08
221-223	#	TSR(3)-13 THRU TSR(5)-13
224-226	#	D&OM(1)-20, D&OM(2)-20, D&OM(3)-20
227-229	#	D&OM(4)-20, D&OM(5)-20, D&OM(6)-20
230	#	D&OM(VIA)-20
231	#	RS(4)-23
232	#	RS(2)-23
233	#	RCD (1)-16
234	#	RCD (2)-16
		VI. ENVIRONMENTAL ISSUES
235-236		ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC) -FM 510
237-239		TPWD BMPs
240		FM 510 TXDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)
241-258		FM 510 STORMWATER POLLUTION PREVENTION PLAN
		ENVIRONMENTAL ISSUES STANDARDS
259	#	TECL-17 (PHR)
260	#	EC(1)-16
261	#	EC(3)-16
		EXHIBIT "A"
262		EXHIBIT "A" LOCATION MAP LOCATION NO.2
263		FM 510 EXHIBIT "A" PROPOSED PLANKING LAYOUT
264		RAILROAD SCOPE OF WORK
265-266		RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET WITH A "#" HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

MORT T. TASHOOR PE , P.E. 6/27/2022 DATE

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

INDEX OF SHEETS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	2
CONTROL	SECTION	JOB	
1057	03	045	

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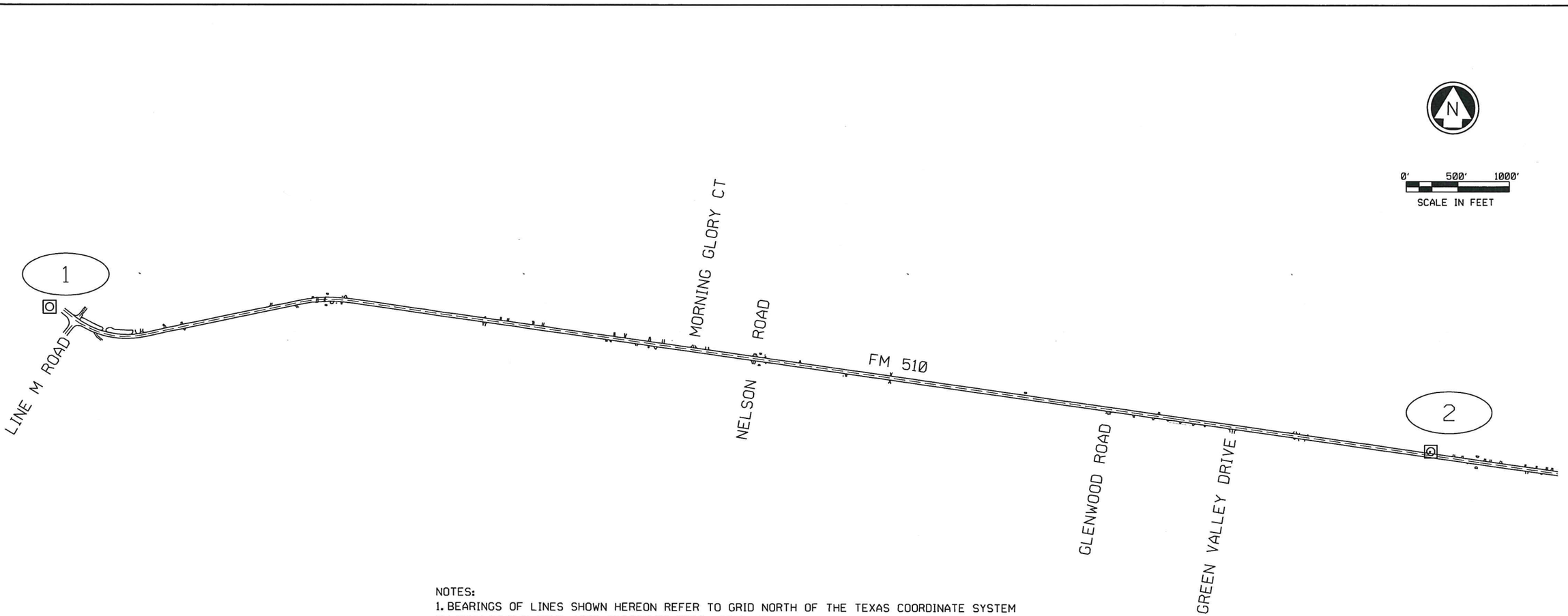

NOTES:

1. BEARINGS OF LINES SHOWN HEREON REFER TO GRID NORTH OF THE TEXAS COORDINATE SYSTEM OF 1983 (SOUTH ZONE 4205; NAD83(2011) EPOCH 2010) AS DERIVED LOCALLY FROM TXDOT'S CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS) VIA REAL TIME KINEMATIC (RTK) METHODS. AN AVERAGE COMBINATION FACTOR OF 0.99996 WAS USED TO SCALE GRID COORDINATES AND DISTANCES TO SURFACE. ALL COORDINATES SHOWN ARE SURFACE.

2. THE ELEVATIONS SHOWN ARE NAVD88 AND WERE DERIVED FROM THE ABOVE RTK OBSERVATIONS. ORTHOMETRIC HEIGHTS WERE CALCULATED BY APPLYING THE GEOID12B MODEL TO THE ELLIPSOID HEIGHTS.

3. FIELD SURVEYS WERE CONDUCTED BY TEAGUE NALL & PERKINS, INC., AUGUST 2017 - OCTOBER 2017.

4. ⊡ = ALUMINUM DISC STAMPED "TEXAS DEPT OF TRANSPORTATION CONTROL MARKER" SET IN CONCRETE

TODD B. TURNER
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 4859
TEAGUE NALL and PERKINS
TBPELS Firm No. 10011601

DATE 11-15-2017

STATE OF TEXAS
REGISTERED
TODD B. TURNER
4859
PROFESSIONAL
LAND SURVEYOR

Texas Department of Transportation

tnp
teague nall & perkins

FM 510 SURVEY CONTROL LAYOUT

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	3
CONTROL	SECTION	JOB	
1057	03	045, ETC	

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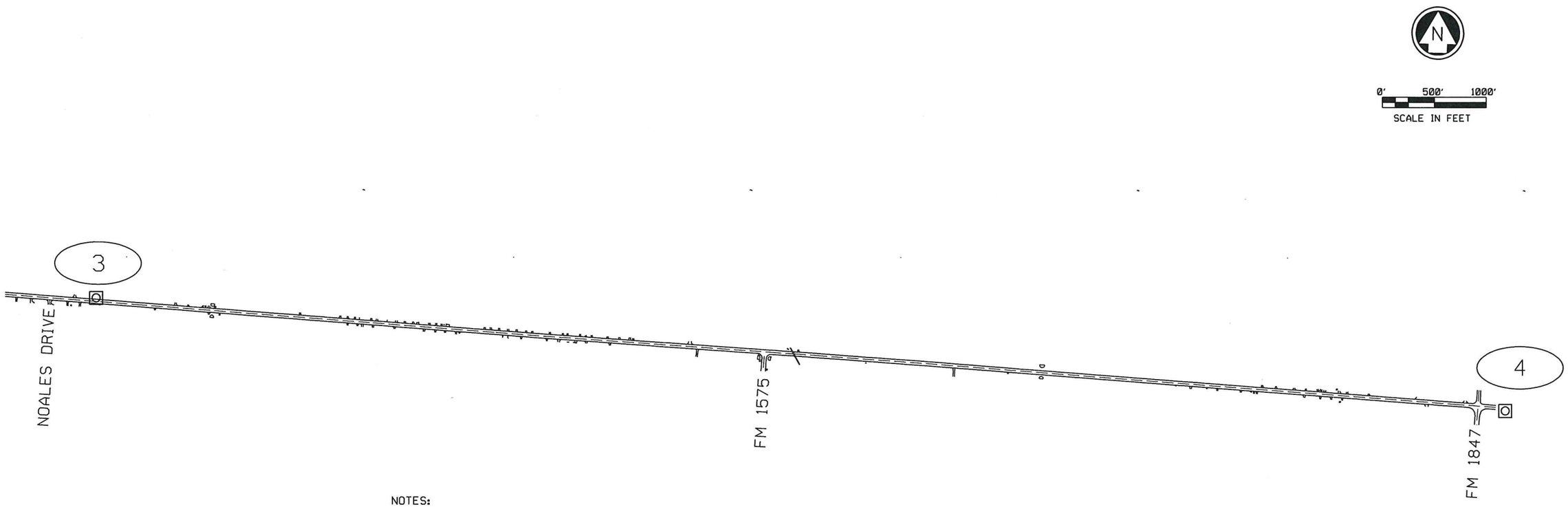

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TODD B. TURNER
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 4859
TEAGUE NALL and PERKINS
TBPELS Firm No. 10011601

DATE 11-15-2017

STATE OF TEXAS
REGISTERED
TODD B. TURNER
4859
PROFESSIONAL
LAND SURVEYOR

Texas Department of Transportation

tnp
teague nall & perkins

FM 510 SURVEY CONTROL LAYOUT

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	4
CONTROL	SECTION	JOB	
1057	03	045, ETC	

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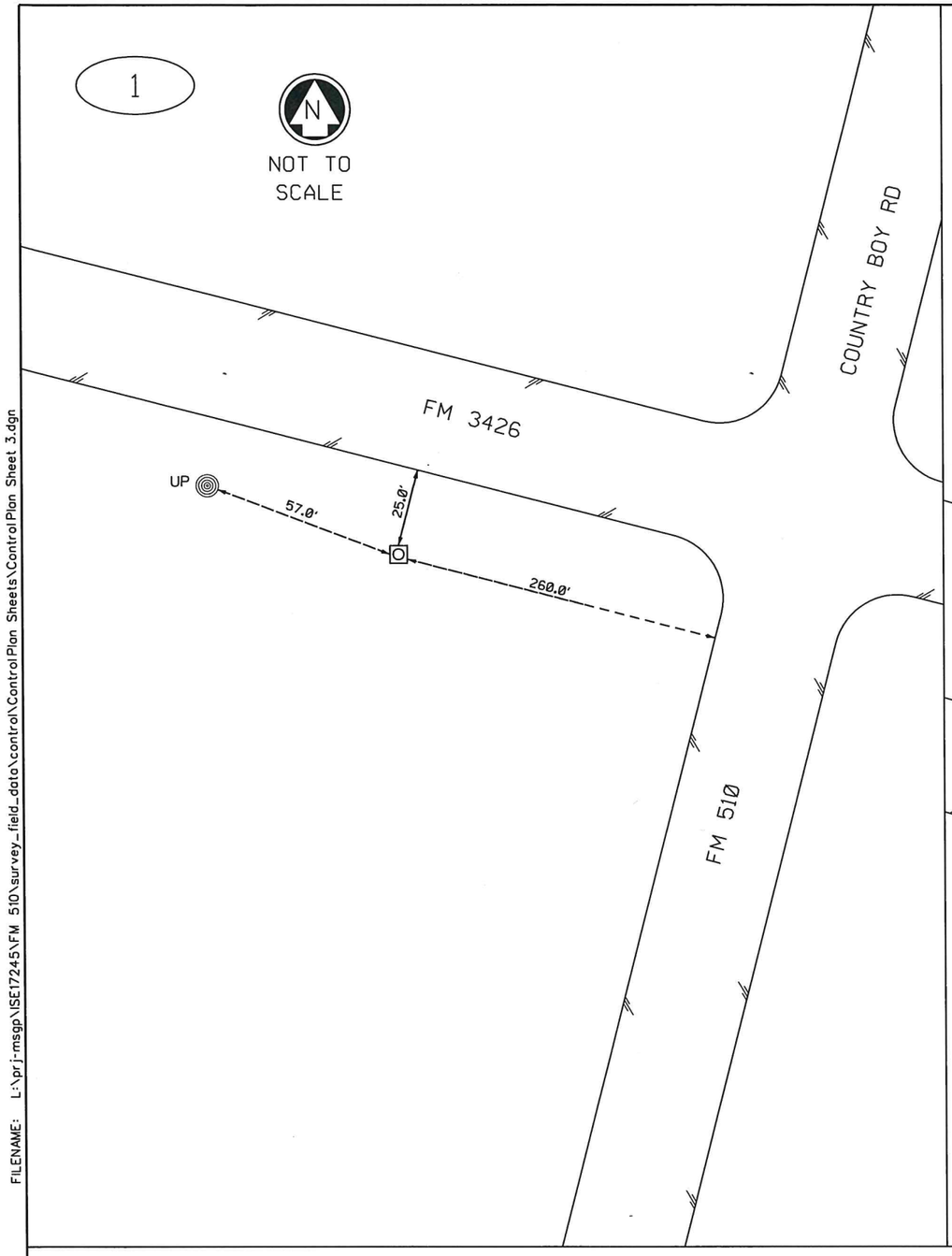

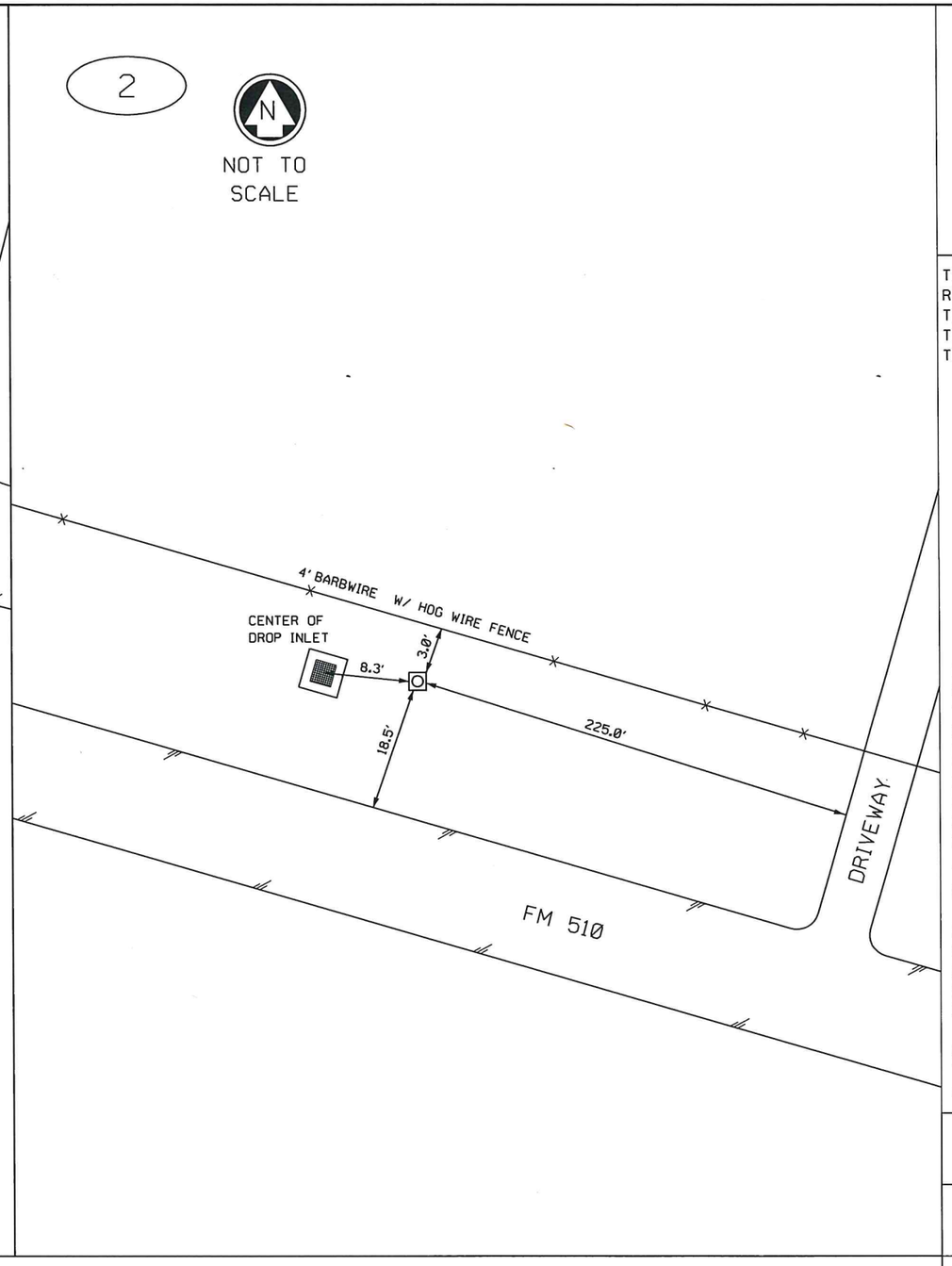

POINT	NORTHING	EASTING	ELEVATION	STATION	ALIGN	OFFSET	RT/LT	DESCRIPTION
CP1	16577198.87	1281742.52	26.91	CP1 IS BEYOND STATION ALIGNMENT	FM 510	N/A	N/A	3 1/4" DIAMETER ALUMINUM CAP SET IN CONRETE ALONG THE SOUTH R.O.W. OF FM 3426. 25.0' SOUTH OF THE SOUTH EDGE OF PAVEMENT AND 260.0' WEST OF THE WEST EDGE OF PAVEMENT OF FM 510 AND 57.0' EAST OF A POWER POLE.
CP2	16575811.27	1295112.79	23.75	133+29.34	FM 510	39.16'	LT.	3 1/4" DIAMETER ALUMINUM CAP SET IN CONRETE ALONG THE NORTH R.O.W. OF FM 510. 18.5' NORTH OF THE NORTH EDGE OF PAVEMENT, 3' SOUTH OF A 4' BARBWIRE W/ HOG WIRE FENCE, 8.3' NORTHEAST OF THE CENTER OF A DROP INLET AND 225' WEST OF THE CENTERLINE OF DRIVEWAY.

STATE OF TEXAS
REGISTERED
TODD B. TURNER
4859
PROFESSIONAL
LAND SURVEYOR

TODD B. TURNER DATE 11-15-2017
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 4859
TEAGUE NALL and PERKINS
TBPELS Firm No. 10011601

- ALUMINUM DISC STAMPED "TEXAS DEPT OF TRANSPORTATION CONTROL MAKER" SET IN CONCRETE
- UP UTILITY POLE
- —OU— OVERHEAD UTILITY
- EDGE OF PAVEMENT

NOTES:
1. BEARINGS OF LINES SHOWN HEREON REFER TO GRID NORTH OF THE TEXAS COORDINATE SYSTEM OF 1983 (SOUTH ZONE 4205; NAD83(2011) EPOCH 2010) AS DERIVED LOCALLY FROM TXDOT'S CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS) VIA REAL TIME KINEMATIC (RTK) METHODS. AN AVERAGE COMBINATION FACTOR OF 0.99996 WAS USED TO SCALE GRID COORDINATES AND DISTANCES TO SURFACE. ALL COORDINATES SHOWN ARE SURFACE.

2. THE ELEVATIONS SHOWN ARE NAVD88 AND WERE DERIVED FROM THE ABOVE RTK OBSERVATIONS. ORTHOMETRIC HEIGHTS WERE CALCULATED BY APPLYING THE GEOID12B MODEL TO THE ELLIPSOID HEIGHTS.

3. FIELD SURVEYS WERE CONDUCTED BY TEAGUE NALL & PERKINS, INC., AUGUST 2017 - OCTOBER 1017

tnp
teague nall & perkins

FM 510
HORIZONTAL & VERTICAL SURVEY CONTROL

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	5
CONTROL	SECTION	JOB	
1057	03	045, ETC	

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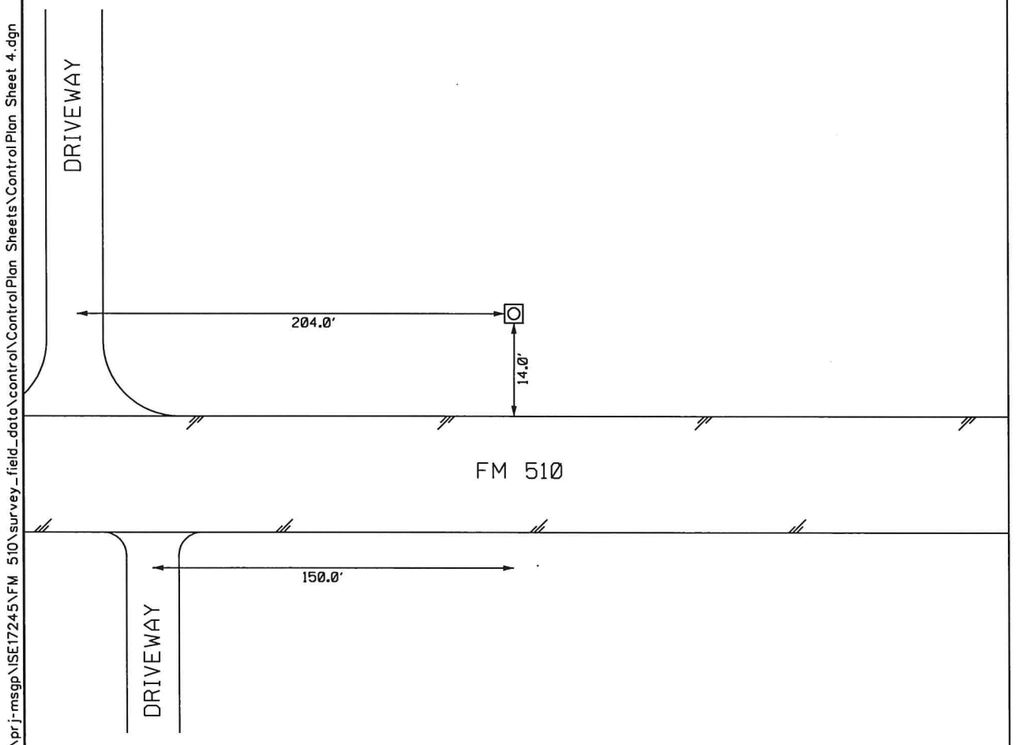

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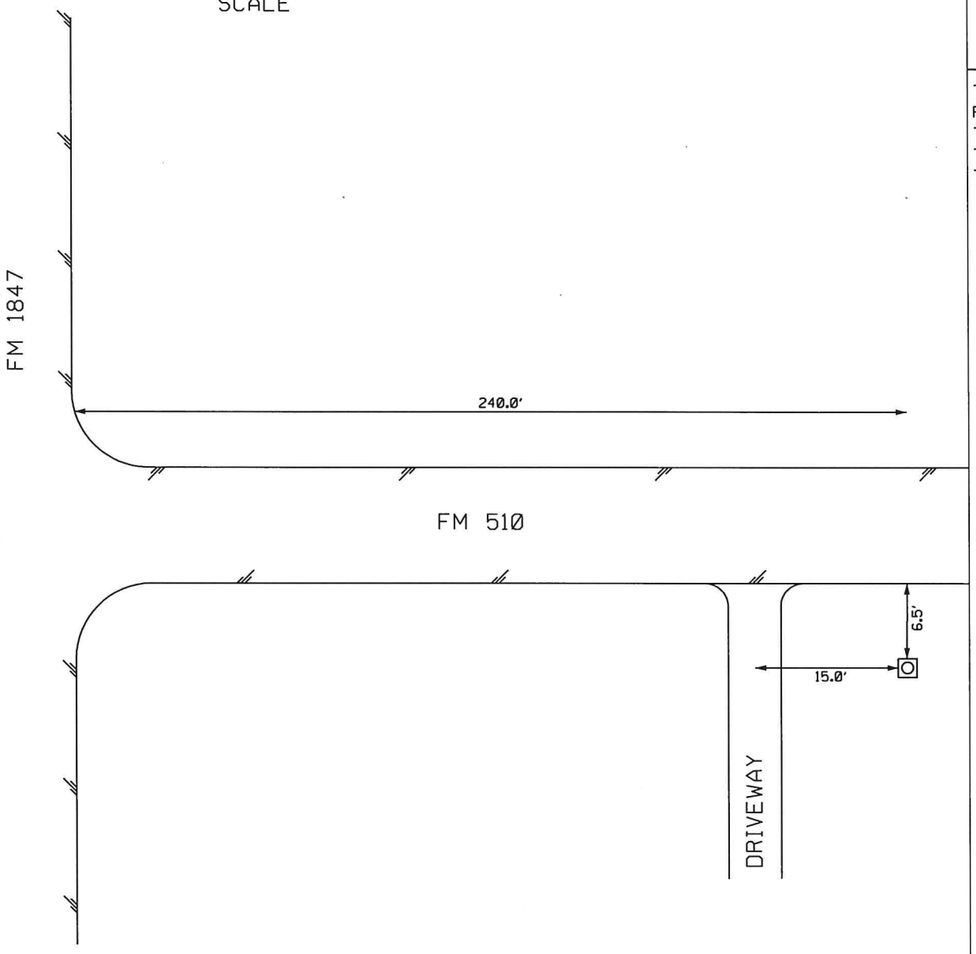

STATE OF TEXAS
REGISTERED
TODD B. TURNER
4859
PROFESSIONAL
LAND SURVEYOR

TODD B. TURNER DATE 11-15-2017
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 4859
TEAGUE NALL and PERKINS
TBPELS Firm No. 10011601

◎	ALUMINUM DISC STAMPED "TEXAS DEPT OF TRANSPORTATION CONTROL MAKER" SET IN CONCRETE
◎UP	UTILITY POLE
—OU—	OVERHEAD UTILITY
——//	EDGE OF PAVEMENT

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Texas Department of Transportation

tnp
teague nall & perkins

POINT	NORTHING	EASTING	ELEVATION	STATION	ALIGN	OFFSET	RT/LT	DESCRIPTION
CP3	16574120.82	1308495.23	20.14	268+85.92	FM 510	34.19	LT.	3 1/4" DIAMETER ALUMINUM CAP SET IN CONRETE ALONG THE NORTH R.O.W. OF FM 510. 2122.76' EAST OF OLMITO NORTH ROAD. 150' EAST OF CENTERLINE OF DRIVEWAY AT MAILBOX • 31382 AND 14' NORTH OF THE NORTH EDGE OF PAVEMENT.
CP4	16573050.19	1322034.28	16.76	CP4 IS BEYOND STATION ALIGNMENT	FM 510	N/A	N/A	3 1/4" DIAMETER ALUMINUM CAP SET IN CONRETE ALONG THE SOUTH R.OW. OF FM 510. 240.0' EAST OF THE EAST EDGE OF PAVEMENT OF FM 1847. 6.5' SOUTH OF THE SOUTH EDGE OF PAVEMENT AND 15' EAST OF THE CENTERLINE OF DRIVEWAY.

FM 510
HORIZONTAL & VERTICAL SURVEY CONTROL

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	6
CONTROL	SECTION	JOB	
1057	03	045, ETC	

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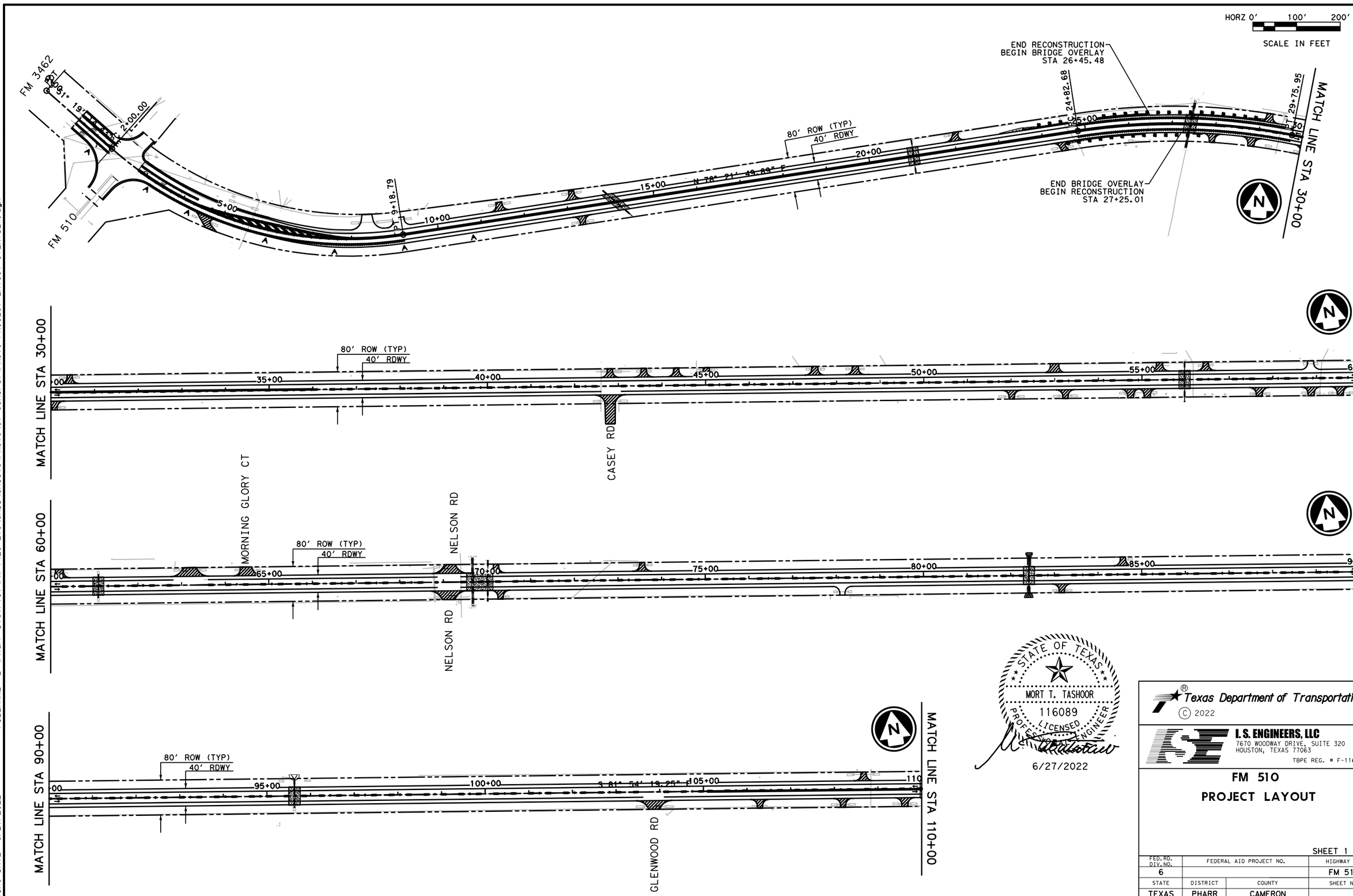

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
PROJECT LAYOUT

SHEET 1 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	7
CONTROL	SECTION	JOB	
1057	03	045	

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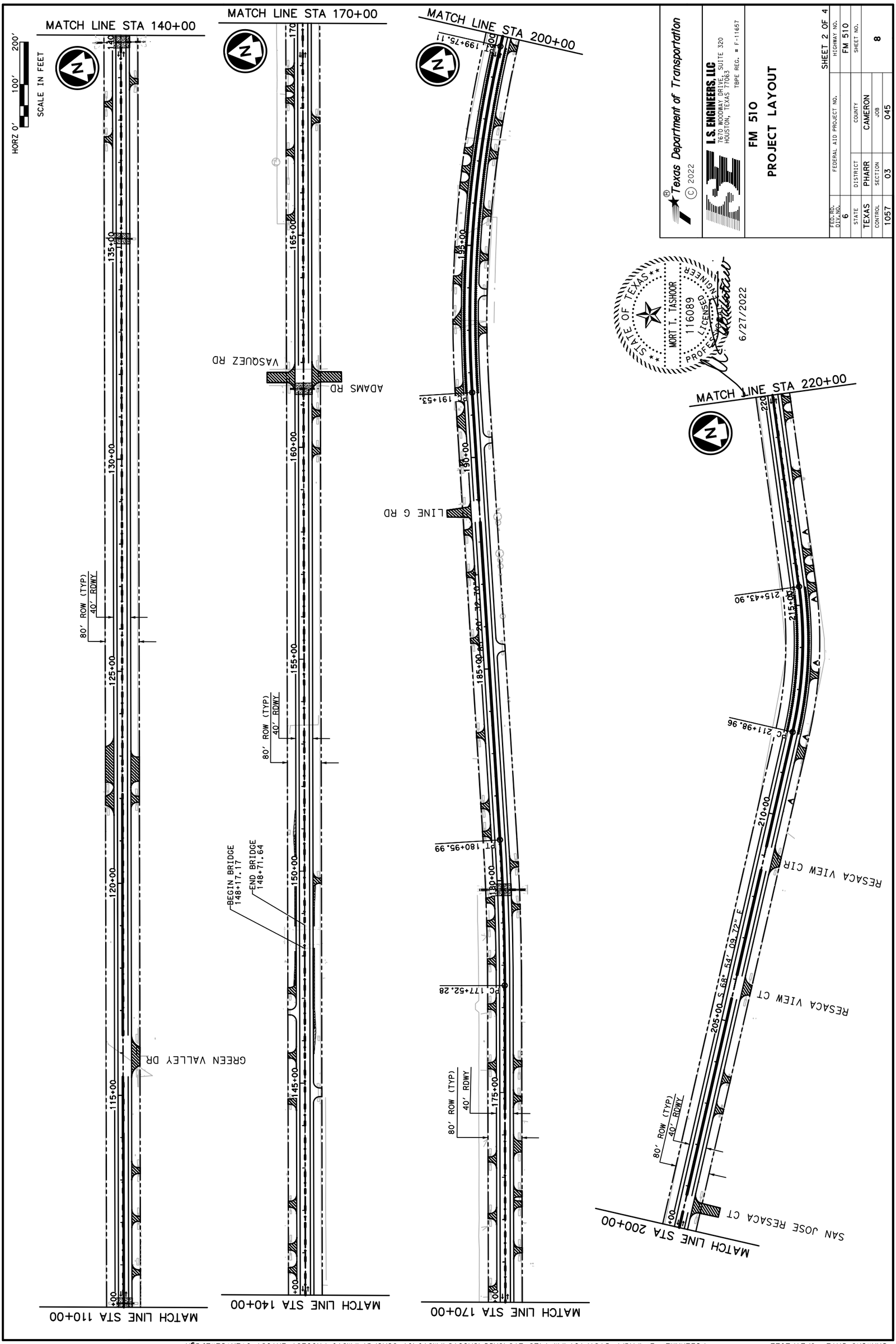


Texas Department of Transportation © 2022

I.S. ENGINEERS, LLC
7610 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
PROJECT LAYOUT

SHEET 2 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	8
CONTROL	SECTION	JOB
1057	03	045

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED PROFESSIONAL ENGINEER
6/27/2022

DRAWING DATE: 6/27/2022 FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\01 General\FM510*PROJECT*LAYOUT OVERVIEW2.dgn

HORZ 0' 100' 200'

SCALE IN FEET

MATCH LINE STA 220+00

225+00 S 89° 35' 56.70" E

230+00

235+00

PI 235+39.45

PT 236+72.05

80' ROW (TYP)
40' RDWY

240+00

245+00

250

RESACA VIEW CIR

EMILY LN

MATCH LINE STA 250+00

MATCH LINE STA 250+00

255+00

260+00

265+00

270+00

275+00 S 85° 37' 20.88" E

280

80' ROW (TYP)
40' RDWY

NOGALES DR

NOGALITOS DR

NOGALES DR

FM 803 (OLMITO NORTH RD)

MATCH LINE STA 280+00

MATCH LINE STA 280+00

285+00

290+00

295+00

300+00

305+00

310

80' ROW (TYP)
40' RDWY

MATCH LINE STA 310+00

MATCH LINE STA 310+00

PI 313+63.72

315+00

320+00

321+98.63

325+00

330

80' ROW (TYP)
40' RDWY

50' ADDITIONAL ROW FOR DRAIN DITCH

MATCH LINE STA 330+00

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
PROJECT LAYOUT

SHEET 3 OF 4

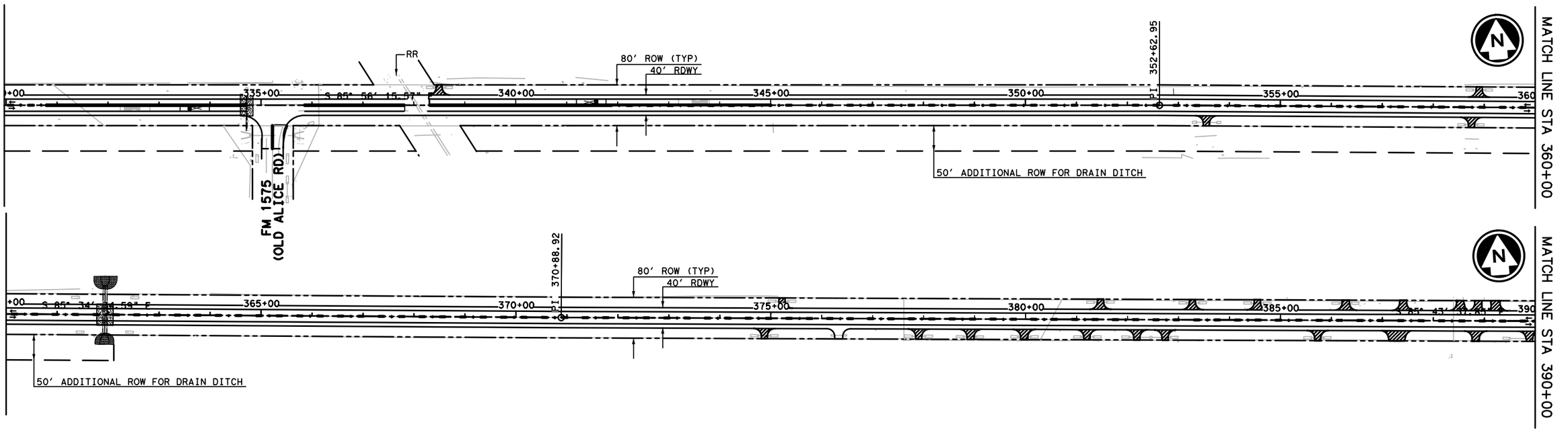
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	9
CONTROL	SECTION	JOB	
1057	03	045	

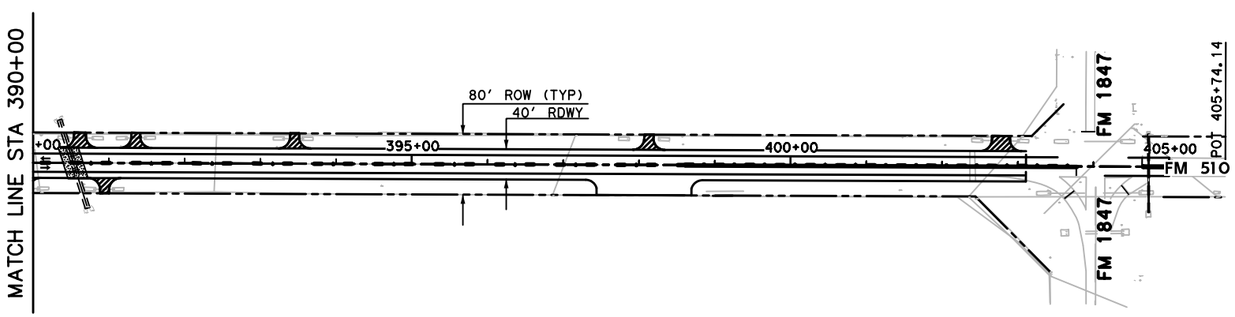
FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\01 General\FM510*PROJECT*LAYOUT OVERVIEW3.dgn

DRAWING DATE: 6/27/2022

HORZ 0' 100' 200'

SCALE IN FEET





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TBPE REG. # F-11657

FM 510
PROJECT LAYOUT

SHEET 4 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	10
CONTROL	SECTION	JOB	
1057	03	045	

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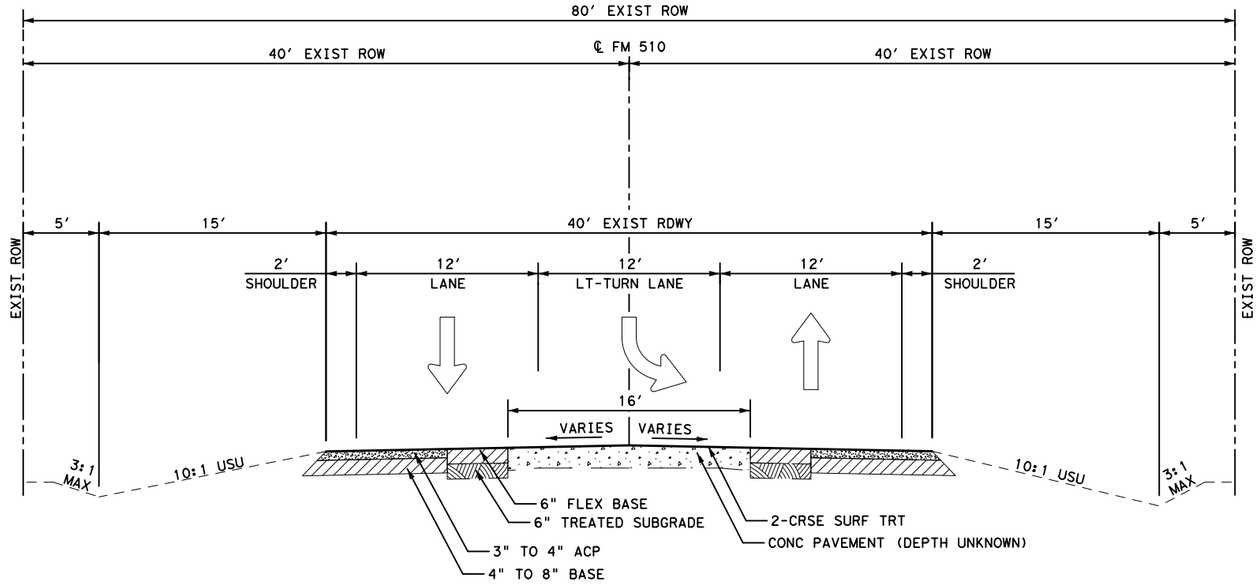
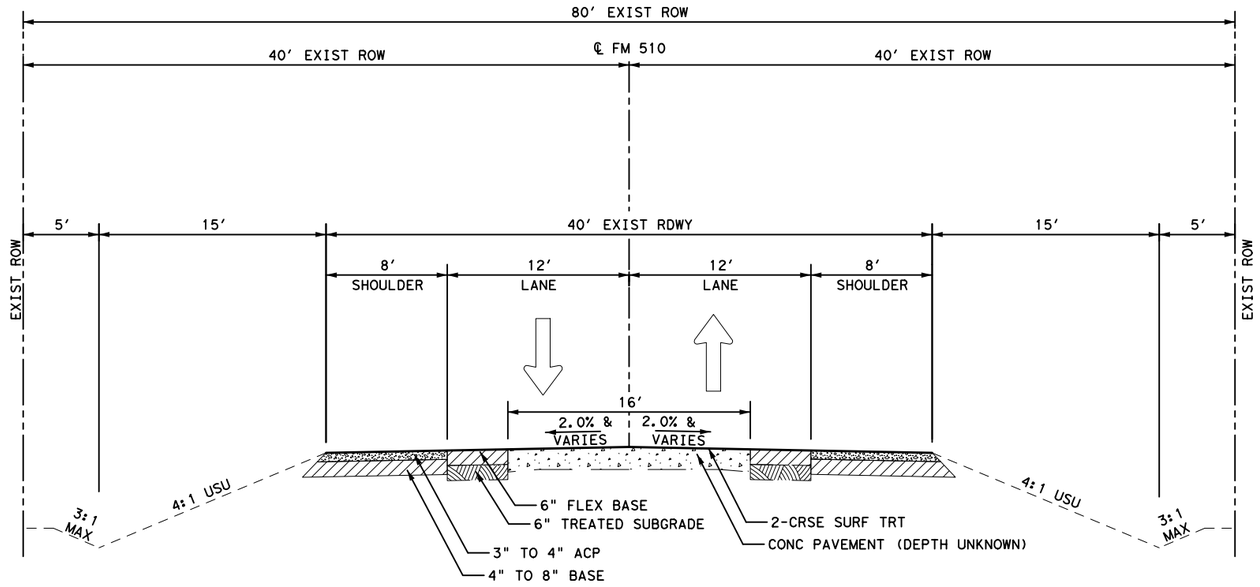
DRAWING DATE: 6/27/2022



EXISTING TYPICAL SECTION

℄ FM 510 FROM STA 01+00 TO STA 08+00
(FROM EAST OF FM 3462 TO 550 FT WEST OF FM 3462)

ROADWAY TRANSITION
STA 06+00.00 TO STA 07+50.00



EXISTING TYPICAL SECTION

℄ FM 510 FROM STA 08+00 TO STA 180+14
(FROM 550 FT WEST OF FM 3462 TO 1.35 MI WEST OF FM 803)

NOTES:

1. INFORMATION SHOWN IN 1961 AS-BUILT (CSJ 1057-03-09) AND 1954 AS-BUILT (CSJ 1057-03-05) IS USED IN DEVELOPING EXISTING TYPICAL SECTIONS.
2. EXISTING PAVEMENT STRUCTURE AND EDGE DETAIL SHOWN HERE ARE BASED ON RECORD DRAWINGS, LIMITED CORE DATA ON THE SHOULDERS OF FM 510 (COLLECTED BY TXDOT), AND ARE PROVIDED FOR CONTRACTOR INFORMATION ONLY.
3. EXISTING ROW WIDTH IS DERIVED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.

PAVEMENT CORE DATA PROVIDED BY TXDOT		
SHOULDER PVMT CORE NO.	STATION	PVMT STRUCTURE
1	19+60.51	4" ACP ON 8" BASE
2	206+84.70	3" ACP ON 4" BASE
3	374+41.22	3.5" ACP ON 4" BASE

STATE OF TEXAS
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6/27/2022

Texas Department of Transportation

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

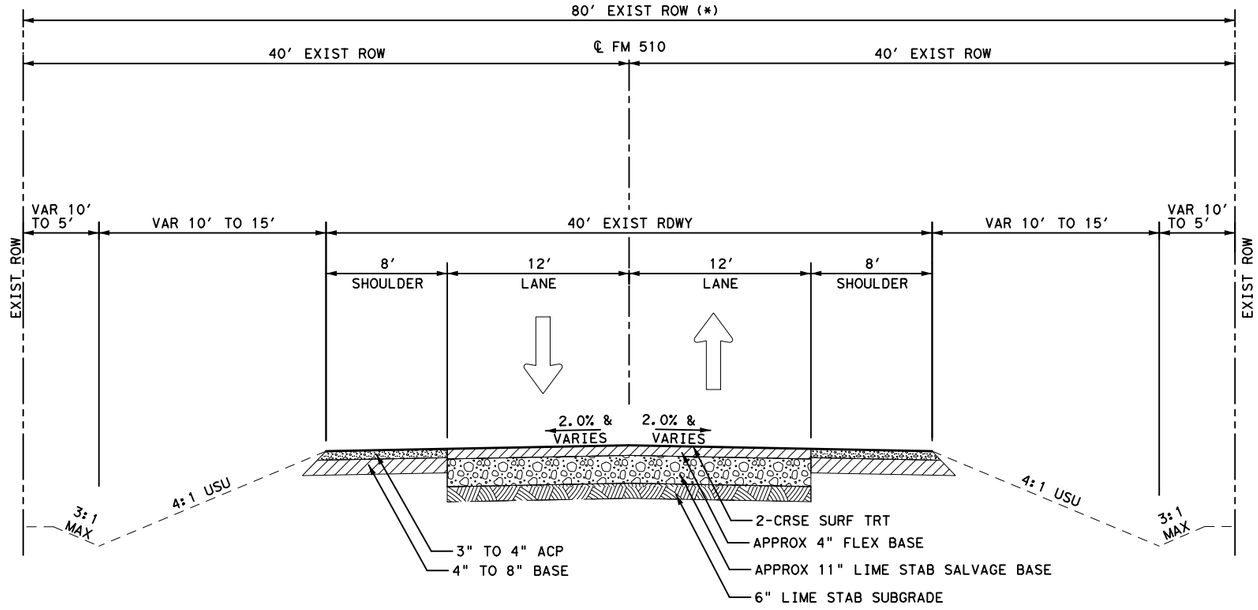
FM 510

EXISTING TYPICAL SECTIONS

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	11
CONTROL	SECTION	JOB	
1057	03	045	

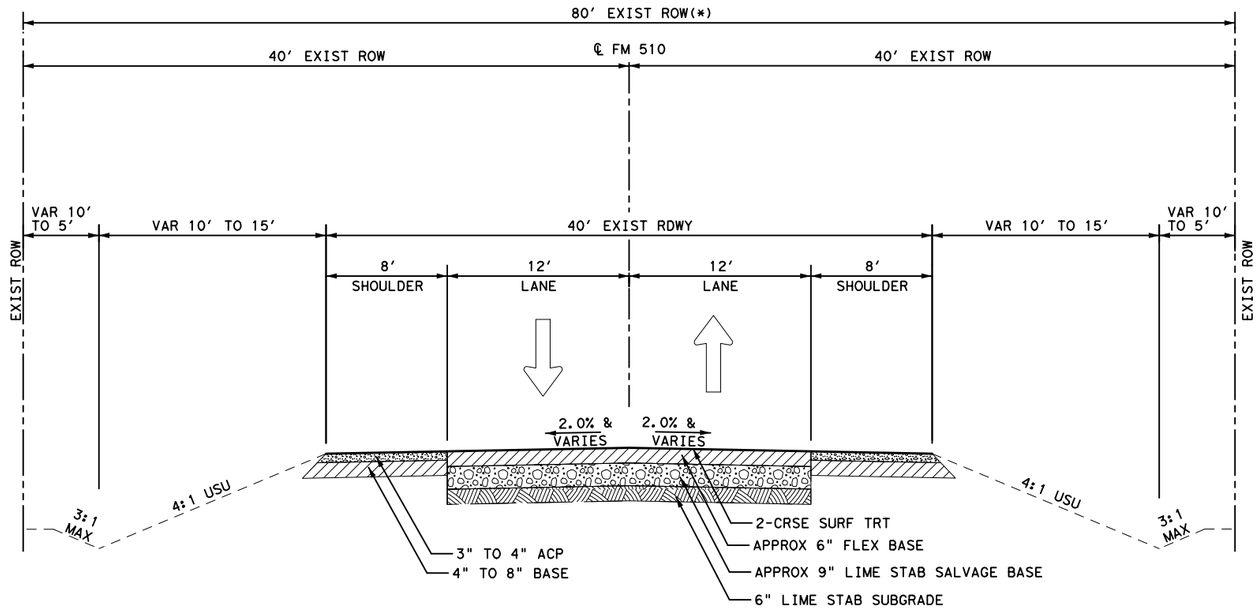
FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\02 Typical Sections\FM 510#TYP#EXISTING#01.dgn
DRAWING DATE: 6/27/2022



EXISTING TYPICAL SECTION

℄ FM 510 FROM STA 180+14 TO STA 254+50
(FROM 1.35 MI WEST OF FM 803 TO FM 803)
℄ FM 510 FROM STA 332+50 TO STA 403+10.82
(FROM 270 FT WEST OF FM 1575 TO FM 1847)

UNION PACIFIC RAILROAD
@ STA 338+05.95



EXISTING TYPICAL SECTION

℄ FM 510 FROM STA 254+50 TO STA 332+50
(FROM FM 803 TO 270 FT WEST OF FM 1575)

NOTES:

1. INFORMATION SHOWN IN 1961 AS-BUILT (CSJ 1057-03-09) AND 1954 AS-BUILT (CSJ 1057-03-05) IS USED IN DEVELOPING EXISTING TYPICAL SECTIONS.
2. EXISTING PAVEMENT STRUCTURE AND EDGE DETAIL SHOWN HERE ARE BASED ON RECORD DRAWINGS, LIMITED CORE DATA ON THE SHOULDERS OF FM 510 (COLLECTED BY TXDOT), AND ARE PROVIDED FOR CONTRACTOR INFORMATION ONLY.
3. EXISTING ROW WIDTH IS DERIVED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
4. ALL MATERAILS REMOVED TO BECOME PROPERTY OF THE CONTRACTOR.

(*) BETWEEN STA 322+00 AND 362+00 THERE IS 50' ADDITIONAL ROW FOR DRAIN DITCH.

STATE OF TEXAS
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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

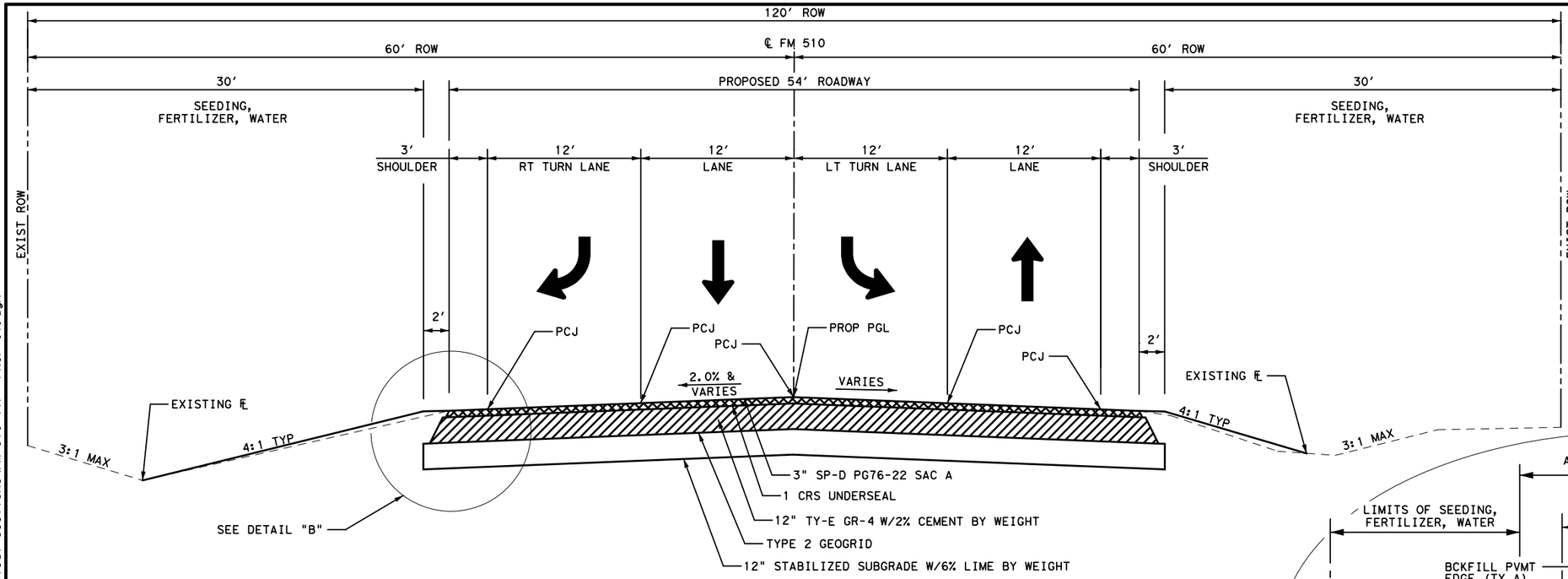
FM 510

EXISTING TYPICAL SECTIONS

SHEET 2 OF 2

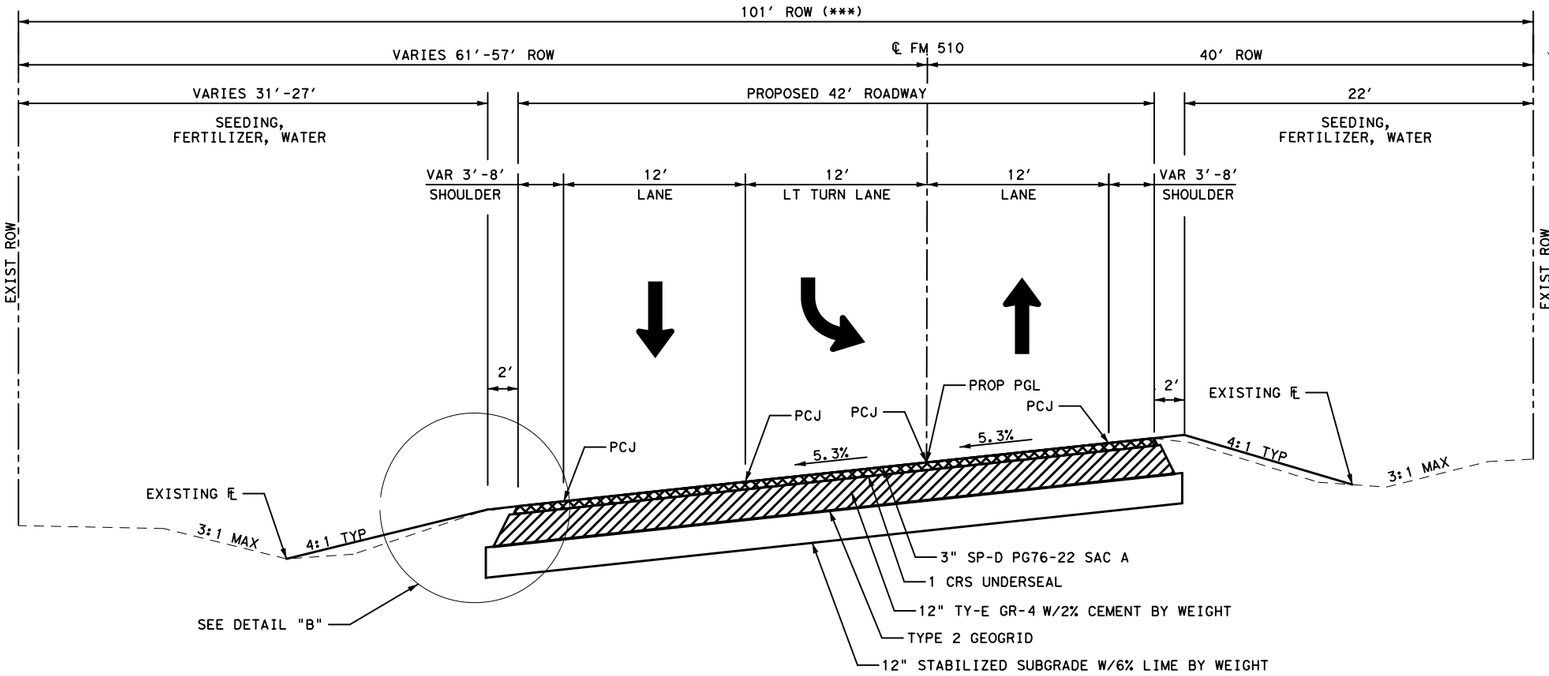
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	12
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022
FILENAME: L:\Pharr District\FM#1425*ETC\CADD\Sheets\FM510\02 Typical Sections\FM 510*TYP*EXISTING*02.dgn



PROPOSED TYPICAL SECTION

℄ FM 510 FROM STA 01+00 TO STA 02+50



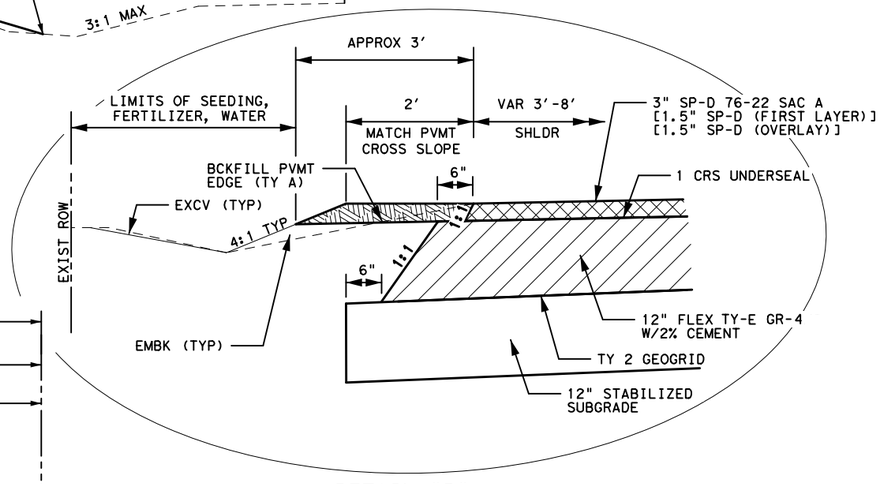
PROPOSED TYPICAL SECTION

℄ FM 510 FROM STA 02+50 TO STA 07+50

ROADWAY TRANSITIONS
STA 06+00.00 TO STA 07+50.00

NOTES:

1. REMOVED EXISTING PAVEMENT AND CONCRETE PAVEMENT MATERIAL SHALL BECOME PROPERTY OF THE CONTRACTOR.
2. SUBGRADE TO BE PROOF ROLLED AS PER ITEM 216.
3. 114 #/SY OF HMA IS EQUIVALENT TO 1" IN DEPTH OF HMA.
4. ANY DAMAGE TO EXISTING CROSS CULVERTS OR IRRIGATION CROSSING CAUSED BY THE CONTRACTOR AS A RESULT OF HIGHWAY WORK WILL BE REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
5. SEE DETAIL C FOR ADDRESSING SOFT SPOTS. CORRECT SOFT SPOT AREAS AS DIRECTED BY THE ENGINEER.
6. FOR SOFT SPOT REPAIRS REMOVAL OF NON-ROADBED (DIRT) FOR PLACEMENT OF GRAVEL BEDDING WILL BE SUBSIDIARY TO ITEM 110.



DETAIL "B"
N.T.S.

STATE OF TEXAS
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6/27/2022

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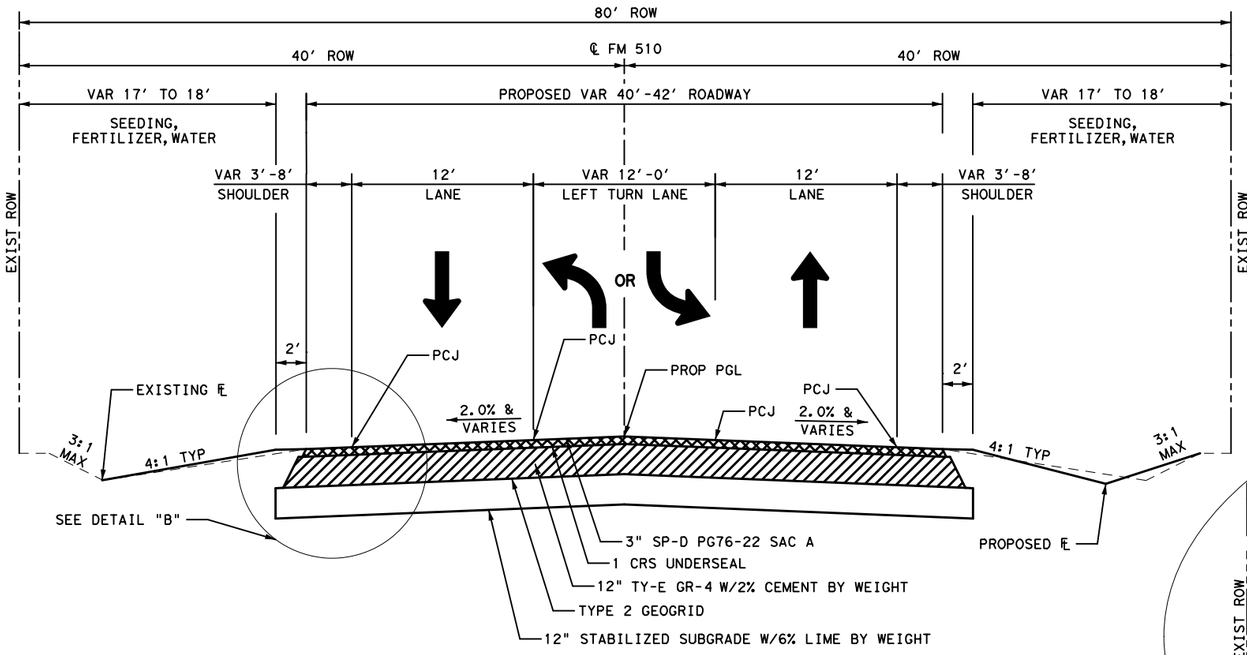
FM 510

PROPOSED TYPICAL SECTIONS

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	13
CONTROL	SECTION	JOB	
1057	03	045	

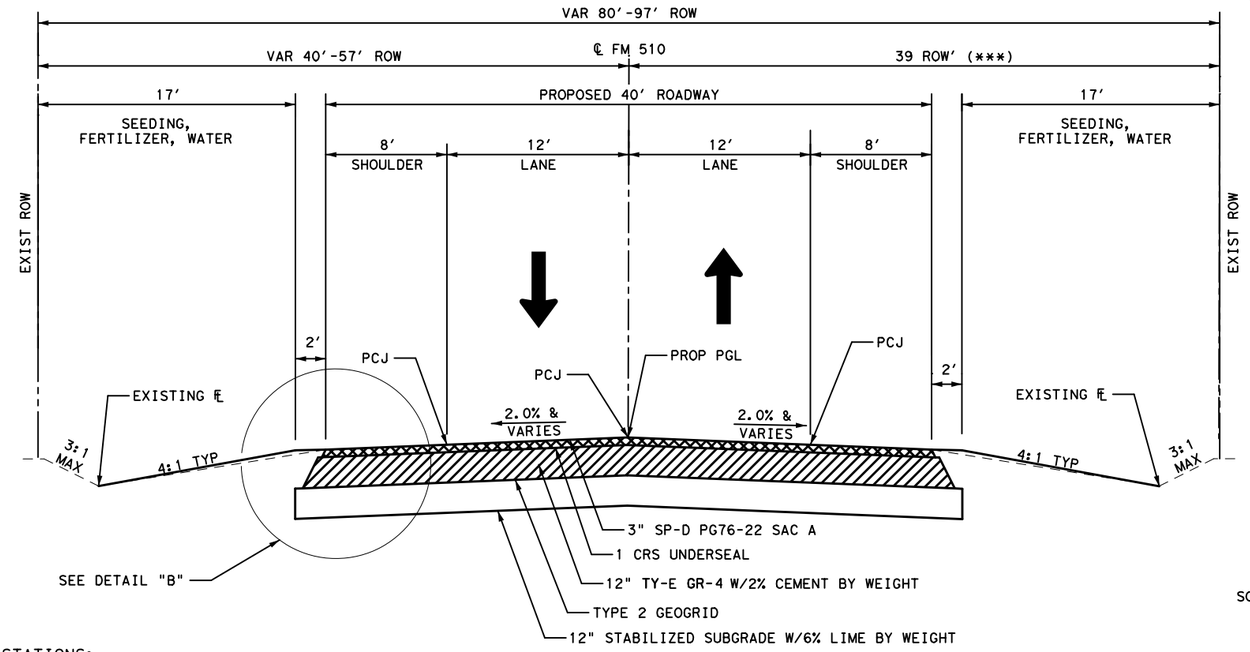
FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\02 Typical Sections\FM 510*TYP* PROP*01.dgn
DRAWING DATE: 6/27/2022



PROPOSED TYPICAL SECTION

℄ FM 510 FROM STA 245+30 TO STA 257+30

ROADWAY TRANSITIONS
STA 245+30.00 TO STA 249+60.00 (40' TO 42')
STA 253+24.61 TO STA 257+30.00 (42' TO 40')



PROPOSED TYPICAL SECTION

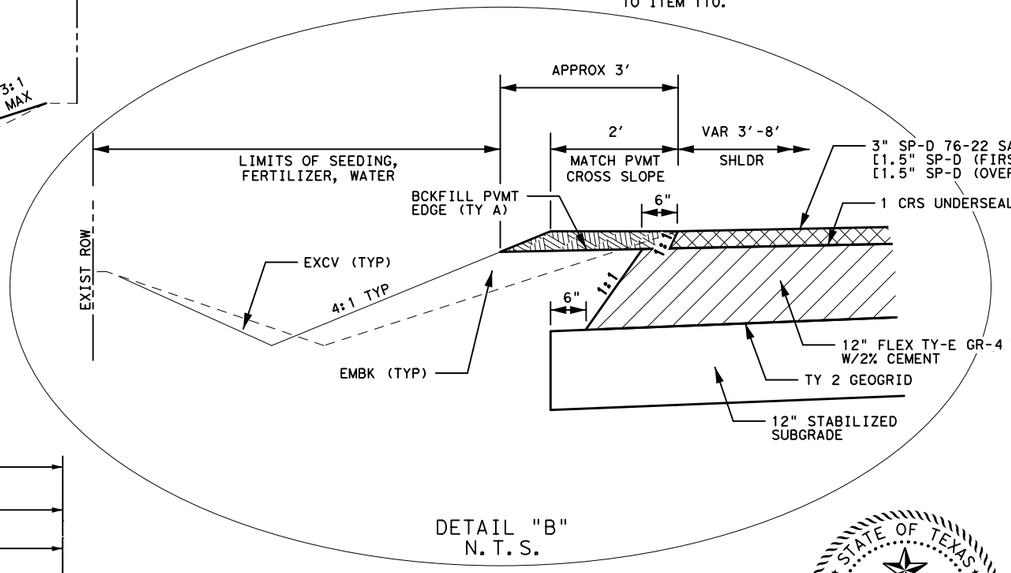
℄ FM 510 FROM STA 07+50 TO STA 180+14*
℄ FM 510 FROM STA 180+14 TO STA 245+30
℄ FM 510 FROM STA 257+30 TO STA 332+50
℄ FM 510 FROM STA 332+50 TO STA 403+10.82

*BRIDGE STATIONS:

℄ FM 510 FROM STA 26+45.48 TO STA 27+25.01
℄ FM 510 FROM STA 148+17.17 TO STA 148+71.66

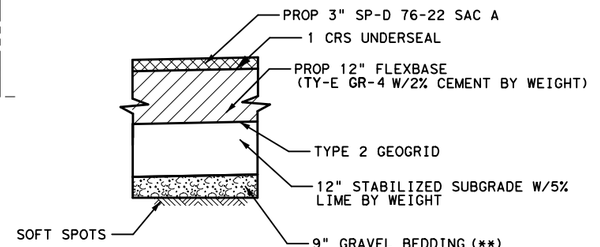
NOTES:

1. REMOVED EXISTING PAVEMENT AND CONCRETE MATERIAL SHALL BECOME PROPERTY OF THE CONTRACTOR.
2. SUBGRADE TO BE PROOF ROLLED AS PER ITEM 216.
3. 114 #/SY OF HMA IS EQUIVALENT TO 1" IN DEPTH OF HMA.
4. ANY DAMAGE TO EXISTING CROSS CULVERTS OR IRRIGATION CROSSING CAUSED BY THE CONTRACTOR AS A RESULT OF HIGHWAY WORK WILL BE REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
5. SEE DETAIL C FOR ADDRESSING SOFT SPOTS. CORRECT SOFT SPOT AREAS AS DIRECTED BY THE ENGINEER.
6. FOR SOFT SPOT REPAIRS REMOVAL OF NON-ROADBED (DIRT) FOR PLACEMENT OF GRAVEL BEDDING WILL BE SUBSIDIARY TO ITEM 110.



DETAIL "B"
N.T.S.

(***) ADDITIONAL 50' OF ROW FROM STA 322+00 TO STA 362+00 FOR DRAIN DITCH



DETAIL "C"
SOFT SPOT REPAIR
(SEE NOTES 5 & 6)

(**) USE DETAIL "C" AS DIRECTED BY THE ENGINEER TO ADDRESS HIGH WATER TABLE CONCERN INDENTIFIED BETWEEN STA 77+00 AND STA 116+00.

STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
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PROFESSIONAL ENGINEER

6/27/2022

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PROPOSED TYPICAL SECTIONS

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	14
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\02 Typical Sections\FM 510*TYP* PROP*02.dgn
DRAWING DATE: 6/27/2022

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1057-03-045 **DISTRICT** Pharr **COUNTY** Cameron
HIGHWAY FM 510

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**1057-03-045**			
		PROJECT ID		**A00123458**			
		COUNTY		**Cameron**			
		HIGHWAY		**FM 510**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	402.000		402.000	
	104-6001	REMOVING CONC (PAV)	SY	31,842.000		31,842.000	
	104-6009	REMOVING CONC (RIPRAP)	SY	812.000		812.000	
	105-6095	REMOVING STAB BASE & ASPH PAV (12"-14")	SY	147,213.000		147,213.000	
	110-6001	EXCAVATION (ROADWAY)	CY	8,410.000		8,410.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	8,216.000		8,216.000	
	134-6001	BACKFILL (TY A)	STA	402.000		402.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	169,219.000		169,219.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	169,219.000		169,219.000	
	164-6036	DRILL SEEDING (PERM) (RURAL) (CLAY)	AC	31.100		31.100	
	168-6001	VEGETATIVE WATERING	MG	21.900		21.900	
	204-6003	SPRINKLING (DUST CONTROL)	MG	402.000		402.000	
	216-6001	PROOF ROLLING	HR	15.090		15.090	
	247-6060	FL BS (CMP IN PLC)(TY E GR 4)(FNAL POS)	CY	2,275.000		2,275.000	
	247-6282	FL BS (CMP IN PLC)(TY E GR 4)(12")	SY	185,737.000		185,737.000	
	260-6011	LIME TRT (EXST MATL) (12")	SY	198,674.000		198,674.000	
	260-6043	LIME (HYD, COM OR QK)(SLURRY)	TON	5,893.000		5,893.000	
	275-6001	CEMENT	TON	2,412.000		2,412.000	
	316-6005	ASPH (TIER II)	GAL	55,718.000		55,718.000	
	316-6486	AGGR (TY-D GR-4P)(SAC-B)	CY	1,560.000		1,560.000	
	354-6021	PLANE ASPH CONC PAV(0" TO 2")	SY	370.000		370.000	
	354-6041	PLANE ASPH CONC PAV (1.5")	SY	457.000		457.000	
	401-6001	FLOWABLE BACKFILL	CY	1,749.000		1,749.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY	157.000		157.000	
	432-6046	RIPRAP (MOW STRIP)(5 IN)	CY	135.000		135.000	
	439-6002	CONCRETE OVERLAY (2 IN)	SY	370.000		370.000	
	450-6023	RAIL (TY SSTR)	LF	190.000		190.000	
	451-6024	RETROFIT RAIL (TY SSTR)	LF	134.000		134.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	686.000		686.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	38.000		38.000	
	480-6001	CLEAN EXIST CULVERTS	EA	21.000		21.000	
	496-6004	REMOV STR (SET)	EA	11.000		11.000	
	496-6007	REMOV STR (PIPE)	LF	546.000		546.000	
	496-6099	REMOVE STR (RAIL)	LF	209.000		209.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	20.000		20.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	312.000		312.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1057-03-045 **DISTRICT** Pharr **COUNTY** Cameron
HIGHWAY FM 510

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**1057-03-045**			
		PROJECT ID		**A00123458**			
		COUNTY		**Cameron**			
		HIGHWAY		**FM 510**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	312.000		312.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	430.000		430.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	430.000		430.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	30,195.000		30,195.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	30,195.000		30,195.000	
	512-6005	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	570.000		570.000	
	512-6029	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	1,165.000		1,165.000	
	512-6053	PORT CTB (REMOVE)(F-SHAPE)(TY 1)	LF	570.000		570.000	
	529-6036	CONCRETE CURB (SPECIAL)	LF	214.000		214.000	
	530-6005	DRIVEWAYS (ACP)	SY	12,472.000		12,472.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	39,150.000		39,150.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	1,175.000		1,175.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	8.000		8.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	1,050.000		1,050.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	2.000		2.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	8.000		8.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	11.000		11.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	10.000		10.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	6.000		6.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA	2.000		2.000	
	545-6026	CRASH CUSHION ATTEN (INSTALL) (QUAD)(N)	EA	1.000		1.000	
	560-6003	MAILBOX INSTALL-M (TWG-POST) TY 1	EA	1.000		1.000	
	560-6007	MAILBOX INSTALL-S (WC-POST) TY 3	EA	134.000		134.000	
	560-6008	MAILBOX INSTALL-D (WC-POST) TY 3	EA	236.320		236.320	
	636-6001	ALUMINUM SIGNS (TY A)	SF	136.000		136.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	12.000		12.000	
	644-6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	78.000		78.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	18.000		18.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	6.000		6.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	88.000		88.000	
	658-6060	REMOVE DELIN & OBJECT MARKER ASSMS	EA	15.000		15.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	81,000.000		81,000.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	81,000.000		81,000.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	4,050.000		4,050.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	4,050.000		4,050.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	602.000		602.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	567.000		567.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1057-03-045 **DISTRICT** Pharr **COUNTY** Cameron
HIGHWAY FM 510

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**1057-03-045**			
		PROJECT ID		**A00123458**			
		COUNTY		**Cameron**			
		HIGHWAY		**FM 510**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	666-6141	REFL PAV MRK TY I (Y)12"(SLD)(100MIL)	LF	1,364.000		1,364.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	79,405.000		79,405.000	
	666-6312	RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)	LF	7,880.000		7,880.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	24,466.000		24,466.000	
	666-6342	REF PROF PAV MRK TY I(W)4"(SLD)(100MIL)	LF	158,810.000		158,810.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	5.000		5.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA	5.000		5.000	
	668-6089	PREFAB PAV MRK TY C (W) (RR XING)	EA	2.000		2.000	
	672-6007	REFL PAV MRKR TY I-C	EA	951.000		951.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	960.000		960.000	
	752-6003	TREE TRIMMING / BRUSH REMOVAL	MI	1.000		1.000	
	752-6006	TREE REMOVAL (12" - 18" DIA)	EA	12.000		12.000	
	760-6001	DITCH CLEANING AND RESHAPING (FOOT)	LF	80,672.000		80,672.000	
	3077-6065	SP MIXESSP-DSAC-A PG76-22	TON	31,199.000		31,199.000	
	3080-6007	STONE-MTRX-ASPH SMA-D SAC-A PG76-22	TON	39.070		39.070	
	5001-6002	GEOGRID BASE REINFORCEMENT (TY II)	SY	198,674.000		198,674.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	200.000		200.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

SEAL COAT MATERIAL SELECTION TABLE

Contractor:
1) Provide materials according to the alternates selected for the roadway tier designations specified at various roadway locations shown on the plans;
2) Alternately supply selected binders from a higher tier, but only if the type of material is allowed for the designated tier; payment will only be made for the tier designated for the pavement;
3) Supply the aggregate type, grade and surface aggregate class that is shown to be allowed with the binder used; and
4) Adhere to the application season selected.

☐ Tier 1: Heavy Use (>5,000 ADT) Use only the selected materials.

Type	Asphalt Rubber (A-R) ☐ A-R Only	Asphalt Cement (A-C) ☐ A-C Only
Asphalt	☐ A-R Ty II ☐ SP 300-016&039 ☐ A-R Ty III	☐ AC-20-5TR ☐ AC-20XP ☐ AC-15P
Aggregate Type	☐ Ty PA ☐ Ty PB ☐ Ty PC ☐ Ty PD ☐ Ty PE ☐ Ty PL	☐ Ty PA ☐ Ty PB ☐ Ty PC ☐ Ty PD ☐ Ty PE ☐ Ty PL
Aggregate Grade	☐ 3S ☐ 3non-1w ☐ 3 1w ☐ 4S ☐ 4P ☐ SP 302-013	☐ 3S ☐ 4S ☐ 5 ☐ 3non-1w ☐ 4P ☐ 5S ☐ 3 1w ☐ SP 302-1
Aggregate SAC	☐ A ☐ B	☐ A ☐ B

☒ Tier 2: Moderate Use (500-5,000 ADT)

Use this materials or any selected Tier 1 materials combinations of the allowed types

Type	Asphalt Cement (A-C) ☒ A-C Only	Asphalt Emulsion ☐ Emulsion Only
Asphalt	☒ AC-10-2TR ☒ AC-5 W/2% SBR ☒ AC-10 ☒ AC-10 W/2% SBR	☐ CHFRS-2P ☐ CRS-2P ☐ HFRS-2P ☐ SP 300-016&039
Aggregate Type	☐ Ty PA ☐ Ty PB ☐ Ty PC ☐ Ty PD ☐ Ty PE ☐ Ty PL ☒ Allow uncoated aggregate	☐ Ty A ☐ Ty B ☐ Ty C ☐ Ty D ☐ Ty E ☐ Ty L
Aggregate Grade	☐ 3S ☐ 4S ☐ 5 ☐ 3non-1w ☒ 4P ☐ 5S ☐ 3 1w ☒ SP 302-001	☐ 3S ☐ 4S ☐ 5S ☐ 3non-1w ☐ 4P ☐ 5 ☐ 3 1w ☐ SP 302-013
Aggregate SAC	☐ A ☒ B	☐ A ☐ B

☐ Tier 3: Moderate Use (<500 ADT) Use this materials or any selected Tier 1 or Tier 2 materials combinations of the allowed types

Type	Asphalt Cement (A-C) ☐ A-C Only	Asphalt Emulsion ☐ Emulsion Only
Asphalt	☐ AC-10-2TR ☐ AC-5 W/2% SBR ☐ AC-20XP ☐ SP 300-016&039 ☐ AC-10 W/2% SBR ☐ AC-15P	☐ CRS-2 ☐ CRS-2H ☐ HFRS-2 ☐ SP 300-016&039
Aggregate Type	☐ Ty PA ☐ Ty PB ☐ Ty PC ☐ Ty PD ☐ Ty PE ☐ Ty PL	☐ Ty A ☐ Ty B ☐ Ty C ☐ Ty D ☐ Ty E ☐ Ty L
Aggregate Grade	☐ 3S ☐ 4S ☐ 5 ☐ 3non-1w ☐ 4P ☐ 5S ☐ 3 1w ☐ SP 302-013	☐ 3S ☐ 4S ☐ ☐ 3non-1w ☐ 4P ☐ 5 ☐ 3 1w ☐ SP 302-013
Aggregate SAC	☐ A ☐ B	☐ A ☐ B

Seasonal Alternates: Use these materials for work in cooler conditions as directed.

☐ CRS-2 ☐ HFRS-2 ☐ CRS-1P ☐ RS-1P ☐ RC-250 ☐ MC-800 ☐ AC-12-5-TR ☐ SP 300-016&032

Seal Coat Seasons: Refer to Item 316 for temperature and weather restrictions.

☒ Season 4: CRP, LRD, PHR	Apr 1 to Sept 30

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SEALCOAT MATERIAL SELECTION TABLE "UNDERSEAL"

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	15
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425*ETC\CADD\Sheets\FM510\01 General\SEAL*COAT.dgn
DRAWING DATE: 6/27/2022

2014 SPECS GENERAL NOTES:

****

General Requirements and Covenants to ITEMS 1 thru 9:

For all pits or quarries, comply with the "Texas Aggregate Quarry and Pit Safety Act."

Provide on a weekly basis a list of equipment, including idle equipment, utilized on the project that week.

The 1-800 call services for utility locations do not include TxDOT facilities. Contact the Pharr District Signal Section (956-702-6225) for coordination regarding TxDOT underground lines.

ITEM 2: Instructions to Bidders

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

Andres Espinoza, P.E., San Benito Area Engineer; Andres.Espinoza@txdot.gov
Gabriel Villareal, P.E., Assist. Area Engineer; Gabriel.Villarreal@txdot.gov

Contractor questions will be accepted through email, phone, and in person by the above individuals. Questions may also be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

Information found on TxDOT's FTP server will be considered for informational purposes only. (Index of /pub/txdot-info/Pre-Letting Responses/Pharr District/21-Pharr District (Construction) (state.tx.us))

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ITEM 5: Control of the Work

The responsibility for the construction surveying on this contract will be in accordance with Article 5.9.1., "Method A."

Prior to contract letting, bidders may obtain a free computerized transfer of files (from the Engineer's office) that contains the earthwork information. If copies of the actual cross-sections in additional to, or instead of the electronic files are requested, they will be available at the Engineer's office for borrowing by copying companies for the purpose of making copies for the bidder at the bidder's expense.

Work in this contract is required to be done on railroad property. Cooperate with the railroad companies and comply with all their requirements including obtaining any training they require before performing work on railroad property.

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

ITEM 6: Control of Materials

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit a notarized original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

Refer to the Buy America Material Classification Sheet for clarification on material categorization.

The Buy America Material Classification Sheet is located at the below link.

https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

ITEM 7: Legal Relations and Responsibilities

No significant traffic generator events identified.

Roadway or Lane closures during the following key dates and/or special events are prohibited:

- National Holidays
- The day before a National Holiday
- During emergency events such as natural disasters or as directed by the Engineer

404 Permit Requirements:
The Contractor shall note that discharge of permanent or temporary fill material into the waters of the United States (U.S.), including jurisdictional wetlands, as necessary for construction, will require specific approval of the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act.

TxDOT will obtain the appropriate nationwide or individual permit(s) when necessary, as dictated by project specific conditions and the potential to affect USACE jurisdictional areas to address the work detailed in the plans. The Contractor may review the permitted plans at the office of the Area Engineer in charge of construction. TxDOT will hold the Contractor responsible for following all conditions of the approved permit. If the Contractor cannot work within the limits or scope of this permit(s), then it becomes the Contractor's entire responsibility to consult with the USACE on the need for changes or amendments to the conditions of the existing permit(s) as originally obtained by TxDOT. However, the Contractor may request TxDOT to assist in this process by providing complete and specific revised details for TxDOT review and submittal to the USACE. For off project right of way coordination, the Contractor or his agent shall handle all activities directly with the USACE.

It is essential that any impacts to USACE jurisdictional waters of the U.S., including jurisdictional wetlands, be the minimum necessary to complete the proposed work. If the Contractor needs further explanation of the conditions of the permit, including means of compliance, they may contact the Pharr District Environmental Coordinator.

Project Specific Locations (PSL's) Coordination
The Contractor shall not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (USACE) permit area that has not been previously evaluated by the USACE as part of the permitting for this project. Such activities include, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here includes materials delivered to or from the PSL. The permit area includes all waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. The Contractor shall be responsible for any and all consultations with the USACE regarding activities, including project specific locations (PSLs) that have not been previously evaluated by the USACE.

The Contractor shall provide the department with a copy of all consultation(s), or approval(s), from the USACE prior to initiating activities.

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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 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 determination(s) that their activities do not affect a USACE permit area. The Contractor shall maintain copies of their determination(s) for review by the department or any regulatory agency.

The disturbed area for all project locations in the Contract, and the 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 right of way. 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 right of way to the Engineer and to the local government that operates a separate storm sewer system.

In order to expedite the approval process for PSL's or to eliminate or minimize potential impacts to project progress, initiate coordination efforts with the USACE **within 30 days from the date of "authorization to begin work".** If this is not done, the Contractor waives the right to request any contract time considerations if project progress is impacted and PSL'S approval is still pending.

Requests submitted to the Area Engineer will be evaluated on this basis and will require documentation showing substantial early coordination efforts to expedite the approval process as herein stated. The request shall include a detailed chronological summary status with dates of coordination activities with the resource agencies, including those occurring after the initial coordination, to be reviewed and confirmed by the district's environmental section.

ITEM 8: Prosecution and Progress

Where road closures or detours around structures are necessary to accomplish proposed work, the removal of existing structures and/or cutting of existing pavement will not be permitted until all precast members for the proposed structure have been cast, tested, and approved for use.

TxDOT is required to provide 10 working days advanced written notice of all proposed bridge widening, rehabilitation, or demolition work to the Texas Department of State Health Services (TDSHS) to allow them the opportunity to both verify information provided regarding asbestos containing materials and abatement and observe the demolition/renovation work. Considering that this notice will be provided TDSHS at the beginning of the project for all affected bridge work based on start and finish dates included in the Contractor's original submitted work

schedule, any schedule changes proposed by the Contractor shall be submitted to TxDOT at least 15 days prior to the revised or original start date to accommodate the required coordination with TDSHS.

Working days will be computed and charged in accordance with Article 8.3.1.4. Standard Workweek.

Prepare progress schedules using the Critical Path Method (CPM).

The State Contractor shall not perform any work operations within the railroad right of way until the railroad agreements have been executed.

ITEM 100: Preparing Right of Way

Preparation of right of way will be done in accordance with the construction phasing shown on the Traffic Control Plans. Performance of this item will not be allowed outside of the project's current construction phase without prior approval by the Engineer.

Removal of all existing vegetation and trees within the ROW will be subsidiary to prep ROW.

ITEM 132: Embankment

Embankment (DENS CONT) shall be Type C with a max. PI of 40. Material used as embankment material in the top two feet below the bottom of Flexible Base shall meet the following requirements based on preliminary tests and such other tests found necessary by the Engineer.

1. The material shall be such as to produce a well-bonded embankment and shall have a minimum PI of 8 and a maximum PI of 30.

It is the Contractor's responsibility to advise the Engineer of the location of the source sufficiently in advance to avoid delay.

ITEM 134: Backfilling Pavement Edges

Areas to be backfilled shall extend approximately 3-ft out from the edges of the proposed overlay. Final slopes shall be uniform and smooth. The 100-foot station payment includes backfilling of both sides.

Backfill Ty A shall not contain particles more than two inches in size and shall have a minimum PI of 10 and a maximum PI of 20.

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Any additional backfill material necessary due to pre-existing edge conditions or to replace existing fill removed during blading operations will not be paid for directly. It will be considered subsidiary to this bid Item.

ITEM 164: Seeding for Erosion Control

During drill seeding operations, application methods shall be in accordance with the method shown in the Standard Specification Book.

SS-1 Tacking Agent shall be a ratio of 2:1, two (Emulsion) to one (water) and applied at a rate of 0.05 gallons per square yard. The SS-1 Tacking Agent required for Drill Seed operations, will not be paid for directly, but will be subsidiary to Item 164 "Drill Seeding." Watering shall not be used with the Drill Seed Method. A biodegradable tacking agent may be used in lieu of the SS-1 tacking agent in accordance with the manufacturer's recommendations when approved by the Engineer.

Cool Season or Warm Season Grasses shall be included as part of Item 164 (See Table 3 and/or Table 4 in the Standard Specification Book or dates and seed type).

Seed mixture shall be as specified under Item 164.

ITEM 166: Fertilizer

Fertilizer rate is based on a rate of 100 Lbs. of Nitrogen per acre. The Nitrogen-Phosphorous Potassium (NPK) ratio shall include a minimum of 5% Phosphorous and 5% Potassium.

Fertilizer shall be homogenized.

ITEM 247: Flexible Base

Flexible Base Type E will be composed of caliche (argillaceous Limestone, calcareous or calcareous clay particles) and may contain stone, conglomerate, gravel, sand, or granular materials when these materials are in situ with the caliche.

Flexible Base (TY E GR 4) caliche shall conform to the following requirements:

Retained on Sq. Sieve:	Percent Retained
2”	0
½”	20-60
No. 4	40-75
No. 40	70-90
Max. PI	15
Max. Wet Ball PI	15
Wet Ball Mill Max. Amount	50
Min. Comp. Strength PSI	150 at 15 PSI lateral pressure
Triaxial Test	Tex-117-E

The Wet Ball Test (Tex-116-E) shall be run and the Plasticity Index of the material passing the No.40 sieve shall be determined (Wet Ball PI).

The percent of density as determined by Compaction Ratio (Tex-113-E) for the new Flexible Base shall be a minimum of 98%.

The Contractor's attention is called to the fact that certain existing and/or proposed structures may be within the limits of the Flexible Base. It shall be the Contractor's responsibility to perform construction operations without damage to these structures.

For water added under Item 247, the sulfate content will not exceed 3000-ppm and the chloride content will not exceed 3000-ppm.

ITEM 260: Lime Treatment (Road-Mixed)

The Contractor's attention is called to the fact that certain existing and/or proposed structures are within the limits of the lime-treated Subgrade. Unless otherwise directed by the Engineer, these structures shall be installed before the final rolling of this Subgrade. It shall be the Contractor's responsibility to perform the proper lime treating operation without damage to these structures.

The slurry method of applying lime will be required, except when the lime is to be added to naturally wet materials as directed by the Engineer.

For this project, the Engineer will direct a random number of lime trucks to be check weighed.

The percent of density as determined by Tex-121-E for the new and salvage Flexible Base shall be a minimum of 98% for all courses.

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In order to avoid damaging the Geogrid, add lime to the first lift of new base and/or salvage base at a central mixing site or mixing plant away from the construction area. The Engineer shall approve the site or plant location and method of mixing.

Proof roll all constructed lime treated subgrade and bases courses in accordance with Item 216, “Proof Rolling.” Correct soft spots as directed. Correction of soft spots in the subgrade or base courses will be at the Contractor’s expense.

Contractor is to place an underseal and/or pavement course as indicated on plans within 14 calendar days of initial prime coat application. Otherwise, reapply prime coat as directed by the Engineer. Reapplication of the prime coat will be at the Contractor’s expense.

Allow the mixture to mellow for a minimum period of 48 hours for all types of lime utilized. Additional time might be required due to sulfate and organic testing requirements, as directed by Engineer.

ITEM 275: Cement Treatment (Road-Mixed)

The percent of density as determined by Tex-120-E for the new and salvage Flexible Base shall be a minimum of 98% for all courses.

Proof roll all constructed cement treated subgrade and bases courses in accordance with Item 216, “Proof Rolling.” Correct soft spots as directed. Correction of soft spots in the subgrade or base courses will be at the Contractor’s expense.

In order to avoid damaging the Geogrid, add cement to the first lift of new base and/or salvage base at a central mixing site or mixing plant away from the construction area. The Engineer shall approve the site or plant location and method of mixing.

Contractor is to place an underseal and/or pavement course as indicated on plans within 14 calendar days of initial prime coat application. Otherwise, reapply prime coat as directed by the Engineer. Reapplication of the prime coat will be at the Contractor’s expense.

ITEM 3096: Asphalts, Oils, and Emulsions

Temporary ramps/detours and driveways may use Performance Grade Binder 64-22.

ITEM 301: Asphalt Antistripping Agents

Hydrated Lime shall be added as an Antistripping additive between the rates of 1% minimum and 2.0% maximum by weight for Items 292, 3076, 3077, and 3080. If the Hamburg Wheel Test cannot be met within these limits, Liquid Antistripping agents as approved by the Engineer may be used in conjunction with lime for Items 3076, 3077, and 3080.

ITEM 316: Seal Coat

In addition to cleaning by brooming of paved surfaces to be sealed as required by this Item, blading may also be necessary to clean dirt and grass from edges of the pavement and/or turnout areas. The cost of this blading will not be paid for directly but will be considered subsidiary to the various bid Items of the project.

When applying surface treatment at railroad crossings, a strip of paper shall be placed over the rail and flange areas across the pavement.

The type and grade of asphalt as shown on the plans and/or as directed by the Engineer, shall be used on these projects. Asphalt cement will be used during the warm season. An emulsified asphalt will be used during the cooler season if permitted in writing by the Engineer. The emulsified asphalt, if used, shall be HFRS 2P. Estimated quantities shown for the bid Item is based on an average of the estimated rates of application for asphaltic cement and emulsified asphalt. These rates should be used for estimating and comparison purposes only.

The one or two-course surface treatment shall be in place for a sufficient period of time in the opinion of the Engineer, for the surface treatment to properly dry and cure before placing the Asphaltic Concrete Pavement.

Traffic will not be permitted on the surface treatment unless authorized by the Engineer.

When emulsified asphalt is used, do not apply subsequent courses over the surface treatment any earlier than the day after the surface treatment was applied, unless otherwise authorized or directed by the Engineer.

Contractor is to place ACP layer(s) as indicated on plans within 14-calendar days of seal coat placement unless otherwise directed by the Engineer.

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ITEM 3077: Superpave Mixtures

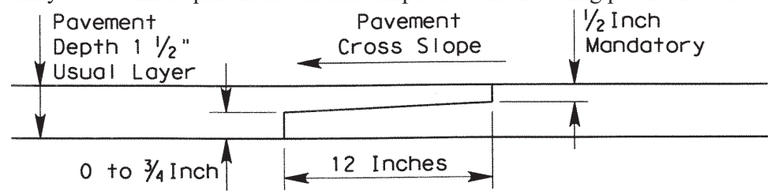
The Contractor shall exercise diligence in the application of "Bonding Course" by the use of flagging and rolling procedures to keep from spraying or splattering the traveling public with asphaltic material.

Blading (not to exceed more than 3-ft from the pavement edge) may also be necessary to clean dirt and grass from pavement edges and turnout areas as work under this bid Item. The cost of this blading will not be paid for directly but shall be considered subsidiary to this bid Item.

Level-up will be placed before the surface course. An asphaltic concrete spreading and finishing machine and/or motor graders; when approved by the Engineer may be used to place the ACP level-up.

Aggregates used on shoulders and ramps are required to meet SAC requirements.

All unconfined longitudinal joints shall be constructed with a joint maker providing a maximum ½-inch vertical edge and a minimum 6:1 edge taper or as approved by the Engineer. The Engineer may waive this requirement when no impacts to the traveling public are foreseen.



NOTCHED WEDGE JOINT

The engineer may allow for variances to the dimensions shown.

Public and private driveways need to have a smooth vertical transition between the edge of pavement and the existing driveways. The Contractor is to add a vertical taper if needed which will be subsidiary to Item 3077.

The use of RAP and RAS (recycled asphalt shingles) will not be allowed as part of the mix design for the final riding surface.

Use a release agent from the Department's MPL to clean and to coat the inside of truck beds for hauling equipment. Hauling equipment shall be cleaned prior to hauling material to job site. Submit a copy of the bill of lading to the Engineer as part of the QCP. Ensure the pavement is free from any spillage of hydraulic oil or diesel from construction equipment. The Department

may reject trucks that contain any foreign material and suspend production if the pavement is contaminated by any pollutants mentioned above.

The percentage of RAS used in the total mix shall not exceed 3% when allowed.

ITEM 3080: Stone-Matrix Asphalt

The Contractor shall exercise diligence in the application of "Bonding Course" by the use of flagging and rolling procedures to keep from spraying or splattering the traveling public with asphaltic material.

Blading (not to exceed more than 3-ft from the pavement edge) may also be necessary to clean dirt and grass from pavement edges and turnout areas as work under this bid Item. The cost of this blading will not be paid for directly but shall be considered subsidiary to this bid Item.

Level-up will be placed before the surface course. An asphaltic concrete spreading and finishing machine and/or motor graders; when approved by the Engineer may be used to place the ACP level-up.
Public and private driveways need to have a smooth vertical transition between the edge of pavement and the existing driveways. The Contractor is to add a vertical taper if needed which will be subsidiary to Item 3080.

The use of RAP and RAS (recycled asphalt shingles) will not be allowed as part of the mix design for the final riding surface.

Use a release agent from the Department's MPL to clean and to coat the inside of truck beds for hauling equipment. Hauling equipment shall be cleaned prior to hauling material to job site. Submit a copy of the bill of lading to the Engineer as part of the QCP. Ensure the pavement is free from any spillage of hydraulic oil or diesel from construction equipment. The Department may reject trucks that contain any foreign material and suspend production if the pavement is contaminated by any pollutants mentioned above.

ITEM 400: Excavation and Backfill for Structures

If the Contractor elects to cut pavement (existing/detour) for structural work beyond that required by the construction phasing shown in the plans and approved by the Engineer, it shall be restored at his expense and backfilled to its original condition or better in accordance with Item 400.

Unless shown otherwise in the plans, use a 1-ft depth for Item 400 Structural Excavation (Special) for gravel bedding needed below drainage structures with unstable material.

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Structural Excavation Special (Gravel):

Use durable natural stone when tested in accordance with Tex-411-A, has weight loss of no more than 18% after 5 cycles of magnesium sulfate solution. Provide gravel conforming to an aggregate Grade No. 1 as shown on Table 4 of Article 421.2.

ITEM 420: Concrete Substructures

Pay bent concrete as plan quantity.

ITEM 421: Hydraulic Cement Concrete

Provide Sulfate Resistant Concrete for all concrete piling and drilled shafts.

Provide equipment at the batch plant for determining the free moisture and/or absorption of aggregates in accordance with applicable TXDOT Test.
Provide the following items for concrete batch inspection in accordance with specifications outlined in DMS-10101, "Computer Equipment":

(1) One Desktop Microcomputer or One Laptop Microcomputer
(2) One Integrated Printer/Scanner/Copier/Fax Unit
(3) Contractor-Furnished Software
(4) Hardware

Submit to the Engineer for approval the project locations for all Portland Cement concrete washout areas prior to starting any concrete work.

Fiber Reinforced Concrete is not permitted.

ITEM 432: Riprap

Provide Class "A" concrete minimum for riprap aprons placed around all box culvert and pipe safety end treatments. Provide ¼-inch thick dummy joints at least every 15-ft for riprap aprons placed around box and pipe culverts.

Do not use fiber reinforced concrete RIPRAP on side slopes equal to or steeper than 6:1 unless approved by the Engineer.

ITEM 464: Reinforced Concrete Pipe

Use tongue and groove pipe where the RCP extends into the lime treated subgrade. The 4-foot depth restriction for heavy equipment passage over pipe structures is voided. The Contractor will be responsible for any construction damage to these facilities.
Do not use mortar joints.

All reinforced concrete pipe shall include rubber gaskets unless shown otherwise on the plans or directed by the Engineer.

ITEM 467: Safety End Treatment

All Type II SET's shall have riprap, Class "A" minimum, aprons as shown on the plans. The Contractor may submit an alternate precast SET design for approval by the Engineer.

ITEM 502: Barricades, Signs, and Traffic Handling

Shadow vehicles equipped with Truck-Mounted Attenuators are required for traffic handling. See notes for Item 6185: Truck Mounted Attenuator/Trailer Attenuator, for additional references pertaining to the TMAs.

A pilot car and radio equipped flaggers shall be required for all undivided roadway locations as directed by the Engineer. The pilot car with necessary flaggers and/or radio equipped flaggers and all signs, equipment, labor, and incidentals required for this method of traffic control will not be paid for directly but shall be considered subsidiary to Item 502.

Replace/relocate all regulatory signs removed due to construction operations with the same sign on fixed support(s) immediately upon its removal. First obtain Project Engineer approval before removing any regulatory roadway sign. Required flaggers are to be available to direct traffic during sign intermediate down time.

Relocate any Directional Sign Assemblies removed during construction operations immediately upon their removal.

These signs shall be relocated to a location in accordance with the Latest Version of the "Texas Manual on Uniform Traffic Control Devices". In no case will a sign be removed without a replacement sign and support(s) being readily available and a location established. Removal and relocation of these signs required for traffic control will not be paid for directly but shall be considered subsidiary to Item 502.

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From the beginning to the end of the project, all traffic control devices need to be in acceptable condition as per the Texas Quality Guidelines for Work Zone Traffic Control Devices.

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 "Safety Contingency" is not intended to be used in lieu of bid Items established by the contract.

Remove and dispose of all litter, debris, objectionable material, excess materials that accumulate at the base of all traffic control devices as directed by the Engineer.

ITEM 506: Temporary Erosion, Sedimentation, and Environmental Controls

Before starting each phase of construction, review with the Engineer the SW3P used for temporary erosion control as outlined on the plans. Before construction, place the temporary erosion and sedimentation control features as shown on the SW3P. Location of Construction Exits are to be approved by the Engineer. After completing earthwork operations, restore and reseed the disturbed areas in accordance with the Department's specifications for permanent or temporary erosion control. 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.

The Contractor Force Account "Erosion Control Maintenance" that has been established for this project is intended to be utilized for work zone Best Management Practice (BMP) maintenance, to improve the effectiveness of the Environmental Controls that may need maintenance attention and/or require replacement while the project is still under the construction stage. These procedures will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent BMP management reviews on the project. The "Erosion Control Maintenance" is not intended to be used in lieu of bid Items established by the contract.

ITEM 512: Portable Traffic Barrier

Haul 570 LF concrete median barriers from the TxDOT office in Pharr, Texas to the project site to be used in conjunction with the suggested traffic control sheets as directed by the Engineer. If needed, modify the ends of the concrete median barriers where the temporary end treatment is attached to the concrete median barrier. Contractor is to provide PCTB reflectors and anchor

materials as needed. Any needed PCTB reflectors and anchor materials will be subsidiary to Item 512.

Maintain the concrete median barrier in first class condition and, when no longer needed for traffic control, return the concrete median barriers to the TxDOT office in Pharr, Texas. Any concrete median barrier damaged beyond reasonable repair shall be replaced at the Contractor's expense.

During the various construction phases, provide drainage slots in every temporary concrete traffic barrier used for traffic control in order to handle temporary drainage. Provide any additional drainage measures needed as directed by the Engineer.

ITEM 529: Concrete Curb, Gutter, and Combined Curb and Gutter

Before final acceptance of the project, remove discoloration caused by tire marks, mud, asphalt, paint, or other similar material by any method satisfactory to the Engineer to achieve a uniform color and texture of the finished surface exposed to view.

Curb attached to the MBGF thrie-beam transition section will be subsidiary to the MBGF transition.

ITEM 530: Intersections, Driveways, and Turnouts

Prime coat shall meet the requirements of Item 310.

Public and private driveways need to have a smooth vertical transition tie-in between the proposed driveway and the existing driveway. The Contractor is to add a vertical taper if needed which will be subsidiary to Item 530.

ITEM 533: Milled Rumble Strips

When rumble strips are specified on the plans, install rumble strips 4” from the edgeline in accordance with Options 3 and 4 as shown on RS(1)-23.

ITEM 540: Metal Beam Guard Fence

The optional terminal anchor post with the terminal connector will be required as shown on the Metal Beam Guard Fence Standard.

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

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ITEM 542: Removing Metal Beam Guard Fence

Dispose all metal beam guard fence materials unless shown otherwise in the plans.

ITEM 544: Guardrail End Treatments

Label “end treatment type” on backside of unit at time of installation.

ITEM 552: Wire Fence

Contractor is to repair any wire fence that is damaged by the Contractor’s construction operations to insure the retention of livestock, if any, in their respective pastures along the project.

ITEM 560: Mailbox Assemblies

Coordinate and verify final mailbox locations with TxDOT and the US Postmaster.

ITEM 585: Ride Quality for Pavement Surfaces

Use Surface Test Type "B" for service roads and ramps.

Quality control results shall be submitted to TxDOT the next working day after each day’s paving.

Pavement areas with public turnout intersections that carry major traffic volumes will not be subjected to inertial profiler testing. These areas shall be evaluated using the 10-ft. straightedge.

Diamond grinding shall be used to remove localized roughness.

Use Surface Test Type B pay adjustment schedule __1__ to evaluate ride quality of the travel lanes in accordance with Item 585, “Ride Quality for Pavement Surfaces.” This includes ramps and service road travel lanes.

ITEMS 636: Signs

Complete sign blanks and panels shall be handled and stored at the job site in such a manner that corners, edges and faces are not damaged. Finished sign blanks shall be stored in either a

weatherproof warehouse or outside and off the ground in a vertical position. All paper, cardboard and chemically treated separators and packaging shall be removed prior to outside storage.

ITEM 644: Small Roadside Sign Assemblies

All signs shall be installed as shown in the plans and in accordance with the current edition of the "Texas Manual on Uniform Traffic Control Devices" and the “Sign Crew Field Book” (SCFB).

All signs shall be erected according to the locations shown on the signing layout sheets except that a sign may be shifted in order to secure a more desirable location. All sign locations will be staked as shown in the plans and as approved. It is the intent of the plans to erect all roadside traffic signs with the sign edge a minimum of 6 feet from the edge of the shoulder, or if none, 12 feet from the edge of the travel lane. In curb and gutter sections, the sign edge shall be a minimum of 2 feet from the face of the curb.

For this project, aluminum type sign blanks as provided for under Item 636 will be required for all proposed signing installed under Item 644. Aluminum sign blanks less than 7.5 square feet shall be 0.08-inch-thick, sign blanks 7.5 to 15 square feet shall be 0.100-inch-thick and sign blanks greater than 15 square feet shall be 0.125 inch thick.

All excess excavation shall be spread uniformly inside the right of way as directed and shall be included in the price of these Items.

Sign types which design details are not shown on the plans shall conform with the latest edition of the Department's "Standard Highway Sign Design for Texas" Manual.

Signs shown to be removed shall include the complete sign installation and separate the sign post at the concrete foundation. The concrete foundation shall be disposed in accordance with this bid Item. Except for concrete foundations, all removed sign panels, sign posts, and hardware shall remain then property of the Department. All removed sign installations shall be completely disassembled. All salvageable sections of sign panels shall be recycled by TxDOT. The removed sign material will be required to be hauled to the maintenance yard closest to the project. No signs shall be removed without prior approval.

Existing signs shown to be removed and relocated within this project shall first be identified in the field before they are removed and relocated to their new installation position as determined in the plans. The complete sign assembly shall be removed and the sign with post shall be separated at the concrete foundation. The concrete foundation shall be disposed off in accordance with this bid Item. No sign shall be removed without prior approval.

All excess excavation shall be spread uniformly inside the right of way as directed and shall be included in the price of this Item.

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ITEM 658: Delineator and Object Marker Assemblies

Delineator assemblies shall be installed 8 feet from the edge of the shoulder unless restricted by some obstruction, in which case, the delineator assembly shall be placed between 2 and 8 feet from the edge of the shoulder.

Bi-directional object markers shall be in accordance with the D&OM standard sheets. The Contractor is directed to the standards when instructed where and how to install the object markers.

ITEMS 662 and 666: Work Zone Pavement Markings and Retroreflectorized Pavement Markings

All permanent pavement markings and work zone pavement markings for this project under these Items shall be 0.100 inches (100 mil) thick thermoplastic.

Any permanent pavement markings or non-removal work zone pavement markings lacking reflectivity in accordance with the requirements of Tex 828-B, or that fail to meet minimum retro reflectivity requirements for longitudinal pavement markings when required, will be addressed per the requirements of the specification. The roadway will be re-striped at no additional compensation.

Pavement surface preparation for markings and markers will not be paid for directly but shall be considered subsidiary to Item 666.

Prior to any striping operations, an on-site coordination meeting between all the parties involved will be required to review striping details and requirements to ensure quality work.

The beads used on this project shall meet the requirements of Departmental Materials Specification DMS-8290, Glass Traffic Beads Texas Type II & III. Use a 50% Type II/ 50% Type III mix utilizing a double drop system with Type III beads dropped first.

ITEM 677: Eliminating Existing Pavement Markings and Markers

Asphalt and aggregate types and grades shall be as approved in writing when a surface treatment is used to eliminate existing pavement markings.

ITEM 5001: Geogrid Base Reinforcement

Provide a construction plan to the Engineer detailing how the base will be lime treated without damaging the Geogrid Base Reinforcement placed on top of the subgrade.

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ITEM 6185: Truck Mounted Attenuator/Trailer Attenuator

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required on the traffic control plan for the project, provide 4 additional shadow vehicle(s) with TMA as per TCP (1-1) -18 as detailed on General Note 5 of this standard sheet;
TCP (1-2) -18 as detailed on General Note 6 of this standard sheet;
TCP (1-3) -18 as detailed on General Note 7 of this standard sheet.

Therefore, 6 total shadow vehicles with TMA will be required on this project for the type of work as shown on the plans. The Contractor will be responsible for determining if one or more of his construction operations will be ongoing at the same time and thus determine the total number of TMAs needed for the project.

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Station	Material Name	End Areas (sq. ft.)	Unadjusted Volumes (cu. yd.)	Adjusted Volumes (cu. yd.)	Mult Factor	Mass Ordinate
1+00.00	DIRT					
	Excavation	19.92	4	4	1.00	
	Fill	3.67	1	1	1.00	3
2+00.00	DIRT					
	Excavation	17.16	69	69	1.00	
	Fill	13.74	32	32	1.00	40
3+00.00	DIRT					
	Excavation	12.95	56	56	1.00	
	Fill	13.19	50	50	1.00	46
4+00.00	DIRT					
	Excavation	23.54	68	68	1.00	
	Fill	12.71	48	48	1.00	66
5+00.00	DIRT					
	Excavation	27.81	95	95	1.00	
	Fill	15.63	52	52	1.00	109
6+00.00	DIRT					
	Excavation	16.29	82	82	1.00	
	Fill	7.80	43	43	1.00	148
7+00.00	DIRT					
	Excavation	13.45	55	55	1.00	
	Fill	9.96	33	33	1.00	170
8+00.00	DIRT					
	Excavation	13.69	50	50	1.00	
	Fill	9.18	35	35	1.00	185
9+00.00	DIRT					
	Excavation	7.23	39	39	1.00	
	Fill	6.85	30	30	1.00	194
10+00.00	DIRT					
	Excavation	7.82	28	28	1.00	
	Fill	2.56	17	17	1.00	205
11+00.00	DIRT					
	Excavation	11.19	35	35	1.00	
	Fill	0.11	5	5	1.00	235
12+00.00	DIRT					
	Excavation	14.38	47	47	1.00	
	Fill	0.66	1	1	1.00	281
13+00.00	DIRT					
	Excavation	11.37	48	48	1.00	
	Fill	1.54	4	4	1.00	325
14+00.00	DIRT					
	Excavation	7.56	35	35	1.00	
	Fill	3.70	10	10	1.00	350
15+00.00	DIRT					
	Excavation	9.14	31	31	1.00	
	Fill	3.30	13	13	1.00	368
16+00.00	DIRT					
	Excavation	10.39	36	36	1.00	
	Fill	0.76	8	8	1.00	396
17+00.00	DIRT					
	Excavation	11.71	41	41	1.00	
	Fill	1.33	4	4	1.00	433
18+00.00	DIRT					
	Excavation	10.13	40	40	1.00	
	Fill	1.73	6	6	1.00	467
19+00.00	DIRT					
	Excavation	8.82	35	35	1.00	
	Fill	2.18	7	7	1.00	495
20+00.00	DIRT					
	Excavation	10.42	36	36	1.00	
	Fill	5.16	14	14	1.00	517
21+00.00	DIRT					
	Excavation	12.96	43	43	1.00	
	Fill	9.37	27	27	1.00	533
22+00.00	DIRT					
	Excavation	12.37	47	47	1.00	
	Fill	3.35	24	24	1.00	556
23+00.00	DIRT					
	Excavation	13.92	49	49	1.00	
	Fill	6.02	17	17	1.00	588
24+00.00	DIRT					
	Excavation	16.34	56	56	1.00	
	Fill	15.16	39	39	1.00	605
25+00.00	DIRT					
	Excavation	13.76	56	56	1.00	
	Fill	22.43	70	70	1.00	591
26+00.00	DIRT					
	Excavation	15.04	53	53	1.00	
	Fill	49.35	133	133	1.00	511
SKIP STATION RANGE = 26+45.25 to 27+25.25						
28+00.00	DIRT					
	Excavation	13.50	63	63	1.00	
	Fill	5.64	122	122	1.00	452
29+00.00	DIRT					
	Excavation	6.41	37	37	1.00	
	Fill	23.42	54	54	1.00	435
30+00.00	DIRT					
	Excavation	7.70	26	26	1.00	
	Fill	10.29	62	62	1.00	399
31+00.00	DIRT					
	Excavation	19.26	50	50	1.00	
	Fill	3.42	25	25	1.00	424
32+00.00	DIRT					
	Excavation	9.77	54	54	1.00	
	Fill	2.22	10	10	1.00	468
33+00.00	DIRT					
	Excavation	12.97	42	42	1.00	
	Fill	1.23	6	6	1.00	504
34+00.00	DIRT					
	Excavation	12.67	47	47	1.00	
	Fill	4.53	11	11	1.00	540
35+00.00	DIRT					
	Excavation	13.21	48	48	1.00	
	Fill	0.12	9	9	1.00	579
36+00.00	DIRT					
	Excavation	12.34	47	47	1.00	
	Fill	5.51	10	10	1.00	616
37+00.00	DIRT					
	Excavation	9.86	41	41	1.00	
	Fill	3.60	17	17	1.00	640
38+00.00	DIRT					
	Excavation	13.93	44	44	1.00	
	Fill	2.72	12	12	1.00	672
39+00.00	DIRT					
	Excavation	16.85	57	57	1.00	
	Fill	2.47	10	10	1.00	719
40+00.00	DIRT					
	Excavation	12.10	54	54	1.00	
	Fill	2.38	9	9	1.00	764
41+00.00	DIRT					
	Excavation	8.28	38	38	1.00	
	Fill	4.32	12	12	1.00	790
42+00.00	DIRT					
	Excavation	11.41	36	36	1.00	
	Fill	4.43	16	16	1.00	810
43+00.00	DIRT					
	Excavation	8.43	37	37	1.00	
	Fill	1.76	11	11	1.00	836
44+00.00	DIRT					
	Excavation	9.94	34	34	1.00	
	Fill	1.50	6	6	1.00	864
45+00.00	DIRT					
	Excavation	11.75	40	40	1.00	
	Fill	0.98	5	5	1.00	899
46+00.00	DIRT					
	Excavation	9.50	39	39	1.00	
	Fill	1.80	5	5	1.00	933
47+00.00	DIRT					
	Excavation	10.11	36	36	1.00	
	Fill	2.77	8	8	1.00	961
48+00.00	DIRT					
	Excavation	10.69	39	39	1.00	
	Fill	2.94	11	11	1.00	989
49+00.00	DIRT					
	Excavation	12.11	42	42	1.00	
	Fill	3.09	11	11	1.00	1020
50+00.00	DIRT					
	Excavation	12.05	45	45	1.00	
	Fill	4.96	15	15	1.00	1050
51+00.00	DIRT					
	Excavation	11.97	44	44	1.00	
	Fill	1.89	13	13	1.00	1081
52+00.00	DIRT					
	Excavation	8.02	37	37	1.00	
	Fill	2.39	8	8	1.00	1110
53+00.00	DIRT					
	Excavation	8.94	31	31	1.00	
	Fill	11.65	26	26	1.00	1115
54+00.00	DIRT					
	Excavation	9.80	35	35	1.00	
	Fill	4.73	30	30	1.00	1120
55+00.00	DIRT					
	Excavation	13.14	42	42	1.00	
	Fill	0.05	9	9	1.00	1153
56+00.00	DIRT					
	Excavation	8.60	40	40	1.00	
	Fill	3.28	6	6	1.00	1187
57+00.00	DIRT					
	Excavation	10.16	35	35	1.00	
	Fill	3.84	13	13	1.00	1209
58+00.00	DIRT					
	Excavation	11.25	40	40	1.00	
	Fill	5.67	18	18	1.00	1231
59+00.00	DIRT					
	Excavation	8.97	37	37	1.00	
	Fill	2.16	15	15	1.00	1253
60+00.00	DIRT					
	Excavation	9.23	34	34	1.00	
	Fill	3.08	10	10	1.00	1277
61+00.00	DIRT					
	Excavation	14.36	44	44	1.00	
	Fill	2.24	10	10	1.00	1311
62+00.00	DIRT					
	Excavation	8.64	43	43	1.00	
	Fill	2.52	9	9	1.00	1345
63+00.00	DIRT					
	Excavation	10.10	35	35	1.00	
	Fill	3.30	11	11	1.00	1369
64+00.00	DIRT					
	Excavation	11.12	39	39	1.00	
	Fill	3.71	13	13	1.00	1395
65+00.00	DIRT					
	Excavation	8.32	36	36	1.00	
	Fill	2.26	11	11	1.00	1420
66+00.00	DIRT					
	Excavation	7.42	29	29	1.00	
	Fill	4.07	12	12	1.00	1437
67+00.00	DIRT					
	Excavation	8.19	29	29	1.00	
	Fill	4.34	16	16	1.00	1450
68+00.00	DIRT					
	Excavation	12.66	39	39	1.00	
	Fill	1.82	11	11	1.00	1478
69+00.00	DIRT					
	Excavation	9.38	41	41	1.00	
	Fill	0.39	4	4	1.00	1515
70+00.00	DIRT					
	Excavation	11.16	38	38	1.00	
	Fill	0.48	2	2	1.00	1551
71+00.00	DIRT					
	Excavation	8.55	37	37	1.00	
	Fill	2.02	5	5	1.00	1583
72+00.00	DIRT					
	Excavation	9.82	34	34	1.00	
	Fill	3.35	10	10	1.00	1607
73+00.00	DIRT					
	Excavation	8.22	33	33	1.00	
	Fill	3.84	13	13	1.00	1627
74+00.00	DIRT					
	Excavation	9.78	33	33	1.00	
	Fill	3.59	14	14	1.00	1646

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DRAWING DATE: 6/27/2022

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
SUMMARY OF EARTHWORK QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	17
CONTROL	SECTION	JOB	
1057	03	045	

Station	Material Name	End Areas (sq. ft.)	Unadjusted Volumes (cu. yd.)	Adjusted Volumes (cu. yd.)	Mult Factor	Mass Ordinate
75+00.00	DIRT					
	Excavation	10.32	37	37	1.00	
	Fill	1.51	9	9	1.00	1674
76+00.00	DIRT					
	Excavation	9.15	36	36	1.00	
	Fill	4.61	11	11	1.00	1699
77+00.00	DIRT					
	Excavation	10.90	37	37	1.00	
	Fill	3.72	15	15	1.00	1721
78+00.00	DIRT					
	Excavation	12.38	43	43	1.00	
	Fill	1.01	9	9	1.00	1755
79+00.00	DIRT					
	Excavation	11.44	44	44	1.00	
	Fill	2.94	7	7	1.00	1792
80+00.00	DIRT					
	Excavation	11.12	42	42	1.00	
	Fill	0.87	7	7	1.00	1827
81+00.00	DIRT					
	Excavation	10.91	41	41	1.00	
	Fill	1.24	4	4	1.00	1864
82+00.00	DIRT					
	Excavation	10.08	39	39	1.00	
	Fill	3.68	9	9	1.00	1894
83+00.00	DIRT					
	Excavation	8.35	34	34	1.00	
	Fill	6.27	18	18	1.00	1910
84+00.00	DIRT					
	Excavation	10.30	35	35	1.00	
	Fill	13.46	37	37	1.00	1908
85+00.00	DIRT					
	Excavation	10.11	38	38	1.00	
	Fill	6.58	37	37	1.00	1909
86+00.00	DIRT					
	Excavation	11.58	40	40	1.00	
	Fill	5.65	23	23	1.00	1926
87+00.00	DIRT					
	Excavation	13.13	46	46	1.00	
	Fill	5.39	20	20	1.00	1952
88+00.00	DIRT					
	Excavation	10.28	43	43	1.00	
	Fill	9.74	28	28	1.00	1967
89+00.00	DIRT					
	Excavation	7.35	33	33	1.00	
	Fill	10.56	38	38	1.00	1962
90+00.00	DIRT					
	Excavation	6.52	26	26	1.00	
	Fill	13.28	44	44	1.00	1944
91+00.00	DIRT					
	Excavation	7.38	26	26	1.00	
	Fill	12.83	48	48	1.00	1922
92+00.00	DIRT					
	Excavation	9.82	32	32	1.00	
	Fill	11.30	45	45	1.00	1909
93+00.00	DIRT					
	Excavation	8.08	33	33	1.00	
	Fill	13.78	46	46	1.00	1896
94+00.00	DIRT					
	Excavation	6.14	26	26	1.00	
	Fill	14.37	52	52	1.00	1870
95+00.00	DIRT					
	Excavation	6.31	23	23	1.00	
	Fill	10.34	46	46	1.00	1847
96+00.00	DIRT					
	Excavation	7.56	26	26	1.00	
	Fill	13.76	45	45	1.00	1828
97+00.00	DIRT					
	Excavation	10.43	33	33	1.00	
	Fill	7.19	39	39	1.00	1822
98+00.00	DIRT					
	Excavation	10.99	40	40	1.00	
	Fill	7.41	27	27	1.00	1835
99+00.00	DIRT					
	Excavation	9.02	37	37	1.00	
	Fill	7.82	28	28	1.00	1844
100+00.00	DIRT					
	Excavation	7.90	31	31	1.00	
	Fill	6.22	26	26	1.00	1849
101+00.00	DIRT					
	Excavation	6.69	27	27	1.00	
	Fill	6.14	23	23	1.00	1853
102+00.00	DIRT					
	Excavation	4.92	22	22	1.00	
	Fill	7.87	26	26	1.00	1849
103+00.00	DIRT					
	Excavation	6.33	21	21	1.00	
	Fill	8.50	30	30	1.00	1840
104+00.00	DIRT					
	Excavation	5.84	23	23	1.00	
	Fill	3.01	21	21	1.00	1842
105+00.00	DIRT					
	Excavation	8.80	27	27	1.00	
	Fill	7.15	19	19	1.00	1850
106+00.00	DIRT					
	Excavation	7.54	30	30	1.00	
	Fill	6.25	25	25	1.00	1855
107+00.00	DIRT					
	Excavation	10.65	34	34	1.00	
	Fill	5.05	21	21	1.00	1868
108+00.00	DIRT					
	Excavation	8.35	35	35	1.00	
	Fill	9.36	27	27	1.00	1876
109+00.00	DIRT					
	Excavation	8.39	31	31	1.00	
	Fill	7.33	31	31	1.00	1876
110+00.00	DIRT					
	Excavation	8.70	32	32	1.00	
	Fill	8.16	29	29	1.00	1879
111+00.00	DIRT					
	Excavation	8.43	32	32	1.00	
	Fill	6.44	27	27	1.00	1884
112+00.00	DIRT					
	Excavation	9.23	33	33	1.00	
	Fill	2.27	16	16	1.00	1901
113+00.00	DIRT					
	Excavation	8.45	33	33	1.00	
	Fill	5.22	14	14	1.00	1920
114+00.00	DIRT					
	Excavation	11.03	36	36	1.00	
	Fill	3.43	16	16	1.00	1940
115+00.00	DIRT					
	Excavation	7.67	35	35	1.00	
	Fill	4.45	15	15	1.00	1960
116+00.00	DIRT					
	Excavation	9.50	32	32	1.00	
	Fill	1.46	11	11	1.00	1981
117+00.00	DIRT					
	Excavation	10.62	37	37	1.00	
	Fill	3.58	9	9	1.00	2009
118+00.00	DIRT					
	Excavation	10.65	39	39	1.00	
	Fill	3.67	13	13	1.00	2035
119+00.00	DIRT					
	Excavation	10.93	40	40	1.00	
	Fill	4.13	14	14	1.00	2061
120+00.00	DIRT					
	Excavation	10.73	40	40	1.00	
	Fill	4.82	17	17	1.00	2084
121+00.00	DIRT					
	Excavation	9.89	38	38	1.00	
	Fill	4.01	16	16	1.00	2106
122+00.00	DIRT					
	Excavation	10.25	37	37	1.00	
	Fill	0.63	9	9	1.00	2134
123+00.00	DIRT					
	Excavation	10.01	38	38	1.00	
	Fill	0.04	1	1	1.00	2171
124+00.00	DIRT					
	Excavation	8.82	35	35	1.00	
	Fill	1.99	4	4	1.00	2202
125+00.00	DIRT					
	Excavation	11.21	37	37	1.00	
	Fill	1.19	6	6	1.00	2233
126+00.00	DIRT					
	Excavation	10.43	40	40	1.00	
	Fill	1.03	4	4	1.00	2269
127+00.00	DIRT					
	Excavation	10.32	38	38	1.00	
	Fill	1.87	5	5	1.00	2302
128+00.00	DIRT					
	Excavation	11.42	40	40	1.00	
	Fill	1.37	6	6	1.00	2336
129+00.00	DIRT					
	Excavation	10.38	40	40	1.00	
	Fill	0.93	4	4	1.00	2372
130+00.00	DIRT					
	Excavation	9.49	37	37	1.00	
	Fill	3.51	8	8	1.00	2401
131+00.00	DIRT					
	Excavation	10.71	37	37	1.00	
	Fill	3.71	13	13	1.00	2425
132+00.00	DIRT					
	Excavation	11.96	42	42	1.00	
	Fill	2.40	11	11	1.00	2456
133+00.00	DIRT					
	Excavation	13.59	47	47	1.00	
	Fill	2.46	9	9	1.00	2494
134+00.00	DIRT					
	Excavation	12.23	48	48	1.00	
	Fill	2.35	9	9	1.00	2533
135+00.00	DIRT					
	Excavation	10.81	43	43	1.00	
	Fill	4.50	13	13	1.00	2563
136+00.00	DIRT					
	Excavation	11.48	41	41	1.00	
	Fill	3.26	14	14	1.00	2590
137+00.00	DIRT					
	Excavation	3.51	28	28	1.00	
	Fill	5.47	16	16	1.00	2602
138+00.00	DIRT					
	Excavation	1.09	9	9	1.00	
	Fill	19.73	47	47	1.00	2564
139+00.00	DIRT					
	Excavation	0.00	2	2	1.00	
	Fill	23.31	80	80	1.00	2486
140+00.00	DIRT					
	Excavation	0.67	1	1	1.00	
	Fill	26.57	92	92	1.00	2395
141+00.00	DIRT					
	Excavation	0.86	3	3	1.00	
	Fill	18.31	83	83	1.00	2315
142+00.00	DIRT					
	Excavation	0.89	3	3	1.00	
	Fill	10.63	54	54	1.00	2264
143+00.00	DIRT					
	Excavation	2.34	6	6	1.00	
	Fill	5.99	31	31	1.00	2239
144+00.00	DIRT					
	Excavation	13.53	29	29	1.00	
	Fill	2.88	16	16	1.00	2252
145+00.00	DIRT					
	Excavation	14.10	51	51	1.00	
	Fill	1.02	7	7	1.00	2296
146+00.00	DIRT					
	Excavation	13.89	52	52	1.00	
	Fill	4.33	10	10	1.00	2338
147+00.00	DIRT					
	Excavation	14.86	53	53	1.00	
	Fill	1.29	10	10	1.00	2381

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
SUMMARY OF EARTHWORK QUANTITIES

SHEET 2 OF 6

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	
CONTROL	SECTION	JOB	18
1057	03	045	

Station	Material Name	End Areas (sq. ft.)	Unadjusted Volumes (cu. yd.)	Adjusted Volumes (cu. yd.)	Mult Factor	Mass Ordinate
148+00.00	DIRT					
	Excavation	11.69	49	49	1.00	
	Fill	0.51	3	3	1.00	2427
149+00.00	DIRT					
	Excavation	10.79	42	42	1.00	
	Fill	0.93	3	3	1.00	2466
150+00.00	DIRT					
	Excavation	12.54	43	43	1.00	
	Fill	0.65	3	3	1.00	2506
151+00.00	DIRT					
	Excavation	15.40	52	52	1.00	
	Fill	2.31	5	5	1.00	2553
152+00.00	DIRT					
	Excavation	12.89	52	52	1.00	
	Fill	0.81	6	6	1.00	2599
153+00.00	DIRT					
	Excavation	14.19	50	50	1.00	
	Fill	1.55	4	4	1.00	2645
154+00.00	DIRT					
	Excavation	12.75	50	50	1.00	
	Fill	2.24	7	7	1.00	2688
155+00.00	DIRT					
	Excavation	10.67	43	43	1.00	
	Fill	2.19	8	8	1.00	2723
156+00.00	DIRT					
	Excavation	11.77	42	42	1.00	
	Fill	1.27	6	6	1.00	2759
157+00.00	DIRT					
	Excavation	11.96	44	44	1.00	
	Fill	2.98	8	8	1.00	2795
158+00.00	DIRT					
	Excavation	9.95	41	41	1.00	
	Fill	3.45	12	12	1.00	2824
159+00.00	DIRT					
	Excavation	12.19	41	41	1.00	
	Fill	1.45	9	9	1.00	2856
160+00.00	DIRT					
	Excavation	13.82	48	48	1.00	
	Fill	0.61	4	4	1.00	2900
161+00.00	DIRT					
	Excavation	8.52	41	41	1.00	
	Fill	4.94	10	10	1.00	2931
162+00.00	DIRT					
	Excavation	9.34	33	33	1.00	
	Fill	4.03	17	17	1.00	2947
163+00.00	DIRT					
	Excavation	10.59	37	37	1.00	
	Fill	1.66	11	11	1.00	2973
164+00.00	DIRT					
	Excavation	10.12	38	38	1.00	
	Fill	5.59	13	13	1.00	2998
165+00.00	DIRT					
	Excavation	9.67	37	37	1.00	
	Fill	6.61	23	23	1.00	3012
166+00.00	DIRT					
	Excavation	12.76	42	42	1.00	
	Fill	5.80	23	23	1.00	3031
167+00.00	DIRT					
	Excavation	9.64	41	41	1.00	
	Fill	4.73	20	20	1.00	3052
168+00.00	DIRT					
	Excavation	11.46	39	39	1.00	
	Fill	3.12	15	15	1.00	3076
169+00.00	DIRT					
	Excavation	12.23	44	44	1.00	
	Fill	4.40	14	14	1.00	3106
170+00.00	DIRT					
	Excavation	9.03	39	39	1.00	
	Fill	5.94	19	19	1.00	3126
171+00.00	DIRT					
	Excavation	10.55	36	36	1.00	
	Fill	7.12	24	24	1.00	3138
172+00.00	DIRT					
	Excavation	14.50	46	46	1.00	
	Fill	3.29	19	19	1.00	3165
173+00.00	DIRT					
	Excavation	14.90	54	54	1.00	
	Fill	2.28	10	10	1.00	3209
174+00.00	DIRT					
	Excavation	15.31	56	56	1.00	
	Fill	2.00	8	8	1.00	3257
175+00.00	DIRT					
	Excavation	15.73	57	57	1.00	
	Fill	4.31	12	12	1.00	3302
176+00.00	DIRT					
	Excavation	14.91	57	57	1.00	
	Fill	1.50	11	11	1.00	3348
177+00.00	DIRT					
	Excavation	15.80	57	57	1.00	
	Fill	1.86	6	6	1.00	3399
178+00.00	DIRT					
	Excavation	19.47	65	65	1.00	
	Fill	2.23	8	8	1.00	3456
179+00.00	DIRT					
	Excavation	17.11	68	68	1.00	
	Fill	3.95	11	11	1.00	3513
180+00.00	DIRT					
	Excavation	15.63	61	61	1.00	
	Fill	1.35	10	10	1.00	3564
181+00.00	DIRT					
	Excavation	2.26	33	33	1.00	
	Fill	4.41	11	11	1.00	3586
182+00.00	DIRT					
	Excavation	2.55	9	9	1.00	
	Fill	0.63	9	9	1.00	3586
183+00.00	DIRT					
	Excavation	3.12	11	11	1.00	
	Fill	0.15	1	1	1.00	3596
184+00.00	DIRT					
	Excavation	4.72	15	15	1.00	
	Fill	1.70	3	3	1.00	3608
185+00.00	DIRT					
	Excavation	1.19	11	11	1.00	
	Fill	2.19	7	7	1.00	3612
186+00.00	DIRT					
	Excavation	3.07	8	8	1.00	
	Fill	2.70	9	9	1.00	3611
187+00.00	DIRT					
	Excavation	4.26	14	14	1.00	
	Fill	0.78	6	6	1.00	3619
188+00.00	DIRT					
	Excavation	1.91	11	11	1.00	
	Fill	2.03	5	5	1.00	3625
189+00.00	DIRT					
	Excavation	1.98	7	7	1.00	
	Fill	3.52	10	10	1.00	3622
190+00.00	DIRT					
	Excavation	0.00	4	4	1.00	
	Fill	3.94	14	14	1.00	3612
191+00.00	DIRT					
	Excavation	1.38	3	3	1.00	
	Fill	2.38	12	12	1.00	3603
192+00.00	DIRT					
	Excavation	1.99	6	6	1.00	
	Fill	14.86	32	32	1.00	3577
193+00.00	DIRT					
	Excavation	4.87	13	13	1.00	
	Fill	8.23	43	43	1.00	3547
194+00.00	DIRT					
	Excavation	1.45	12	12	1.00	
	Fill	2.61	20	20	1.00	3539
195+00.00	DIRT					
	Excavation	0.12	3	3	1.00	
	Fill	9.33	22	22	1.00	3520
196+00.00	DIRT					
	Excavation	0.32	1	1	1.00	
	Fill	4.44	26	26	1.00	3495
197+00.00	DIRT					
	Excavation	1.71	4	4	1.00	
	Fill	0.65	9	9	1.00	3490
198+00.00	DIRT					
	Excavation	0.00	3	3	1.00	
	Fill	3.45	8	8	1.00	3485
199+00.00	DIRT					
	Excavation	4.06	8	8	1.00	
	Fill	5.51	17	17	1.00	3476
200+00.00	DIRT					
	Excavation	0.00	8	8	1.00	
	Fill	10.48	30	30	1.00	3454
201+00.00	DIRT					
	Excavation	1.01	2	2	1.00	
	Fill	4.30	27	27	1.00	3429
202+00.00	DIRT					
	Excavation	0.37	3	3	1.00	
	Fill	5.28	18	18	1.00	3414
203+00.00	DIRT					
	Excavation	0.00	1	1	1.00	
	Fill	10.65	30	30	1.00	3385
204+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	13.78	45	45	1.00	3340
205+00.00	DIRT					
	Excavation	0.17	0	0	1.00	
	Fill	4.70	34	34	1.00	3306
206+00.00	DIRT					
	Excavation	0.15	1	1	1.00	
	Fill	4.67	17	17	1.00	3290
207+00.00	DIRT					
	Excavation	2.31	5	5	1.00	
	Fill	4.99	18	18	1.00	3277
208+00.00	DIRT					
	Excavation	2.05	8	8	1.00	
	Fill	5.05	19	19	1.00	3266
209+00.00	DIRT					
	Excavation	2.52	8	8	1.00	
	Fill	2.63	14	14	1.00	3260
210+00.00	DIRT					
	Excavation	4.93	14	14	1.00	
	Fill	2.63	10	10	1.00	3264
211+00.00	DIRT					
	Excavation	8.12	24	24	1.00	
	Fill	4.93	14	14	1.00	3274
212+00.00	DIRT					
	Excavation	0.00	15	15	1.00	
	Fill	5.51	19	19	1.00	3270
213+00.00	DIRT					
	Excavation	5.93	11	11	1.00	
	Fill	5.58	21	21	1.00	3260
214+00.00	DIRT					
	Excavation	3.50	17	17	1.00	
	Fill	7.22	24	24	1.00	3253
215+00.00	DIRT					
	Excavation	4.79	15	15	1.00	
	Fill	10.50	33	33	1.00	3235
216+00.00	DIRT					
	Excavation	2.31	13	13	1.00	
	Fill	7.55	33	33	1.00	3215
217+00.00	DIRT					
	Excavation	5.42	14	14	1.00	
	Fill	8.96	31	31	1.00	3198
218+00.00	DIRT					
	Excavation	2.98	16	16	1.00	
	Fill	0.72	18	18	1.00	3196
219+00.00	DIRT					
	Excavation	3.57	12	12	1.00	
	Fill	1.39	4	4	1.00	3204
220+00.00	DIRT					
	Excavation	3.04	12	12	1.00	
	Fill	7.03	16	16	1.00	3200

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\05 Roadway Details\FM510*EWK*DATA.dgn

DRAWING DATE: 6/27/2022

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
SUMMARY OF EARTHWORK QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	19
CONTROL	SECTION	JOB	
1057	03	045	

Station	Material Name	End Areas (sq. ft.)	Unadjusted Volumes (cu. yd.)	Adjusted Volumes (cu. yd.)	Mult Factor	Mass Ordinate
221+00.00	DIRT					
	Excavation	0.00	6	6	1.00	
	Fill	3.77	20	20	1.00	3186
222+00.00	DIRT					
	Excavation	1.52	3	3	1.00	
	Fill	4.26	15	15	1.00	3174
223+00.00	DIRT					
	Excavation	2.94	8	8	1.00	
	Fill	3.67	15	15	1.00	3167
224+00.00	DIRT					
	Excavation	1.01	7	7	1.00	
	Fill	3.99	14	14	1.00	3160
225+00.00	DIRT					
	Excavation	4.97	11	11	1.00	
	Fill	2.62	12	12	1.00	3159
226+00.00	DIRT					
	Excavation	1.96	13	13	1.00	
	Fill	0.91	7	7	1.00	3165
227+00.00	DIRT					
	Excavation	1.60	7	7	1.00	
	Fill	2.90	7	7	1.00	3165
228+00.00	DIRT					
	Excavation	1.39	6	6	1.00	
	Fill	3.42	12	12	1.00	3159
229+00.00	DIRT					
	Excavation	0.02	3	3	1.00	
	Fill	6.00	17	17	1.00	3145
230+00.00	DIRT					
	Excavation	6.20	12	12	1.00	
	Fill	6.05	22	22	1.00	3135
231+00.00	DIRT					
	Excavation	4.62	20	20	1.00	
	Fill	4.32	19	19	1.00	3136
232+00.00	DIRT					
	Excavation	4.06	16	16	1.00	
	Fill	5.97	19	19	1.00	3133
233+00.00	DIRT					
	Excavation	3.40	14	14	1.00	
	Fill	2.96	17	17	1.00	3130
234+00.00	DIRT					
	Excavation	2.93	12	12	1.00	
	Fill	2.41	10	10	1.00	3132
235+00.00	DIRT					
	Excavation	4.69	14	14	1.00	
	Fill	4.44	13	13	1.00	3133
236+00.00	DIRT					
	Excavation	2.83	14	14	1.00	
	Fill	12.24	31	31	1.00	3116
237+00.00	DIRT					
	Excavation	1.95	9	9	1.00	
	Fill	5.97	34	34	1.00	3091
238+00.00	DIRT					
	Excavation	0.00	4	4	1.00	
	Fill	7.86	26	26	1.00	3069
239+00.00	DIRT					
	Excavation	1.15	2	2	1.00	
	Fill	2.48	19	19	1.00	3052
240+00.00	DIRT					
	Excavation	4.19	10	10	1.00	
	Fill	3.19	11	11	1.00	3051
241+00.00	DIRT					
	Excavation	1.57	11	11	1.00	
	Fill	8.95	22	22	1.00	3040
242+00.00	DIRT					
	Excavation	1.87	6	6	1.00	
	Fill	0.90	18	18	1.00	3028
243+00.00	DIRT					
	Excavation	4.22	11	11	1.00	
	Fill	0.37	2	2	1.00	3037
244+00.00	DIRT					
	Excavation	0.05	8	8	1.00	
	Fill	1.47	3	3	1.00	3042
245+00.00	DIRT					
	Excavation	0.98	2	2	1.00	
	Fill	2.04	7	7	1.00	3037
246+00.00	DIRT					
	Excavation	4.72	11	11	1.00	
	Fill	4.82	13	13	1.00	3035
247+00.00	DIRT					
	Excavation	2.46	13	13	1.00	
	Fill	3.75	16	16	1.00	3032
248+00.00	DIRT					
	Excavation	4.01	12	12	1.00	
	Fill	7.88	22	22	1.00	3022
249+00.00	DIRT					
	Excavation	2.93	13	13	1.00	
	Fill	4.58	23	23	1.00	3012
250+00.00	DIRT					
	Excavation	2.75	11	11	1.00	
	Fill	3.25	15	15	1.00	3008
251+00.00	DIRT					
	Excavation	5.66	16	16	1.00	
	Fill	30.29	62	62	1.00	2962
252+00.00	DIRT					
	Excavation	0.00	10	10	1.00	
	Fill	49.37	148	148	1.00	2824
253+00.00	DIRT					
	Excavation	0.89	2	2	1.00	
	Fill	33.61	154	154	1.00	2672
254+00.00	DIRT					
	Excavation	1.69	5	5	1.00	
	Fill	15.77	91	91	1.00	2586
255+00.00	DIRT					
	Excavation	2.08	7	7	1.00	
	Fill	3.33	35	35	1.00	2558
256+00.00	DIRT					
	Excavation	3.81	11	11	1.00	
	Fill	2.34	11	11	1.00	2558
257+00.00	DIRT					
	Excavation	2.87	12	12	1.00	
	Fill	2.48	9	9	1.00	2561
258+00.00	DIRT					
	Excavation	0.01	5	5	1.00	
	Fill	6.29	16	16	1.00	2550
259+00.00	DIRT					
	Excavation	0.51	1	1	1.00	
	Fill	5.18	21	21	1.00	2530
260+00.00	DIRT					
	Excavation	1.02	3	3	1.00	
	Fill	3.97	17	17	1.00	2516
261+00.00	DIRT					
	Excavation	2.19	6	6	1.00	
	Fill	2.74	12	12	1.00	2510
262+00.00	DIRT					
	Excavation	1.49	7	7	1.00	
	Fill	1.35	8	8	1.00	2509
263+00.00	DIRT					
	Excavation	0.77	4	4	1.00	
	Fill	4.07	10	10	1.00	2503
264+00.00	DIRT					
	Excavation	1.30	4	4	1.00	
	Fill	5.47	18	18	1.00	2489
265+00.00	DIRT					
	Excavation	0.01	2	2	1.00	
	Fill	5.70	21	21	1.00	2470
266+00.00	DIRT					
	Excavation	0.29	1	1	1.00	
	Fill	3.68	17	17	1.00	2454
267+00.00	DIRT					
	Excavation	3.54	7	7	1.00	
	Fill	1.56	10	10	1.00	2451
268+00.00	DIRT					
	Excavation	1.49	9	9	1.00	
	Fill	2.94	8	8	1.00	2452
269+00.00	DIRT					
	Excavation	0.21	3	3	1.00	
	Fill	3.01	11	11	1.00	2444
270+00.00	DIRT					
	Excavation	2.34	5	5	1.00	
	Fill	1.32	8	8	1.00	2441
271+00.00	DIRT					
	Excavation	4.64	13	13	1.00	
	Fill	0.46	3	3	1.00	2451
272+00.00	DIRT					
	Excavation	1.13	11	11	1.00	
	Fill	2.85	6	6	1.00	2456
273+00.00	DIRT					
	Excavation	0.87	4	4	1.00	
	Fill	2.22	9	9	1.00	2451
274+00.00	DIRT					
	Excavation	0.12	2	2	1.00	
	Fill	3.46	11	11	1.00	2442
275+00.00	DIRT					
	Excavation	1.31	3	3	1.00	
	Fill	3.43	13	13	1.00	2432
276+00.00	DIRT					
	Excavation	0.00	2	2	1.00	
	Fill	4.47	15	15	1.00	2419
277+00.00	DIRT					
	Excavation	0.04	0	0	1.00	
	Fill	4.55	17	17	1.00	2402
278+00.00	DIRT					
	Excavation	1.64	3	3	1.00	
	Fill	4.91	18	18	1.00	2387
279+00.00	DIRT					
	Excavation	0.25	4	4	1.00	
	Fill	4.35	17	17	1.00	2374
280+00.00	DIRT					
	Excavation	3.15	6	6	1.00	
	Fill	2.57	13	13	1.00	2367
281+00.00	DIRT					
	Excavation	1.31	8	8	1.00	
	Fill	3.08	10	10	1.00	2365
282+00.00	DIRT					
	Excavation	0.00	2	2	1.00	
	Fill	14.52	33	33	1.00	2334
283+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	5.57	37	37	1.00	2297
284+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	5.60	21	21	1.00	2276
285+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	5.04	20	20	1.00	2256
286+00.00	DIRT					
	Excavation	0.05	0	0	1.00	
	Fill	6.33	21	21	1.00	2235
287+00.00	DIRT					
	Excavation	1.46	3	3	1.00	
	Fill	7.26	25	25	1.00	2213
288+00.00	DIRT					
	Excavation	1.40	5	5	1.00	
	Fill	2.79	19	19	1.00	2199
289+00.00	DIRT					
	Excavation	0.00	3	3	1.00	
	Fill	5.93	16	16	1.00	2186
290+00.00	DIRT					
	Excavation	0.42	1	1	1.00	
	Fill	7.01	24	24	1.00	2163
291+00.00	DIRT					
	Excavation	0.48	2	2	1.00	
	Fill	5.67	23	23	1.00	2142
292+00.00	DIRT					
	Excavation	0.18	1	1	1.00	
	Fill	3.61	17	17	1.00	2126
293+00.00	DIRT					
	Excavation	1.19	3	3	1.00	
	Fill	1.96	10	10	1.00	2119

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
SUMMARY OF EARTHWORK QUANTITIES

SHEET 4 OF 6

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	20
CONTROL	SECTION	JOB	
1057	03	045	

Station	Material Name	End Areas (sq. ft.)	Unadjusted Volumes (cu. yd.)	Adjusted Volumes (cu. yd.)	Mult Factor	Mass Ordinate
294+00.00	DIRT					
	Excavation	1.31	5	5	1.00	
	Fill	1.88	7	7	1.00	2117
295+00.00	DIRT					
	Excavation	0.07	3	3	1.00	
	Fill	2.92	9	9	1.00	2111
296+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	7.87	20	20	1.00	2091
297+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	7.23	28	28	1.00	2063
298+00.00	DIRT					
	Excavation	0.08	0	0	1.00	
	Fill	5.06	23	23	1.00	2040
299+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	3.70	16	16	1.00	2024
300+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	7.60	21	21	1.00	2003
301+00.00	DIRT					
	Excavation	0.03	0	0	1.00	
	Fill	6.50	26	26	1.00	1977
302+00.00	DIRT					
	Excavation	2.08	4	4	1.00	
	Fill	6.30	24	24	1.00	1957
303+00.00	DIRT					
	Excavation	0.44	5	5	1.00	
	Fill	4.97	21	21	1.00	1941
304+00.00	DIRT					
	Excavation	3.64	8	8	1.00	
	Fill	1.72	12	12	1.00	1937
305+00.00	DIRT					
	Excavation	0.88	8	8	1.00	
	Fill	2.55	8	8	1.00	1937
306+00.00	DIRT					
	Excavation	1.52	4	4	1.00	
	Fill	3.10	10	10	1.00	1931
307+00.00	DIRT					
	Excavation	0.15	3	3	1.00	
	Fill	5.32	16	16	1.00	1918
308+00.00	DIRT					
	Excavation	0.08	0	0	1.00	
	Fill	6.45	22	22	1.00	1896
309+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	2.02	16	16	1.00	1880
310+00.00	DIRT					
	Excavation	2.15	4	4	1.00	
	Fill	0.53	5	5	1.00	1879
311+00.00	DIRT					
	Excavation	0.00	4	4	1.00	
	Fill	8.28	16	16	1.00	1867
312+00.00	DIRT					
	Excavation	1.37	3	3	1.00	
	Fill	3.92	23	23	1.00	1847
313+00.00	DIRT					
	Excavation	0.71	4	4	1.00	
	Fill	2.76	12	12	1.00	1839
314+00.00	DIRT					
	Excavation	0.00	1	1	1.00	
	Fill	9.10	22	22	1.00	1818
315+00.00	DIRT					
	Excavation	0.36	1	1	1.00	
	Fill	9.45	34	34	1.00	1785
316+00.00	DIRT					
	Excavation	0.22	1	1	1.00	
	Fill	2.53	22	22	1.00	1764
317+00.00	DIRT					
	Excavation	1.68	4	4	1.00	
	Fill	3.10	10	10	1.00	1758
318+00.00	DIRT					
	Excavation	1.77	6	6	1.00	
	Fill	0.77	7	7	1.00	1757
319+00.00	DIRT					
	Excavation	1.68	6	6	1.00	
	Fill	6.17	13	13	1.00	1750
320+00.00	DIRT					
	Excavation	1.02	5	5	1.00	
	Fill	5.20	21	21	1.00	1734
321+00.00	DIRT					
	Excavation	1.07	4	4	1.00	
	Fill	5.53	20	20	1.00	1718
322+00.00	DIRT					
	Excavation	1.76	5	5	1.00	
	Fill	1.78	14	14	1.00	1709
323+00.00	DIRT					
	Excavation	0.81	5	5	1.00	
	Fill	4.61	12	12	1.00	1702
324+00.00	DIRT					
	Excavation	0.26	2	2	1.00	
	Fill	4.40	17	17	1.00	1687
325+00.00	DIRT					
	Excavation	0.02	1	1	1.00	
	Fill	4.74	17	17	1.00	1671
326+00.00	DIRT					
	Excavation	1.25	2	2	1.00	
	Fill	5.62	19	19	1.00	1654
327+00.00	DIRT					
	Excavation	1.03	4	4	1.00	
	Fill	6.64	23	23	1.00	1635
328+00.00	DIRT					
	Excavation	1.44	5	5	1.00	
	Fill	5.36	22	22	1.00	1618
329+00.00	DIRT					
	Excavation	4.34	11	11	1.00	
	Fill	3.79	17	17	1.00	1612
330+00.00	DIRT					
	Excavation	1.89	12	12	1.00	
	Fill	3.29	13	13	1.00	1611
331+00.00	DIRT					
	Excavation	3.02	9	9	1.00	
	Fill	2.94	12	12	1.00	1608
332+00.00	DIRT					
	Excavation	1.45	8	8	1.00	
	Fill	3.02	11	11	1.00	1605
333+00.00	DIRT					
	Excavation	2.84	8	8	1.00	
	Fill	2.57	10	10	1.00	1603
334+00.00	DIRT					
	Excavation	2.98	11	11	1.00	
	Fill	3.45	11	11	1.00	1603
335+00.00	DIRT					
	Excavation	0.00	6	6	1.00	
	Fill	10.09	25	25	1.00	1584
336+00.00	DIRT					
	Excavation	3.01	6	6	1.00	
	Fill	4.46	27	27	1.00	1563
337+00.00	DIRT					
	Excavation	1.21	8	8	1.00	
	Fill	9.38	26	26	1.00	1545
338+00.00	DIRT					
	Excavation	14.64	29	29	1.00	
	Fill	1.38	20	20	1.00	1554
339+00.00	DIRT					
	Excavation	1.83	31	31	1.00	
	Fill	2.68	8	8	1.00	1577
340+00.00	DIRT					
	Excavation	2.22	8	8	1.00	
	Fill	2.11	9	9	1.00	1576
341+00.00	DIRT					
	Excavation	2.65	9	9	1.00	
	Fill	2.87	9	9	1.00	1576
342+00.00	DIRT					
	Excavation	1.42	8	8	1.00	
	Fill	7.39	19	19	1.00	1565
343+00.00	DIRT					
	Excavation	1.49	5	5	1.00	
	Fill	8.13	29	29	1.00	1541
344+00.00	DIRT					
	Excavation	0.38	3	3	1.00	
	Fill	8.93	32	32	1.00	1512
345+00.00	DIRT					
	Excavation	2.10	5	5	1.00	
	Fill	13.06	41	41	1.00	1476
346+00.00	DIRT					
	Excavation	0.06	4	4	1.00	
	Fill	10.66	44	44	1.00	1436
347+00.00	DIRT					
	Excavation	0.15	0	0	1.00	
	Fill	8.30	35	35	1.00	1401
348+00.00	DIRT					
	Excavation	0.18	1	1	1.00	
	Fill	5.37	25	25	1.00	1377
349+00.00	DIRT					
	Excavation	1.66	3	3	1.00	
	Fill	3.17	16	16	1.00	1364
350+00.00	DIRT					
	Excavation	0.84	5	5	1.00	
	Fill	4.12	14	14	1.00	1355
351+00.00	DIRT					
	Excavation	0.91	3	3	1.00	
	Fill	4.46	16	16	1.00	1342
352+00.00	DIRT					
	Excavation	0.03	2	2	1.00	
	Fill	6.88	21	21	1.00	1323
353+00.00	DIRT					
	Excavation	1.38	3	3	1.00	
	Fill	6.83	25	25	1.00	1301
354+00.00	DIRT					
	Excavation	0.00	3	3	1.00	
	Fill	4.08	20	20	1.00	1284
355+00.00	DIRT					
	Excavation	3.55	7	7	1.00	
	Fill	1.38	10	10	1.00	1281
356+00.00	DIRT					
	Excavation	0.00	7	7	1.00	
	Fill	4.29	11	11	1.00	1277
357+00.00	DIRT					
	Excavation	1.38	3	3	1.00	
	Fill	4.39	16	16	1.00	1264
358+00.00	DIRT					
	Excavation	2.02	6	6	1.00	
	Fill	3.51	15	15	1.00	1255
359+00.00	DIRT					
	Excavation	3.23	10	10	1.00	
	Fill	3.57	13	13	1.00	1252
360+00.00	DIRT					
	Excavation	0.01	6	6	1.00	
	Fill	6.82	19	19	1.00	1239
361+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	11.32	34	34	1.00	1205
362+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	3.38	27	27	1.00	1178
363+00.00	DIRT					
	Excavation	0.03	0	0	1.00	
	Fill	15.01	34	34	1.00	1144
364+00.00	DIRT					
	Excavation	2.79	5	5	1.00	
	Fill	13.14	52	52	1.00	1097
365+00.00	DIRT					
	Excavation	1.36	8	8	1.00	
	Fill	11.05	45	45	1.00	1060
366+00.00	DIRT					
	Excavation	2.75	8	8	1.00	
	Fill	12.29	43	43	1.00	1025V

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\05 Roadway Details\FM510*EWK*DATA.dgn

DRAWING DATE: 6/27/2022

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
SUMMARY OF EARTHWORK QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	21
CONTROL	SECTION	JOB	
1057	03	045	

Station	Material Name	End Areas (sq. ft.)	Unadjusted Volumes (cu. yd.)	Adjusted Volumes (cu. yd.)	Mult Factor	Mass Ordinate
367+00.00	DIRT					
	Excavation	2.43	10	10	1.00	
	Fill	11.31	44	44	1.00	991
368+00.00	DIRT					
	Excavation	0.16	5	5	1.00	
	Fill	11.53	42	42	1.00	954
369+00.00	DIRT					
	Excavation	1.20	3	3	1.00	
	Fill	10.94	42	42	1.00	915
370+00.00	DIRT					
	Excavation	0.00	2	2	1.00	
	Fill	11.04	41	41	1.00	876
371+00.00	DIRT					
	Excavation	1.12	2	2	1.00	
	Fill	9.62	38	38	1.00	840
372+00.00	DIRT					
	Excavation	1.08	4	4	1.00	
	Fill	10.46	37	37	1.00	807
373+00.00	DIRT					
	Excavation	1.14	4	4	1.00	
	Fill	8.23	35	35	1.00	776
374+00.00	DIRT					
	Excavation	1.15	4	4	1.00	
	Fill	9.47	33	33	1.00	747
375+00.00	DIRT					
	Excavation	0.00	2	2	1.00	
	Fill	8.36	33	33	1.00	716
376+00.00	DIRT					
	Excavation	1.17	2	2	1.00	
	Fill	7.44	29	29	1.00	689
377+00.00	DIRT					
	Excavation	1.82	6	6	1.00	
	Fill	10.97	34	34	1.00	661
378+00.00	DIRT					
	Excavation	0.00	3	3	1.00	
	Fill	10.29	39	39	1.00	625
379+00.00	DIRT					
	Excavation	0.17	0	0	1.00	
	Fill	9.76	37	37	1.00	588
380+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	2.74	23	23	1.00	565
381+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	8.82	21	21	1.00	544
382+00.00	DIRT					
	Excavation	1.51	3	3	1.00	
	Fill	3.93	24	24	1.00	523
383+00.00	DIRT					
	Excavation	1.40	5	5	1.00	
	Fill	5.07	17	17	1.00	511
384+00.00	DIRT					
	Excavation	0.00	3	3	1.00	
	Fill	9.73	27	27	1.00	487
385+00.00	DIRT					
	Excavation	0.11	0	0	1.00	
	Fill	6.04	29	29	1.00	458
386+00.00	DIRT					
	Excavation	1.79	4	4	1.00	
	Fill	6.51	23	23	1.00	439
387+00.00	DIRT					
	Excavation	0.00	3	3	1.00	
	Fill	5.02	21	21	1.00	421
388+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	6.01	20	20	1.00	401
389+00.00	DIRT					
	Excavation	0.00	0	0	1.00	
	Fill	5.91	22	22	1.00	379
390+00.00	DIRT					
	Excavation	0.60	1	1	1.00	
	Fill	1.56	14	14	1.00	366
391+00.00	DIRT					
	Excavation	0.70	2	2	1.00	
	Fill	2.27	7	7	1.00	361
392+00.00	DIRT					
	Excavation	0.00	1	1	1.00	
	Fill	3.11	10	10	1.00	352
393+00.00	DIRT					
	Excavation	1.68	3	3	1.00	
	Fill	3.69	13	13	1.00	342
394+00.00	DIRT					
	Excavation	1.25	5	5	1.00	
	Fill	3.76	14	14	1.00	333
395+00.00	DIRT					
	Excavation	0.00	2	2	1.00	
	Fill	5.69	17	17	1.00	318
396+00.00	DIRT					
	Excavation	0.46	1	1	1.00	
	Fill	5.06	20	20	1.00	299
397+00.00	DIRT					
	Excavation	0.00	1	1	1.00	
	Fill	6.88	22	22	1.00	278
398+00.00	DIRT					
	Excavation	0.58	1	1	1.00	
	Fill	2.73	18	18	1.00	261
399+00.00	DIRT					
	Excavation	0.00	1	1	1.00	
	Fill	4.51	13	13	1.00	249
400+00.00	DIRT					
	Excavation	0.41	1	1	1.00	
	Fill	3.69	15	15	1.00	235
401+00.00	DIRT					
	Excavation	0.04	1	1	1.00	
	Fill	6.25	18	18	1.00	218
402+00.00	DIRT					
	Excavation	0.10	0	0	1.00	
	Fill	2.97	17	17	1.00	201
403+00.00	DIRT					
	Excavation	0.81	2	2	1.00	
	Fill	1.79	9	9	1.00	194

* G R A N D S U M M A R Y T O T A L S

Material Name	Unadjusted Volumes (cu. yd.)	Adjusted Volumes (cu. yd.)	Mult Factor
DIRT			
Excavation	8410	8410	1.00
Fill	8216	8216	1.00

LOCATION (STA TO STA)	110	132
	6001	6006
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY C)
	CY	CY
CSJ: 1057-03-045	8,410	8,216
PROJECT TOTALS	8,410	8,216

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
SUMMARY OF EARTHWORK QUANTITIES

SHEET 6 OF 6

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	22
CONTROL	SECTION	JOB	
1057	03	045	

SUMMARY OF WORKZONE ITEMS

LOCATION (STA TO STA)	512 6005 PORT CTB (FUR & INST) (F-SHAPE) (TY 1)	512 6029 PORT CTB (MOVE) (F-SHAPE) (TY 1)	512 6053 PORT CTB (REMOVE) (F-SHAPE) (TY 1)	545 6001 CRASH CUSH ATTEN (INSTL)	545 6003 CRASH CUSH ATTEN (MOVE & RESET)	545 6005 CRASH CUSH ATTEN (REMOVE)	662 6004 WK ZN PAV MRK NON-REMOV (W)4" (SLD)	662 6034 WK ZN PAV MRK NON-REMOV (Y)4" (SLD)	662 6109 WK ZN PAV MRK SHT TERM (TAB)TY W	662 6111 WK ZN PAV MRK SHT TERM (TAB)TY Y-2	6001 6002 PORTABLE CHANGEABLE MESSAGE SIGN	6185 6001 TMA (STATIONARY)	6185 6003 TMA (MOBILE OPERATION)
CSJ: 1057-03-045	LF	LF	LF	EA	EA	EA	LF	LF	EA	EA	EA	EA	HR
	570	1,165	570	2	6	2	81,000	81,000	4,050	4,050	2	6	200
PROJECT TOTALS	**570**	**1,165**	**570**	**2**	**6**	**2**	**81,000**	**81,000**	**4,050**	**4,050**	**2**	**6**	**200**

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\03 Quantity Summaries\SUMMARY OF WORKZONE QUANTITIES.dgn

DRAWING DATE: 6/27/2022

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SUMMARY OF WORKZONE QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	23
CONTROL	SECTION	JOB	
1057	03	045	

SUMMARY OF ROADWAY ITEMS

LOCATION (STA TO STA)	100 6002 PREPARING ROW	104 6001 REMOVING CONC (PAV)	105 6095 REMOVING STAB BASE & ASPH PAV (12"-14")	134 6001 BACKFILL (TY A)	164 6036 DRILL SEEDING (PERM) (RURAL) (CLAY)	166 NON-PAY FERTILIZER (SUBSIDIARY TO ITEM 164)	168 6001 VEGETATIVE WATERING	204 6003 SPRINKLING (DUST CONTROL)	216 6001 PROOF ROLLING	247 6060 FL BS (CMP IN PLC) (TY E GR 4) (FNAL POS)	247 6282 FL BS (CMP IN PLC) (TY E GR 4) (12")	260 6011 LIME TRT (EXST MATL) (12")	260 6043 LIME (HYD, COM OR QK) (SLURRY)	275 6001 CEMENT	316 6005 ASPH (TIER II)	316 6486 AGGR (TY-D GR-4P) (SAC-B)	3077 6065 SP MIXES SP-D SAC-A PG76-22	3080 6007 STONE-MTRX-ASPH SMA-D SAC-A PG76-22	354 6021 PLANE ASPH CONC PAV (0" TO 2")	354 6041 PLANE ASPH CONC PAV (1.5")	760 6001 DITCH CLEANING AND RESHAPING (FOOT)	5001 6002 GEOGRID BASE REINFORCEMENT (TY II)
						(100 LB/AC)	(2 APP@0.05 GAL/SY)	(1 MG/STA)	(26.4 STA/HR)					(2% BY WT)	(0.3 GAL/SY)	(1 CY/120 SY)	(342 LB/SY) TWO 1.5"	(171 LB/SY)				
CSJ: 1057-03-045	STA	SY	SY	STA	AC	TON	MG	MG	HR	CY	SY	SY	TON	TON	GAL	CY	TON	TON	SY	SY	LF	SY
00+00.00 TO 08+00.00	8.00	1,156	3,029	8.00	0.48	0.02	0.2	8	0.30		4,437	4,642	138	58.00	1,311	36	737.00	18.90		221.00	1,600	4,642
08+00.00 TO 20+00.00	12.00	2,133	3,143	12.00	1.05	0.05	0.5	12	0.45		5,606	5,867	174	73.00	1,642	46	919.00				2,400	5,867
20+00.00 TO 32+00.00	12.00	2,133	2,679	12.00	1.05	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00		370		2,400	5,867
32+00.00 TO 44+00.00	12.00	2,133	3,122	12.00	1.07	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
44+00.00 TO 56+00.00	12.00	2,133	3,166	12.00	1.03	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
56+00.00 TO 68+00.00	12.00	2,133	3,184	12.00	1.01	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
68+00.00 TO 80+00.00	12.00	2,133	3,134	12.00	1.03	0.05	0.5	12	0.45	175	5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
80+00.00 TO 92+00.00	12.00	2,133	3,225	12.00	1.09	0.05	0.5	12	0.45	700	5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
92+00.00 TO 104+00.0	12.00	2,133	3,180	12.00	1.09	0.05	0.5	12	0.45	700	5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
104+00.00 TO 116+00.0	12.00	2,133	3,210	12.00	1.03	0.05	0.5	12	0.45	700	5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
116+00.00 TO 128+00.0	12.00	2,133	3,187	12.00	1.00	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
128+00.00 TO 140+00.0	12.00	2,133	3,143	12.00	1.08	0.05	0.5	12	0.45		5,600	5,870	174	73.00	1,640	46	918.00				2,400	5,870
140+00.00 TO 152+00.0	12.00	2,133	2,881	12.00	1.03	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
152+00.00 TO 164+00.0	12.00	2,133	3,188	12.00	1.06	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
164+00.00 TO 176+00.0	12.00	2,133	3,166	12.00	0.91	0.05	0.4	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
176+00.00 TO 188+00.0	12.00	736	4,537	12.00	1.01	0.05	0.5	12	0.45		5,600	5,868	174	73.00	1,640	46	918.00				2,400	5,868
188+00.00 TO 200+00.0	12.00		5,340	12.00	0.92	0.05	0.4	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
200+00.00 TO 212+00.0	12.00		5,287	12.00	1.03	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
212+00.00 TO 224+00.0	12.00		5,235	12.00	1.02	0.05	0.5	12	0.45		5,600	5,862	174	73.00	1,640	46	918.00				2,400	5,862
224+00.00 TO 236+00.0	12.00		5,193	12.00	1.01	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
236+00.00 TO 248+00.0	12.00		5,369	12.00	1.00	0.05	0.5	12	0.45		5,622	5,886	175	73.00	1,647	46	922.00				2,400	5,886
248+00.00 TO 260+00.0	12.00		5,854	12.00	0.91	0.05	0.4	12	0.45		6,395	6,462	192	83.00	1,926	54	1,079.00	12.14		142.00	2,400	6,462
260+00.00 TO 272+00.0	12.00		5,316	12.00	1.01	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
272+00.00 TO 284+00.0	12.00		5,323	12.00	1.03	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
284+00.00 TO 296+00.0	12.00		5,327	12.00	1.06	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
296+00.00 TO 308+00.0	12.00		5,346	12.00	0.93	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
308+00.00 TO 320+00.0	12.00		5,305	12.00	0.91	0.05	0.4	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
320+00.00 TO 332+00.0	12.00		5,342	12.00	1.03	0.05	0.5	12	0.45		5,600	5,870	174	73.00	1,640	46	918.00				2,400	5,870
332+00.00 TO 344+00.0	12.00		5,665	12.00	1.06	0.05	0.5	12	0.45		5,822	6,106	181	75.00	1,740	48	983.00	8.04		94.00	2,400	6,106
344+00.00 TO 356+00.0	12.00		5,289	12.00	1.09	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
356+00.00 TO 368+00.0	12.00		5,213	12.00	1.09	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
368+00.00 TO 380+00.0	12.00		5,262	12.00	1.06	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
380+00.00 TO 392+00.0	12.00		5,323	12.00	0.95	0.05	0.5	12	0.45		5,600	5,867	174	73.00	1,640	46	918.00				2,400	5,867
392+00.00 TO 403+10.8	11.00		4,954	11.00	0.98	0.05	0.5	11	0.42		5,184	5,433	161	67.00	1,518	42	855.00				2,222	5,433
PROJECT TOTALS	**403.00**	**31,754**	**147,117**	**403.00**	**34.11**	**1.67**	**16.30**	**403.00**	**15.12**	**2,275**	**189,866**	**198,674**	**5,893**	**2,473**	**55,704**	**1,560**	**31,199**	**39.07**	**370.00**	**457.00**	**80,622**	**198,674**

SUMMARY OF MBGF ITEMS

LOCATION (STA TO STA)	LT/R	432 6046 RIPRAP (MOW STRIP) (5 IN)	450 6023 RAIL (TY SSTR)	451 6024 RETROFIT RAIL (TY SSTR)	496 6099 REMOVE STR (RAIL)	540 6002 MTL W-BEAM GD FEN (STEEL POST)	540 6006 MTL BEAM GD FEN TRANS (THRIE-BEAM)	542 6001 REMOVE METAL BEAM GUARD FENCE	542 6002 REMOVE TERMINAL ANCHOR SECTION	542 6004 RM MTL BM GD FENCE TRANS (THRIE-BEAM)	544 6001 GUARDRAIL END TREATMENT (INSTALL)	544 6003 GUARDRAIL END TREATMENT (REMOVE)	545 6026 CRASH CUSHION ATTEN (INSTALL) (QUAD) (N)	658 6008 INSTL DEL ASSM (D-SW) SZ 1 (FLX) GF2 (BI)	658 6049 INSTL OM ASSM (OM-2Z) (FLX) GND (BI)
CSJ: 1057-03-045		CY	LF	LF	LF	LF	EA	LF	EA	EA	EA	EA	EA	EA	EA
23+00.00 TO 26+45.25	RT	11				112.5	1	112.5		1	1	1		4	2
23+00.00 TO 26+45.25	LT	22				225.0	1	200		1	1	1		4	2
26+45.25 TO 27+25.25	RT		95		95										
26+45.25 TO 27+25.25	LT		95		114										
27+25.25 TO 28+00.00	RT	5				12.5	1	25		1		1	1	1	1
27+25.25 TO 29+00.00	LT	10				100.0	1	112.5		1	1	1		4	2
146+00.00 TO 148+16.92	RT	15				125.0	1	125		1	1	1		4	2
147+00.00 TO 148+16.92	LT	5				25.0	1	25		1	1	1		1	2
148+16.92 TO 148+71.92	RT			67											
148+16.92 TO 148+71.92	LT			67											
148+71.92 TO 150+00.00	RT	6				25.0	1	25		1	1	1		2	2
148+71.92 TO 151+00.00	LT	17				150.0	1	125		1	1	1		4	2
230+00.00 TO 233+00.00	RT	21				200.0		150	1		2	1		4	2
230+00.00 TO 233+50.00	LT	23				200.0		150	1		2	1		4	2
CSJ: 1057-03-045 TOTALS		**135**	**190**	**134**	**209**	**1,175.0**	**8**	**1050**	**2**	**8**	**11**	**10**	**1**	**32**	**19**
PROJECT TOTALS		**135**	**190**	**134**	**209**	**1,175.0**	**8**	**1,050**	**2**	**8**	**11**	**10**	**1**	**32**	**19**

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

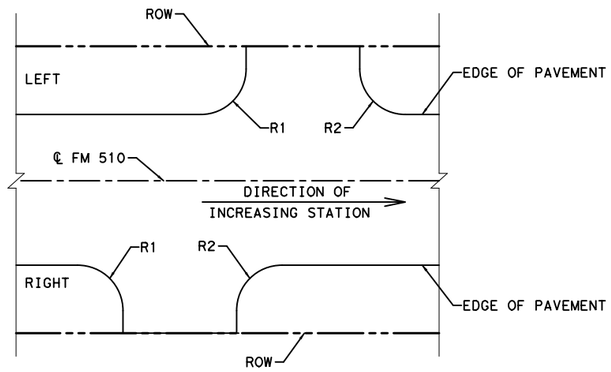
SUMMARY OF ROADWAY QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	24
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\03 Quantity Summaries\SUMMARY OF ROADWAY QUANTITIES.dgn
DRAWING DATE: 6/27/2022

SUMMARY OF DRIVEWAYS

DRIVEWAY/ ROADWAY NUMBER	LEFT/RIGHT	ROADWAY NAME (IF APPLICABLE)	STATION AT CENTERLINE OF DRIVEWAY	EXIST DRIVEWAY WIDTH (FT)	PROP WIDTH AT ROW LINE (FT)	PROP WIDTH AT EDGE OF PAVMNT (FT)	LENGTH FROM ROW TO EOP (FT)	PROP RADIUS (FT) R1/R2	464	467	496	496	530	
									6003	6363	6004	6007	6005	
									RC PIPE (CL III) (18 IN)	SET (TY II) (18 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (PIPE) 18"	DRIVEWAYS (ACP) (PB-1)	DRIVEWAYS (ACP) (PRB-1)
									LF	EA	EA	LF	SY	SY
1	RT		4+83.43	27	28	51	25	15/8					78	
3	LT		8+38.79	28										
4	LT		9+13.07	25										
5	LT		11+47.18	14	14	44	20	15/15					42	
6	LT		13+14.92	11	12	42	20	15/15					37	
7	RT		13+30.55	10	12	42	20	15/15					37	
8	LT		22+05.07	12	12	44	20	20/12	28	2	1	28	39	
9	RT		24+45.83	16	16	36	20	15/8					37	
10	RT		27+93.83	12	12	42	20	15/15					38	
11	RT		28+85.88	7	14	45	20	15/15					43	
12	LT		29+19.61	12	14	43.5	20	15/15					42	
13	RT		30+08.02	12	12	42	20	15/15					37	
14	LT		30+43.24	12	12	42	20	15/15					37	
15	LT		42+79.32	12	12	42	20	15/15					37	
16	RT	Casey Rd.	42+80.45	22	22	71	20	25/25						194
17	LT		43+58.86	12	12	42	20	15/15					37	
18	LT		44+33.33	10	12	42	20	15/15	24	2		16	37	
19	LT		45+02.11	13	14	44	20	15/15					42	
20	LT		47+50.98	12	14	44	20	15/15					42	
21	LT		48+43.55	13	14	44	20	15/15					42	
22	RT		52+01.06	12	12	42	20	15/15					37	
22A	LT		53+00.00	20	20	42	20	15/15					53	
23	RT		53+24.07	12	12	42	20	15/15					37	
24	RT		54+73.10	13	14	41	20	15/15					41	
25	RT		55+13.67	10	14	41	20	15/15					41	
26	LT		55+41.29	10	14	44	20	15/15	40	2		40	42	
27	LT		56+46.59	11	12	42	20	15/15	28	2	2	19	37	
28	RT		57+68.03	13	14	44	20	15/15					42	
29	LT		58+86.20	14										
SUB TOTALS									120	8	3	103	1,034	194



I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

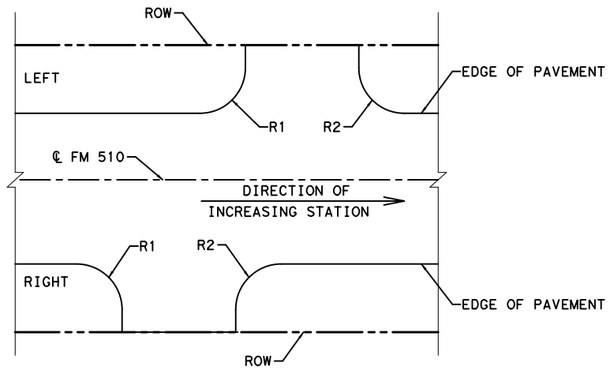
SUMMARY OF DRIVEWAY QUANTITIES

SHEET 1 OF 9

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	25
CONTROL	SECTION	JOB	
1057	03	045	

SUMMARY OF DRIVEWAYS

DRIVEWAY/ ROADWAY NUMBER	LEFT/RIGHT	ROADWAY NAME (IF APPLICABLE)	STATION AT CENTERLINE OF DRIVEWAY	EXIST DRIVEWAY WIDTH (FT)	PROP WIDTH AT ROW LINE (FT)	PROP WIDTH AT EDGE OF PAVMNT (FT)	LENGTH FROM ROW TO EOP (FT)	PROP RADIUS (FT) R1/R2	464	467	496	496	530	
									6003	6363	6004	6007	6005	
									RC PIPE (CL III) (18 IN)	SET (TY II) (18 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (PIPE) 18"	DRIVEWAYS (ACP) (PB-1)	DRIVEWAYS (ACP) (PRB-1)
									LF	EA	EA	LF	SY	SY
30	RT		58+87.43	8	14	44	20	15/15					42	
31	RT		59+54.07	13	14	44	20	15/15					42	
32	LT		60+20.43	18	18	48	20	15/15	42	2		41	51	
33	LT	Morning Glory Ct.	63+19.95	30	30	87	20	30/30						101
34	LT		64+49.25	28	28	66	20	15/25					78	
35	RT	Nelson Rd.	69+12.17	29	29	85.5	20	30/30						98
35	LT	Nelson Rd.	69+15.83	24	24	82	20	30/30						90
36	LT		70+20.74	12	12	42	20	15/15					37	
37	RT		70+30.62	12	12	42	20	15/15					37	
38	LT		73+54.37	6	12	42	20	15/15					37	
39	RT		78+14.05	9										
40	RT		83+16.58	12	12	42	20	15/15					37	
41	LT		84+57.49	12	12	42	20	15/15					37	
42	RT	Glenwood Rd.	103+86.90	24	24	82	20	30/30						90
43	RT		106+29.48	11	12	42	20	15/15					37	
44	RT		108+19.67	9	12	42	20	15/15					37	
45	LT		108+67.68	11	12	42	20	15/15					37	
46	RT		109+61.21	14	14	44	20	15/15					37	
47	RT		110+82.07	9	12	42	20	15/15					37	
48	RT		112+07.38	9	12	42	20	15/15					37	
49	RT		113+21.24	8	14	44	20	15/15					37	
50	RT	Green Valley Dr.	115+89.70	43	43	100	20	30/30						130
51	LT		121+94.15	21	21	67	20	25/25					75	
52	RT		121+98.34	8	14	44	20	15/15					42	
53	RT		122+70.21	58	58	87	20	15/15					137	
54	LT		122+80.11	84	84	120	20	15/25					204	
55	LT		137+54.95	12	12	42	20	15/15					37	
56	LT		138+37.61	11	12	42	20	15/15					37	
57	RT		138+92.46	8	12	42	20	15/15					37	
SUB TOTALS									42	2		41	1,226	509



Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

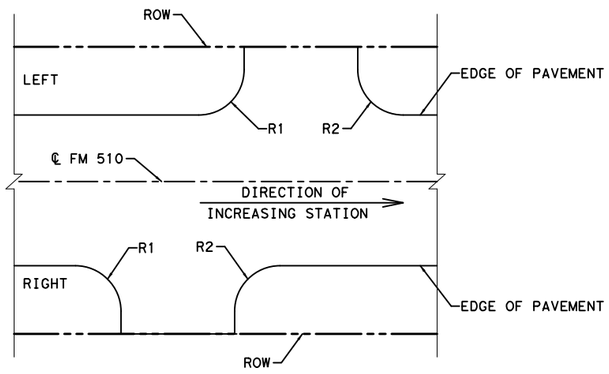
SUMMARY OF DRIVEWAY QUANTITIES

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	26
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\03 Quantity Summaries\SUMMARY OF DWYS QUANTITIES#FM 510#2.dgn
DRAWING DATE: 6/27/2022

SUMMARY OF DRIVEWAYS

DRIVEWAY/ ROADWAY NUMBER	LEFT/RIGHT	ROADWAY NAME (IF APPLICABLE)	STATION AT CENTERLINE OF DRIVEWAY	EXIST DRIVEWAY WIDTH (FT)	PROP WIDTH AT ROW LINE (FT)	PROP WIDTH AT EDGE OF PAVMNT (FT)	LENGTH FROM ROW TO EOP (FT)	PROP RADIUS (FT) R1/R2	464	467	496	496	530	
									6003	6363	6004	6007	6005	
									RC PIPE (CL III) (18 IN)	SET (TY II) (18 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (PIPE) 18"	DRIVEWAYS (ACP) (PB-1)	DRIVEWAYS (ACP) (PRB-1)
									LF	EA	EA	LF	SY	SY
58	LT		140+59.40	12	12	42	20	15/15	82	2		19	37	
59	LT		141+13.89	15	15	45	20	15/15			2	35	43	
60	LT		142+14.71	14	14	44	20	15/15					42	
61	LT		144+56.45	10	12	42	20	15/15					37	
62	RT		144+78.49	20										
63	LT		145+65.76	10	12	42	20	15/15	24	2		17	37	
64	LT		146+67.96	12										
65	LT		147+18.66	12	14	44	20	15/15					42	
66	RT		149+77.62	12	12	42	20	15/15					37	
66A	RT		159+91.03	12	12	42	20	15/15					37	
67	RT		160+80.35	11	14	44	20	15/15					37	
68	LT	Vasquez Rd.	161+64.60	22	22	71	20	25/25						199
69	RT	Adams Rd.	161+65.24	23	24	73	20	25/25						210
70	LT		165+41.85	6	12	42	20	15/15					37	
71	LT		166+96.61	11	14	44	20	15/15					42	
72	RT		167+72.20	12	12	44	20	15/15					37	
73	LT		168+17.84	12	12	35	20	15/15					35	
74	LT		168+45.03	8	12	34	20	15/15					35	
75	LT		168+86.23	9	12	41	20	15/15					37	
76	LT		170+36.35	10	12	42	20	15/15					37	
77	RT		171+27.72	11	12	42	20	15/15					37	
78	LT		172+08.55	10	12	42	20	15/15					37	
79	RT		172+37.00	14	14	34	20	15/15					38	
80	RT		172+60.79	10	14	34	20	15/15					38	
81	LT		173+42.33	12	12	42	20	15/15					37	
82	RT		173+72.42	25	26	56	20	15/15					68	
83	RT		174+85.37	12	12	42	20	15/15					37	
84	LT		175+63.30	10	14	44	20	15/15					37	
85	RT		175+67.98	11	14	44	20	15/15					37	
86	LT		177+01.77	9	12	42	20	15/15					37	
87	LT		178+09.19	9	12	42	20	15/15					37	
SUB TOTALS									106	4	2	71	1,049	409



Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

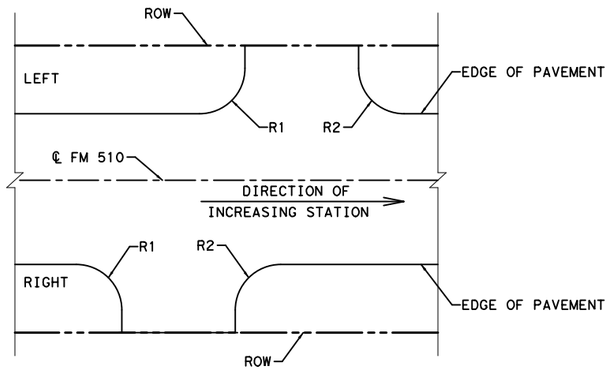
SUMMARY OF DRIVEWAY QUANTITIES

SHEET 3 OF 9

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	27
CONTROL	SECTION	JOB	
1057	03	045	

SUMMARY OF DRIVEWAYS

DRIVEWAY/ ROADWAY NUMBER	LEFT/RIGHT	ROADWAY NAME (IF APPLICABLE)	STATION AT CENTERLINE OF DRIVEWAY	EXIST DRIVEWAY WIDTH (FT)	PROP WIDTH AT ROW LINE (FT)	PROP WIDTH AT EDGE OF PAVMNT (FT)	LENGTH FROM ROW TO EOP (FT)	PROP RADIUS (FT) R1/R2	464	467	496	496	530	
									6003	6363	6004	6007	6005	
									RC PIPE (CL III) (18 IN)	SET (TY II) (18 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (PIPE) 18"	DRIVEWAYS (ACP) (PB-1)	DRIVEWAYS (ACP) (PRB-1)
									LF	EA	EA	LF	SY	SY
88	LT		178+99.58	9	14	44	20	15/15					42	
89	RT		179+36.57	12	12	42	20	15/15					37	
90	LT		179+54.56	6	12	42	20	15/15					37	
91	RT		180+35.99	10	12	42	20	15/15					37	
92	LT		181+12.47	8	12	42	20	15/15					37	
93	LT		181+76.33	9	12	42	20	15/15					37	
94	LT		183+45.61	12	12	42	20	15/15					37	
95	RT		185+47.57	14										
96	LT		185+68.88	12	12	42	20	15/15					37	
97	LT		187+24.33	10	12	42	20	15/15					37	
98	LT		188+23.24	10	12	40	20	15/15					37	
99	LT	Line G Rd.	188+70.44	16	16	54	20	20/20						136
100	LT		189+89.23	8	12	42	20	15/15					37	
101	RT		190+38.12	13										
102	LT		190+86.02	23	24	70	20	25/25					80	
103	LT		191+50.58	31	32	61	20	15/15					81	
103A	RT		193+00.00	14	14	44	20	15/15					42	
104	LT		193+18.01	8	8	58	20	15/30					51	
105	RT		193+90.45	16										
106	LT		194+17.72	18	18	48	20	15/15					51	
107	RT		194+74.16	14	14	44	20	15/15					42	
108	LT		194+88.70	11	14	44	20	15/15					42	
109	RT		195+79.44	14	14	44	20	15/15					42	
110	LT		196+41.93	10	14	44	20	15/15					46	
111	LT		196+78.18	12	14	41	20	15/15					41	
112	RT		197+19.82	16	16	46	20	15/15					46	
113	LT		197+20.02	12	14	44	20	15/15					42	
114	RT		197+97.11	10	12	42	20	15/15					38	
115	RT		199+78.21	13	14	44	20	15/15					42	
116	RT	San Jose Resaca Ct.	200+55.44	22	22	62	20	20/20						182
117	RT		202+90.93	10	12	42	20	15/15					37	
SUB TOTALS													1,135	318



Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

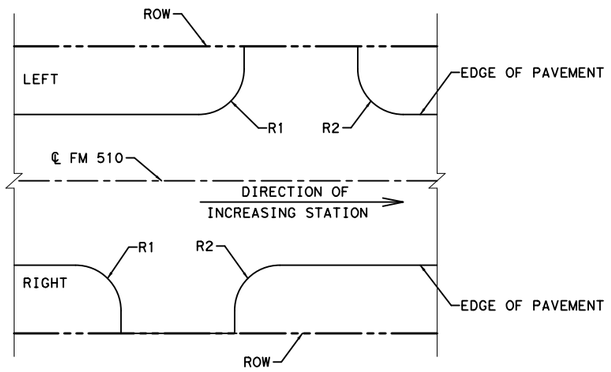
SUMMARY OF DRIVEWAY QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	
CONTROL	SECTION	JOB	28
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\03 Quantity Summaries\SUMMARY OF DWYS QUANTITIES#FM 510#4.dgn
DRAWING DATE: 6/27/2022

SUMMARY OF DRIVEWAYS

DRIVEWAY/ ROADWAY NUMBER	LEFT/RIGHT	ROADWAY NAME (IF APPLICABLE)	STATION AT CENTERLINE OF DRIVEWAY	EXIST DRIVEWAY WIDTH (FT)	PROP WIDTH AT ROW LINE (FT)	PROP WIDTH AT EDGE OF PAVMNT (FT)	LENGTH FROM ROW TO EOP (FT)	PROP RADIUS (FT) R1/R2	464	467	496	496	530	
									6003	6363	6004	6007	6005	
									RC PIPE (CL III) (18 IN)	SET (TY II) (18 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (PIPE) 18"	DRIVEWAYS (ACP) (PB-1)	DRIVEWAYS (ACP) (PRB-1)
									LF	EA	EA	LF	SY	SY
118	RT		203+65.00	12	14	44	20	15/15					42	
119	RT	Resaca View Ct.	205+83.15	24	24	64	20	20/20						72
120	RT	Resaca View Cir.	208+93.30	24	24	73	20	25/25						80
121	RT		211+55.63	26	26	56	20	15/15					69	
122	RT		213+38.01	10	14	44	20	15/15					42	
123	RT		215+38.17	20	20	51	20	15/15					56	
123A	RT		215+82.54	14	14	36	20	15/15					41	
124	RT		216+21.08	13	14	44	20	15/15					41	
125	RT		218+08.14	10	14	44	20	15/15	24	2		24	42	
126	RT		219+48.77	10	14	40.5	20	15/15	66	2		27	41	
127	RT		219+84.85	9	14	40.5	20	15/15				16	41	
128	RT		221+02.38	12	14	44	20	15/15	24	2		17	42	
129	RT		222+17.69	11	14	44	20	15/15	24	2		24	42	
130	RT		223+23.09	11	15	45	20	15/15	30	2		23	43	
131	RT		224+22.16	11	14	44	20	15/15	30	2		40	42	
132	RT		226+20.73	27	27	67	20	20/20	44	2	2	28	79	
133	RT	Resaca View Cir.	227+31.83	25	25	65	20	20/20						75
134	RT		228+69.21	15	16	46	20	15/15					47	
135	RT		229+48.53	18	18	48	20	15/15					51	
136	LT		229+53.70	8	12	42	20	15/15					37	
137	RT		233+06.18	12	12	42	20	15/15					37	
138	LT		235+14.52	12	12	42	20	15/15					37	
139	RT		235+44.56	13	14	44	20	15/15					42	
140	RT		236+64.29	8	12	42	20	15/15					38	
141	RT		238+42.32	12	12	42	20	15/15					37	
142	RT		240+23.01	10	12	42	20	15/15					37	
143	LT		241+54.57	13	14	44	20	15/15					42	
144	RT		241+55.57	10	14	41	20	15/15					41	
145	RT		241+93.47	12	14	41	20	15/15					41	
146	LT		242+31.84	13	14	46	20	15/15					46	
147	LT		244+80.16	12	14	44	20	15/15					42	
SUB TOTALS									242	14	2	199	1,238	227



Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

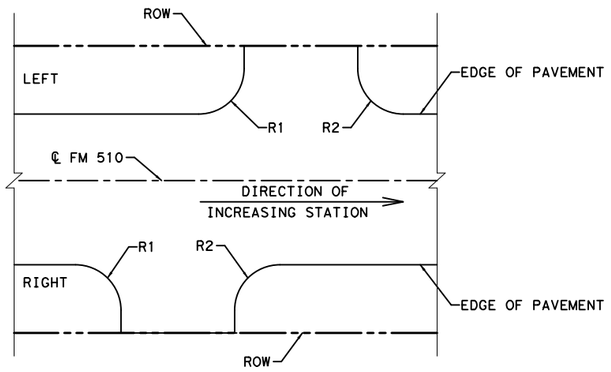
SUMMARY OF DRIVEWAY QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	29
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\03 Quantity Summaries\SUMMARY OF DWYS QUANTITIES*FM 510*5.dgn
DRAWING DATE: 6/27/2022

SUMMARY OF DRIVEWAYS

DRIVEWAY/ ROADWAY NUMBER	LEFT/RIGHT	ROADWAY NAME (IF APPLICABLE)	STATION AT CENTERLINE OF DRIVEWAY	EXIST DRIVEWAY WIDTH (FT)	PROP WIDTH AT ROW LINE (FT)	PROP WIDTH AT EDGE OF PAVMNT (FT)	LENGTH FROM ROW TO EOP (FT)	PROP RADIUS (FT) R1/R2	464	467	496	496	530	
									6003	6363	6004	6007	6005	
									RC PIPE (CL III) (18 IN)	SET (TY II) (18 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (PIPE) 18"	DRIVEWAYS (ACP) (PB-1)	DRIVEWAYS (ACP) (PRB-1)
									LF	EA	EA	LF	SY	SY
148	RT	Emily Ln.	246+08.46	24	24	73	20	25/25						80
149	LT		246+11.45	12	14	43	20	15/15					42	
150	LT		246+53.61	11	14	43	20	15/15					42	
151	LT		248+13.72	12	12	42	20	15/15					37	
152	RT		248+79.53	14	16	46	20	15/15					45	
153	RT		250+16.69	84	84	124	20	20/20					196	
154	LT		250+42.24	12	12	42	20	15/15					36	
155	RT	FM 803 (Olmito North Rd.)												
155	LT	FM 803 (Olmito North Rd.)												
156	RT		252+45.39	11	12	36	20	12/12					32	
157	LT		252+45.39	12	12	36	20	12/12					32	
159	LT		252+97.01	10	12	36	20	12/12					32	
160	RT		253+04.25	10	12	36	20	12/12					32	
161	RT	Nogales Dr.	256+51.35	31	31	87	20	30/30						101
162	RT		258+66.02	10	14	44	20	15/15	28	2		16	42	
163	RT		259+60.70	17	17	47	20	15/15	32	2		25	48	
164	RT	Nogalitos Dr.	261+48.97	30	30	86	20	30/30						100
165	RT		263+27.02	10	12	42	20	15/15	26	2	2	19	37	
166	RT		264+69.36	16	16	46	20	15/15					46	
167	RT	Nogales Dr.	266+45.95	29	29	85	20	30/30						98
168	RT		268+20.35	11	14	44	20	15/15					42	
169	LT		268+82.58	16	14	38	20	12/12					38	
170	RT		269+33.33	12	13	43	20	15/15					40	
171	RT		271+25.99	12	12	39	20	15/15					35	
172	RT		276+58.89	8	12	42	20	15/15					37	
173	LT		278+53.23	14	14	44	20	15/15	42	2		41	42	
174	LT		279+75.92	12	14	44	20	15/15					42	
175	LT		281+20.80	10	14	49	23	15/15					50	
176	LT		281+75.86	12	12	42	20	15/15					38	
177	RT		281+80.16	10	12	42	20	15/15					37	
178	LT		282+36.68	11	12	42	20	15/15					37	
179	RT		282+82.84	9	12	42	20	15/15					37	
SUB TOTALS									**128**	**8**	**2**	**101**	**1,174**	**379**



I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

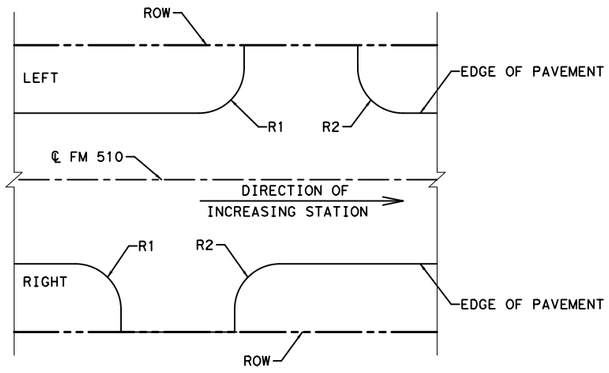
SUMMARY OF DRIVEWAY QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	30
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\03 Quantity Summaries\SUMMARY OF DWYS QUANTITIES*FM 510*6.dgn
DRAWING DATE: 6/27/2022

SUMMARY OF DRIVEWAYS

DRIVEWAY/ ROADWAY NUMBER	LEFT/RIGHT	ROADWAY NAME (IF APPLICABLE)	STATION AT CENTERLINE OF DRIVEWAY	EXIST DRIVEWAY WIDTH (FT)	PROP WIDTH AT ROW LINE (FT)	PROP WIDTH AT EDGE OF PAVMNT (FT)	LENGTH FROM ROW TO EOP (FT)	PROP RADIUS (FT) R1/R2	464	467	496	496	530	
									6003	6363	6004	6007	6005	
									RC PIPE (CL III) (18 IN)	SET (TY II) (18 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (PIPE) 18"	DRIVEWAYS (ACP) (PB-1)	DRIVEWAYS (ACP) (PRB-1)
									LF	EA	EA	LF	SY	SY
180	LT		283+86.01	12	12	42	20	15/15					37	
181	LT		290+50.28	14	12	42	20	15/15					37	
181A	LT		293+56.00	10	12	42	20	15/15					37	
182	LT		294+37.36	10	12	42	20	15/15					37	
183	LT		295+07.74	9	12	42	20	15/15					37	
184	RT		295+10.60	9	12	42	20	15/15					37	
185	LT		295+76.58	9	12	42	20	15/15					37	
186	RT		296+06.49	10	12	42	20	15/15					37	
187	LT		296+25.94	12	12	42	20	15/15					37	
188	RT		296+54.09	15	16	46	20	15/15					46	
189	LT		297+37.35	12	12	42	20	15/15					37	
190	RT		297+57.24	12	12	42	20	15/15					37	
191	LT		297+90.53	14	14	44	20	15/15					42	
192	LT		298+97.21	14	14	44	20	15/15					42	
193	RT		299+66.83	12	12	42	20	15/15					37	
194	LT		299+80.40	15	14	44	20	15/15					42	
195	LT		300+62.35	12	12	42	20	15/15					37	
196	LT		301+44.20	11	12	42	20	15/15					37	
197	LT		301+88.30	16	16	48	20	15/15					51	
198	RT		302+54.39	14	14	44	20	15/15					42	
199	LT		303+00.42	13	14	44	20	15/15					42	
200	RT		303+61.02	11	14	44	20	15/15					42	
201	LT		303+65.98	12	14	44	20	15/15					42	
202	LT		304+18.55	12	12	42	20	15/15					37	
203	RT		304+56.19	12	12	42	20	15/15					37	
204	LT		304+78.28	31.5	32	62	20	15/15					82	
205	RT		305+63.32	10	12	37	20	15/15					36	
206	RT		305+96.30	7	12	37	20	15/15					36	
207	LT		308+34.14	12	12	42	20	15/15					37	
208	LT		308+92.32	12	12	42	20	15/15					37	
209	LT		309+71.46	11	12	42	20	15/15					37	
SUB TOTALS													1,248	



Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

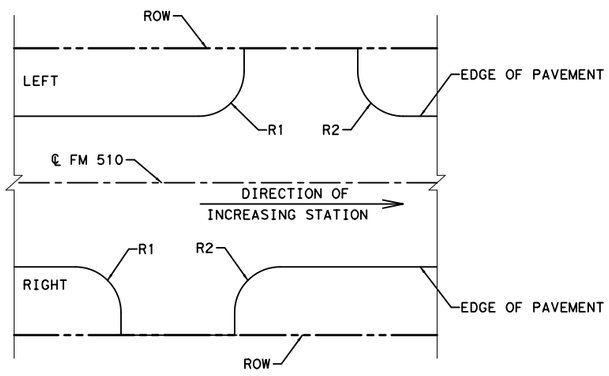
SUMMARY OF DRIVEWAY QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	31
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\03 Quantity Summaries\SUMMARY OF DWYS QUANTITIES#FM 510#7.dgn
DRAWING DATE: 6/27/2022

SUMMARY OF DRIVEWAYS

DRIVEWAY/ ROADWAY NUMBER	LEFT/RIGHT	ROADWAY NAME (IF APPLICABLE)	STATION AT CENTERLINE OF DRIVEWAY	EXIST DRIVEWAY WIDTH (FT)	PROP WIDTH AT ROW LINE (FT)	PROP WIDTH AT EDGE OF PAVMNT (FT)	LENGTH FROM ROW TO EOP (FT)	PROP RADIUS (FT) R1/R2	464	467	496	496	530	
									6003	6363	6004	6007	6005	
									RC PIPE (CL III) (18 IN)	SET (TY II) (18 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (PIPE) 18"	DRIVEWAYS (ACP) (PB-1)	DRIVEWAYS (ACP) (PRB-1)
									LF	EA	EA	LF	SY	SY
210	RT		310+34.85	50	50	74	20	15/15					110	
211	LT		310+56.92	14	14	43	20	15/15					42	
212	LT		311+38.90	14	14	44	20	15/15					42	
213	RT		311+87.37	10	12	42	20	15/15					37	
214	LT		312+29.77	10	12	42	20	15/15					37	
215	LT		312+89.34	12	12	42	20	15/15					37	
216	RT		313+04.70	12	12	42	20	15/15					37	
217	RT		314+33.55	7	12	42	20	15/15					37	
218	LT		314+58.72	11	14	44	20	15/15					42	
219	RT		315+47.92	15	15	64.5	20	25/25					61	
220	LT		315+82.33	9	12	42	20	15/15					37	
221	LT		316+26.26	10	12	42	20	15/15					37	
222	RT		317+09.56	14	28	77	20	25/25	48	2	2	31	90	
223	LT		317+45.57	9	12	42	20	15/15					37	
224	LT		318+00.66	10	14	44	20	15/15					42	
225	RT		318+11.22	12	12	42	20	15/15					37	
226	LT		318+58.23	11	12	42	20	15/15					37	
227	LT		320+11.22	14	14	44	20	15/15					42	
228	RT		320+37.45	9	12	42	20	15/15					37	
229	LT		321+23.97	11	14	44	20	15/15					42	
230	LT		322+23.64	15	16	41	20	15/15					46	
231	LT		322+56.29	12	12	36	20	15/15					36	
232	LT		328+03.35	27	28	77	20	25/25					90	
233	RT		328+77.28	13	14	44	20	15/15					42	
234	RT	FM 1575 (Old Alice Rd.)												
235	LT		338+50.85	10	12	41	20	15/15					37	
236	RT		353+53.97	16	12	42	20	15/15					37	
237	RT		358+75.28	8	12	42	20	15/15					37	
237A	LT		358+90.08	8	12	42	20	15/15					37	
238	RT		374+87.61	11	12	42	20	15/15					37	
239	RT		376+33.53	16										
SUB TOTALS									**48**	**2**	**2**	**31**	**1,319**	



I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

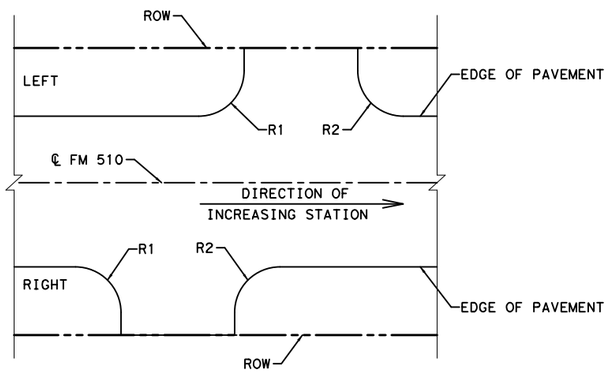
SUMMARY OF DRIVEWAY QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	32
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\03 Quantity Summaries\SUMMARY OF DWYS QUANTITIES#FM 510#8.dgn
DRAWING DATE: 6/27/2022

SUMMARY OF DRIVEWAYS

DRIVEWAY/ ROADWAY NUMBER	LEFT/RIGHT	ROADWAY NAME (IF APPLICABLE)	STATION AT CENTERLINE OF DRIVEWAY	EXIST DRIVEWAY WIDTH (FT)	PROP WIDTH AT ROW LINE (FT)	PROP WIDTH AT EDGE OF PAVMNT (FT)	LENGTH FROM ROW TO EOP (FT)	PROP RADIUS (FT) R1/R2	464	467	496	496	530	
									6003	6363	6004	6007	6005	
									RC PIPE (CL III) (18 IN)	SET (TY II) (18 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (PIPE) 18"	DRIVEWAYS (ACP) (PB-1)	DRIVEWAYS (ACP) (PRB-1)
									LF	EA	EA	LF	SY	SY
240	RT		377+90.53	8	12	42	20	15/15					37	
241	RT		378+92.05	9	14	44	20	15/15					42	
242	RT		379+97.36	12	14	44	20	15/15					42	
243	RT		381+19.83	10	12	42	20	15/15					37	
244	LT		381+46.87	12	12	42	20	15/15					37	
245	RT		382+18.36	12	12	42	20	15/15					37	
246	RT		382+73.46	9	12	42	20	15/15					37	
247	LT		383+27.16	11	12	42	20	15/15					37	
248	LT		384+54.01	11	12	42	20	15/15					37	
249	RT		385+73.17	12	12	42	20	15/15					37	
250	LT		386+28.26	13	14	44	20	15/15					42	
251	RT		387+28.09	11	30	58	20	15/15					83	
252	LT		387+40.74	10	14	44	20	15/15					42	
253	LT		388+52.45	13	14	39	20	15/15					42	
254	RT		388+83.16	11	14	44	20	15/15					42	
255	LT		388+88.98	12	14	34	20	15/15					38	
256	LT		389+21.43	18	18	42	20	15/15					47	
257	RT		389+88.95	11.5	11.5	43	20	15/15					39	
258	LT		390+61.17	15.5	16	46	20	15/15					46	
259	RT		390+94.47	12	12	42	20	15/15					37	
260	LT		391+35.48	11.5	11.5	41.5	20	15/15					36	
261	LT		393+45.61	11	12	42	20	15/15					37	
262	LT		398+13.35	12	12	42	20	15/15					38	
263	RT		399+10.89	30										
264	LT		402+77.85	23	24	54	20	15/15					64	
SUB TOTALS													1013	
PROJECT TOTALS									686	38	11	546	10436	2036



I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SUMMARY OF DRIVEWAY QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	33
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\03 Quantity Summaries\SUMMARY OF DWYS QUANTITIES*FM 510*9.dgn
DRAWING DATE: 6/27/2022

SUMMARY OF CROSS CULVERT STRUCTURES

ITEM		104 6009	401 6001	432 6002	480 6001	529 6036	658 6048	658 6060	760 6001
STATION	CULVERT NO.	REMOVING CONC (RIPRAP)	FLOWABLE BACKFILL	RIPRAP (CONC) (5 IN)	CLEAN EXIST CULVERTS	CONCRETE CURB (SPECIAL)	INSTL OM ASSM (OM-2Z) (FLX) G ND	REMOVE DELIN & OBJECT MARKER ASSMS	DITCH CLEANING AND RESHAPING (FOOT)
		SY	CY	CY	EA	LF	EA	EA	LF
14+11.75	1		59						
21+01.85	2		58						
27+41.76	3		65		1				
55+97.55	4		60						
61+09.36	5		58		1		2	1	
69+67.02	6		141		1		2	2	
70+01.66	7		141						
82+41.59	8	70	60	15	1		2	1	100
95+62.96	9	28	61	6	1		2	1	50
110+09.30	10		60		1		2	2	
135+20.72	11		58		1		2	2	
139+83.58	12	87	63	18	1	90			
161+37.68	13		63						
179+78.04	14		65		1				
231+26.60	15		62		1				
243+13.20	16		35		1				
251+72.42	16A		63		1				100
252+13.37	17	149	66	29	1	124			
252+76.21	18	91	66	18	1		2	1	
268+98.30	18A		60		1				
282+10.08	19	171	71	32	1		2	2	
282+47.18	19A		59						
321+86.47	20		58		1		2	1	
334+71.83	21		59		2		2		
361+93.75	22	216	76	39	1		2	2	
390+52.95	23		62		1				
PROJECT TOTALS		**812**	**1,749**	**157**	**21**	**214**	**22**	**15**	**250**

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SUMMARY CROSS CULVERT QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	34
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022 FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\03 Quantity Summaries\FM510 SUMMARY OF DRAINAGE QUANTITIES 01.dgn

SUMMARY OF PAVEMENT MARKING QUANTITIES

SHEET SEQUENCE	ITEM			666	666	666	666	666	666	666	668	668	668	672	672	6056
	DESC. CODE			6036	6048	6141	6309 RE PM W/RET REQ TY I (W)6"(SLD) (100MIL)	6318 RE PM W/RET REQ TY I (Y)6"(BRK) (100MIL)	6321 RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD) (100MIL)	6077	6085	6089	6007	6009	6002
	LOCATION (STA TO STA)			REFL PAV MRK TY I (W)8"(SLD) (100MIL)	REFL PAV MRK TY I (W)24"(SLD) (100MIL)	REFL PAV MRK TY I (Y)12"(SLD) (100MIL)					PREFAB PAV MRK TY C (W) (ARROW)	PREFAB PAV MRK TY C (W) (WORD)	PREFAB PAV MRK TY C (W) (RR XING)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A	PREFORMED CENTERLINE RUMBLE STRIP
	CSJ: 1057-03-045			LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	LF
SHEET 1 OF 18	BEGIN	TO	8+00.00	350	114	535	1,510		1,980	1,510	3	3		170	105	620
	08+00.00	TO	20+00.00				2,400		2,400	2,400				25	31	1,200
SHEET 2 OF 18	20+00.00	TO	32+00.00				2,400	100	2,012	2,400				200	32	1,200
	32+00.00	TO	44+00.00				2,354	300	400	2,354					22	1,154
SHEET 3 OF 18	44+00.00	TO	56+00.00				2,400	300		2,400					16	1,200
	56+00.00	TO	68+00.00		12		2,320	290		2,320					15	1,120
SHEET 4 OF 18	68+00.00	TO	80+00.00		38		2,292	280		2,292					15	1,146
	80+00.00	TO	92+00.00				2,400	300		2,400					16	1,200
SHEET 5 OF 18	92+00.00	TO	104+00.00		12		2,362	290		2,362					15	1,162
	104+00.00	TO	116+00.00				2,347	290	1,054	2,347					28	1,147
SHEET 6 OF 18	116+00.00	TO	128+00.00		20		2,359	290	542	2,359					22	1,159
	128+00.00	TO	140+00.00				2,400	300		2,400					16	1,200
SHEET 7 OF 18	140+00.00	TO	152+00.00				2,400	300		2,400					16	1,200
	152+00.00	TO	164+00.00		24		2,260	290		2,260					15	1,139
SHEET 8 OF 18	164+00.00	TO	176+00.00				2,400	300	140	2,400					18	1,200
	176+00.00	TO	188+00.00				2,400	150	1,905	2,400					31	1,200
SHEET 9 OF 18	188+00.00	TO	200+00.00		12		2,350		2,300	2,350				342	29	1,150
	200+00.00	TO	212+00.00		24		2,245		2,244	2,245					28	1,044
SHEET 10 OF 18	212+00.00	TO	224+00.00				2,400	220	1,544	2,400				140	31	1,200
	224+00.00	TO	236+00.00				2,463	290	1,048	2,463				27	29	1,140
SHEET 11 OF 18	236+00.00	TO	248+00.00		12	224	2,340	240	1,510	2,340				32	72	1,140
	248+00.00	TO	260+00.00	252	96	605	2,140	70	2,615	2,140	2	2		15	145	1,112
SHEET 12 OF 18	260+00.00	TO	272+00.00		32		2,260	280		2,260					14	1,060
	272+00.00	TO	284+00.00				2,400	300		2,400					16	1,200
SHEET 13 OF 18	284+00.00	TO	296+00.00				2,400	300		2,400					16	1,200
	296+00.00	TO	308+00.00				2,400	300		2,400					16	1,200
SHEET 14 OF 18	308+00.00	TO	320+00.00				2,400	300		2,400					16	1,200
	320+00.00	TO	332+00.00				2,400	270	242	2,400					18	1,200
SHEET 15 OF 18	332+00.00	TO	344+00.00		96		2,200	60	1,846	2,200			2		28	1,045
	344+00.00	TO	356+00.00				2,400	280	100	2,400					18	1,200
SHEET 16 OF 18	356+00.00	TO	368+00.00				2,400	300		2,400					16	1,200
	368+00.00	TO	380+00.00				2,400	300		2,400					16	1,200
SHEET 17 OF 18	380+00.00	TO	392+00.00				2,400	300		2,400					16	1,200
	392+00.00	TO	404+00.00		47		2,262	290	516	2,262					21	1,177
SHEET 18 OF 18	404+00.00	TO	END		28		141		68	141					2	35
	PROJECT TOTALS			**602**	**567**	**1,364**	**79,405**	**7,880**	**24,466**	79,405	**5**	**5**	**2**	**951**	**960**	**39,150**

(*) PROFILE PAVEMENT MARKING QUANTITIES ACCOUNT FOR TWO APPLICATIONS OF PAINT AT 100 MIL THICKNESS TO PROVIDE MINIMUM 300 MIL IN HEIGHT THAT IS REQUIRED BY STANDARD PM(2)-12.

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SUMMARY OF PAVEMENT MARKING QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	35
CONTROL	SECTION	JOB	
1057	03	045	

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SEE LEGEND FOR CLARIFICATION	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT / BM / WC / EXAL	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
								FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY = TYPE TY N TY S
1	01	W1-2(L) W13-1P	01	40	36 X 36 18 X 18	A A		S80	1	SA	P		
1	02	W1-8L W1-8R	02		30 X 36 30 X 36	A A		10BWG	1	SA	P		
1	03	R1-1	03 03	STOP	36 X 36	A		S80	1	SA	P		
1	04	M3-4 M1-6F M6-3 M3-4 M1-6F M6-1	04 04	WEST 3462 WEST 510	24 X 12 24 X 24 21 X 15 24 X 12 24 X 24 21 X 15	A A A A A A		S80	1	SA	U		
1	05	W1-8L W1-8R	05		30 X 36 30 X 36	A A		10BWG	1	SA	P		
1	06	W1-8L W1-8R	06		30 X 36 30 X 36	A A		10BWG	1	SA	P		
1	07	M3-4 M1-6F	07 07	WEST 510	24 X 12 24 X 24	A A		S80	1	SA	P		
1	08	W1-9TL	08		96 X 36	A		S80	1	SA	P		
1	09	W1-8R W1-8L	09		30 X 36 30 X 36	A A		10BWG	1	SA	P		
1	10	W1-9TR	10		96 X 36	A		S80	1	SA	P		
1	11	W1-8L W1-8R	11		30 X 36 30 X 36	A A		10BWG	1	SA	P		
1	12	W2-2R(L)	12 12		36 X 36	A		S80	1	SA	P		
1	13	W1-8L W1-8R	13		30 X 36 30 X 36	A A		10BWG	1	SA	P		

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

LEGEND:

- SIGN TO BE RELOCATED
- SIGN TO BE REMOVED
- SIGN TO BE INSTALLED
- SIGN TO REMAIN IN PLACE
- SIGN TO BE REMOVED AND REINSTALLED

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).

FM 510

SHEET 1 OF 9

Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT 1057	SECT 03	JOB 045	HIGHWAY FM 510
REVISIONS 4-16 8-16	DIST PHARR	COUNTY CAMERON		SHEET NO. 36

18

DATE: 6/27/2022 4:44:39 PM
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\SOSS

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SEE LEGEND FOR CLARIFICATION	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
1	14	W1-2aR	14	40	36 X 36	A		S80	1	SA	P		
1	15	W1-8R W1-8L	15		30 X 36 30 X 36	A A		10BWG	1	SA	P		
1	16	M2-1 M1-6F	16 16	JCT FARM 3462 ROAD	21 X 15 24 X 24	A A		S80	1	SA	P		
1	17	W1-2(R) W13-1P	17 17	40	36 X 36 18 X 18	A A		S80	1	SA	P		
1	18	W1-2(R) W13-1P	18 18	45	36 X 36 18 X 18	A A		S80	1	SA	P		
2	01	W1-2aR	01	45	36 X 36	A		S80	1	SA	P		
2	02	W1-2aL	02	45	36 X 36	A		S80	1	SA	P		
2	03	R2-1	03	SPEED LIMIT 55	30 X 36	A		S80	1	SA	P		
2	04	W1-2(L) W13-1P	04 04	45	36 X 36 18 X 18	A A		S80	1	SA	P		
2	05	R2-1	05 05	SPEED LIMIT 55	30 X 36	A		S80	1	SA	P		
2	06	D21-1TR	06 06	Casey Rd ⇨	66 X 12	A		S80	1	SA	T		
3	01	D21-1TL	01 01	⇦ Casey Rd	66 X 12	A		S80	1	SA	T		
3	02	R1-1	02 02	STOP	36 X 36	A		S80	1	SA	P		
3	03	D21-1TDBL	03	⇔ Nelson Rd	72 X 12	A		S80	1	SA	T		
4	01	R1-1	01 01	STOP	36 X 36	A		S80	1	SA	P		

LEGEND:

- SIGN TO BE RELOCATED
- SIGN TO BE REMOVED
- SIGN TO BE INSTALLED
- SIGN TO REMAIN IN PLACE
- SIGN TO BE REMOVED AND REINSTALLED

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).

FM 510

SHEET 2 OF 9

Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 4-16 8-16	DIST PHARR		COUNTY CAMERON	SHEET NO. 37

18

DATE: 6/27/2022 4:44:39 PM
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\10 Signing Striping

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SEE LEGEND FOR CLARIFICATION	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE: FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80	POSTS: 1 or 2	ANCHOR TYPE: UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic	MOUNTING DESIGNATION – PREFABRICATED: P = "Plain", T = "T", U = "U"	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext, BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE: TY N, TY S
4	02	R1-1	◇02 (02)	STOP	36 X 36	A		S80	1	SA	P		
4	03	D21-1TDBL	(03)	⇔ Nelson Rd	72 X 12	A		S80	1	SA	T		
5	01	D21-1TR	(01)	Glenwood Rd ⇨	84 X 12	A		S80	1	SA	T		
5	02	D21-1TL	(02)	⇦ Glenwood Rd	84 X 12	A		S80	1	SA	T		
5	03	M3-2 M1-6F	◇03 (03)	EAST FARM 510 ROAD	24 X 12 24 X 24	A A		S80	1	SA	P		
5	04	D21-1TR	◇04 (04)	Green Valley Dr ⇨	96 X 12	A		S80	1	SA	T		
6	01	R2-1	◇01 (01)	SPEED LIMIT 55	30 X 36	A		S80	1	SA	P		
6	02	D21-1TL	◇02 (02)	⇦ Green Valley Dr	96 X 12	A		S80	1	SA	T		
7	01	D21-2T	◇01 (01)	⇦ Vasquez Rd Adams Rd ⇨	72 X 24	A		S80	1	SA	T		
7	02	R1-1	◇02 (02)	STOP	36 X 36	A		S80	1	SA	P		
7	03	R1-1	◇03 (03)	STOP	36 X 36	A		S80	1	SA	P		
7	04	R2-1	◇04 (04)	SPEED LIMIT 55	30 X 36	A		S80	1	SA	P		
8	01	D21-2T	◇01 (01)	⇦ Adams Rd Vasquez Rd ⇨	72 X 24	A		S80	1	SA	T		
8	02	W1-2(R) W13-1P	(02)	(curve warning) 40 MPH	36 X 36 18 X 18	A A		S80	1	SA	P		
9	01	R1-1	◇01 (01)	STOP	36 X 36	A		S80	1	SA	P		

LEGEND:

- (#) with triangle/circle: SIGN TO BE RELOCATED
- △#: SIGN TO BE REMOVED
- (#): SIGN TO BE INSTALLED
- (*): SIGN TO REMAIN IN PLACE
- ◇# (#): SIGN TO BE REMOVED AND REINSTALLED

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).

FM 510

SHEET 3 OF 9

Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT 1057	SECT 03	JOB 045	HIGHWAY FM 510
REVISIONS 4-16 8-16	DIST PHARR	COUNTY CAMERON		SHEET NO. 38

DATE: 6/27/2022 4:44:40 PM
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\10 Signing Striping

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SEE LEGEND FOR CLARIFICATION	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
9	02	W1-2aR	02		36 X 36	A		S80	1	SA	P		
9	03	W1-2aL	03		36 X 36	A		S80	1	SA	P		
9	04	R1-1	02 04		36 X 36	A		S80	1	SA	P		
9	05	W1-2(L) W13-1P	05		36 X 36 18 X 18	A A		S80	1	SA	P		
9	06	W1-2(L) W13-1P	06		36 X 36 18 X 18	A A		S80	1	SA	P		
9	07	R1-1	07 07		36 X 36	A		S80	1	SA	P		
9	08	W1-8L W1-8R	08		30 X 36 30 X 36	A A		10BWG	1	SA	P		
9	09	W1-2aL	09		36 X 36	A		S80	1	SA	P		
9	10	W1-8L W1-8R	10		30 X 36 30 X 36	A A		10BWG	1	SA	P		
10	01	W1-8L W1-8R	01		30 X 36 30 X 36	A A		10BWG	1	SA	P		
10	02	W1-8L W1-8R	02		30 X 36 30 X 36	A A		10BWG	1	SA	P		
10	03	W1-2aR	03		36 X 36	A		S80	1	SA	P		
10	04	W1-8L W1-8R	04		30 X 36 30 X 36	A A		10BWG	1	SA	P		
10	05	W1-2(R) W13-1P	05		36 X 36 18 X 18	A A		S80	1	SA	P		
10	06	W1-2(R) W13-1P	06		36 X 36 18 X 18	A A		S80	1	SA	P		

LEGEND:

- (#) SIGN TO BE RELOCATED
- (#) SIGN TO BE REMOVED
- (#) SIGN TO BE INSTALLED
- (*) SIGN TO REMAIN IN PLACE
- (#)(#) SIGN TO BE REMOVED AND REINSTALLED

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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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.
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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

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Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-16 8-16	1057	053	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHR	CAMERON		39

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DATE: 6/27/2022 4:44:41 PM
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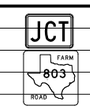
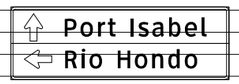
SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SEE LEGEND FOR CLARIFICATION	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
10	07	W1-2aR	(07)		36 X 36	A		S80	1	SA	P		
10	08	M2-1 M1-6F	(08)		21 X 15 24 X 24	A A		S80	1	SA	P		
11	01	W1-2aL	(01)		36 X 36	A		S80	1	SA	P		
11	02	W1-2(L) W13-1P	(02)		36 X 36 18 X 18	A A		S80	1	SA	P		
11	03	W3-1	(03)		36 x 36	A		S80	1	SA	P		
11	04	R2-1	(04)		30 X 36	A		S80	1	SA	P		
11	05	R1-1	(05)		36 X 36	A		S80	1	SA	P		
11	06	W2-2L	(06)		36 X 36	A		S80	1	SA	P		
11	07	M3-4 M1-6F	(07)		24 X 12 24 X 24	A A		S80	1	SA	P		
11	08	D1-2	(08)		72 X 24	A		S80	1	SA	T		
11	09	M1-6F M6-3 M1-6F M6-4	(09)		24 X 24 21 X 15 24 X 24 21 X 15	A A A A		S80	1	SA	U		
11	10	R1-1 R1-3P	(10)		36 X 36 30 X 12	A A		S80	1	SA	P		

LEGEND:

- (#) SIGN TO BE RELOCATED
- (#) SIGN TO BE REMOVED
- (#) SIGN TO BE INSTALLED
- (*) SIGN TO REMAIN IN PLACE
- (#)(#) SIGN TO BE REMOVED AND REINSTALLED

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.

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NOTE:

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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

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SHEET 5 OF 9

Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
4-16	DIST	COUNTY		SHEET NO.
8-16	PHARR	CAMERON		40

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SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SEE LEGEND FOR CLARIFICATION	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
								FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
		M1-6F		FARM 510 ROAD	24 X 24	A							
		M6-4			21 X 15	A							
11	11		(11)					S80	1	SA	U		
		M1-6F		FARM 803 ROAD	24 X 24	A							
		M6-3			21 X 15	A							
11	12	R1-1	(12)	STOP ALL WAY	36 X 36	A		S80	1	SA	T		
		R1-3P			30 X 12	A							
11	13	R1-1	(13)	STOP ALL WAY	36 X 36	A		S80	1	SA	T		
		R1-3P			30 X 12	A							
11	14	R1-1	(14)	STOP ALL WAY	36 X 36	A		S80	1	SA	T		
		R1-3P			30 X 12	A							
11	15	R4-2	(15)	PASS WITH CARE	36 X 48	A		S80	1	SA	P		
11	16	M3-2	(16)	EAST FARM 510 ROAD	24 X 12	A		S80	1	SA	P		
		M1-6F			24 X 24	A							
11	17	D1-2	(17)	San Benito Rio Hondo	72 X 24	A		S80	1	SA	T		
11	18	R4-2	(18)	PASS WITH CARE	36 X 48	A		S80	1	SA	P		
11	19	R1-1	(19)	STOP	36 X 36	A		S80	1	SA	P		
11	20	R2-1	(20)	SPEED LIMIT 55	30 X 36	A		S80	1	SA	P		
11	21	R4-1	(21)	DO NOT PASS	36 X 48	A		S80	1	SA	P		

LEGEND:

- (#) SIGN TO BE RELOCATED
- (#) SIGN TO BE REMOVED
- (#) SIGN TO BE INSTALLED
- (*) SIGN TO REMAIN IN PLACE
- (#)(#) SIGN TO BE REMOVED AND REINSTALLED

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.

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NOTE:

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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

FM 510

SHEET 6 OF 9

Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		1057	03	045	FM 510
4-16		DIST	COUNTY		SHEET NO.
8-16		PHARR	CAMERON		41

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DATE: 6/27/2022 4:44:42 PM
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SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SEE LEGEND FOR CLARIFICATION	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)					BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
								POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		TY = TYPE
								FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY N TY S
12	01	W3-1	01 01		36 X 36	A		S80	1	SA	P		
12	02	R1-1	02 02	STOP	36 X 36	A		S80	1	SA	P		
12	03	M2-1 M1-6F	03 03	JCT FARM 803 ROAD	21 X 15 24 X 24	A A		S80	1	SA	P		
12	04	R1-1	02 04	STOP	36 X 36	A		S80	1	SA	P		
14	01	M3-2 M1-6F	01 01	EAST FARM 510 ROAD	24 X 12 24 X 24	A A		S80	1	SA	P		
14	02	R2-1	02 02	SPEED LIMIT 55	30 X 36	A		S80	1	SA	P		
15	01	D1-1	01 01	Laureles ⇨	66 X 12	A		S80	1	SA	T		
15	02	M3-4 M1-6F	02 02	WEST FARM 510 ROAD	24 X 12 24 X 24	A A		S80	1	SA	P		
15	03	W10-1	03 03	R R	36" DIA	A		S80	1	SA	P		
15	04	M1-6F M6-3 M1-6F M6-1	04 04	FARM 510 ROAD ⇧ FARM 1575 ROAD ⇨	24 X 24 21 X 15 24 X 24 21 X 15	A A A A		S80	1	SA	U		
15	05	W1-7T	05 05	⇔	96 X 36	A		S80	1	SA	T		
15	06	M1-6F M6-4	06 06	FARM 510 ROAD ⇔	24 X 24 21 X 15	A A		S80	1	SA	P		

LEGEND:

- (#) SIGN TO BE RELOCATED
- (#) SIGN TO BE REMOVED
- (#) SIGN TO BE INSTALLED
- (*) SIGN TO REMAIN IN PLACE
- (#)(#) SIGN TO BE REMOVED AND REINSTALLED

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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Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
4-16 8-16	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		42

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DATE: 6/27/2022 4:44:43 PM
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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SEE LEGEND FOR CLARIFICATION	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE (FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80)	POSTS (1 or 2)	ANCHOR TYPE (UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic)	MOUNTING DESIGNATION: PREFABRICATED (P = "Plain", T = "T", U = "U")	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext, BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE (TY N, TY S)
15	07	R1-1	07 07	STOP	36 X 36	A		S80	1	SA	P		
				FARM 1575 ROAD									
		M1-6F			24 X 24	A							
		M6-1			21 X 15	A							
15	08		08 08					S80	1	SA	U		
		M1-6F		FARM 510 ROAD	24 X 24	A							
		M6-3			21 X 15	A							
15	09	R8-8	09 09	DO NOT STOP ON TRACKS	36 X 48	A		S80	1	SA	P		
				EAST									
15	10	M3-2	10 10	FARM 510 ROAD	24 X 12	A		S80	1	SA	P		
		M1-6F			24 X 24	A							
15	11	R8-8	11 11	DO NOT STOP ON TRACKS	36 X 48	A		S80	1	SA	P		
15	12	D1-1	12 12	Laureles	66 X 12	A		S80	1	SA	T		
15	13	W10-1	13 13	R R	36" DIA	A		S80	1	SA	P		
15	14	R4-2	14	PASS WITH CARE	36 X 48	A		S80	1	SA	P		
15	15	R2-1	15 15	SPEED LIMIT 55	30 X 36	A		S80	1	SA	P		
				JCT									
15	16	M2-1	16 16	FARM 1575 ROAD	21 X 15	A		S80	1	SA	P		
		M1-6F			24 X 24	A							
				JCT									
17	01	M2-1	01 01	FARM 1847 ROAD	21 X 15	A		S80	1	SA	P		
		M1-6F			24 X 24	A							
17	02	W3-1	02 02		36 X 36	A		S80	1	SA	P		

LEGEND:

- (#) SIGN TO BE RELOCATED
- (#) SIGN TO BE REMOVED
- (#) SIGN TO BE INSTALLED
- (*) SIGN TO REMAIN IN PLACE
- (#)(#) SIGN TO BE REMOVED AND REINSTALLED

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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SHEET 8 OF 9

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
4-16	DIST	COUNTY		SHEET NO.
8-16	PHARR	CAMERON		43

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DATE: 6/27/2022 4:44:43 PM
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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SEE LEGEND FOR CLARIFICATION	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
17	03	D1-3	03 03	⇦ Arroyo Colorado Los Fresnos ⇨ Brownsville ⇨	96 X 36	A		S80	1	SA	U		
17	04	M3-4 M1-6F	04 04	WEST FARM 510 ROAD	24 X 12 24 X 24	A A		S80	1	SA	P		
17	05	M1-6F M6-4	05 05	FARM 1847 ROAD ⇔	24 X 24 21 X 15	A A		S80	1	SA	P		
17	06	R1-1	06 06	STOP	36 X 36	A		S80	1	SA	P		
17	07	R1-1	07 07	STOP	36 X 36	A		S80	1	SA	P		
17	08	R1-1	08 08	STOP	36 X 36	A		S80	1	SA	P		
18	01	R1-1	01 01	STOP	36 X 36	A		S80	1	SA	P		
18	02	R1-1	02 02	STOP	36 X 36	A A		S80	1	SA	P		
18	03	M1-6F M6-4	03 03	FARM 1847 ROAD ⇔	24 X 24 21 X 15	A A		S80	1	SA	P		

LEGEND:

- SIGN TO BE RELOCATED
- SIGN TO BE REMOVED
- SIGN TO BE INSTALLED
- SIGN TO REMAIN IN PLACE
- SIGN TO BE REMOVED AND REINSTALLED

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
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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).

FM 510

SHEET 9 OF 9

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
4-16 8-16	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		44

18

DATE: 6/27/2022 4:44:44 PM
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\10 Signing Striping and Lighting\sums16.dgn

SUMMARY OF SIGNING QUANTITIES

SHEET SEQUENCE	ITEM / DESC. CODE / LOCATION (STA TO STA)			636 6001 ALUMINUM SIGNS (TY A)	644 6001 IN SM RD SN SUP&AM TY10BWG(1) SA(P)	644 6027 IN SM RD SN SUP&AM TYS80(1)SA (P)	644 6030 IN SM RD SN SUP&AM TYS80(1)SA (T)	644 6033 IN SM RD SN SUP&AM TYS80(1) SA(U)	644 6076 REMOVE SM RD SN SUP&AM
	CSJ: 1057-03-045			SF	EA	EA	EA	EA	EA
SHEET 1 OF 18	BEGIN	TO	8+00.00		5	5		1	7
	08+00.00	TO	20+00.00		2	5			4
SHEET 2 OF 18	20+00.00	TO	32+00.00			2			
	32+00.00	TO	44+00.00	5.50		3	1		3
SHEET 3 OF 18	44+00.00	TO	56+00.00	5.50			1		1
	56+00.00	TO	68+00.00	6.00		1	1		2
SHEET 4 OF 18	68+00.00	TO	80+00.00	6.00		2	1		3
	80+00.00	TO	92+00.00						
SHEET 5 OF 18	92+00.00	TO	104+00.00	7.00			1		1
	104+00.00	TO	116+00.00	15.00		1	2		3
SHEET 6 OF 18	116+00.00	TO	128+00.00	8.00		1	1		2
	128+00.00	TO	140+00.00						
SHEET 7 OF 18	140+00.00	TO	152+00.00						
	152+00.00	TO	164+00.00	12.00		3	1		4
SHEET 8 OF 18	164+00.00	TO	176+00.00	12.00			1		1
	176+00.00	TO	188+00.00			1			1
SHEET 9 OF 18	188+00.00	TO	200+00.00			3			1
	200+00.00	TO	212+00.00		2	5			2
SHEET 10 OF 18	212+00.00	TO	224+00.00		3	2			
	224+00.00	TO	236+00.00			3			2
SHEET 11 OF 18	236+00.00	TO	248+00.00			7			5
	248+00.00	TO	260+00.00	24.00		7	5	2	14
SHEET 12 OF 18	260+00.00	TO	272+00.00			4			4
	272+00.00	TO	284+00.00						
SHEET 13 OF 18	284+00.00	TO	296+00.00						
	296+00.00	TO	308+00.00						
SHEET 14 OF 18	308+00.00	TO	320+00.00						
	320+00.00	TO	332+00.00			2			2
SHEET 15 OF 18	332+00.00	TO	344+00.00	11.00		10	3	2	14
	344+00.00	TO	356+00.00			1			1
SHEET 16 OF 18	356+00.00	TO	368+00.00						
	368+00.00	TO	380+00.00						
SHEET 17 OF 18	380+00.00	TO	392+00.00			1			1
	392+00.00	TO	404+00.00	24.00		6		1	7
SHEET 18 OF 18	404+00.00	TO	END			3			3
	PROJECT TOTALS			136.00	12	78	18	6	88

SUMMARY OF SITE CLEANING ITEMS

STATION	RT/LT	752 6003 TREE TRIMMING / BRUSH REMOVAL	752 6006 TREE REMOVAL (12" - 18" DIA)
CSJ: 1057-03-045		MI	EA
72+60	LT		1
84+64	LT		1
186+20	RT		1
186+50	RT		1
187+20	RT		1
188+43	RT		1
188+57	RT		1
256+79	LT		1
266+15	RT		1
338+88	LT		1
386+00	RT		1
393+20	RT		1
PROJECT TOTALS		1	12

SUMMARY OF MAILBOX ITEMS

STATION	RT/LT	560 6003 MAILBOX INSTALL-M (TWG-POST) TY 1	560 6007 MAILBOX INSTALL-S (WC-POST) TY 3	560 6008 MAILBOX INSTALL-D (WC-POST) TY 3
CSJ: 1057-03-045		EA	EA	EA
10+85	RT		1	
24+06	RT		1	
29+04	RT		1	
29+42	LT		1	
43+35	LT		1	
44+60	LT		1	
45+32	LT		1	
47+28	LT		1	
48+74	LT		1	
54+93	RT		1	
55+55	LT		1	
57+52	RT			1
57+58	RT		1	
58+56	LT		1	
58+70	RT		1	
59+81	LT		1	
73+34	LT		1	
78+36	RT		1	
108+43	RT		1	
108+45	LT		1	
111+00	RT		1	
114+56	RT		1	
137+81	LT		1	
138+69	LT		1	
140+93	LT		1	
141+93	LT		1	
145+02	RT		1	
146+48	LT		1	
146+91	LT		1	
160+91	RT		1	
165+70	LT		1	
166+70	LT		1	
168+03	LT		1	
168+73	LT		1	
170+56	LT		1	
171+48	RT		1	
171+51	RT		1	
171+89	LT		1	
172+88	RT		1	
173+73	LT			1
173+96	RT		1	
175+46	LT		1	
175+88	RT		1	
176+80	LT		1	
178+36	LT		1	
179+17	LT		1	
181+32	LT		1	
183+71	LT		1	
185+48	LT		1	
185+71	RT		1	
188+38	LT			1
188+48	LT		1	
189+38	LT			1
189+88	RT		1	
191+16	LT		1	
193+01	LT		1	
194+07	RT		1	
194+48	LT		1	
196+99	RT		1	
197+47	LT		1	
198+30	RT		1	
203+10	RT		1	
210+13	RT		1	
211+25	RT		1	
213+56	RT		1	
215+22	RT		1	
216+39	RT		1	
218+25	RT		1	
219+32	RT		1	
220+06	RT		1	

SUMMARY OF MAILBOX ITEMS

STATION	RT/LT	560 6003 MAILBOX INSTALL-M (TWG-POST) TY 1	560 6007 MAILBOX INSTALL-S (WC-POST) TY 3	560 6008 MAILBOX INSTALL-D (WC-POST) TY 3
221+17	RT		1	
222+41	RT		1	
223+13	RT		1	
224+00	RT		1	
228+19	RT		1	
229+22	RT		1	
235+69	RT		1	
238+64	RT		1	
238+99	RT		1	
241+31	RT			1
242+10	LT		1	
245+01	LT		1	
245+97	LT		1	
246+77	LT		1	
247+96	LT		1	
250+23	LT		1	
254+61	RT		1	
258+32	RT		1	
259+85	RT		1	
263+55	RT		1	
264+96	RT		1	
267+34	RT		1	
267+93	RT		1	
268+30	LT		1	
269+63	RT		1	
276+90	RT		1	
278+20	LT		1	
281+35	LT		1	
295+33	LT		1	
295+79	RT		1	
296+44	LT		1	
297+98	RT		1	
298+23	LT		1	
299+17	LT		1	
300+05	LT		1	
300+95	LT		1	
302+20	RT		1	
303+88	LT		1	
304+41	LT		1	
304+78	RT		1	
305+80	RT		1	
308+57	LT		1	
309+97	LT		1	
310+84	LT		1	
311+18	RT	1		
311+59	LT		1	
312+49	LT		1	
314+57	RT		1	
314+77	LT		1	
315+59	LT		1	
315+97	RT		1	
316+49	LT		1	
317+27	LT		1	
318+35	RT		1	
318+38	LT		1	
320+12	RT		1	
320+34	LT		1	
335+45	RT		1	
377+06	RT		1	
379+09	RT		1	
380+68	RT		1	
381+76	RT		1	
382+88	RT		1	
382+94	RT		1	
384+31	LT		1	
385+98	LT		1	
388+40	LT		1	
389+50	LT		1	
391+16	LT		1	
393+22	LT		1	
PROJECT TOTALS		1	134	5

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SUMMARY OF SIGNING AND MAILBOX QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	45
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&P#SUMMARY OF SIGNING#QUANTITIES.dgn
DRAWING DATE: 6/27/2022

SUMMARY OF EROSION CONTROL DEVICES

LOCATION (STA TO STA)			164 6009 BROADCAST SEED (TEMP) (WARM)	164 6011 BROADCAST SEED (TEMP) (COOL)	166 6002 FERTILIZER	168 6001 VEGETATIVE WATERING	506 6020 CONSTRUCTION EXITS (INSTALL) (TY 1)	506 6024 CONSTRUCTION EXITS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)	506 6041 BIODEG EROSN CONT LOGS (INSTL) (12")	506 6043 BIODEG EROSN CONT LOGS (REMOVE)
			SY	SY	TON	MG	SY	SY	LF	LF	LF	LF
BEGIN CSJ: 1057-03-045												
PHASE 1												
BEGIN	TO	08+00.00										
08+00.00	TO	20+00.00										
20+00.00	TO	32+00.00							80		120	
32+00.00	TO	44+00.00										
44+00.00	TO	56+00.00										
56+00.00	TO	68+00.00									60	
68+00.00	TO	80+00.00										
80+00.00	TO	92+00.00										
92+00.00	TO	104+00.00							90		90	
104+00.00	TO	116+00.00									60	
116+00.00	TO	128+00.00										
128+00.00	TO	140+00.00									60	
140+00.00	TO	152+00.00							80		120	
152+00.00	TO	164+00.00										
164+00.00	TO	176+00.00										
176+00.00	TO	188+00.00										
188+00.00	TO	200+00.00									60	
200+00.00	TO	212+00.00										
212+00.00	TO	224+00.00										
224+00.00	TO	236+00.00										
236+00.00	TO	248+00.00										
248+00.00	TO	260+00.00							90			
260+00.00	TO	272+00.00										
272+00.00	TO	284+00.00									30	
284+00.00	TO	296+00.00										
296+00.00	TO	308+00.00									30	
308+00.00	TO	320+00.00										
320+00.00	TO	332+00.00										
332+00.00	TO	344+00.00									90	
344+00.00	TO	356+00.00									30	
356+00.00	TO	368+00.00							90		120	
368+00.00	TO	380+00.00										
380+00.00	TO	392+00.00									30	
392+00.00	TO	404+00.00										
404+00.00	TO	END										
PHASE 2												
BEGIN	TO	08+00.00	6,307	6,307	0.33	0.3	156	156			338	
08+00.00	TO	20+00.00	5,482	5,482	0.28	0.3					1,451	
20+00.00	TO	32+00.00	5,061	5,061	0.26	0.3					478	
32+00.00	TO	44+00.00	5,182	5,182	0.27	0.3					925	
44+00.00	TO	56+00.00	4,970	4,970	0.26	0.2					1,188	
56+00.00	TO	68+00.00	4,899	4,899	0.25	0.2					120	
68+00.00	TO	80+00.00	4,995	4,995	0.26	0.2					855	
80+00.00	TO	92+00.00	5,258	5,258	0.27	0.3					759	
92+00.00	TO	104+00.00	5,259	5,259	0.27	0.3					1,031	

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SUMMARY OF SW3P QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	46
CONTROL	SECTION	JOB	
1057	03	045	

SUMMARY OF EROSION CONTROL DEVICES

LOCATION (STA TO STA)			164	164	166	168	506	506	506	506	506	506
			6009	6011	6002	6001	6020	6024	6038	6039	6041	6043
			BROADCAST SEED (TEMP) (WARM)	BROADCAST SEED (TEMP) (COOL)	FERTILIZER	VEGETATIVE WATERING	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
			SY	SY	TON	MG	SY	SY	LF	LF	LF	LF
104+00.00	TO	116+00.00	4,964	4,964	0.26	0.2					421	
116+00.00	TO	128+00.00	4,827	4,827	0.25	0.2					682	
128+00.00	TO	140+00.00	5,221	5,221	0.27	0.3					341	
140+00.00	TO	152+00.00	4,963	4,963	0.26	0.2					502	
152+00.00	TO	164+00.00	5,135	5,135	0.27	0.3					360	
164+00.00	TO	176+00.00	4,399	4,399	0.23	0.2					240	
176+00.00	TO	188+00.00	4,868	4,868	0.25	0.2					437	
188+00.00	TO	200+00.00	4,470	4,470	0.23	0.2					1,030	
200+00.00	TO	212+00.00	4,964	4,964	0.26	0.2					240	
212+00.00	TO	224+00.00	4,947	4,947	0.26	0.2					809	
224+00.00	TO	236+00.00	4,886	4,886	0.25	0.2					784	
236+00.00	TO	248+00.00	4,838	4,838	0.25	0.2					1,028	
248+00.00	TO	260+00.00	4,196	4,196	0.22	0.2					240	
260+00.00	TO	272+00.00	4,896	4,896	0.25	0.2					547	
272+00.00	TO	284+00.00	4,976	4,976	0.26	0.2					947	
284+00.00	TO	296+00.00	5,140	5,140	0.27	0.3					552	
296+00.00	TO	308+00.00	4,500	4,500	0.23	0.2					360	
308+00.00	TO	320+00.00	4,422	4,422	0.23	0.2					240	
320+00.00	TO	332+00.00	4,993	4,993	0.26	0.2					1,710	
332+00.00	TO	344+00.00	5,134	5,134	0.27	0.3					2,079	
344+00.00	TO	356+00.00	5,296	5,296	0.27	0.3					2,581	
356+00.00	TO	368+00.00	5,296	5,296	0.27	0.3					1,911	
368+00.00	TO	380+00.00	5,142	5,142	0.27	0.3					2,589	
380+00.00	TO	392+00.00	4,597	4,597	0.24	0.2					1,068	
392+00.00	TO	404+00.00	4,736	4,736	0.24	0.2					452	
404+00.00	TO	END					156	156				
PHASE 3												
BEGIN	TO	08+00.00										338
08+00.00	TO	20+00.00										1,451
20+00.00	TO	32+00.00								80		598
32+00.00	TO	44+00.00										925
44+00.00	TO	56+00.00										1,188
56+00.00	TO	68+00.00										180
68+00.00	TO	80+00.00										855
80+00.00	TO	92+00.00										759
116+00.00	TO	128+00.00										682
128+00.00	TO	140+00.00										401
140+00.00	TO	152+00.00								80		622
152+00.00	TO	164+00.00										360
164+00.00	TO	176+00.00										240
176+00.00	TO	188+00.00										437
188+00.00	TO	200+00.00										1,090
200+00.00	TO	212+00.00										240
212+00.00	TO	224+00.00										809
224+00.00	TO	236+00.00										784
236+00.00	TO	248+00.00										1,028
248+00.00	TO	260+00.00								90		240

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SUMMARY OF SW3P QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	47
CONTROL	SECTION	JOB	
1057	03	045	

SUMMARY OF EROSION CONTROL DEVICES

LOCATION (STA TO STA)			164	164	166	168	506	506	506	506	506	506
			6009	6011	6002	6001	6020	6024	6038	6039	6041	6043
			BROADCAST SEED (TEMP) (WARM)	BROADCAST SEED (TEMP) (COOL)	FERTILIZER	VEGETATIVE WATERING	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
			SY	SY	TON	MG	SY	SY	LF	LF	LF	LF
260+00.00	TO	272+00.00										547
272+00.00	TO	284+00.00										977
284+00.00	TO	296+00.00										552
296+00.00	TO	308+00.00										390
308+00.00	TO	320+00.00										240
320+00.00	TO	332+00.00										1,710
332+00.00	TO	344+00.00										2,169
344+00.00	TO	356+00.00										2,611
356+00.00	TO	368+00.00								90		2,031
368+00.00	TO	380+00.00										2,589
380+00.00	TO	392+00.00										1,098
392+00.00	TO	404+00.00										452
404+00.00	TO	END						134				
TOTAL CSJ: 1057-03-045			169,219	169,219	8.74	8.1	312	446	430	430	30,195	30,195
PROJECT TOTALS			**169,219**	**169,219**	**8.74**	**8.1**	**312**	**446**	**430**	**430**	**30,195**	**30,195**

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\03 Quantity Summaries\FM510#SUM#SW3P#03.dgn

DRAWING DATE: 6/27/2022

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SUMMARY OF SW3P QUANTITIES

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	48
CONTROL	SECTION	JOB	
1057	03	045	

GENERAL:

USE A POWER-BROOM WHEN CLEANING THE ROADWAY IS NEEDED.

REMOVE & DISPOSE ALL MATERIAL NOT DEEMED SALVAGEABLE BY THE ENGINEER, UNLESS OTHERWISE SHOWN ON THE PLANS.

ON EXISTING PAVEMENT THAT WILL REMAIN IN PLACE, SAND BLAST OR SURFACE TREAT IN ORDER TO REMOVE EXISTING STRIPING.

DO NOT BLOCK DRAINAGE WHEN HANDLING & STOCKPILING EXCAVATED MATERIAL.

MAINTAIN ACCESS TO DRIVEWAYS AND INTERSECTIONS THROUGH ALL PHASES OF CONSTRUCTION.

MAINTAIN POSITIVE DRAINAGE DURING ALL PHASES OF CONSTRUCTION.

ALWAYS COMPLETE THE PROPOSED DRIVEWAYS DURING THEIR TCP PHASE BEFORE SWITCHING TRAFFIC TO A NEW PHASE UNLESS DIRECTED BY THE ENGINEER.

CONTRACTOR WILL NOT BE ALLOWED TO COMBINE PHASE/SEGMENT/STEPS WITHOUT APPROVAL FROM THE ENGINEER.

TRAFFIC CONTROL DEVICES:

AT THE COMMENCEMENT OF THE PROJECT, ALL TRAFFIC CONTROL DEVICES SHALL BE IN ACCEPTABLE CONDITION, AND MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT, AS PER GUIDELINES FOR TEMPORARY TRAFFIC CONTROL DEVICES AND FEATURES.

NOTIFY THE AREA ENGINEER(AE) IN WRITING(E-MAIL IS ACCEPTABLE) ONCE THE TRAFFIC CONTROL PLAN(TCP) AND ALL TRAFFIC CONTROL DEVICES HAVE BEEN INSTALLED AS PER PLANS ON THE PROJECT SO THAT THE DEPARTMENT'S RESPONSIBLE PERSON ACCOMPANIED BY THE CONTRACTOR'S RESPONSIBLE PERSON CAN CONDUCT A NIGHT INSPECTION ON THE SAID TCP AND TRAFFIC CONTROL DEVICES. COMMENCEMENT OF WORK WILL NOT BE AUTHORIZED NOR ALLOWED UNTIL THE AE NOTIFIES THE CONTRACTOR IN WRITING(E-MAIL IS ACCEPTABLE) TO PROCEED WITH THE WORK.

CONTRACTOR SHALL HAVE A SUFFICIENT AMOUNT OF TRAFFIC CONTROL DEVICES IN ACCEPTABLE CONDITION TO REPLACE ANY DAMAGED TRAFFIC CONTROL DEVICE WITHIN 24 HOURS OF NOTIFICATION.

PROVIDE ADDITIONAL SIGNS AND BARRICADES AS NECESSARY TO ADDRESS FIELD CONSTRUCTIBILITY & VISIBILITY. THESE ADDITIONAL SIGNS WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.

REMOVE OR COMPLETELY COVER ALL EXISTING SIGNS WHICH ARE IN CONFLICT WITH THE TRAFFIC CONTROL PLAN.

ADJUST STOP SIGNS AS NEEDED ON INTERSECTING STREETS DURING THE VARIOUS CONSTRUCTION PHASES. DO NOT REMOVE ANY EXISTING STOP SIGNS UNTIL TEMPORARY SIGNS ARE IN PLACE.

COORDINATE THE TRAFFIC CONTROL PLAN AND THE VARIOUS SEQUENCES OF CONSTRUCTION WITH ADJACENT CONSTRUCTION PROJECTS IF APPLICABLE, TO ENSURE THE UNINTERRUPTED AND SAFE FLOW OF TRAFFIC.

NOTIFY THE ENGINEER IN WRITING WHEN MAJOR TRAFFIC CHANGES ARE TO BE MADE. NOTIFICATIONS MUST BE GIVEN A MINIMUM OF THREE WORKING DAYS PRIOR TO THE CHANGE.

ALL WORK ZONE PAVEMENT MARKINGS FOR THIS PROJECT SHALL BE 0.100 INCHES (100 MIL) THICK THERMOPLASTIC.

SAFETY:

PROTECT EXPOSED PITS THAT MUST REMAIN OPEN DURING NON-WORKING HOURS AS PER OSHA REQUIREMENTS.

CONSTRUCTION SEQUENCE:

INSTALL PROJECT LIMIT AND ADVANCED WARNING SIGNS PER ADVANCED WARNING LAYOUT OR AS DIRECTED BY THE ENGINEER. THESE SIGNS SHALL BE ERECTED AND PLACED PRIOR TO COMMENCING ANY CONSTRUCTION AND SHALL REMAIN IN PLACE FOR THE DURATION OF THE PROJECT UNTIL FINAL ACCEPTANCE.

CONSTRUCTION WILL TAKE PLACE IN SEGMENTS. FOR ROADWAY CONSTRUCTION SEGMENTS REFER TO "FM 510 CONSTRUCTION SEGMENTS" SHEET. FOR EACH SEGMENT FOLLOW THE SEQUENCE BELOW. CONTRACTOR SHALL WORK ON ONE SEGMENT AT A TIME AND COMPLETE PHASE I AND II FOR EACH SEGMENT BEFORE STARTING CONSTRUCTION IN THE NEXT SEGMENT.

NOTE:
TO ALLOW AMPLE TIME FOR EXECUTION OF THE UNION PACIFIC RAILROAD AGREEMENT, SEGMENT 5 SHALL BE THE LAST SEGMENT TO BE CONSTRUCTED UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

PHASE I -

1. INSTALL SWPPP DEVICES AS SHOWN IN THE LAYOUTS.
2. INSTALL DETOUR SIGNS PER "DETOUR LAYOUT" APPLICABLE TO THE SEGMENT THAT WILL UNDERGO CONSTRUCTION. CLOSE THE SEGMENT OF ROADWAY THAT WILL BE UNDER CONSTRUCTION USING "TYPICAL SEGMENT CLOSURE DETAIL".
3. REPLACE RAILROAD PLANKING WITHIN THE CLOSED SEGMENT IN ACCORDANCE WITH "EXHIBIT A". FOR THE PLANKING REPLACEMENT REFER TO THE "TYPICAL SEGMENT CLOSURE DETAIL" SHEET AND FULLY CLOSED THE ROADWAY ON BOTH SIDES OF THE RAILROAD CROSSING. CONTRACTOR SHALL COORDINATE WITH THE RAILROAD AUTHORITY REGARDING THE FLAGGER OPERATIONS NECESSARY FOR PLANKING REPLACEMENT.
4. ROADWORK AND DRAINAGE STRUCTURE CONSTRUCTION IN SEGMENT 5 SHALL BE THE LAST SEGMENT OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER. PRIOR TO ANY CONSTRUCTION WITHIN RAILROAD RIGHT-OF-WAY, CONTRACTOR SHALL PROVIDE PROOF OF THE EXECUTED RIGHT-OF-ENTRY WITH THE ASSOCIATED RAILROAD COMPANY AS REQUIRED.

PHASE II -

1. MAINTAIN DETOUR ROUTE FOR THE SEGMENT UNDER CONSTRUCTION. KEEP USING "TYPICAL SEGMENT CLOSURE DETAIL" SHEET THROUGH END OF PHASE II.
2. EXISTING ROADWAY SHALL REMAIN CLOSED TO THRU TRAFFIC DURING CONSTRUCTION. ROADWAY SHALL BE USED BY LOCAL TRAFFIC ONLY. CONTRACTOR SHALL COORDINATE WITH THE ENGINEER AND UTILIZE THE TCP STANDARDS INCLUDED IN THE PLANS TO MAINTAIN ACCESS TO LOCAL PROPERTIES WITHIN THE SEGMENT UNDER CONSTRUCTION AT ALL TIMES. CONTRACTOR SHALL MAINTAIN AN ALL-WEATHER PASSABLE SURFACE FOR LOCAL TRAFFIC AT ALL TIMES.
3. REMOVE EXISTING PAVEMENT AND CONSTRUCT LIME TREATED SUBGRADE, GEOGRID, FLEXIBLE BASE, 1 COURSE UNDERSEAL, AND FIRST LAYER (1.5") OF SUPERPAVE PER PROPOSED TYPICAL SECTIONS. THE BRIDGE RAIL REPLACEMENT AND CONCRETE OVERLAY SHALL TAKE PLACE CONCURRENTLY WITH THE ROADWAY WORK IN THE APPLICABLE SEGMENT THAT IS CLOSED AND UNDER CONSTRUCTION. AT END OF EACH WORKING DAY CONTRACTOR SHALL PROVIDE EDGE CONDITION TY 1 IN ACCORDANCE WITH THE "TREATMENT OF VARIOUS EDGE CONDITIONS" SHEET, PLACE VERTICAL PANELS ON THE CENTERLINE TO DIVIDE OPPOSING LOCAL TRAFFIC AND OPEN BOTH LANES TO LOCAL TRAFFIC WHILE KEEPING THE SEGMENT CLOSED TO THRU TRAFFIC.
4. CONSTRUCT ROADWAY SIDE SLOPES. MAINTAIN EDGE CONDITION TY 1 AT END OF EACH WORKING DAY.
5. PROVIDE TEMPORARY SEEDING PER SWPPP LAYOUTS.
6. INSTALL PERMANENT ROADWAY SIGNAGE ACCORDING TO SIGNING LAYOUTS.
7. FOR EACH SEGMENT THAT IS UNDER CONSTRUCTION AFTER CONSTRUCTING PROPOSED PAVEMENT WITHIN THE LIMITS OF THE SEGMENT USE "TYPICAL INTERSECTION CLOSURE DETAIL" SHEET TO CONSTRUCT HALF OF EACH ADJOINED TERMINI INTERSECTIONS IN TWO STAGES/QUADRANTS. THE QUADRANT CONSTRUCTION INVOLVES LIME TREATED SUBGRADE, GEOGRID, FLEXIBLE BASE, 1 COURSE UNDERSEAL, AND FIRST LAYER (1.5") OF SUPERPAVE PER PROPOSED TYPICAL SECTIONS. THE QUADRANT CONSTRUCTIONS AT EACH TERMINI INTERSECTION IS LIMITED TO DAY-TIME OPERATIONS AND BOTH SIDE STREET LANES SHALL BE OPEN TO TRAFFIC BY END OF THE WORKING DAY. CONTRACTOR TO PROVIDE EDGE CONDITION TY 1 IN ACCORDANCE WITH THE "TREATMENT OF VARIOUS EDGE CONDITIONS" SHEET.
8. FURNISH REMOVABLE WORKZONE PAVEMENT MARKING OVER THE FIRST LAYER OF SUPERPAVE THROUGHOUT THE SEGMENT AND OVER NEWLY CONSTRUCTED INTERSECTION QUADRANTS.
9. OPEN THE SEGMENT AND MOBILIZE TO NEXT SEGMENT AND REPEAT STEPS 1 THRU 8. NOTE THAT CONTRACTOR SHALL NOT START THE NEXT SEGMENT BEFORE FINISHING THE CURRENT SEGMENT.

PHASE III -

1. FURNISH FINAL LAYER OF THE PROPOSED SUPERPAVE (1.5" OVERLAY) USING TCP MOBILE OPERATION STANDARD TCP(3-1).
2. FURNISH TY Y-2 TABS ALONG THE CENTERLINE.
3. BACKFILL PAVEMENT EDGES USING BACKFILL TY A.
4. FURNISH TOPSOIL, FERTILIZER, SEEDING AND WATERING.
5. INSTALL PERMANENT PAVEMENT MARKINGS.
6. REMOVE SWPPP DEVICES, CLEAN UP.

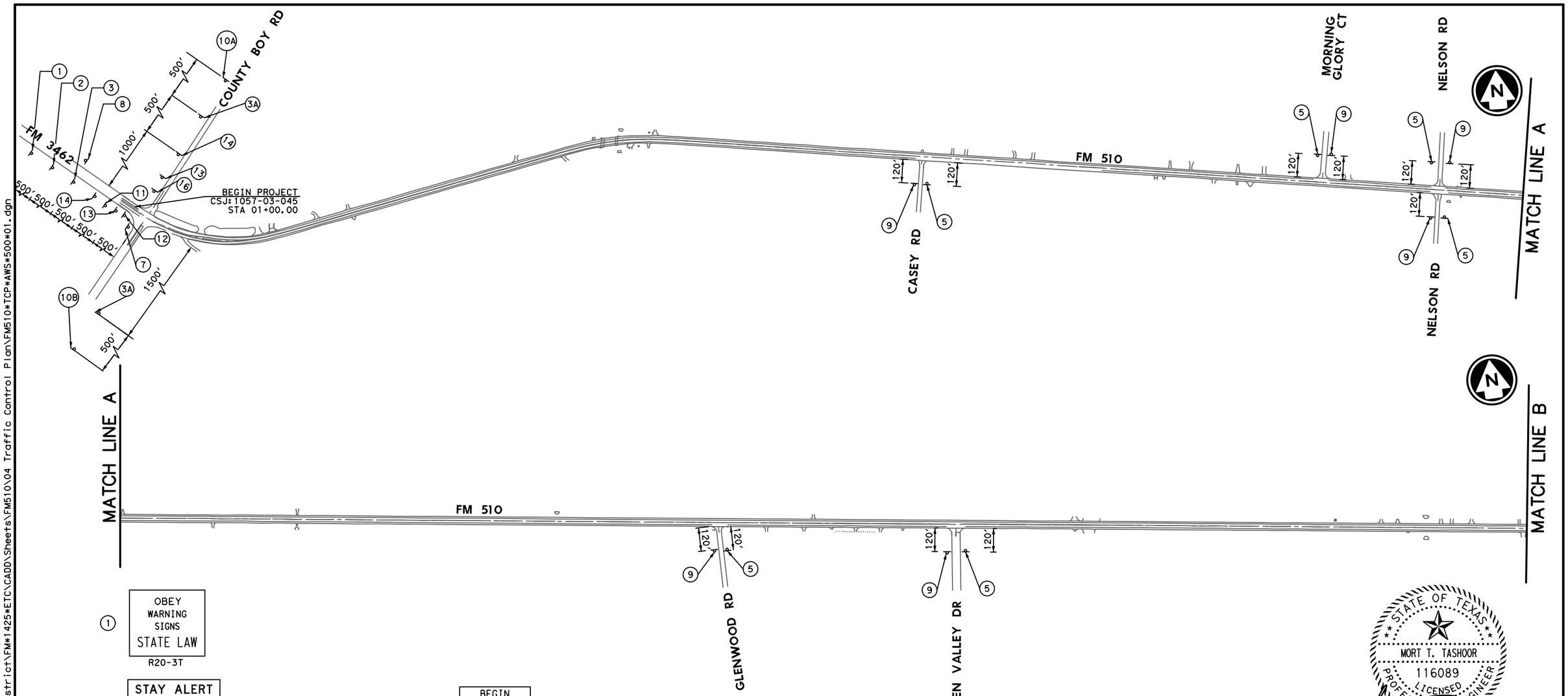
STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

TRAFFIC CONTROL PLAN NOTES

Texas Department of Transportation

Rev 03/22/2017

STATE	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS	6				49
DIST.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
PHR	CAMERON	1057	01	045	FM 510



1 OBEY WARNING SIGNS STATE LAW — R20-3T

2 STAY ALERT / TALK OR TEXT LATER — G20-10T

3 BEGIN WORK ZONE / TRAFFIC FINES DOUBLE / WHEN WORKERS ARE PRESENT — G20-9TP, R20-5T, R20-5aTP

3A WORK ZONE / TRAFFIC FINES DOUBLE / WHEN WORKERS ARE PRESENT — G20-5AP, R20-5T, R20-5aTP

5 ROAD WORK AHEAD — CW20-1D

6 ROAD CLOSED AHEAD — CW20-3D

7 BEGIN ROAD WORK NEXT 7 MILES / NAME ADDRESS CITY STATE / CONTRACTOR — G20-5T, G20-6T

8 END WORK ZONE — G20-2bT

9 END ROAD WORK — G20-2

10A ROAD WORK ⇦ NEXT 7 MILES — G20-1bTL

10B ROAD WORK NEXT 7 MILES ⇨ — G20-1bTR

11 DETOUR M4-8 24X12 / EAST M3-2 24X12 / 510 M1-6F 24X24 / M5-1R 21X15

12 DETOUR M4-8 24X12 / EAST M3-2 24X12 / 510 M1-6F 24X24 / M5-1R 21X15

13 CW20-2C 48X48 DETOUR 500 FT

14 CW20-2B 48X48 DETOUR 1000 FT

15 CW20-2A 48X48 DETOUR 1500 FT

16 DETOUR M4-8 24X12 / EAST M3-2 24X12 / 510 M1-6F 24X24 / M6-3 21X15

NOTE:

1. CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE ENGINEER TO ADJUST SIGN SPACINGS BASED ON STANDARD BC(2)-14 IF THE POSTED SPEED LIMITS ON THE APPROACHING ROADS ARE DIFFERENT FROM WHAT IS USED ON THIS SHEET.
2. SIGN PLACEMENT AND SPACING MAY BE ADJUSTED PER DIRECTION OF THE ENGINEER.

STATE OF TEXAS
MORT T. TASHOOR
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LICENSED
PROFESSIONAL ENGINEER
6/27/2022

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
TRAFFIC CONTROL PLAN
ADVANCE WARNING SIGNS
(CSJ: 1057-03-045)

SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	50
CONTROL	SECTION	JOB	
1057	03	045	

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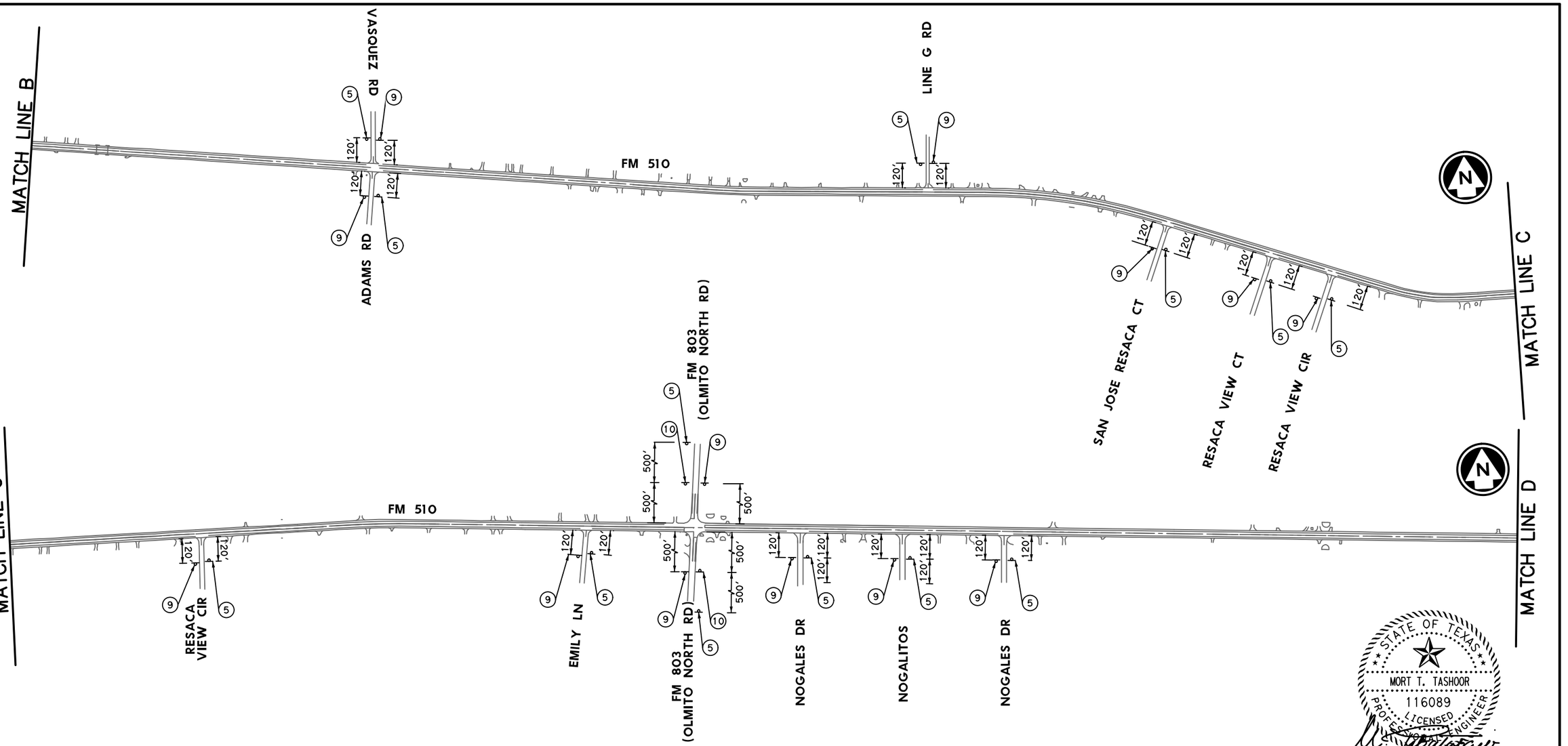
DRAWING DATE: 6/27/2022



(5) ROAD WORK AHEAD — CW20-1D

(9) END ROAD WORK — G20-2

(10) ROAD WORK ⇦ NEXT X MILES NEXT X MILES ⇨ — G20-1aT

NOTE:

1. CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE ENGINEER TO ADJUST SIGN SPACINGS BASED ON STANDARD BC(2)-14 IF THE POSTED SPEED LIMITS ON THE APPROACHING ROADS ARE DIFFERENT FROM WHAT IS USED ON THIS SHEET.
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STATE OF TEXAS
MORT T. TASHOOR
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LICENSED
PROFESSIONAL ENGINEER
6/27/2022

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
TRAFFIC CONTROL PLAN
ADVANCE WARNING SIGNS
(CSJ: 1057-03-045)

SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	51
CONTROL	SECTION	JOB	
1057	03	045	

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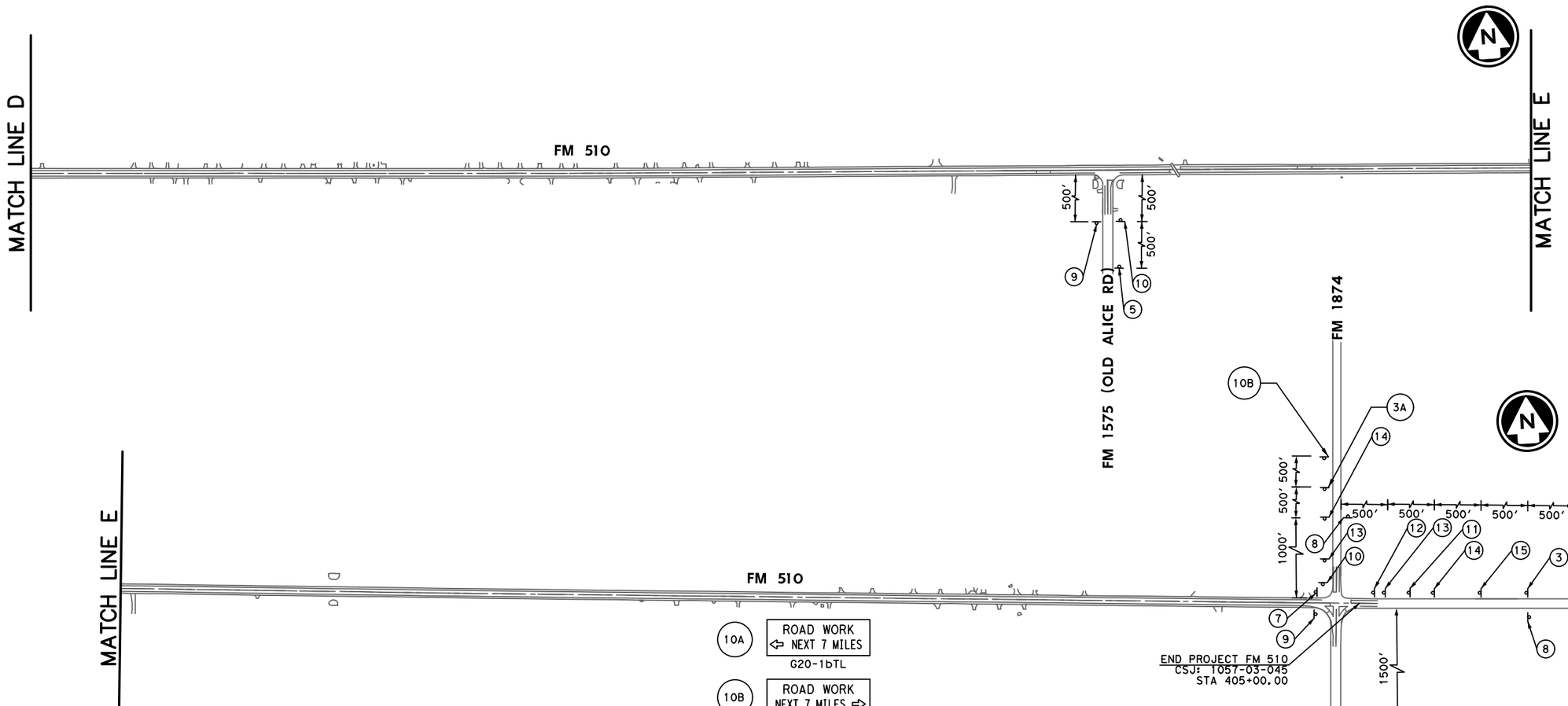
DRAWING DATE: 6/27/2022



NOTE:

1. CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE ENGINEER TO ADJUST SIGN SPACINGS BASED ON STANDARD BC(2)-14 IF THE POSTED SPEED LIMITS ON THE APPROACHING ROADS ARE DIFFERENT FROM WHAT IS USED ON THIS SHEET.
2. SIGN PLACEMENT AND SPACING MAY BE ADJUSTED PER DIRECTION OF THE ENGINEER.

STATE OF TEXAS
MORT T. TASHOOR
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PROFESSIONAL ENGINEER
6/27/2022

Texas Department of Transportation

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
TRAFFIC CONTROL PLAN
ADVANCE WARNING SIGNS
(CSJ: 1057-03-045)

SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	
CONTROL	SECTION	JOB	52
1057	03	045	

DRAWING DATE: 6/27/2022
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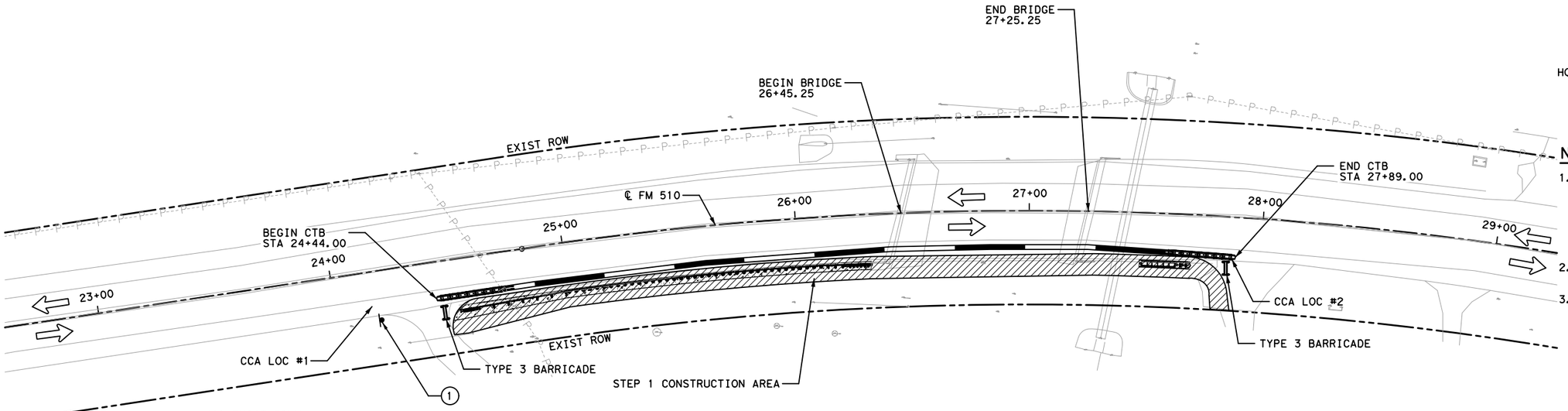


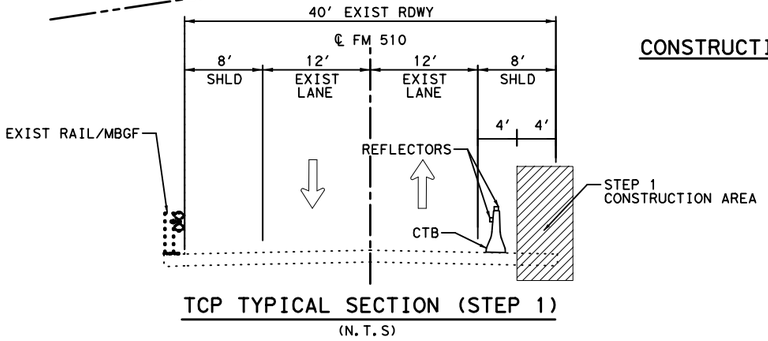
HORZ 0′ 25′ 50′

SCALE IN FEET

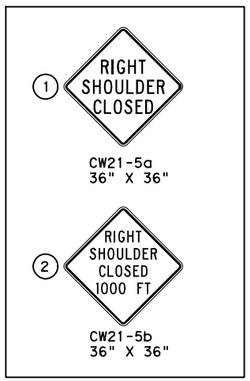
NOTES:

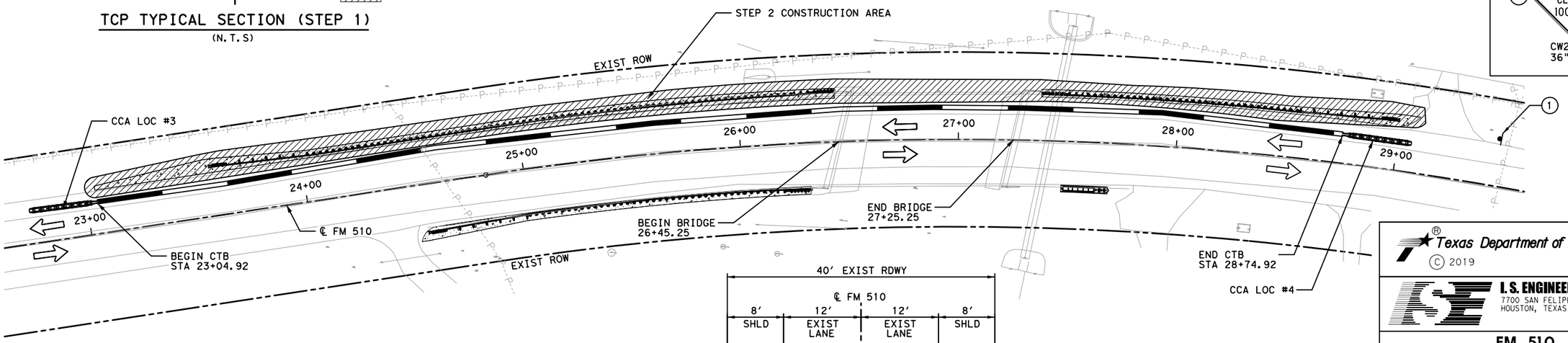
1. BOTH STEP 1 AND STEP 2 SHALL BE DONE CONCURRENTLY WITH ROADWAY CONSTRUCTION WHILE SEGMENT 1 IS CLOSED TO THRU TRAFFIC AND OPEN ONLY TO THE LOCAL TRAFFIC.
2. PLACE SIGN (2) 1000 FEET IN ADVANCE OF SIGN (1).
3. THE RAIL REPLACEMENT WORK SHALL TAKE PLACE CONCURRENTLY WITH ROADWAY WORK AND WHILE SEGMENT 1 IS UNDER CLOSURE.

SEGMENT-1 ROADWAY CONSTRUCTION
CONSTRUCTION OF NEW SSTR/MBGF ON RIGHT SIDE (STEP 1)
NBI 21-031-1057-03-022

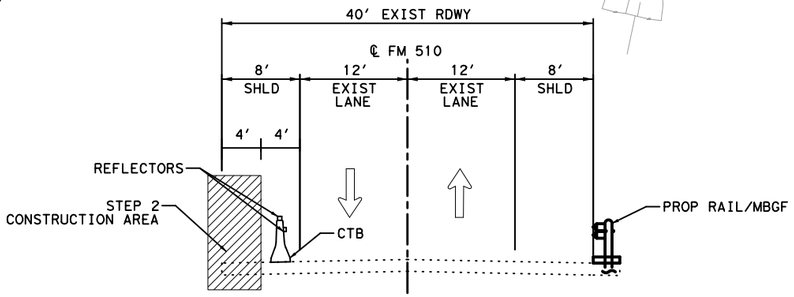


TCP TYPICAL SECTION (STEP 1)
(N.T.S)





SEGMENT-1 ROADWAY CONSTRUCTION
CONSTRUCTION OF NEW SSTR/MBGF ON RIGHT SIDE (STEP 2)
NBI 21-031-1057-03-022



TCP TYPICAL SECTION (STEP 2)
(N.T.S)

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STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER
6/27/2022

FM 510
TRAFFIC CONTROL PLAN FOR BRIDGE RAIL REPLACEMENT

NBI 21-031-1057-03-022

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	53
CONTROL	SECTION	JOB	
1057	03	045	

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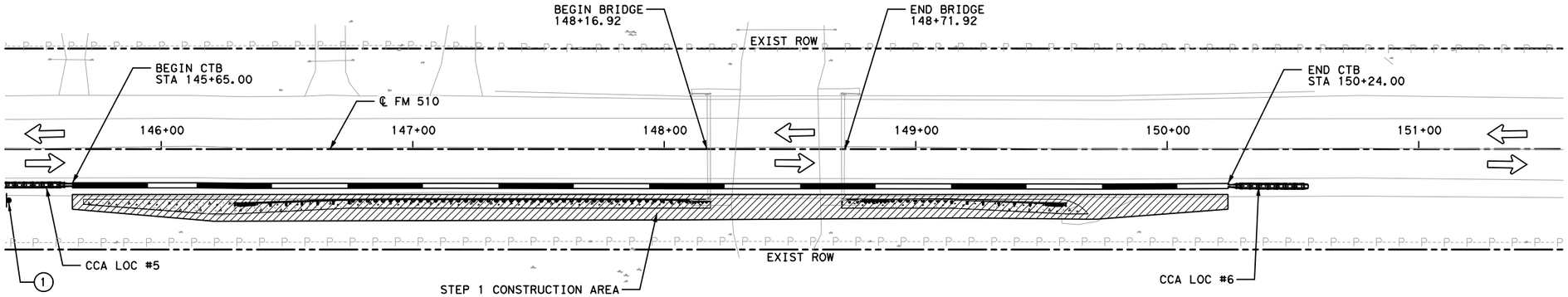
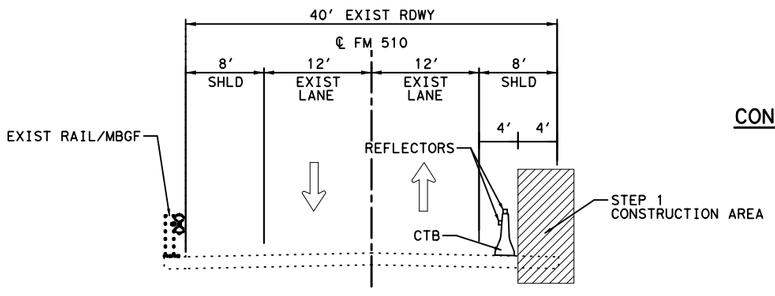
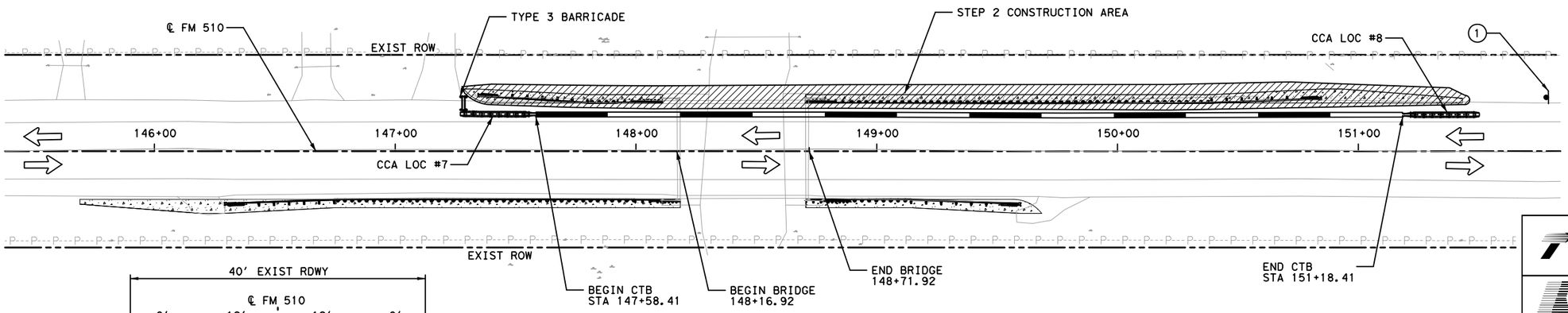


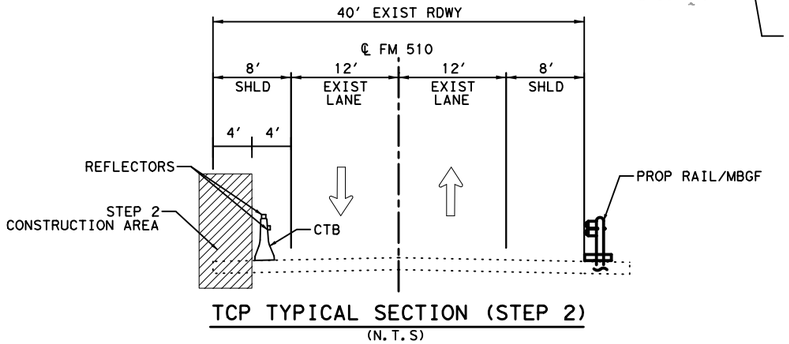


TCP TYPICAL SECTION (STEP 1)
(N.T.S)

SEGMENT-2 ROADWAY CONSTRUCTION

CONSTRUCTION OF RETROFIT SSTR/MBGF ON RIGHT SIDE (STEP 1)
NBI 21-031-1057-03-023





TCP TYPICAL SECTION (STEP 2)
(N.T.S)

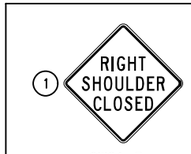
SEGMENT-2 ROADWAY CONSTRUCTION

CONSTRUCTION OF RETROFIT SSTR/MBGF ON RIGHT SIDE (STEP 2)
NBI 21-031-1057-03-023

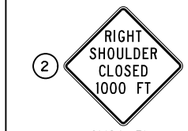
SCALE IN FEET

NOTES:

1. BOTH STEP 1 AND STEP 2 SHALL BE DONE CONCURRENTLY WITH ROADWAY CONSTRUCTION WHILE SEGMENT 2 IS CLOSED TO THRU TRAFFIC AND OPEN ONLY TO THE LOCAL TRAFFIC.
2. PLACE SIGN (2) 1000 FEET IN ADVANCE OF SIGN (1) .
3. THE RAIL REPLACEMENT WORK SHALL TAKE PLACE CONCURRENTLY WITH ROADWAY WORK AND WHILE SEGMENT 2 IS UNDER CLOSURE.



CW21-5a
36" X 36"



CW21-5b
36" X 36"

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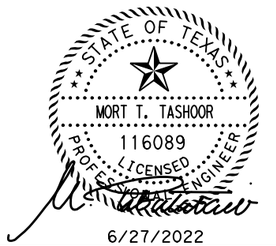
FM 510
TRAFFIC CONTROL PLAN FOR BRIDGE RAIL REPLACEMENT

NBI 21-031-1057-03-023

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	54
CONTROL	SECTION	JOB	
1057	03	045	



6/27/2022

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\04 Traffic Control Plan\FM 510*BRDGE*TCP*PH2.dgn
DRAWING DATE: 6/27/2022

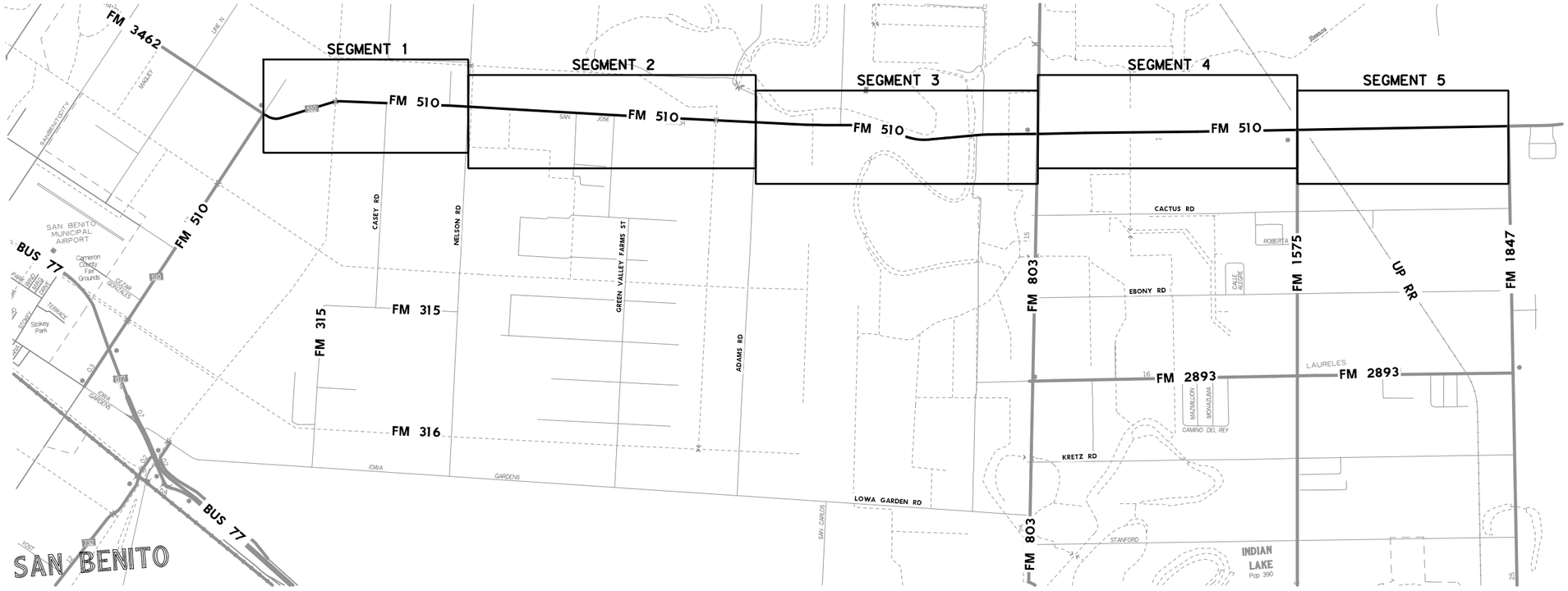
LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC.#	N	W	N	W	N	W
1	RAIL/MBGF CONST. STEP 1	SEE TCP SHEETS	SEE P&P SHEETS	24+47, RT	TL3	BI	NOT REQUIRED	NOT RELEVANT	STEEL BACKUP (ATTACH TO PRECAST CONC BARRIER)	2'	33"	32'	X								X	
2	RAIL/MBGF CONST. STEP 1	SEE TCP SHEETS	SEE P&P SHEETS	27+81, RT	TL3	BI	NOT REQUIRED	NOT RELEVANT	STEEL BACKUP (ATTACH TO PRECAST CONC BARRIER)	2'	33"	32'	X								X	
3	RAIL/MBGF CONST. STEP 2	SEE TCP SHEETS	SEE P&P SHEETS	23+05, LT	TL3	BI	NOT REQUIRED	NOT RELEVANT	STEEL BACKUP (ATTACH TO PRECAST CONC BARRIER)	2'	33"	32'			X	3					X	
4	RAIL/MBGF CONST. STEP 2	SEE TCP SHEETS	SEE P&P SHEETS	28+75, LT	TL3	BI	NOT REQUIRED	NOT RELEVANT	STEEL BACKUP (ATTACH TO PRECAST CONC BARRIER)	2'	33"	32'			X	4					X	
5	RAIL/MBGF CONST. STEP 1	SEE TCP SHEETS	SEE P&P SHEETS	145+65, RT	TL3	BI	NOT REQUIRED	NOT RELEVANT	STEEL BACKUP (ATTACH TO PRECAST CONC BARRIER)	2'	33"	32'			X	1					X	
6	RAIL/MBGF CONST. STEP 1	SEE TCP SHEETS	SEE P&P SHEETS	150+24, RT	TL3	BI	NOT REQUIRED	NOT RELEVANT	STEEL BACKUP (ATTACH TO PRECAST CONC BARRIER)	2'	33"	32'			X	2					X	
7	RAIL/MBGF CONST. STEP 2	SEE TCP SHEETS	SEE P&P SHEETS	147+58, LT	TL3	BI	NOT REQUIRED	NOT RELEVANT	STEEL BACKUP (ATTACH TO PRECAST CONC BARRIER)	2'	33"	32'		X	X	5					X	
8	RAIL/MBGF CONST. STEP 2	SEE TCP SHEETS	SEE P&P SHEETS	151+18, LT	TL3	BI	NOT REQUIRED	NOT RELEVANT	STEEL BACKUP (ATTACH TO PRECAST CONC BARRIER)	2'	33"	32'		X	X	6					X	
NA	NA	131	EB FM 510	27+50,RT	3	UNI/BI	CONC	8"	PROP SSTR	2'-0"	2'-8"	22'	X	N/A	N/A	N/A			X			
												TOTALS	3	2	6							

LEGEND:
L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwylse.htm

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:	CK:
© TxDOT 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
	DIST	COUNTY	
	PHARR	CAMERON	
	FEDERAL AID PROJECT		SHEET NO.
			55



PROPOSED CONSTRUCTION SEGMENTS FOR FM 510

(SEE NOTE 4)

SEGMENT 1: ℄ FM 510 STA 01+00.00 TO STA 68+24
(FROM FM 3462 TO NELSON RD)
SEGMENT 2: ℄ FM 510 STA 70+04 TO STA 160+80
(FROM NELSON RD TO ADAMS RD)
SEGMENT 3: ℄ FM 510 STA 162+50 TO STA 250+37
(FROM ADAMS RD TO FM 803)
SEGMENT 4: ℄ FM 510 STA 252+33 TO STA 334+12
(FROM FM 803 TO FM 1575)
SEGMENT 5: ℄ FM 510 STA 336+35 TO STA 405+00.00
(FROM FM 1575 TO FM 1847)

IRRIGATION OR DRAINAGE CROSSINGS WITHIN EACH SEGMENT

SEGMENT 1: 1, 2, 3, 4, 5
SEGMENT 2: 6, 7, 8, 9, 10, 11, 12, 13
SEGMENT 3: 14, 15, 16
SEGMENT 4: 17, 18, 19, 20, 21
SEGMENT 5: 22, 23

RAILROAD CROSSINGS WITHIN EACH SEGMENT

SEGMENT 5: UNION PACIFIC RAILROAD (RIO VALLEY SWITCHING COMPANY)

NOTES:

1. FOR ON-SYSTEM DETOUR ROUTE AND SIGNAGE APPLICABLE TO EACH CONSTRUCTION SEGMENT REFER TO "FM 510 DETOUR SHEETS".
2. FOR REQUIRED ADDITIONAL SIGNAGE AND BARRICADES FOR CLOSURE OF EACH CONSTRUCTION SEGMENT REFER TO "TYPICAL SEGMENT CLOSURE DETAIL" SHEET.
3. FOR CLOSURE DETAIL AT INTERSECTIONS REFER TO "TYPICAL INTERSECTION CLOSURE DETAIL" SHEET.
4. TO ALLOW ADEQUATE TIME FOR EXECUTION OF RAILROAD AGREEMENT SEGMENT 5 SHALL BE THE LAST SEGMENT OF CONSTRUCTION UNLESS OTHERWISE DIRECTED BY THE ENGINEER. .

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

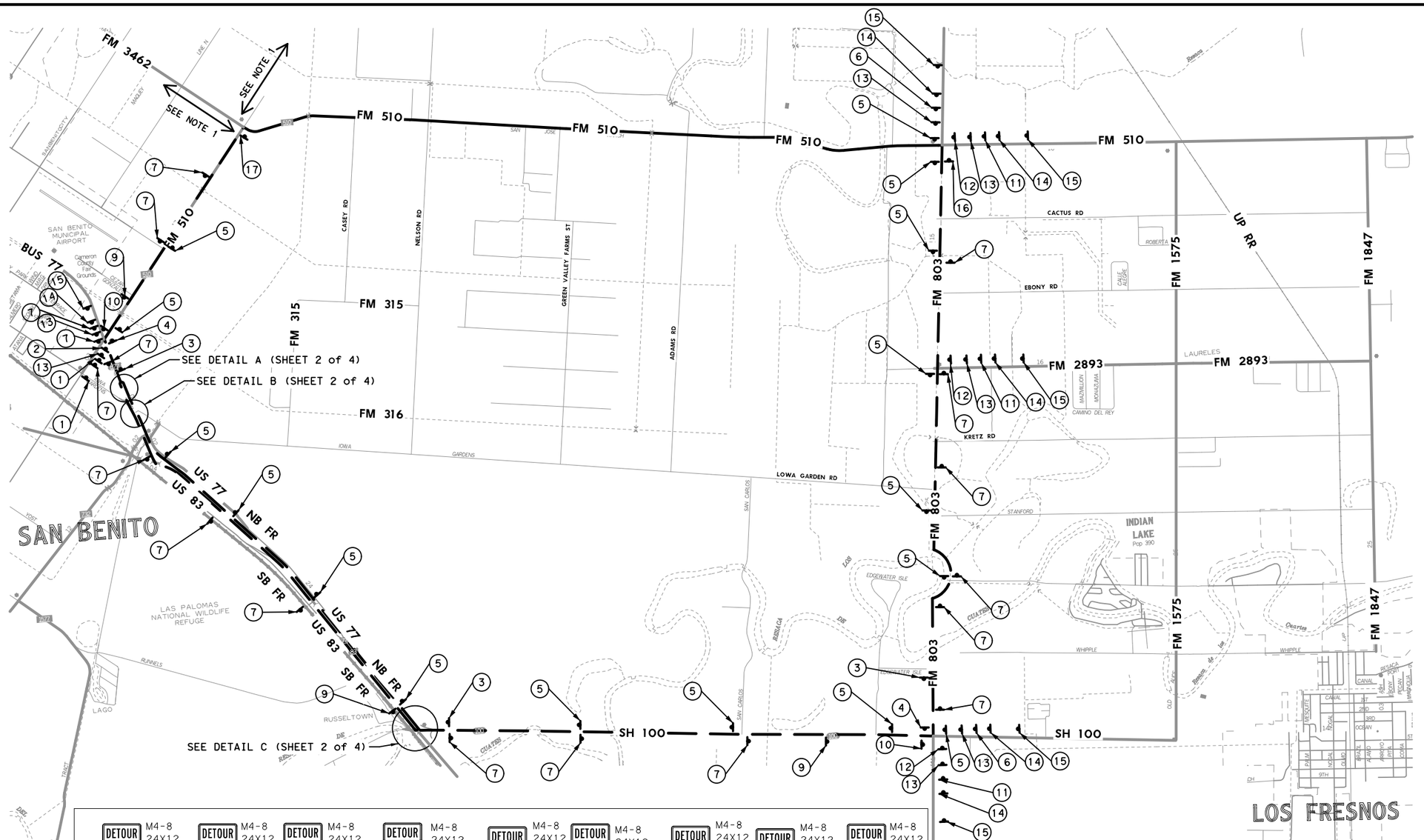
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

CONSTRUCTION SEGMENTS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	56
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022 FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\04 Traffic Control Plan\FM510*SEGMENTS.dgn



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DRAWING DATE: 6/27/2022

0' 2000' 4000'
SCALE IN FEET

LEGEND

DETOUR ROUTE
SMALL SIGN

NOTE:

1. FOR ADDITIONAL SIGNAGE FOR DETOURS, REFER TO "AVANCED WARNING SIGNS"SHEET.
2. FOR ADDITIONAL SIGNAGE AND BARRICADE REQUIRED FOR CLOSURE OF EACH CONSTRUCTION SEGMENT REFER TO "SEGMENT CLOSURE DETAIL" SHEET.

SUGGESTED INDICATIONS FOR THE PORTABLE CHANGEABLE MESSAGE SIGN

ROAD CLOSED AHEAD	USE DETOUR AHEAD
PCMS PH-1	PCMS PH-2

INSTALL PCMS AS DIRECTED BY THE ENGINEER

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116089
6/27/2022

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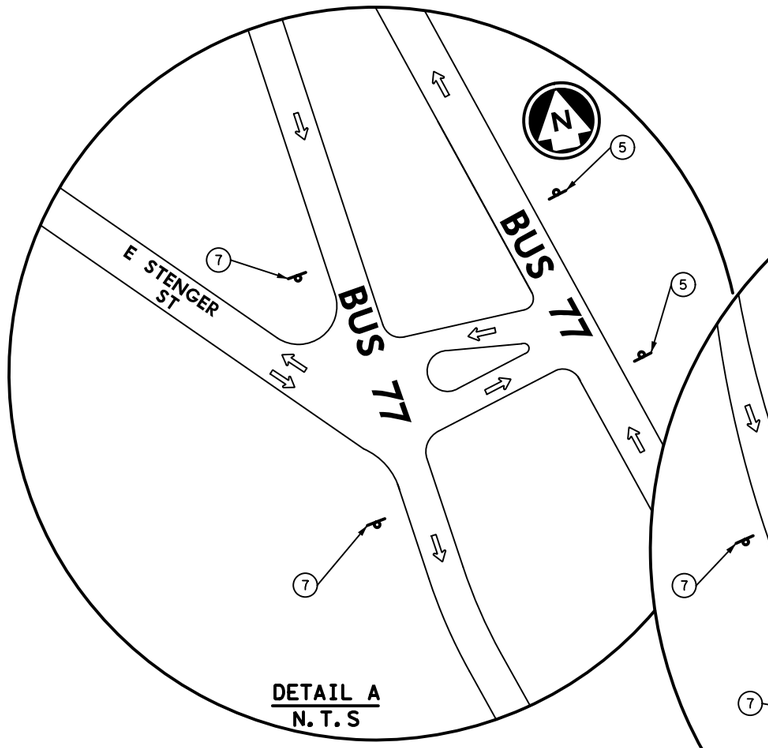
FM 510

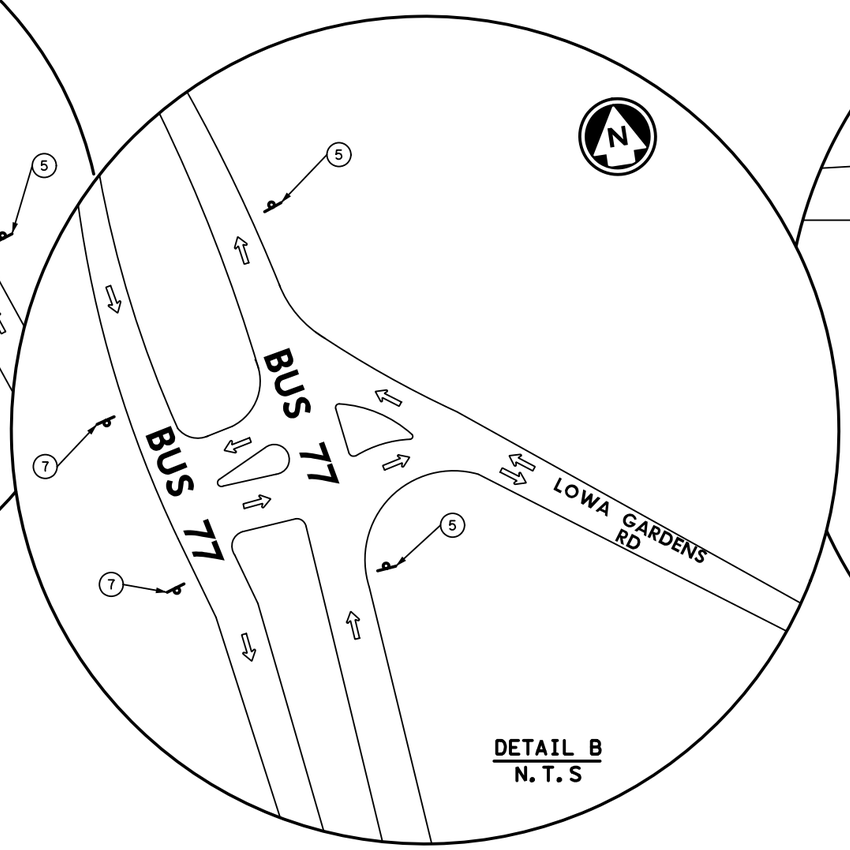
DETOUR LAYOUT (SEGMENTS 1,2,3)

SHEET 1 OF 4

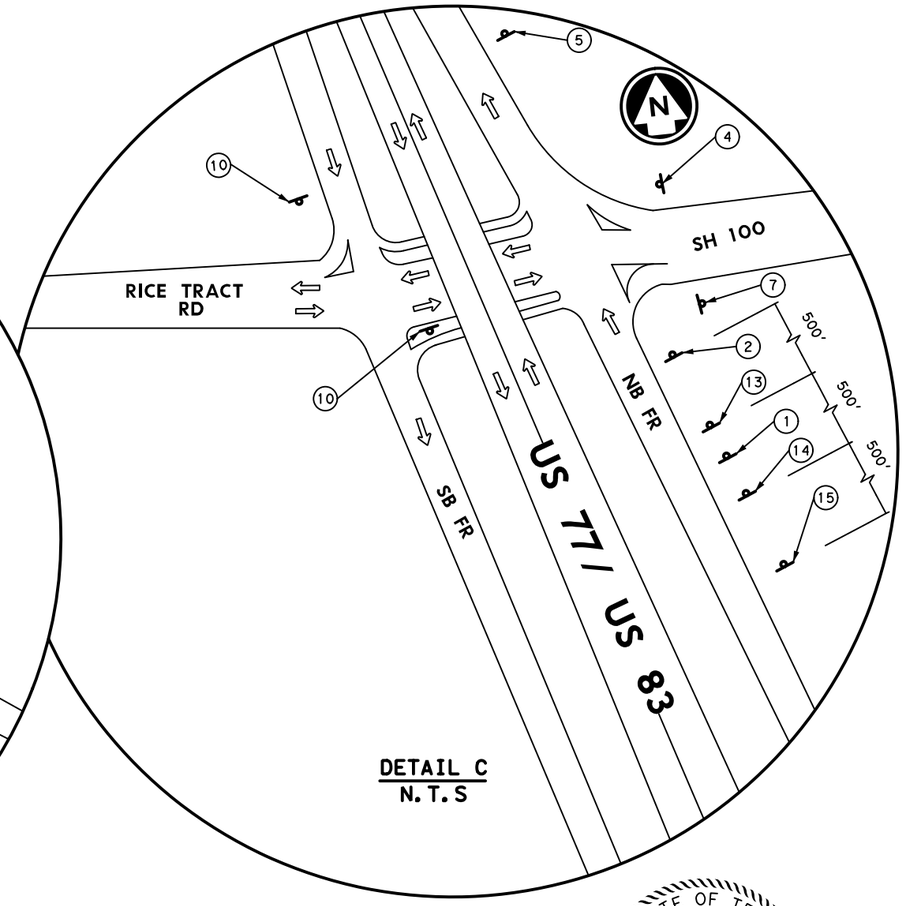
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	57
CONTROL	SECTION	JOB	
1057	03	045	



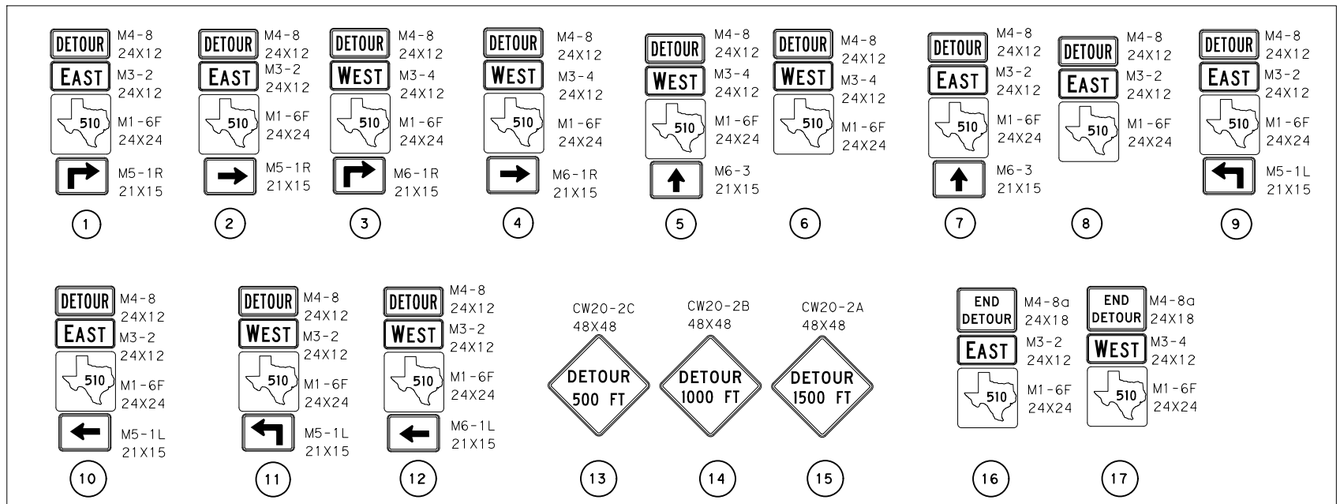
DETAIL A
N.T.S



DETAIL B
N.T.S



DETAIL C
N.T.S



STATE OF TEXAS
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116089
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PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

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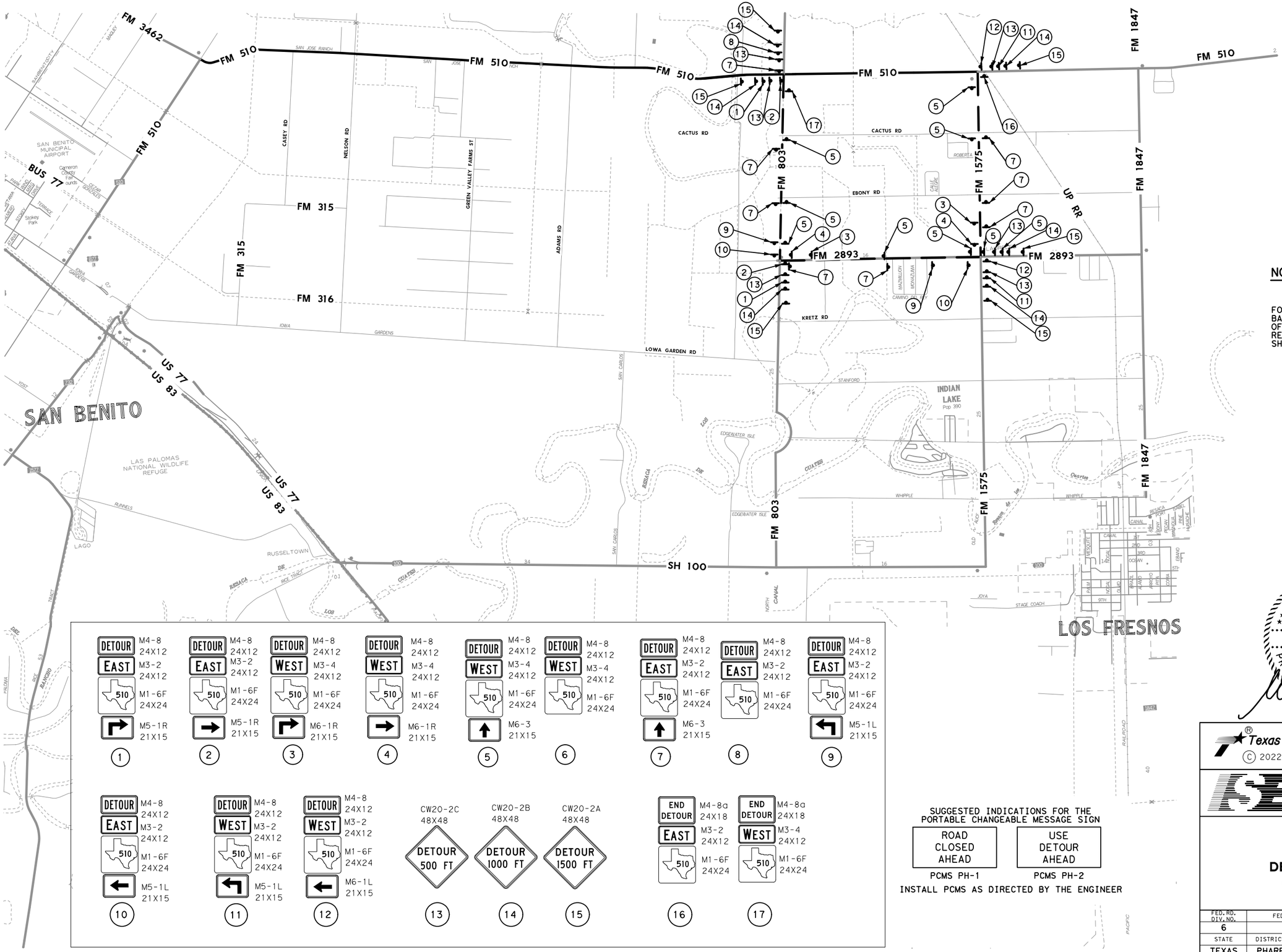
FM 510

DETOUR LAYOUT (SEGMENTS 1, 2, 3)

SHEET 2 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	
CONTROL	SECTION	JOB	58
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\04 Traffic Control Plan\FM510#DETOUR01#A2#510.dgn
DRAWING DATE: 6/27/2022



LEGEND

DETOUR ROUTE

SMALL SIGN

NOTE:

FOR ADDITIONAL SIGNAGE AND BARRICADE REQUIRED FOR CLOSURE OF EACH CONSTRUCTION SEGMENT REFER TO "SEGMENT CLOSURE DETAIL" SHEET.

DETOUR EAST 510 M4-8 24X12 M3-2 24X12 M1-6F 24X24 M5-1R 21X15 1	DETOUR EAST 510 M4-8 24X12 M3-2 24X12 M1-6F 24X24 M5-1R 21X15 2	DETOUR WEST 510 M4-8 24X12 M3-4 24X12 M1-6F 24X24 M6-1R 21X15 3	DETOUR WEST 510 M4-8 24X12 M3-4 24X12 M1-6F 24X24 M6-1R 21X15 4	DETOUR WEST 510 M4-8 24X12 M3-4 24X12 M1-6F 24X24 M6-3 21X15 5	DETOUR WEST 510 M4-8 24X12 M3-4 24X12 M1-6F 24X24 6	DETOUR EAST 510 M4-8 24X12 M3-2 24X12 M1-6F 24X24 M6-3 21X15 7	DETOUR EAST 510 M4-8 24X12 M3-2 24X12 M1-6F 24X24 8	DETOUR EAST 510 M4-8 24X12 M3-2 24X12 M1-6F 24X24 M5-1L 21X15 9
DETOUR EAST 510 M4-8 24X12 M3-2 24X12 M1-6F 24X24 M5-1L 21X15 10	DETOUR WEST 510 M4-8 24X12 M3-2 24X12 M1-6F 24X24 M5-1L 21X15 11	DETOUR WEST 510 M4-8 24X12 M3-2 24X12 M1-6F 24X24 M6-1L 21X15 12	CW20-2C 48X48 DETOUR 500 FT 13	CW20-2B 48X48 DETOUR 1000 FT 14	CW20-2A 48X48 DETOUR 1500 FT 15	END DETOUR EAST 510 M4-8a 24X18 M3-2 24X12 M1-6F 24X24 16	END DETOUR WEST 510 M4-8a 24X18 M3-4 24X12 M1-6F 24X24 17	

SUGGESTED INDICATIONS FOR THE PORTABLE CHANGEABLE MESSAGE SIGN

ROAD CLOSED AHEAD	USE DETOUR AHEAD
PCMS PH-1	PCMS PH-2

INSTALL PCMS AS DIRECTED BY THE ENGINEER

STATE OF TEXAS
MORT T. TASHOOR
116089
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PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

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FM 510

DETOUR LAYOUT (SEGMENT 4)

SHEET 3 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	59
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\04 Traffic Control Plan\FM510*DETOUR01*B*510.dgn

DRAWING DATE: 6/27/2022

LEGEND

DETOUR ROUTE

SMALL SIGN

NOTE:

1. FOR ADDITIONAL SIGNAGE FOR DETOURS, REFER TO "AVANCED WARNING SIGNS"SHEET.
2. FOR ADDITIONAL SIGNAGE AND BARRICADE REQUIRED FOR CLOSURE OF EACH CONSTRUCTION SEGMENT REFER TO "SEGMENT CLOSURE DETAIL" SHEET.

1	DETOUR M4-8 24X12 EAST M3-2 24X12 510 M1-6F 24X24 M5-1R 21X15	2	DETOUR M4-8 24X12 EAST M3-2 24X12 510 M1-6F 24X24 M5-1R 21X15	3	DETOUR M4-8 24X12 WEST M3-4 24X12 510 M1-6F 24X24 M6-1R 21X15	4	DETOUR M4-8 24X12 WEST M3-4 24X12 510 M1-6F 24X24 M6-1R 21X15	5	DETOUR M4-8 24X12 WEST M3-4 24X12 510 M1-6F 24X24 M6-3 21X15
6	DETOUR M4-8 24X12 WEST M3-4 24X12 510 M1-6F 24X24	7	DETOUR M4-8 24X12 EAST M3-2 24X12 510 M1-6F 24X24 M6-3 21X15	8	DETOUR M4-8 24X12 EAST M3-2 24X12 510 M1-6F 24X24	9	DETOUR M4-8 24X12 EAST M3-2 24X12 510 M1-6F 24X24 M5-1L 21X15	10	DETOUR M4-8 24X12 EAST M3-2 24X12 510 M1-6F 24X24 M5-1L 21X15
11	DETOUR M4-8 24X12 WEST M3-2 24X12 510 M1-6F 24X24 M5-1L 21X15	12	DETOUR M4-8 24X12 WEST M3-2 24X12 510 M1-6F 24X24 M6-1L 21X15	13	CW20-2C 48X48 DETOUR 500 FT	14	CW20-2B 48X48 DETOUR 1000 FT	15	CW20-2A 48X48 DETOUR 1500 FT
16	END DETOUR M4-8a 24X18 EAST M3-2 24X12 510 M1-6F 24X24	17	END DETOUR M4-8a 24X18 WEST M3-4 24X12 510 M1-6F 24X24						

SUGGESTED INDICATIONS FOR THE PORTABLE CHANGEABLE MESSAGE SIGN

ROAD CLOSED AHEAD	USE DETOUR AHEAD
PCMS PH-1	PCMS PH-2

INSTALL PCMS AS DIRECTED BY THE ENGINEER

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

DETOUR LAYOUT (SEGMENT 5)

SHEET 4 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	60
CONTROL	SECTION	JOB	
1057	03	045	

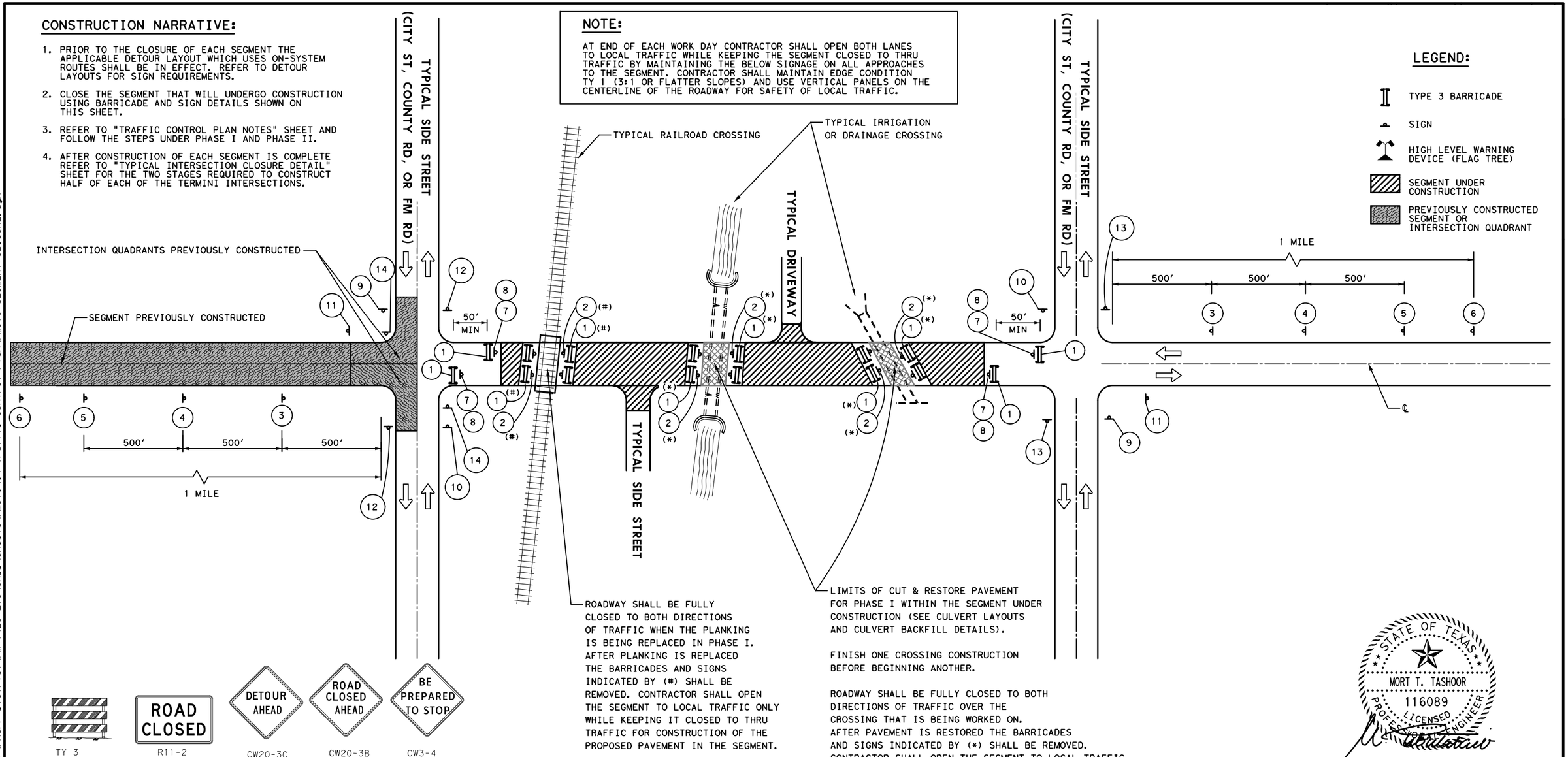
FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\04 Traffic Control Plan\FM510*DETOUR01*c*510.dgn
DRAWING DATE: 6/27/2022

CONSTRUCTION NARRATIVE:

1. PRIOR TO THE CLOSURE OF EACH SEGMENT THE APPLICABLE DETOUR LAYOUT WHICH USES ON-SYSTEM ROUTES SHALL BE IN EFFECT. REFER TO DETOUR LAYOUTS FOR SIGN REQUIREMENTS.
2. CLOSE THE SEGMENT THAT WILL UNDERGO CONSTRUCTION USING BARRICADE AND SIGN DETAILS SHOWN ON THIS SHEET.
3. REFER TO "TRAFFIC CONTROL PLAN NOTES" SHEET AND FOLLOW THE STEPS UNDER PHASE I AND PHASE II.
4. AFTER CONSTRUCTION OF EACH SEGMENT IS COMPLETE REFER TO "TYPICAL INTERSECTION CLOSURE DETAIL" SHEET FOR THE TWO STAGES REQUIRED TO CONSTRUCT HALF OF EACH OF THE TERMINI INTERSECTIONS.

NOTE:

AT END OF EACH WORK DAY CONTRACTOR SHALL OPEN BOTH LANES TO LOCAL TRAFFIC WHILE KEEPING THE SEGMENT CLOSED TO THRU TRAFFIC BY MAINTAINING THE BELOW SIGNAGE ON ALL APPROACHES TO THE SEGMENT. CONTRACTOR SHALL MAINTAIN EDGE CONDITION TY 1 (3:1 OR FLATTER SLOPES) AND USE VERTICAL PANELS ON THE CENTERLINE OF THE ROADWAY FOR SAFETY OF LOCAL TRAFFIC.



ROADWAY SHALL BE FULLY CLOSED TO BOTH DIRECTIONS OF TRAFFIC WHEN THE PLANKING IS BEING REPLACED IN PHASE I. AFTER PLANKING IS REPLACED THE BARRICADES AND SIGNS INDICATED BY (#) SHALL BE REMOVED. CONTRACTOR SHALL OPEN THE SEGMENT TO LOCAL TRAFFIC ONLY WHILE KEEPING IT CLOSED TO THRU TRAFFIC FOR CONSTRUCTION OF THE PROPOSED PAVEMENT IN THE SEGMENT.

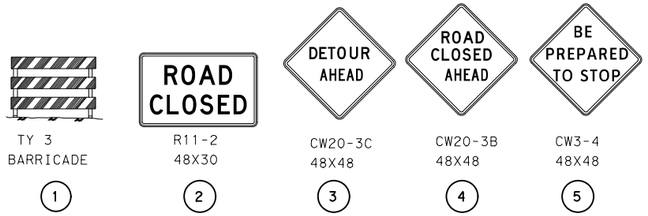
LIMITS OF CUT & RESTORE PAVEMENT FOR PHASE I WITHIN THE SEGMENT UNDER CONSTRUCTION (SEE CULVERT LAYOUTS AND CULVERT BACKFILL DETAILS).

FINISH ONE CROSSING CONSTRUCTION BEFORE BEGINNING ANOTHER.

ROADWAY SHALL BE FULLY CLOSED TO BOTH DIRECTIONS OF TRAFFIC OVER THE CROSSING THAT IS BEING WORKED ON. AFTER PAVEMENT IS RESTORED THE BARRICADES AND SIGNS INDICATED BY (*) SHALL BE REMOVED. CONTRACTOR SHALL OPEN THE SEGMENT TO LOCAL TRAFFIC ONLY WHILE KEEPING IT CLOSED TO THRU TRAFFIC FOR CONSTRUCTION OF THE PROPOSED PAVEMENT IN THE SEGMENT.

LEGEND:

- TYPE 3 BARRICADE
- SIGN
- HIGH LEVEL WARNING DEVICE (FLAG TREE)
- SEGMENT UNDER CONSTRUCTION
- PREVIOUSLY CONSTRUCTED SEGMENT OR INTERSECTION QUADRANT



6 7 8 9 10 11 12 13 14

STATE OF TEXAS
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6/27/2022

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TBPE REG. # F-11657

FM 510

TYPICAL SEGMENT CLOSURE DETAIL

(N. T. S)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	61
CONTROL	SECTION	JOB	
1057	03	045	

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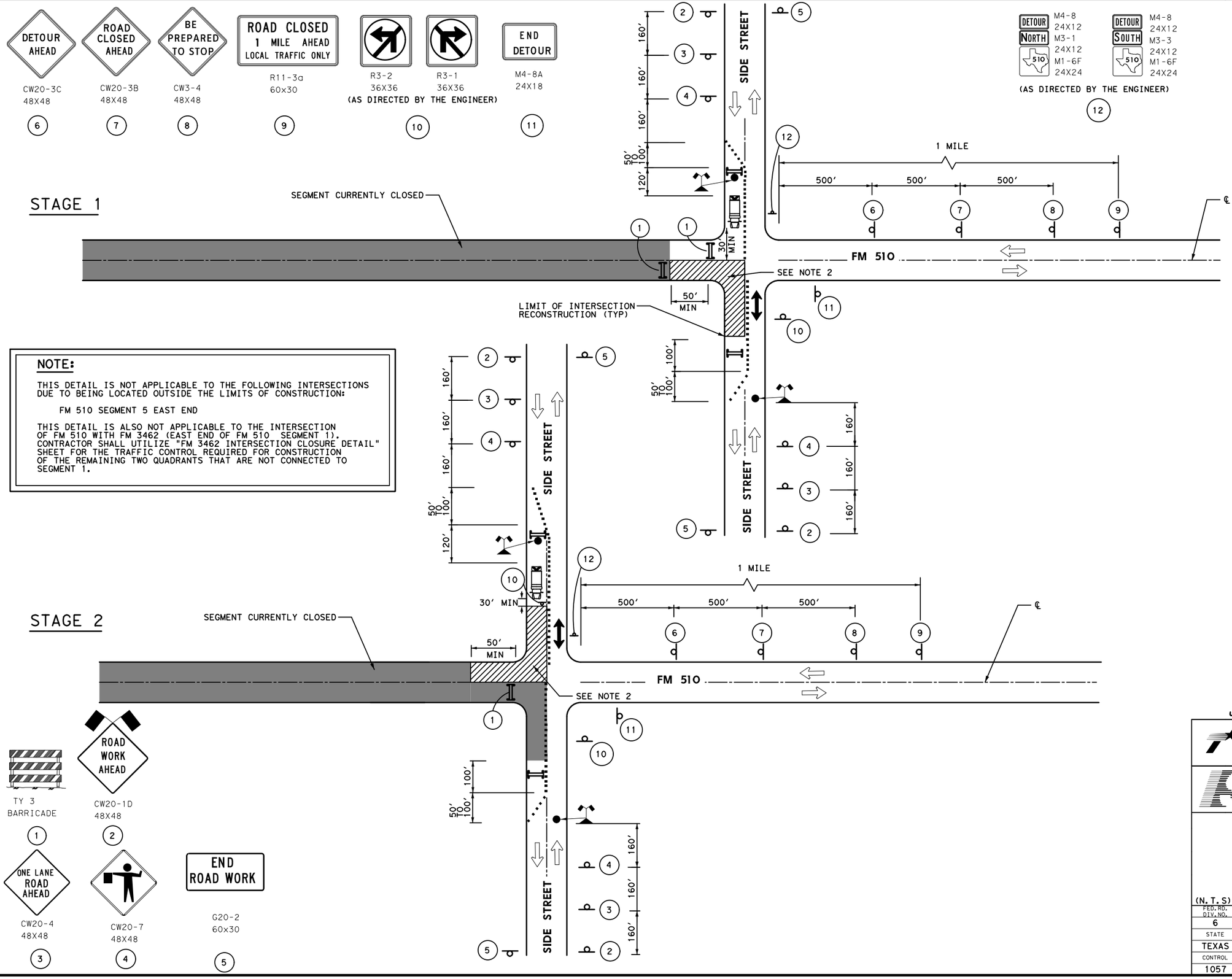

NOTE:

THIS DETAIL IS NOT APPLICABLE TO THE FOLLOWING INTERSECTIONS DUE TO BEING LOCATED OUTSIDE THE LIMITS OF CONSTRUCTION:

FM 510 SEGMENT 5 EAST END

THIS DETAIL IS ALSO NOT APPLICABLE TO THE INTERSECTION OF FM 510 WITH FM 3462 (EAST END OF FM 510 SEGMENT 1). CONTRACTOR SHALL UTILIZE "FM 3462 INTERSECTION CLOSURE DETAIL" SHEET FOR THE TRAFFIC CONTROL REQUIRED FOR CONSTRUCTION OF THE REMAINING TWO QUADRANTS THAT ARE NOT CONNECTED TO SEGMENT 1.

LEGEND:

- TYPE 3 BARRICADE
- SIGN
- HIGH LEVEL WARNING DEVICE (FLAG TREE)
- CONSTRUCTION AREA
- PREVIOUSLY CONSTRUCTED AREA
- VERTICAL PANELS (@ 10′ C-C)
- HEAVY WORK VEHICLE WITH TRUCK MOUNTED ATTENUATOR

NOTES:

1. SIGN NUMBERS 6 THRU 12 ON THIS SHEET ARE INSTALLED EARLIER AS PART OF THE SEGMENT CLOSURE AND SHALL STAY IN EFFECT THROUGH COMPLETION OF STAGE 1 AND STAGE 2 OF EACH INTERSECTION QUADRANT CONSTRUCTION ON THE NEAR SIDE OF THE CLOSED SEGMENT.
2. CONSTRUCTION OF STAGE 1 OR STAGE 2 OR BOTH STAGES SHALL BE COMPLETED IN A SINGLE WORKING DAY AND BOTH TRAVEL LANES ON THE SIDE STREET SHALL BE OPEN TO TRAFFIC AT THE END OF EACH WORKING DAY. CONTRACTOR SHALL PROVIDE EDGE CONDITION TYPE 1 (IN ACCORDANCE WITH THE "TREATMENT FOR VARIOUS EDGE CONDITIONS" SHEET) AND INSTALL SIGN CW8-11 IN ACCORDANCE WITH STANDARD WZ(UL)-13 AT THE END OF EACH WORKING DAY.
3. AT THE END OF EACH WORK DAY, TRAFFIC CONTROL SHALL DEFAULT TO THE " TYPICAL SEGMENT CLOSURE DETAIL" SHEET FOR THE CURRENTLY CLOSED SEGMENT OR THE NEXT SEGMENT TO BE CLOSED.

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116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

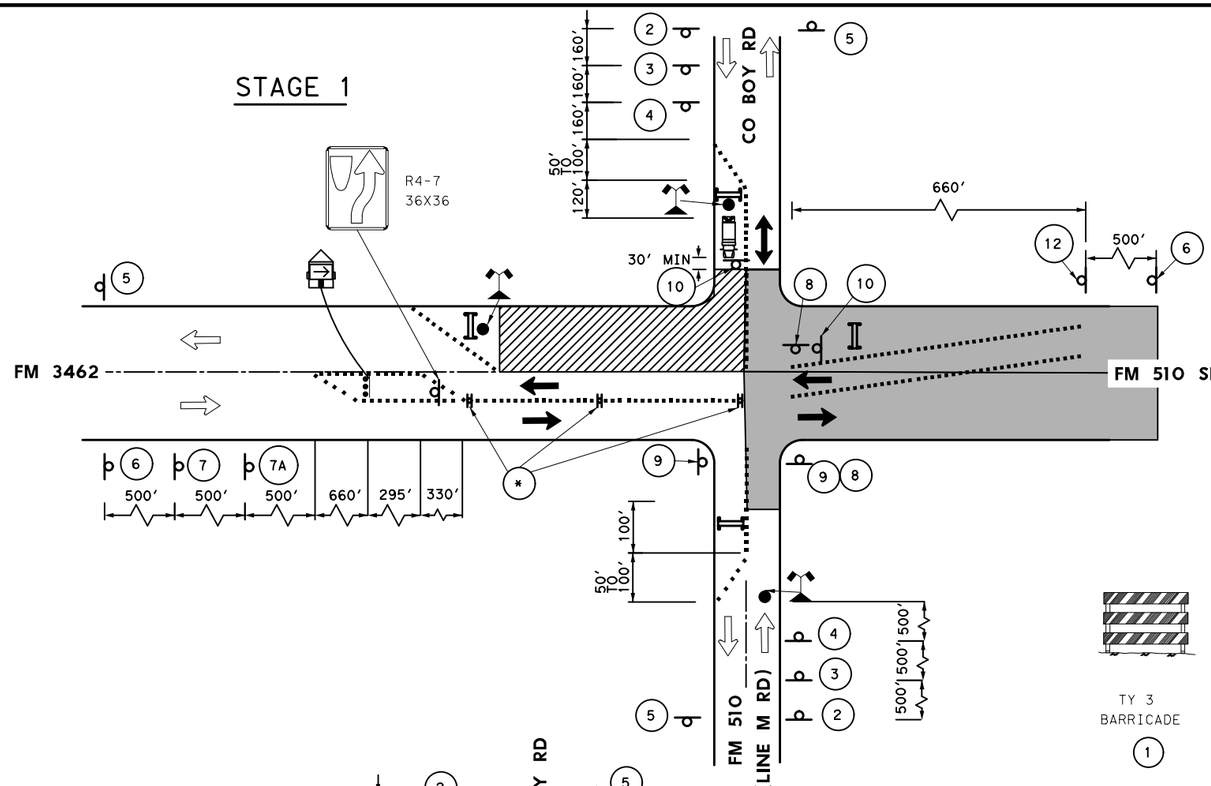
TYPICAL INTERSECTION CLOSURE DETAIL

(N. T. S)

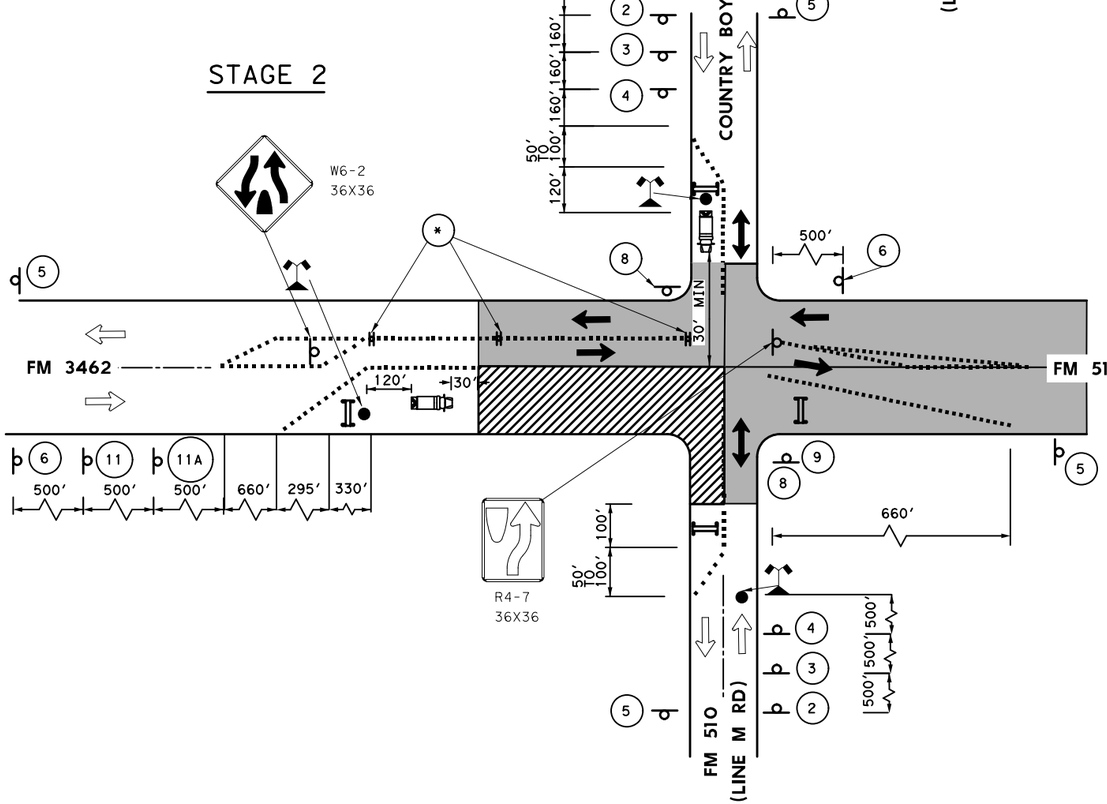
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	62
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\04 Traffic Control Plan\FM510*INTERSECTION-CLOSURE.dgn
DRAWING DATE: 6/27/2022

STAGE 1



STAGE 2



LEGEND:

- TYPE 3 BARRICADE
- SIGN
- HIGH LEVEL WARNING DEVICE (FLAG TREE)
- CONSTRUCTION AREA
- PREVIOUSLY CONSTRUCTED AREA
- VERTICAL PANELS (@ 10' C-C)
- HEAVY WORK VEHICLE WITH TRUCK MOUNTED ATTENUATOR
- TRAILER MOUNTED FLASHING ARROW BOARD

OPPOSING TRAFFIC LANE DIVIDERS (OTLD) (*)

1. CONSTRUCTION OF STAGE 1 OR STAGE 2 OR BOTH STAGES SHALL BE COMPLETED IN A SINGLE WORKING DAY AND BOTH TRAVEL LANES ON THE SIDE STREET SHALL BE OPEN TO TRAFFIC AT THE END OF EACH WORKING DAY. CONTRACTOR SHALL PROVIDE EDGE CONDITION TYPE 1 (IN ACCORDANCE WITH THE "TREATMENT FOR VARIOUS EDGE CONDITIONS" SHEET) AND INSTALL SIGN CW8-11 IN ACCORDANCE WITH STANDARD WZ(UL)-13 AT THE END OF EACH WORKING DAY.
2. AT THE END OF EACH WORK DAY, TRAFFIC CONTROL SHALL DEFAULT TO THE " TYPICAL SEGMENT CLOSURE DETAIL" SHEET FOR THE CURRENTLY CLOSED SEGMENT OR THE NEXT SEGMENT TO BE CLOSED.

TY 3 BARRICADE (1)	ROAD WORK AHEAD CW20-1D 48X48 (2)	ONE LANE ROAD AHEAD CW20-4 48X48 (3)	CW20-7 48X48 (4)
END ROAD WORK G20-2 60x30 (5)	ROAD WORK AHEAD CW20-1D 48X48 (6)	LEFT LANE CLOSED 1000 FT CW20-5TL 48X48 / CW16-2aP(2) 30X24 (7)	LEFT LANE CLOSED 500 FT CW20-5TL 48X48 / CW16-2aP(1) 30X24 (7A)
STOP R1-1 36X36 (8)	R3-2 36X36 (9)	R3-1 36X36 (10)	
RIGHT LANE CLOSED AHEAD 1000 FT CW20-5DR 48X48 / CW16-2aP(2) 30X24 (11)	RIGHT LANE CLOSED AHEAD 500 FT CW20-5DR 48X48 / CW16-2aP(1) 30X24 (11A)	THRU TRAFFIC MERGE LEFT W4-1aTL 48X48 (12)	

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116089
LICENSED PROFESSIONAL ENGINEER
6/27/2022

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

FM 3462 INTERSECTION CLOSURE DETAIL

(N. T. S)

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	63
CONTROL	SECTION	JOB	
1057	03	045	

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

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	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		64

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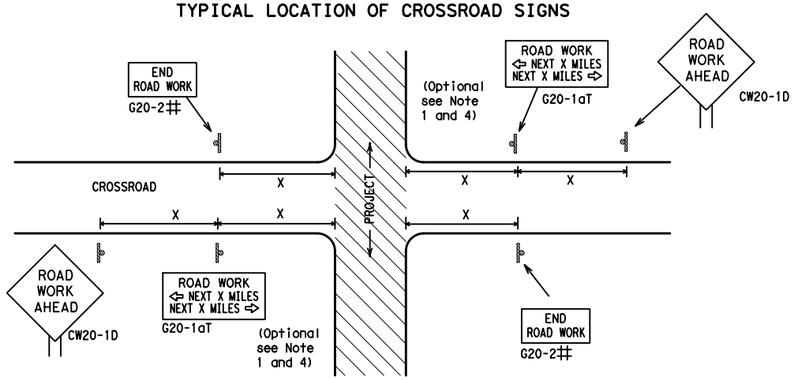
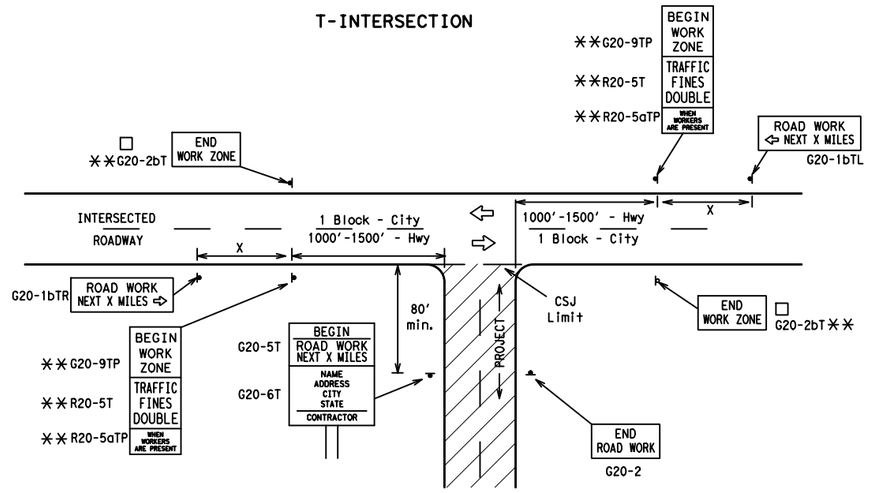
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

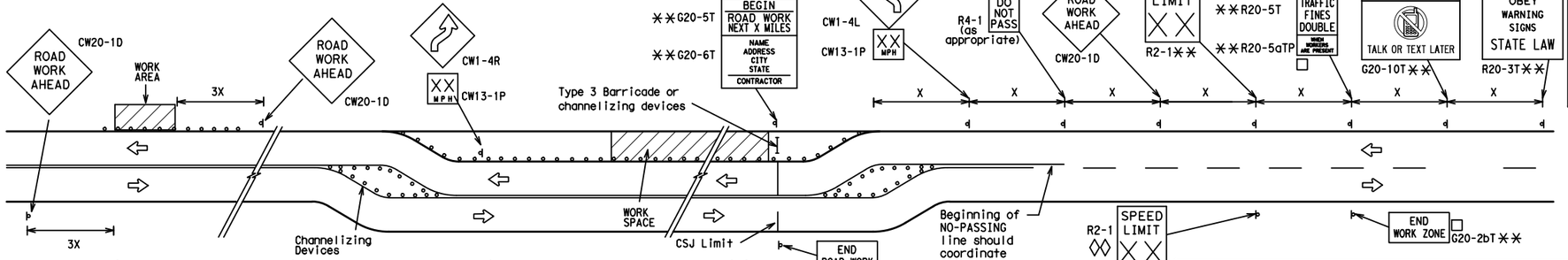
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

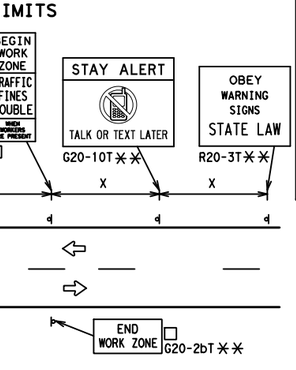
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

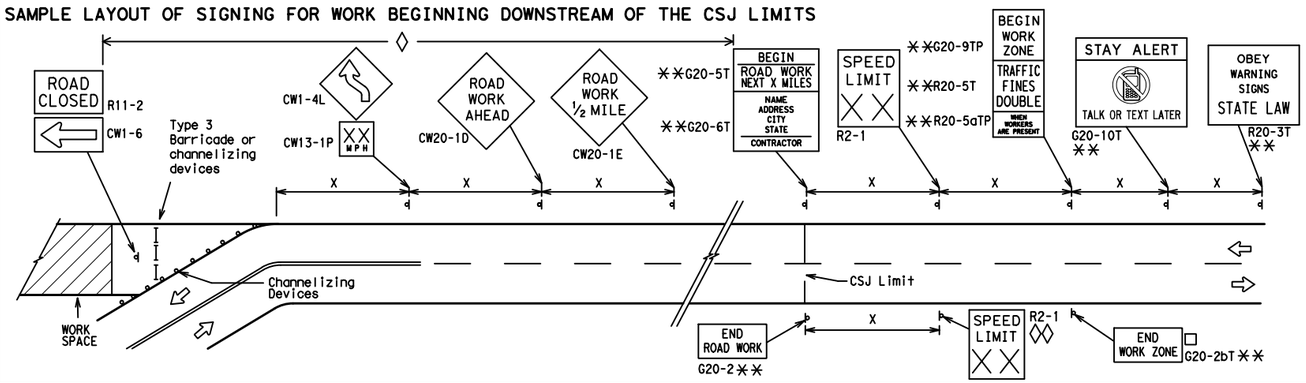


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

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

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

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

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

SHEET 2 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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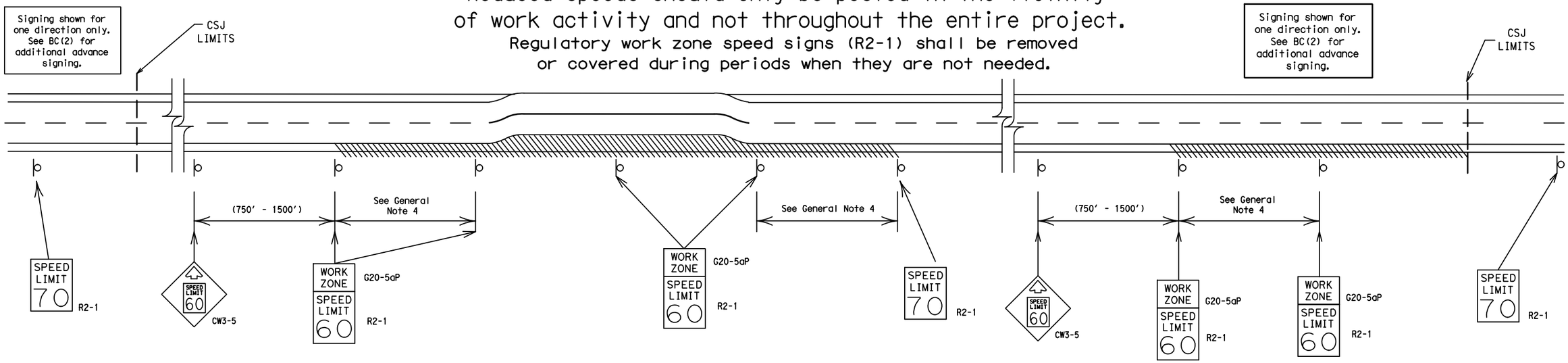
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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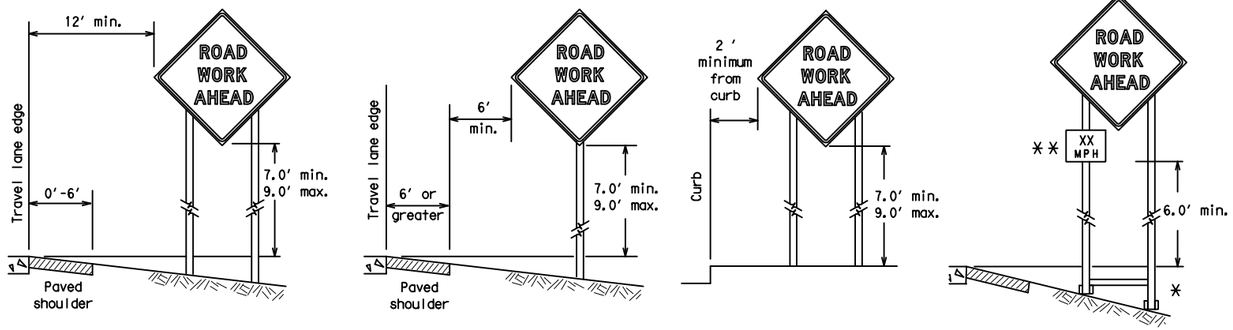
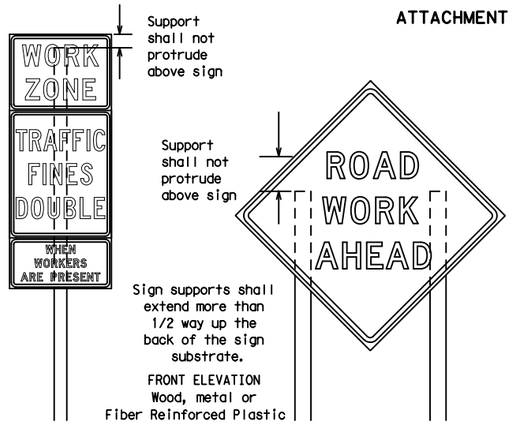
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

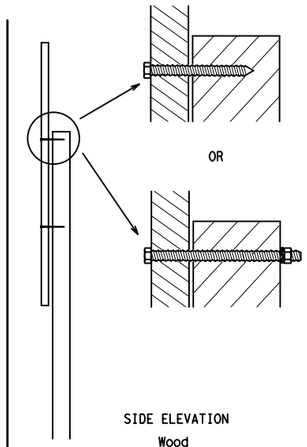


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





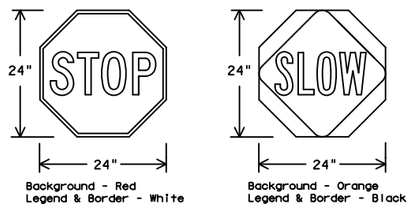
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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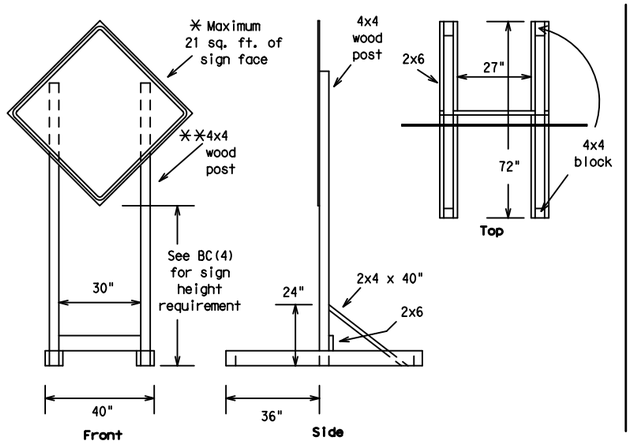
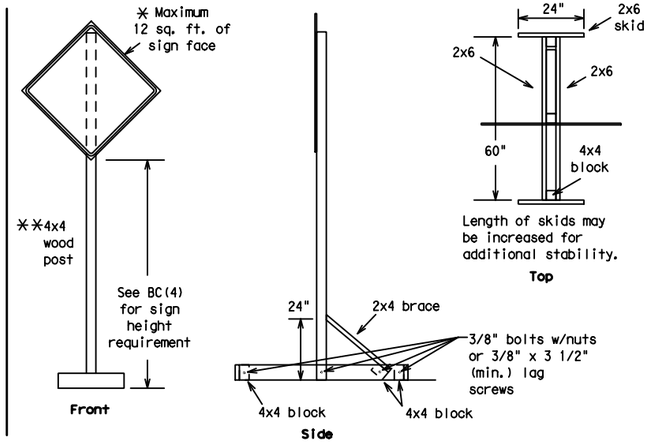
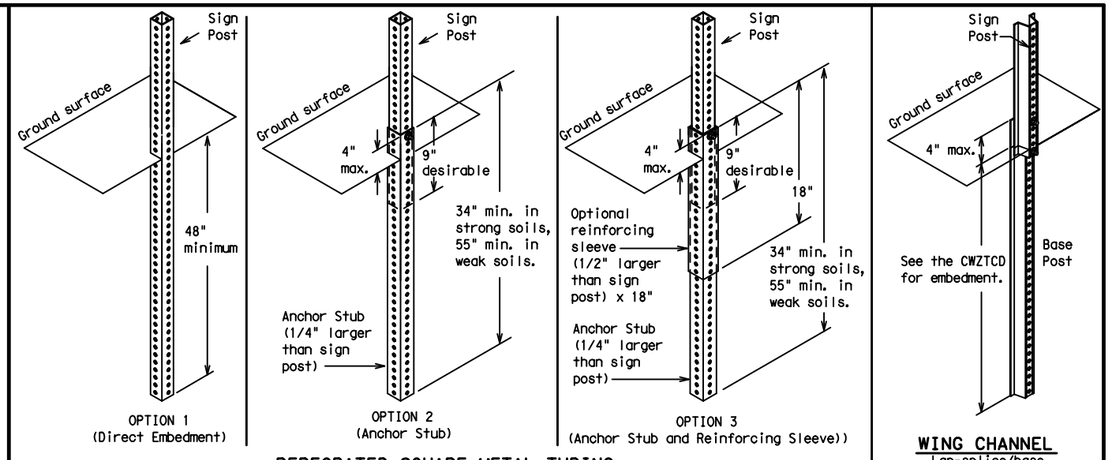




SKID MOUNTED WOOD SIGN SUPPORTS

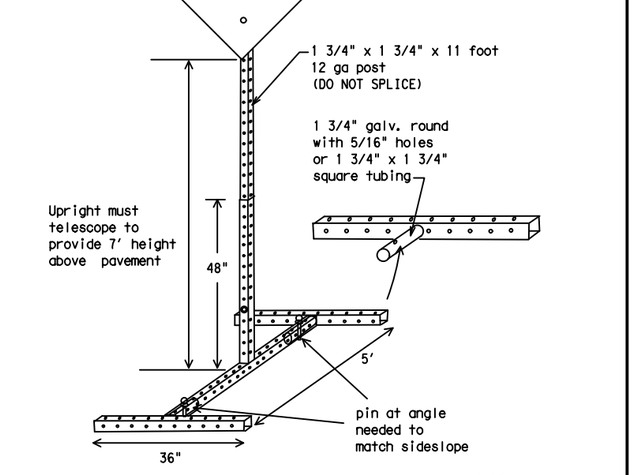
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

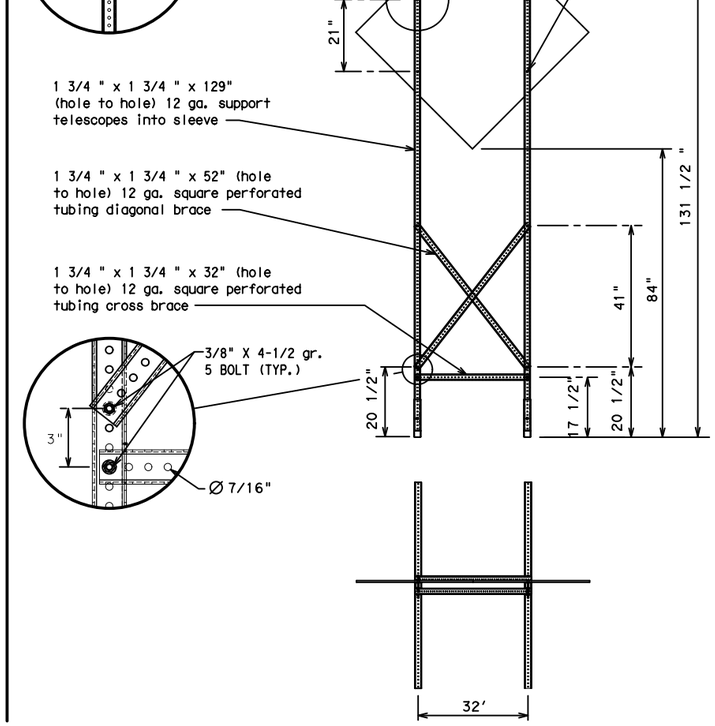


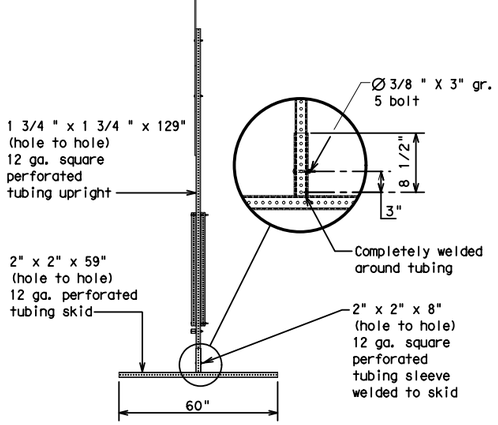
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHARR	CAMERON		68

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHARR	CAMERON		69

DATE: 6/27/2022 4:47:50 PM
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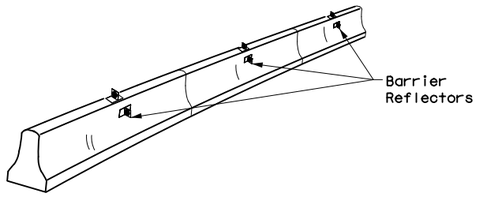
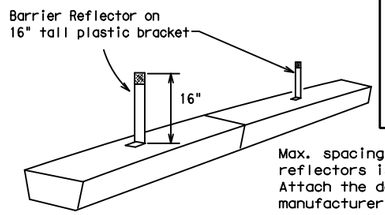
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



CONCRETE TRAFFIC BARRIER (CTB)

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

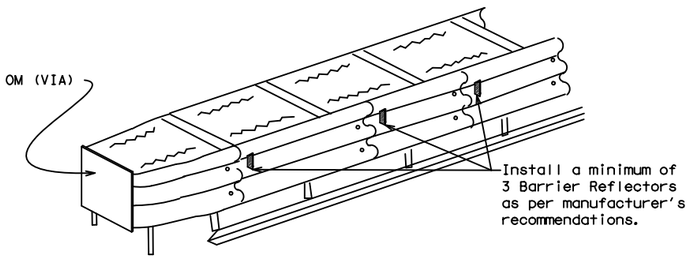


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

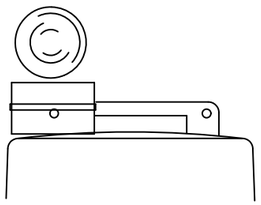


DELINEATION OF END TREATMENTS

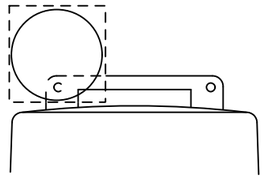
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

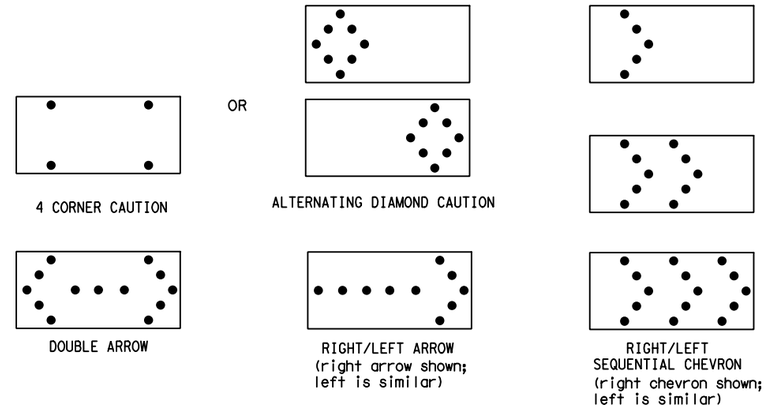
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

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

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

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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHARR	CAMERON		70

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

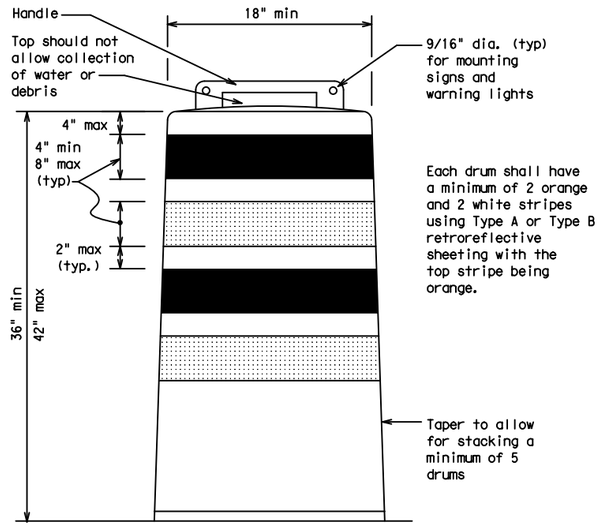
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

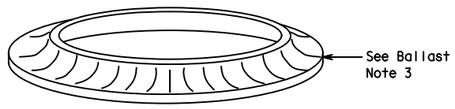
RETROREFLECTIVE SHEETING

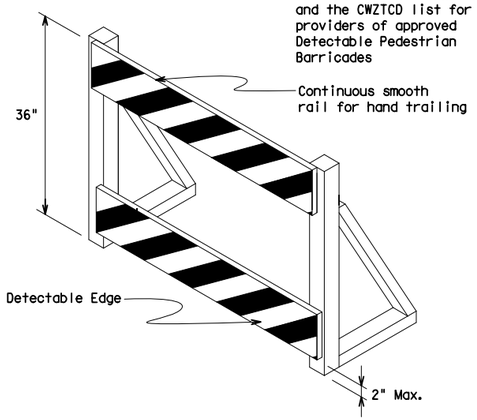
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

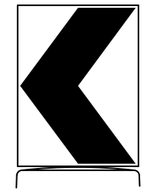




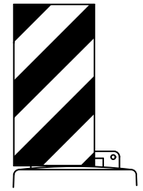


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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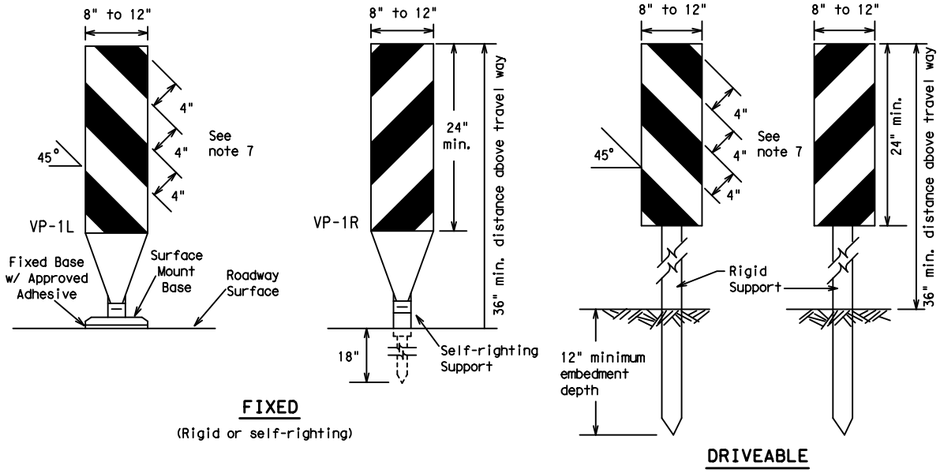
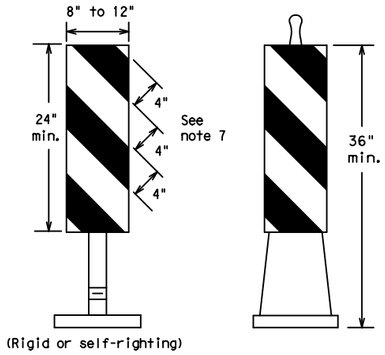


FIXED
(Rigid or self-righting)

DRIVEABLE

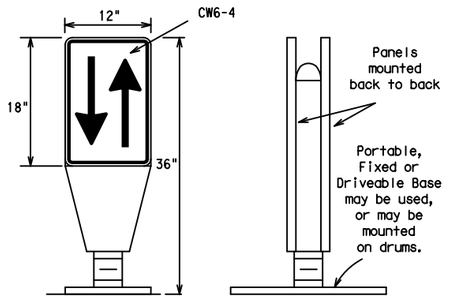


(Rigid or self-righting)

PORTABLE

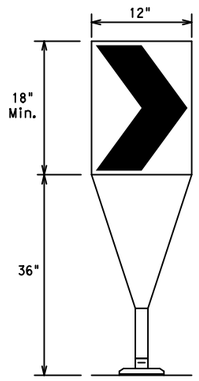
VERTICAL PANELS (VPs)

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



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

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



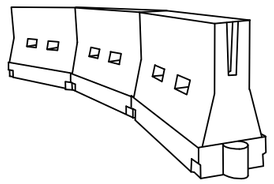
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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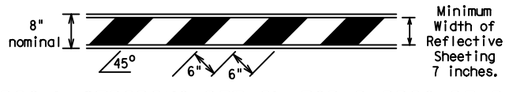
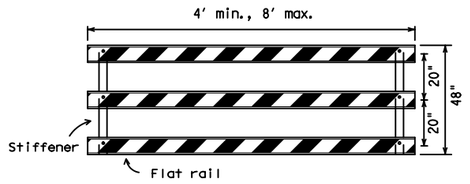
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



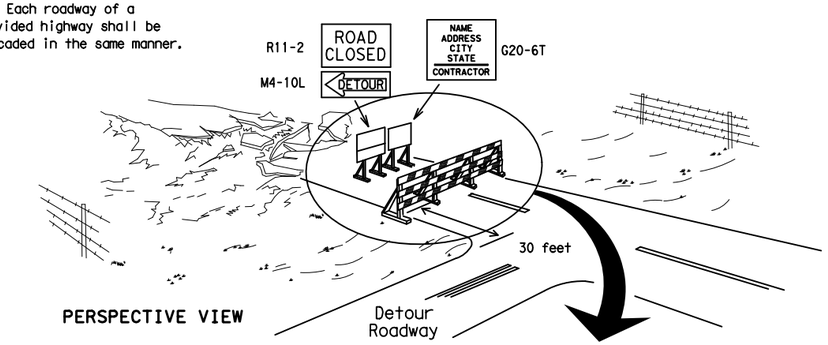
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

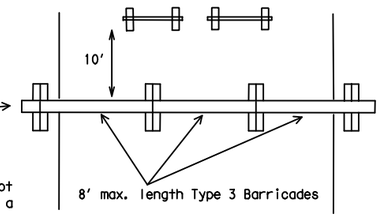
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

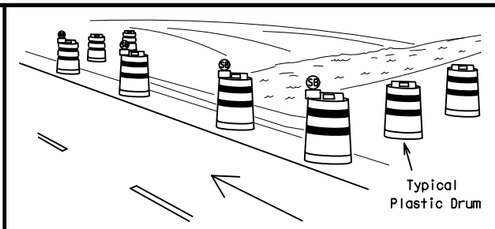
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

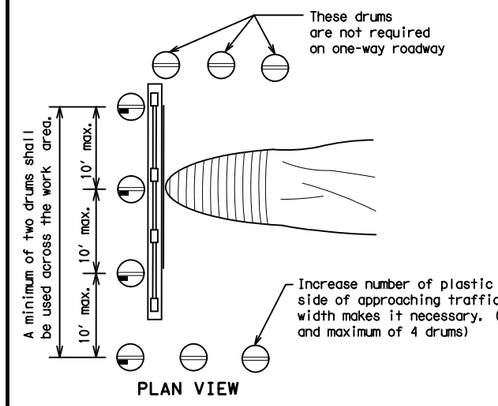
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

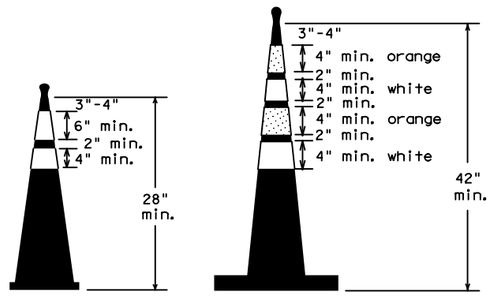
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

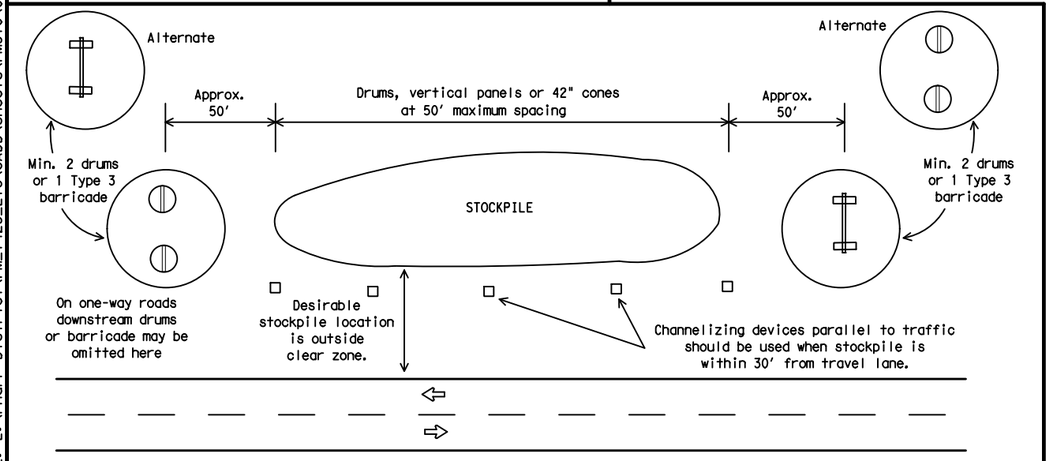
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

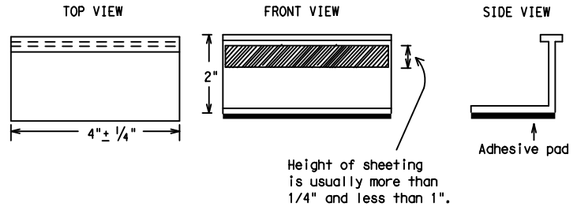
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	PHARR	CAMERON		74
11-02 8-14				

DATE: 6/27/2022 4:47:52 PM
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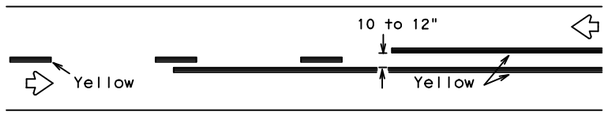
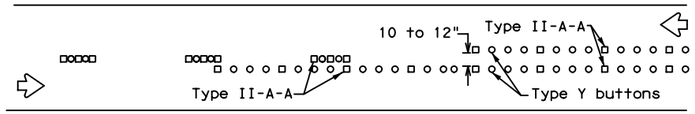
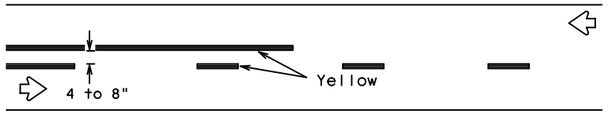
PAVEMENT MARKING PATTERNS



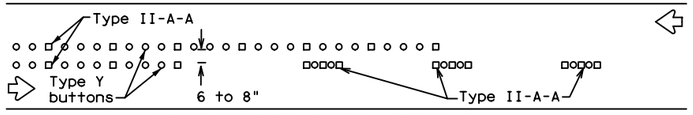
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



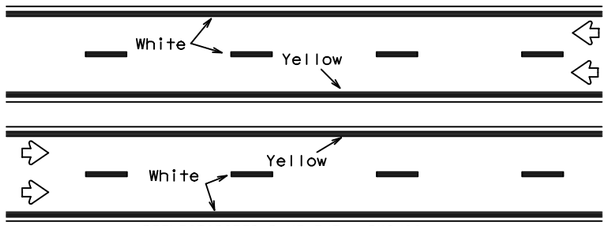
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



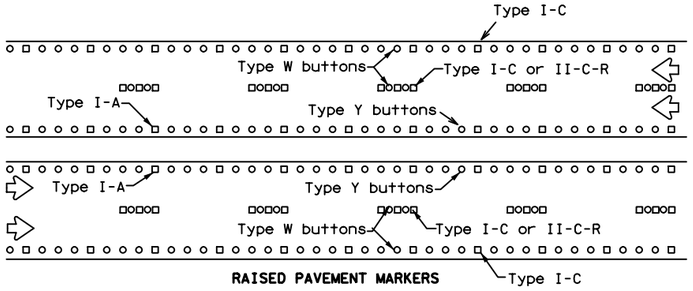
RAISED PAVEMENT MARKERS - PATTERN B

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

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



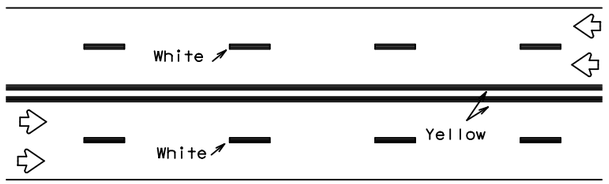
REFLECTORIZED PAVEMENT MARKINGS



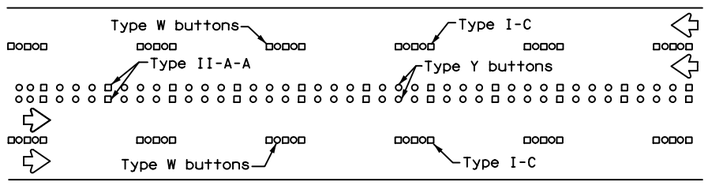
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



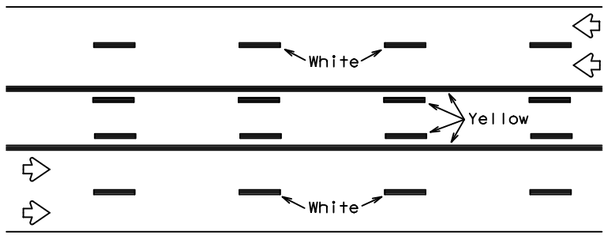
REFLECTORIZED PAVEMENT MARKINGS



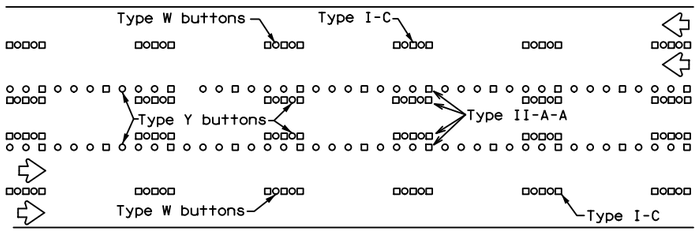
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

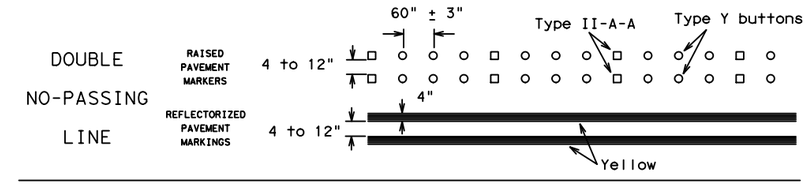
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

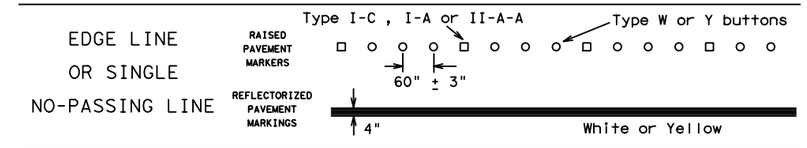
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

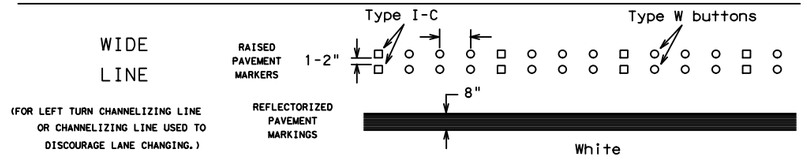


EDGE LINE OR SINGLE NO-PASSING LINE



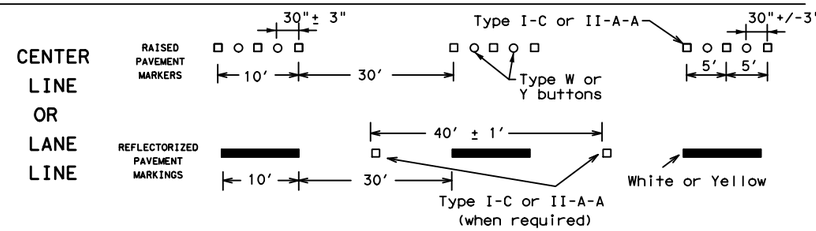
WIDE LINE

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

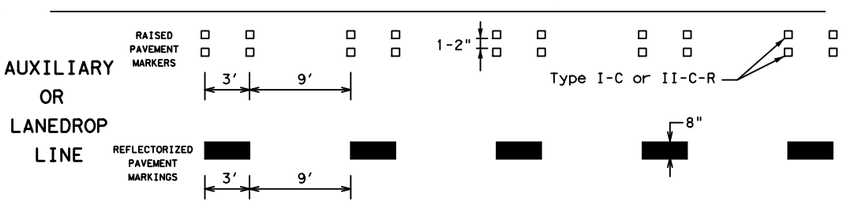


BROKEN LINES

CENTER LINE OR LANE LINE

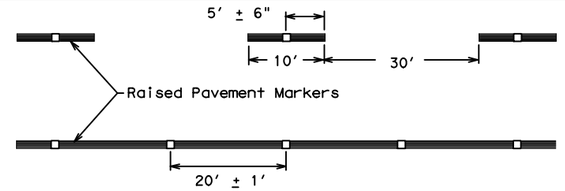


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	1057	03	045	FM 510
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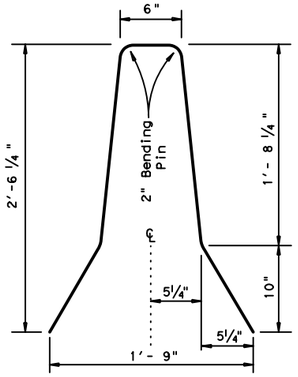
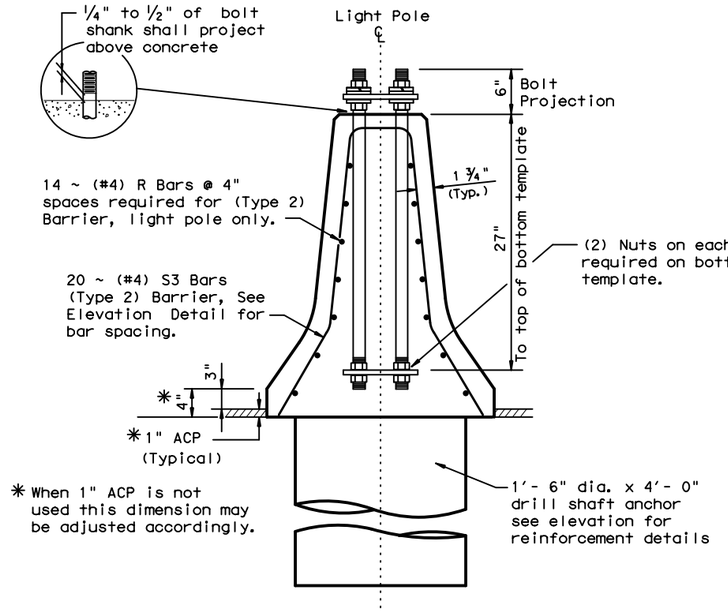


S3 BAR (#4)

(20) At each light pole section of barrier

Note:
The reinforcement cage may rest on top of the finished grade.



* When 1" ACP is not used this dimension may be adjusted accordingly.

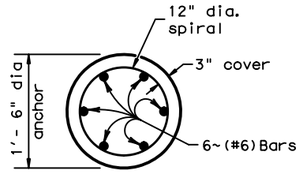
(ROADWAY) SECTION AT LIGHT POLE

Symmetrical about center line

Schedule of reinforcement for each 10 foot cast-in-place section at light poles (excluding anchorage)

BAR	SIZE	QUANTITY
S3	#4	20
R	#4	14

Welded Wire Reinforcement (WWR): IS NOT APPROVED FOR USE WITH (TYPE 2) BARRIER.

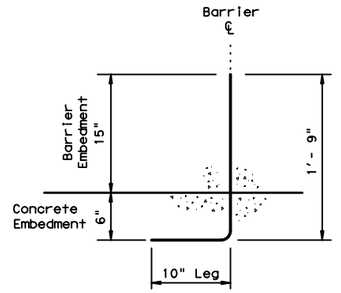


No.3 spiral at 6" pitch (one flat turn top and bottom)

SECTION A-A

GENERAL NOTES

1. All concrete shall be Class C, unless otherwise specified in the plans.
2. Anchor bolts, junction box, non-metallic flexible conduit, and bonding to steel shall not be paid for directly, but will be subsidiary to the various bid items.
3. For proper installation and material requirements for the anchor bolts and light pole, see Traffic Engineering RIP standard sheets.
4. Junction boxes shall be polymer concrete, and shall be mounted flush (+0, - 1/2") with concrete surface. For details and material requirements on barrier junction box, see DMS-11030.
5. Install 12 AWG stranded conductors from load side of fused breakaway connector to luminaire. Fused breakaway connectors shall be installed as required on Traffic Engineering RID Sheets. Typically fused breakaway connectors are installed in the barrier junction box adjacent to each light pole. If fused breakaway connectors are installed in the pole's handhole, increase the size of the 3/4" flexible non-metallic conduit according to the NEC as needed to accomodate the branch circuit conductors.
6. Anchor bolts and their assemblies shall be in accordance with Item 449, "Anchor Bolts" High-Strength Steel or Alloy Steel. Galvanization requirements for anchor bolts are shown on RIP sheets.
7. The required anchorage for Type 2 barrier (drill shaft, standard or optional concrete anchorage) shall not be paid for directly, but is subsidiary to Item 514, "Permanent Concrete Traffic Barrier."
8. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.

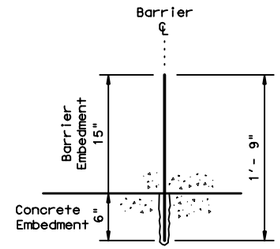


STANDARD "CONCRETE" ANCHORAGE

(#6) Bar

Concrete Pavement / Bridge Deck Anchorage: Cast-in-Place or Slip-Formed Barrier

Standard Anchorage Note:
10" leg may be oriented 90 degrees in any direction about the barrier ℄.

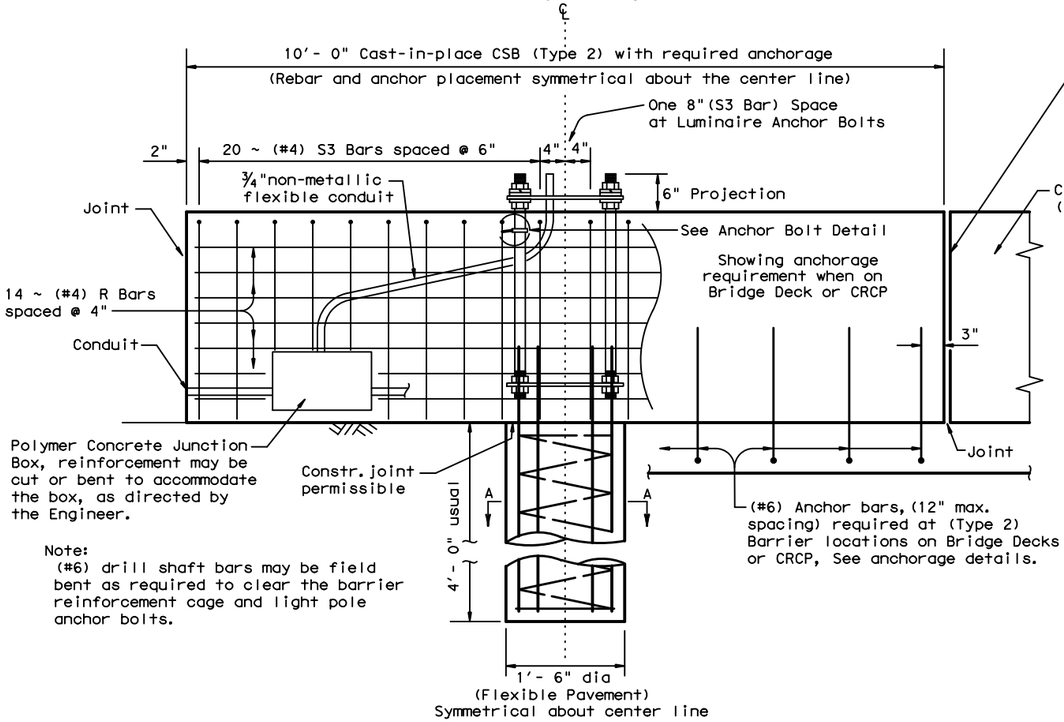


"OPTIONAL" EPOXY ANCHORAGE

(#6) Bar
Type III, Class C Epoxy

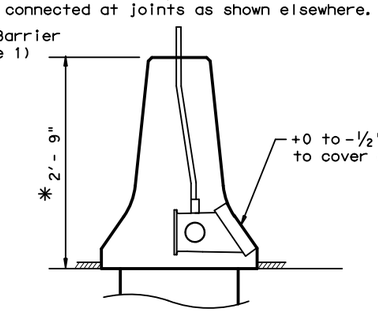
Concrete Pavement / Bridge Deck Anchorage: Cast-in-Place or Slip-Formed Barrier

Epoxy Note:
If epoxy coated anchor bars are required, the lower 6" of the bars must not be epoxy coated.

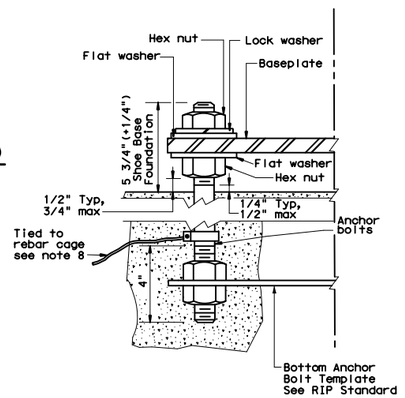


Note:
(#6) drill shaft bars may be field bent as required to clear the barrier reinforcement cage and light pole anchor bolts.

Each end of cast-in-place light pole section shall be formed to mate with the adjacent precast (Type 1) roadway barrier. The cast-in-place section shall be connected at each end to the precast sections in the same manner that precast sections are connected at joints as shown elsewhere.



SECTION SHOWING JUNCTION BOX CONCRETE SAFETY BARRIER (TYPE 2)



ANCHOR BOLT DETAIL

ELEVATION SHOWING THE REQUIRED REINFORCEMENT AND ANCHORAGE OF (TYPE 2) BARRIER

The "Drilled Shaft Anchor" is the required anchorage for (Type 2) barrier on roadways with Flexible Pavement.
The #6 Anchor Bars (Shown) is the required anchorage for (Type 2) barrier on Bridge Decks and CRCP.

Texas Department of Transportation — Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)
CAST-IN-PLACE (TYPE 2) AT LIGHT POLE
TL-3 MASH COMPLIANT
CSB(4)-19

FILE: csb419.dgn	DN: TxDOT	CK: KM	DW: BD	CK:
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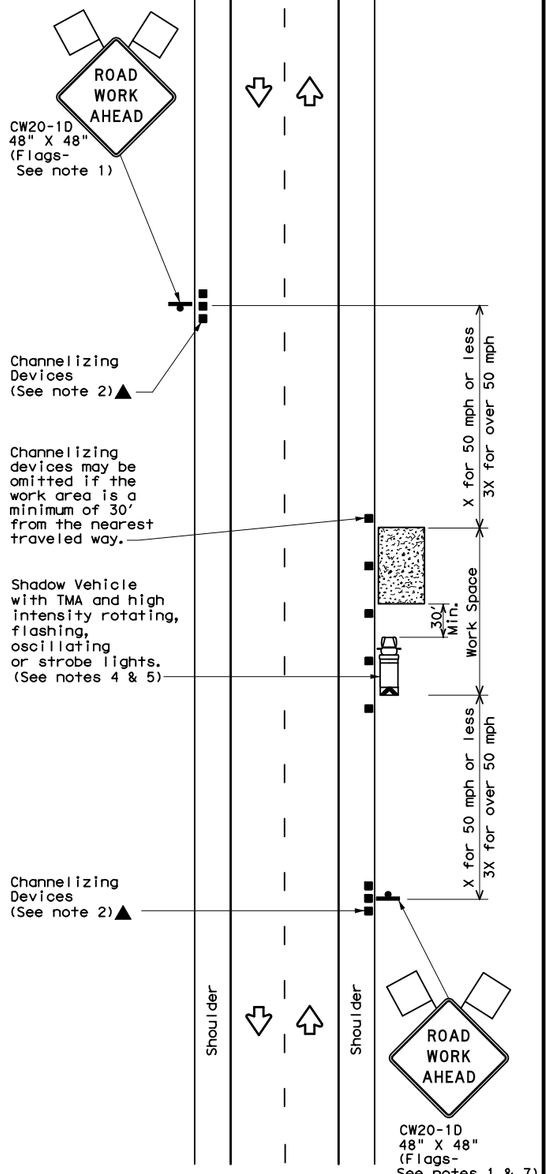
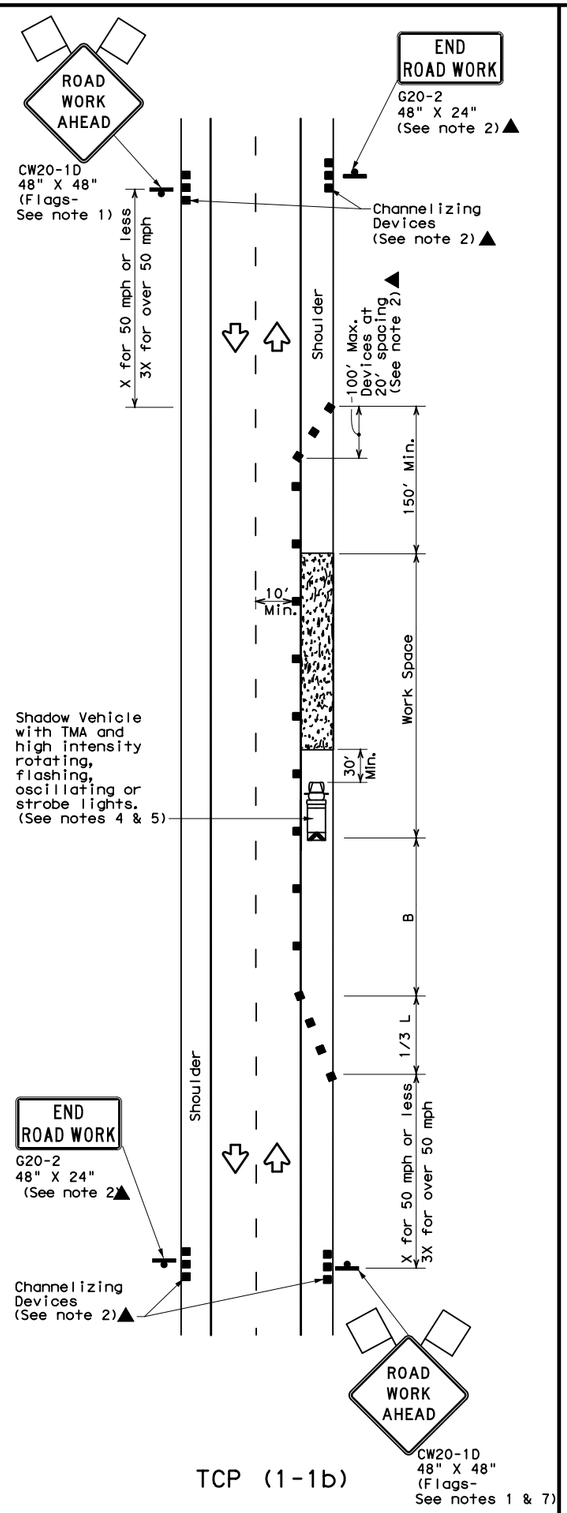


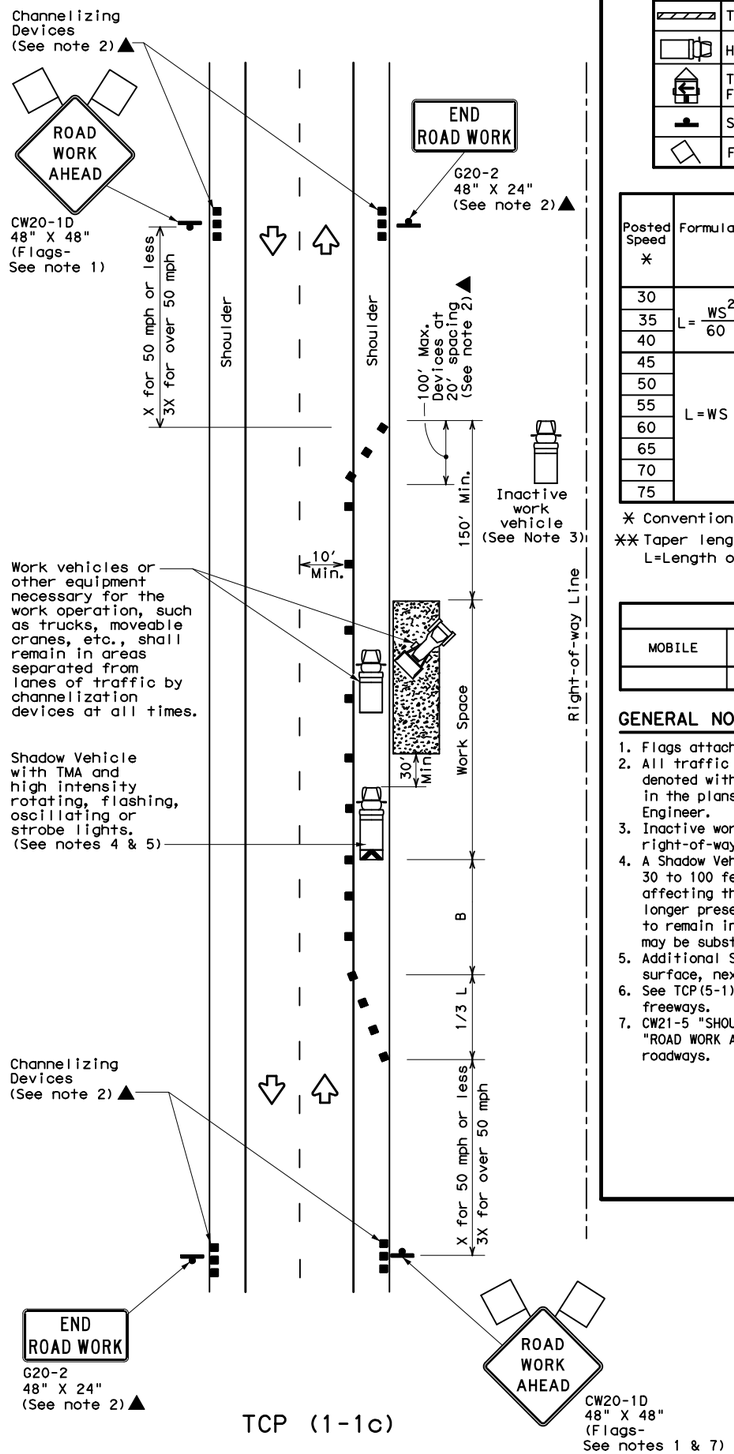
TCP (1-1a)

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
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8-95 2-12	PHARR	CAMERON		77
1-97 2-18				

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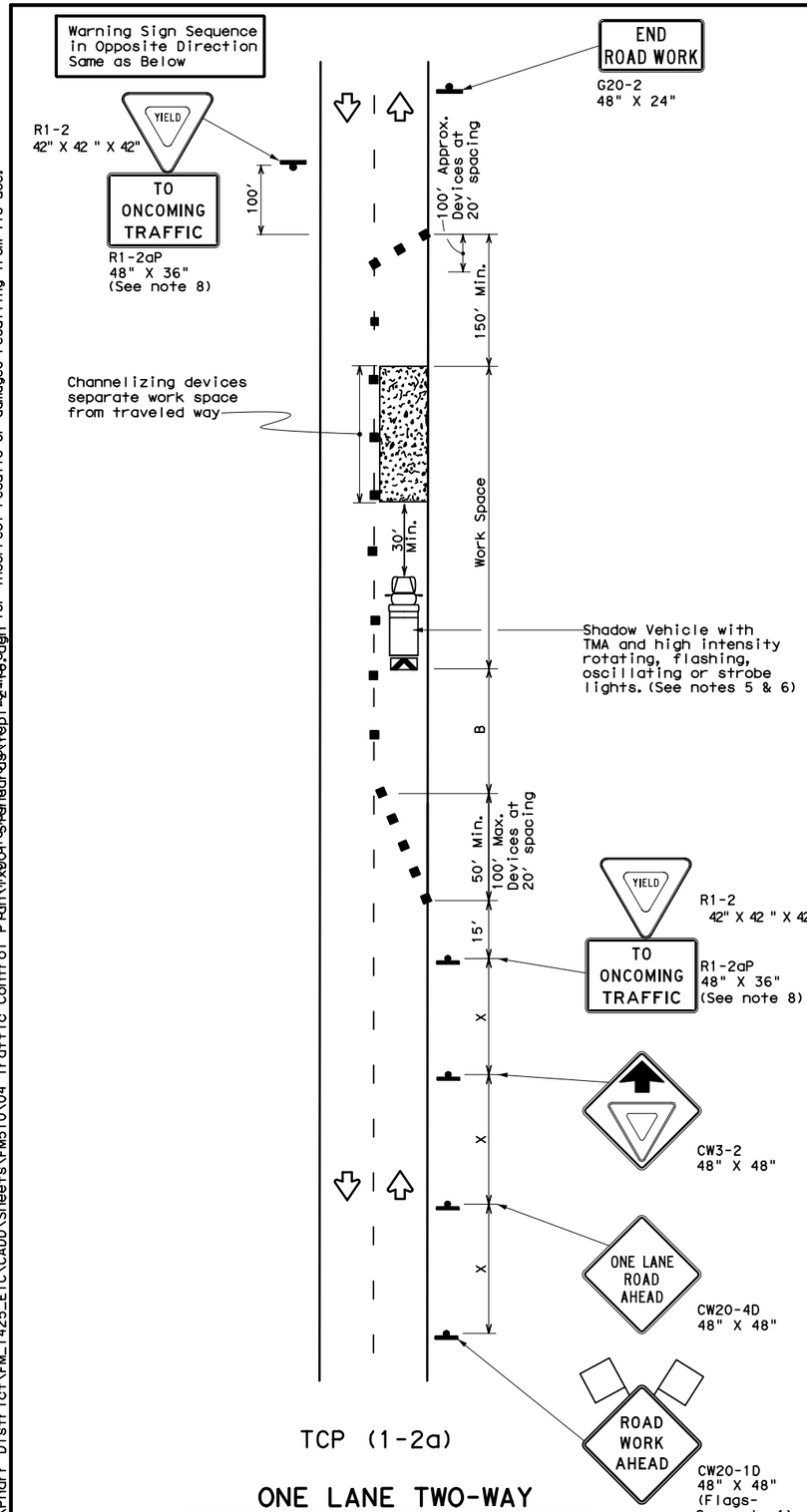
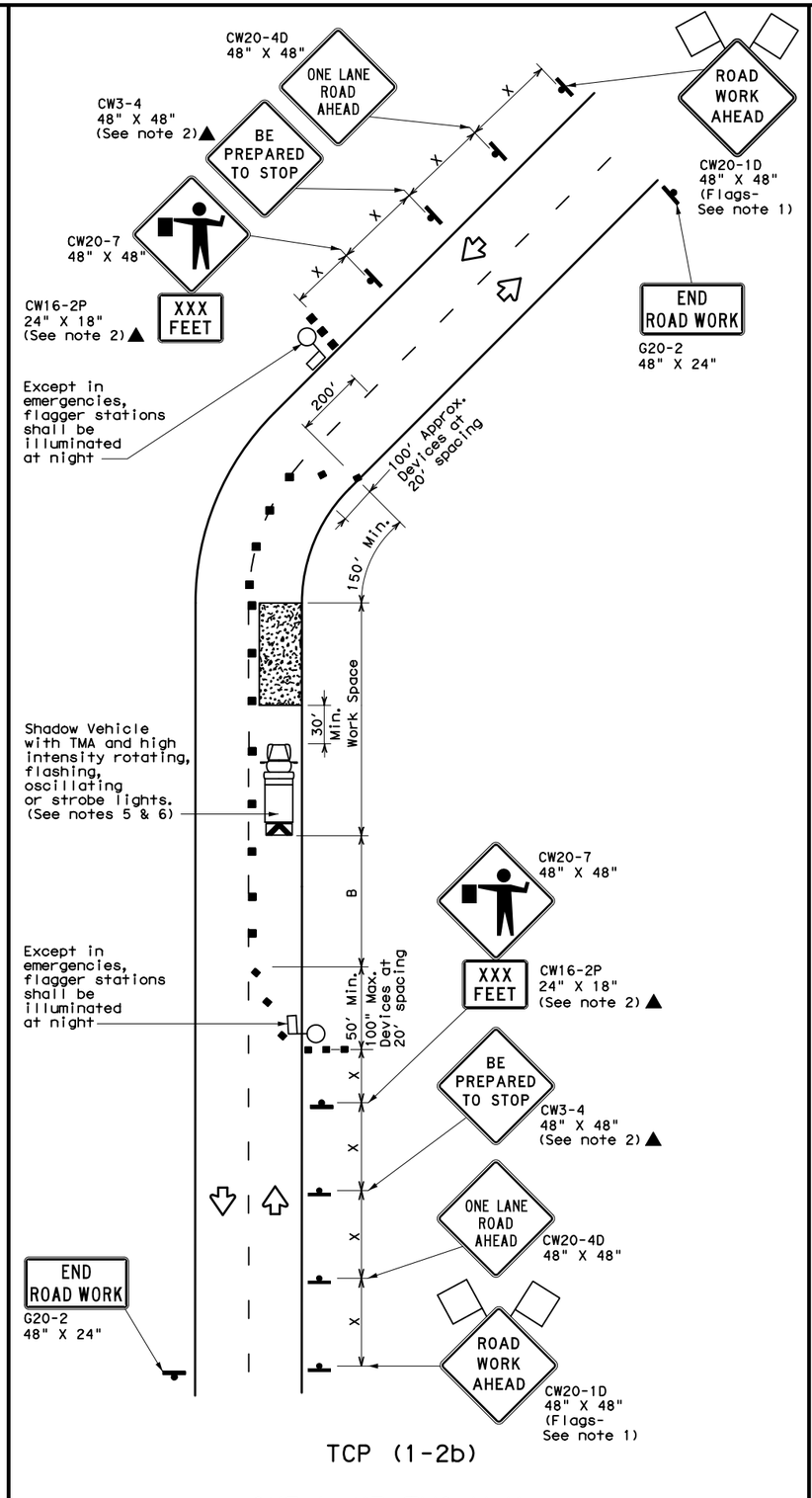


TCP (1-2a)

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	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		78

DATE: 6/27/2022 4:47:54 PM
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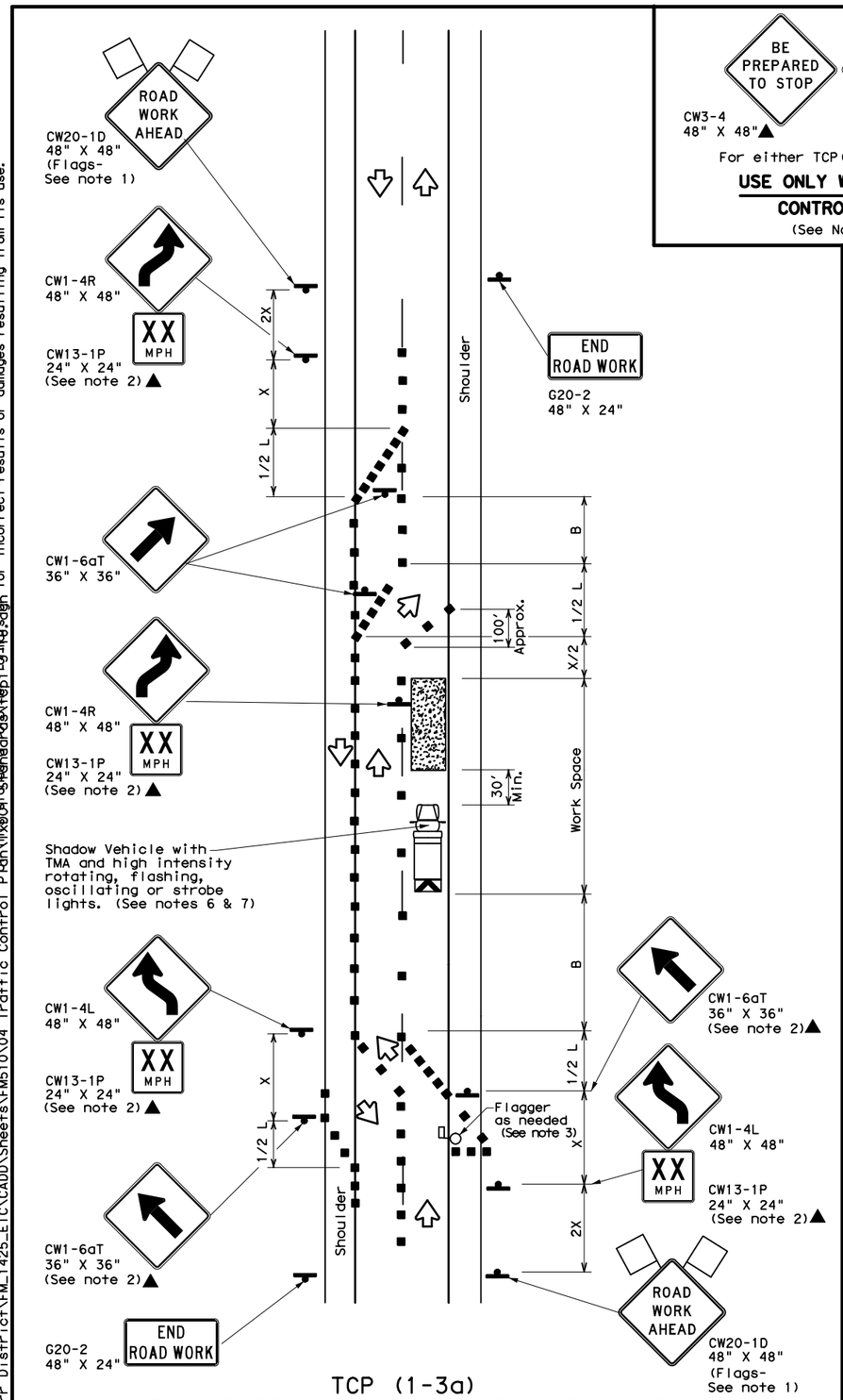


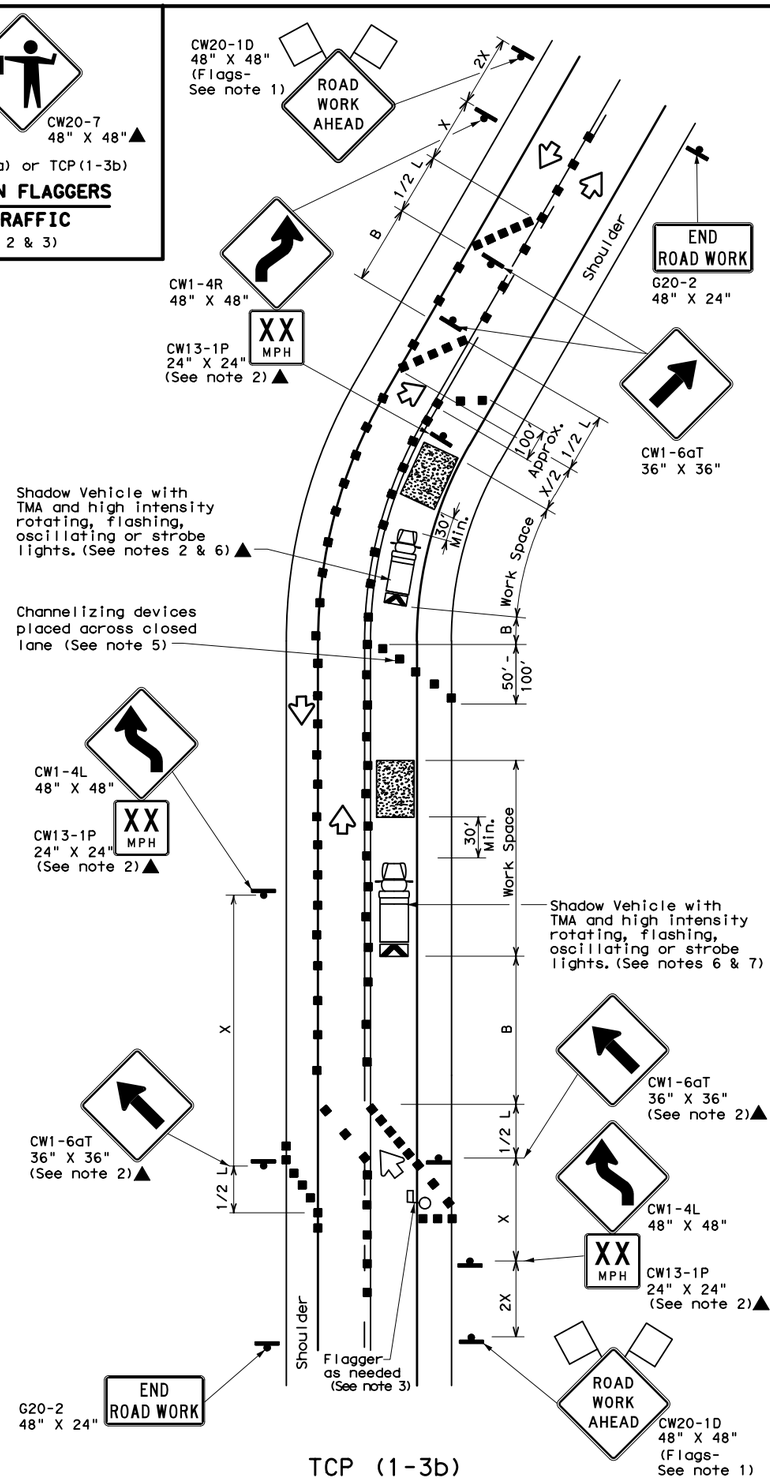
TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. 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

FILE: tcp1-3-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	PHARR	CAMERON		79
1-97 2-18				

153

DATE: 6/27/2022 4:47:54 PM
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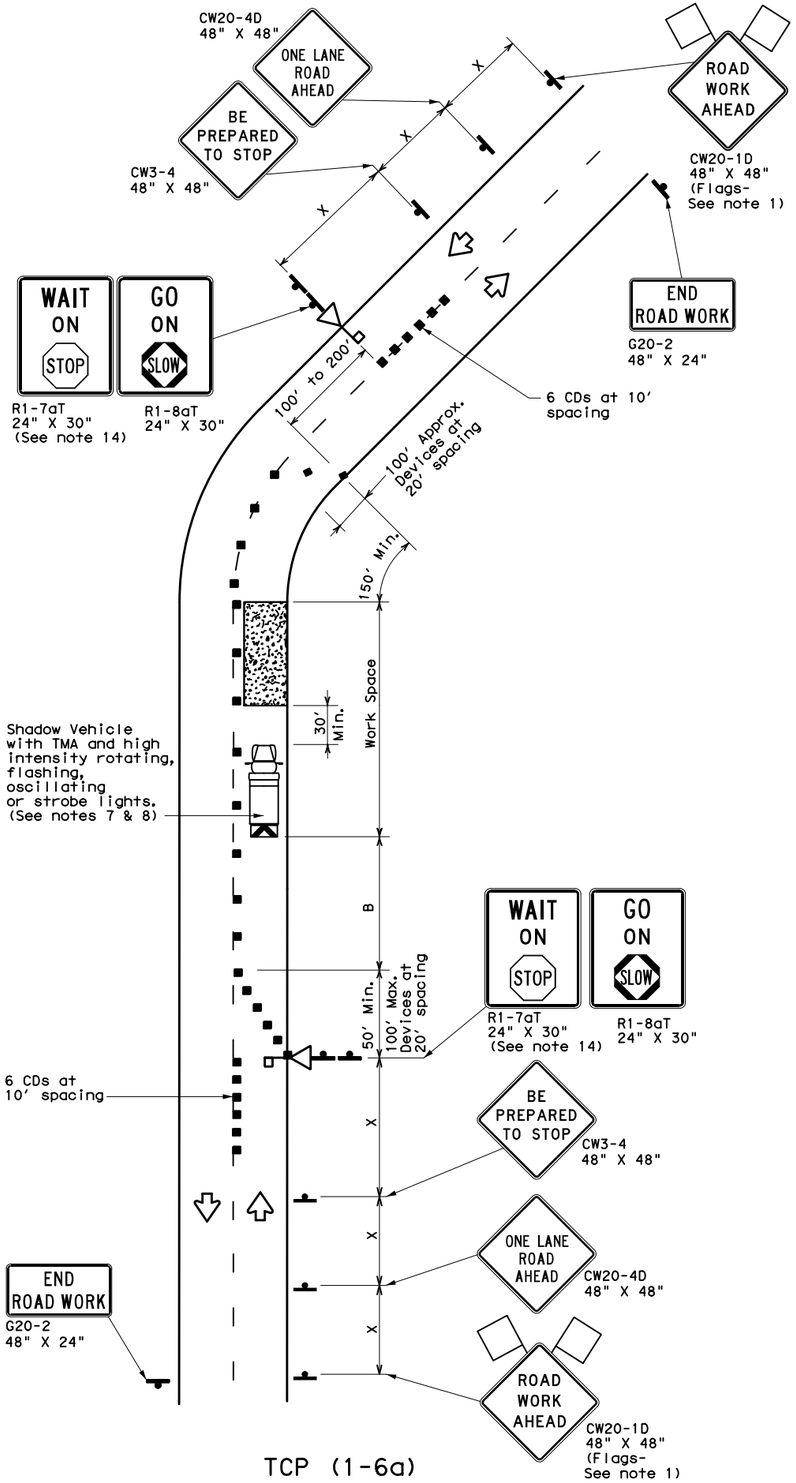
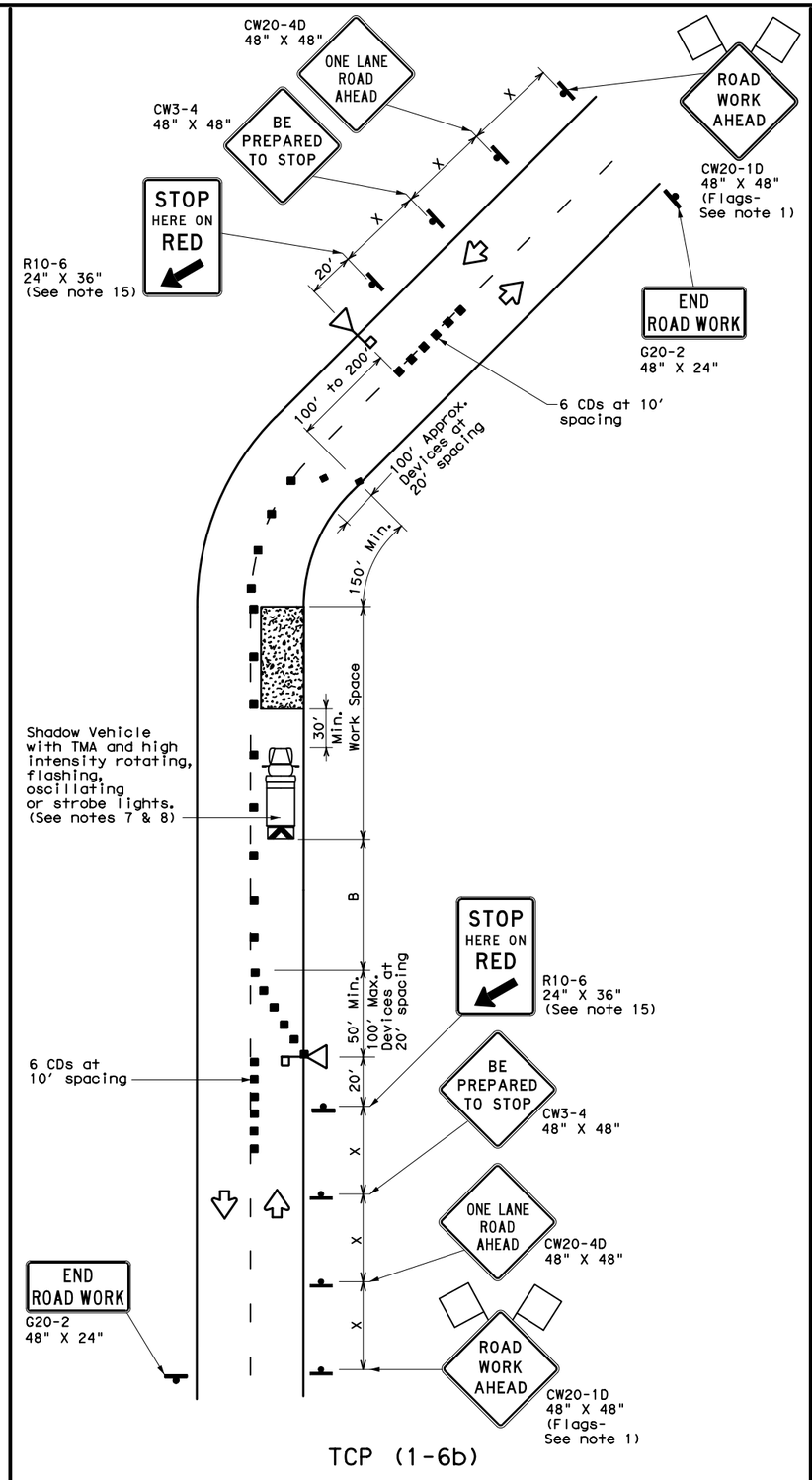


TCP (1-6a)

ONE LANE TWO-WAY CONTROL WITH STOP/SLOW AFADs



TCP (1-6b)

ONE LANE TWO-WAY CONTROL WITH RED/YELLOW LENS AFADs

LEGEND			
	Type 3 Barricade	■ ■	Channelizing Devices (CDs)
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Automated Flagger Assistance Device (AFAD)	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. AFADs shall only be used in situations where there is one lane of approaching traffic in the direction to be controlled.
3. Adequate stopping sight distance must be provided to each AFAD location for approaching traffic. (See table above).
4. Each AFAD shall be operated by a qualified/certified flagger. Flaggers operating AFADs shall not leave them unattended while they are in use.
5. One flagger may operate two AFADs only when the flagger has an unobstructed view of both AFADs and of the approaching traffic in both directions.
6. When pilot cars are used, a flagger controlling traffic shall be located on each approach. AFADs shall not be operated by the pilot car operator.
7. All AFADs shall be equipped with gate arms with an orange or fluorescent red-orange flag attached to the end of the gate arm. The flag shall be a minimum of 16" square.
8. 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.
9. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
10. Flaggers should use two-way radios or other methods of communication to control traffic.
11. Length of work space should be based on the ability of flaggers to communicate.
12. 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 AFAD.
13. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
14. The R1-7aT "WAIT ON STOP" sign and the R1-8aT "GO ON SLOW" sign shall be installed at the AFAD location on separate supports or they may be fabricated as one 48" x 30" sign. They shall not obscure the face of the STOP/SLOW AFAD.
15. The R10-6 "STOP HERE ON RED" arrow sign shall be offset so as not to obscure the lenses of the AFAD.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
AUTOMATED FLAGGER ASSISTANCE DEVICES (AFADS)
TCP (1-6)-18

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©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
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	PHARR	CAMERON		80

DATE: 6/27/2022 4:47:55 PM
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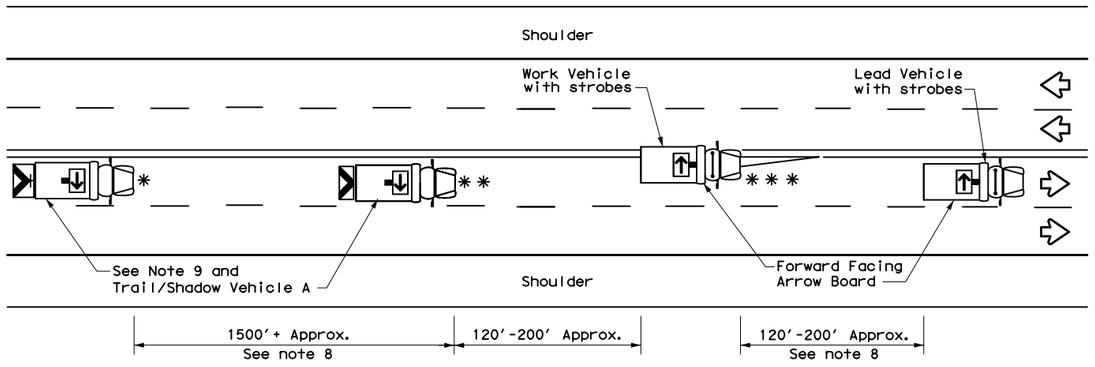
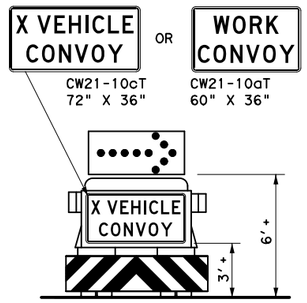


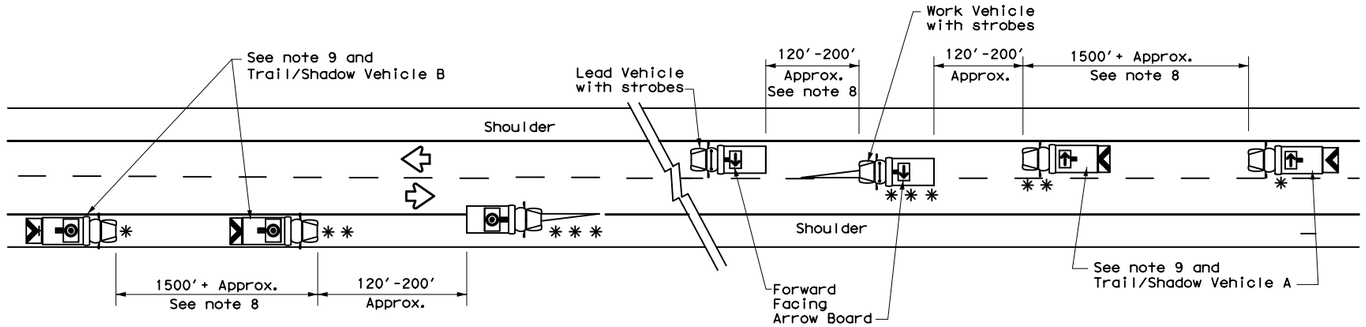
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

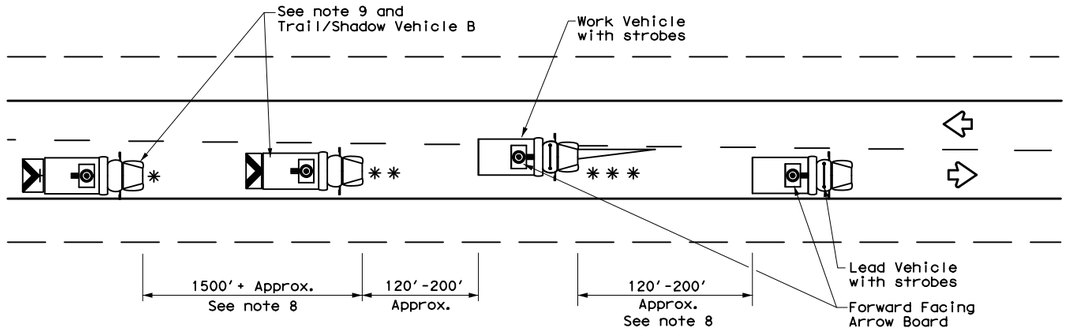


WORK ON SHOULDER

WORK ON TRAVEL LANE

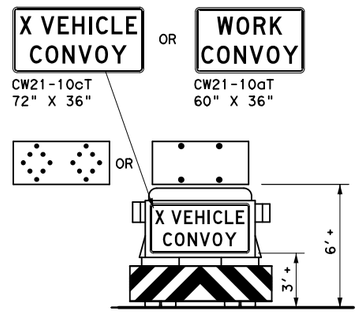
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

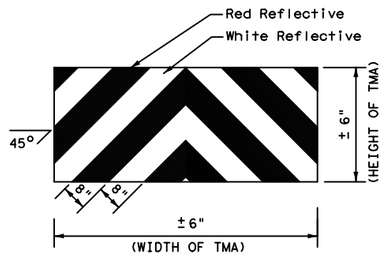
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP (3-1)-13

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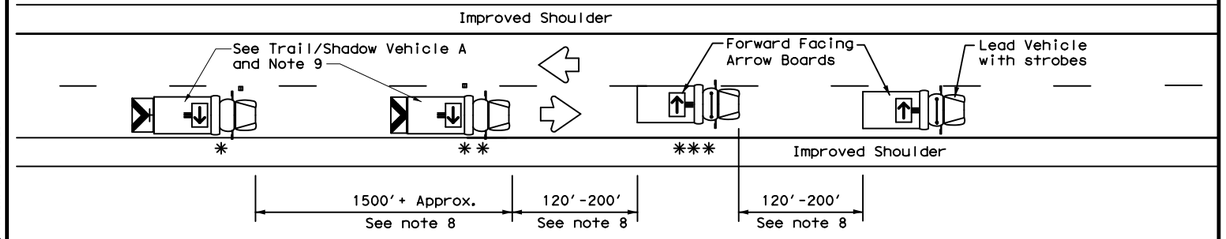
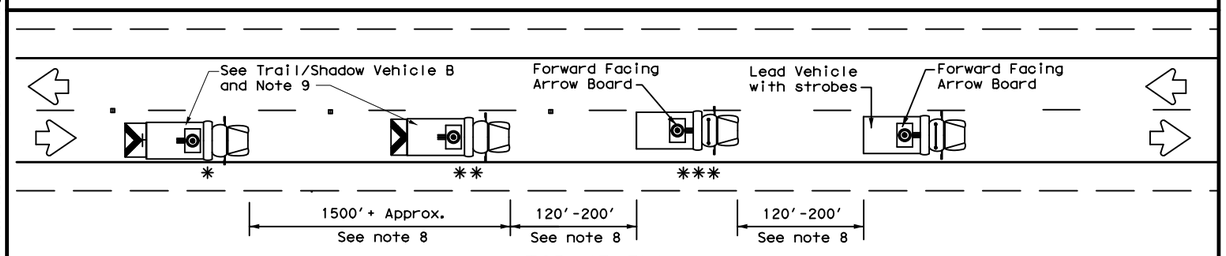
	PHARR	CAMERON		81



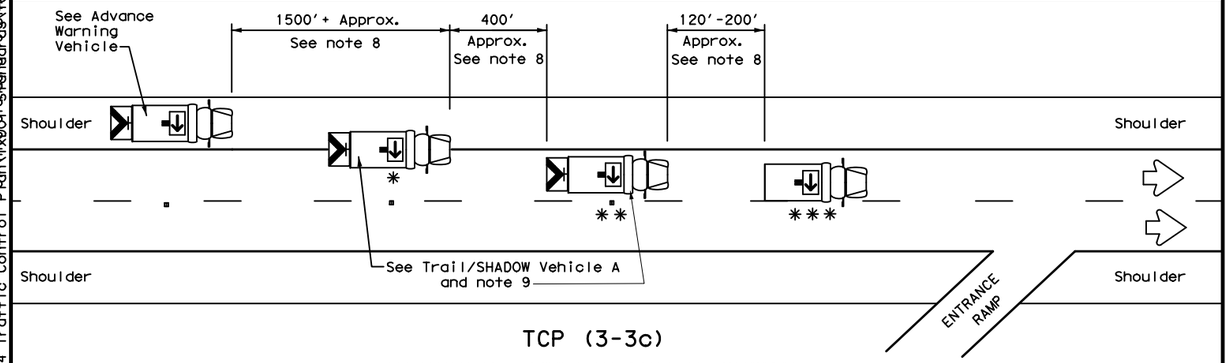
TCP (3-3a)

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



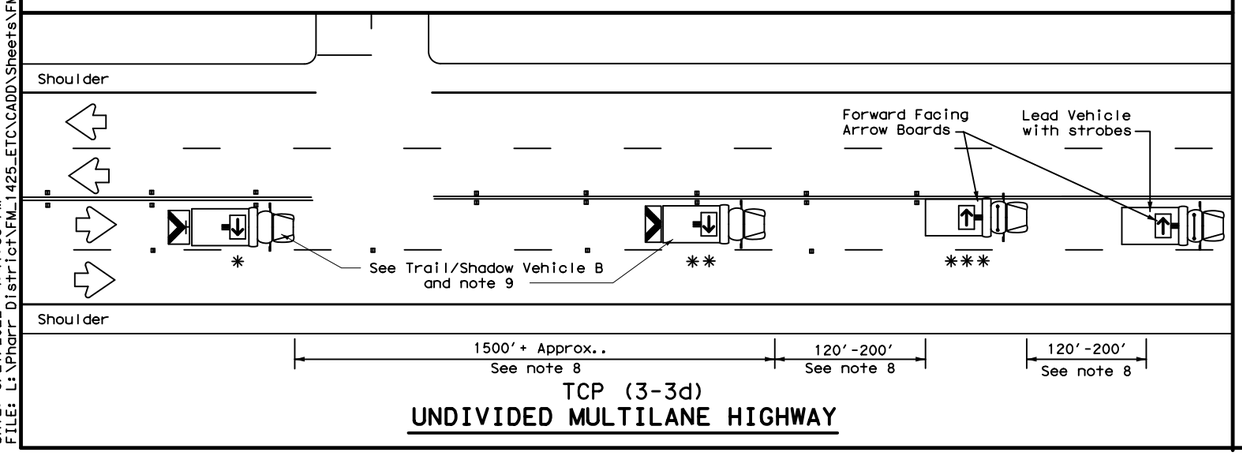
TCP (3-3b)

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



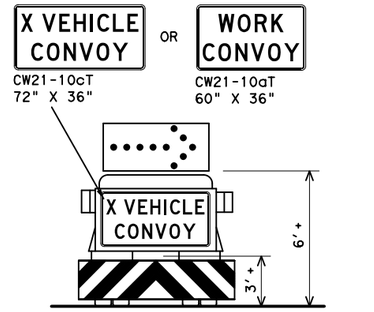
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



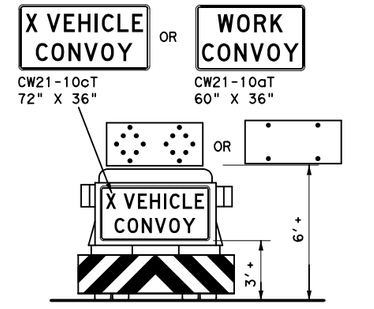
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



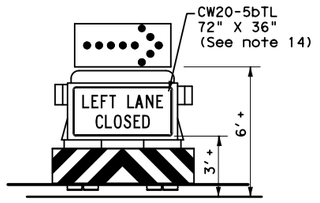
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

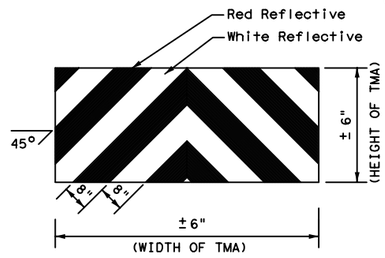


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

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REVISIONS	1057	03	045	FM 510
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	PHARR	CAMERON		82
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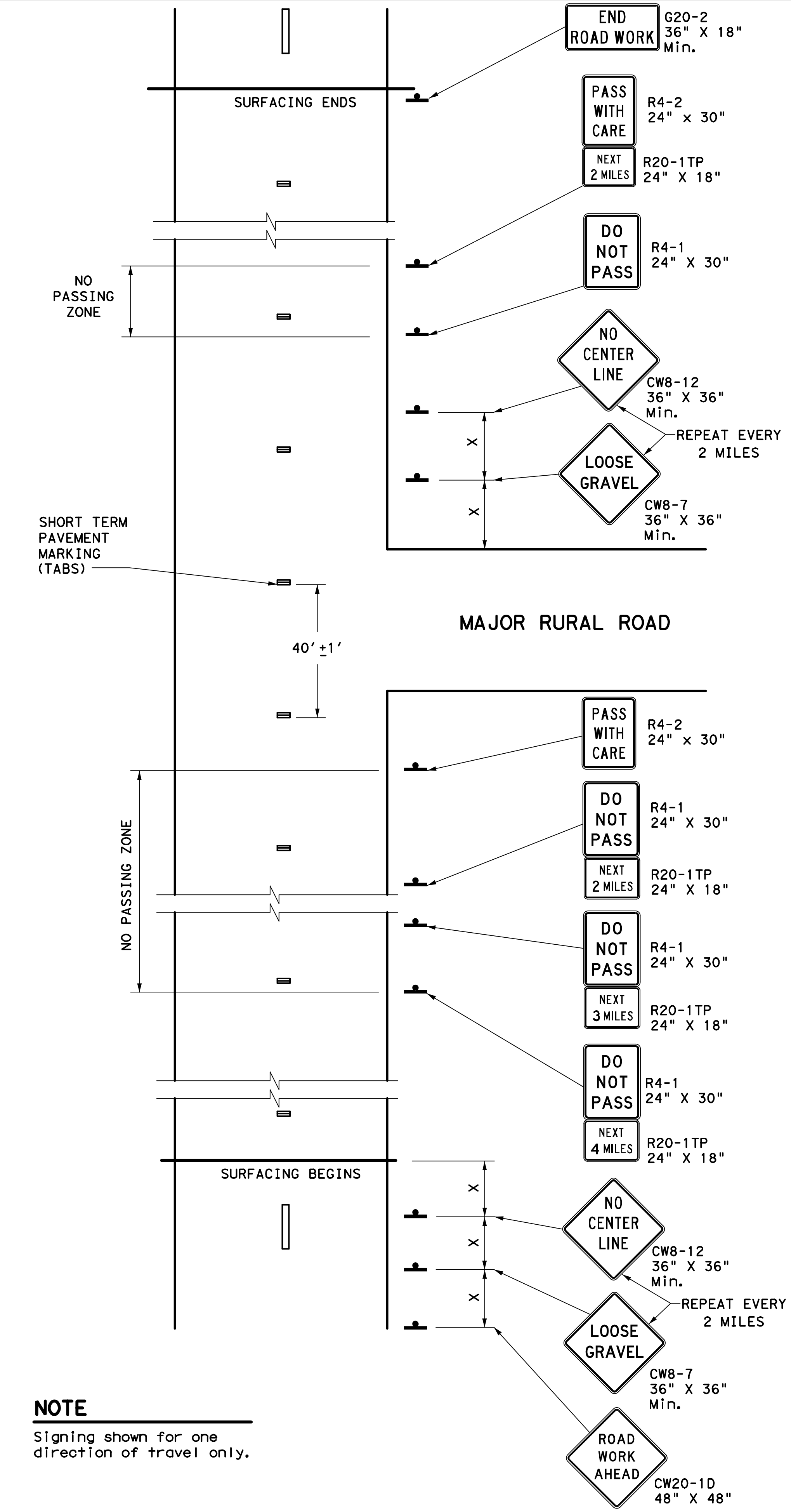
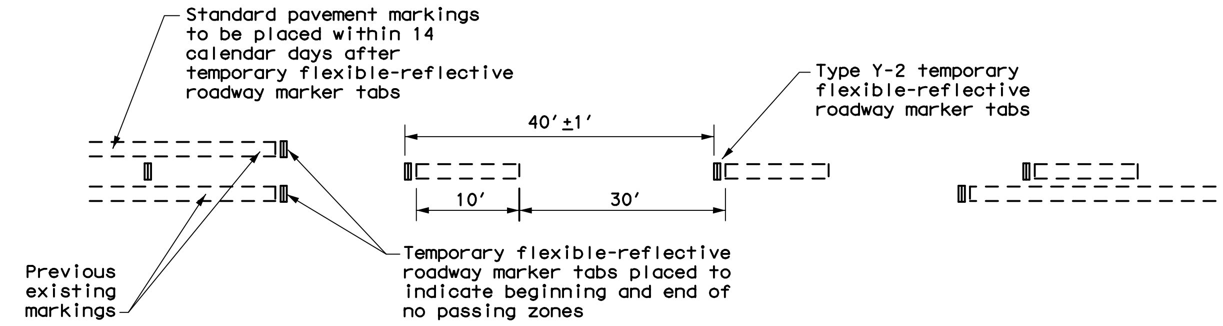


NOTE

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

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.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 4-98 1-97 7-13	1057	03	045	FM 510
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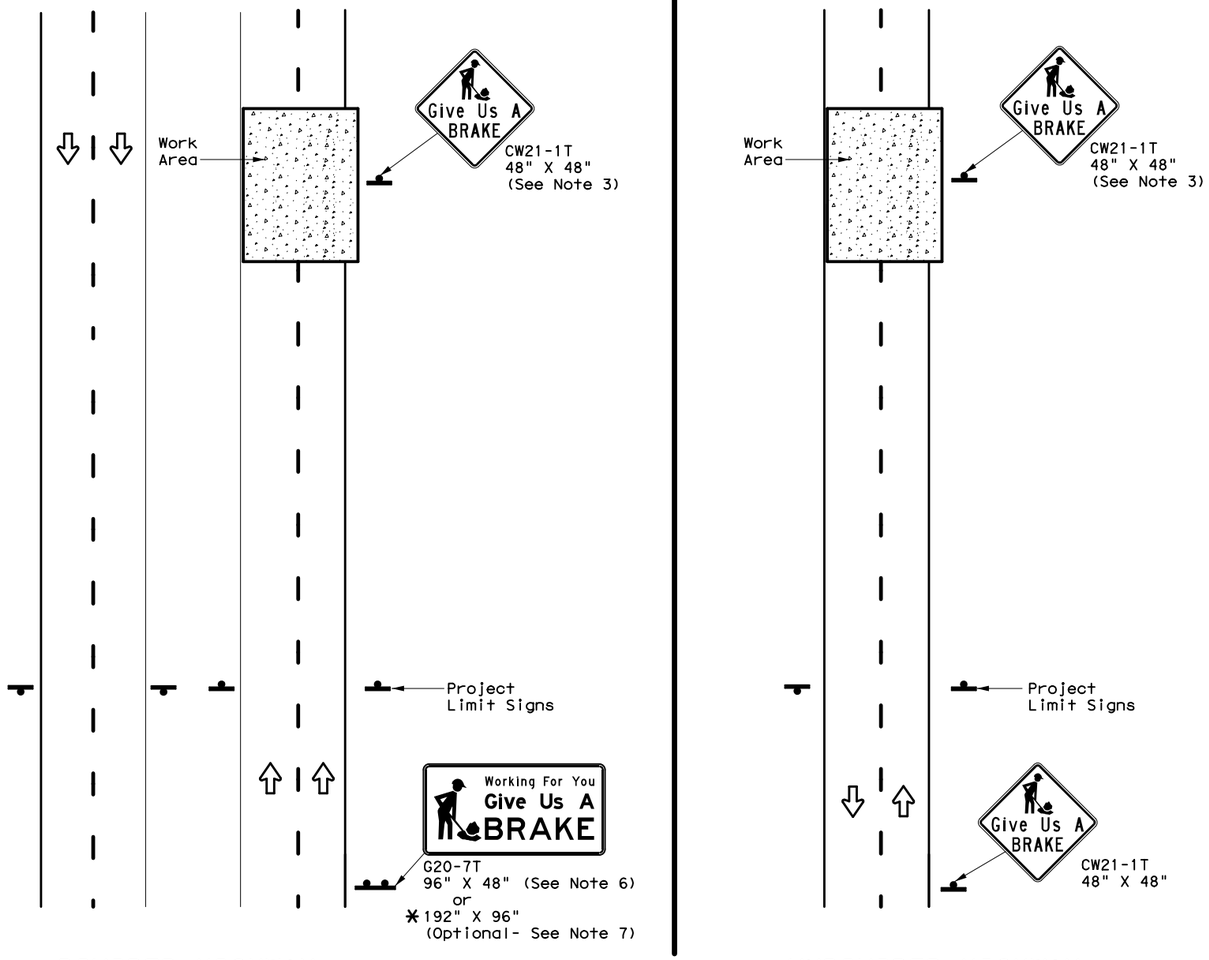

DIVIDED HIGHWAY

UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

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

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL			DRILLED SHAFT 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

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©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
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8-96 3-03	PHARR	CAMERON		84

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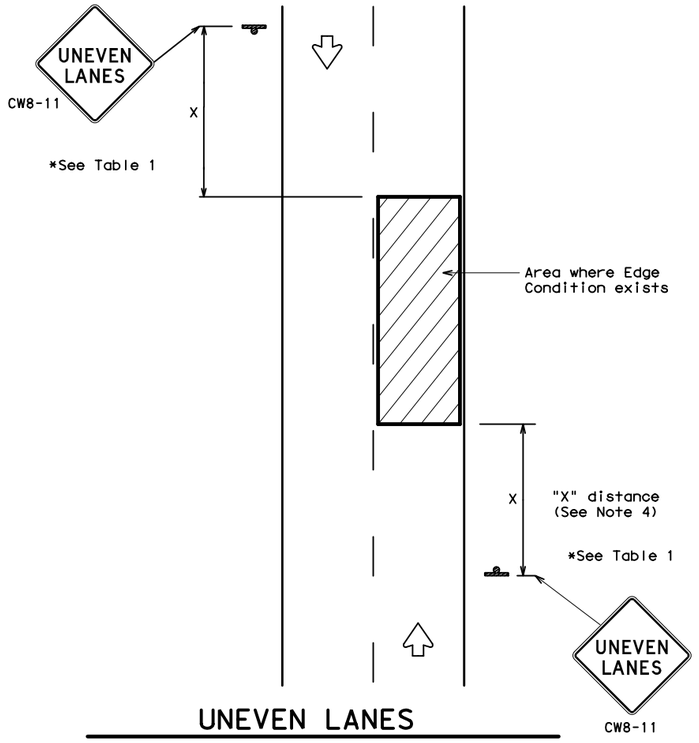
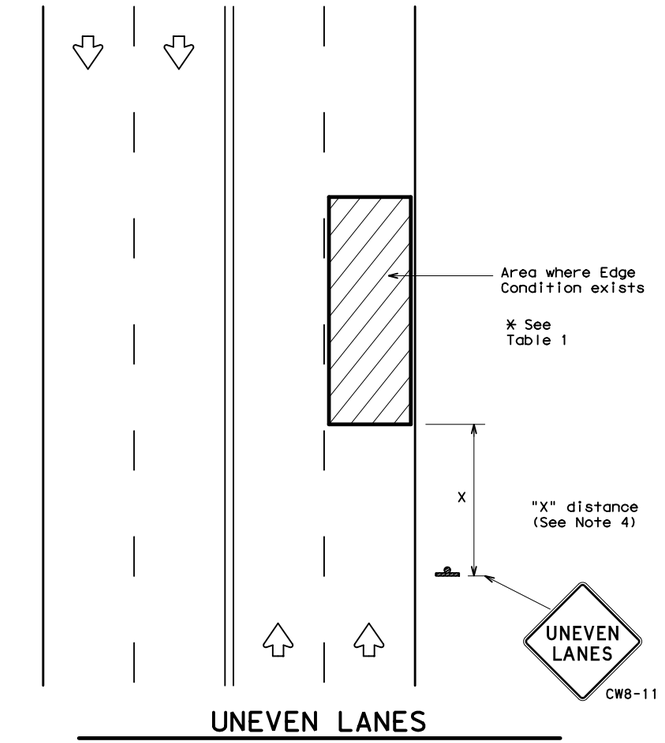
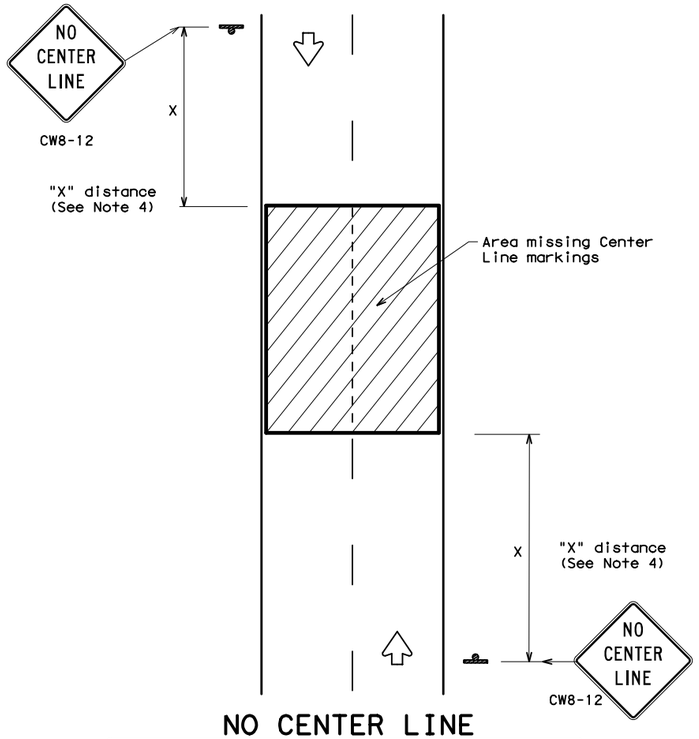


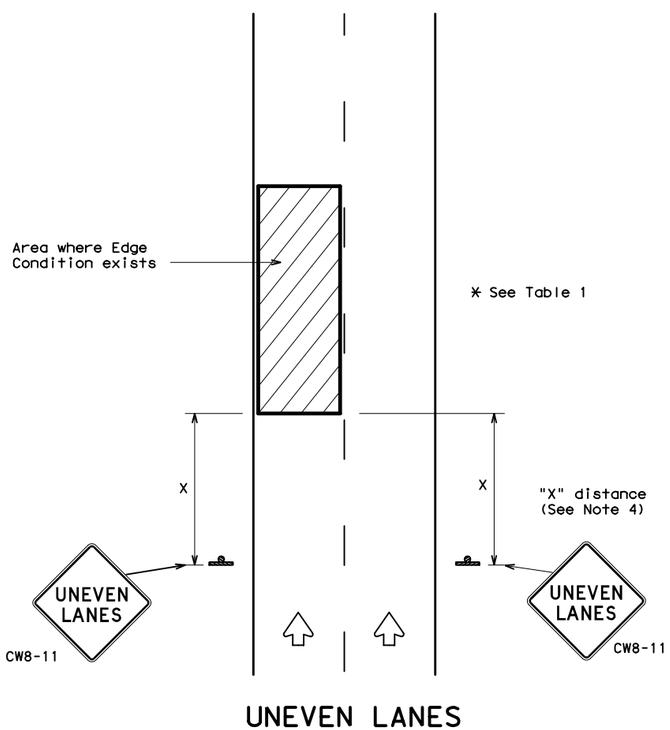
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

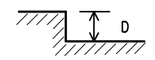
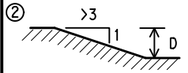
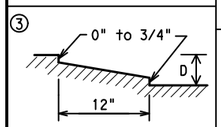
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

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1-97 3-03	PHARR	CAMERON		85

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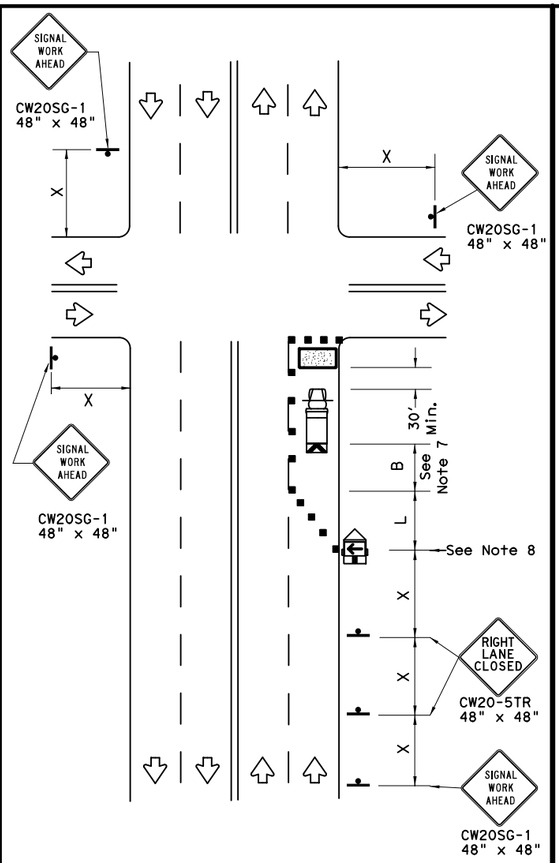
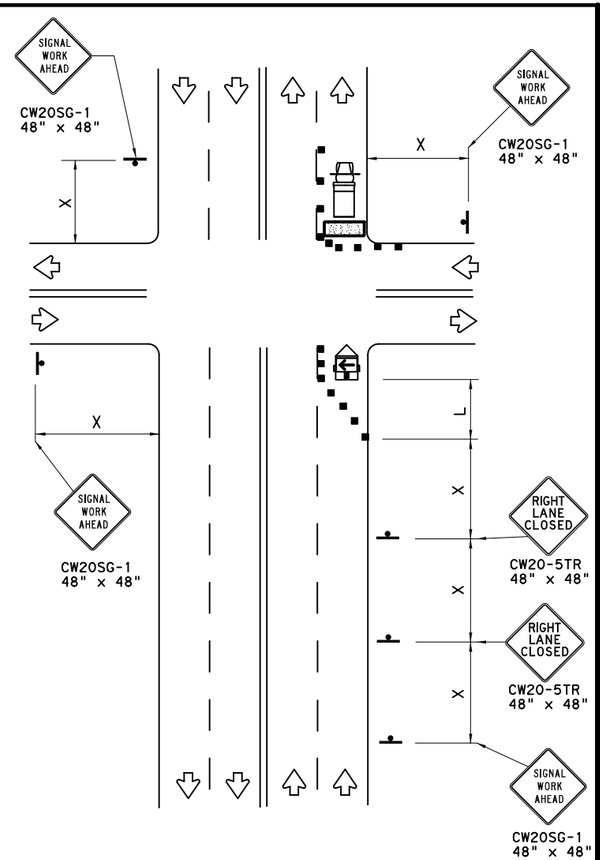


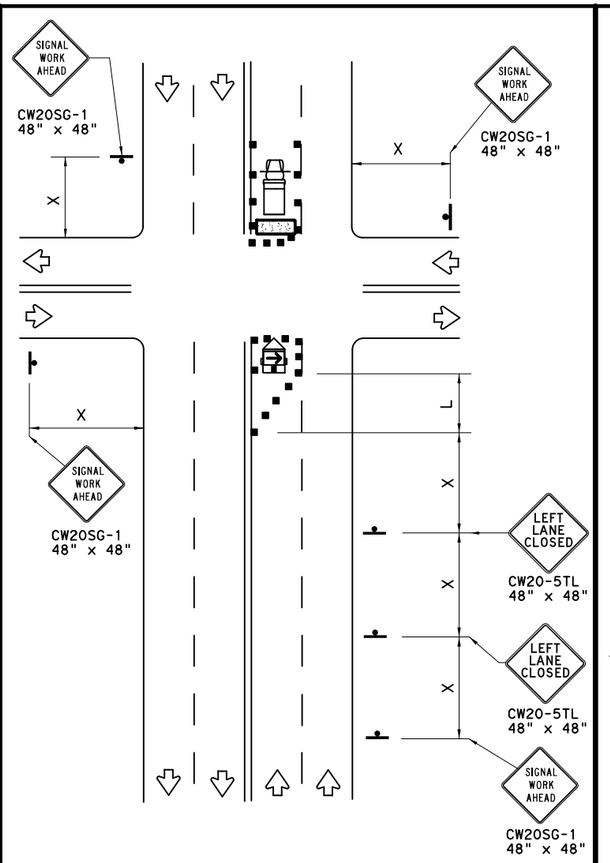
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



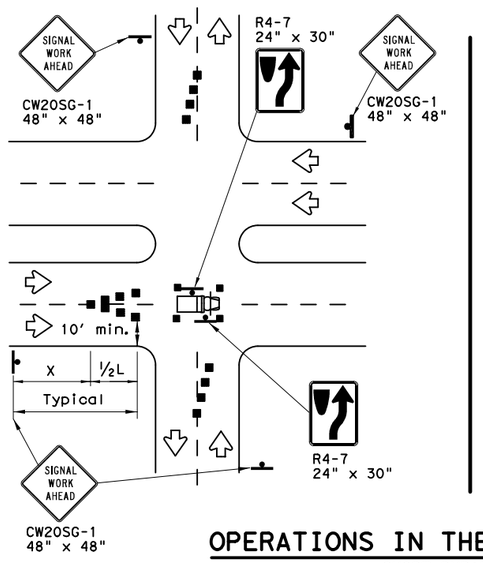
FAR SIDE RIGHT LANE CLOSURE

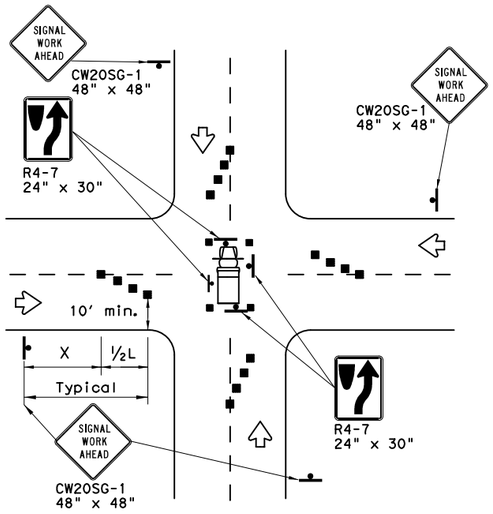
SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY





OPERATIONS IN THE INTERSECTION

SHORT DURATION

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

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

* Conventional Roads Only

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

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.

GENERAL NOTES

1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
5. High level warning devices (flag trees) may be used at corners of the vehicle.
6. When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
7. For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
8. The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
9. Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

SHEET 1 OF 2

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

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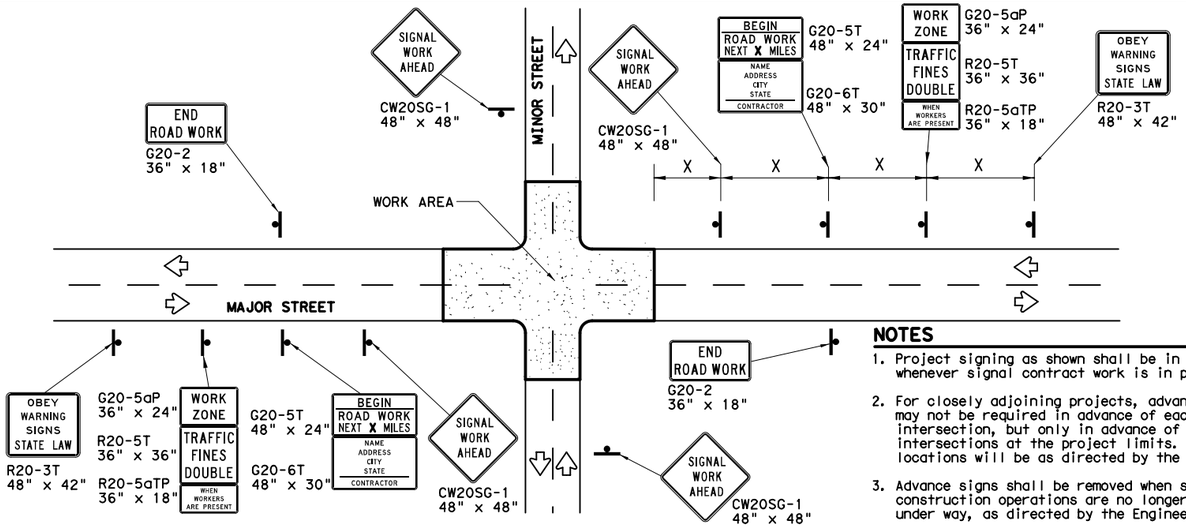


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

1. Project signing as shown shall be in place whenever signal contract work is in progress.
2. For closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits. Actual locations will be as directed by the Engineer.
3. Advance signs shall be removed when signal construction operations are no longer under way, as directed by the Engineer.
4. Warning sign spacing shown is typical for both directions.
5. See the Table on sheet 1 of 2 for Typical warning sign spacing.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Signs shall be installed and maintained in a straight and plumb condition.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer.
6. The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
7. The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.
8. Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
9. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1".
10. Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

DURATION OF WORK

1. Work zone durations are defined in Part 6, Section 6G.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

SIGN MOUNTING HEIGHT

1. Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
2. Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
3. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night without damaging the sign sheeting. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

SIGN SUPPORT WEIGHTS

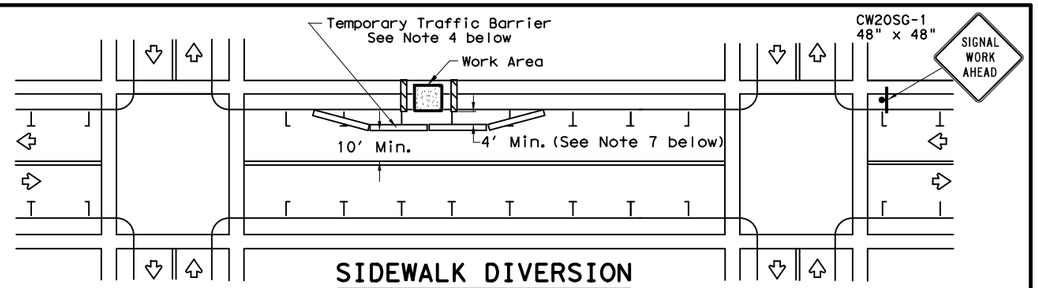
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support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

LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

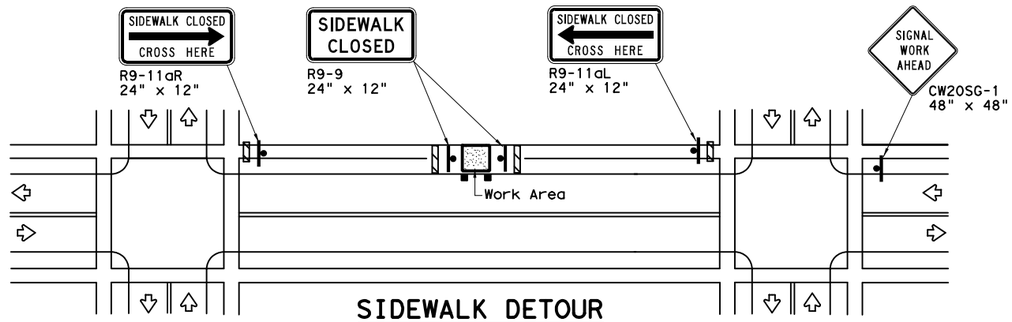
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

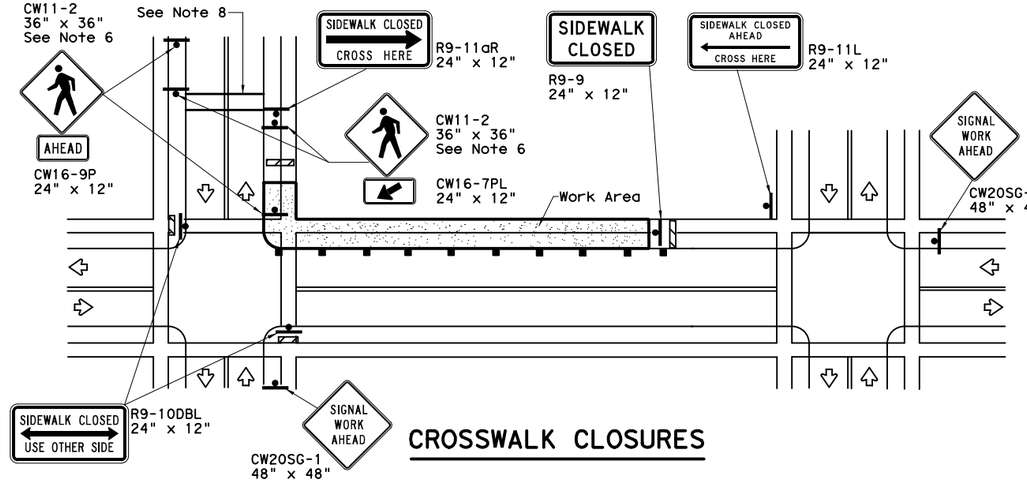
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

1. Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.
2. "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
3. R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.
4. For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
5. Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
6. Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
7. The width of existing sidewalk should be maintained if practical.
8. Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
9. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

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© TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		1057	03	045	FM 510
2-98 10-99 7-13		DIST	COUNTY		SHEET NO.
4-98 3-03		PHARR	CAMERON		87

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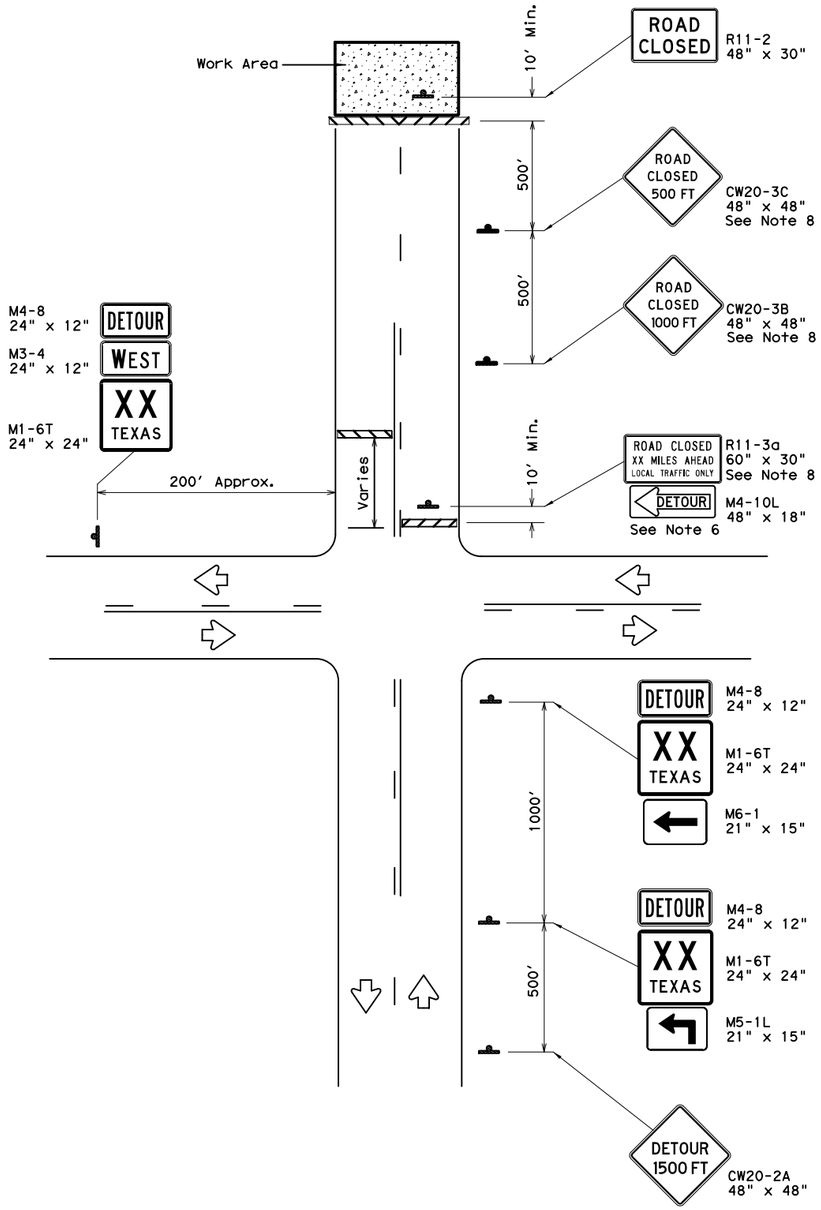
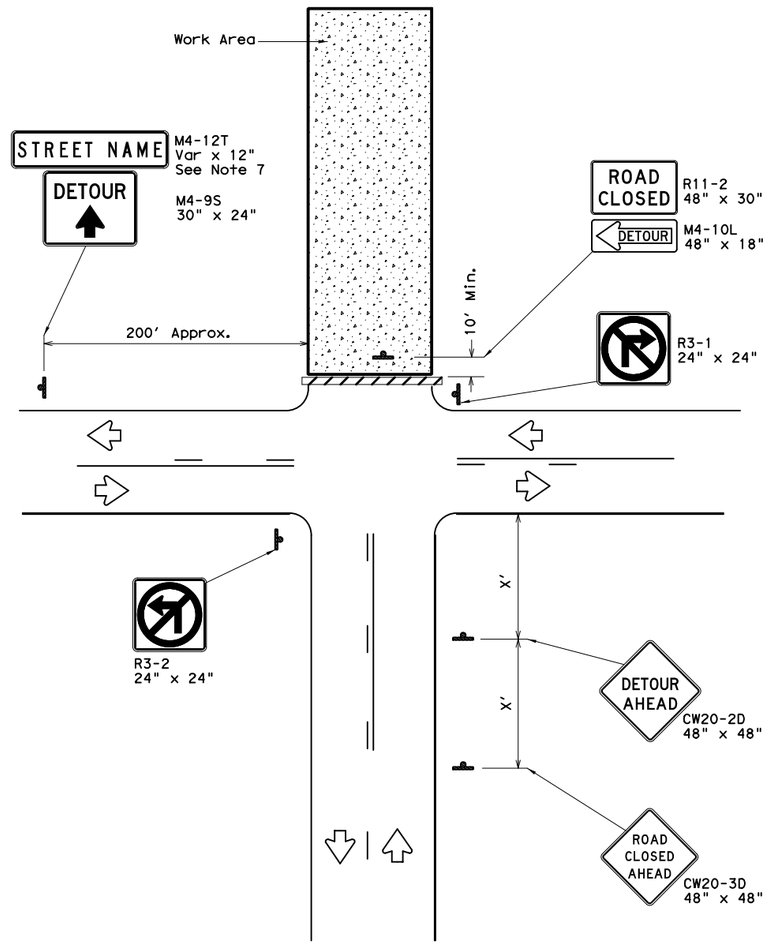


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

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

LEGEND	
	Type 3 Barricade
	Sign

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

* Conventional Roads Only

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

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©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
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2-98 3-03	PHARR	CAMERON		88

DATE: 6/27/2022 4:47:59 PM
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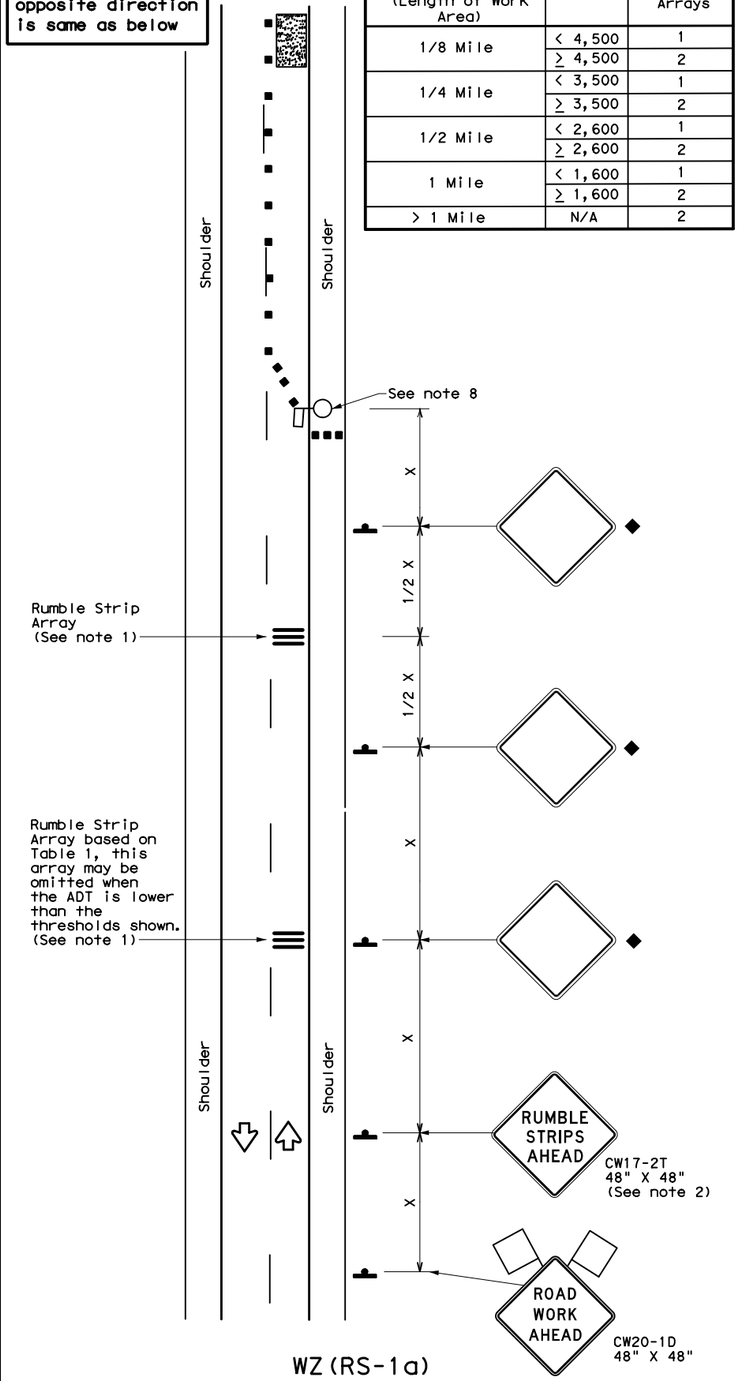
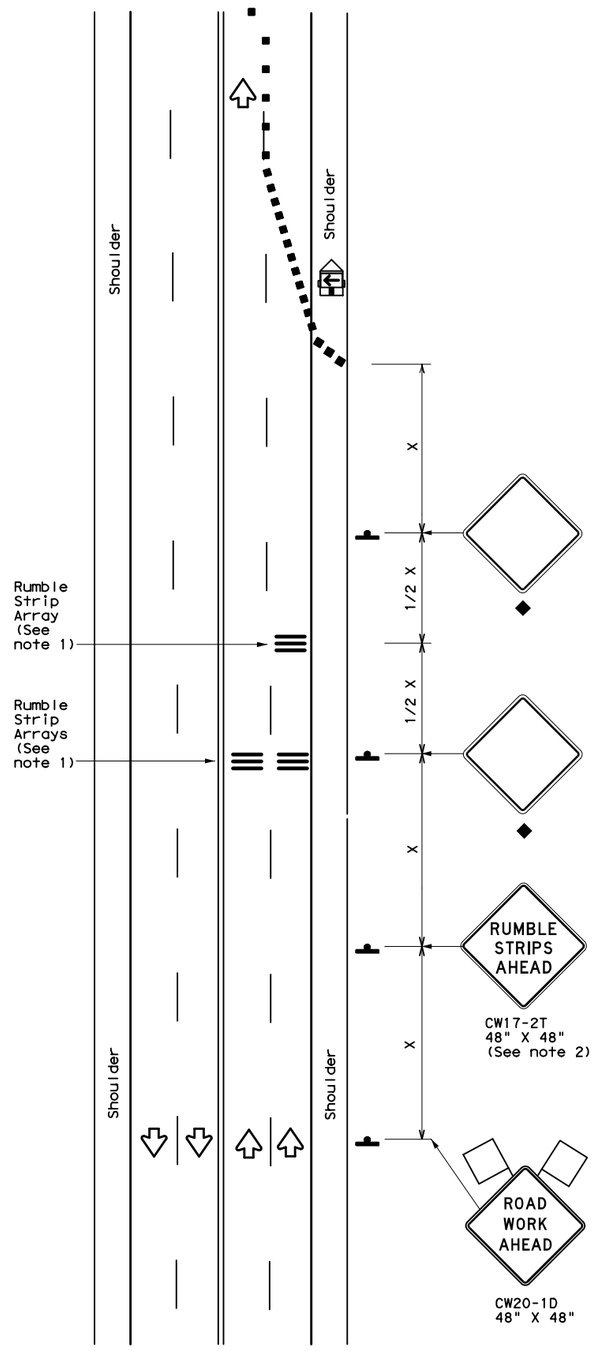
Warning sign and rumble strip sequence in opposite direction is same as below

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



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

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

* Conventional Roads Only

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

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

◆ **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
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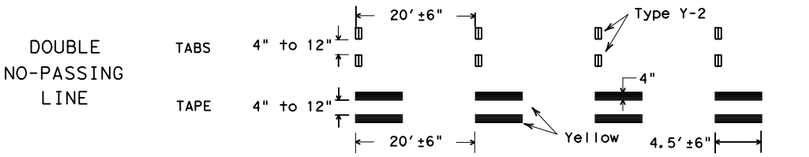
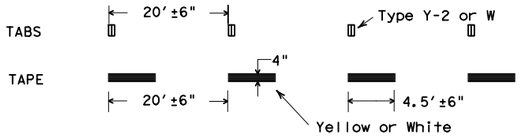
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

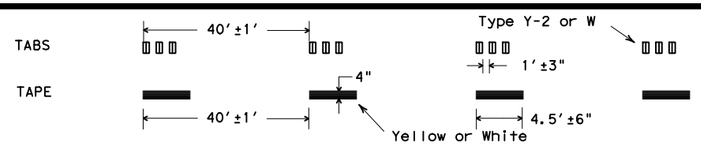


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



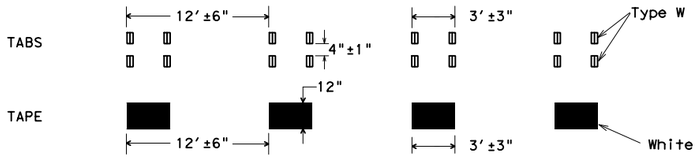
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

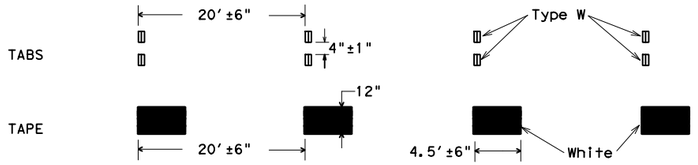


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



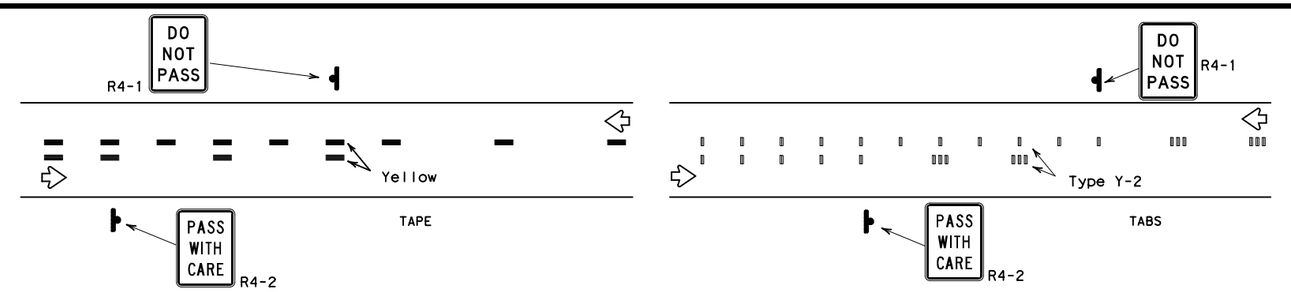
NOTES:

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

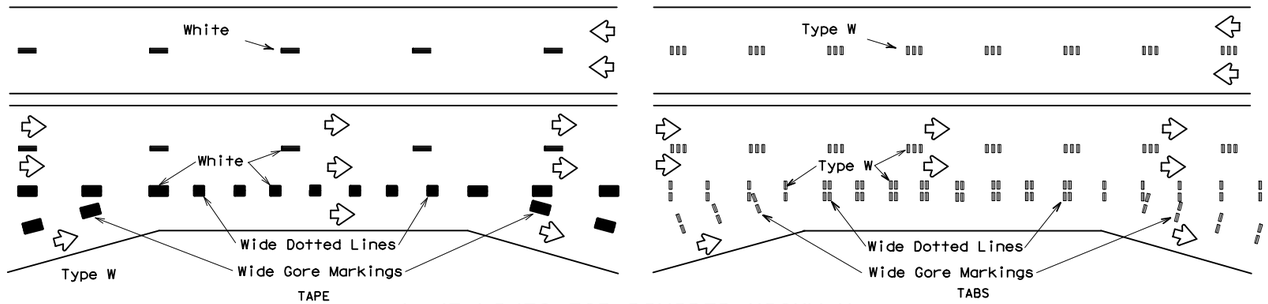
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

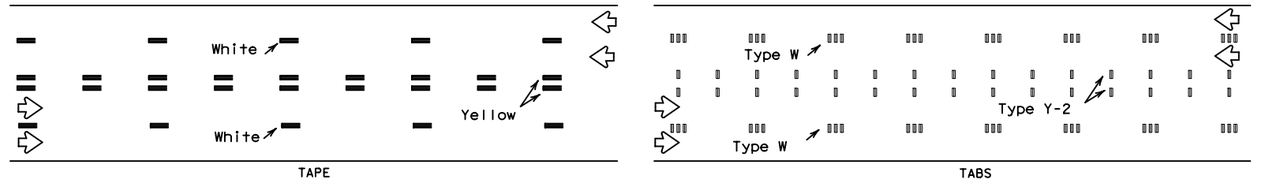
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



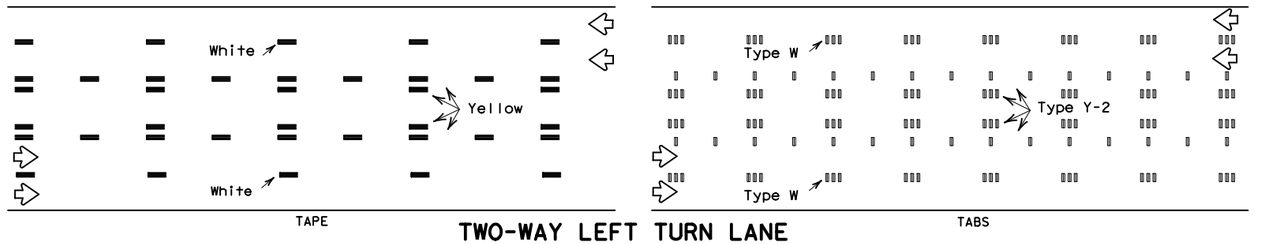
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



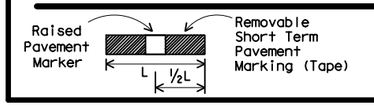
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

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111

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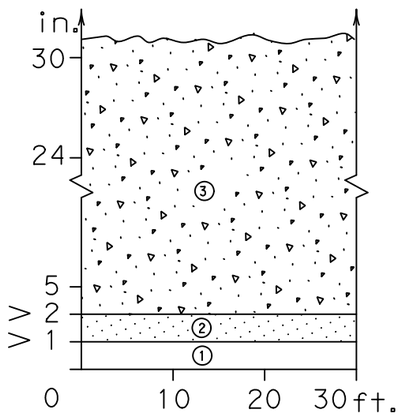
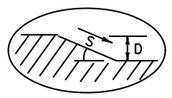
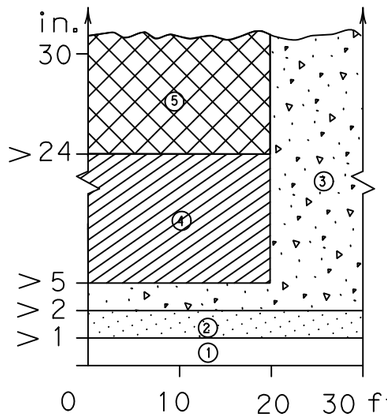
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet

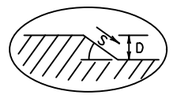


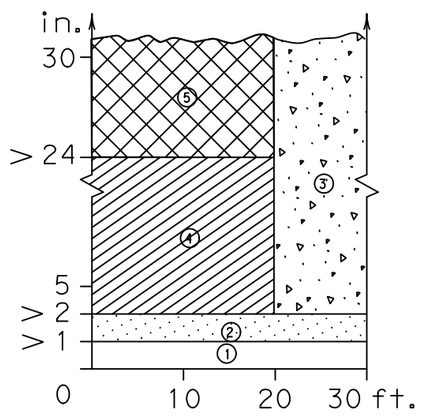
Edge Condition I
S = (3:1) (or flatter)



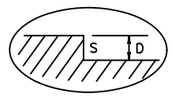


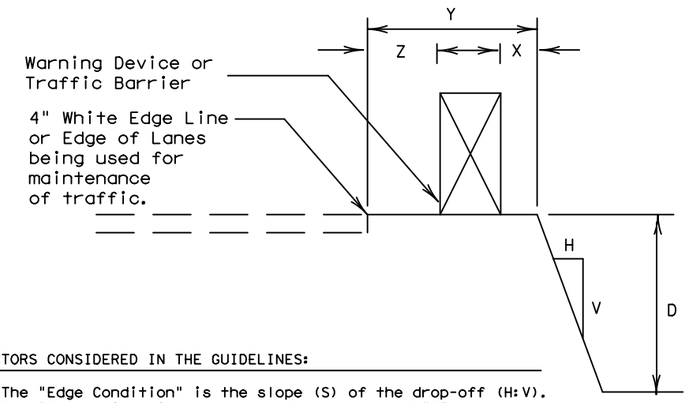
Edge Condition II
S = ((2.99):1) to (1:1)





Edge Condition III
S is steeper than (1:1)





FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".

2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.

3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.

4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.

5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Zone	Treatment Types Guidelines:
①	No treatment.
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a "Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW 8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge fill may be provided to change the edge slope to that of the preferable Edge Condition I.
⑤	Check indications (Figure-1) for positive barrier. Where positive barrier is not indicated, the treatment shown above for Zone- 4 may be used after consideration of other applicable factors.

Edge Condition Notes:

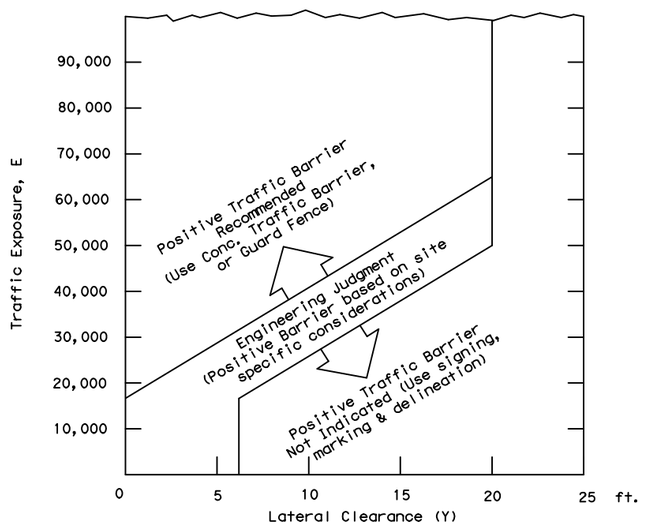
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.

3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.

4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▨)



1 E = ADT x T
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

2 Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.

3 An approved end treatment should be provided for any positive barrier end located within a lateral offset of 20 feet from the edge of the travel lane.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

Engineer's Seal

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

Date 6/27/2022

Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
03-01	CONT	SECT	JOB	HIGHWAY
08-01 correct typos	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		91

PROPOSED FM 510 ALIGNMENT

Beginning chain CL_FM510 description

Point 5100 N 16,577,215.6234 E 1,281,803.9261 Sta 0+00.00

Course from 5100 to PC CL_FM5101 S 51° 19′ 14.43" E Dist 200.0000

Curve Data					
Curve CL_FM5101					
P.I. Station	5+84.42	N	16,576,850.3807	E	1,282,260.1608
Delta =	50° 18′ 55.68"	(LT)			
Degree =	7° 00′ 00.00"				
Tangent =	384.4248				
Length =	718.7924				
Radius =	818.5111				
External =	85.7803				
Long Chord =	695.9173				
Mid. Ord. =	77.6432				
P.C. Station	2+00.00	N	16,577,090.6312	E	1,281,960.0573
P.T. Station	9+18.79	N	16,576,927.9175	E	1,282,636.6851
C.C.		N	16,577,729.6068	E	1,282,471.5948
Back = S 51° 19′ 14.43" E					
Ahead = N 78° 21′ 49.89" E					
Chord Bear = S 76° 28′ 42.27" E					

Course from PT CL_FM5101 to PC CL_FM5102 N 78° 21′ 49.89" E Dist 1,563.8878

Curve Data					
Curve CL_FM5102					
P.I. Station	27+31.78	N	16,577,293.5898	E	1,284,412.4142
Delta =	19° 43′ 50.86"	(RT)			
Degree =	4° 00′ 00.00"				
Tangent =	249.1015				
Length =	493.2699				
Radius =	1,432.3945				
External =	21.4987				
Long Chord =	490.8361				
Mid. Ord. =	21.1808				
P.C. Station	24+82.68	N	16,577,243.3471	E	1,284,168.4322
P.T. Station	29+75.95	N	16,577,258.5141	E	1,284,659.0339
C.C.		N	16,575,840.3908	E	1,284,457.3401
Back = N 78° 21′ 49.89" E					
Ahead = S 81° 54′ 19.25" E					
Chord Bear = N 88° 13′ 45.32" E					

Course from PT CL_FM5102 to PC CL_FM5103 S 81° 54′ 19.25" E Dist 14,776.3349

Curve Data					
Curve CL_FM5103					
P.I. Station	179+24.19	N	16,575,153.6696	E	1,299,458.3416
Delta =	3° 26′ 13.46"	(LT)			
Degree =	1° 00′ 00.00"				
Tangent =	171.9051				
Length =	343.7072				
Radius =	5,729.5780				
External =	2.5783				
Long Chord =	343.6556				
Mid. Ord. =	2.5771				
P.C. Station	177+52.28	N	16,575,177.8753	E	1,299,288.1492
P.T. Station	180+95.99	N	16,575,139.7108	E	1,299,629.6791
C.C.		N	16,580,850.3684	E	1,300,094.9245
Back = S 81° 54′ 19.25" E					
Ahead = S 85° 20′ 32.70" E					
Chord Bear = S 83° 37′ 25.98" E					

Course from PT CL_FM5103 to PC CL_FM5104 S 85° 20′ 32.70" E Dist 1,057.1294

Curve Data					
Curve CL_FM5104					
P.I. Station	195+66.96	N	16,575,020.2674	E	1,301,095.7871
Delta =	16° 26′ 22.98"	(RT)			
Degree =	2° 00′ 00.00"				
Tangent =	413.8360				
Length =	821.9859				
Radius =	2,864.7890				
External =	29.7362				
Long Chord =	819.1691				
Mid. Ord. =	29.4307				
P.C. Station	191+53.12	N	16,575,053.8712	E	1,300,683.3177
P.T. Station	199+75.11	N	16,574,871.3060	E	1,301,481.8839
C.C.		N	16,572,198.5423	E	1,300,450.6949
Back = S 85° 20′ 32.70" E					
Ahead = S 68° 54′ 09.72" E					
Chord Bear = S 77° 07′ 21.21" E					

Course from PT CL_FM5104 to PC CL_FM5105 S 68° 54′ 09.72" E Dist 1,223.8547

PROPOSED FM 510 ALIGNMENT

Curve Data					
Curve CL_FM5105					
P.I. Station	213+73.33	N	16,574,368.0111	E	1,302,786.3862
Delta =	20° 41′ 46.98"	(LT)			
Degree =	6° 00′ 00.00"				
Tangent =	174.3700				
Length =	344.9397				
Radius =	954.9297				
External =	15.7894				
Long Chord =	343.0674				
Mid. Ord. =	15.5326				
P.C. Station	211+98.96	N	16,574,430.7760	E	1,302,623.7042
P.T. Station	215+43.90	N	16,574,366.7909	E	1,302,960.7519
C.C.		N	16,575,321.6972	E	1,302,967.4338
Back = S 68° 54′ 09.72" E					
Ahead = S 89° 35′ 56.70" E					
Chord Bear = S 79° 15′ 03.21" E					

Course from PT CL_FM5105 to PC CL_FM5106 S 89° 35′ 56.70" E Dist 1,995.5895

Curve Data					
Curve CL_FM5106					
P.I. Station	236+05.79	N	16,574,352.3633	E	1,305,022.5945
Delta =	3° 58′ 35.82"	(RT)			
Degree =	3° 00′ 00.00"				
Tangent =	66.3036				
Length =	132.5539				
Radius =	1,909.8593				
External =	1.1506				
Long Chord =	132.5273				
Mid. Ord. =	1.1499				
P.C. Station	235+39.49	N	16,574,352.8273	E	1,304,956.2926
P.T. Station	236+72.05	N	16,574,347.3025	E	1,305,088.7047
C.C.		N	16,572,443.0147	E	1,304,942.9288
Back = S 89° 35′ 56.70" E					
Ahead = S 85° 37′ 20.88" E					
Chord Bear = S 87° 36′ 38.79" E					

Course from PT CL_FM5106 to 5101 S 85° 37′ 20.88" E Dist 7,691.6743

Point 5101 N 16,573,760.2119 E 1,312,757.9405 Sta 313+63.72

Course from 5101 to 5102 S 85° 58′ 02.00" E Dist 834.9058

Point 5102 N 16,573,701.4953 E 1,313,590.7791 Sta 321+98.63

Course from 5102 to 5103 S 85° 56′ 15.57" E Dist 3,064.3222

Point 5103 N 16,573,484.4130 E 1,316,647.4024 Sta 352+62.95

Course from 5103 to 5104 S 85° 34′ 34.59" E Dist 1,825.9745

Point 5104 N 16,573,343.5722 E 1,318,467.9371 Sta 370+88.92

Course from 5104 to 5105 S 85° 43′ 37.85" E Dist 3,485.2147

Point 5105 N 16,573,083.9040 E 1,321,943.4650 Sta 405+74.14

Ending chain CL_FM510 description

PROPOSED COUNTRY BOY RD ALIGNMENT

Beginning chain FM3462*CL description

Point CL3462001 N 16,577,223.4894 E 1,282,115.6747 Sta 10+00.00

Course from CL3462001 to CL3462002 S 38° 14′ 26.00" W Dist 400.0000

Point CL3462002 N 16,576,909.3218 E 1,281,868.0889 Sta 14+00.00

Ending chain FM3462*CL description

PROPOSED FM 803 ALIGNMENT

Beginning chain FM803*CL description

Point SS803003 N 16,574,036.3725 E 1,306,525.2480 Sta 10+00.00

Course from SS803003 to SS803004 N 5° 55′ 32.80" E Dist 400.0001

Point SS803004 N 16,574,434.2352 E 1,306,566.5440 Sta 14+00.00

Ending chain FM803*CL description

STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

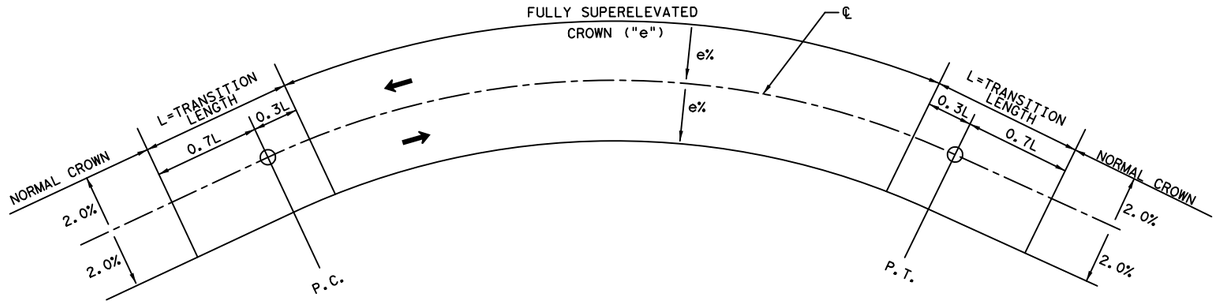
FM 510

HORIZONTAL ALIGNMENT DATA

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	92
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022
FILENAME: L:\Pharr District\FM#1425*ETC\CADD\Sheets\FM510\05 Roadway Details\FM510*RDWY*DATA.dgn

TYPICAL SUPERELEVATION TRANSITION DETAIL



STATION LIMITS FULL "e"	STATION P.I.	STATION P.C.	STATION P.T.	DEGREE OF CURVE D	SLOPE	e %	TRANSITION LENGTH AT PC			TRANSITION LENGTH AT PT		
							BEGIN	END	LENGTH (FT)	BEGIN	END	LENGTH (FT)
EB												
2+56.40-8+62.39	5+84.42	2+00.00	9+18.79	7° 00′ 00.00"	LT.	5.35	0+68.40	02+56.40	188(EB)	08+62.39	10+50.39	188(EB)
25+36.38-29+22.25	27+31.78	24+82.68	29+75.95	4° 00′ 00.00"	RT.	5	24+59.38	25+36.38	77(EB)	29+22.25	29+99.25	77(EB)
Not needed	179+24.19	177+52.28	180+95.99	1° 00′ 00.00"		NORM CRWN	Not needed	Not needed		Not needed	Not needed	
191+99.32-199+28.91	195+66.96	191+53.12	199+75.11	2° 00′ 00.00"	RT.	4	191+47.32	191+99.32	52 (EB)	199+28.91	199+80.91	52 (EB)
212+52.66-214+90.20	213+73.33	211+98.96	215+43.90	6° 00′ 00.00"	LT.	5	210+73.66	212+52.66	179 (EB)	214+90.20	216+69.20	179 (EB)
235+81.79-236+29.75	236+05.79	235+39.49	236+72.05	3° 00′ 00.00"	RT.	3.5	235+42.79	235+81.79	39 (EB)	236+29.75	236+68.75	39 (EB)
WB												
2+56.40-8+62.39	5+84.42	2+00.00	9+18.79	7° 00′ 00.00"	LT.	5.35	01+70.40	02+56.40	86(WB)	08+62.39	09+48.39	86(WB)
25+36.38-29+22.25	27+31.78	24+82.68	29+75.95	4° 00′ 00.00"	RT.	5	23+57.38	25+36.38	179(WB)	29+22.25	31+01.25	179(WB)
191+99.32-199+28.91	195+66.96	191+53.12	199+75.11	2° 00′ 00.00"	RT.	4	190+45.32	191+99.32	154 (WB)	199+28.91	200+82.91	154 (WB)
212+52.66-214+90.20	213+73.33	211+98.96	215+43.90	6° 00′ 00.00"	LT.	5	211+75.66	212+52.66	77 (WB)	214+90.20	215+67.20	77 (WB)
235+81.79-236+29.75	236+05.79	235+39.49	236+72.05	3° 00′ 00.00"	RT.	3.5	234+40.79	235+81.79	141 (WB)	236+29.75	237+70.75	141 (WB)

(*) SEE ROADWAY P&P AND INTERSECTION P&P FOR MORE CLARIFICATION.

6/27/2022

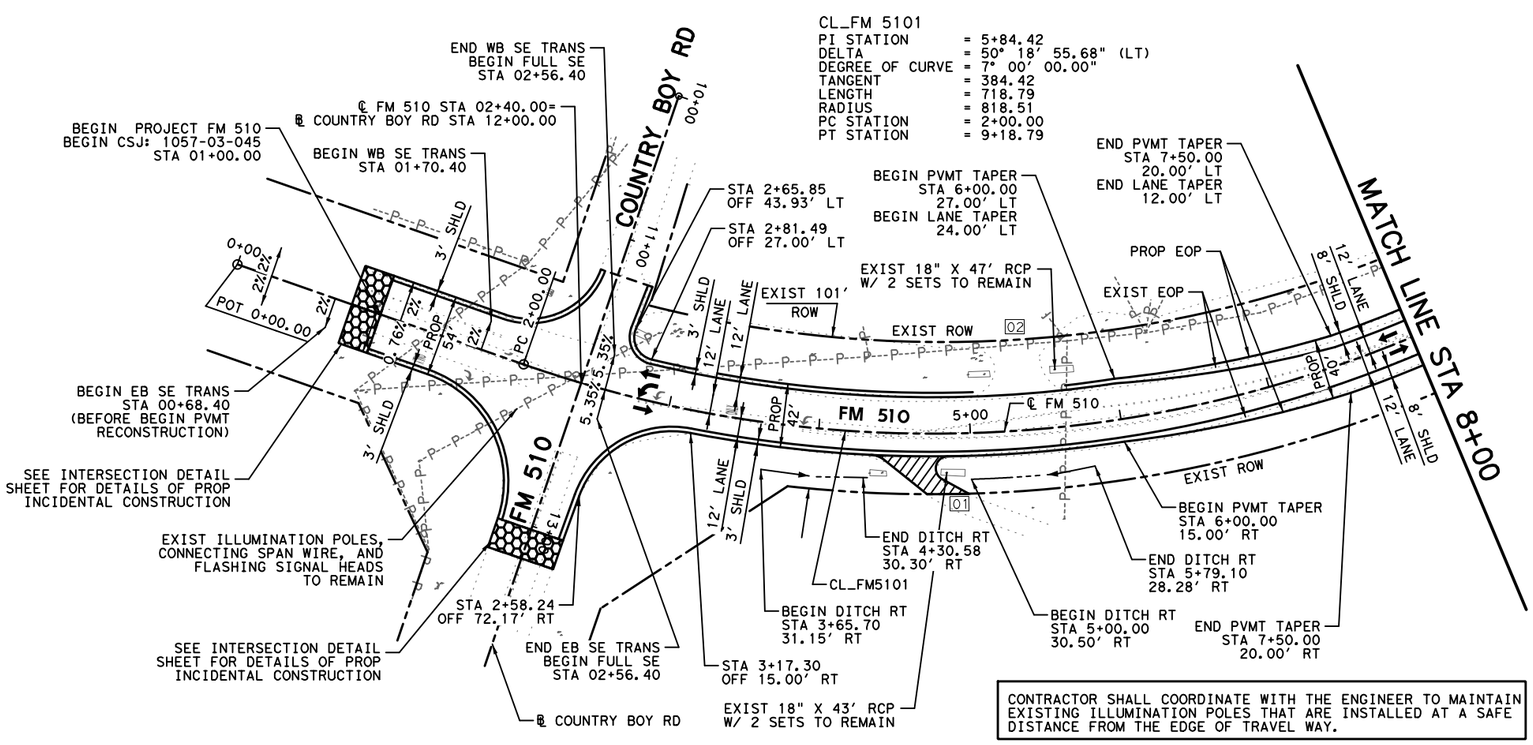
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SUPERELEVATION DATA SHEET

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	
CONTROL	SECTION	JOB	93
1057	03	045	

DRAWING DATE: 6/27/2022 FILENAME: L:\Pharr District\FM\1425\ETC\CADD\Sheets\FM510\05 Roadway Details\FM510*SUPERELEVATION.dgn

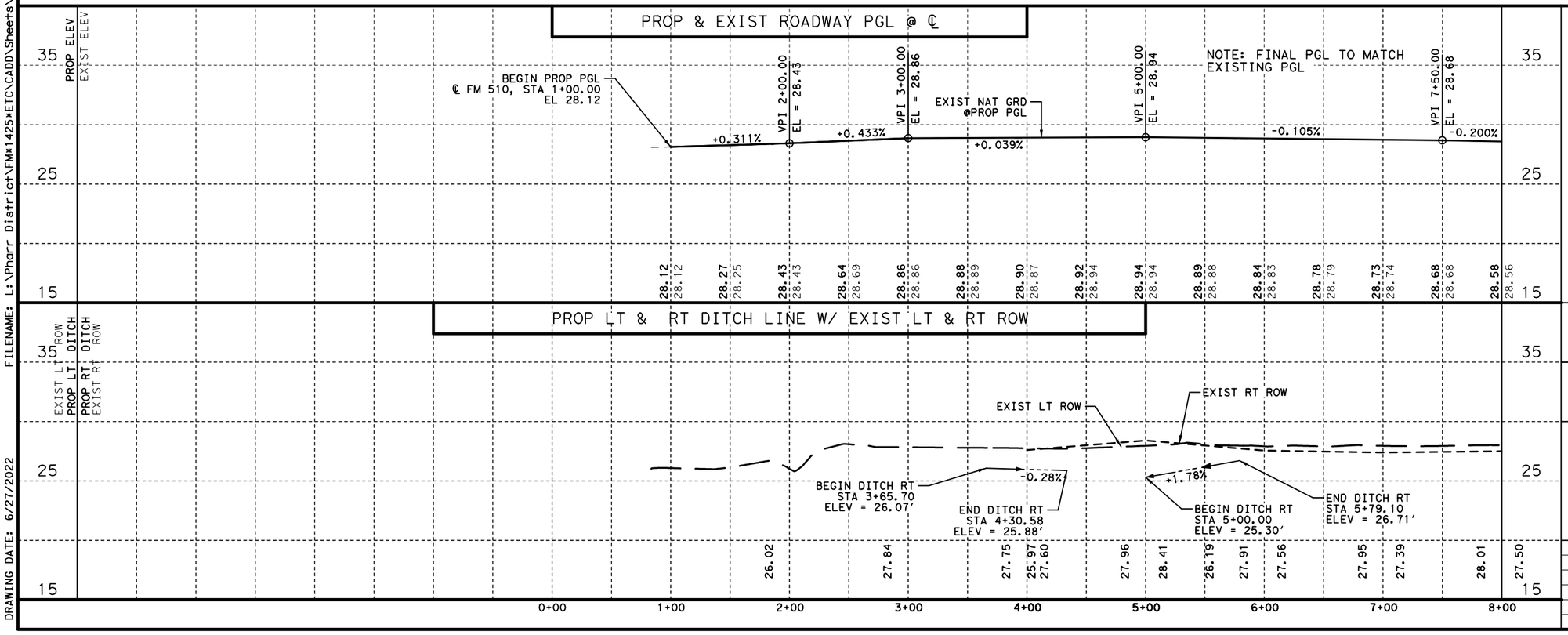


NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY



STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED PROFESSIONAL ENGINEER

6/27/2022

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I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE
STA 00+00 TO STA 08+00

SHEET 1 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	94
CONTROL	SECTION	JOB	
1057	03	045	

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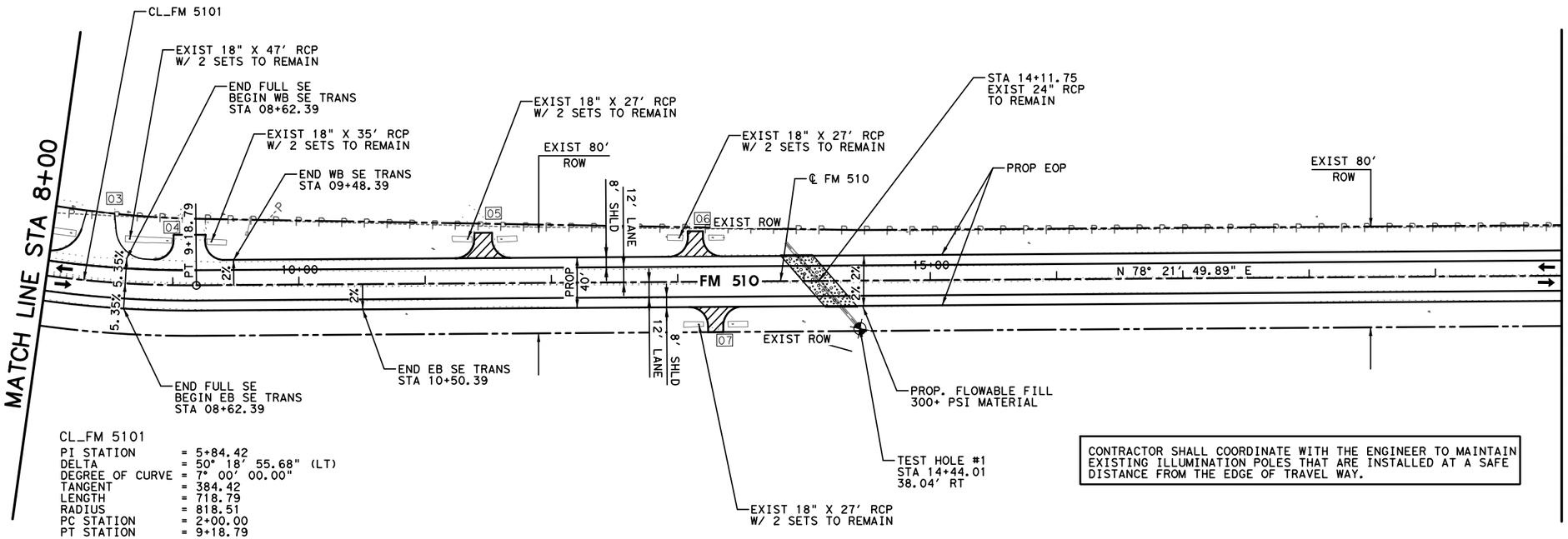
DRAWING DATE: 6/27/2022



CL_FM 5101

PI STATION	= 5+84.42
DELTA	= 50° 18' 55.68" (LT)
DEGREE OF CURVE	= 7° 00' 00.00"
TANGENT	= 384.42
LENGTH	= 718.79
RADIUS	= 818.51
PC STATION	= 2+00.00
PT STATION	= 9+18.79

CONTRACTOR SHALL COORDINATE WITH THE ENGINEER TO MAINTAIN EXISTING ILLUMINATION POLES THAT ARE INSTALLED AT A SAFE DISTANCE FROM THE EDGE OF TRAVEL WAY.

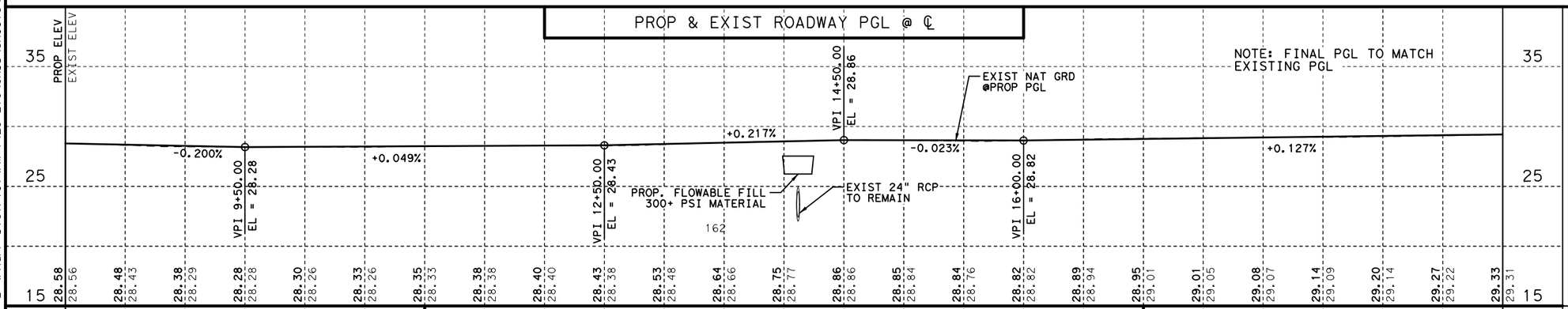
HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

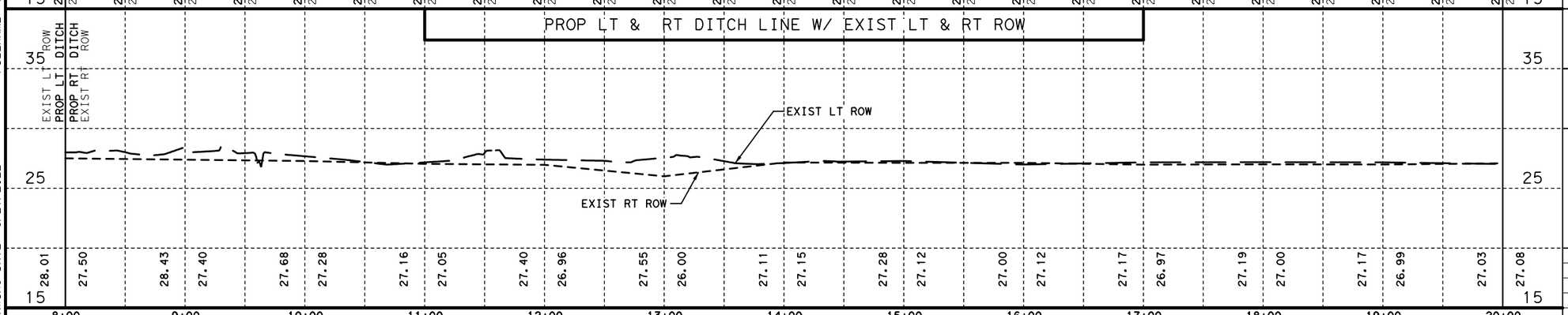
NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY





STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED PROFESSIONAL ENGINEER

6/27/2022

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I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE STA 08+00 TO STA 20+00

SHEET 2 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	95
CONTROL	SECTION	JOB	
1057	03	045	

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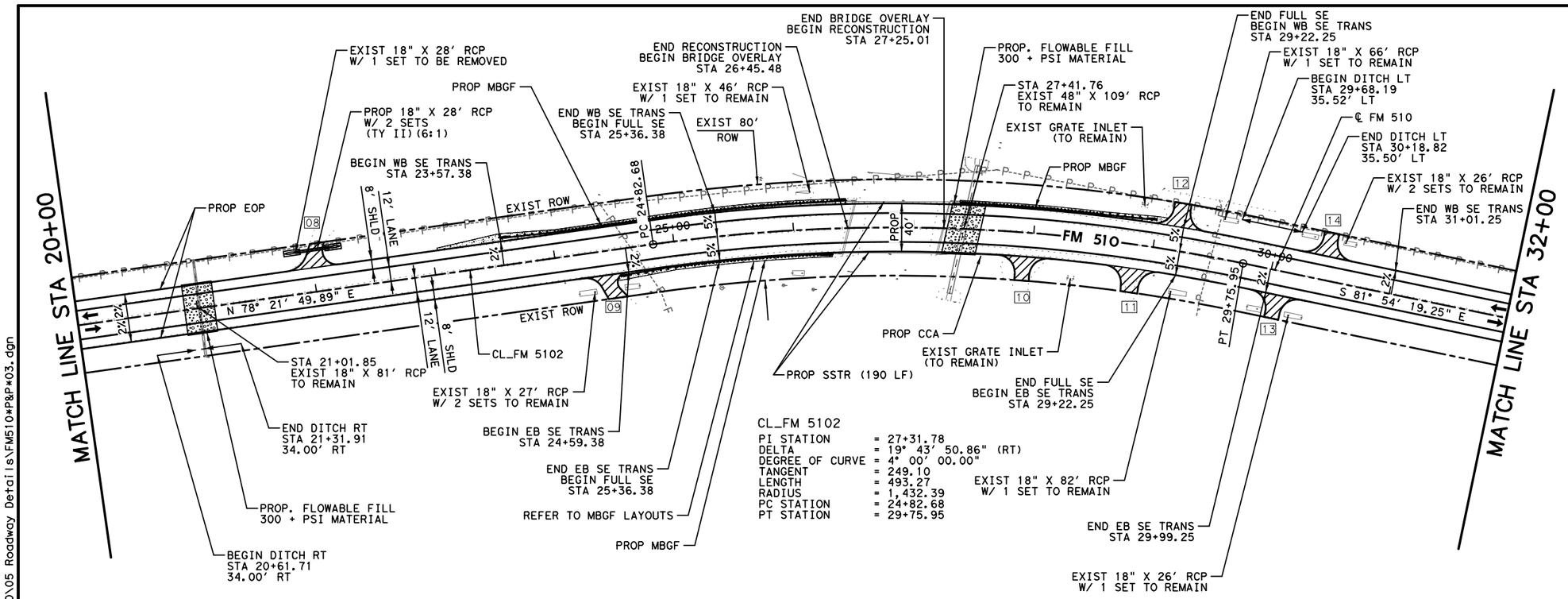
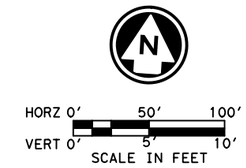
DRAWING DATE: 6/27/2022





NOTES:

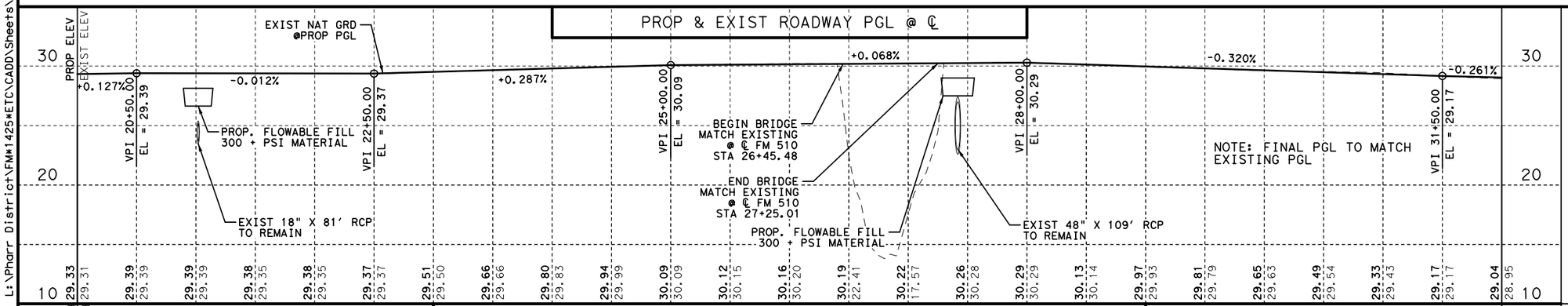
1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

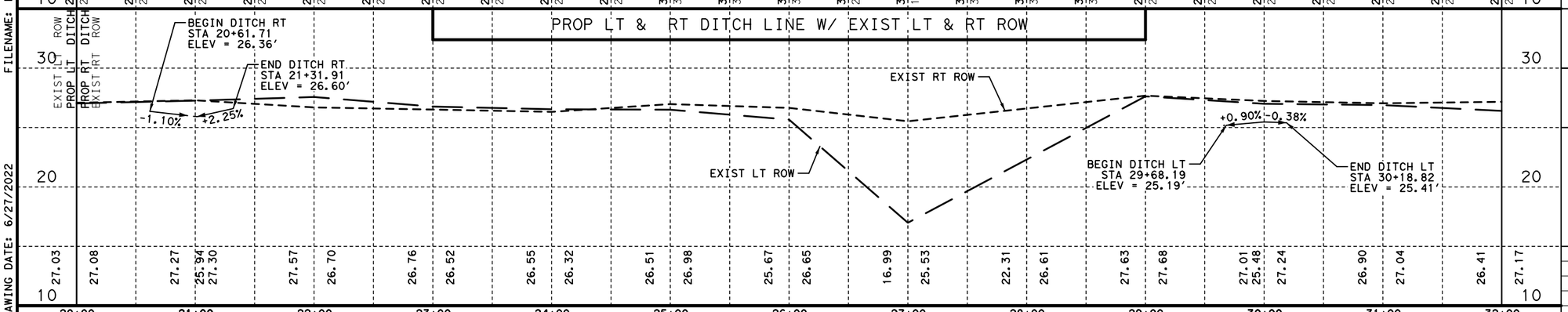
LEGEND:

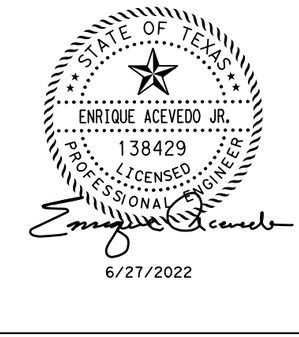
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY

CL_FM 5102

PI STATION	= 27+31.78
DELTA	= 19° 43' 50.86" (RT)
DEGREE OF CURVE	= 4° 00' 00.00"
TANGENT	= 249.10
LENGTH	= 493.27
RADIUS	= 1,432.39
PC STATION	= 24+82.68
PT STATION	= 29+75.95







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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE STA 20+00 TO STA 32+00

SHEET 3 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	96
CONTROL	SECTION	JOB	
1057	03	045	

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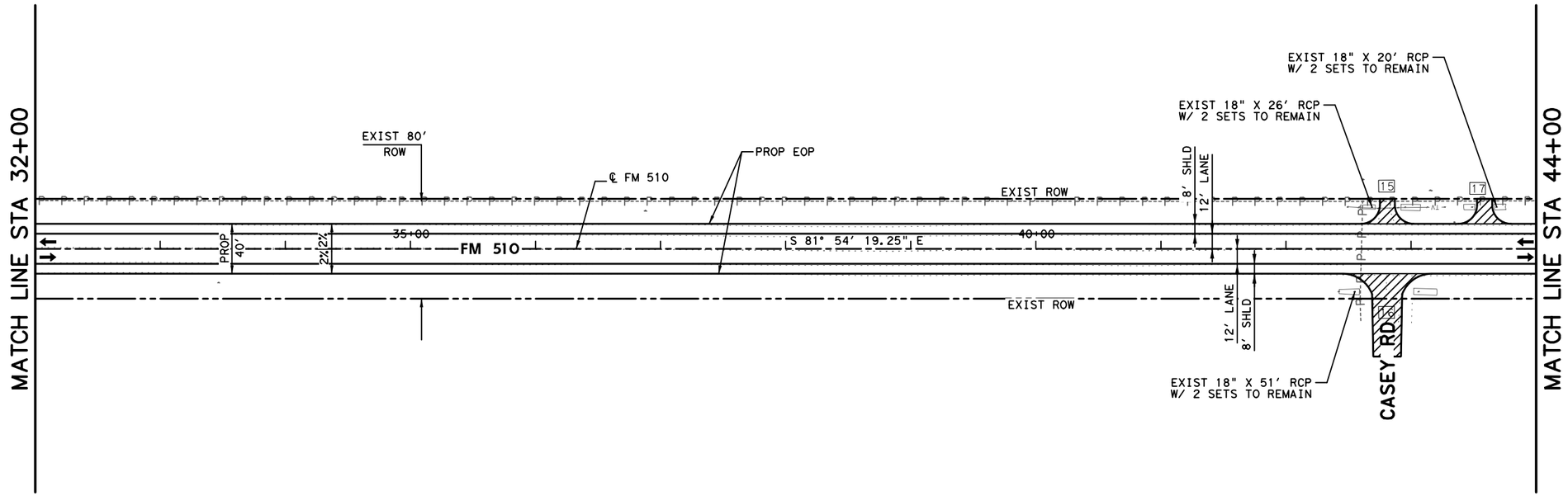
DRAWING DATE: 6/27/2022



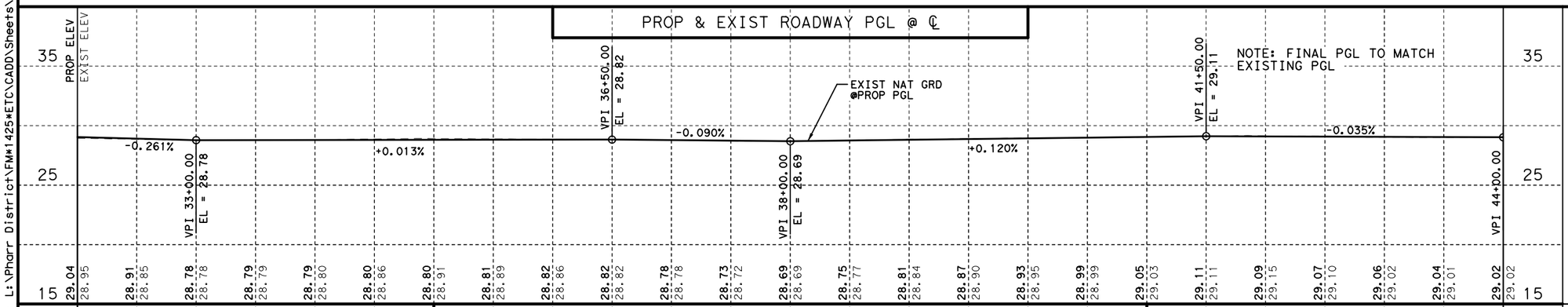
HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY



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ENRIQUE ACEVEDO JR.
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6/27/2022

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FM 510

PLAN AND PROFILE STA 32+00 TO STA 44+00

SHEET 4 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	97
CONTROL	SECTION	JOB	
1057	03	045	

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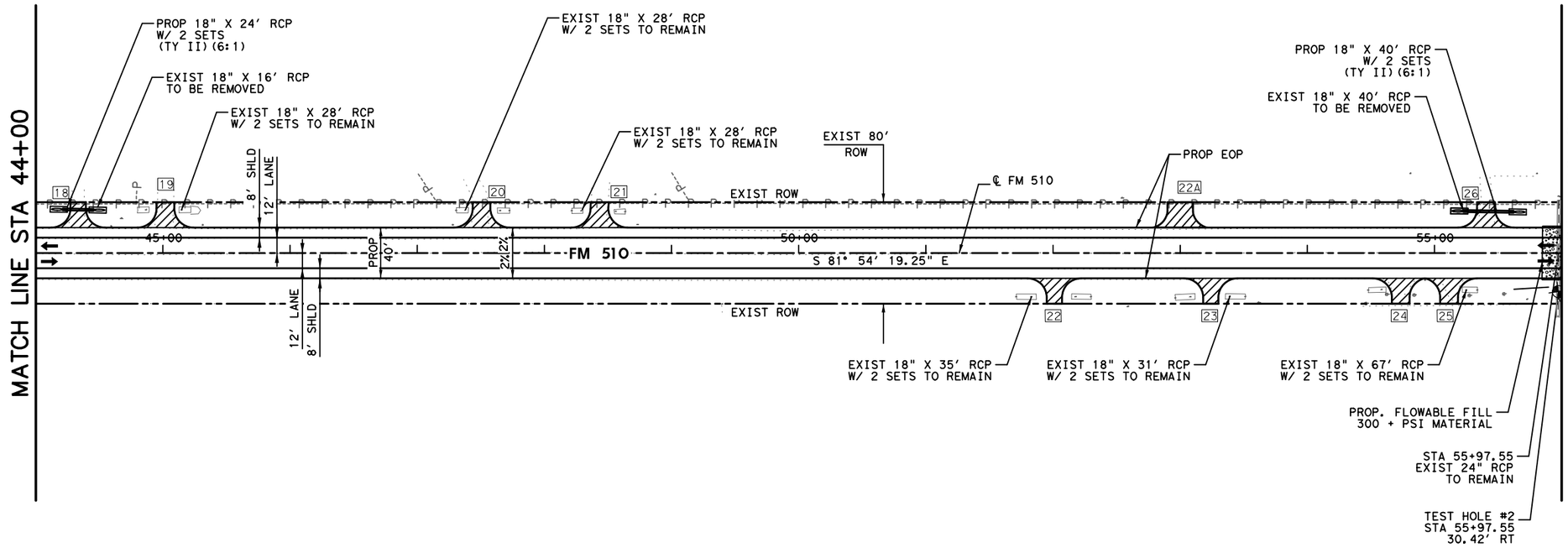
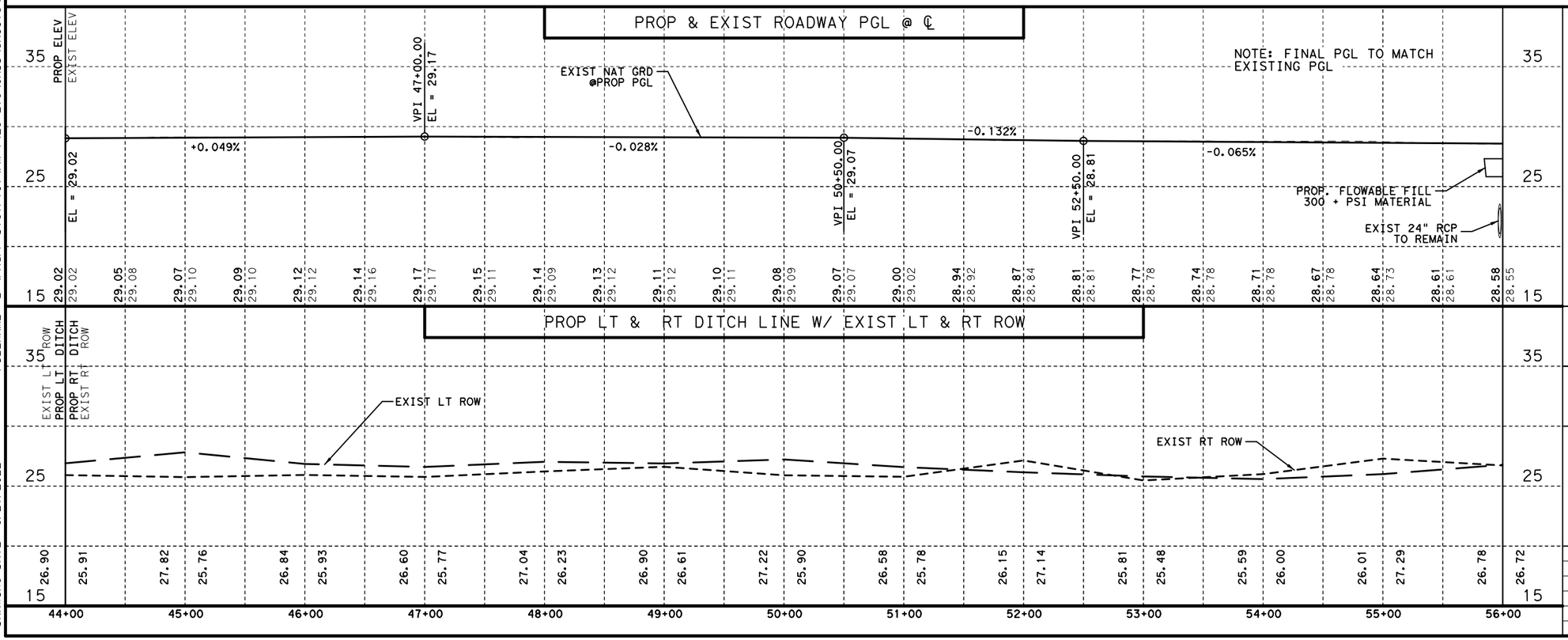
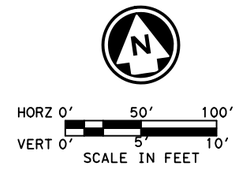
DRAWING DATE: 6/27/2022







NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC) (5 IN)
- PROP ACP DRIVEWAY

6/27/2022

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TBPE REG. # F-11657

FM 510

PLAN AND PROFILE STA 44+00 TO STA 56+00

SHEET 5 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	98
CONTROL	SECTION	JOB	
1057	03	045	

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DRAWING DATE: 6/27/2022
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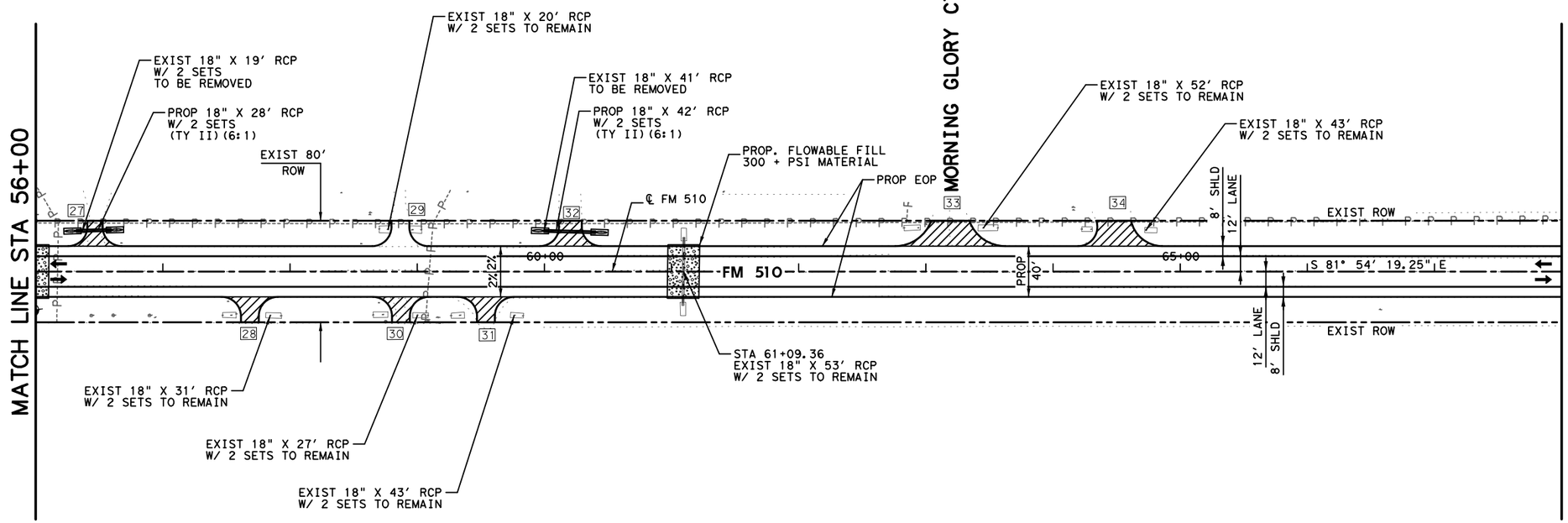


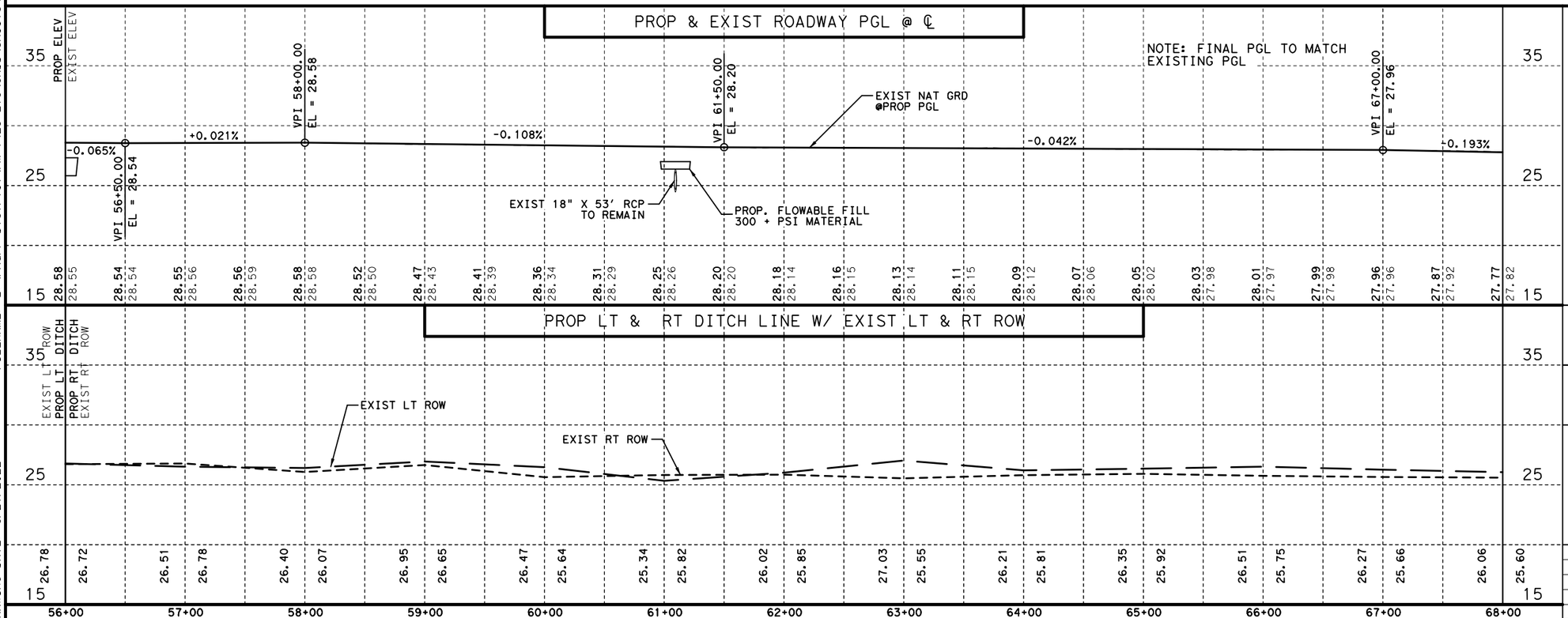
HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- ---P---P---P--- OVERHEAD POWER LINE
- —G—G— UNDERGROUND GAS LINE
- —T1—T1— UNDERGROUND TELEPHONE LINE
- —TV—TV— UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC) (5 IN)
- PROP ACP DRIVEWAY



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FM 510

PLAN AND PROFILE STA 56+00 TO STA 68+00

SHEET 6 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	99
CONTROL	SECTION	JOB	
1057	03	045	

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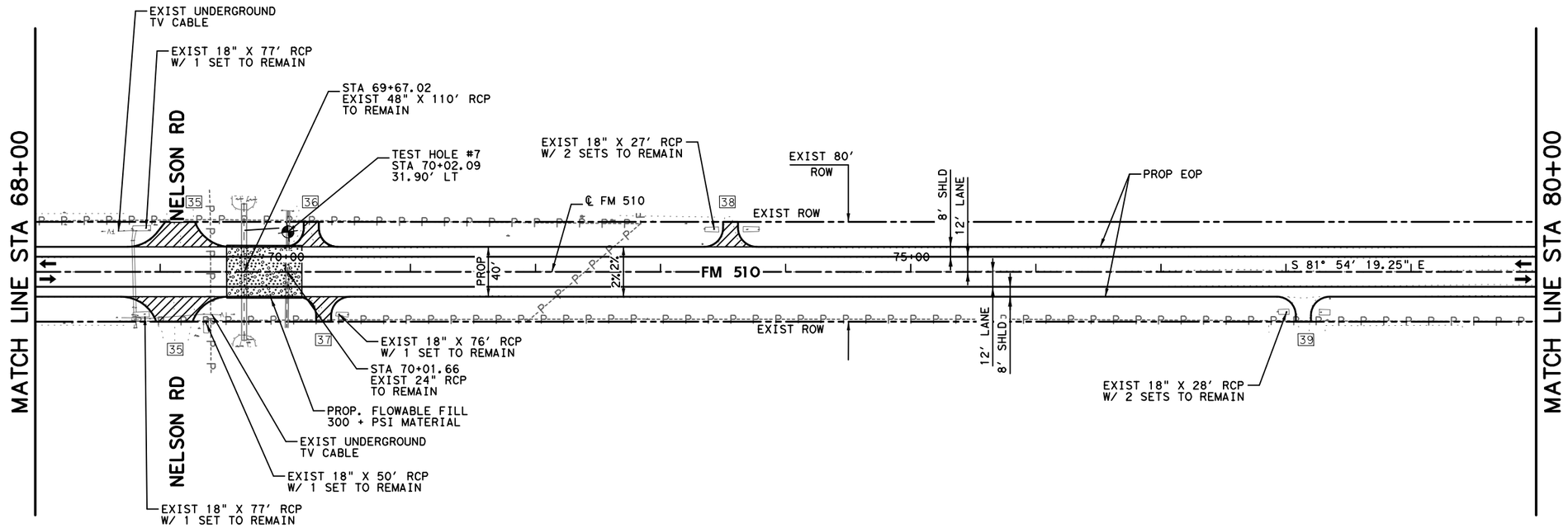
DRAWING DATE: 6/27/2022



HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC) (5 IN)
- PROP ACP DRIVEWAY

6/27/2022

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TBPE REG. # F-11657

FM 510

PLAN AND PROFILE STA 68+00 TO STA 80+00

SHEET 7 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	100
CONTROL	SECTION	JOB	
1057	03	045	

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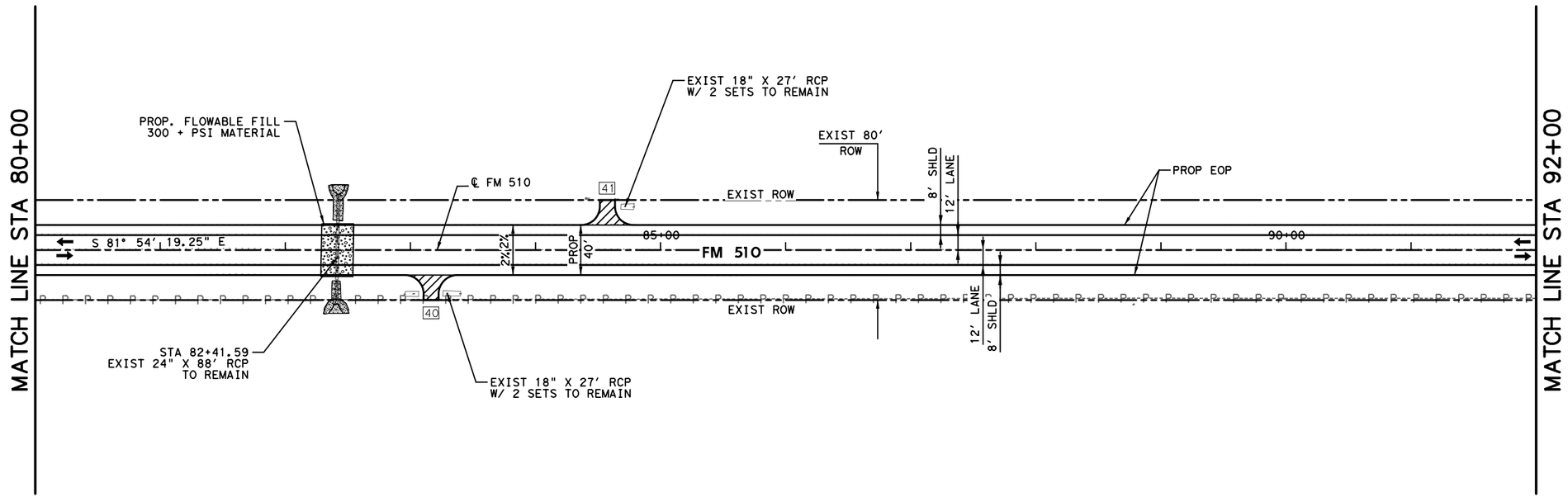
DRAWING DATE: 6/27/2022



NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY

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TBPE REG. # F-11657

FM 510

PLAN AND PROFILE
STA 80+00 TO STA 92+00

SHEET 8 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	101
CONTROL	SECTION	JOB	
1057	03	045	

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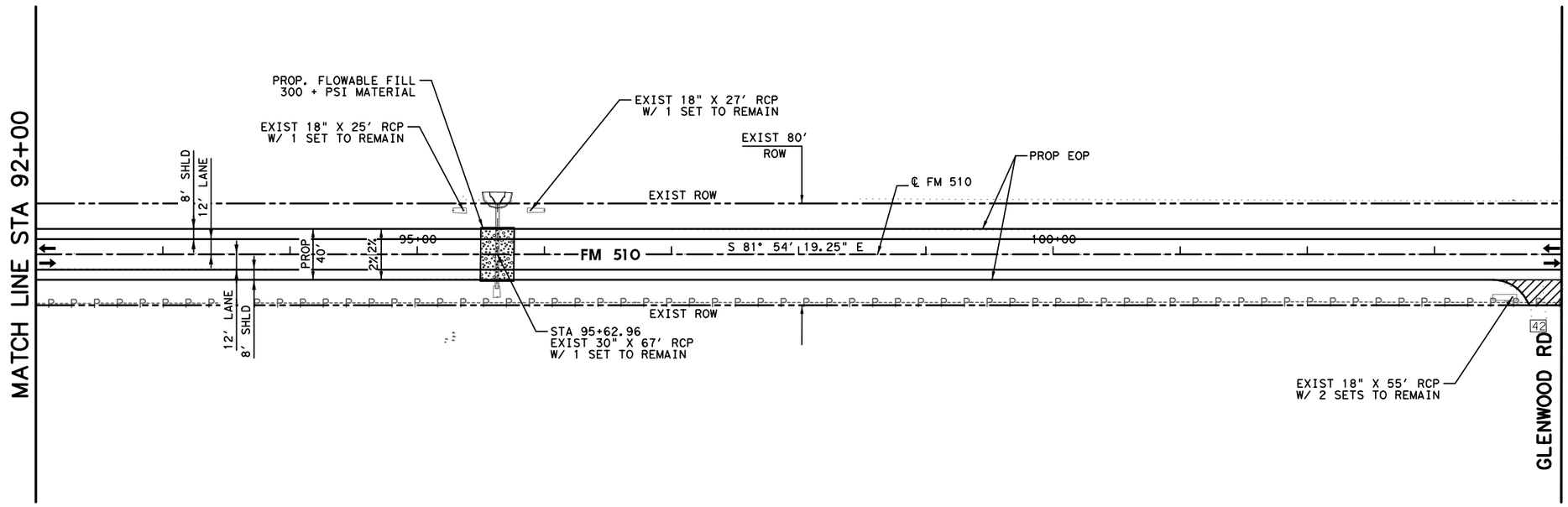
DRAWING DATE: 6/27/2022



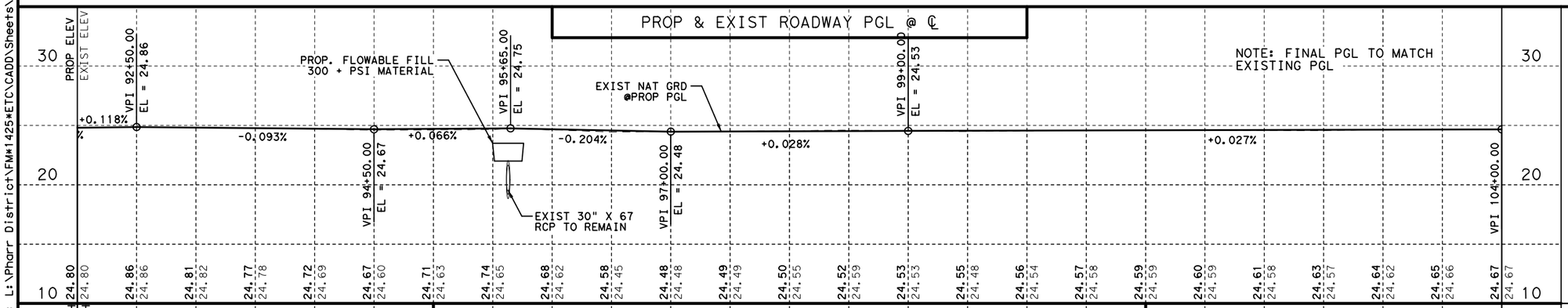
HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

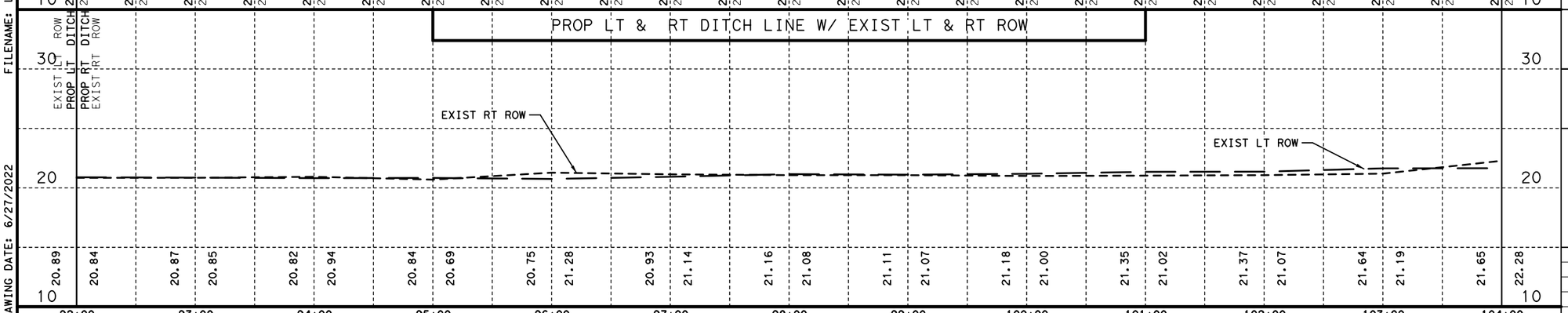
NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY





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FM 510

PLAN AND PROFILE
STA 92+00 TO STA 104+00

SHEET 9 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	102
CONTROL	SECTION	JOB	
1057	03	045	

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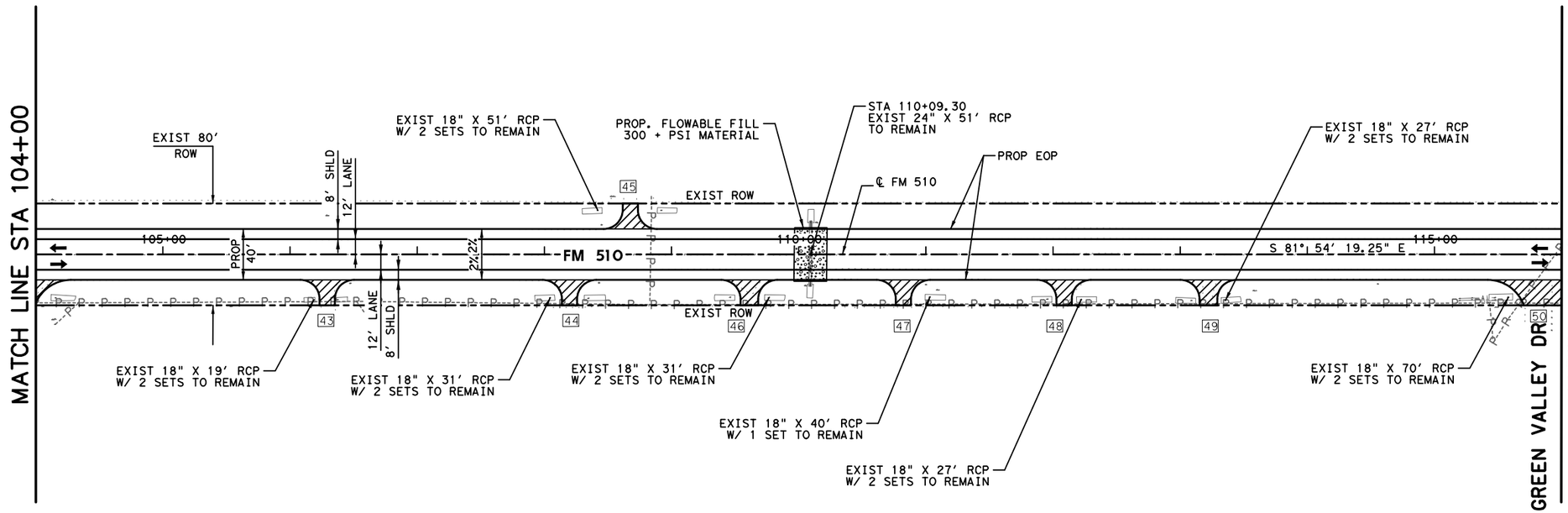
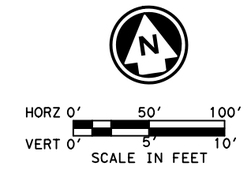
DRAWING DATE: 6/27/2022



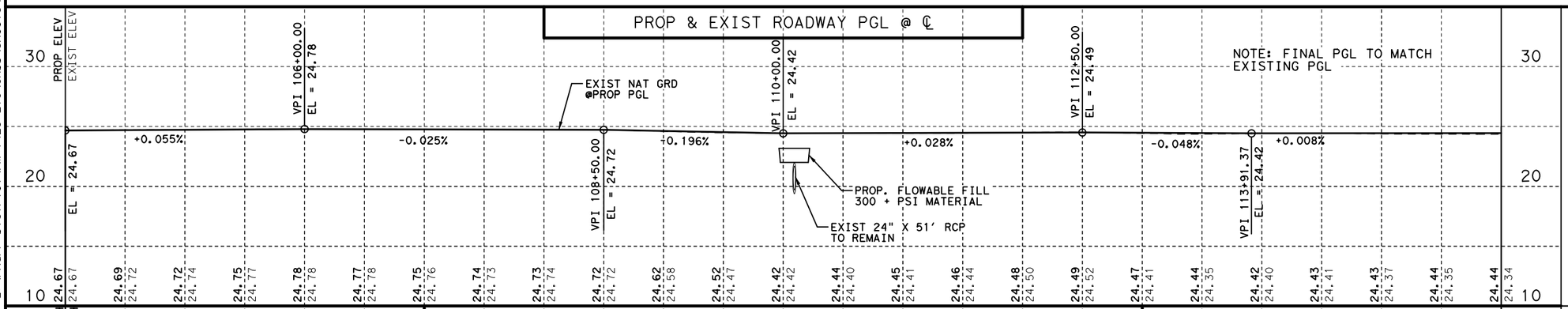


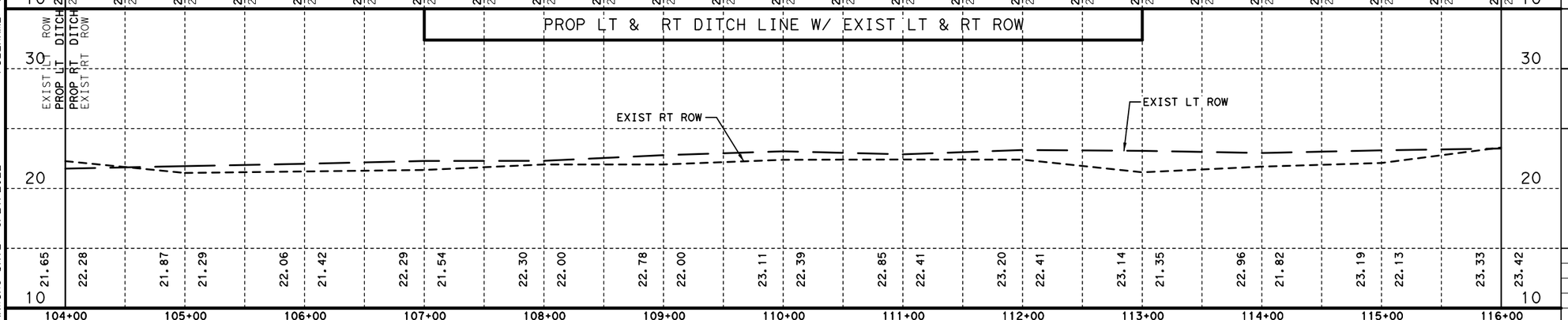
NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY





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FM 510

PLAN AND PROFILE STA 104+00 TO STA 116+00

SHEET 10 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	103
CONTROL	SECTION	JOB	
1057	03	045	

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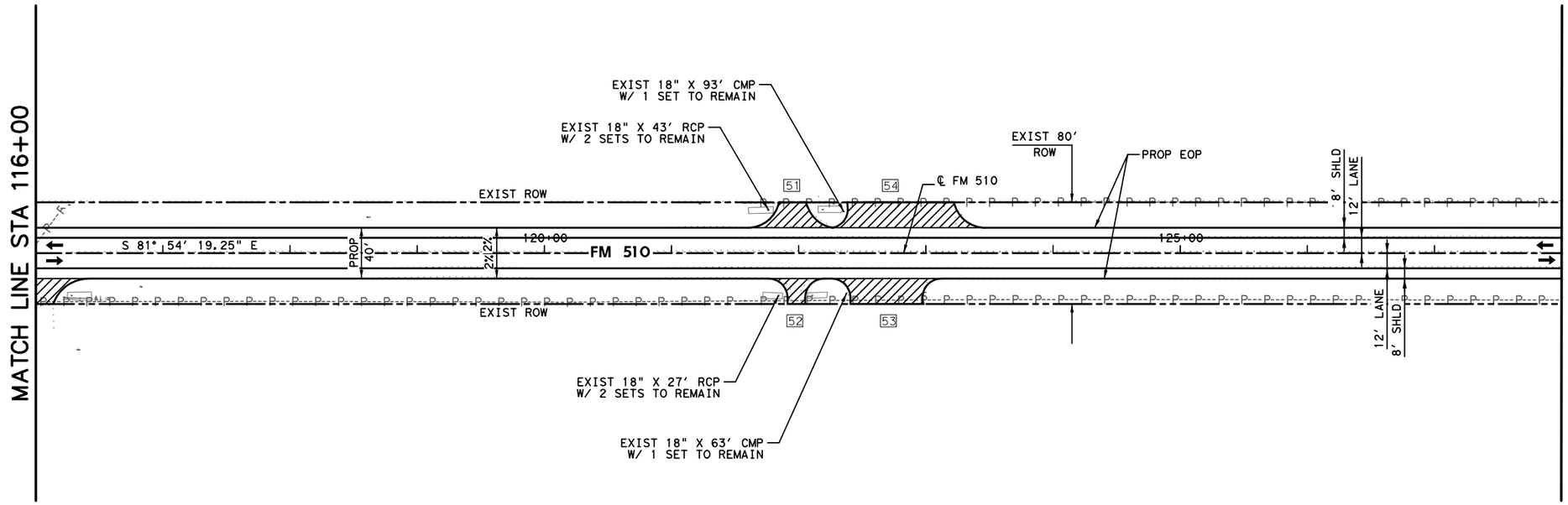
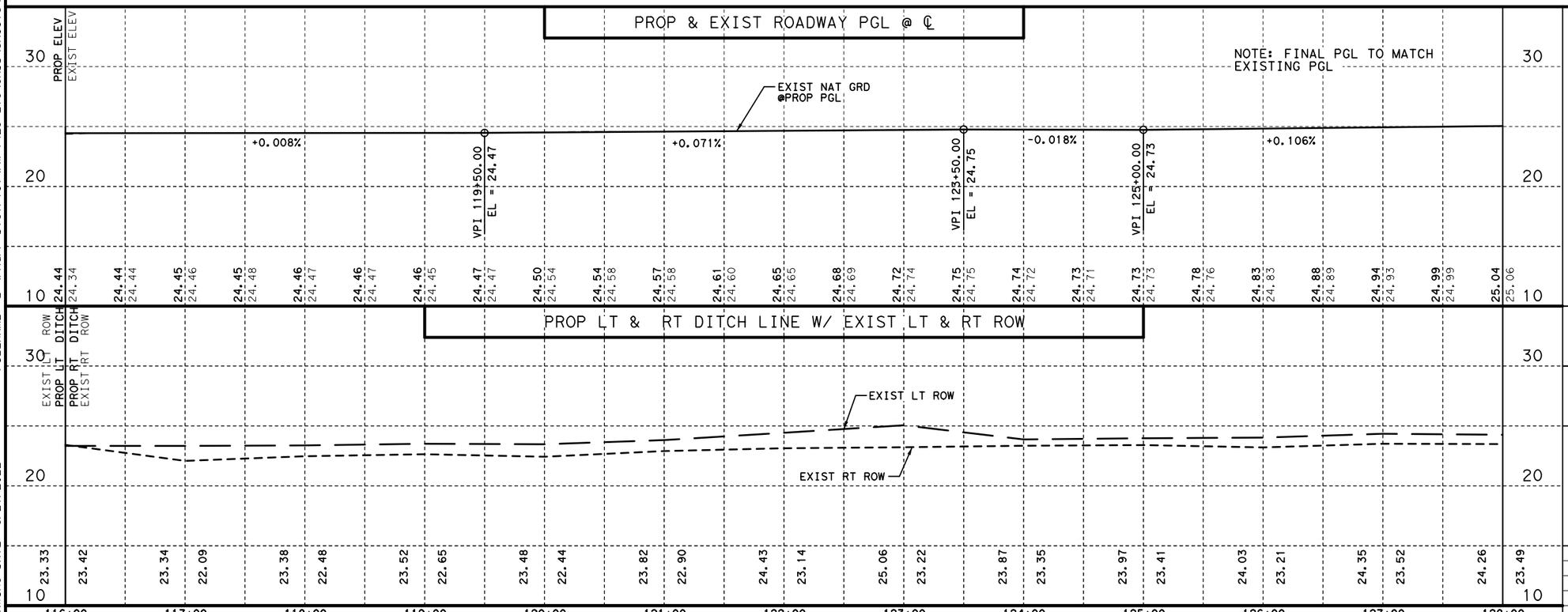
DRAWING DATE: 6/27/2022





HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY

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TBPE REG. # F-11657

FM 510

PLAN AND PROFILE
STA 116+00 TO STA 128+00

SHEET 11 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	104
CONTROL	SECTION	JOB	
1057	03	045	

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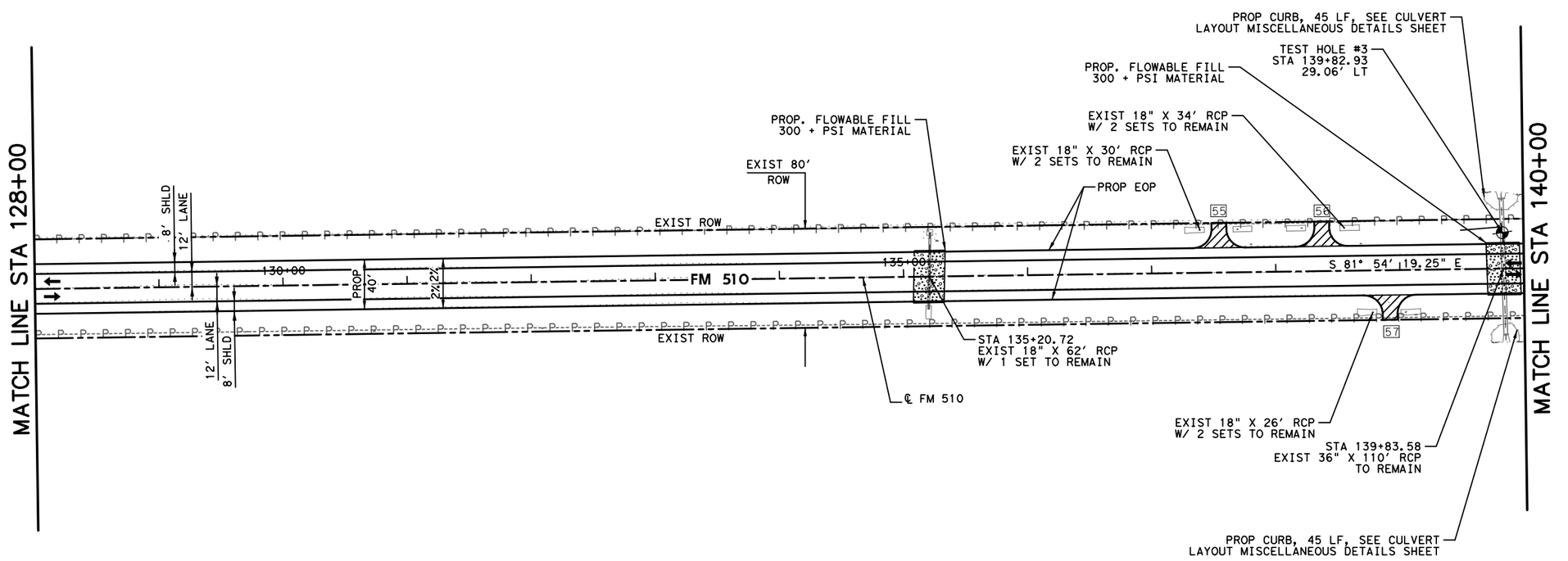
DRAWING DATE: 6/27/2022



HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

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2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY

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TBPE REG. # F-11657

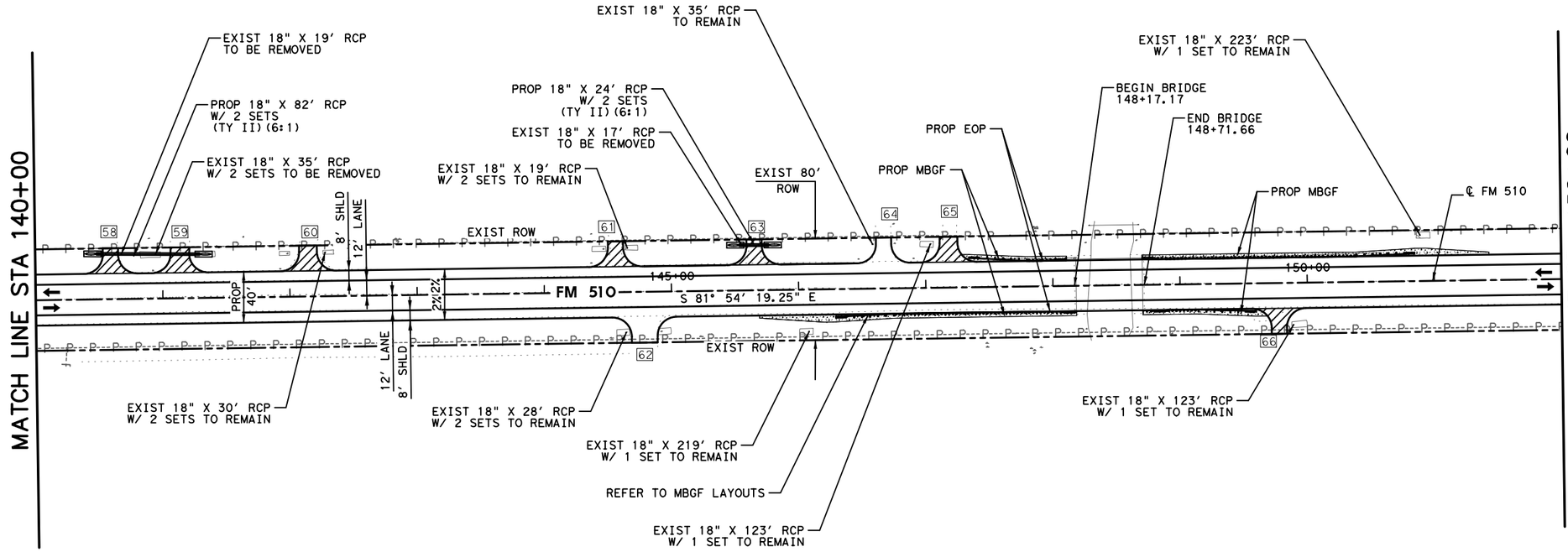
FM 510

PLAN AND PROFILE
STA 128+00 TO STA 140+00

SHEET 12 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	105
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\05 Roadway Details\FM510#P&P#12.dgn
DRAWING DATE: 6/27/2022



HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

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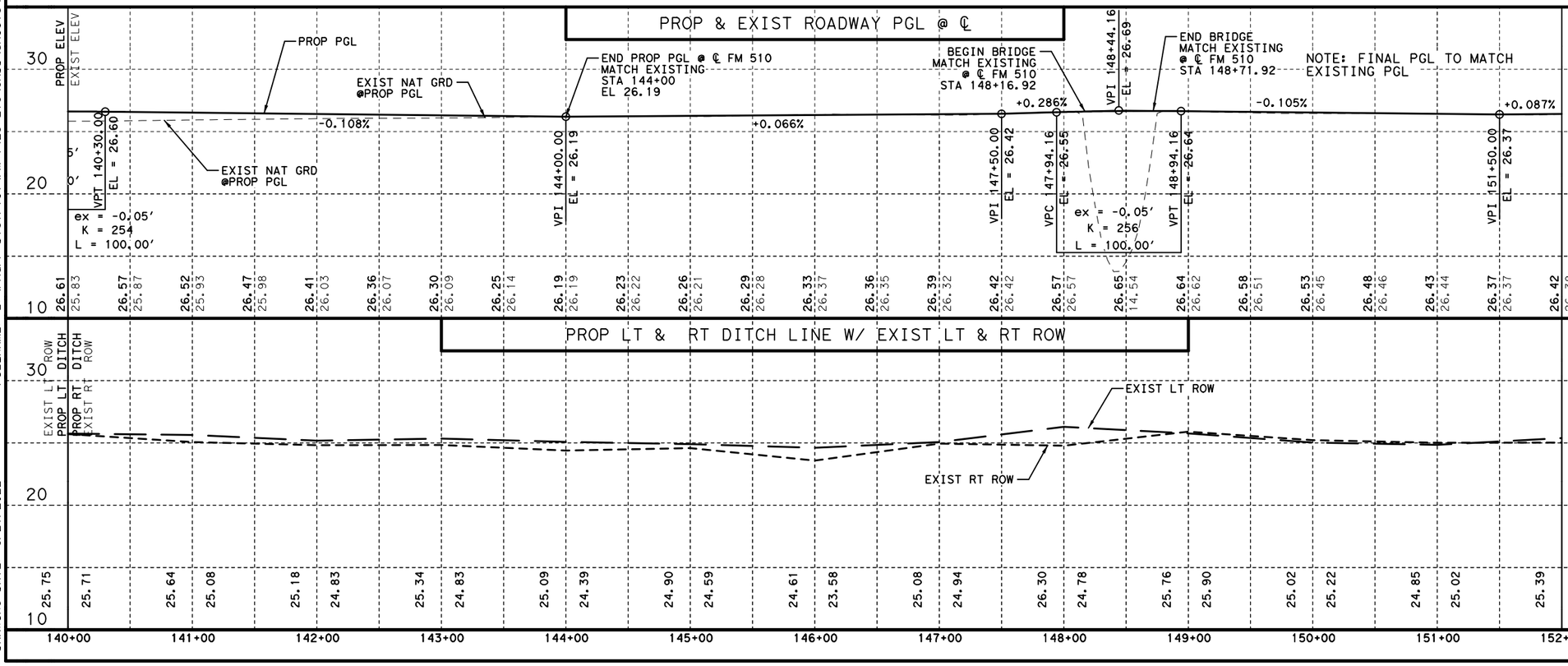
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY



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6/27/2022

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE STA 140+00 TO STA 152+00

SHEET 13 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	106
CONTROL	SECTION	JOB	
1057	03	045	

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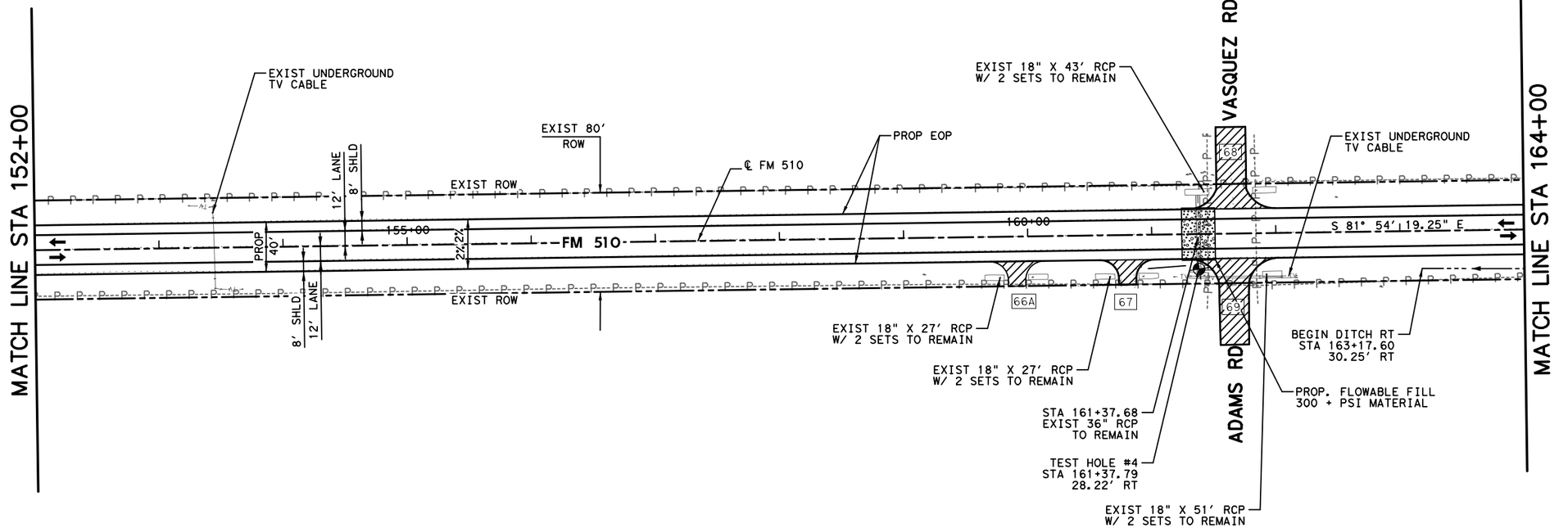
DRAWING DATE: 6/27/2022



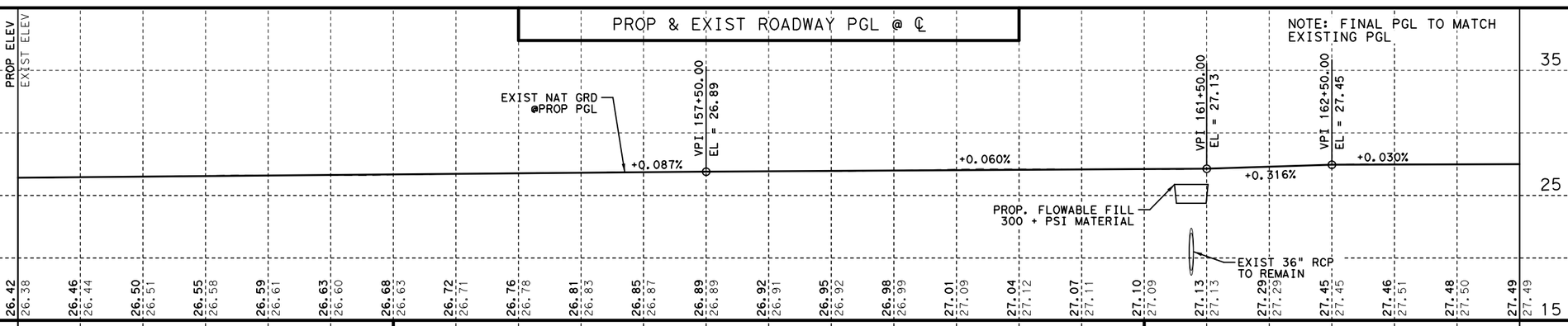
HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC) (5 IN)
- PROP ACP DRIVEWAY



STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED PROFESSIONAL ENGINEER

6/27/2022

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

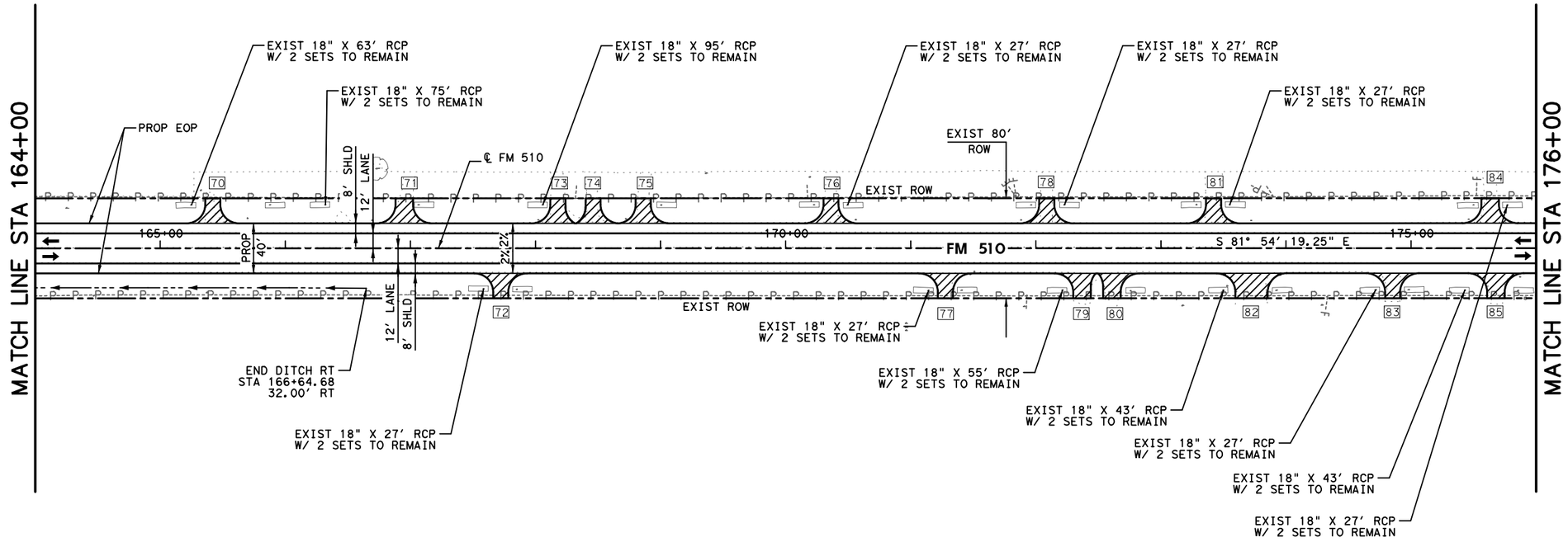
FM 510

PLAN AND PROFILE STA 152+00 TO STA 164+00

SHEET 14 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	107
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\05 Roadway Details\FM510#P&P#14.dgn
DRAWING DATE: 6/27/2022



HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

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2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY

STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

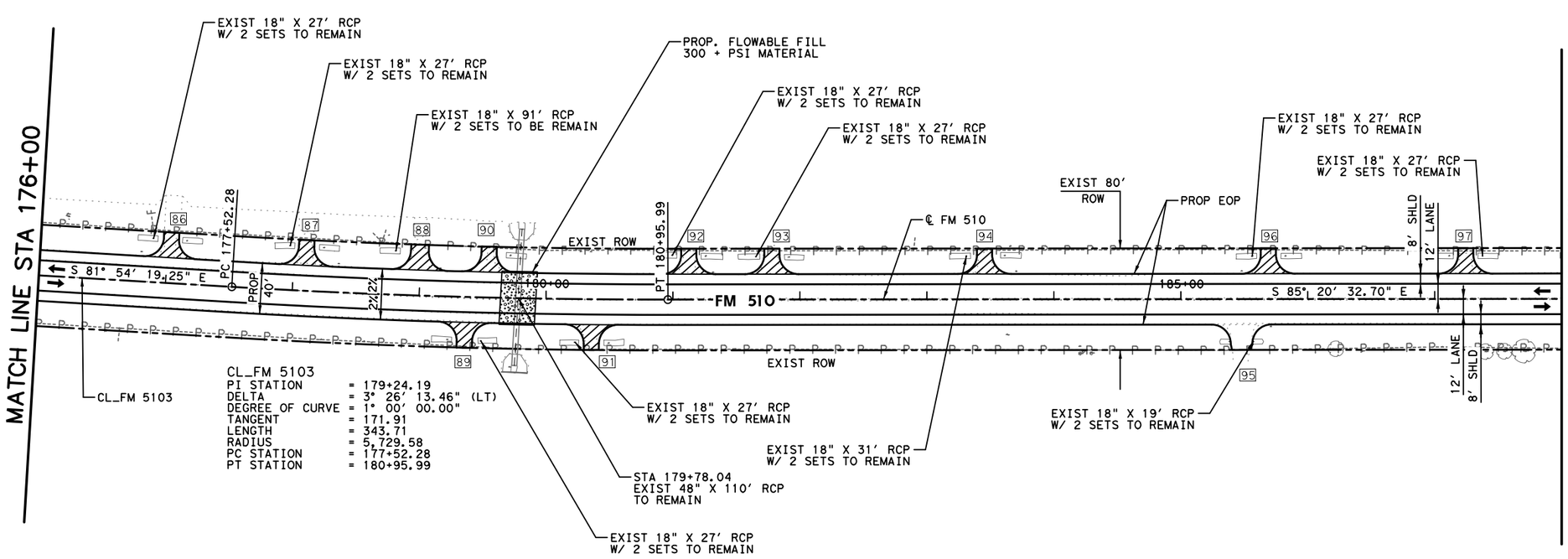
FM 510

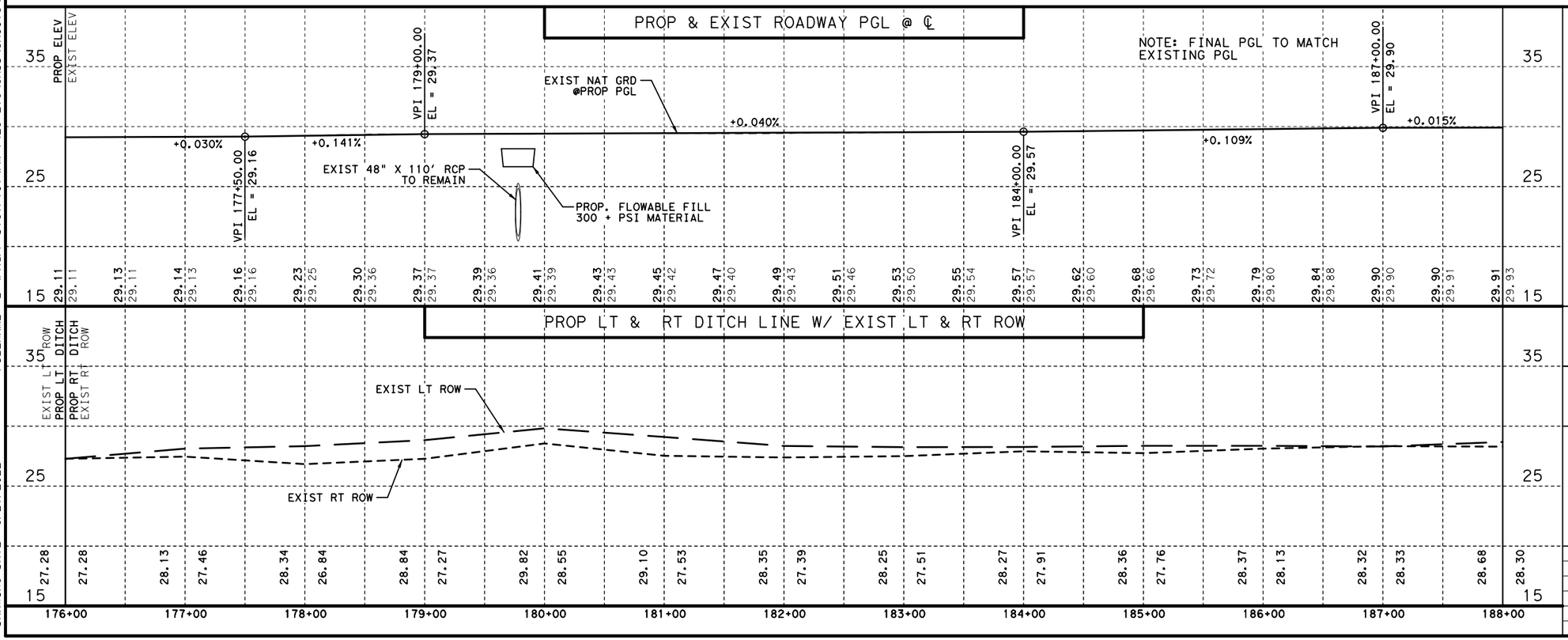
PLAN AND PROFILE STA 164+00 TO STA 176+00

SHEET 15 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	108
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\05 Roadway Details\FM510#P&P#15.dgn
DRAWING DATE: 6/27/2022





HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

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2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY

STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED PROFESSIONAL ENGINEER

6/27/2022

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7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE STA 176+00 TO STA 188+00

SHEET 16 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	109
CONTROL	SECTION	JOB	
1057	03	045	

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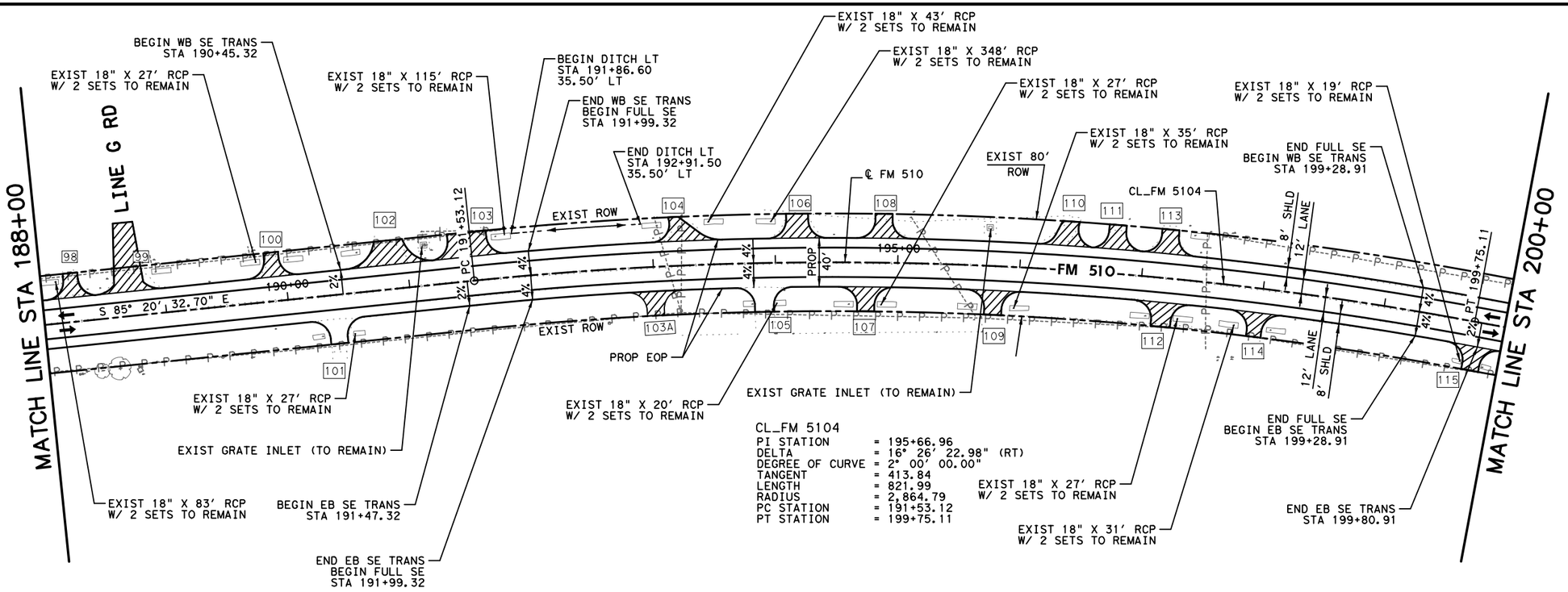
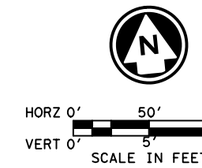
DRAWING DATE: 6/27/2022





NOTES:

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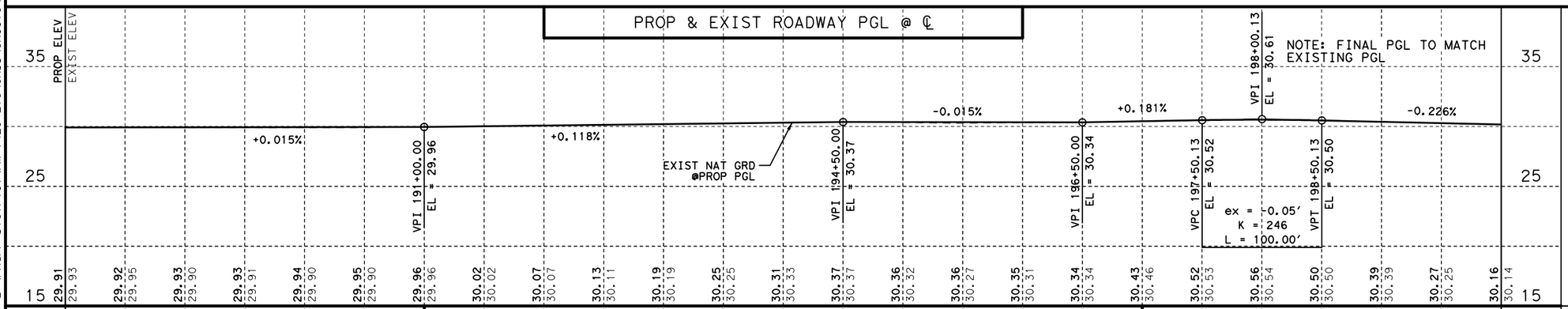
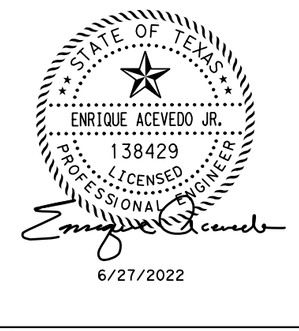
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY





I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE STA 188+00 TO STA 200+00

SHEET 17 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	110
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510*P&P*17.dgn
DRAWING DATE: 6/27/2022
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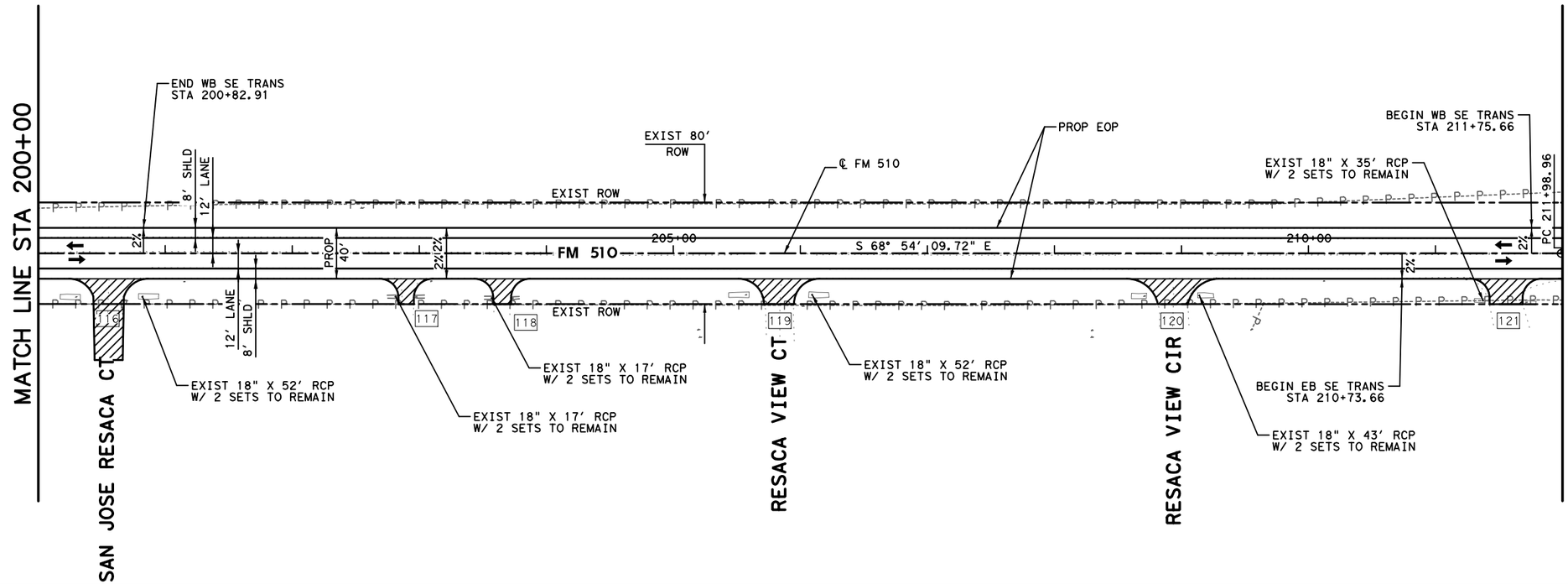

HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

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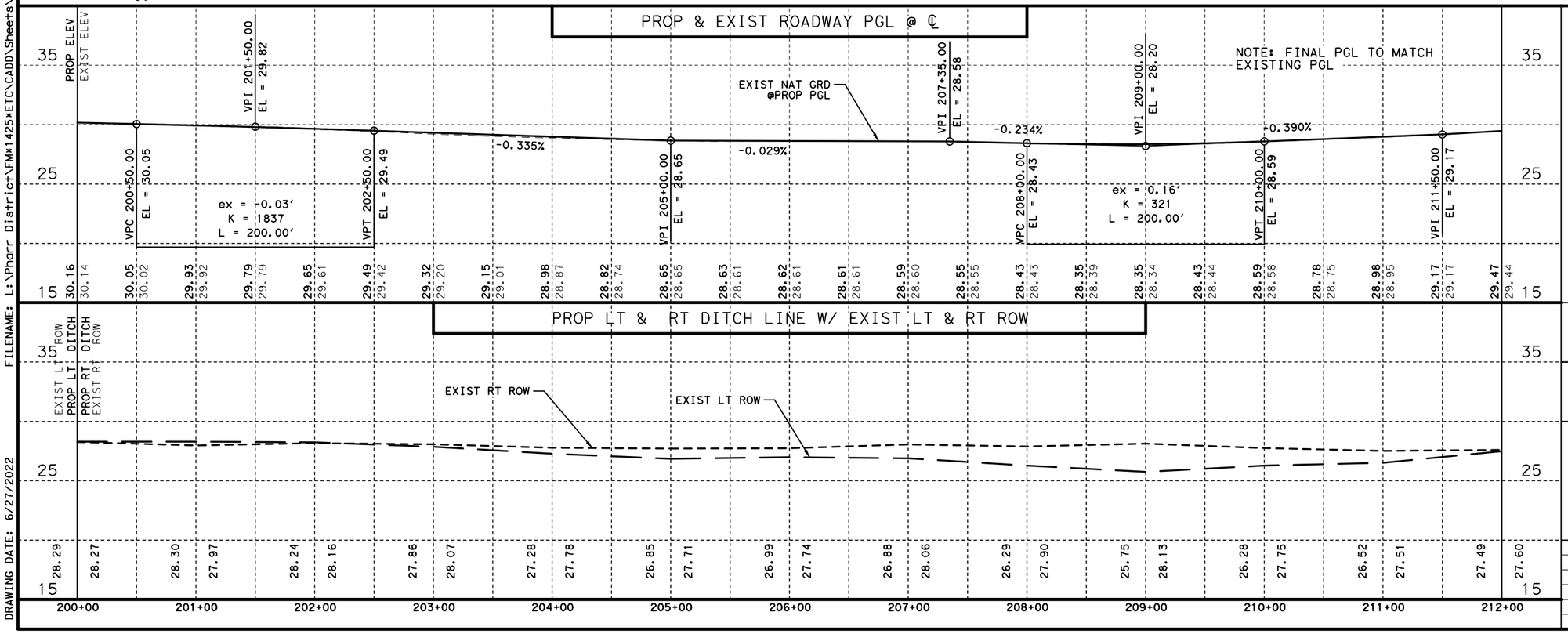
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY



STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

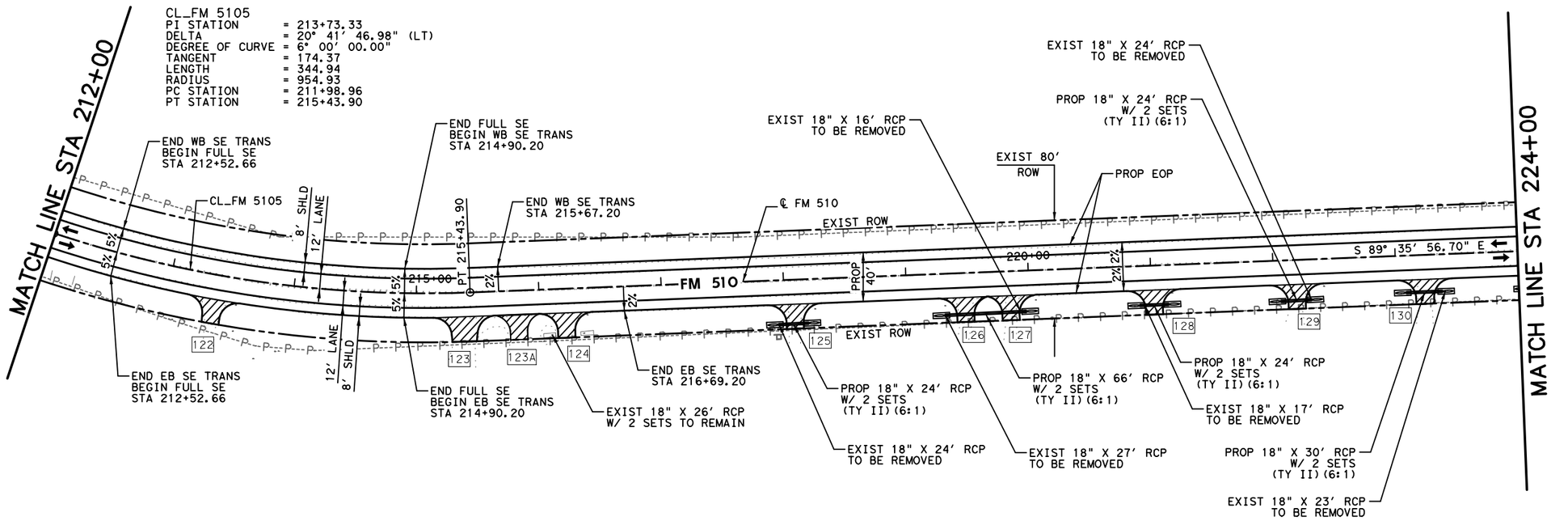
FM 510

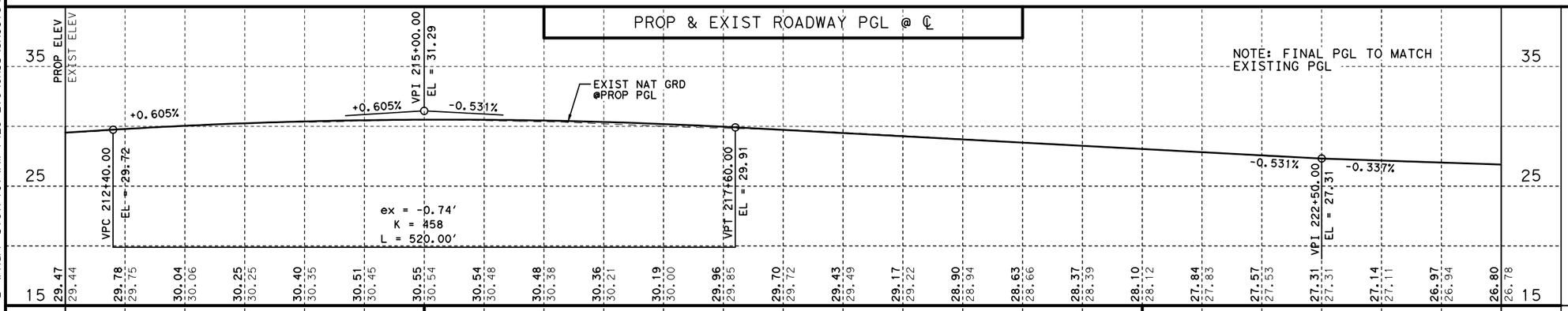
PLAN AND PROFILE
STA 200+00 TO STA 212+00

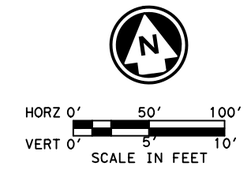
SHEET 18 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	111
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425*ETC\CADD\Sheets\FM510\05 Roadway Details\FM510*P&P*18.dgn
DRAWING DATE: 6/27/2022







NOTES:

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2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC) (5 IN)
- PROP ACP DRIVEWAY

6/27/2022

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

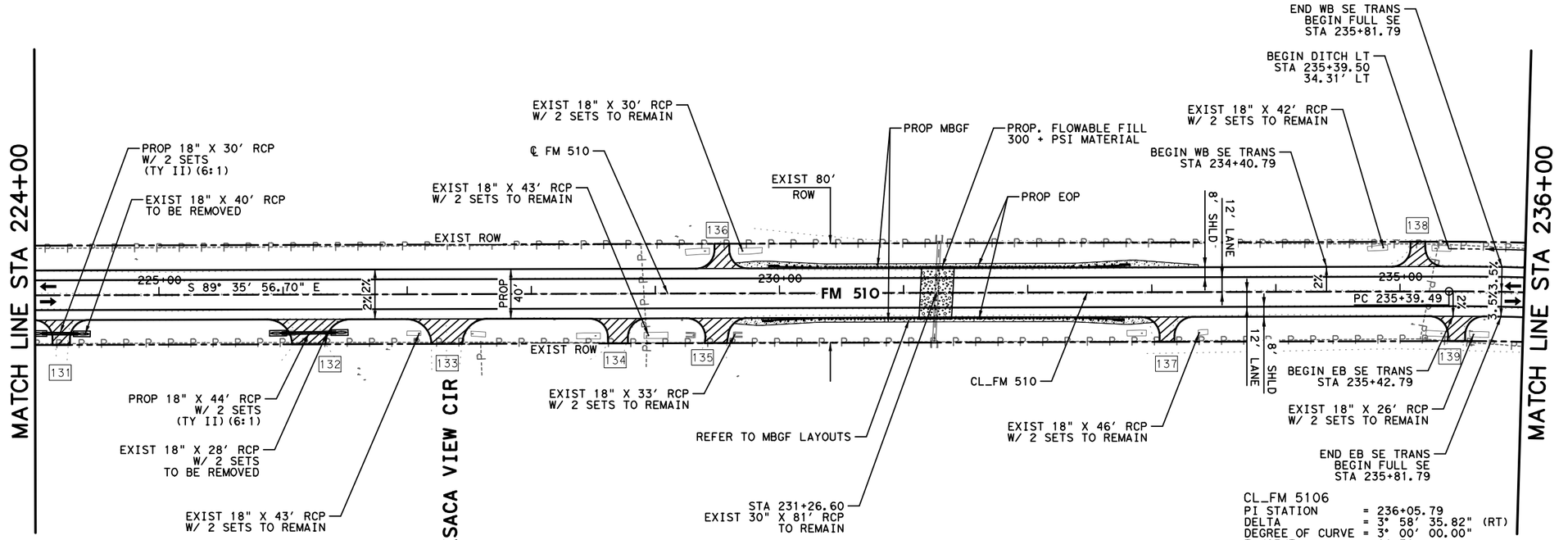
FM 510

PLAN AND PROFILE
STA 212+00 TO STA 224+00

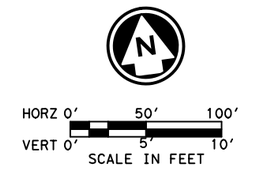
SHEET 19 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	112
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM\1425\ETC\CADD\Sheets\FM510\05 Roadway Details\FM510*P&P*19.dgn
DRAWING DATE: 6/27/2022



CL_FM 5106
PI STATION = 236+05.79
DELTA = 3° 58' 35.82" (RT)
DEGREE OF CURVE = 3° 00' 00.00"
TANGENT = 66.30
LENGTH = 132.55
RADIUS = 1,909.86
PC STATION = 235+39.49
PT STATION = 236+72.05



NOTES:

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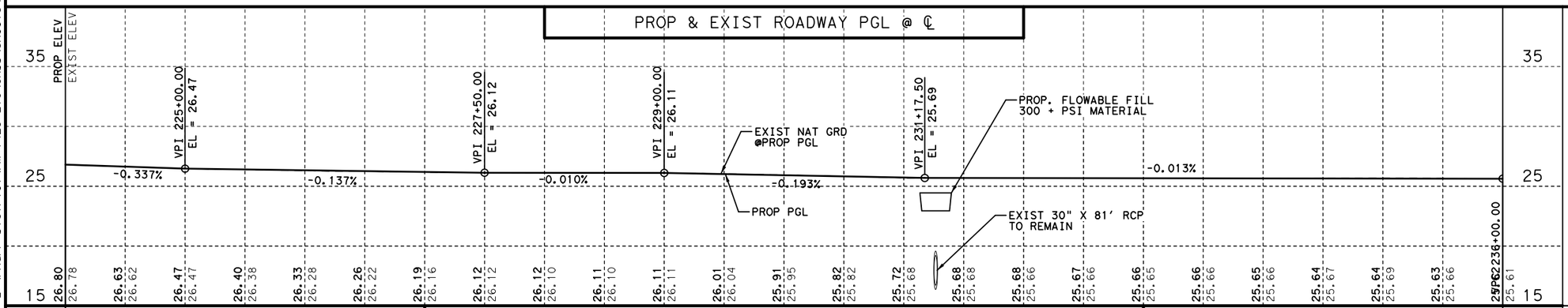
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC) (5 IN)
- PROP ACP DRIVEWAY



STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

Texas Department of Transportation
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I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

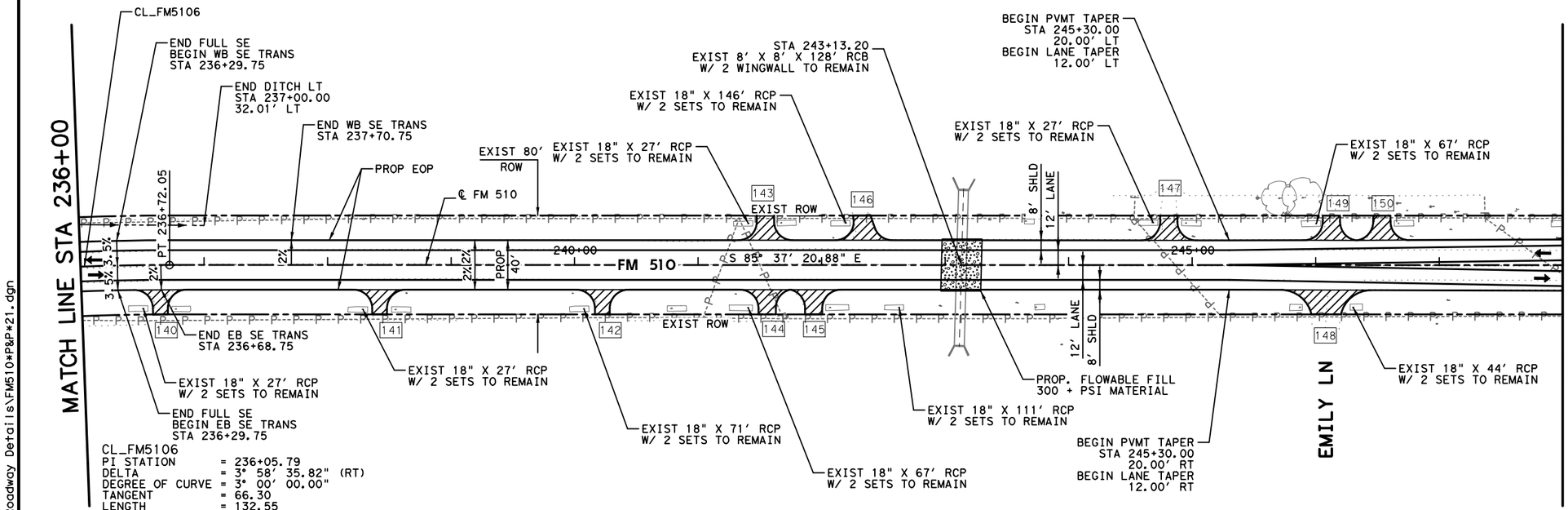
FM 510

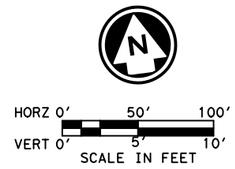
PLAN AND PROFILE STA 224+00 TO STA 236+00

SHEET 20 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	113
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\05 Roadway Details\FM510*P&P*20.dgn
DRAWING DATE: 6/27/2022





NOTES:

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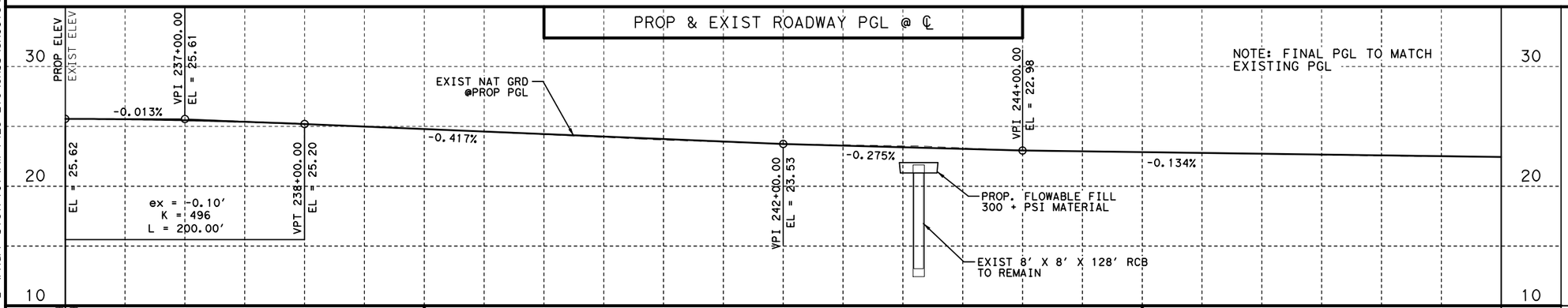
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY



I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE
STA 236+00 TO STA 248+00

SHEET 21 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	114
CONTROL	SECTION	JOB	
1057	03	045	

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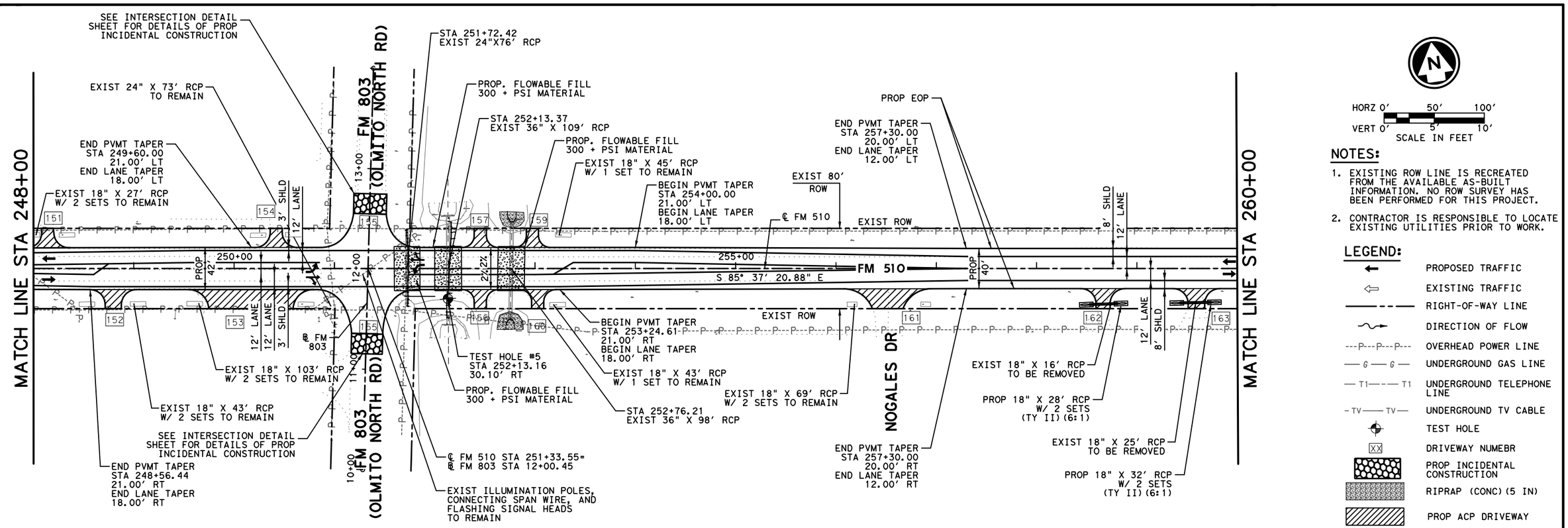
DRAWING DATE: 6/27/2022



NOTES:

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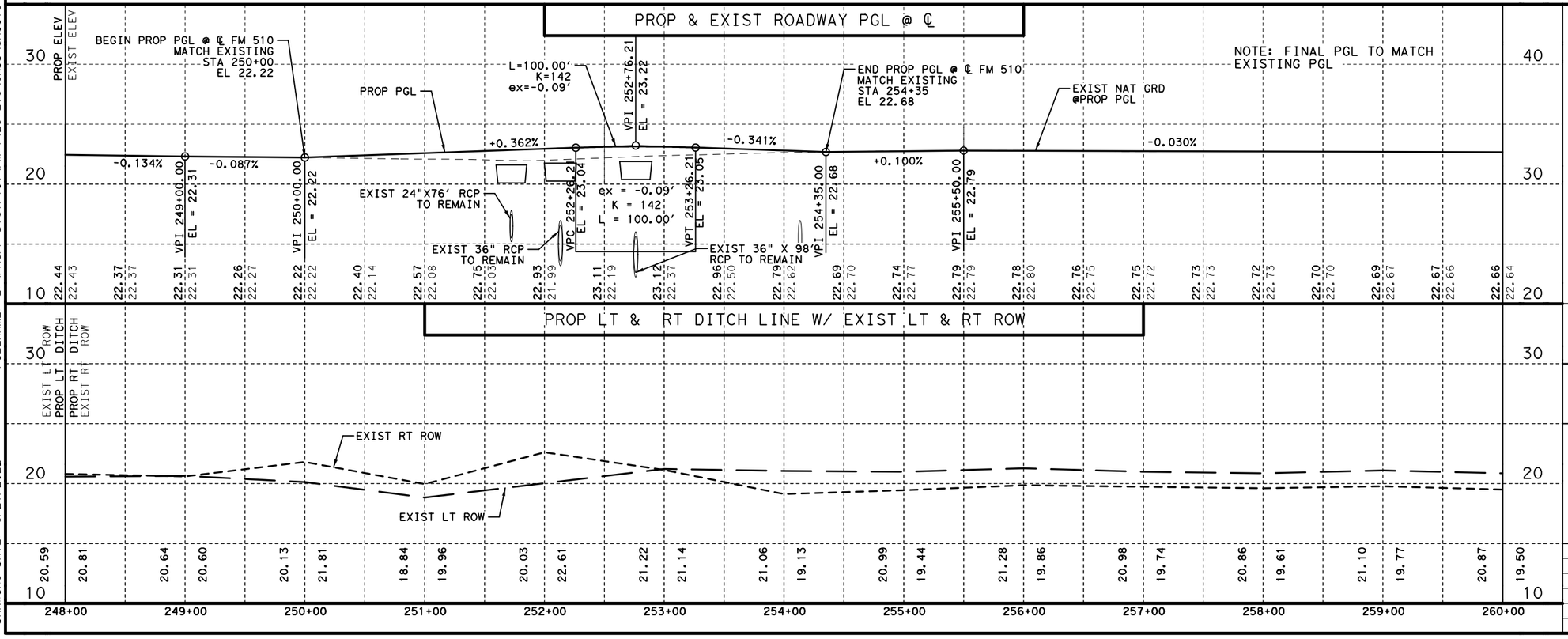
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND TV CABLE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- PROP INCIDENTAL CONSTRUCTION
- RIPRAP (CONC) (5 IN)
- PROP ACP DRIVEWAY



I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE STA 248+00 TO STA 260+00

SHEET 22 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	115
CONTROL	SECTION	JOB	
1057	03	045	

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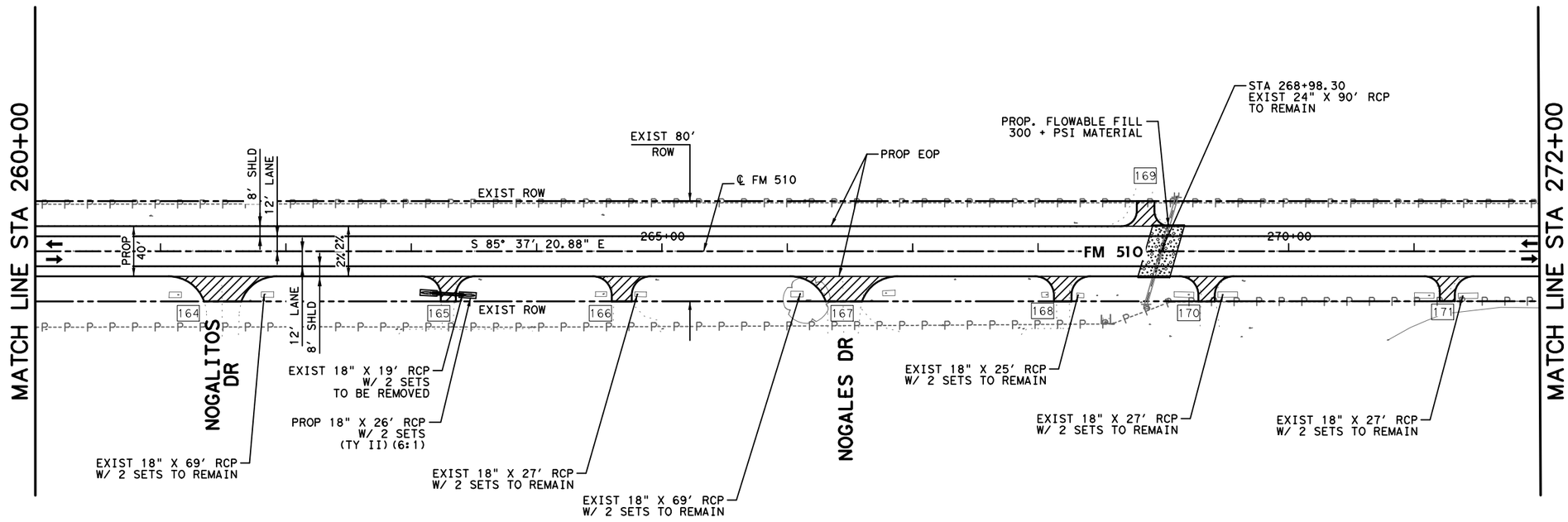
DRAWING DATE: 6/27/2022



NOTES:

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2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE
STA 260+00 TO STA 272+00

SHEET 23 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	116
CONTROL	SECTION	JOB	
1057	03	045	

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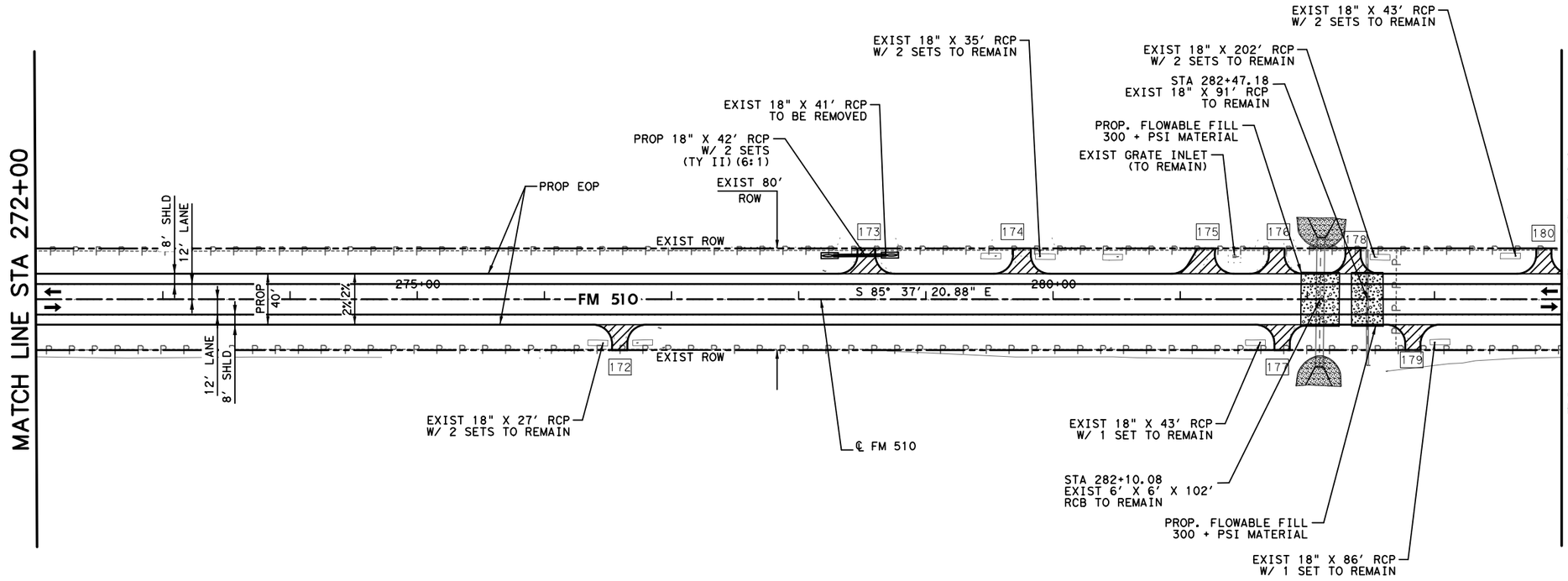
DRAWING DATE: 6/27/2022



HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
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LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- ---P---P---P--- OVERHEAD POWER LINE
- —G—G— UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY

STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

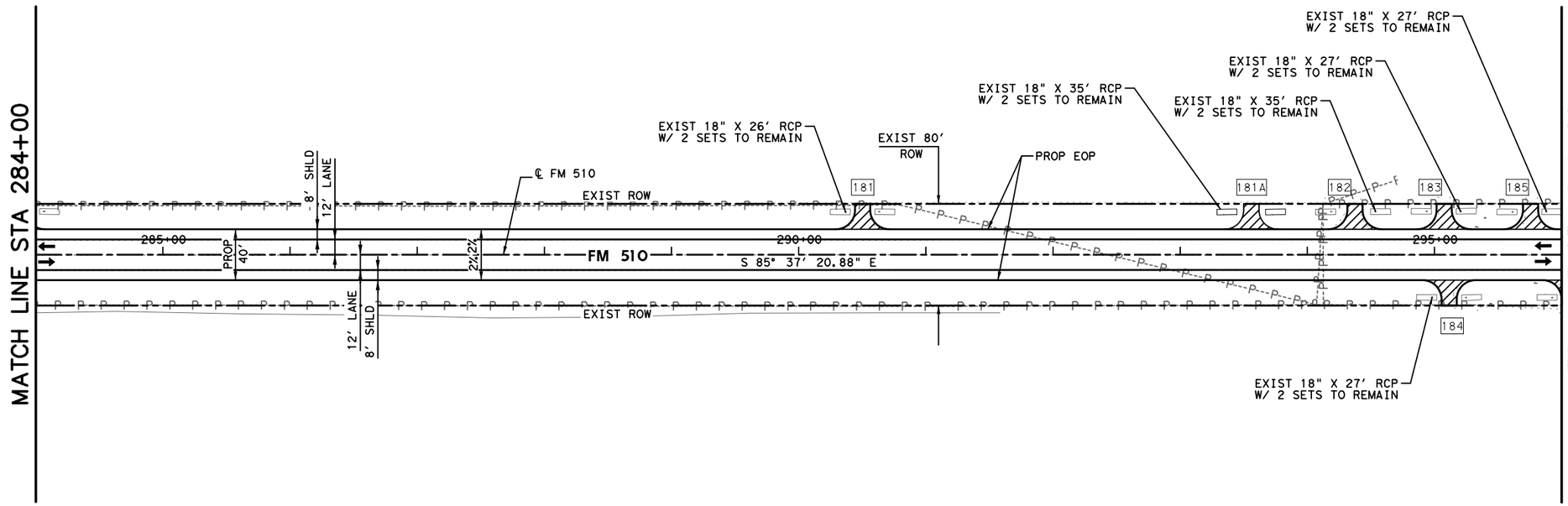
FM 510

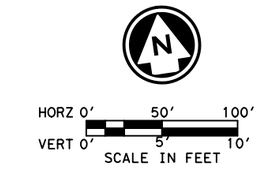
PLAN AND PROFILE
STA 272+00 TO STA 284+00

SHEET 24 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	117
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\05 Roadway Details\FM510#P&P#24.dgn
DRAWING DATE: 6/27/2022



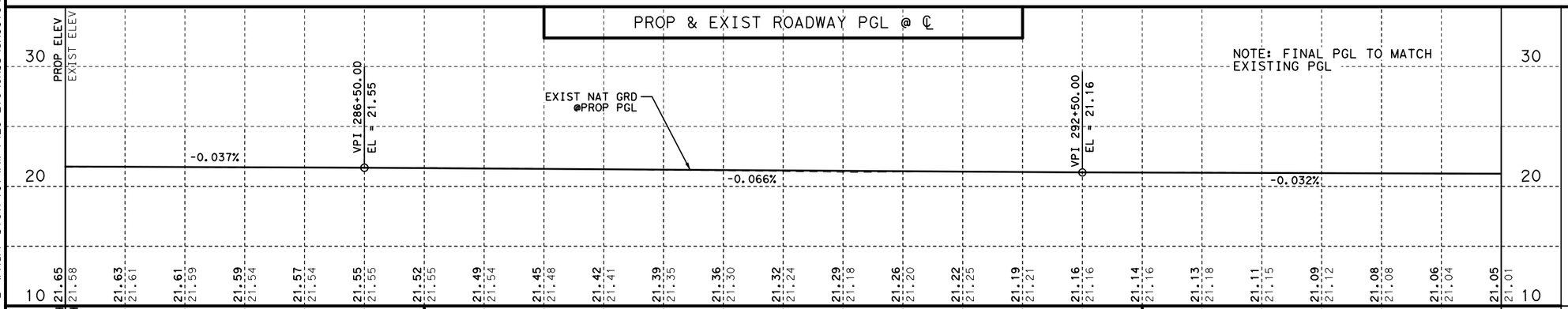


NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY



STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE
STA 284+00 TO STA 296+00

SHEET 25 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	118
CONTROL	SECTION	JOB	
1057	03	045	

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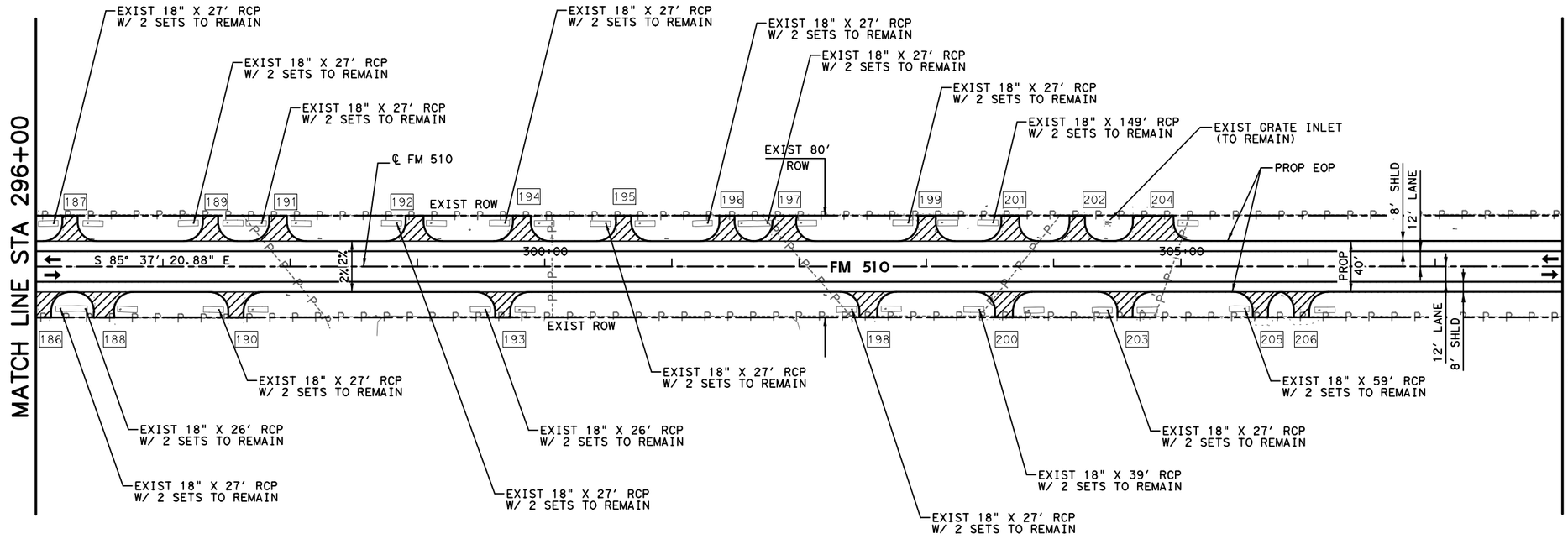
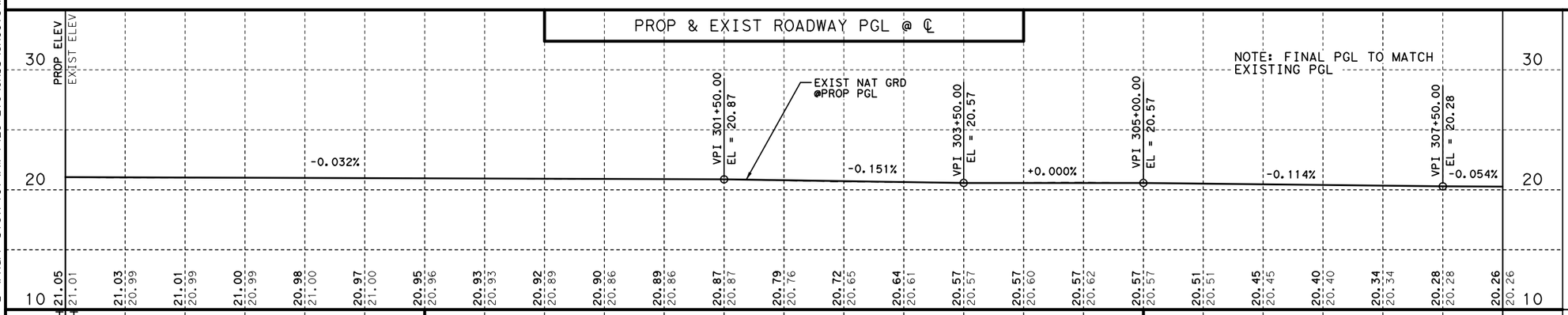
DRAWING DATE: 6/27/2022





HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY

STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

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7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE STA 296+00 TO STA 308+00

SHEET 26 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	119
CONTROL	SECTION	JOB	
1057	03	045	

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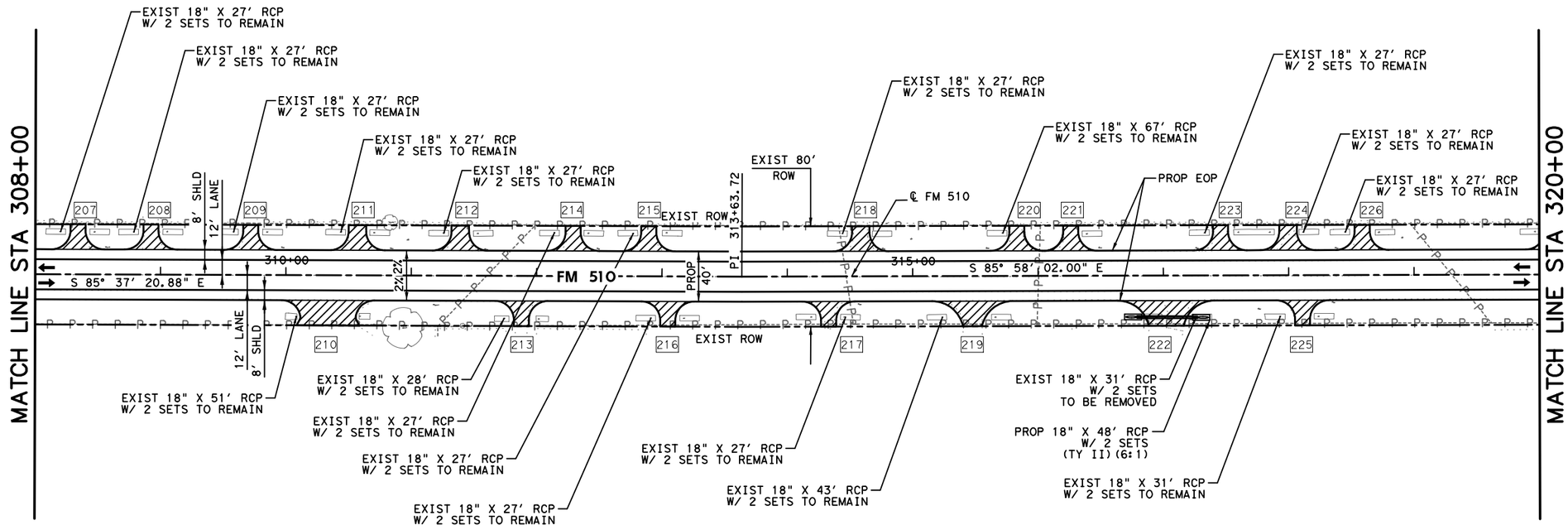
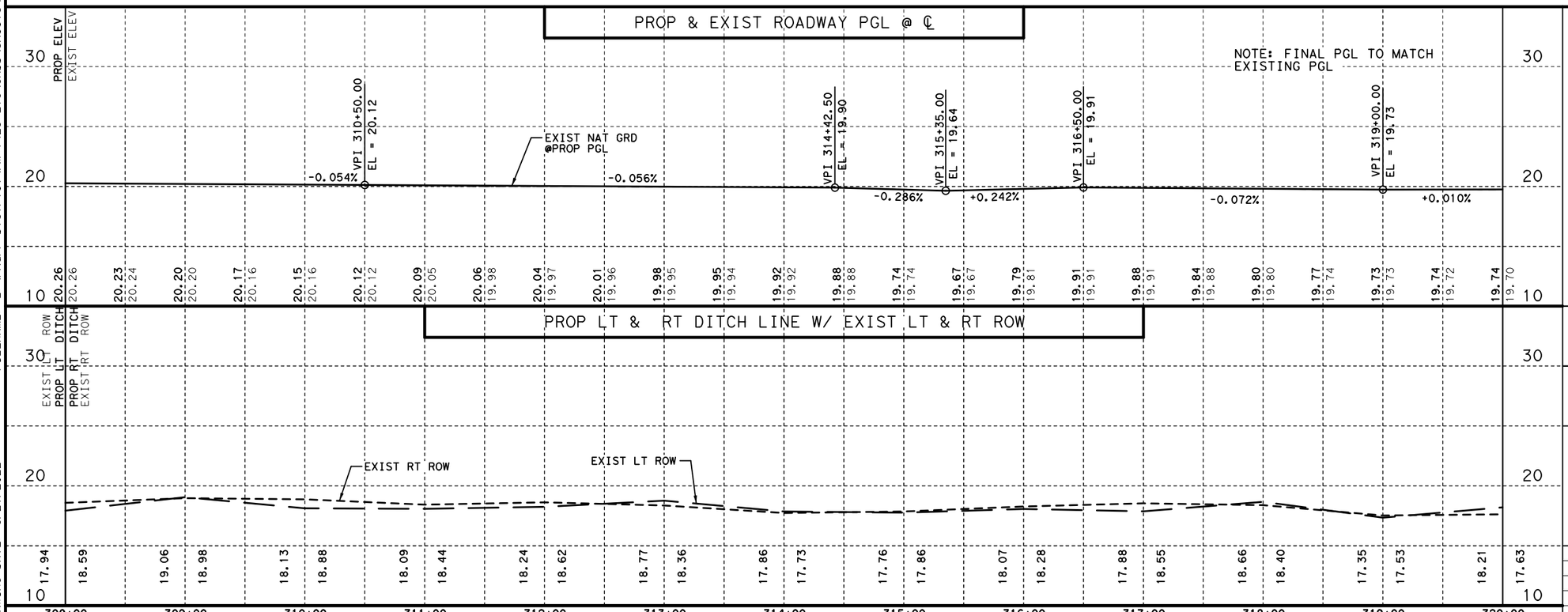
DRAWING DATE: 6/27/2022





HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC) (5 IN)
- PROP ACP DRIVEWAY

STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

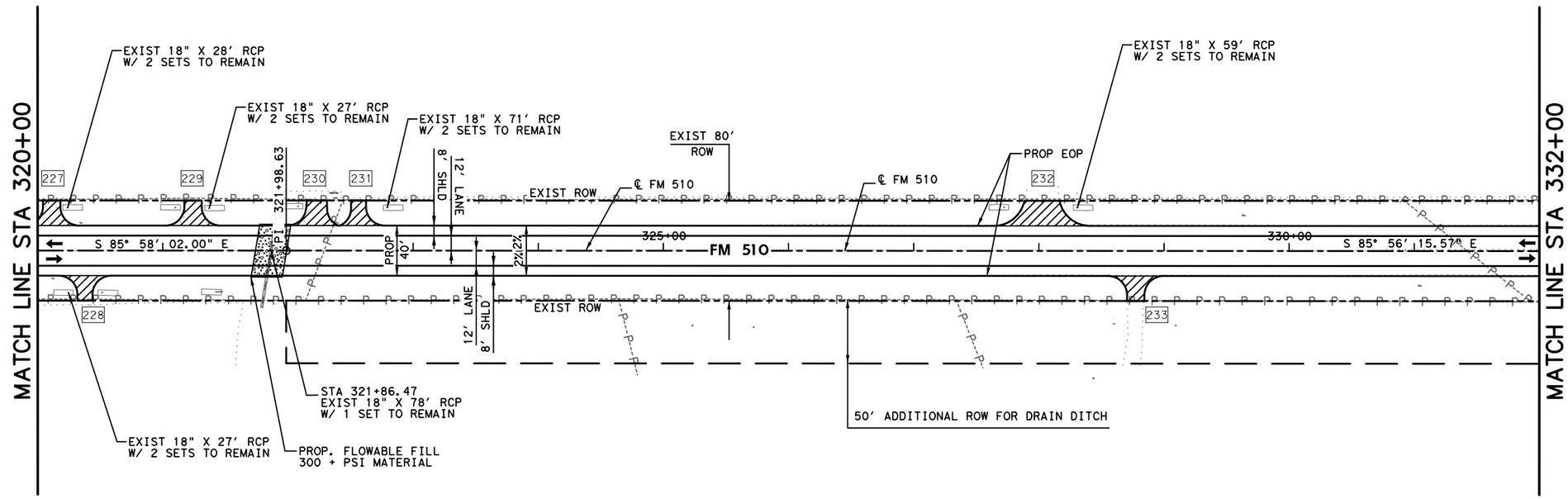
FM 510

PLAN AND PROFILE
STA 308+00 TO STA 320+00

SHEET 27 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	120
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\05 Roadway Details\FM510#P&P#27.dgn
DRAWING DATE: 6/27/2022



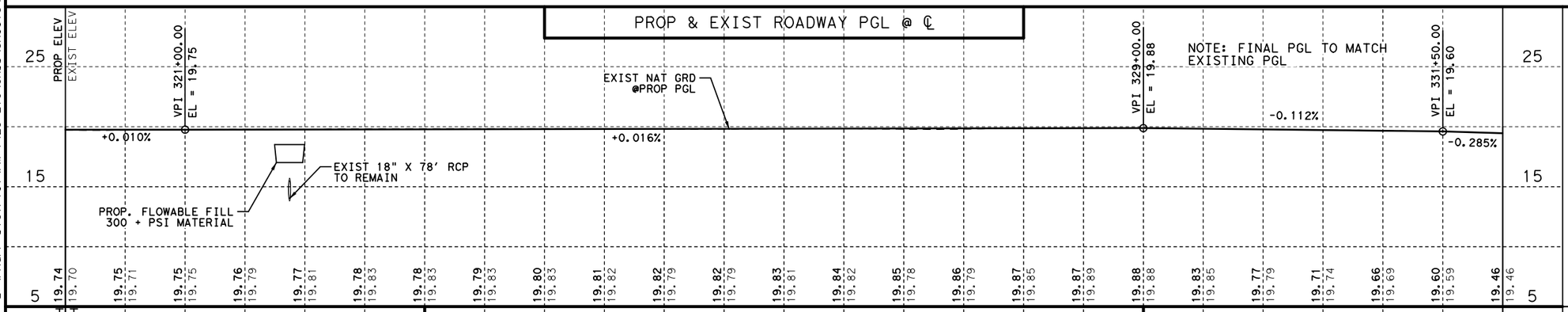
HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY



6/27/2022

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE
STA 320+00 TO STA 332+00

SHEET 28 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	121
CONTROL	SECTION	JOB	
1057	03	045	

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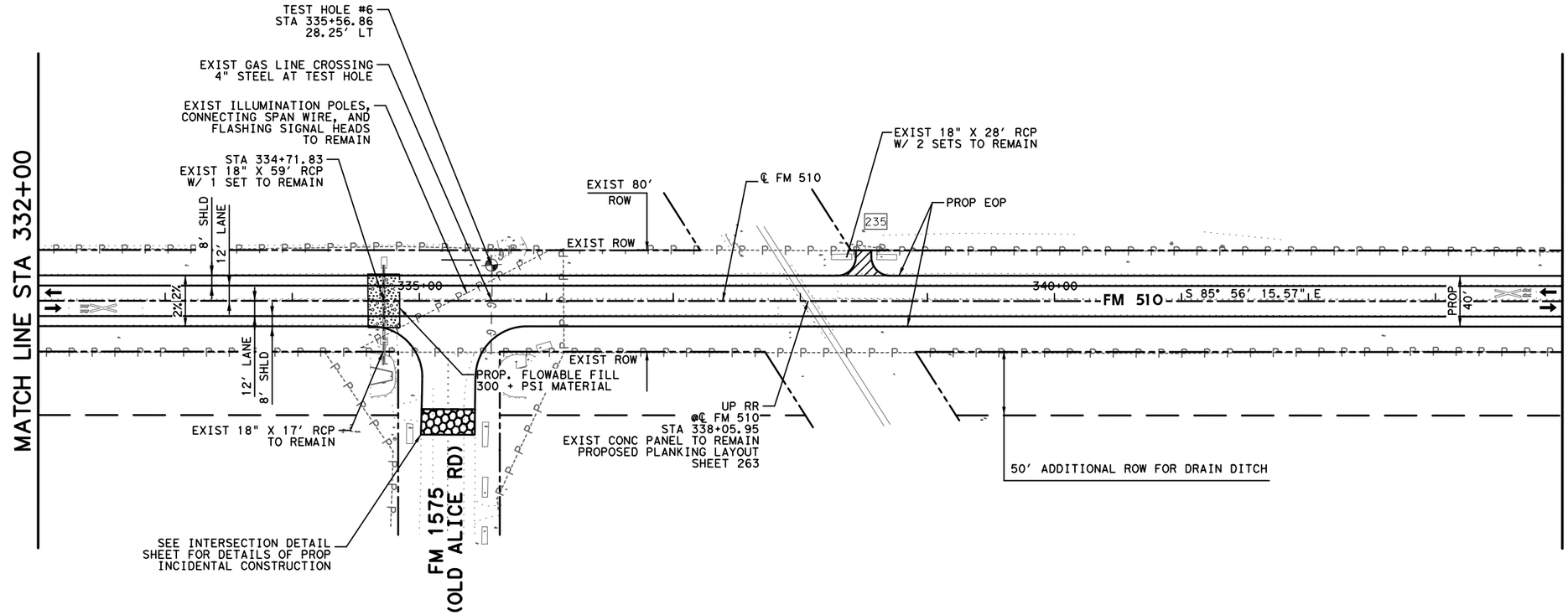
DRAWING DATE: 6/27/2022



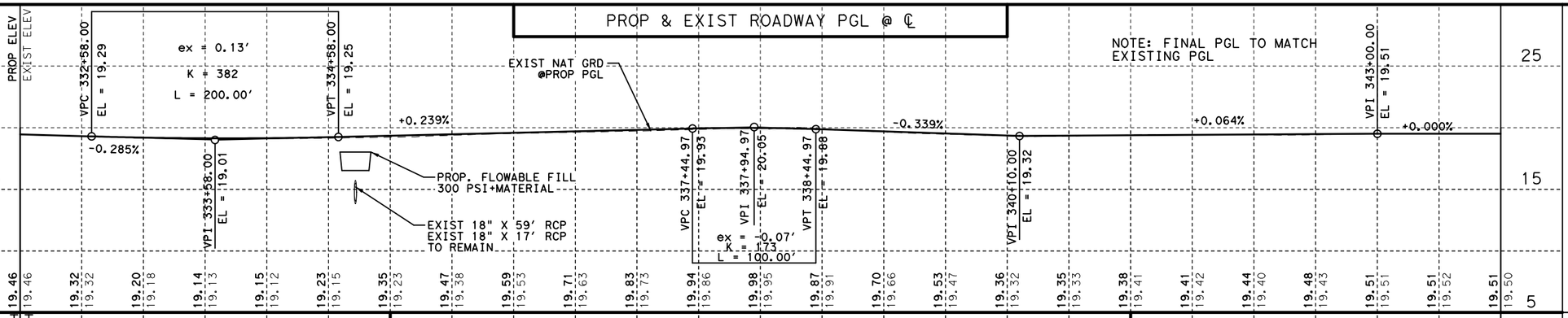
HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

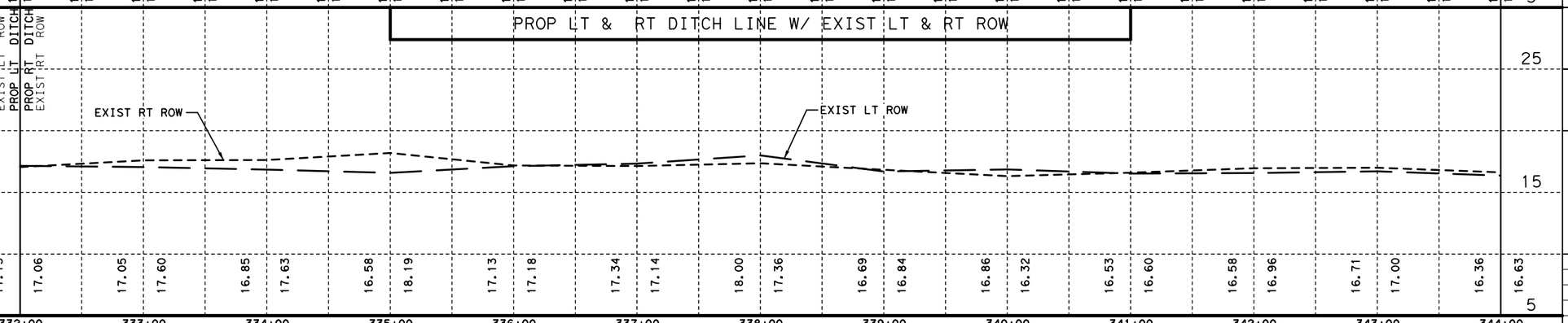
NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY





STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

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7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

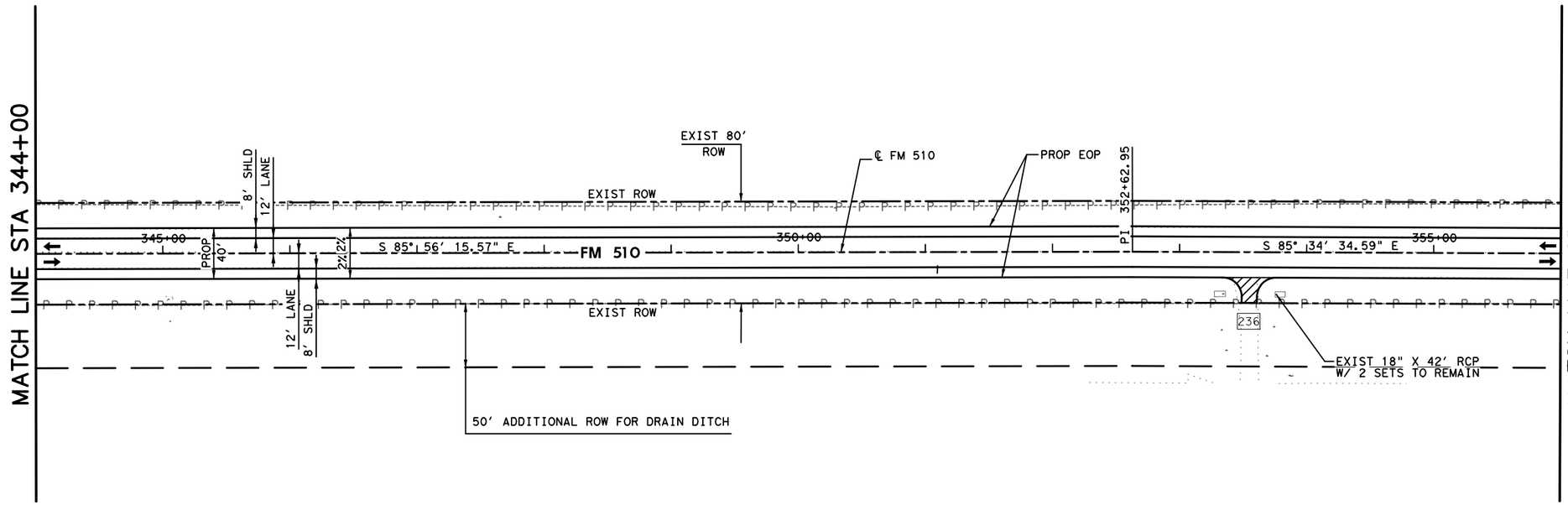
FM 510

PLAN AND PROFILE
STA 332+00 TO STA 344+00

SHEET 29 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	122
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\05 Roadway Details\FM510#P&P#29.dgn
DRAWING DATE: 6/27/2022



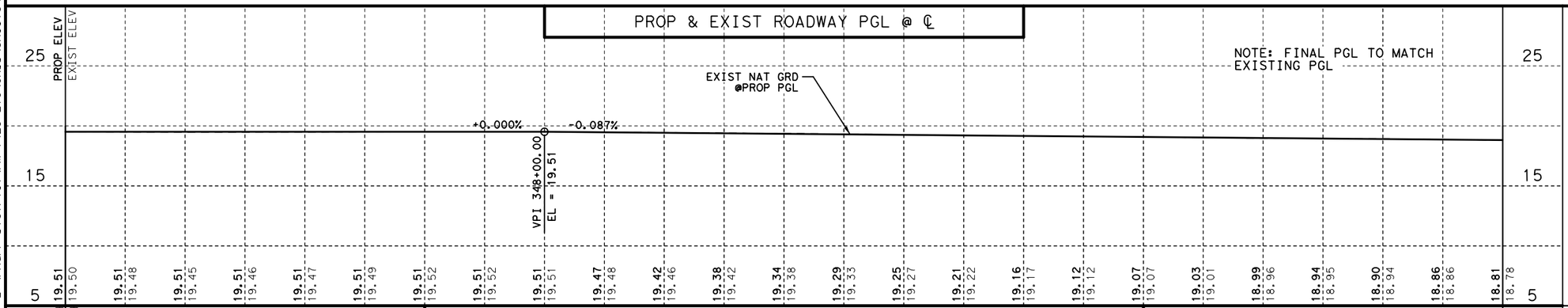
HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY



STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

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7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

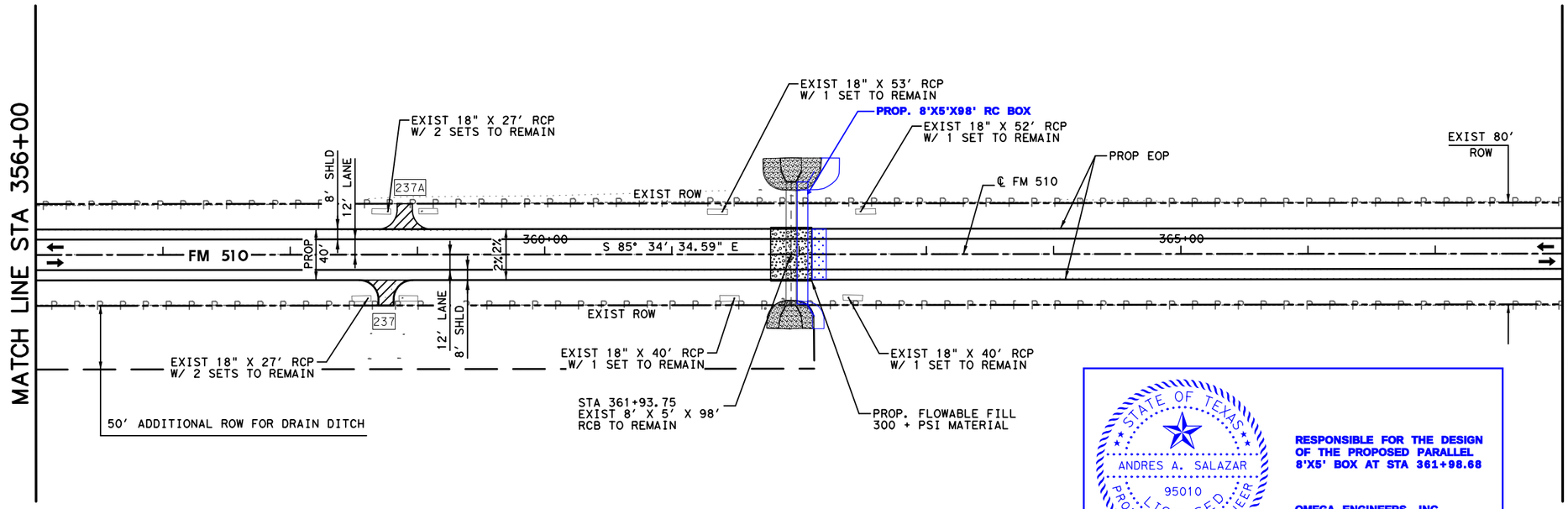
FM 510

PLAN AND PROFILE
STA 344+00 TO STA 356+00

SHEET 30 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	123
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\05 Roadway Details\FM510#P&P#30.dgn
DRAWING DATE: 6/27/2022



HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

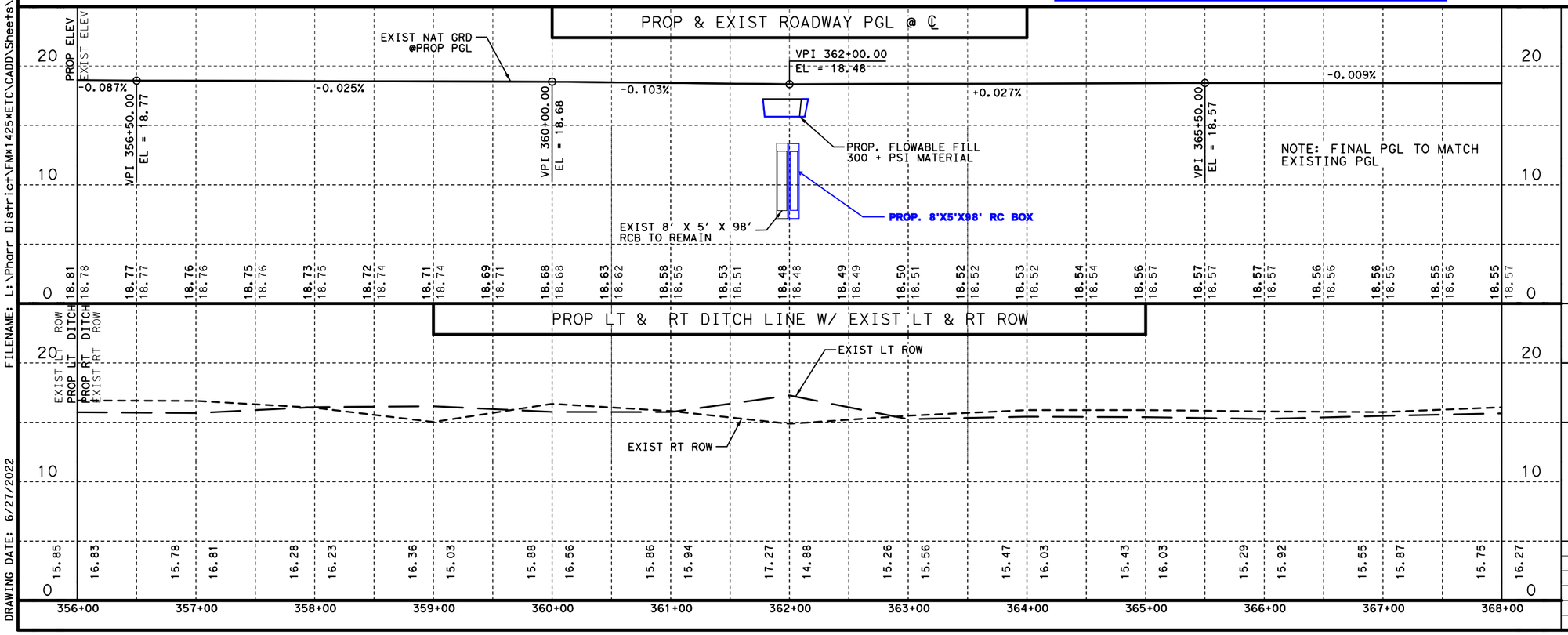
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC) (5 IN)
- PROP ACP DRIVEWAY

STATE OF TEXAS
ANDRES A. SALAZAR
95010
LICENSED
PROFESSIONAL ENGINEER

RESPONSIBLE FOR THE DESIGN OF THE PROPOSED PARALLEL 8'X5' BOX AT STA 361+98.68

OMEGA ENGINEERS, INC.
TBPE REG # F-2147.

05/25/2023



STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE
STA 356+00 TO STA 368+00

SHEET 31 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	124
CONTROL	SECTION	JOB	
1057	03	045	

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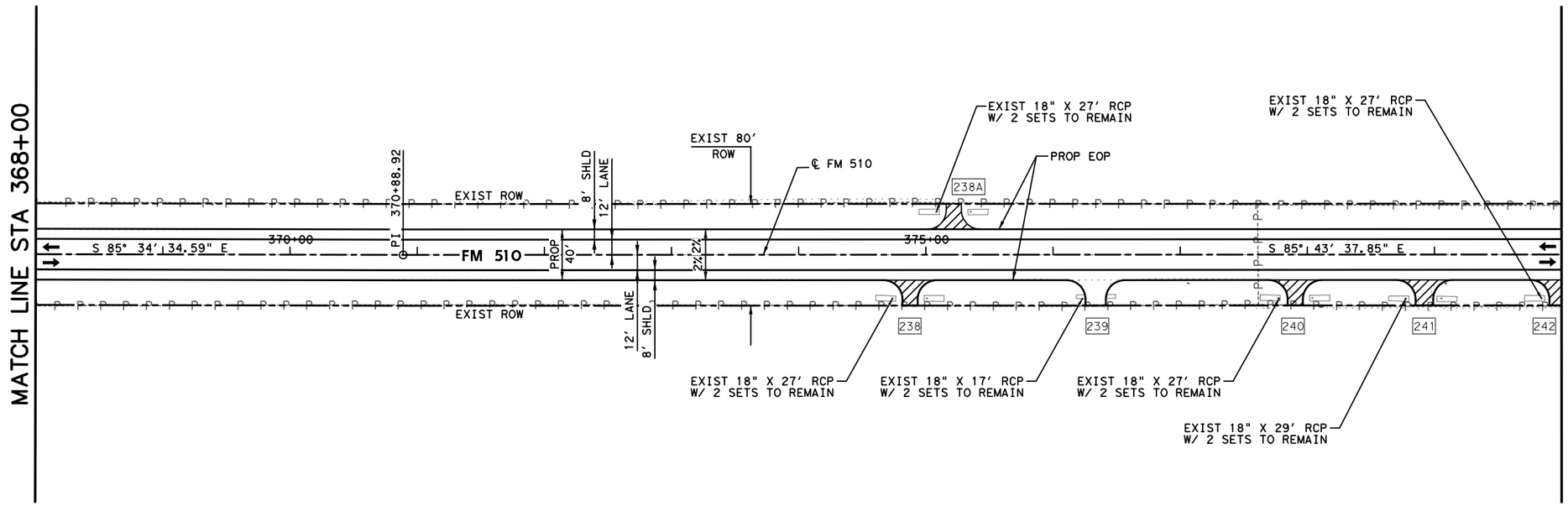
DRAWING DATE: 6/27/2022



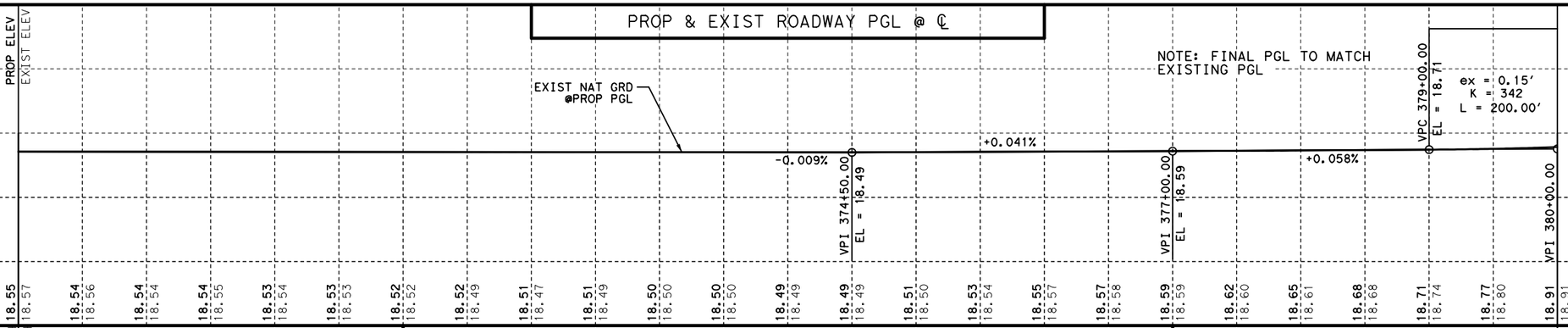
HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY



STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

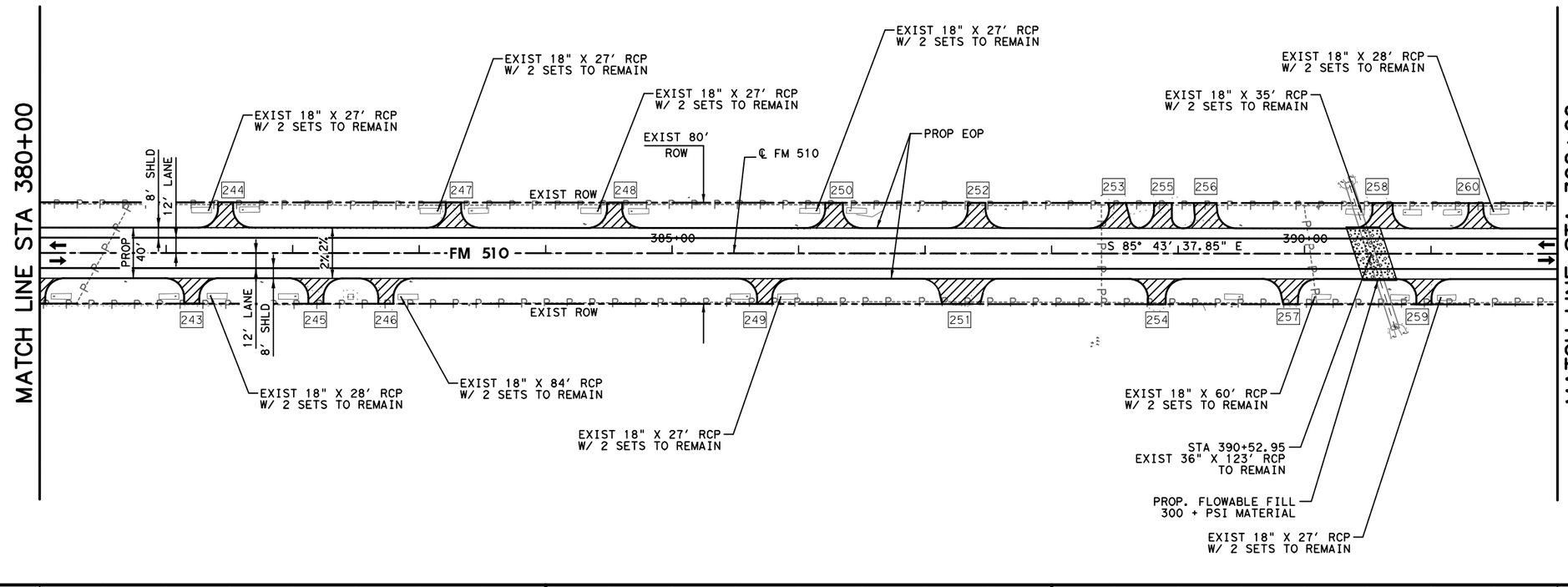
FM 510

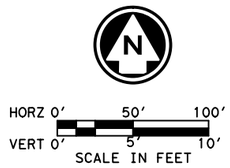
PLAN AND PROFILE STA 368+00 TO STA 380+00

SHEET 32 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	125
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\05 Roadway Details\FM510#P&P#32.dgn
DRAWING DATE: 6/27/2022





NOTES:

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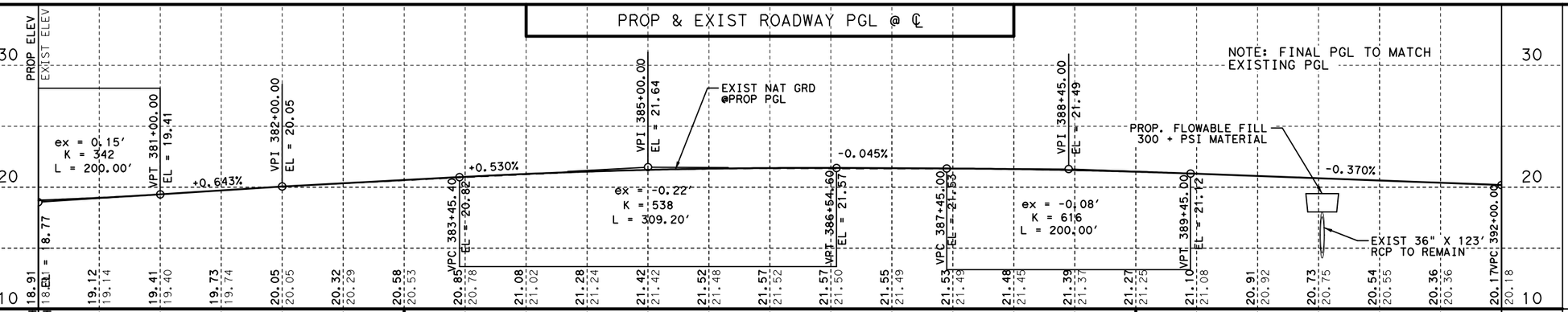
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY



STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE STA 380+00 TO STA 392+00

SHEET 33 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	126
CONTROL	SECTION	JOB	
1057	03	045	

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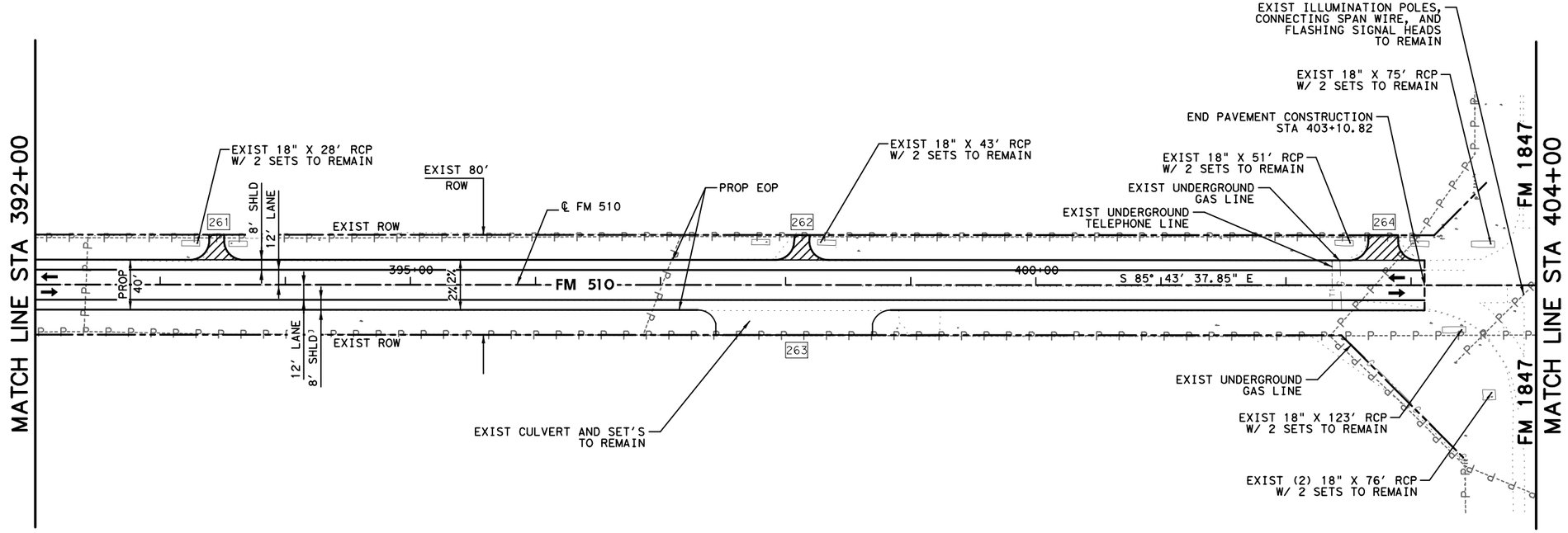
DRAWING DATE: 6/27/2022



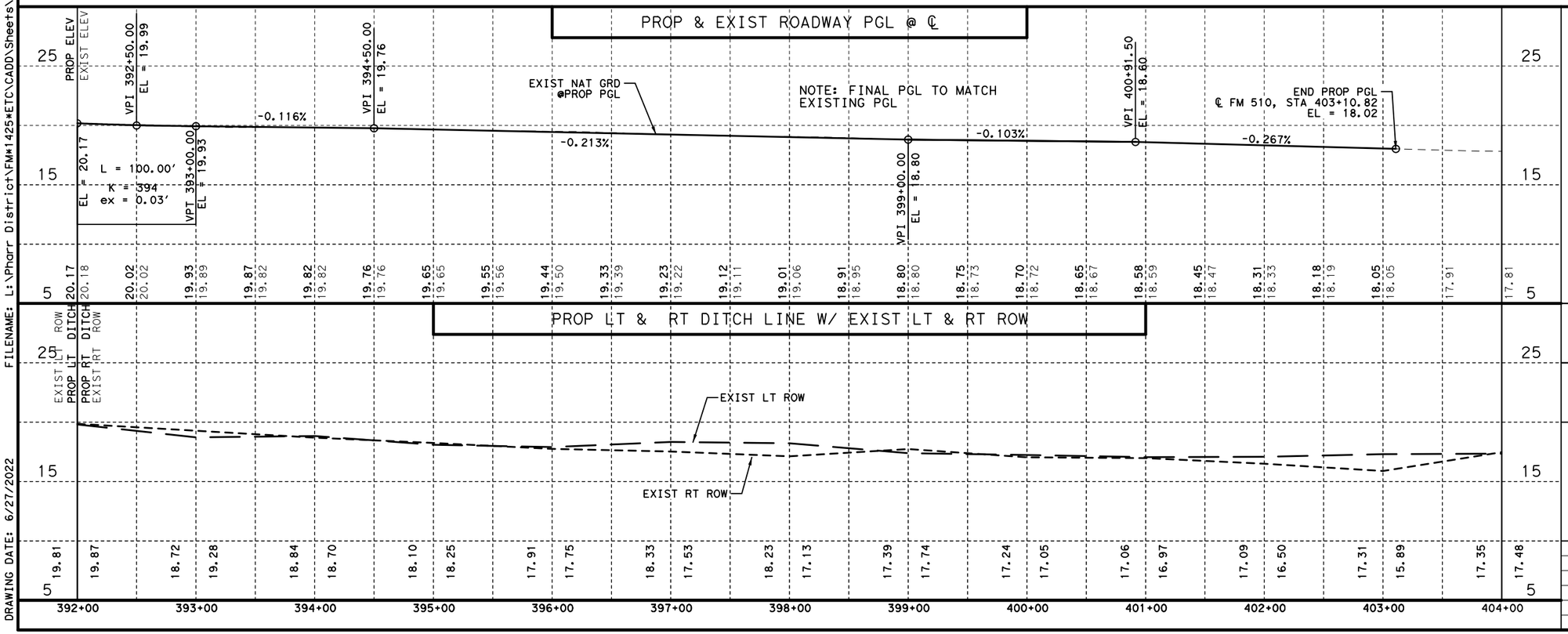
HORZ 0' 50' 100'
VERT 0' 5' 10'
SCALE IN FEET

NOTES:

1. EXISTING ROW LINE IS RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY



I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE
STA 392+00 TO STA 404+00

SHEET 34 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	127
CONTROL	SECTION	JOB	
1057	03	045	

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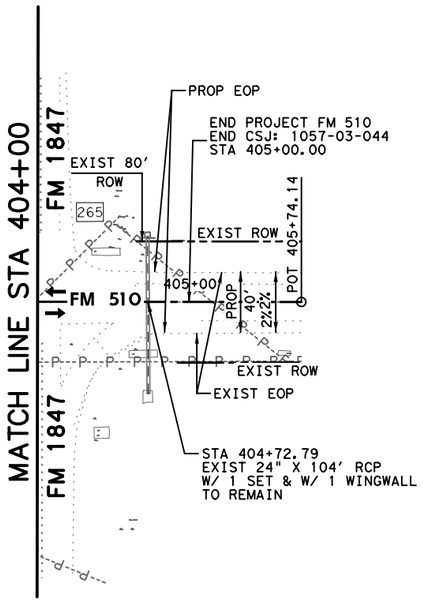
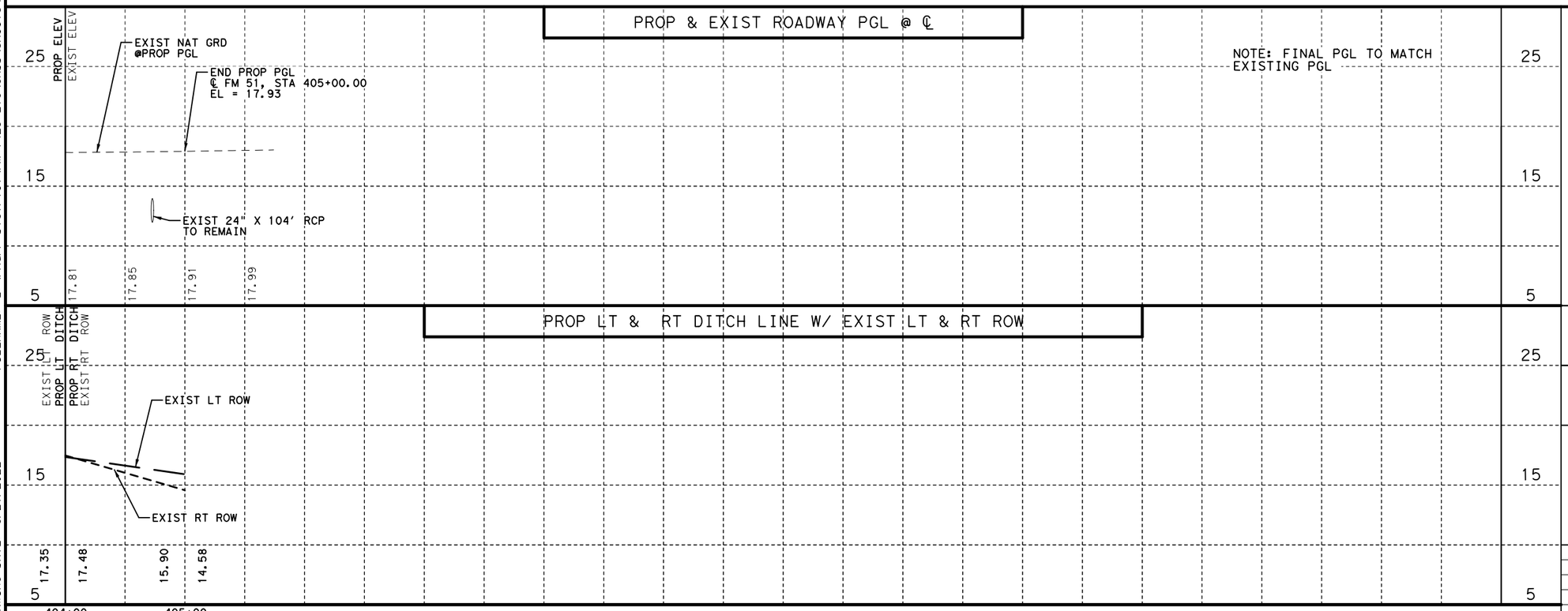
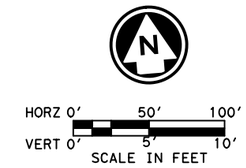
DRAWING DATE: 6/27/2022







NOTES:

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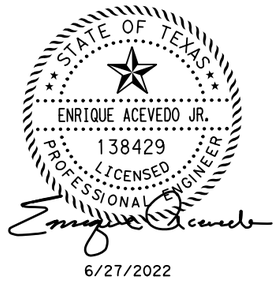
2. CONTRACTOR IS RESPONSIBLE TO LOCATE EXISTING UTILITIES PRIOR TO WORK.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- MAILBOX TURNOUT
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY



I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

PLAN AND PROFILE
STA 404+00 STA 405+74.14

SHEET 35 OF 35

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	128
CONTROL	SECTION	JOB	
1057	03	045	

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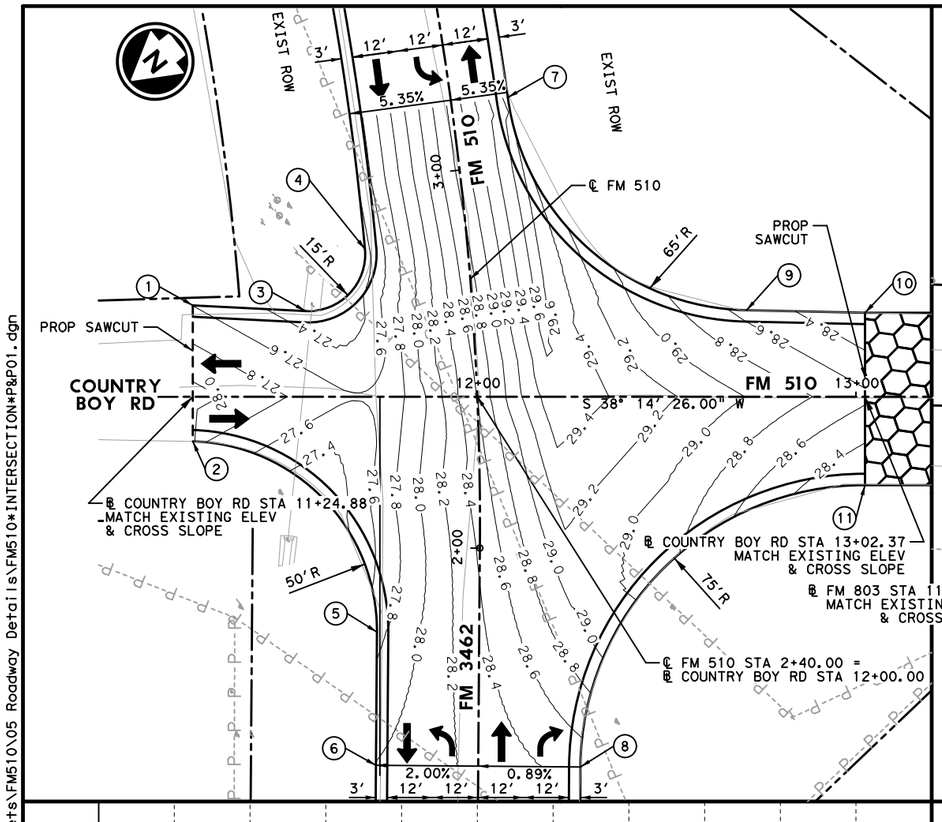

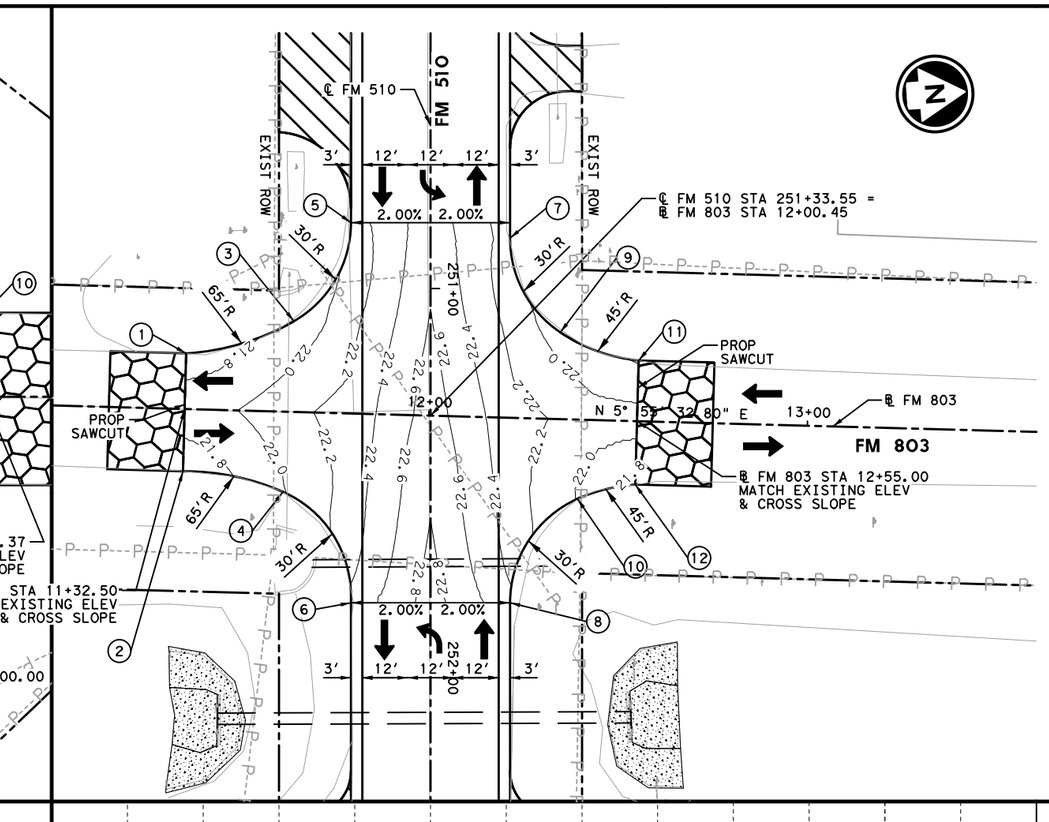

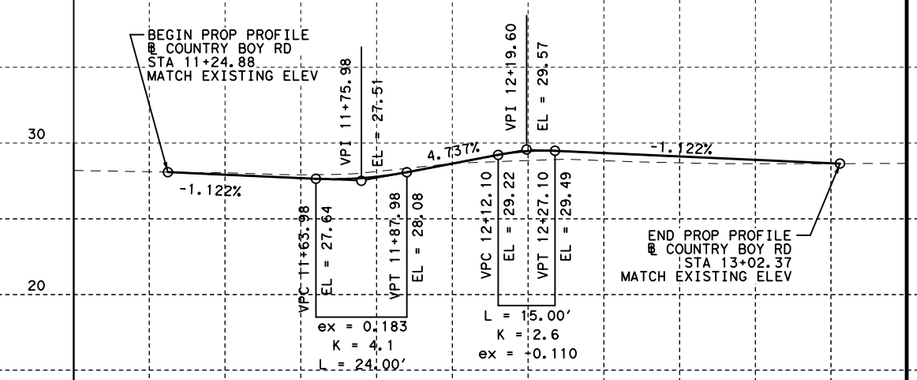

PT ID	STA	OFFSET	EL
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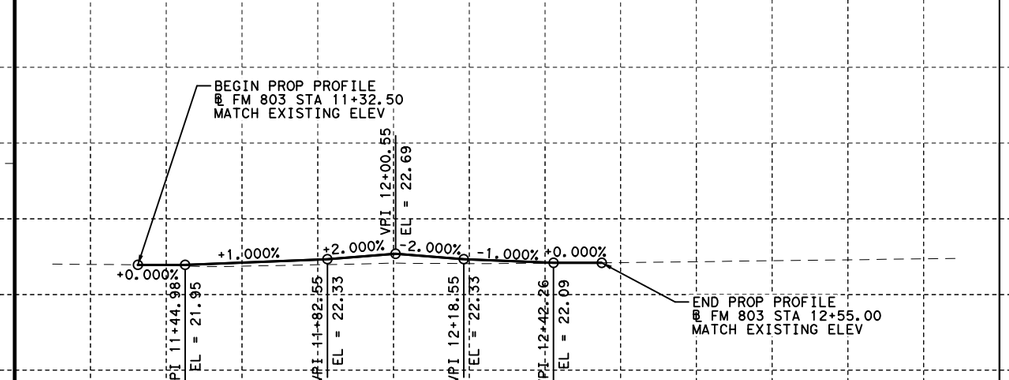
2	11+24.88	11.82' RT	28.08
3	11+54.65	22.61' LT	27.29
4	11+70.35	38.97' LT	27.34
5	11+73.50	62.18' RT	27.75
6	11+73.23	97.35' RT	28.01
7	12+08.04	78.99' LT	29.67
8	12+27.23	97.76' RT	28.49
9	12+71.07	22.80' LT	28.54
10	13+02.37	22.14' LT	28.20
11	13+02.37	23.34' RT	28.18



PT ID	STA	OFFSET	EL
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3	11+63.71	23.95' LT	21.87
4	11+62.06	21.19' RT	21.99
5	11+78.08	50.37' LT	22.10
6	11+80.79	49.95' RT	22.46
7	12+20.17	47.43' LT	22.11
8	12+22.77	48.82' RT	22.46
9	12+34.14	22.88' LT	21.92
10	12+39.83	20.94' RT	21.97
11	12+55.00	16.04' LT	21.77
12	12+55.00	16.74' RT	21.76

0' 10' 20' 40'

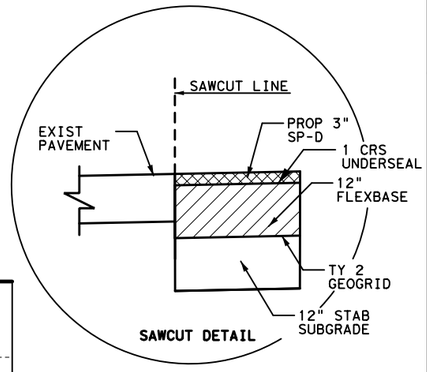
SCALE IN FEET

NOTES:

1. SAWCUT IS SUBSIDIARY TO VARIOUS BID ITEMS.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- DRIVEWAY NUMEBR



STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation
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7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

INTERSECTION PLAN & PROFILE

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	129
CONTROL	SECTION	JOB	
1057	03	045	

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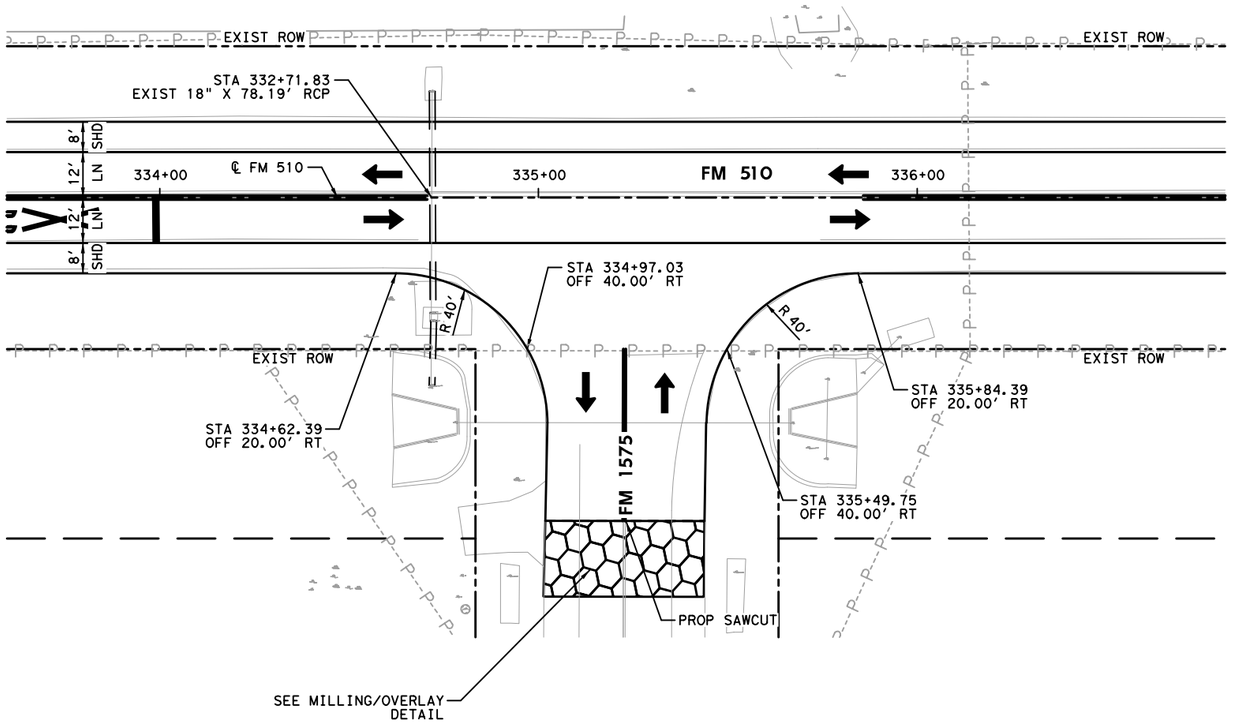
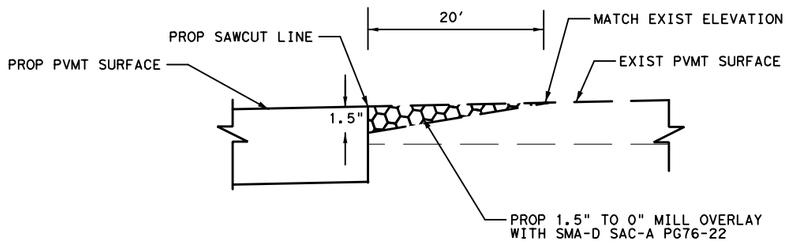
DRAWING DATE: 6/27/2022





MILLING/OVERLAY DETAIL

0' 10' 20' 40'

SCALE IN FEET

NOTES:

1. SAWCUT IS SUBSIDIARY TO VARIOUS BID ITEMS.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

INTERSECTION DETAIL

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	130
CONTROL	SECTION	JOB	
1057	03	045	

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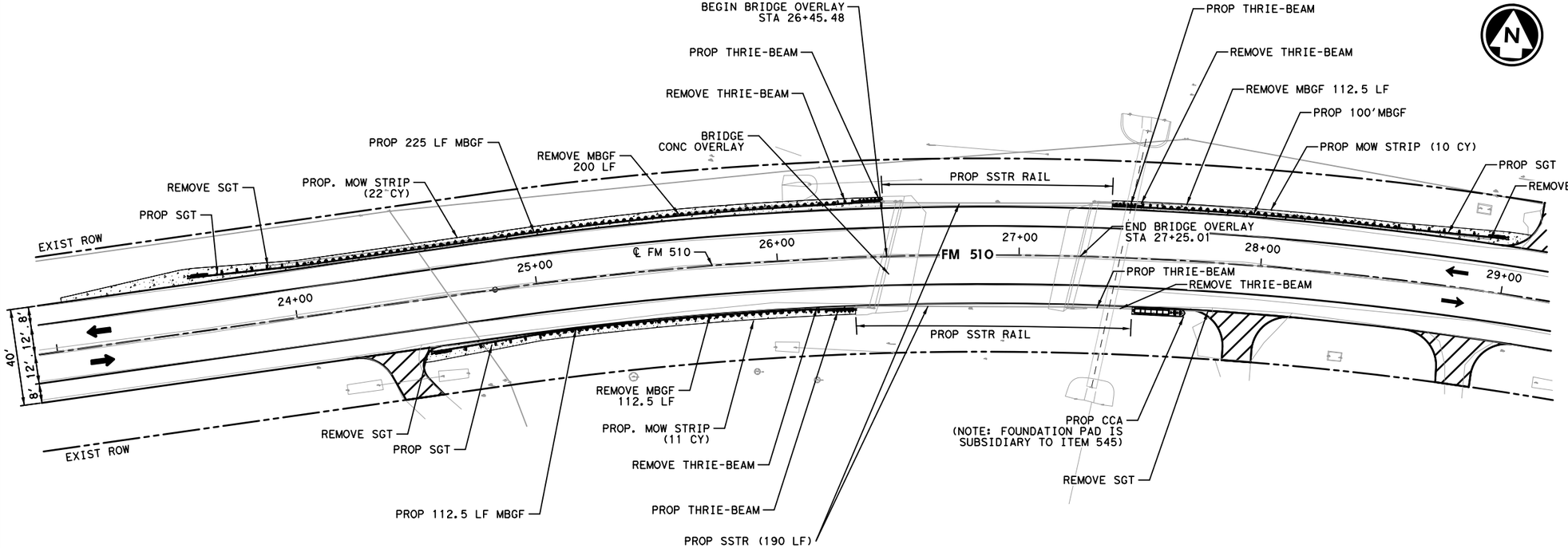
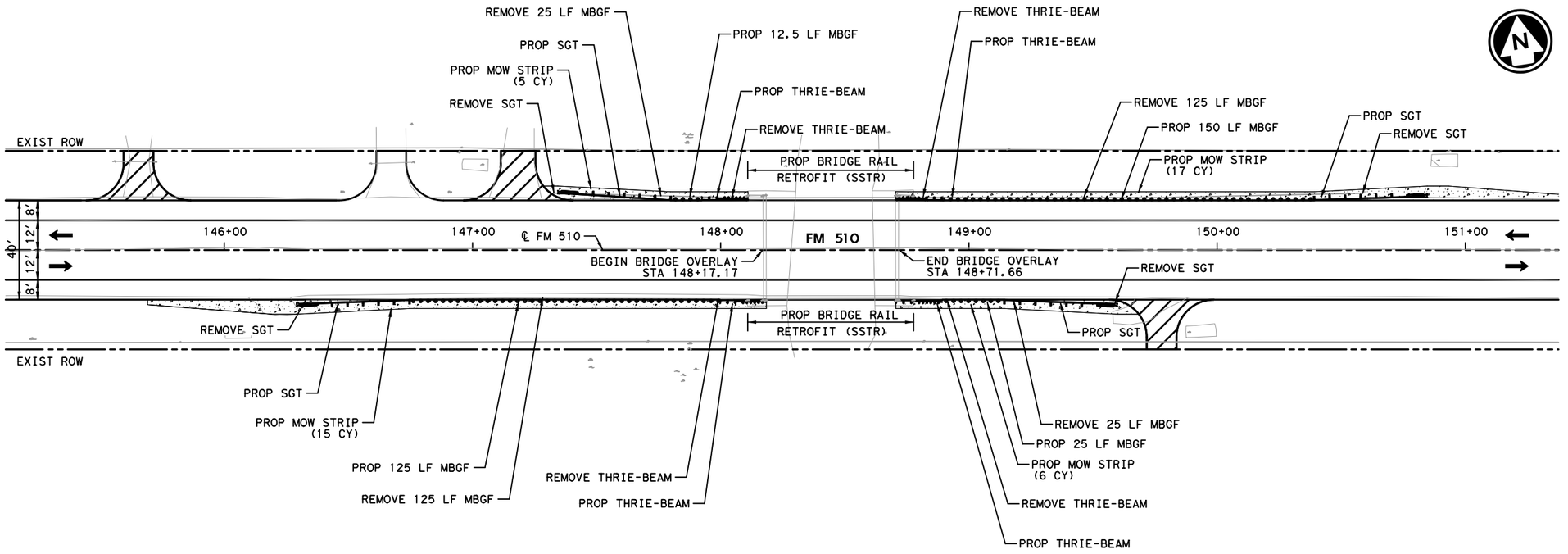
DRAWING DATE: 6/27/2022





HORZ 0' 10' 20'

SCALE IN FEET

NOTES:

1. CONTRACTOR SHALL FIELD VERIFY DIMENSIONS PRIOR TO CONSTRUCTION AND NOTIFY THE ENGINEER IF THERE ARE ANY DISCREPANCIES.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

METAL BEAM GUARD FENCE LAYOUT

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	
CONTROL	SECTION	JOB	131
1057	03	045	

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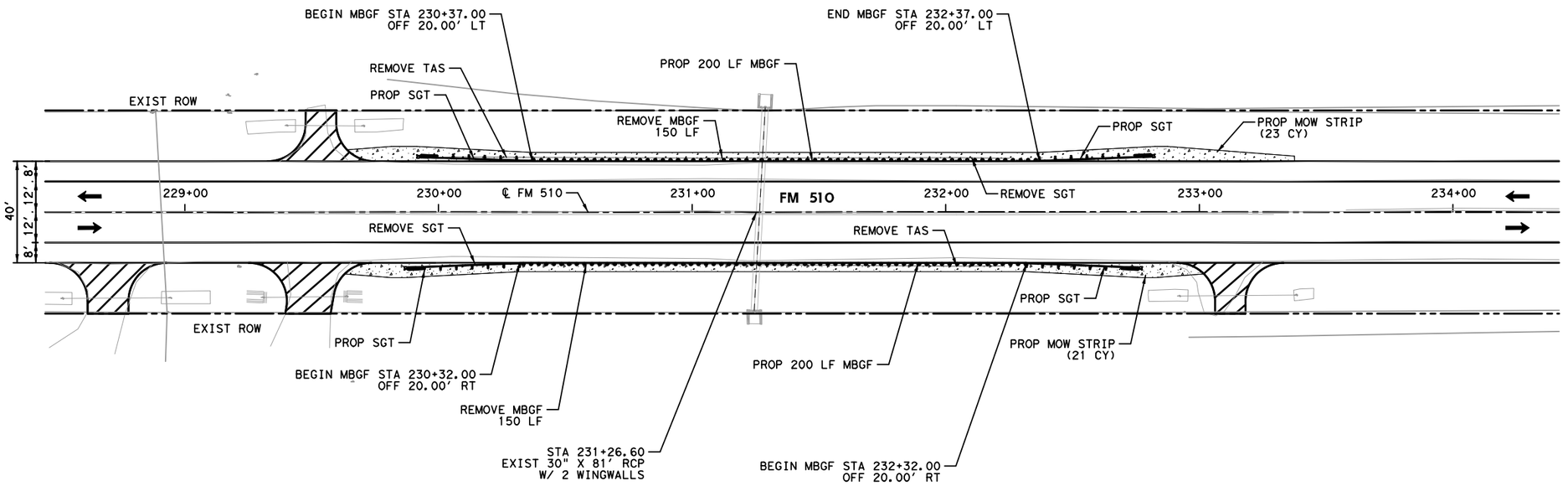
DRAWING DATE: 6/27/2022



NOTE:

CONTRACTOR SHALL NOT REMOVE ANY SEGMENT OF THE EXISTING MBGF WITHOUT REPLACING THAT SEGMENT WITH THE PROPOSED MBGF AND SGT IN THE SAME WORKING DAY. IF NEEDED, TEMPORARY LONGITUDINAL BARRIERS AND END PROTECTION MAY BE INSTALLED PER TXDOT STANDARDS AS APPROVED BY THE AREA ENGINEER. PAYMENT FOR THE TEMPORARY LONGITUDINAL BARRIERS AND END PROTECTION SHALL BE SUBSIDIARY TO VARIOUS BID ITEMS.

N

HORZ 0' 10' 20'

SCALE IN FEET

NOTES:

1. CONTRACTOR SHALL FIELD VERIFY DIMENSIONS PRIOR TO CONSTRUCTION AND NOTIFY THE ENGINEER IF THERE ARE ANY DISCREPANCIES.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE
- UNDERGROUND GAS LINE
- TEST HOLE
- XX DRIVEWAY NUMEBR
- RIPRAP (CONC)(5 IN)
- PROP ACP DRIVEWAY

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

METAL BEAM GUARD FENCE LAYOUT

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	
CONTROL	SECTION	JOB	132
1057	03	045	

DRAWING DATE: 6/27/2022
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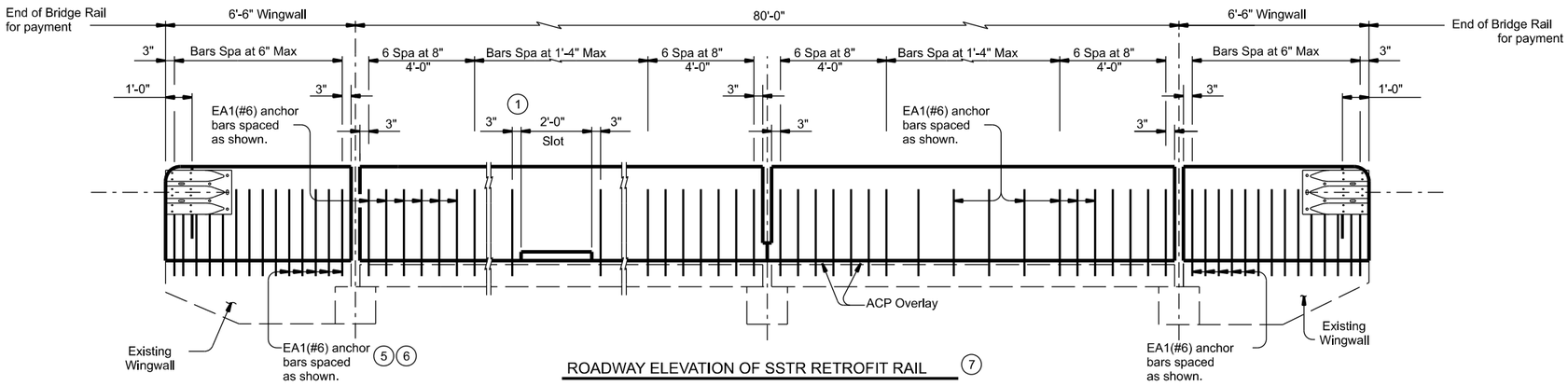
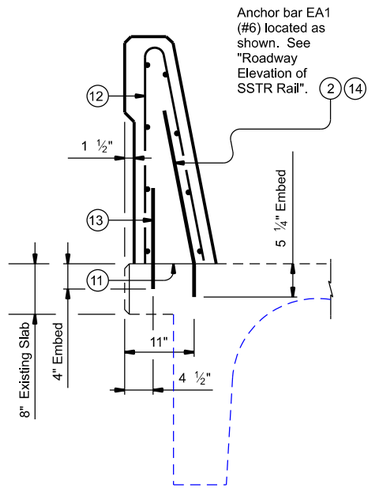
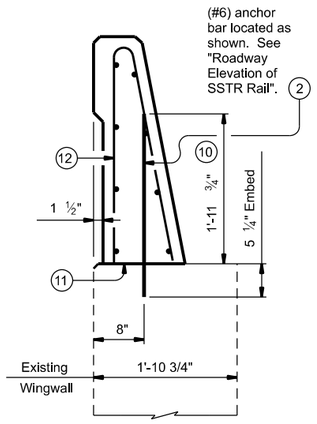


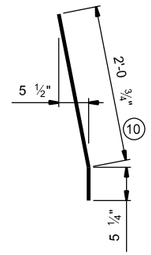
ROADWAY ELEVATION OF SSTR RETROFIT RAIL (7)



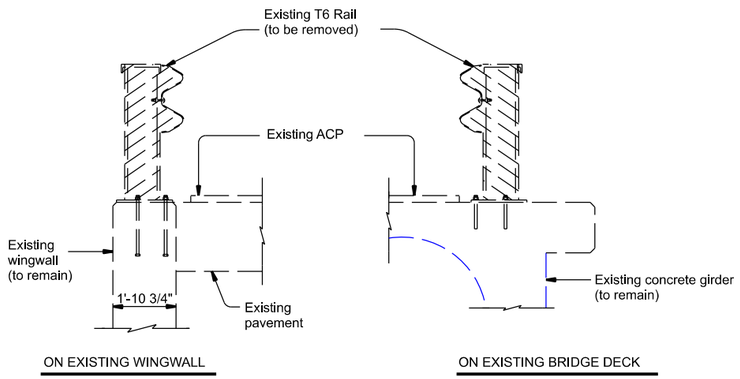
RAIL RETROFITS SECTIONS ON CONCRETE SLABS USING ADHESIVE ANCHORS (9)



RAIL RETROFITS SECTIONS ON WINGWALLS USING ADHESIVE ANCHORS (9)



ANCHOR BAR EA1 (#6)



ON EXISTING WINGWALL

ON EXISTING BRIDGE DECK

PARTIAL TRANSVERSE SECTIONS

(1) When side slot drains are used, provide 8'-0" Min clear spacing between drain slots.

(2) Embed (#6) anchor bars with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 5 ¼". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

(5) See T551 or SSTR Rail Sections in "Rail Retrofit Section on Wingwalls using Adhesive Anchors" and/or "Rail Retrofit Section on Concrete Slabs using Adhesive Anchors".

(6) See T552 Rail Sections in "Rail Retrofit Section on Wingwalls using Adhesive Anchors" and/or "Rail Retrofit Section on Concrete Slabs using Adhesive Anchors".

(7) Showing spacing of (#6) adhesive anchor in a rail retrofit condition. Secondary (#4) adhesive anchor in a rail retrofit not shown for clarity. Reinforcing steel and terminal connections not shown for clarity. See rail standard for details and notes not shown.

(8) Place side slot drains as shown. See appropriate rail standard for side slot drains, except as noted.

(9) Showing location or locations of anchor bars in a rail retrofit condition. See appropriate rail standard for details and notes not shown.

(10) Increase by amount of existing overlay/seal coat thickness, not to exceed 2". If thickness of existing overlay/seal coat is greater than 2" at toe of rail, taper overlay at a 1:10 or flatter slope over shoulder width to a thickness of 2" or less at toe of rail.

(11) Do not cast rails or parapet walls on top of overlays/seal coats.

(12) See appropriate rail standard for reinforcing steel. Modify length of vertical reinforcing bars as required to fit existing structure. Longitudinal reinforcing bars may be removed only if their position puts them in conflict with un-removed portions of existing structure.

(13) Embed secondary (#4) anchor bars 1'-4" in length with a Type III Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 10 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing". (#4) anchor bars spaced longitudinally along rail at 4 ft Max (Spaced 3" longitudinally from outside edge and edge of side slot drains).

(14) (#6) anchor bars need to be rotated slightly to fit in designated area, as shown.

GENERAL NOTES:

Field verify dimensions before any work starts or ordering of materials.

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer. Install railing end face openings perpendicular to adjacent roadway grade.

By adding additional anchorage, welding can be performed at a minimum spacing of 3 ft between the cage and additional anchorage. By satisfying additional anchorage requirements slip forming is allowed. Do not weld to the required anchorage.

Test epoxy anchorage system in accordance with Item 450.3.3, Tests. Test one additional bar every 40' of railing during production. Perform corrective measures to provide adequate capacity in any of the tests do not meet the required test load. Repair damage from testing.

Align and attach traffic face of GF(31)TR-14 and SSTR rail retrofit.

Repair and replace any removed or damaged ACP overlay from rail retrofit and Quadguard concrete pad.

Provide Grade 60 reinforcing steel.

(#6) and (#4) anchor bars used for the epoxied anchorage system must not be epoxy coated within the required embedment.

Galvanize Bars RD(#8)

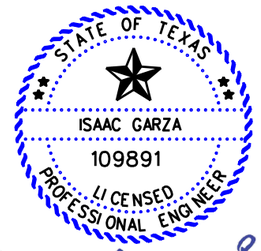
Provide Class "S" concrete for quadguard concrete pad and approach slab. Provide Class "C" concrete for rail. Chamfer all exposed corners. Provide Grade 60 reinforcing steel. Provide 1 1/4" PCV pipe Sch 80. Provide 3/4" minimum width, open, rail parapet joints at all deck joints and at ends of bridge. Make joint opening end faces perpendicular to adjacent roadway grade.

Use of these retrofit details will result in a railing acceptable for Test Level 3 regardless of the higher ratings that may be indicated on the rail standard.

New SSTR(MOD) Railing will be in accordance with and paid for under Item 451 Retrofit Railing (Ty SSTR). All parts of the railing, including removal of overlay, cleaning existing deck, breakbacks, installation and testing of anchors, and installation of new reinforced concrete are included in the price bid per linear foot of rail. Capture and properly dispose of all material removed from bridge, including abrasives, overlay, saw cuttings, and other foreign material. This work will not be paid for directly but is considered subsidiary to the bid item.

MBGF Terminal Connectors, bolts, nuts, washers and installation are subsidiary to the MBGF Transition.

Payment for Quadguard concrete pad, removal of existing rail at Quadguard location, and breaking back of existing concrete is subsidiary to Item 545



Isaac Garza, P.E.

1/21/2022

SHEET 1 OF 1

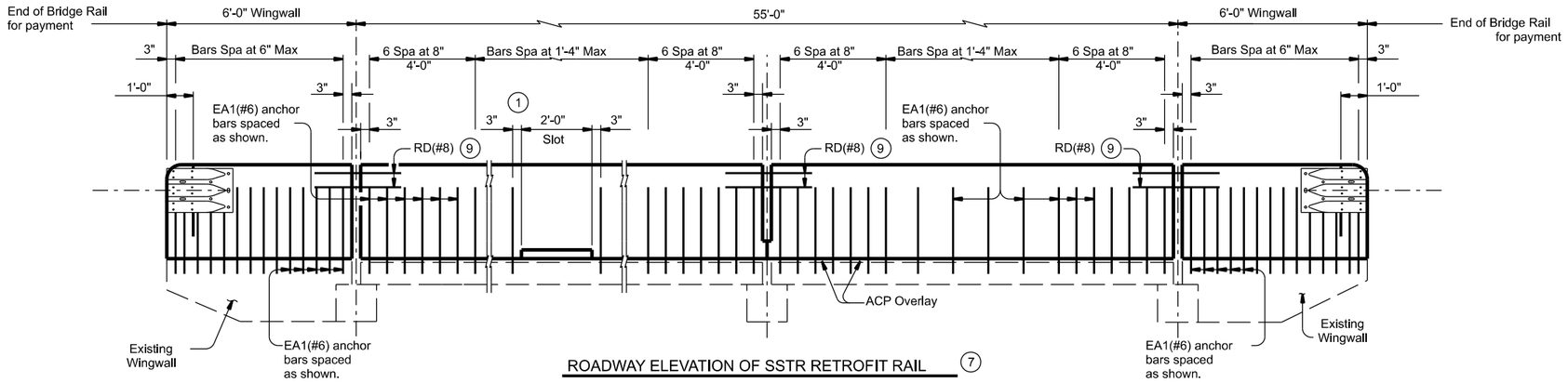
Texas Department of Transportation

Bridge Division Standard

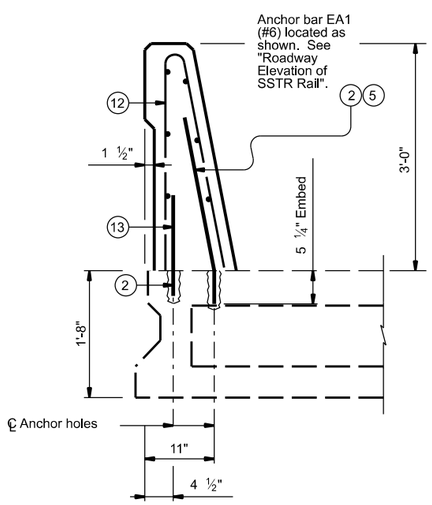
FM 510
SSTR RAIL RETROFIT OVER DRAIN CROSSING
4.2 MI W OF FM 803
NBI 21-031-1057-03-022

FILE: rlstd022-20.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 07-20: Text change from epoxy to adhesive and changed MASH Test Level note.				
	DIST	COUNTY		SHEET NO.
				133

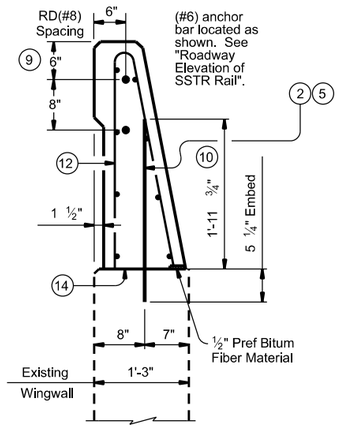
DATE:
FILE:



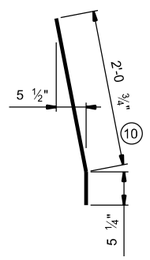
ROADWAY ELEVATION OF SSTR RETROFIT RAIL (7)



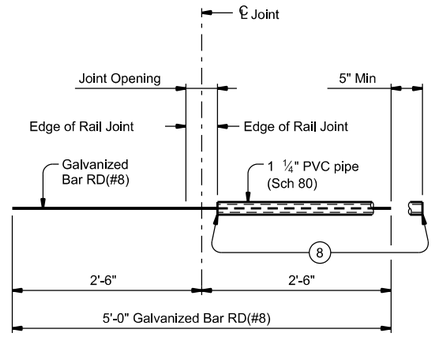
SSTR RAIL over BOX BEAM



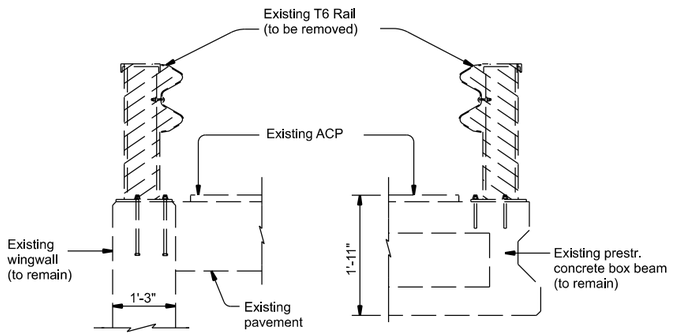
ON ABUTMENT NO. 1 & NO. 3 WINGWALL



ANCHOR BAR EA1 (#6)



BAR RD(#8) ASSEMBLY DETAIL



ON EXISTING WINGWALL

ON EXISTING BRIDGE DECK

PARTIAL TRANSVERSE SECTIONS

(1) When side slot drains are used, provide 8'-0" Min clear spacing between drain slots.

(2) Use drill equiped with depth gauge stop device to keep from drilling through bottom of beam top flange. If hole extends to bottom of beam top flange, plug bottom of hole prior to placing epoxy anchor system. Do not drill substitue hole next to drilled through hole. Embed EA1(#6) anchor bars 5¼" with Hilti HIT RE500 epoxy adhesive. Other Type III Class C, D, E, or F 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 RE500 with the same embedment depth and anchor bar size and spacing. Follow Manufacturer's directions for installing the epoxied anchor bars.

(5) See SSTR Rail Sections in "Retrofit Rail Section on Wingwalls using Epoxy Anchor Bars" and/or "Retrofit Rail Section on Concrete Slabs using Epoxy Anchor Bars".

(7) Showing spacing of (#6) anchor bar epoxy anchored in a retrofitted rail condition. Secondary (#4) anchor bar epoxy anchored in retrofitted rail not shown for clarity. Reinforcing steel and terminal connections not shown for clarity. See appropriate rail standard for details and notes not shown.

(8) Tape ends of 1¼" PVC pipe Sch 80 to prevent concrete or mortar from seeping in.

(9) Omit bars RD(#8) at interface between Quadguard and SSTR Rail Retrofit. 2 Bars RD(#8) placed as shown at each joint. Center RD(#8) bar at joint locations with 1 1/4" PVC pipe Sch 80 sleeve on one side of joint.

(10) Increase by amount of existing overlay/seal coat thickness, not to exceed 2". If thickness of existing overlay/seal coat is greater than 2" at toe of rail, taper overlay at a 1:10 or flatter slope over shoulder width to a thickness of 2" or less at toe of rail.

(12) See appropriate rail standard for reinforcing steel. Modify length of vertical reinforcing bars as required to fit existing structure. Longitudinal reinforcing bars may be removed only if their position puts them in conflict with un-removed portions of existing structure.

(13) Secondary (#4) anchor bars 1'-4" in length are embedded 4" with a Type III Class C, D, E, or F epoxy anchorage system. Follow Manufacturer's directions for installing the epoxied anchor bars. (#4) anchor bars spaced longitudinally along rail at 4 ft Max (Spaced 3" longitudinally from outside edge and edge of side slot drains).

(14) Do not cast rail retrofit on top of overlays/seal coats.

GENERAL NOTES:

Field verify dimensions before any work starts or ordering of materials.

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer. Install railing end face openings perpendicular to adjacent roadway grade.

By adding additional anchorage, welding can be performed at a minimum spacing of 3 ft between the cage and additional anchorage. By satisfying additional anchorage requirements slip forming is allowed. Do not weld to the required anchorage.

Test epoxy anchorage system in accordance with Item 450.3.3, Tests. Test one additional bar every 40' of railing during production. Perform corrective measures to provide adequate capacity in any of the tests do not meet the required test load. Repair damage from testing.

Align and attach traffic face of GF(31)TR-14 and SSTR rail retrofit.

Repair and replace any removed or damaged ACP overlay from rail retrofit and Quadguard concrete pad.

Provide Grade 60 reinforcing steel.

(#6) and (#4) anchor bars used for the epoxied anchorage system must not be epoxy coated within the required embedment.

Galvanize Bars RD(#8)

Provide Class "S" concrete for quadguard concrete pad and approach slab

Provide Class "C" concrete for rail. Chamfer all exposed corners.

Provide Grade 60 reinforcing steel.

Provide 1 1/4" PCV pipe Sch 80.

Provide 3/4" minimum width, open, rail parapet joints at all deck joints and at ends of bridge. Make joint opening end faces perpendicular to adjacent roadway grade.

Use of these retrofit details will result in a railing acceptable for Test Level 3 regardless of the higher ratings that may be indicated on the rail standard.

New SSTR(MOD) Railing will be in accordance with and paid for under Item 451 Retrofit Railing (Ty SSTR). All parts of the railing, including removal of overlay, cleaning existing deck, breakbacks, installation and testing of anchors, and installation of new reinforced concrete are included in the price bid per linear foot of rail. Capture and properly dispose of all material removed from bridge, including abrasives, overlay, saw cuttings, and other foreign material. This work will not be paid for directly but is considered subsidiary to the bid item.

MBGF Terminal Connectors, bolts, nuts, washers and installation are subsidiary to the MBGF Transition.

Payment for Quadguard concrete pad, removal of existing rail at Quadguard location, and breaking back of existing concrete is subsidiary to Item 545

STATE OF TEXAS
ISAAC GARZA
109891
LICENSED PROFESSIONAL ENGINEER

Isaac Garza, P.E.

1/21/2022

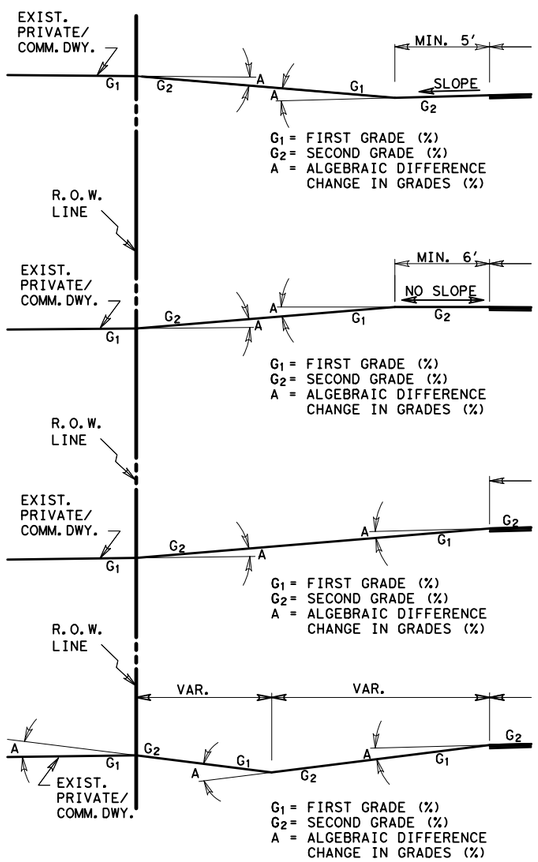
Sheet 1 of 1

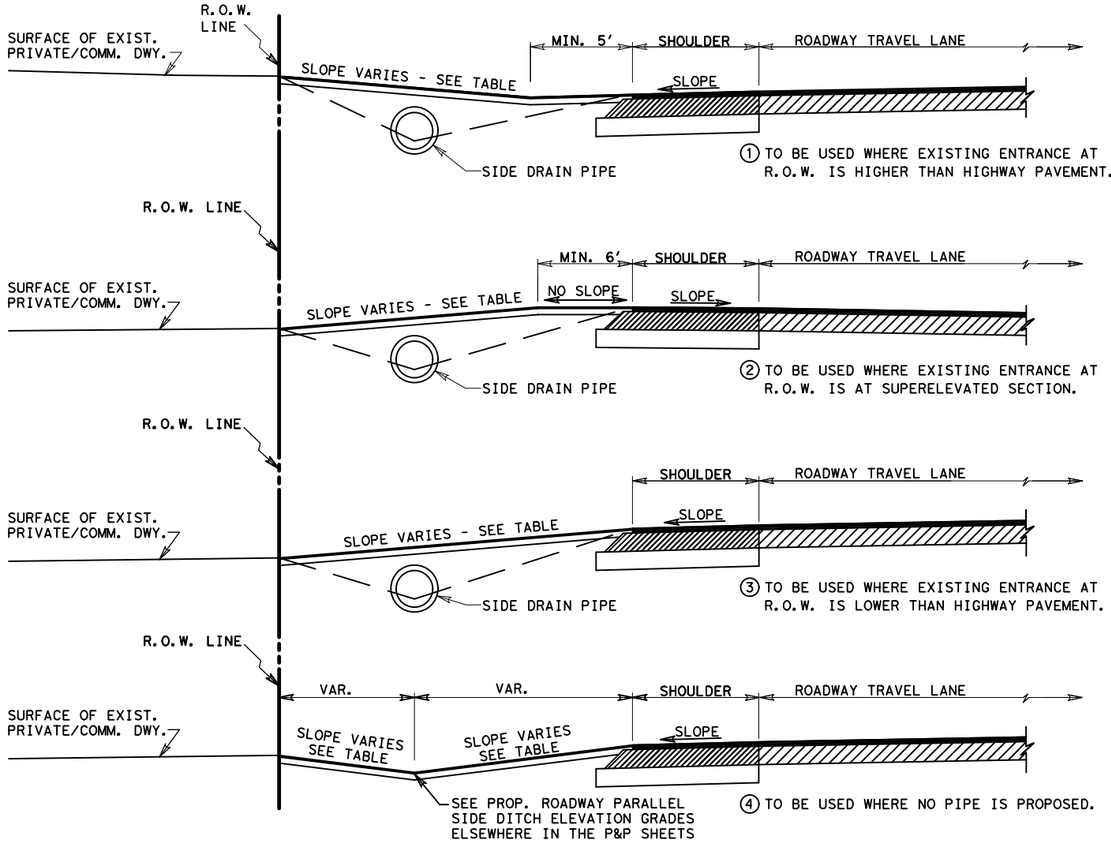
Texas Department of Transportation

Bridge Division Standard

FM 510
SSTR RAIL RETROFIT OVER DRAIN CROSSING
1.90 MI W OF FM 803
NBI 21-031-1057-03-023

FILE: rlstd022-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
				134





NOTES:

ALL ENTRANCES CONSTRUCTED ON THIS PROJECT ARE SUBJECT TO CONCURRENCE WITH EXISTING GOVERNING REGULATIONS AS SET OUT BY THE STATE - TEXAS TRANSPORTATION COMMISSION.

ENTRANCE'S BASE AND SURFACING MAY BE EXTENDED BEYOND R.O.W. LINE AS REQUIRED TO MEET EXISTING DRIVEWAY GRADE IN A SATISFACTORY MANNER OF WHICH NO STEEPER THAN 12:1 FOR COMMERCIAL DRIVEWAY AND 8:1 FOR RESIDENTIAL DRIVEWAY SLOPE WILL BE CONSTRUCTED.

ALL FLEXIBLE BASE USED FOR PRIVATE DRIVES & COMMERCIAL DRIVES WILL NOT REQUIRE LIME TREATMENT.

EXACT LOCATIONS, DIMENSIONS, AND TYPE TO BE ESTABLISHED DURING CONSTRUCTION BY THE ENGINEER.

PROP. WIDTH OF DRIVEWAYS TO MATCH EXISTING WIDTH AT R.O.W. LINE.

114 #/SY ACP (COMPACTED) IS EQUAL TO 1 IN. DEPTH,
171 #/SY ACP (COMPACTED) IS EQUAL TO 1½ IN. DEPTH.

SIDE DRAIN PIPES TO BE INSTALLED WHERE ROADWAY DITCH DRAINAGE IS NECESSARY, AS INDICATED ON PLANS AND/OR AS DIRECTED BY THE ENGINEER.

SIDE DRAIN PIPES TO BE INSTALLED WITH A MINIMUM OF 12" COVER WITH PROPOSED RESIDENTIAL & COMMERCIAL DRIVEWAY MATERIAL OR 15" COVER WITH PROPOSED COUNTY ROAD & CITY STREET ROADWAY MATERIAL.

AVERAGE DRIVEWAY DIMENSIONS SHOWN ON TABLE OF DRIVEWAYS (ELSEWHERE IN PLANS) ARE FOR ESTIMATING PURPOSES ONLY. ACTUAL DRIVEWAY DIMENSIONS MAY BE CHANGED BY THE ENGINEER BASED ON EXISTING FIELD CONDITIONS.

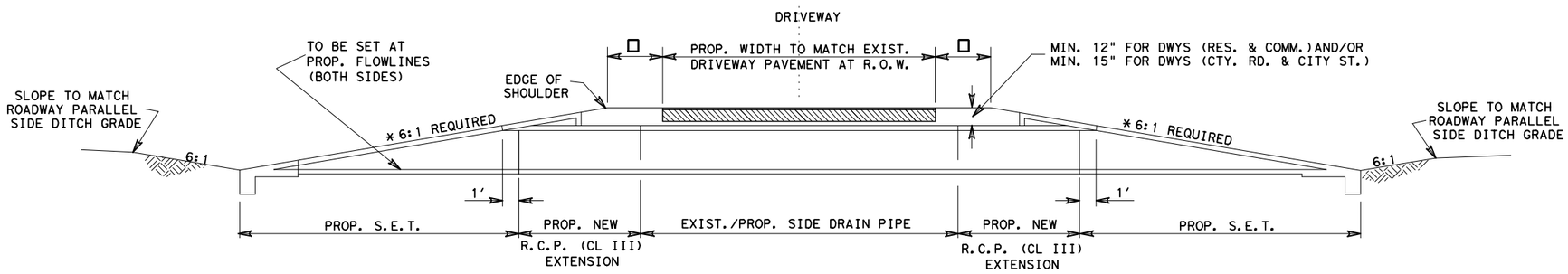
THE RATE OF PRIME COAT SHALL BE 0.10 GAL/SY FOR PRIVATE AND/OR COMMERCIAL DRIVEWAYS AND 0.20 GAL/SY FOR PUBLIC DRIVEWAYS (COUNTY ROADS AND/OR CITY STREETS).

TYPICALLY A CHANGE IN GRADE OF THREE PERCENT (3%) OR LESS AND A DISTANCE BETWEEN CHANGES IN GRADE OF AT LEAST ELEVEN FEET (11') ACCOMMODATES MOST VEHICLES. HOWEVER, LITERATURE SUGGESTS THAT A SIX PERCENT (6%) TO EIGHT PERCENT (8%) CHANGE IN GRADE MAY OPERATE EFFECTIVELY. INDIVIDUAL SITE CONDITIONS SHOULD BE EVALUATED TO ACCOMMODATE THE VEHICLE FLEET USING THE DRIVEWAY.

TYPICAL ENTRANCE PROFILE FOR DRIVEWAYS W/OUT C&G

PROPOSED DRIVEWAY SLOPE TABLE
COMMERCIAL DRIVEWAYS @ 12:1 MAX.
RESIDENTIAL DRIVEWAYS @ 8:1 MAX.

PROP. DWY ALGEBRAIC DIFFERENCE TABLE
COMMERCIAL DRIVEWAYS @ A = 6% MAX.
RESIDENTIAL DRIVEWAYS @ A = 8% MAX.



□ - 1' MIN. ON DRIVEWAYS (RES. & COMM.)
2' MIN. ON DRIVEWAYS (COUNTY RD. & CITY ST.)

* - 6:1 SLOPE REQUIRED

PHARR DISTRICT STANDARD

TEXAS DEPARTMENT OF TRANSPORTATION

DRIVEWAY PROFILE DETAILS

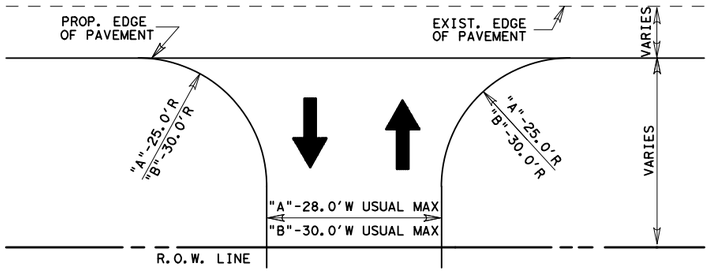
REV. 1/17

DRIVEWAY1.DGN

FED. ROAD DIV. NO.	STATE AID PROJECT NO.	FILE NO.	SHEET NO.
6			135

STATE	STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
TEXAS	21	CAMERON	1057	03	045	FM 510

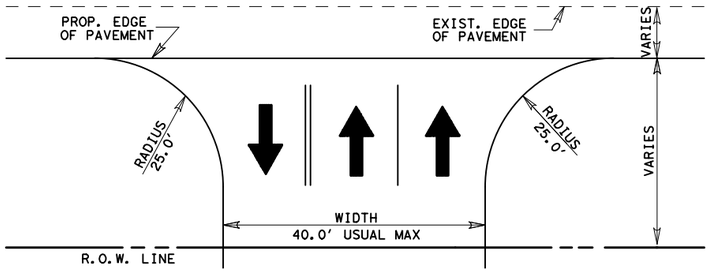
DESIGNS FOR TWO-WAY COMMERCIAL DRIVEWAYS



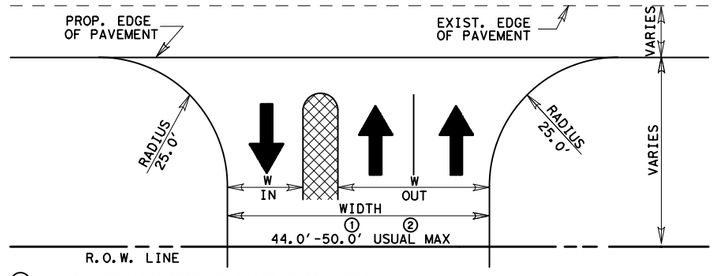
"A"- ONE ENTRY LANE AND ONE EXIT LANE, FEWER THAN 4 LARGE VEHICLES PER HOUR

"B"- ONE ENTRY LANE AND ONE EXIT LANE, 4 OR MORE SINGLE UNIT VEHICLES① PER HOUR

① - *DRIVEWAY DESIGNS FOR LARGER VEHICLES WILL BE CONSIDERED ON A CASE BY CASE BASIS*

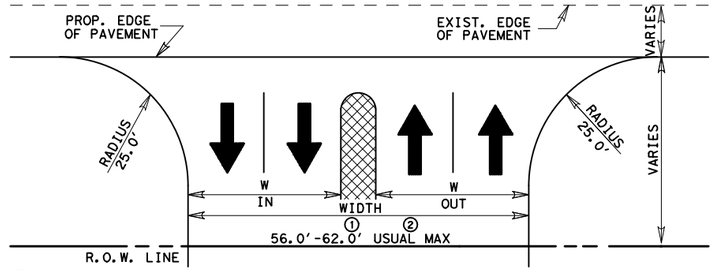


ONE ENTRY LANE AND TWO EXIT LANES (WITHOUT DIVIDERS)



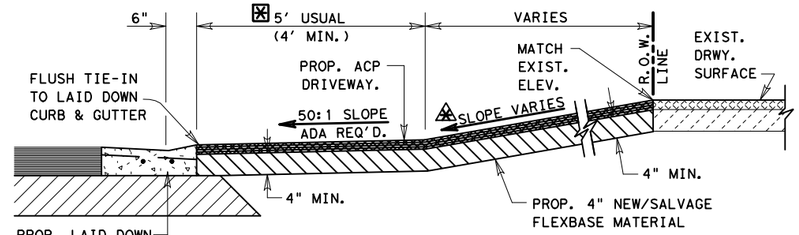
① - *4.0' WIDE DIVIDER, FACE-TO-FACE CURBS*
② - *10.0' WIDE DIVIDER, FACE-TO-FACE-CURBS*

ONE ENTRY LANE AND TWO EXIT LANES (WITH A DIVIDER)



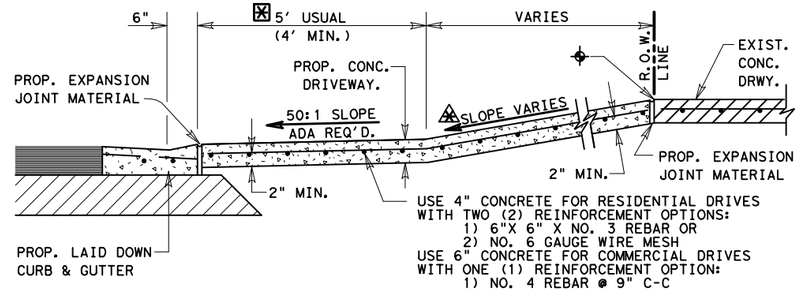
① - *4.0' WIDE DIVIDER, FACE-TO-FACE CURBS*
② - *10.0' WIDE DIVIDER, FACE-TO-FACE-CURBS*

TWO ENTRY LANES AND TWO EXIT LANES (WITH A DIVIDER)



TYPICAL ASPH. CONC. PVM'T. DRIVEWAY SECTION

N.T.S.



TYPICAL CONCRETE DRIVEWAY SECTION

N.T.S.

⊕ CONCRETE SHALL BE SAW CUT TO THE LIMITS OF REMOVAL WHERE APPLICABLE.

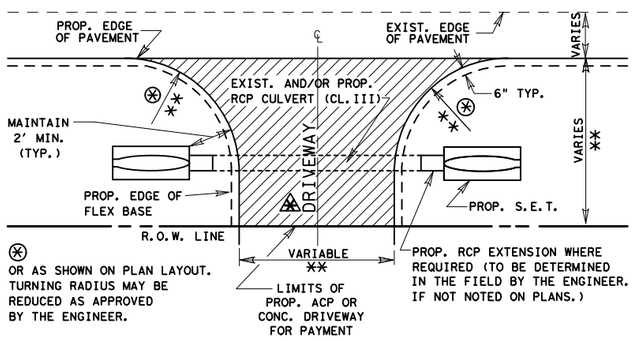
⊠ PROP./FUTURE SIDEWALK CROSSING LOCATION UNLESS SHOWN ELSEWHERE ON P&P SHEETS. SEE P&P SHEETS FOR PROP. SIDEWALK LOCATION IF SIDEWALKS ARE INCLUDED AS PART OF PROJECT. REFER TO STATE STANDARDS - PEDESTRIAN FACILITIES - FOR ADDITIONAL REQUIREMENTS.

⚠ ENTRANCE'S BASE AND SURFACING MAY BE EXTENDED BEYOND R.O.W. LINE AS REQUIRED TO MEET EXISTING GRADE IN A SATISFACTORY MANNER OF WHICH NO STEEPER THAN 12:1 FOR COMMERCIAL DRIVEWAY AND 8:1 FOR RESIDENTIAL DRIVEWAY SLOPE WILL BE CONSTRUCTED.

PROP. DWY ALGEBRAIC DIFFERENCE TABLE
COMMERCIAL DRIVEWAYS @ A = 6% MAX. RESIDENTIAL DRIVEWAYS @ A = 8% MAX.

PROPOSED DRIVEWAY SLOPE TABLE
COMMERCIAL DRIVEWAYS @ 12:1 MAX. RESIDENTIAL DRIVEWAYS @ 8:1 MAX.

PRIVATE AND COMMERCIAL DRIVES WITHOUT CURB & GUTTER

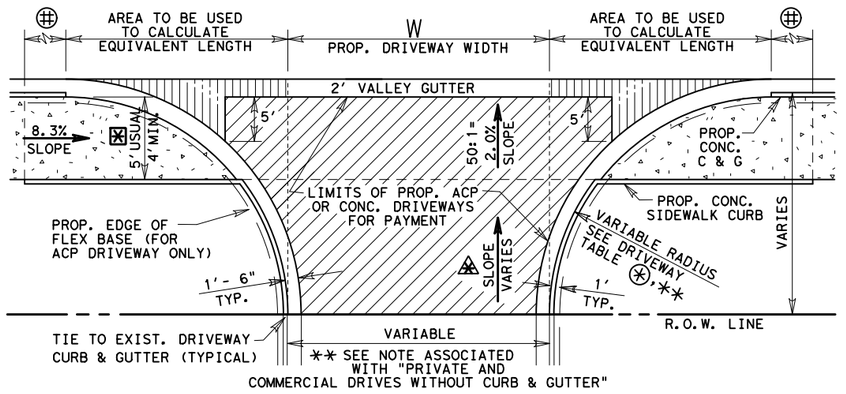


PLAN OF PRIVATE AND COMMERCIAL DRIVES

** FOR PRIVATE RESIDENTIAL DRIVES, TRY TO MATCH EXISTING WITH A MINIMUM WIDTH OF 12 FT. AND A MAXIMUM WIDTH OF 24 FT. WITH 15 FT. USUAL RADIUS. FOR COMMERCIAL DRIVES, USE ABOVE COMMERCIAL DRIVEWAY DETAILS.

⚠ SEE TYPICAL DRIVEWAY SECTIONS NOTES FOR DRIVEWAY SLOPE CRITERIA.

PRIVATE AND COMMERCIAL DRIVES WITH CURB & GUTTER



PLAN OF PRIVATE AND COMMERCIAL DRIVES

SEE P&P SHEETS FOR LOCATIONS OF DRIVES
N.T.S.

⊠ PROP./FUTURE CONC. SIDEWALK LOCATION UNLESS SHOWN ELSEWHERE ON P&P SHEETS. REFER TO STATE STANDARDS - PEDESTRIAN FACILITIES - FOR ADDITIONAL REQUIREMENTS.

⊕ LIMITS OF SLOPE FOR PROP. CONC. CURB BASED ON 8.3% SLOPE FOR SIDEWALK.

⚠ SEE TYPICAL DRIVEWAY SECTIONS NOTES FOR DRIVEWAY SLOPE CRITERIA.

LF EQUIVALENT TABLE FOR PAYMENT LIMITS OF 2' VALLEY GUTTER

LF OF VALLEY GUTTER= W + X1 + X2

WHERE X1 AND X2 MAY VARY DEPENDING ON RADIUS

Prop. Driveway Radius	X1 or X2 (Sq Ft Area / 2') Equivalent LF Length
5'	1
8'	2
10'	4
12'	6
15'	9
18'	12
20'	15
22'	18
25'	24
28'	30
30'	34

SEE DRIVEWAY TABLE FOR LIMITS OF LAID DOWN CURB TO BE PAID FOR AS CURB AND GUTTER

DRIVEWAY TYPES

TY PB-1
EXIST. PRIVATE OR COMMERCIAL DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 4" NEW AND/OR SALVAGE FLEX. BASE, PRIMED AND SURFACED WITH 114#/SY ACP.

CONCRETE (RESIDENTIAL)
EXIST. PRIVATE DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 4" CONCRETE. TO BE PAID FOR BY THE SQ.YD.

CONCRETE (COMMERCIAL)
EXIST. BUSINESS DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 6" CONCRETE. TO BE PAID FOR BY THE SQ.YD.

PHARR DISTRICT STANDARD

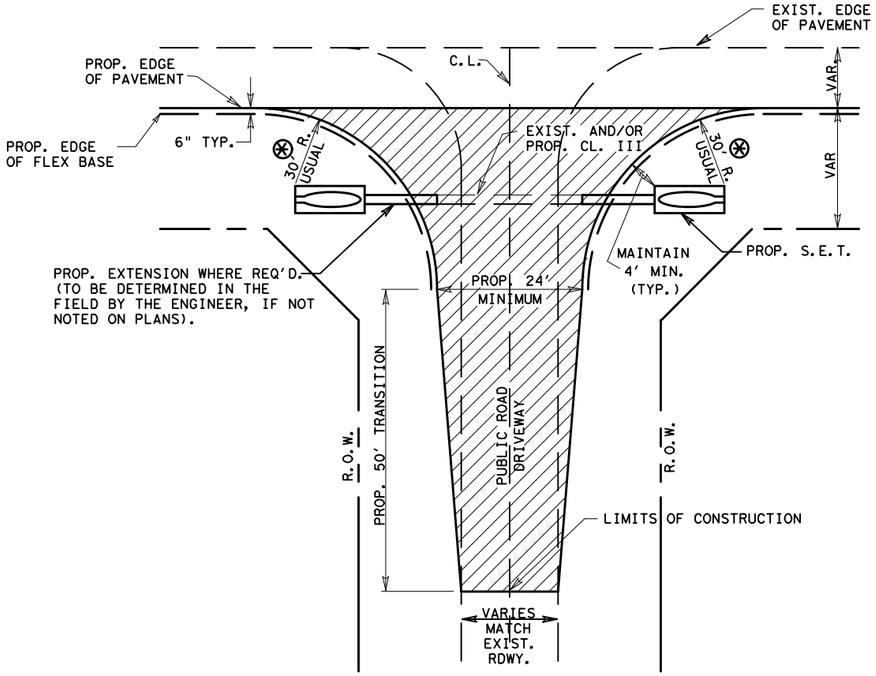
TEXAS DEPARTMENT OF TRANSPORTATION

DRIVEWAY DETAILS PRIVATE (RESIDENTIAL-COMMERCIAL)

REV. 01/17

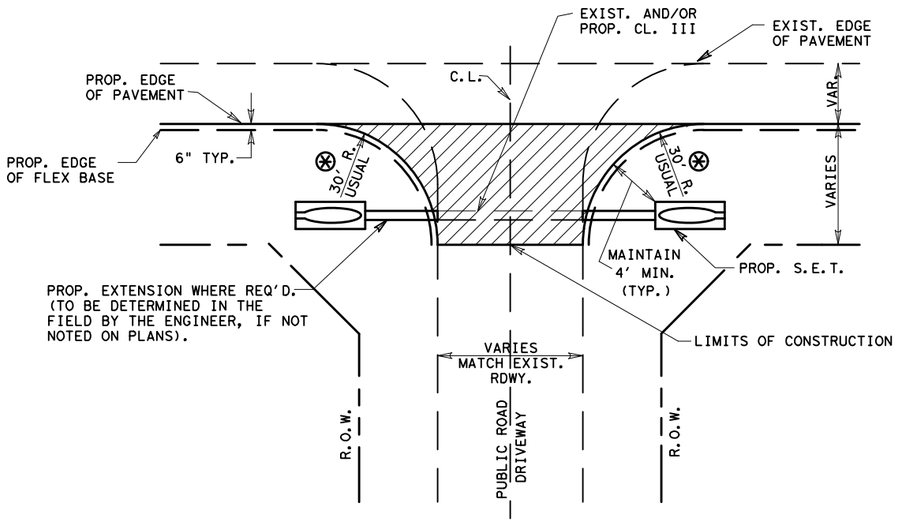
DRIVEWAY2.DGN

FED. RD. DIV. NO.	PROJECT NO.		FILE NO.			SHEET NO.
6						136
STATE	STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
TEXAS	21	CAMERON	1057	03	045	FM 510



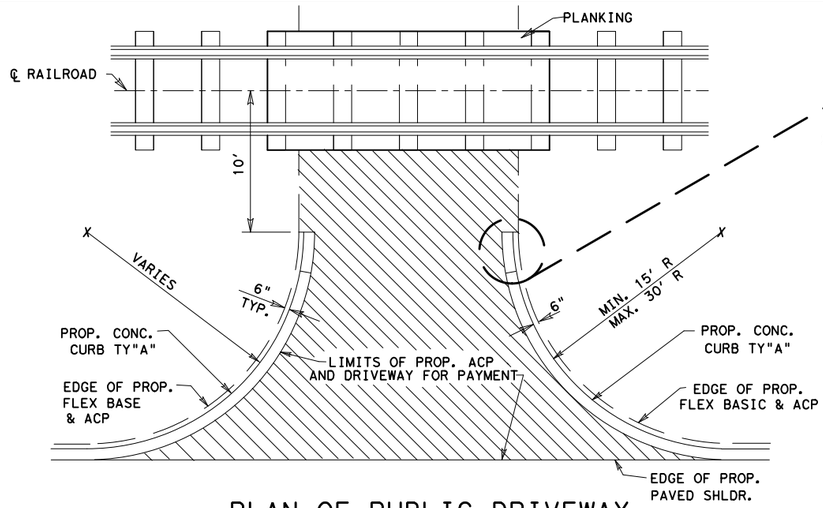
TYPICAL DETAIL

(WHEN EXIST. ROADWAY WIDTH LESS THAN 24'.)

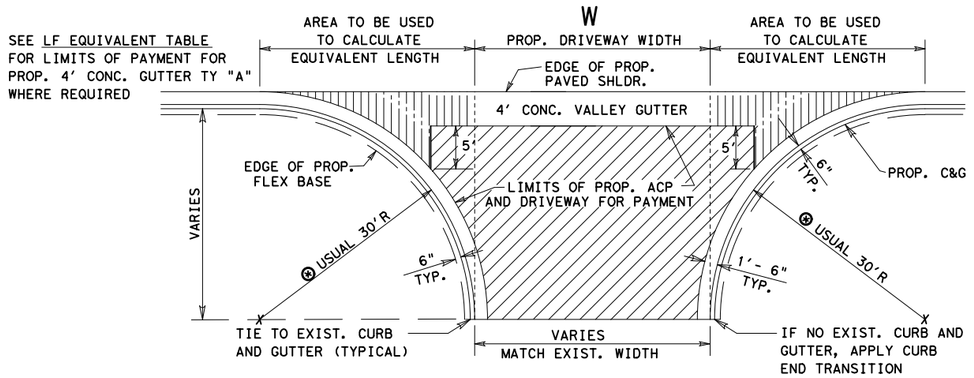


TYPICAL DETAIL

(WHEN EXIST. ROADWAY WIDTH EQUAL TO OR GREATER THAN 24'.)



PLAN OF PUBLIC DRIVEWAY ADJACENT TO R.R. CROSSING



PLAN OF PUBLIC DRIVEWAY

TY P

EXIST. PAVED DRIVEWAYS TO BE SURFACED W/171#/SY ACP.

TY PRB1

EXIST. PAVED, CALICHE AND/OR GRAVEL DRIVEWAYS TO BE SCARIFIED AND RECONTRUCTED WITH 4" NEW FLEX. BASE W/1% LIME TO MATCH THE PROPOSED WIDENED SECTION, THEN PRIMED AND SURFACED WITH 171#/SY ACP

TY PBS1

EXIST. UNPAVED PUBLIC DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 12" LIME TREAT. SUBGRADE, 8" FLEX. BASE 1% LIME, THEN PRIMED AND SURFACED WITH 171#/SY ACP.

TY PBS2

EXIST. DRIVEWAY TO BE CONSTRUCTED SAME AS ROADWAY.

LF EQUIVALENT TABLE FOR PAYMENT LIMITS OF 4'CONC. GUTTER TY."A"

LF OF VALLEY GUTTER= W + X1 + X2

WHERE X1 AND X2 MAY VARY DEPENDING ON RADIUS

Prop. Driveway Radius	X1 or X2 (Sq Ft Area / 4') Equivalent LF Length
10	3
15	7
20	12
25	19
30	27
35	37
40	48
45	61
50	75
55	91
60	109
65	127
70	148
75	170

GENERAL NOTES:

AVERAGE DIMENSIONS SHOWN ON TABLE OF DRIVEWAYS ARE FOR ESTIMATING PURPOSES ONLY.

LOCATIONS LISTED ON THE TABLE ARE APPROXIMATE, EXACT LOCATIONS, DIMENSIONS, AND TYPE TO BE ESTABLISHED DURING CONSTRUCTION BY THE ENGINEER AS REQUIRED.

⊛ SEE DRIVEWAY TABLE, TURNING RADIUS MAY BE REDUCED AS APPROVED BY THE ENGINEER.

SEE TABLE OF DRIVEWAYS FOR TOTAL LENGTH OF PROP. 4' CONC. VALLEY GUTTER FOR EACH LOCATION.

PHARR DISTRICT STANDARD

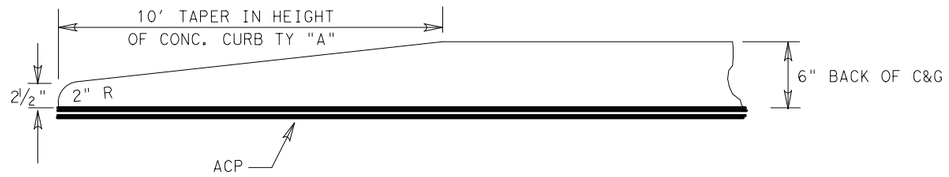
TEXAS DEPARTMENT OF TRANSPORTATION

DRIVEWAY DETAILS PUBLIC (COUNTY ROAD-CITY STREET)

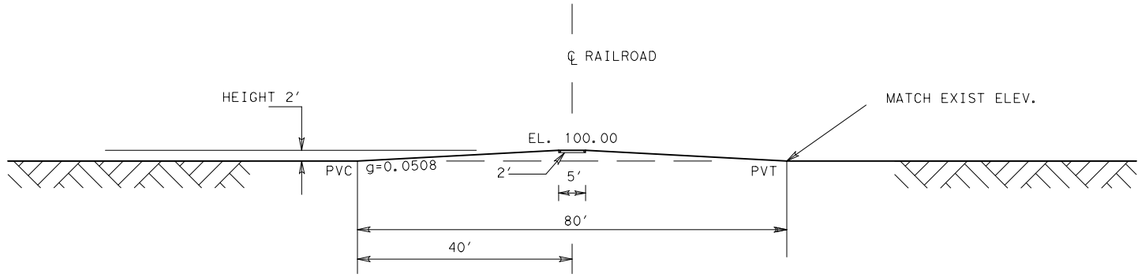
REV. 4/05

DRIVEWAY3.DGN

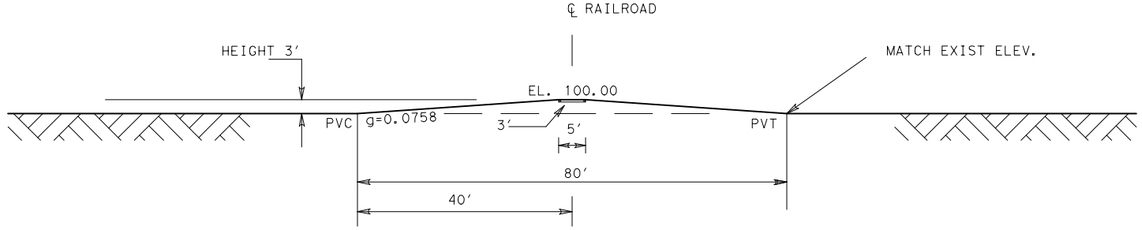
FED.RD. DIV.NO.	STATE AID PROJECT NO.		FILE NO.			SHEET NO.
6						137
STATE	STATE DIST.NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
TEXAS	21	CAMERON	1057	03	045	FM 510



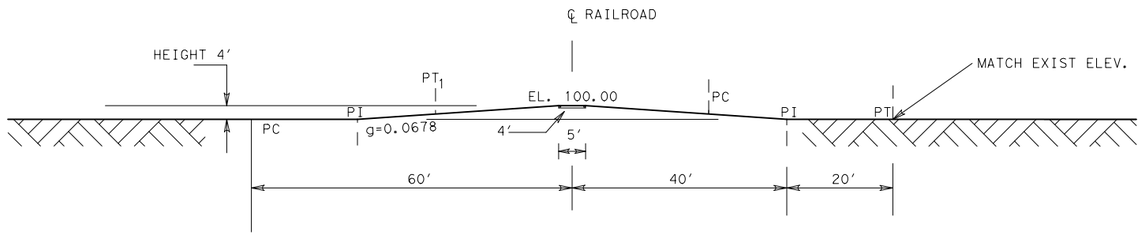
C & G TAPER DETAIL (TY A)



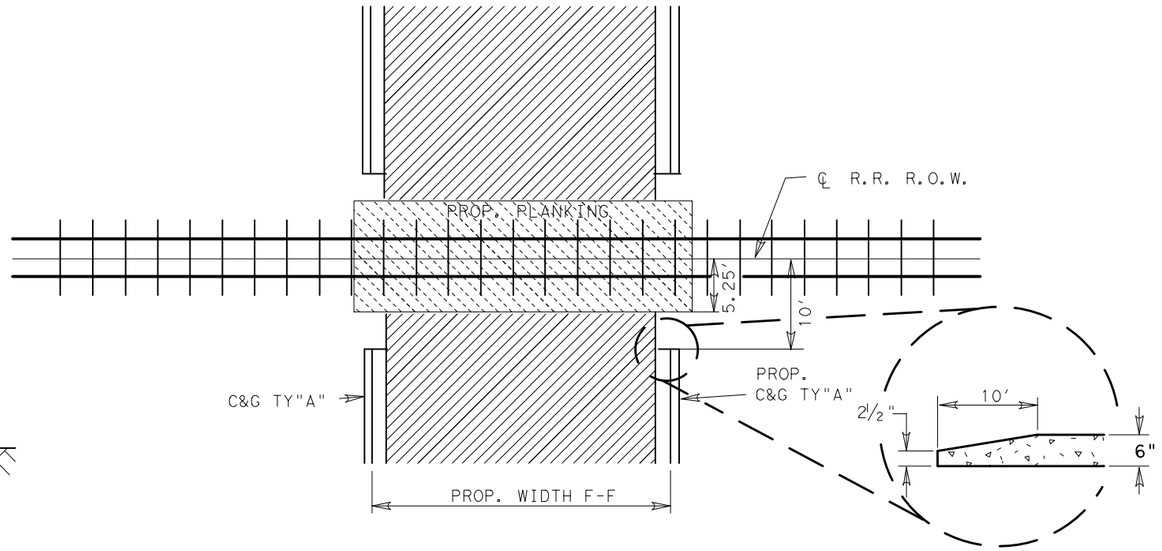
CROSS SECTION HEIGHT (2.0 ft.)



CROSS SECTION HEIGHT (3.0 ft.)



CROSS SECTION HEIGHT (4.0 ft.)



TYPICAL RAILROAD CROSSING

WORK TO BE DONE BY STATE FORCES

1. STABILIZE BASE AT CROSSING
2. UNLOAD BALLAST, STOCK PILE AND DUMP IN CROSSING.
3. APPLY ACP FOR SMOOTH APPROACH
4. FURNISH AND INSTALL BARRICADES.

ELEVATION TABLE *

HEIGHT	OFFSET (ft.)												
(ft)	0.0	5′	10′	15′	20′	25′	30′	35′	40′	45′	50′	55′	60′
2′-0"	100.00	99.93	99.85	99.78	99.70	99.62	99.54	99.47	99.39	0.00	0.00	0.00	0.00
3′-0"	100.00	99.89	99.77	99.66	99.55	99.43	99.32	99.21	99.09	0.00	0.00	0.00	0.00
4′-0"	100.00	99.90	99.80	99.70	99.59	99.50	99.39	99.29	99.19	99.09	98.98	98.89	98.78

*ASSUMED ELEVATIONS

N. T. S.

PHARR DISTRICT STANDARD

TEXAS DEPARTMENT OF TRANSPORTATION

R.R. CROSSING MISCELLANEOUS DETAILS

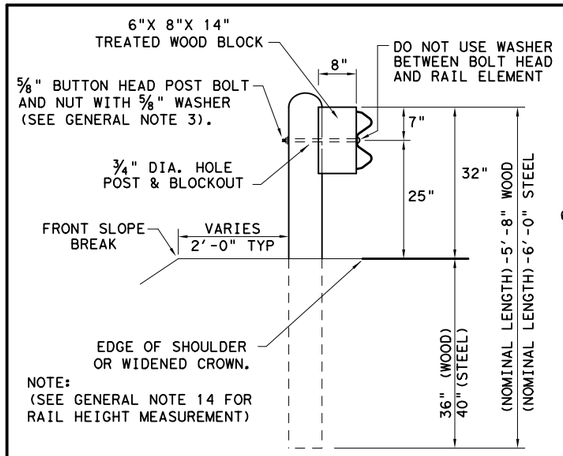
REV. 4/02

RR. DGN

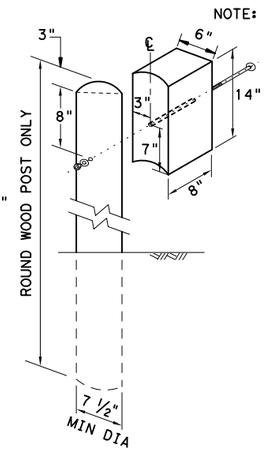
FED. RD. DIV. NO.	FILE NO.	PROJECT NO.	SHEET NO.
6			138

STATE	STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
TEXAS	21	CAMERON	1057	03	045	FM 510

DATE: 6/27/2022
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\05 Roadway Details\TxDOT Standards\gf3119.dgn

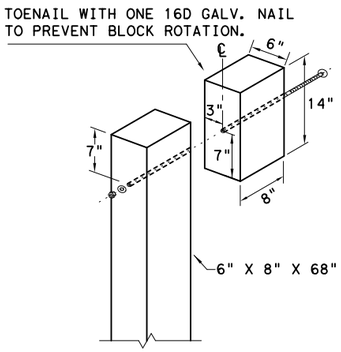


TYPICAL POST PLACEMENT

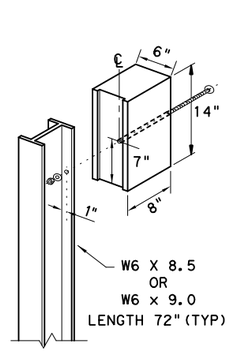


WOOD BLOCK TO ROUND WOOD POST

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

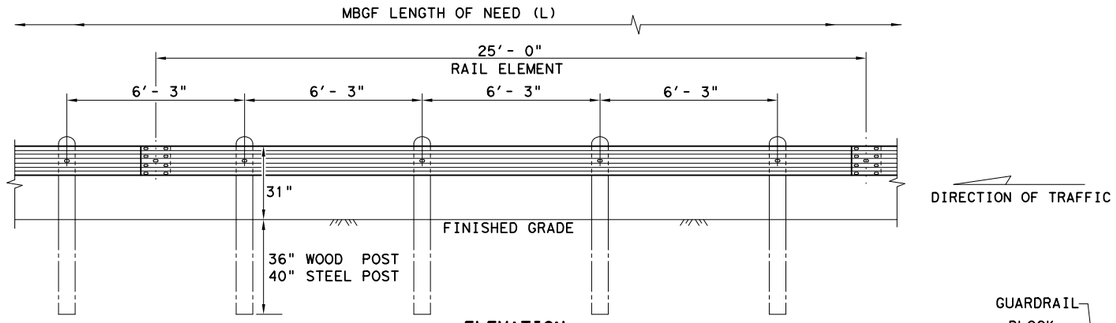


WOOD BLOCK TO RECTANGULAR WOOD POST



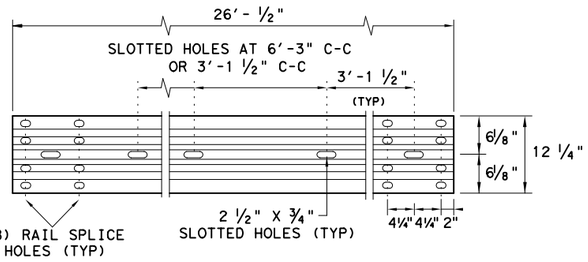
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



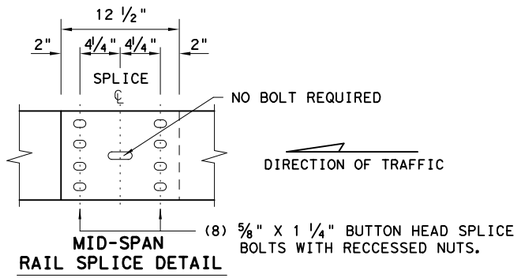
ELEVATION MID-SPAN RAIL SPLICE

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
FBBO1 = 1 1/4"
FBBO2 = 2"
5/8"

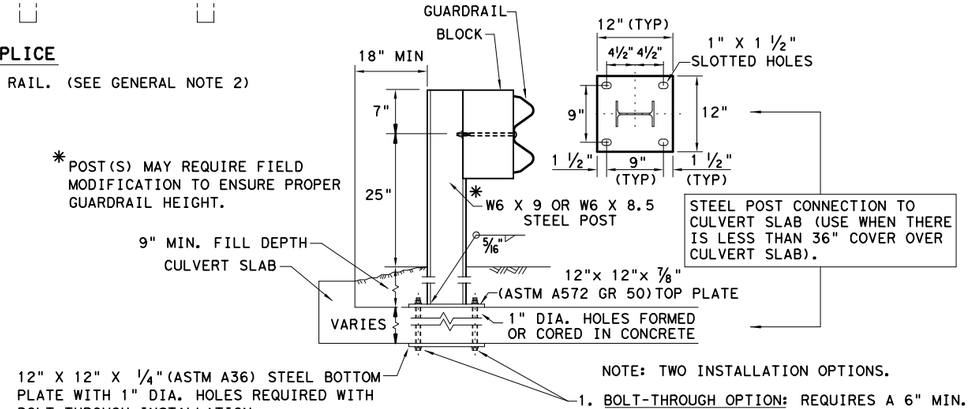
POST & BLOCK LENGTH
FBBO3 = 10"
FBBO4 = 18"

BUTTON HEAD BOLT

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

MID-SPAN RAIL SPLICE DETAIL

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



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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

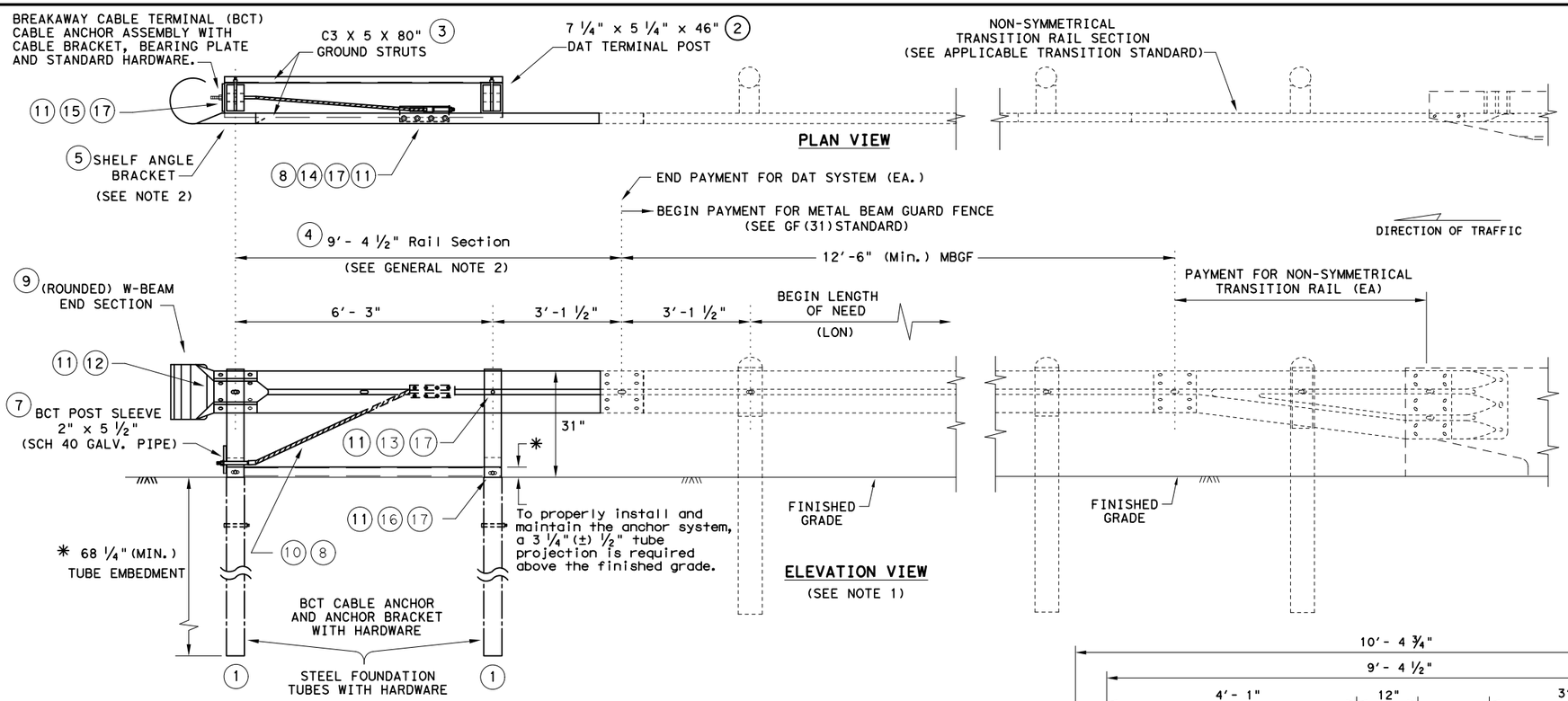
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS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

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	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		139

DATE: 6/27/2022
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\05 Roadway Details\TxDOT Standards\gf31dat19.dgn



DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

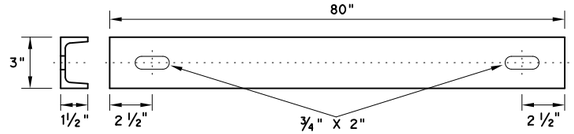
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

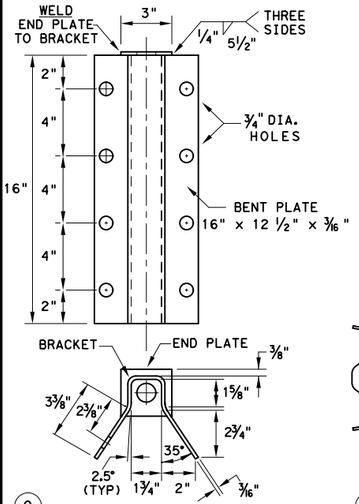
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

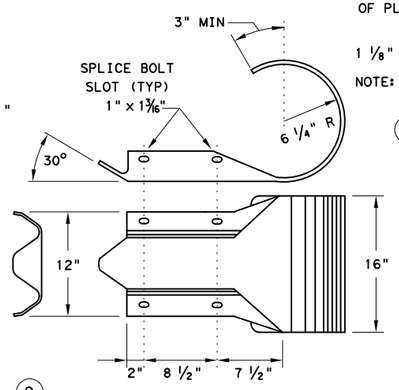
(4) TERMINAL RAIL ELEMENT FOR DAT



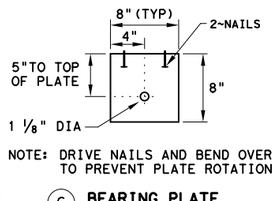
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

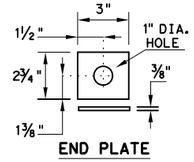


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

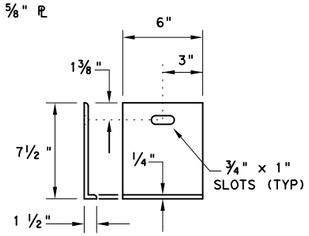


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

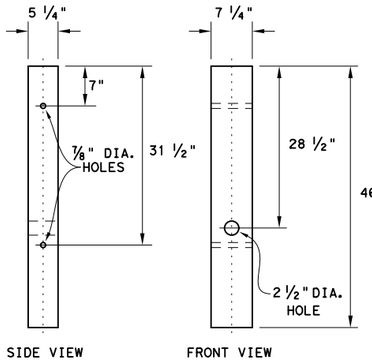
(6) BEARING PLATE
8"x 8"x 5/8" PL



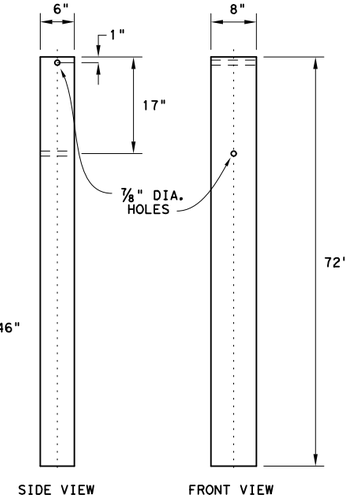
END PLATE



(5) SHELF ANGLE BRACKET



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



(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT

GF(31)DAT-19

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REVISIONS	1057	03	045	FM 510	
	DIST	COUNTY		SHEET NO.	
	PHARR	CAMERON		140	

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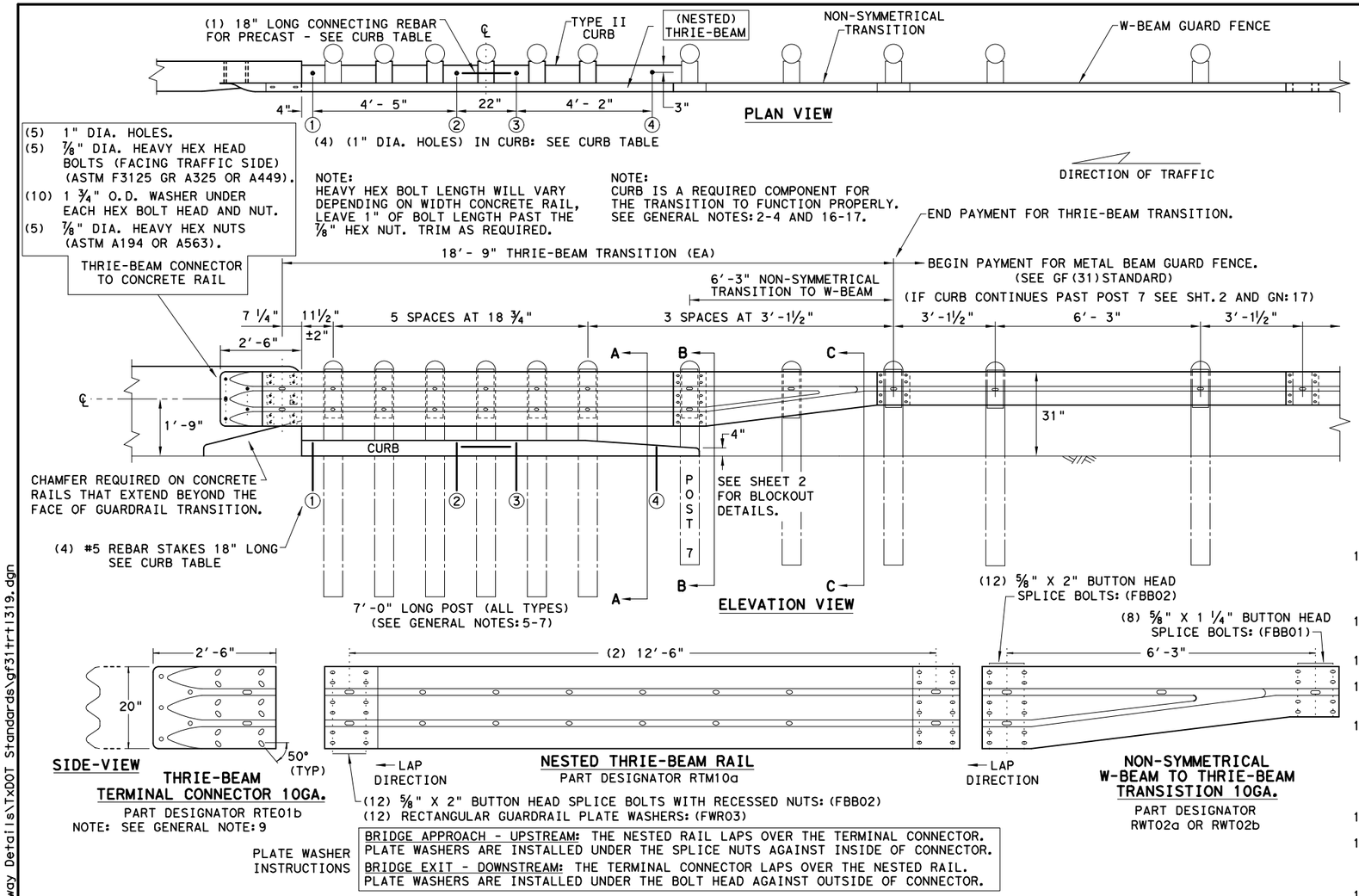
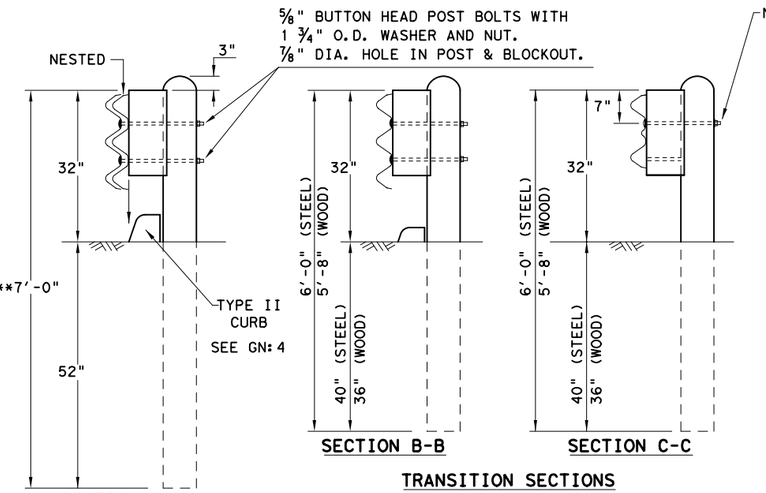
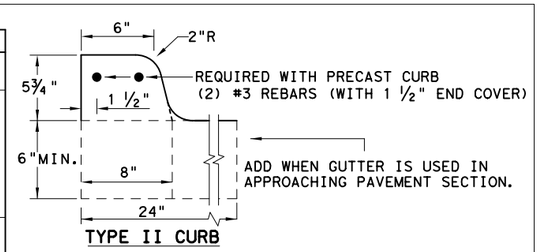




THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



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 MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
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

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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	PHARR	CAMERON		141

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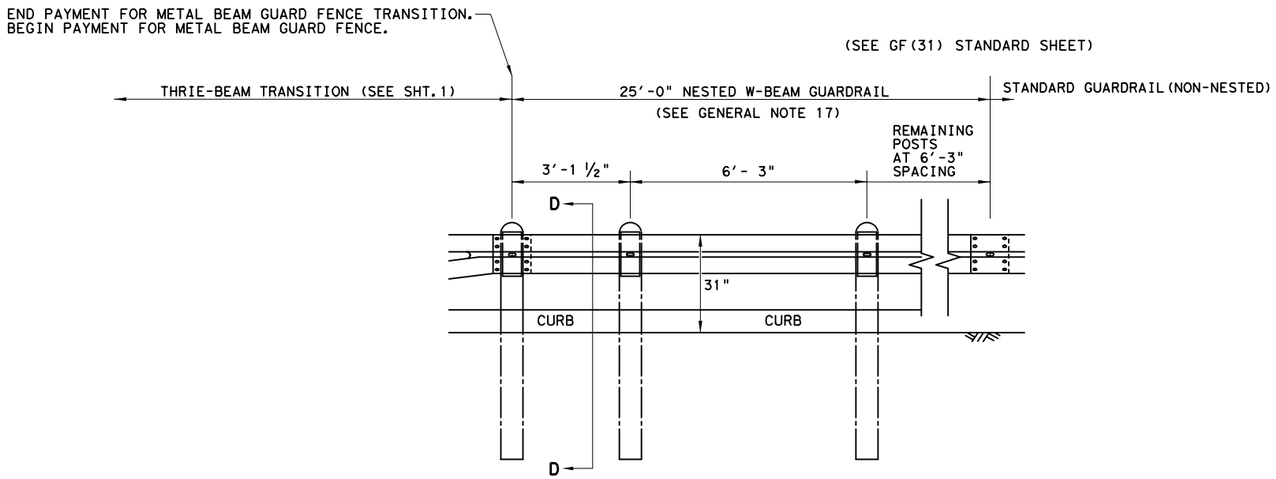
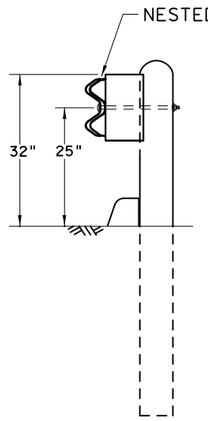
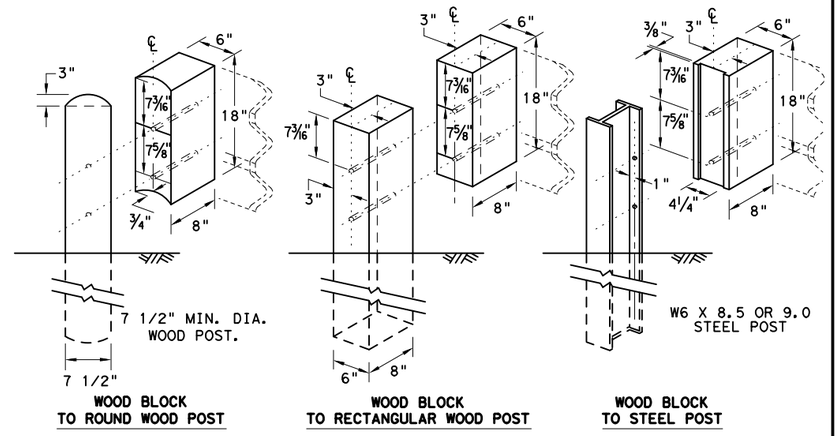
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

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 TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
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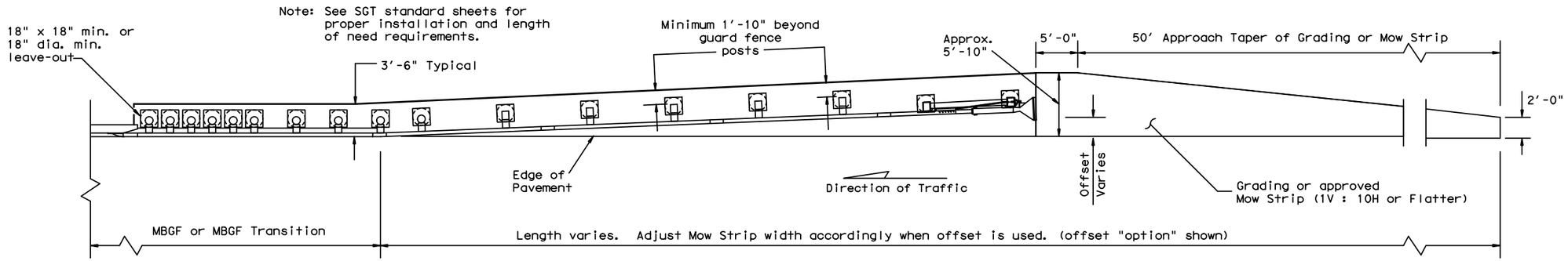
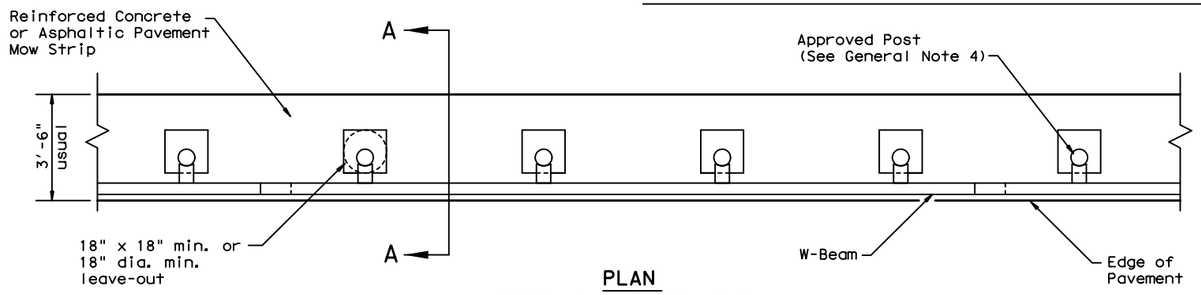
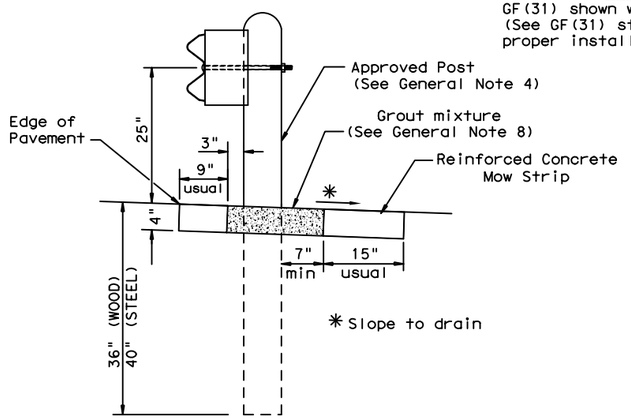


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



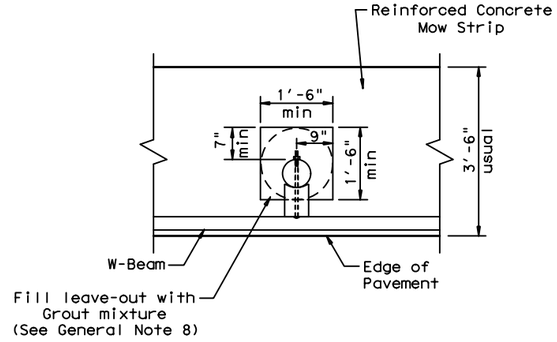
PLAN

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



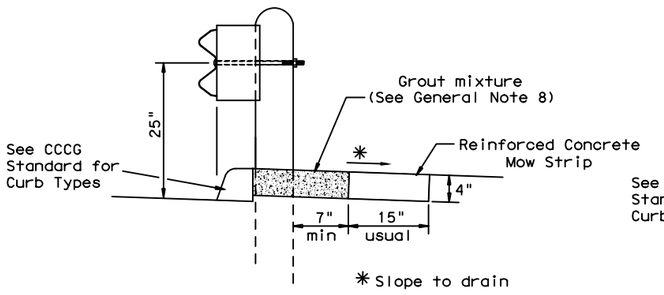
SECTION A-A

Typical



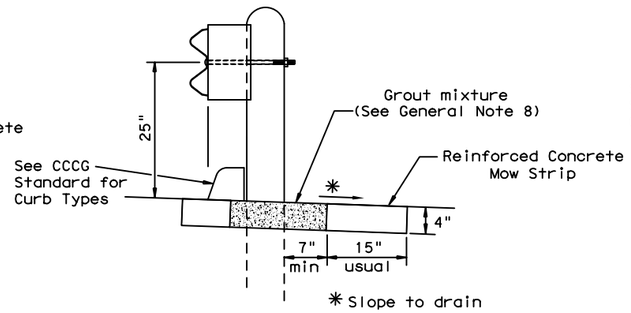
MOW STRIP DETAIL

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



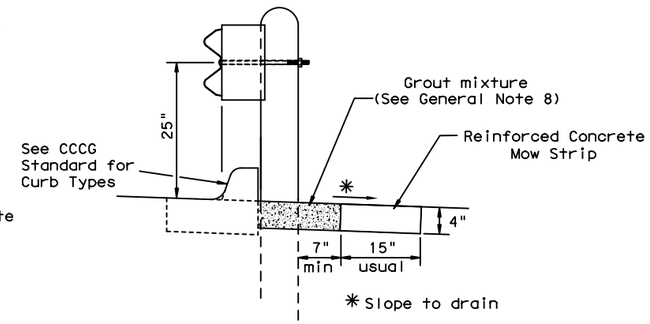
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		143

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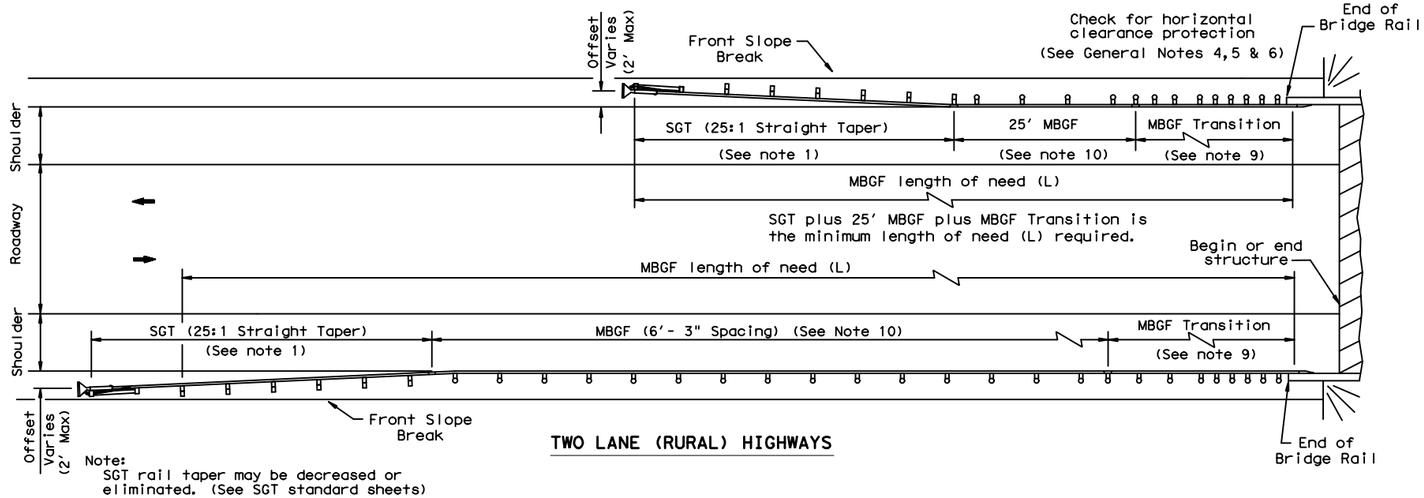
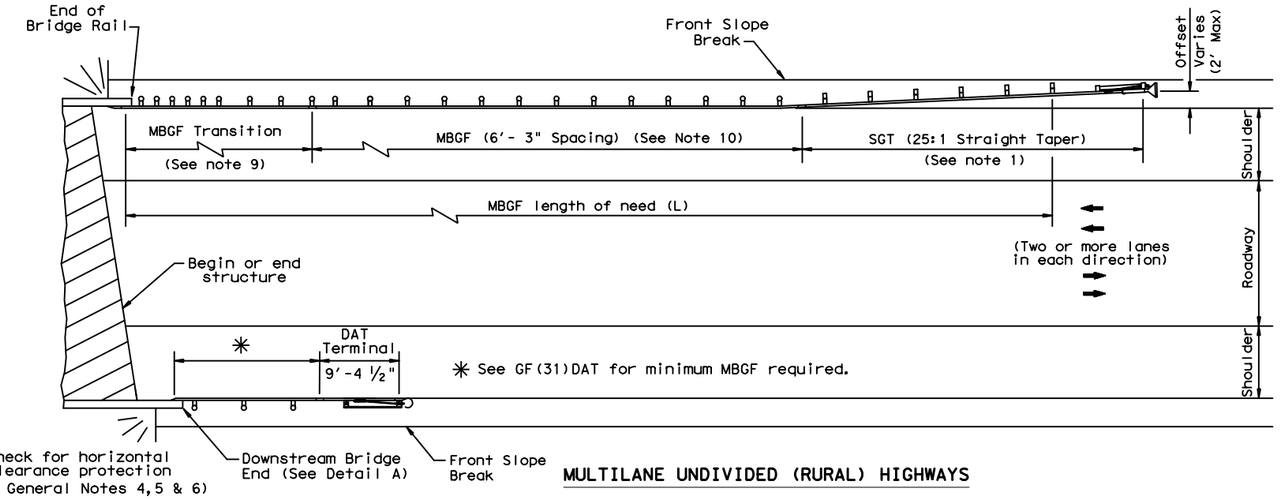
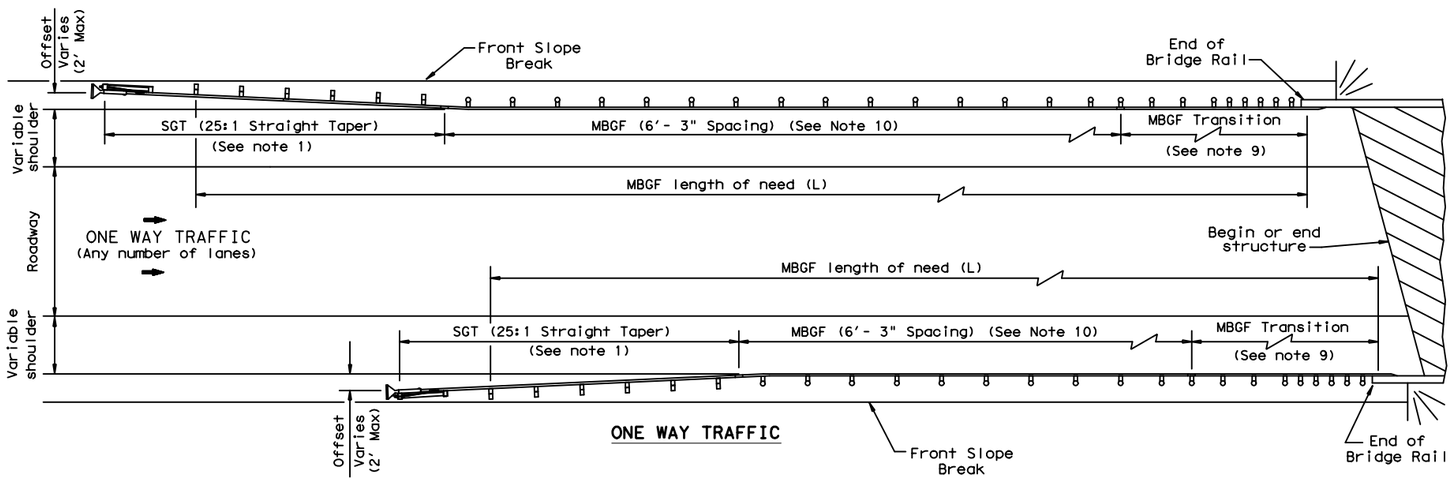


TWO LANE (RURAL) HIGHWAYS

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



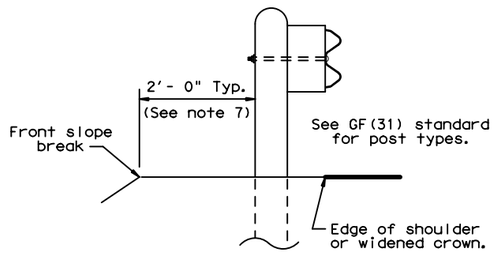
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



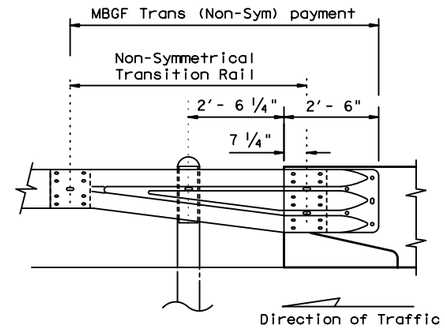
ONE WAY TRAFFIC

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. <u>For restrictive bridge widths:</u> The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft."maximum" offset from the shoulder edge in the approach direction.
9. Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
10. A minimum 25' length of MBGF will be required.



TYPICAL CROSS SECTION AT MBGF



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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation | Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		144

DATE: 6/27/2022
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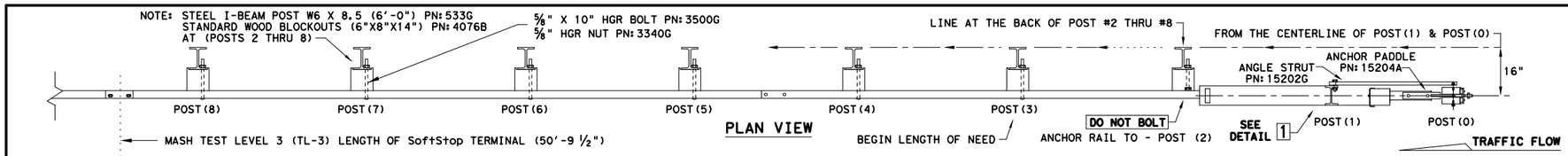

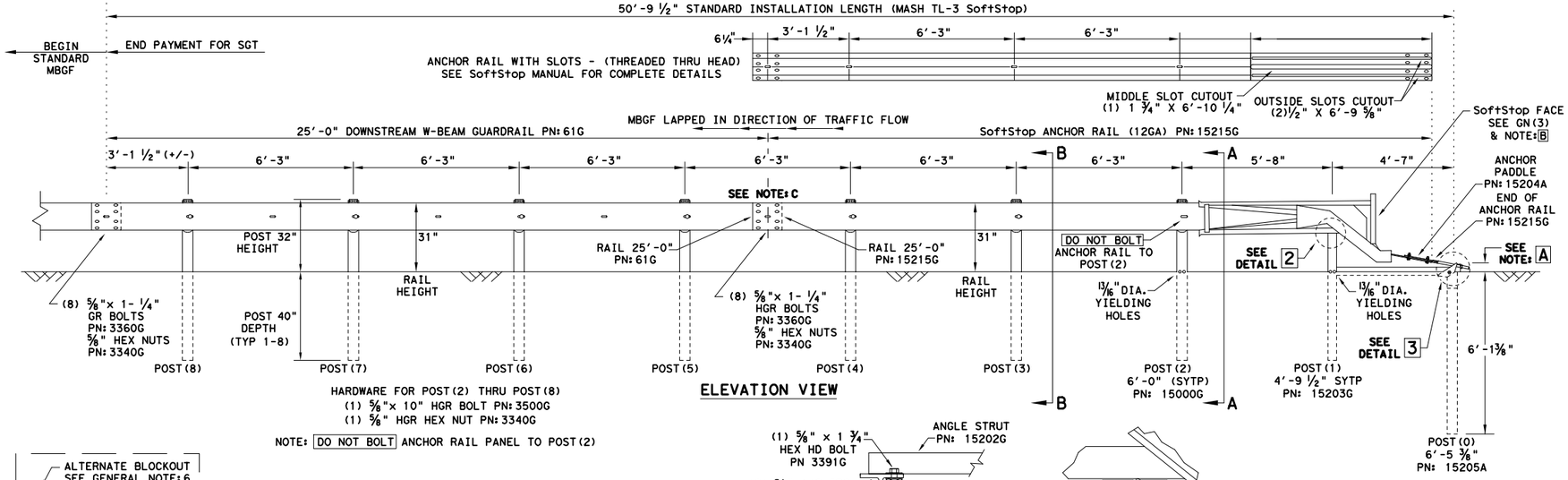

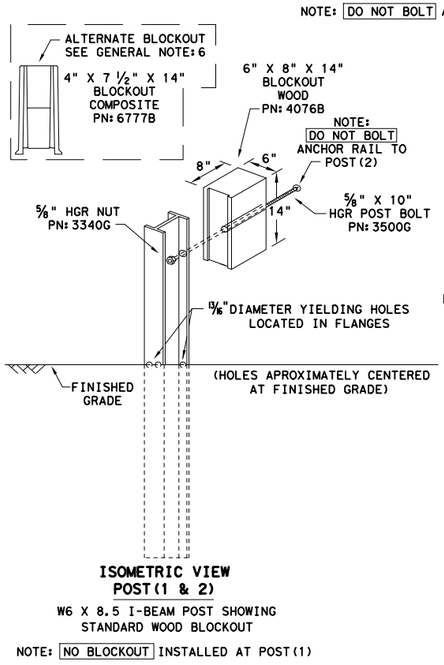

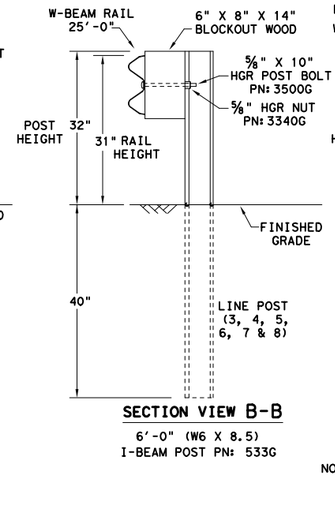

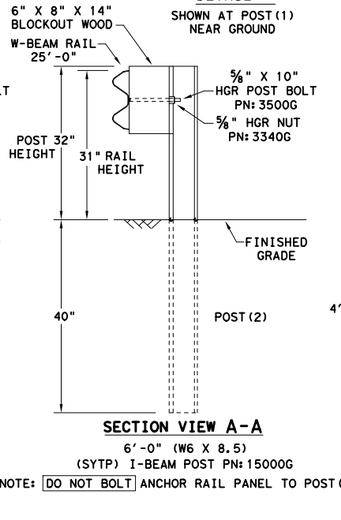

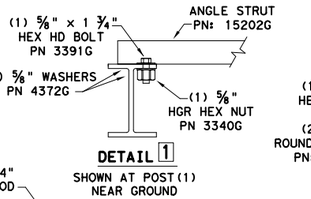

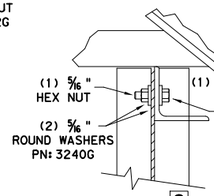

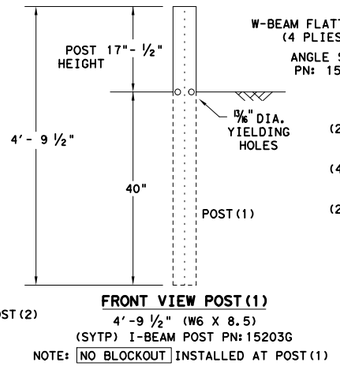

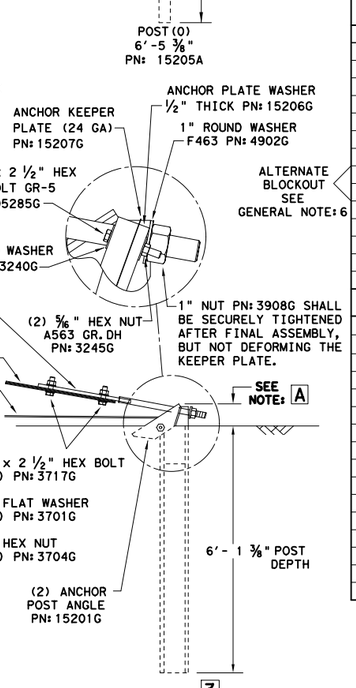

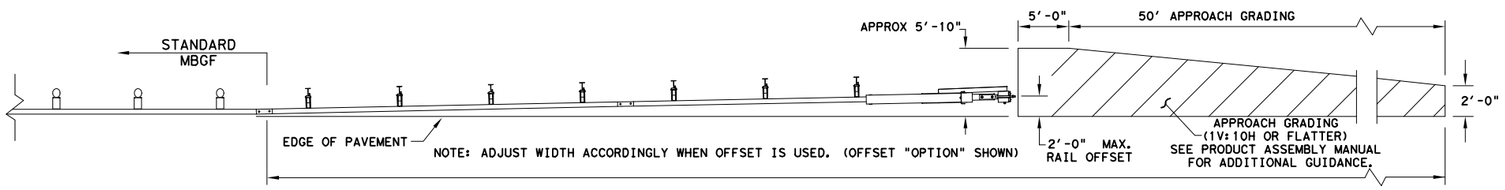

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

NOTE: A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE: C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅜")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR. DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR. DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR. DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

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

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3

SGT(10S)31-16

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP		
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY		
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	PHARR	CAMERON		145		

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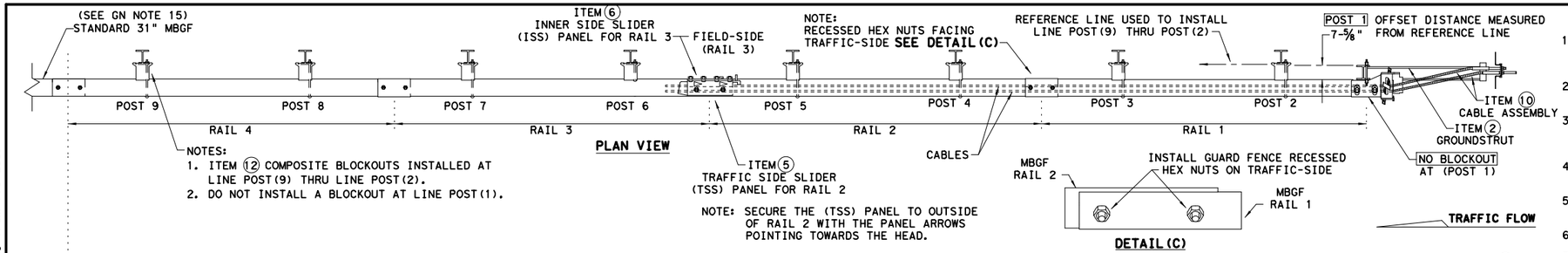

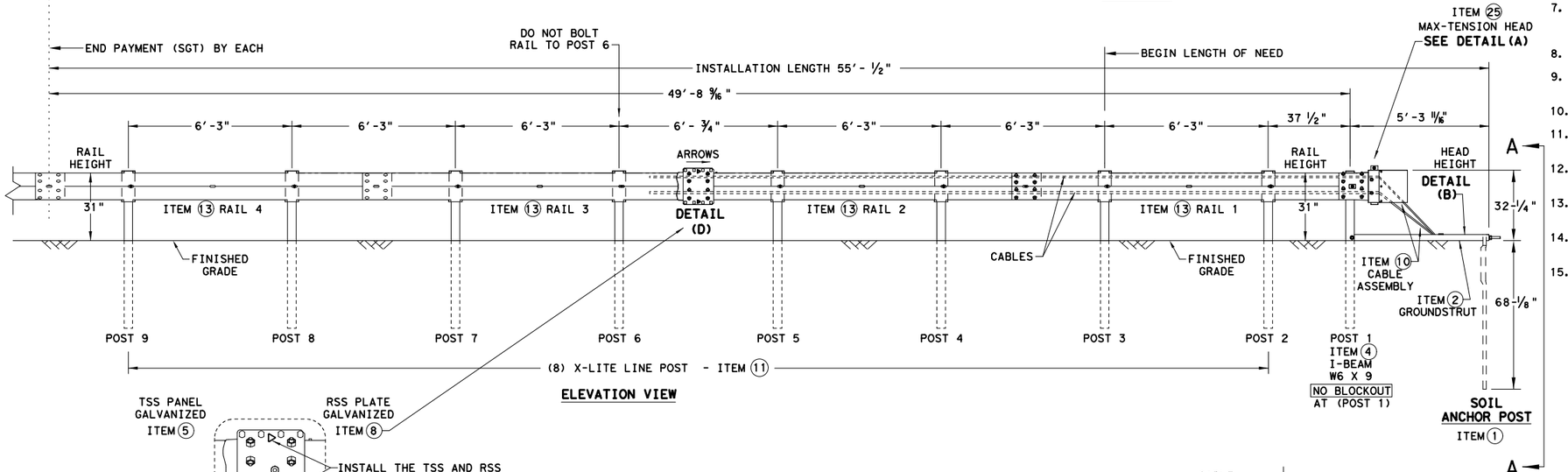

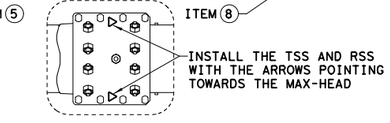

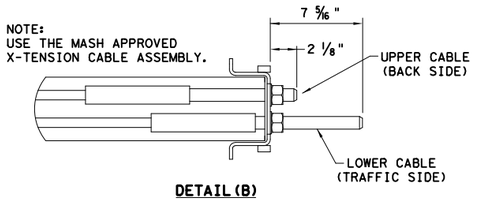

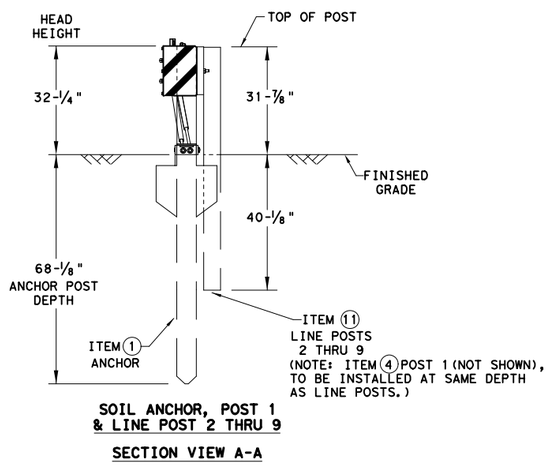

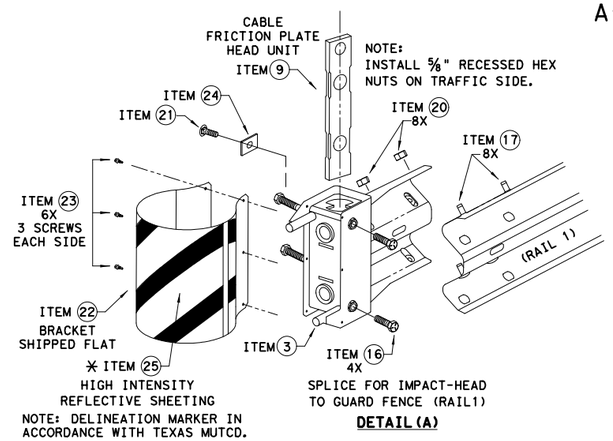

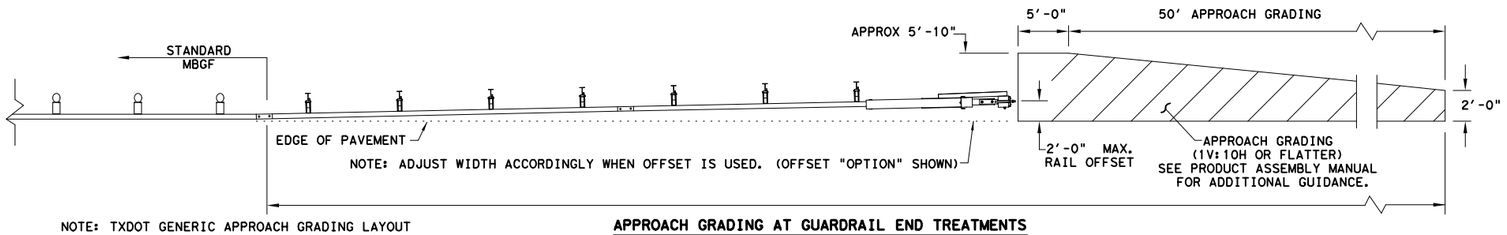

GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		146

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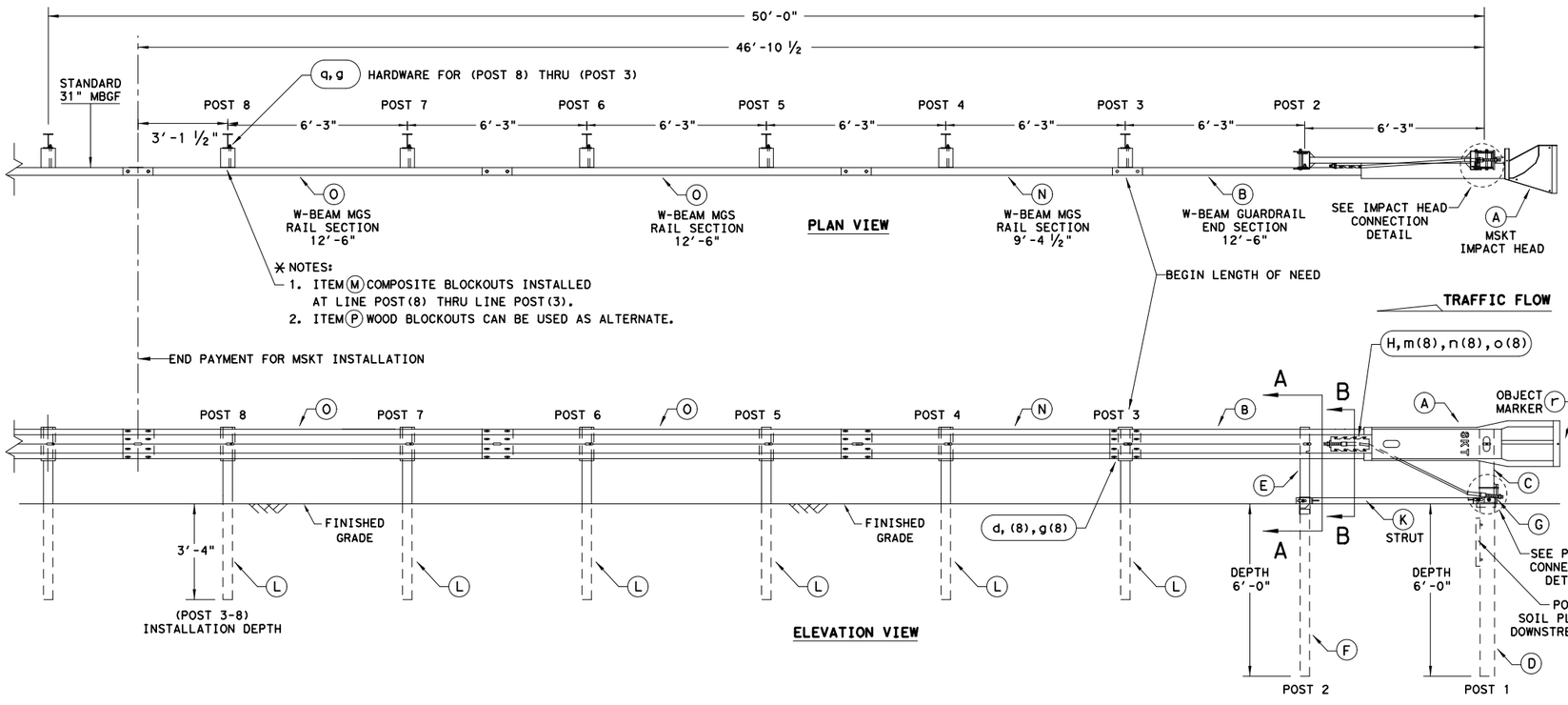
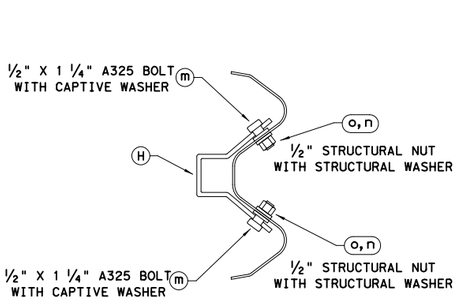
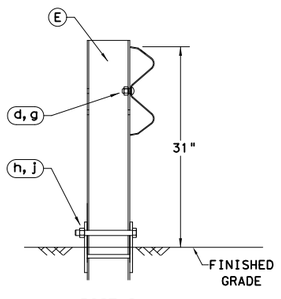


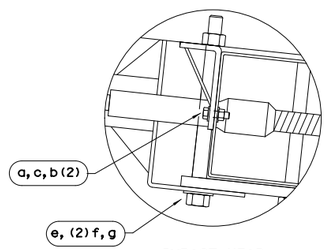
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



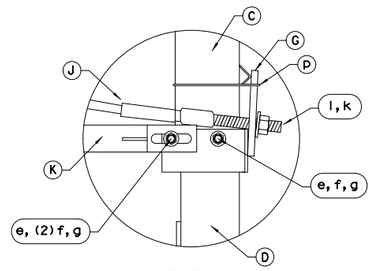
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

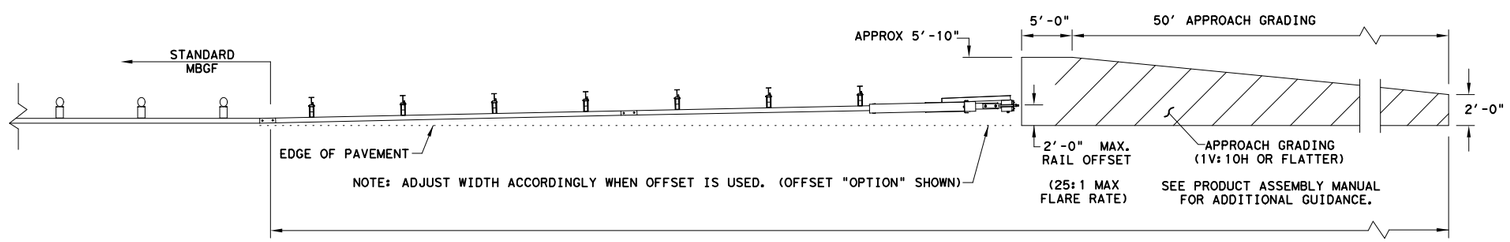
GENERAL NOTES

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X ⅛" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 ½")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x ⅜" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

SEE NOTES: ✳

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



APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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.

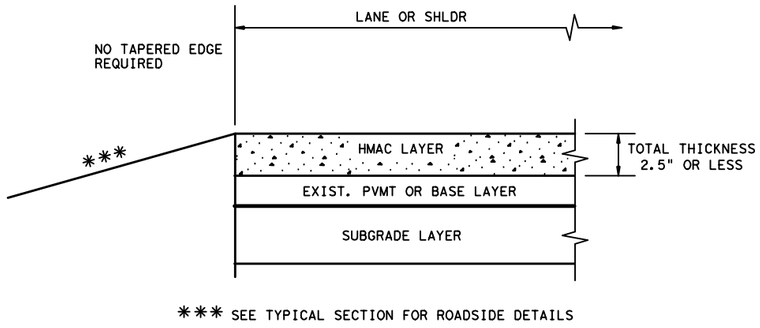
Texas Department of Transportation

Design Division Standard

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

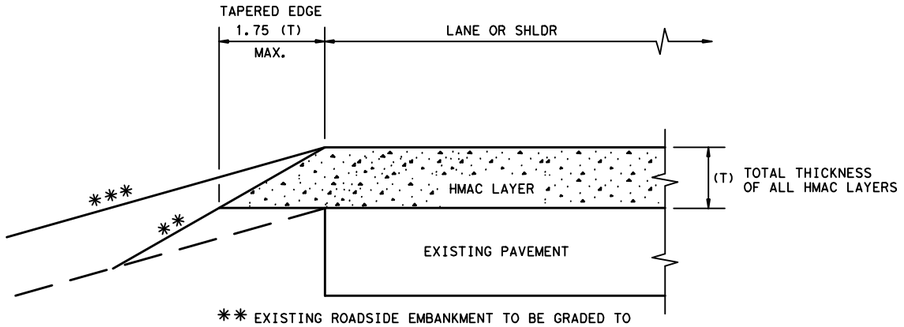
FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1057	03	045	FM 510	
	DIST	COUNTY		SHEET NO.	
	PHARR	CAMERON		147	

DATE: 6/27/2022
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\05 Roadway Details\TxDOT Standards\tehmac11.dgn



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

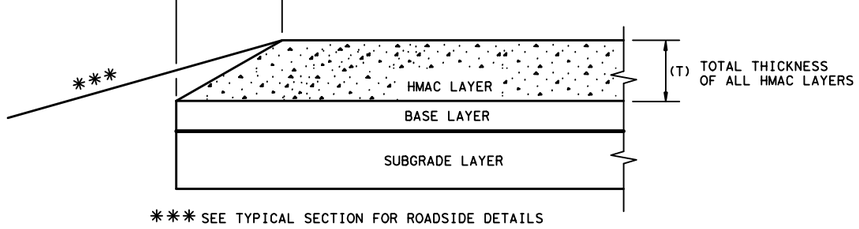
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY
WITH THICKNESS OF 2.5" OR LESS



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

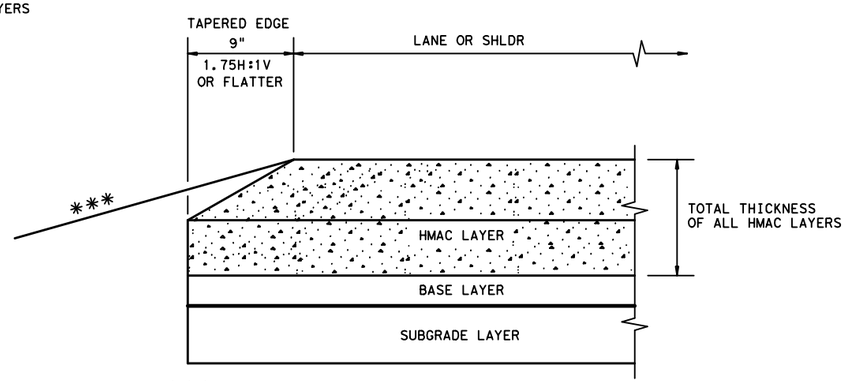
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

(NOT TO SCALE)

GENERAL NOTES

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

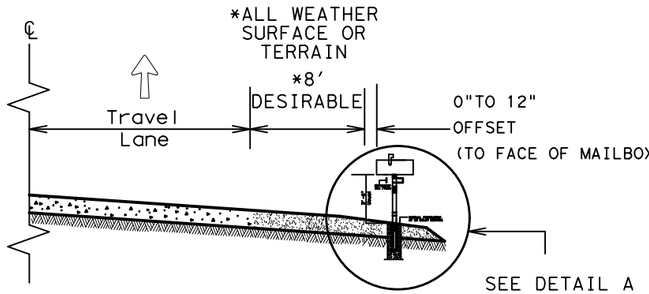
Texas Department of Transportation

Design Division Standard

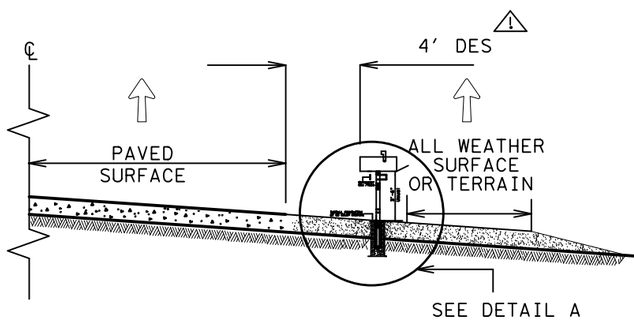
TAPERED EDGE DETAILS
HMAC PAVEMENT

TE(HMAC)-11

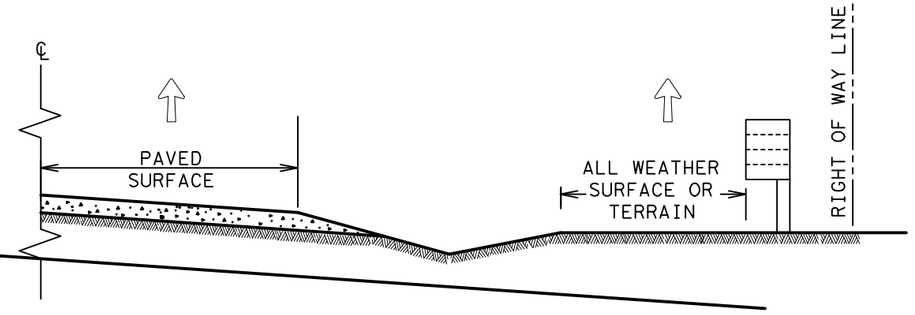
FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
©TxDOT January 2011 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		148



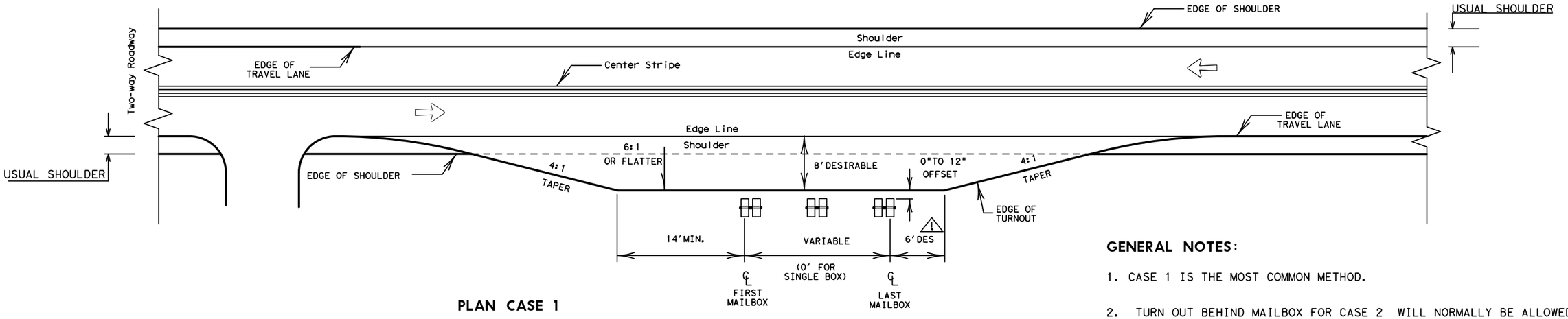
CASE 1. OFF TRAVEL WAY DELIVERY



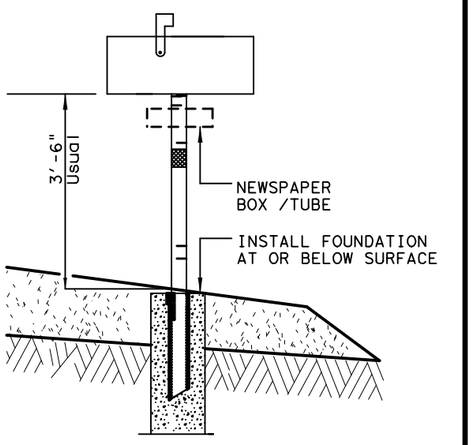
CASE 2. BACK SIDE DELIVERY



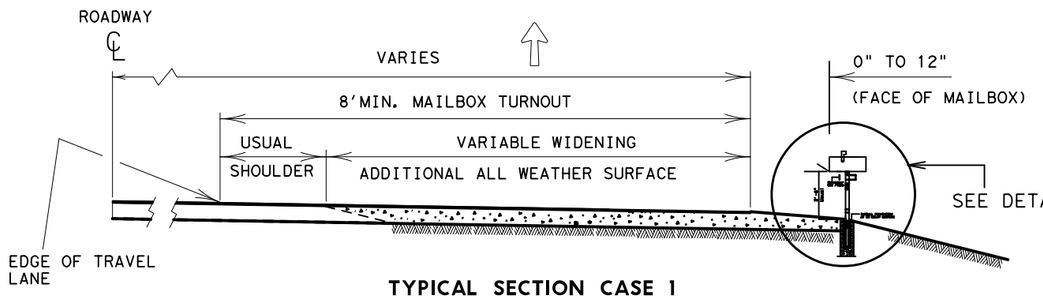
CASE 3. DELIVERY NEAR RIGHT OF WAY LINE



PLAN CASE 1



DETAIL A



TYPICAL SECTION CASE 1

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

GENERAL NOTES:

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

Texas Department of Transportation

Maintenance Division Standard

Guideline

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

FILE: MB14(2).DGN	DN: JEO		CK:	DW: JEO		CK:
©TxDOT MAY 2014	CONT	SECT	JOB		HIGHWAY	
REVISIONS DECEMBER 2012-NEW TXDOT TITLE BLOCK	1057	03	045		FM 510	
	DIST	COUNTY			SHEET NO.	
	PHARR	CAMERON			149	

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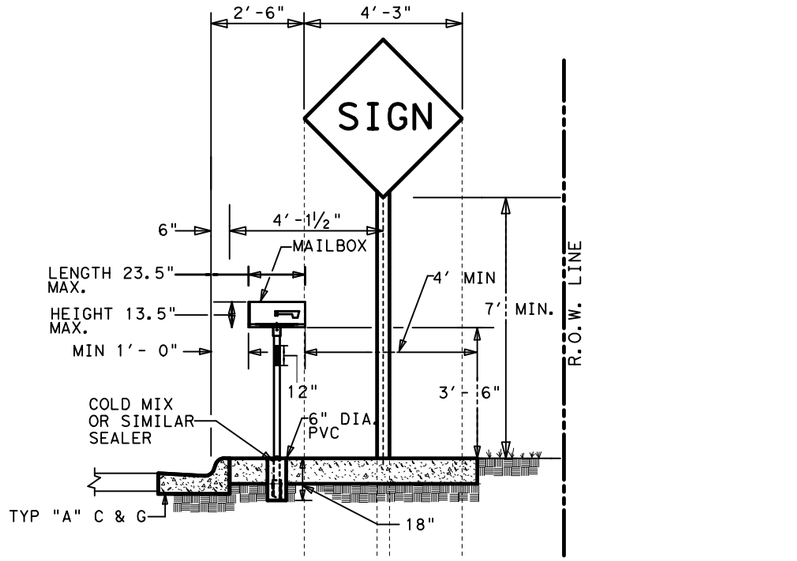
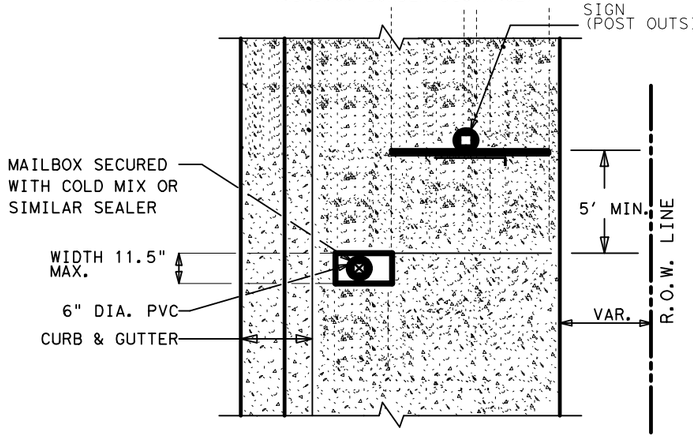
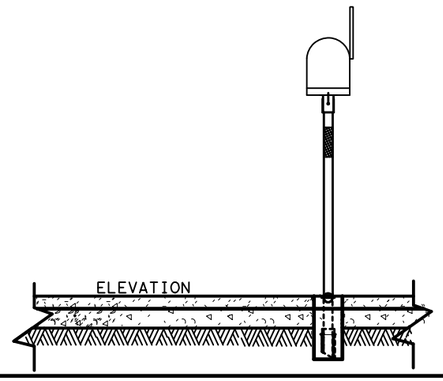
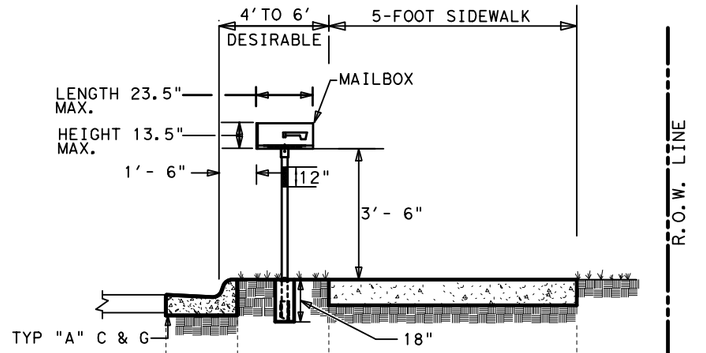


MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN
(MINIMUM BORDER DISTANCE)

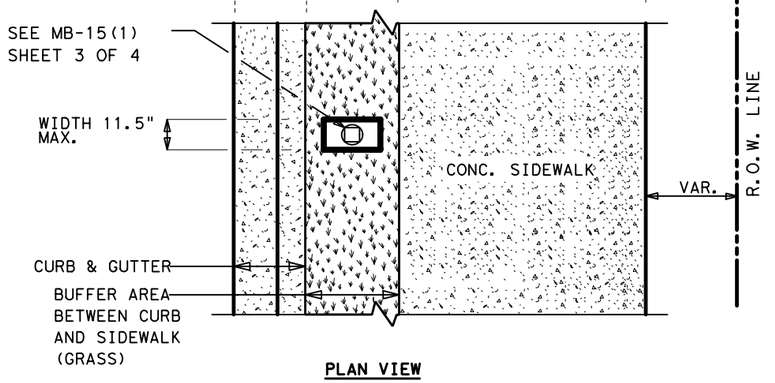


PLAN VIEW





MAILBOX SIDEWALK INSTALLATION
(DESIRABLE BORDER DISTANCE)



PLAN VIEW

Texas Department of Transportation | Maintenance Division Standard

SINGLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

MB-14(2A)

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	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		150

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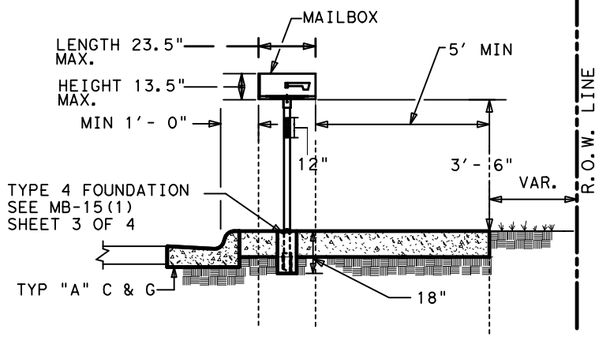
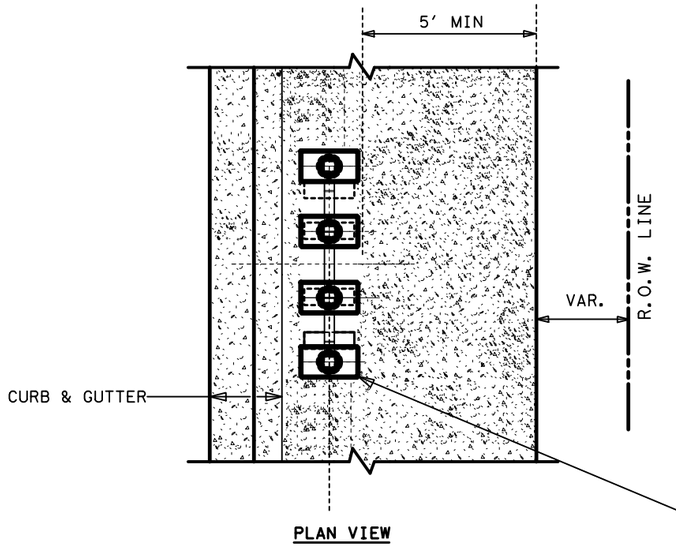
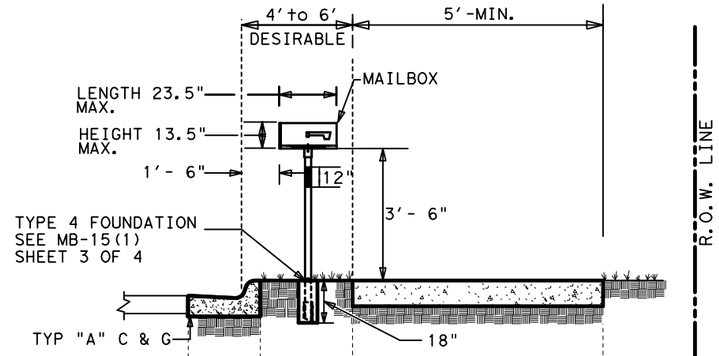


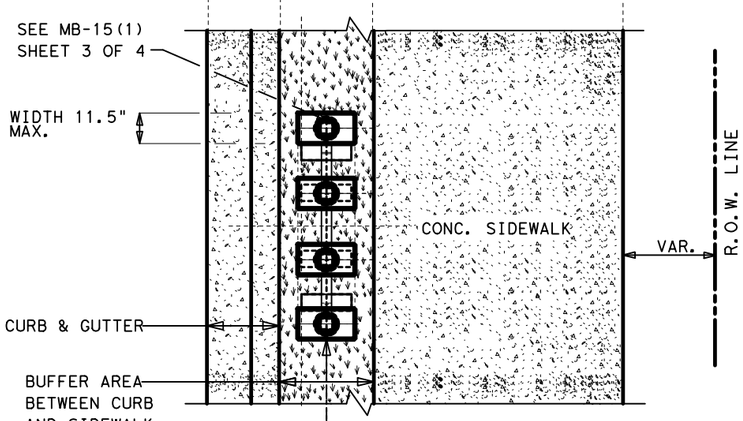
MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN
(MINIMUM BORDER DISTANCE)



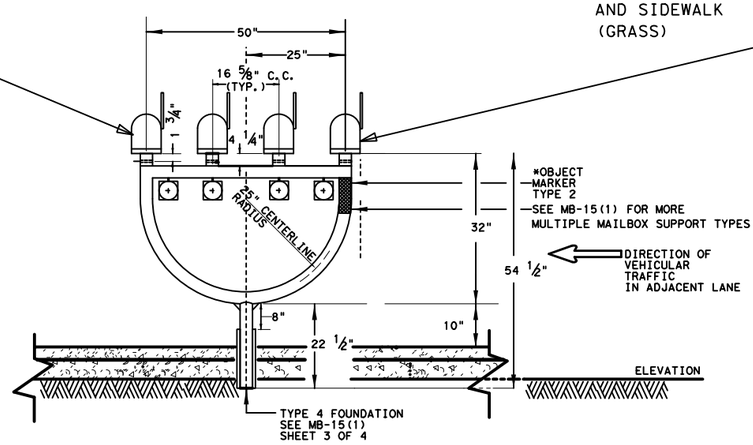
PLAN VIEW



MAILBOX SIDEWALK INSTALLATION
(DESIRABLE BORDER DISTANCE)



PLAN VIEW



SHEET 3 OF 3

Texas Department of Transportation | Maintenance Division Standard

MULTIPLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

MB-14(2B)

FILE: MB-14(2A)	DN:	CK:	DW:	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		151

6/27/2022 4:50:51 PM
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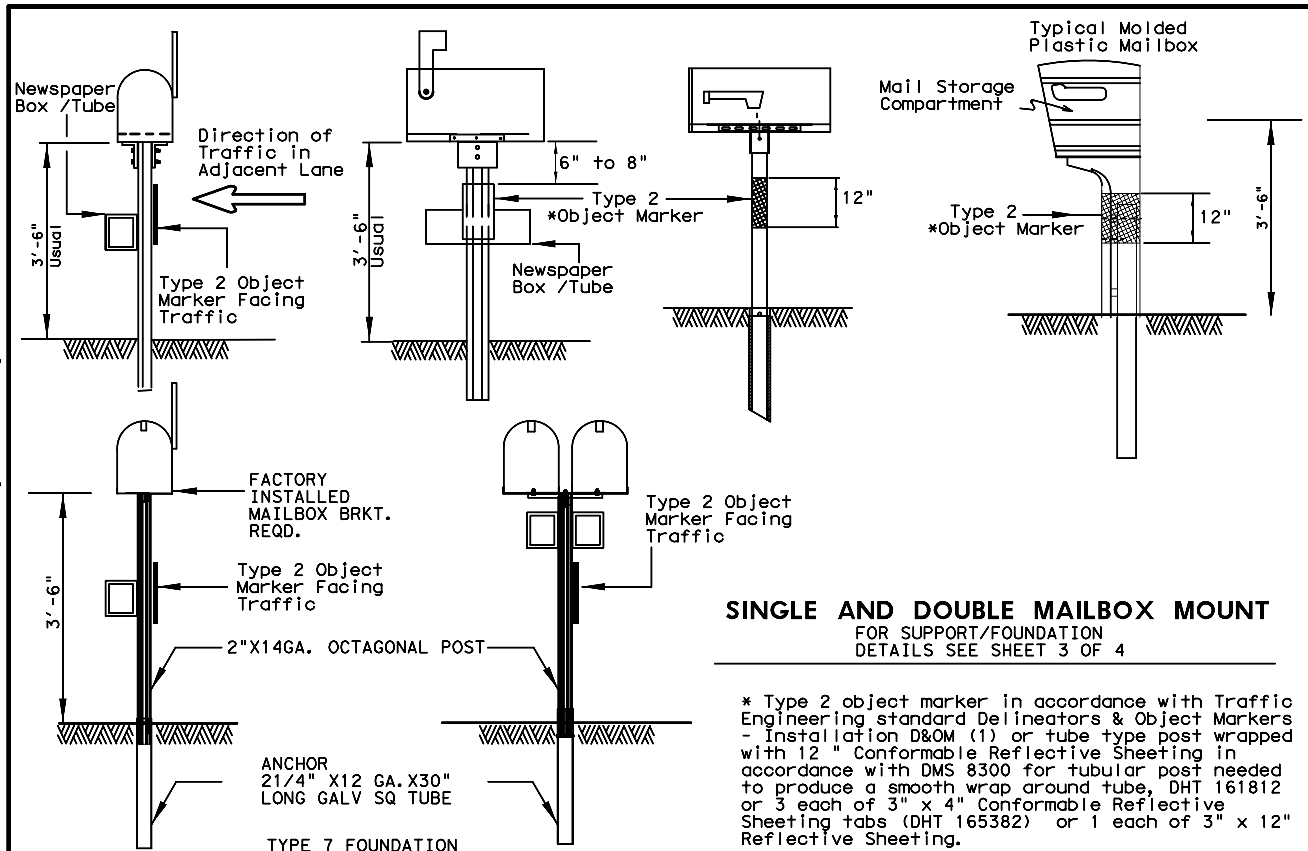


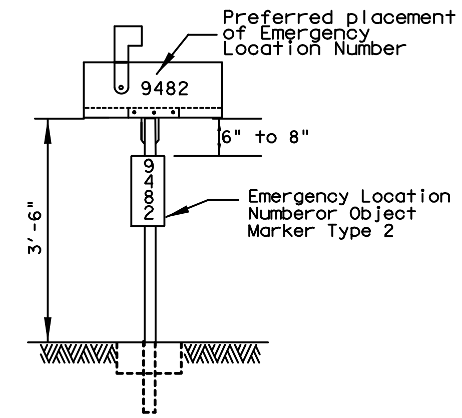
SINGLE AND DOUBLE MAILBOX MOUNT

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")

MAILBOX SIZES

SIZE	TYPICAL MAILBOX SIZE LENGTH (INCHES)	WIDTH (INCHES)	HEIGHT (INCHES)	LIGHT WEIGHT MATERIAL: SHEET METAL MAXIMUM WEIGHT (POUNDS)	**PLASTIC MAXIMUM WEIGHT (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

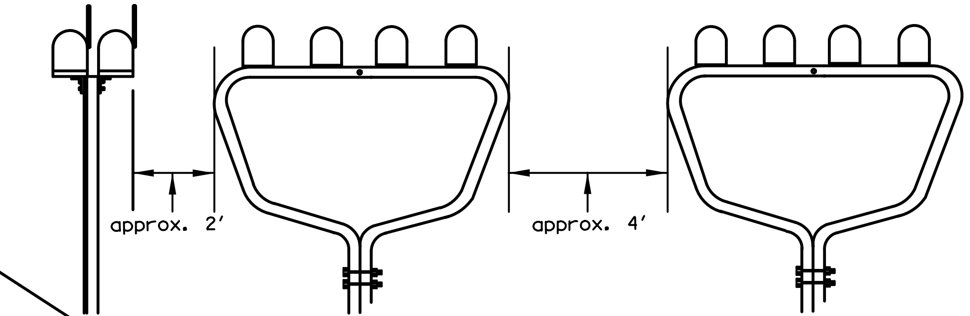
* Maximum allowed dimensions for mailbox
** Excluding Molded Plastic on 4 X 4 Post

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

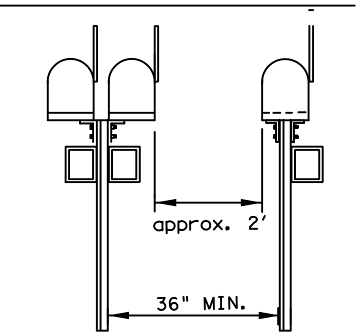
Mailboxes shall be made of light weight sheet metal or light weight plastic. Lockable architectural mailboxes shall meet the requirements of the above table.

Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.



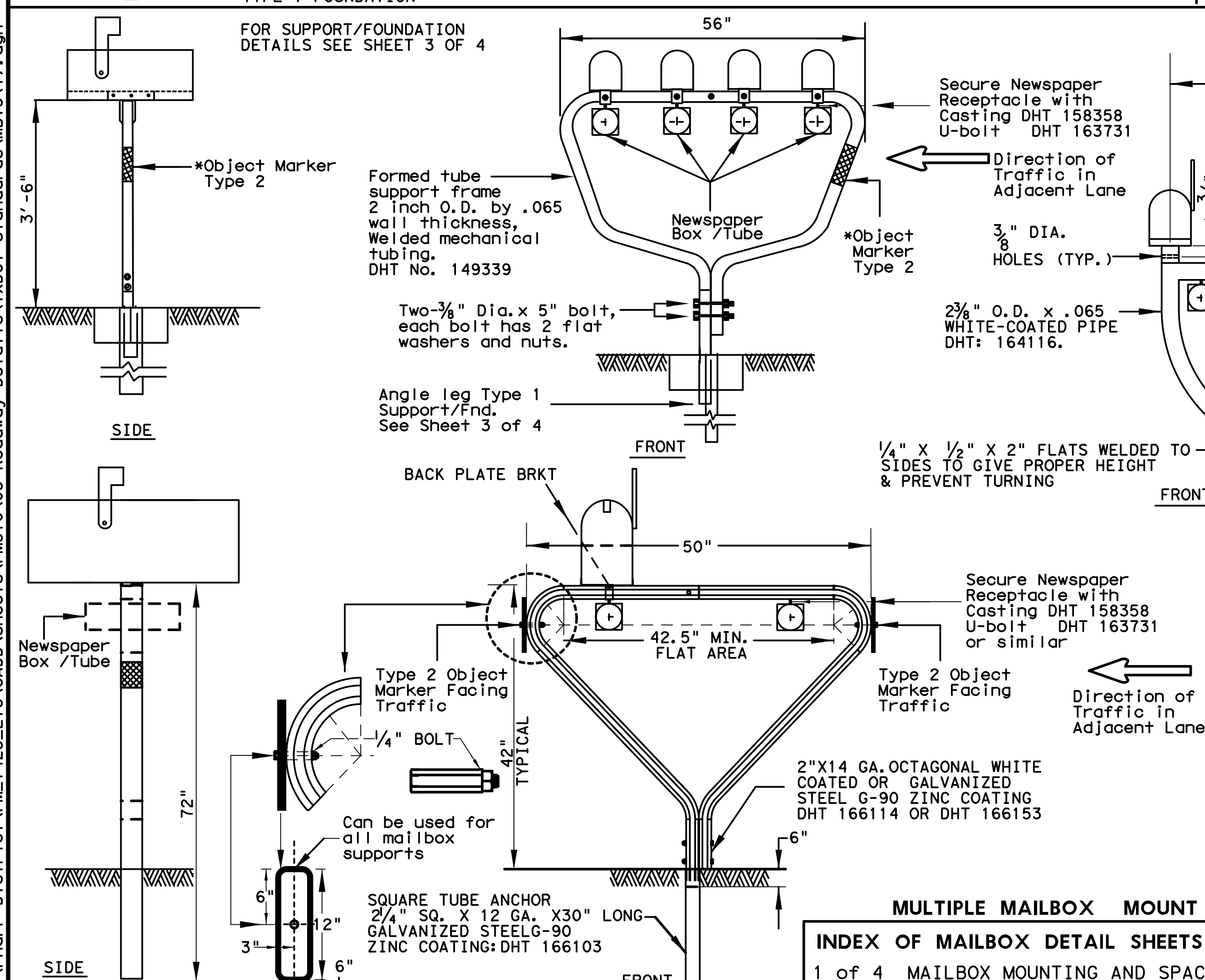
4' Clear Distance between multiple installations and 2' clearance between double or single installations and the multiple installation. DHT #'s 164116 or 149339.

MULTIPLE MAILBOX PLACEMENT

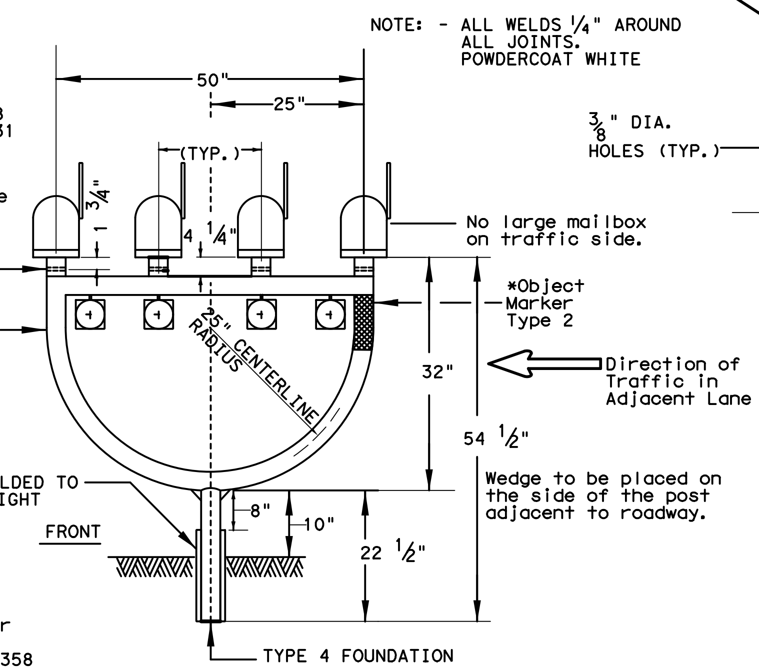


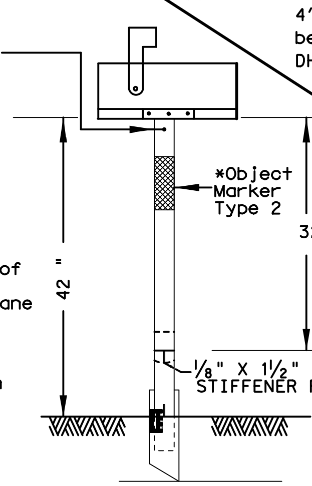
Clear Distance between single or double mounted posts. (Normally when 3 or more mailboxes are in one location, a multiple support is used).

SINGLE & DOUBLE MAILBOX PLACEMENT



MULTIPLE MAILBOX MOUNT





DOUBLE AND MULTIPLE MAILBOX MOUNT

FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4
FOR DHT NUMBERS SEE SHEET 4 OF 4

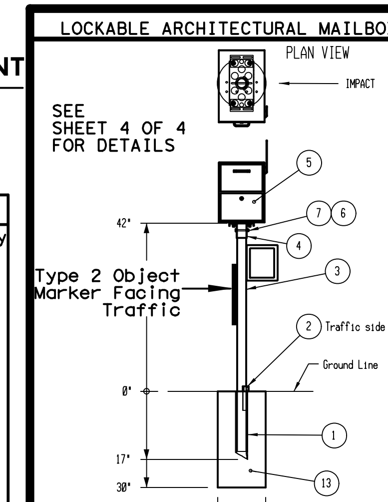
NEWSPAPER RECEPTACLE

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

SEE SHEET 4 OF 4 FOR DETAILS



INDEX OF MAILBOX DETAIL SHEETS

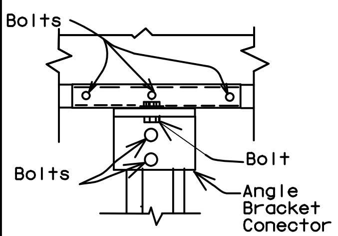
Texas Department of Transportation — Maintenance Division Standard

MAILBOX MOUNTING AND SPACING

MB-15(1)

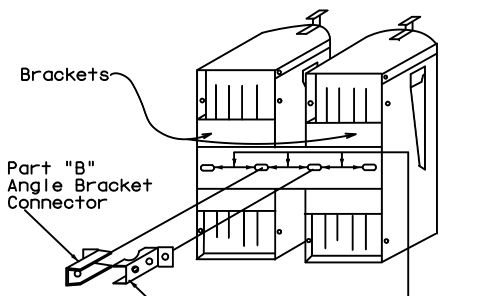
FILE: MB14(1).DGN	DN: JEO	CK: JEO	DW:	CK:
©TxDOT APRIL 2015	CONT 1057	SECT 03	JOB 045	HIGHWAY FM 510
REVISIONS: Added additional newspaper receptacle for double mailbox support	DIST PHARR		COUNTY CAMERON	SHEET NO. 152

6/27/2022 4:50:51 PM
L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\05 Roadway Details\TxDOT Standards\MB14(1).dgn



For bolt sizes see details below for "SMALL MAILBOX" and "MEDIUM AND LARGE MAILBOXES"

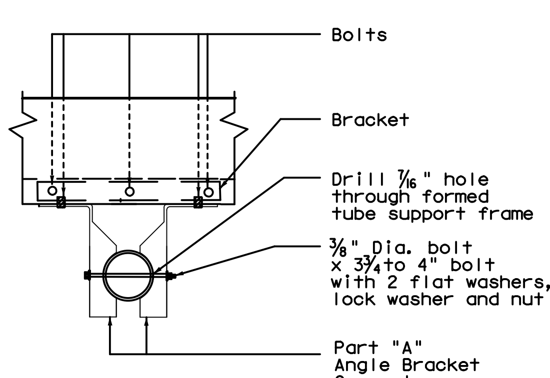
SINGLE MAILBOX



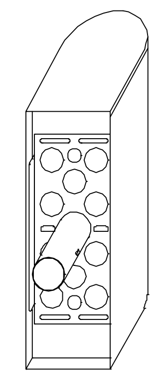
Adapter Plate to Bracket Attachment, 4 - 3/8" Dia.x 3/4" bolt; each bolt has 2 flat washers, lock washer and nut per each bolt

(Not permitted for Large Mailboxes)

DOUBLE MAILBOX

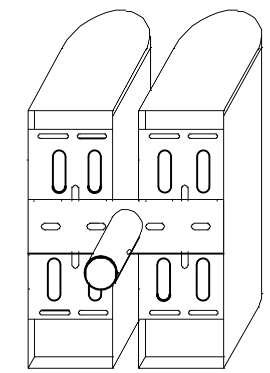


MULTIPLE MAILBOX



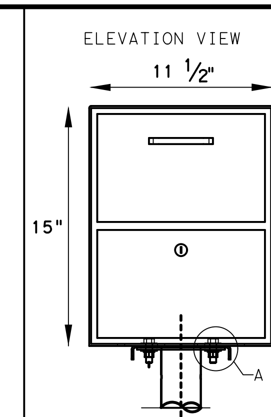
To be used with 2 3/8" OD RR or thinwall Steel posts.

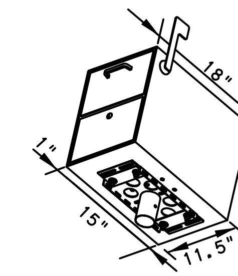
WELDED SINGLE MAILBOXBRACKET

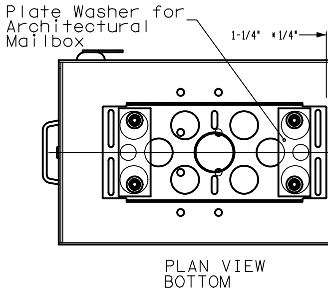


To be used with thinwall Steel posts. Not to be used with RR posts.

WELDED DOUBLE MAILBOX BRACKET WITHADAPTER PLATE







Preferred placement of Emergency Location Number

X~5.25" min; Y~5.75" min

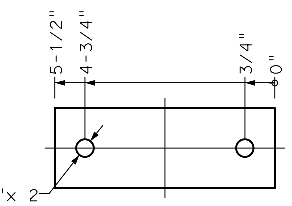
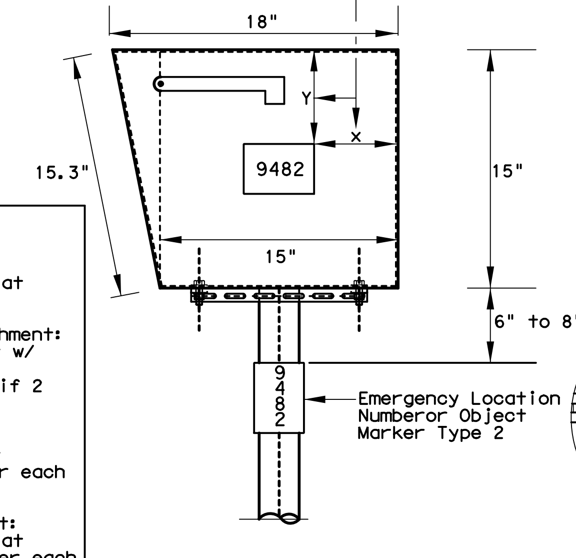
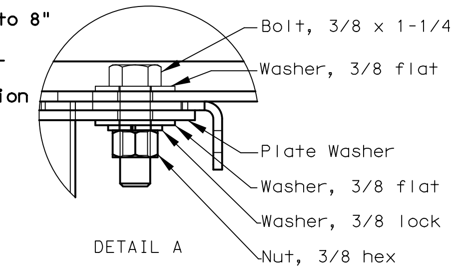
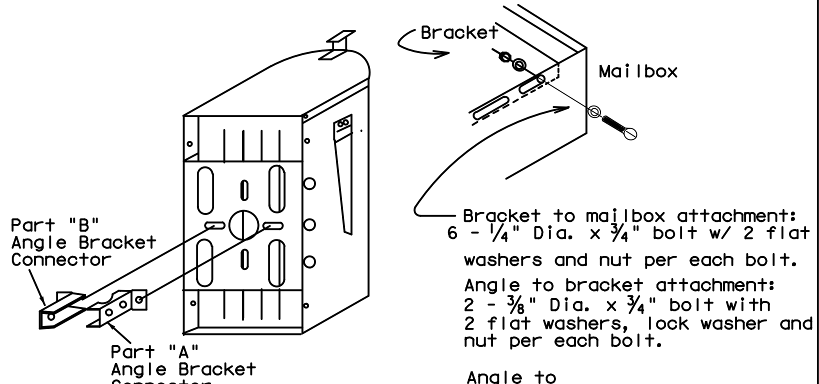


Plate Washer for Architectural Mailbox Plate, 2" x 1/8" ASTM A36 Steel





LOCKABLE ARCHITECTURAL MAILBOX CONNECTION DETAILS

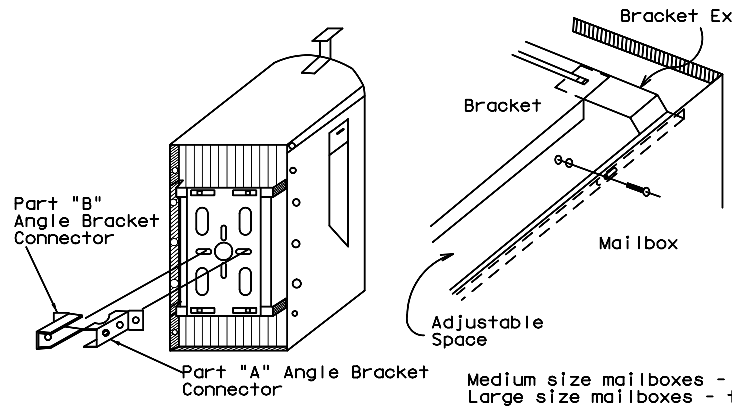


Bracket to mailbox attachment:
6 - 1/4" Dia. x 3/4" bolt w/ 2 flat washers and nut per each bolt.

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.

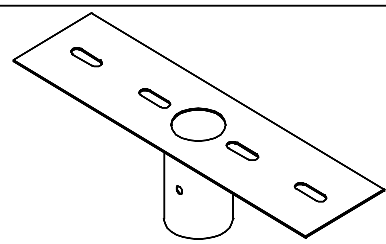
Angle to mailbox support attachment:
2 - 3/8" Dia. x 2 1/2" bolt w/2 flat washers, lock washer, and nut per each bolt.

Medium size mailboxes - one extension bracket
Large size mailboxes - two extension brackets

MEDIUM AND LARGE MAILBOXES

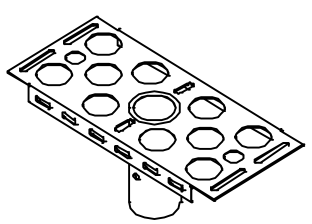
GENERAL NOTES

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.



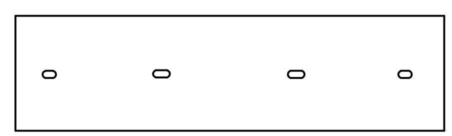
DHT 162323

For use with galvanized thinwall steel posts DHT # 143426 or powder-coated thinwall steel post DHT # 162911.



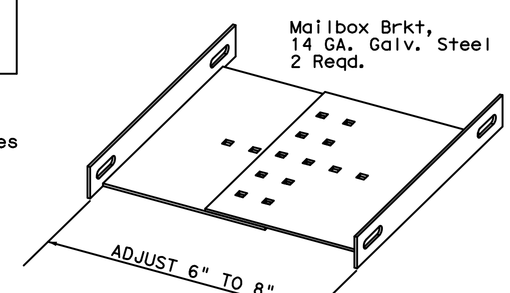
DHT 161443

For use with RCR post DHT # 161442 or galvanized thinwall steel post DHT # 143426 or powder-coated thinwall steel post. DHT # 162911.

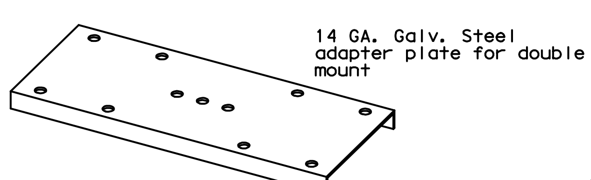


DHT #3789

Used for mounting two Mailboxes on the same post.



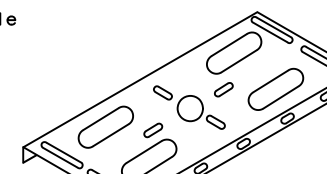
DHT 166105



DHT 166108

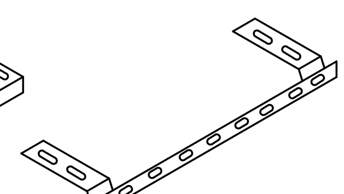
HARDWARE AT TXDOT REGIONAL WAREHOUSES

Brackets and adapter plate shown in this section should be available to the Contractor when stated elsewhere in plans or specifications.



DHT 148939

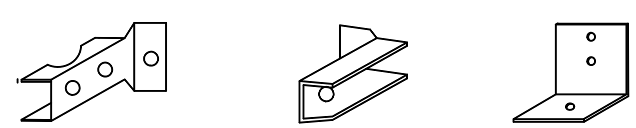
Mailbox Bracket



DHT 148938

Used for extending 6" wide bracket to attach larger mailboxes.

Bracket Extension



DHT 159489

Part "A" Angle Bracket Connector

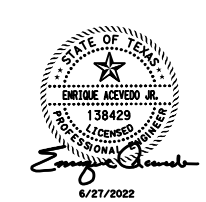
DHT 159490

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.



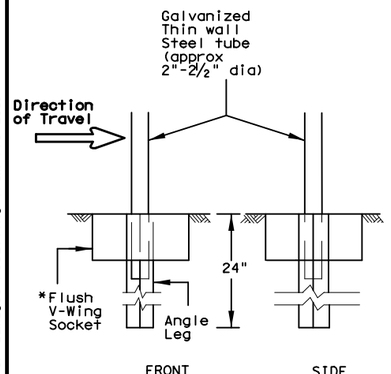
Texas Department of Transportation

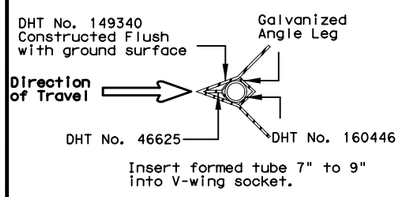
Maintenance Division Standard

MAILBOX BRACKET CONNECTING DETAILS

MB-15(1)

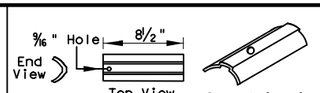
FILE: MB14(1).DGN	DN: JEO	CK:	DW: JEO	CK:
©TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS ADDED DHT 163730	1057	03	045	FM 510
	DIST		COUNTY	SHEET NO.
	PHARR		CAMERON	153





TYPE 1 SUPPORT/FOUNDATION

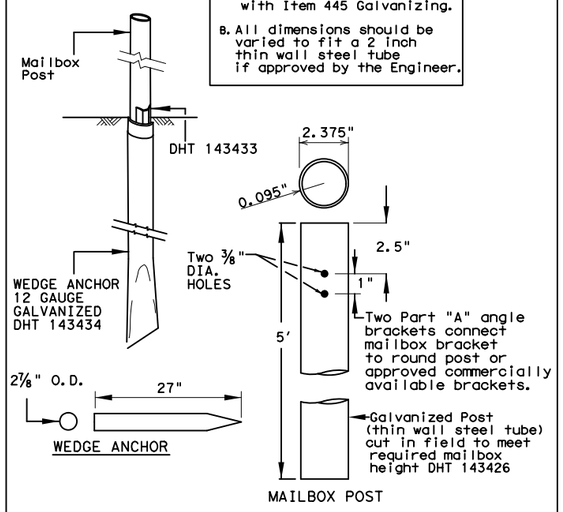
THIN WALL STEEL TUBE w/ V-LOC ANCHORAGE



NOTES FOR TYPE 2 SUPPORT/FOUNDATION

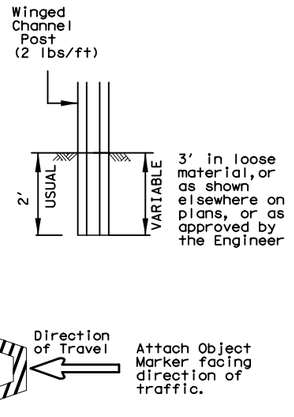
A. Galvanize steel support foundation in accordance with Item 445 Galvanizing.

B. All dimensions should be varied to fit a 2 inch thin wall steel tube if approved by the Engineer.



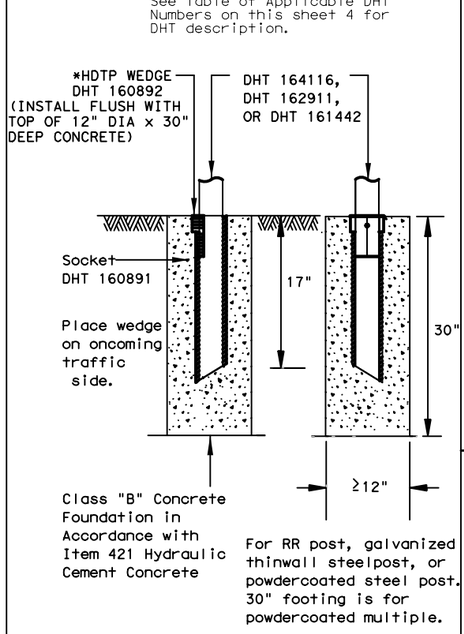
TYPE 2 SUPPORT/FOUNDATION

THIN WALL STEEL TUBE w/ WEDGE ANCHOR SYSTEM



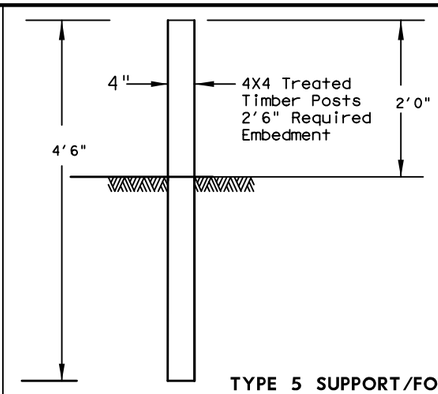
TYPE 3 SUPPORT/FOUNDATION

WINGED CHANNEL POST



TYPE 4 SUPPORT/FOUNDATION

FOR WHITECOATED STEEL POST, MULTIPLE POST, AND RECYCLED RUBBER.

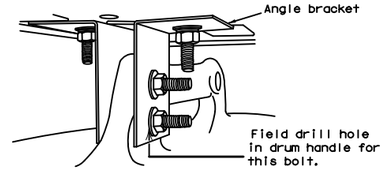


TYPE 5 SUPPORT/FOUNDATION

FOR ONE PIECE MOLDED PLASTIC MAILBOX

ONE PIECE MOLDED PLASTIC MAILBOXES

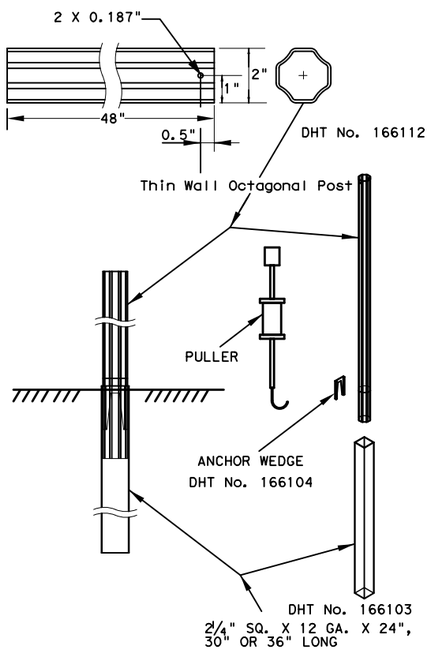
Molded Plastic Mailboxes shall be installed on 4"x4" treated timber posts only. The use of steel pipe or structural tubing in place of timber post is prohibited.



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



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

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.

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	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		154

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

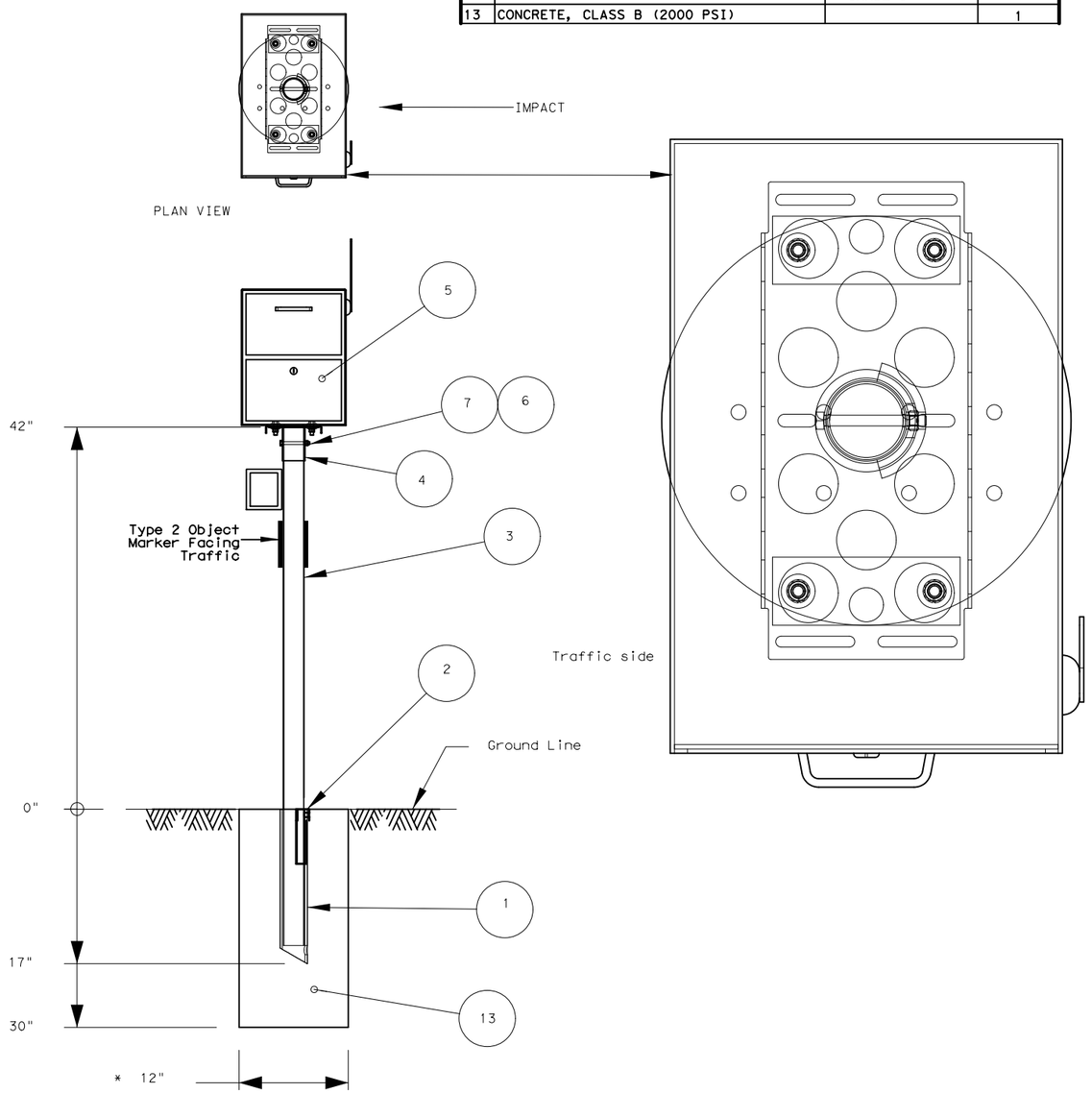


TABLE OF APPLICABLE DHT NUMBERS	
DHT NUMBER	DESCRIPTION
	FOUNDATIONS
46625	WEDGE FOR V-WING SOCKET FOR TYPE 1 FOUNDATION
149340	V-WING SOCKET FOR TYPE 1 FOUNDATION
143433	WEDGE FOR TYPE 2 FOUNDATION
143434	ANCHOR FOR TYPE 2 FOUNDATION
166103	ANCHOR FOR TYPE 7 FOUNDATION
160891	SOCKET FOR TYPE 4 FOUNDATION
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

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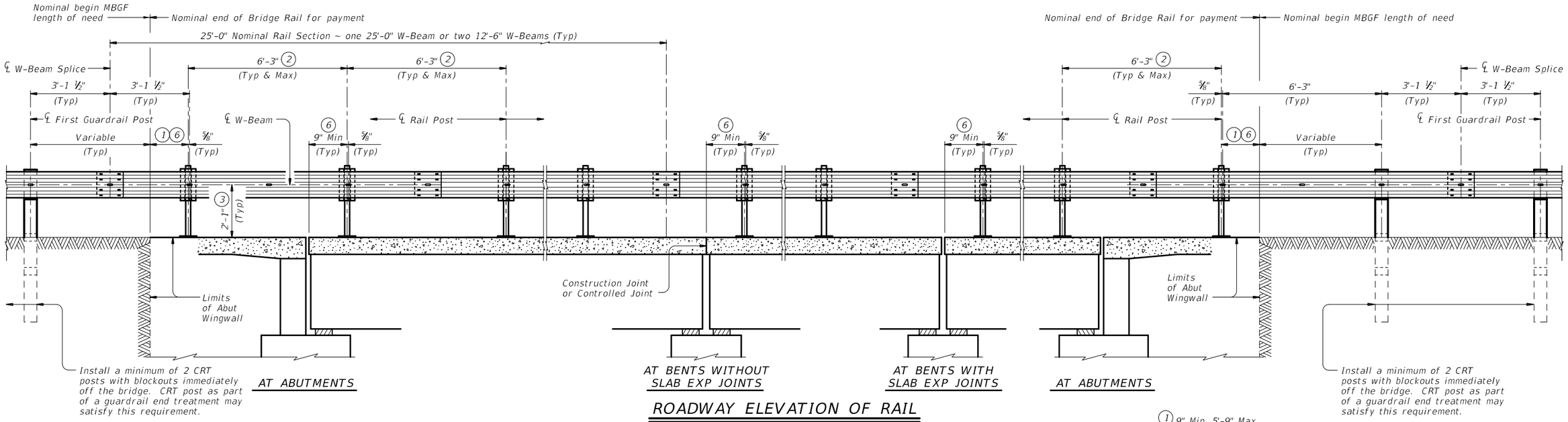
SHEET 4 OF 4

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	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		155



ROADWAY ELEVATION OF RAIL

Showing without overlay.

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

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

(3) Increase 2" for structures with overlay.

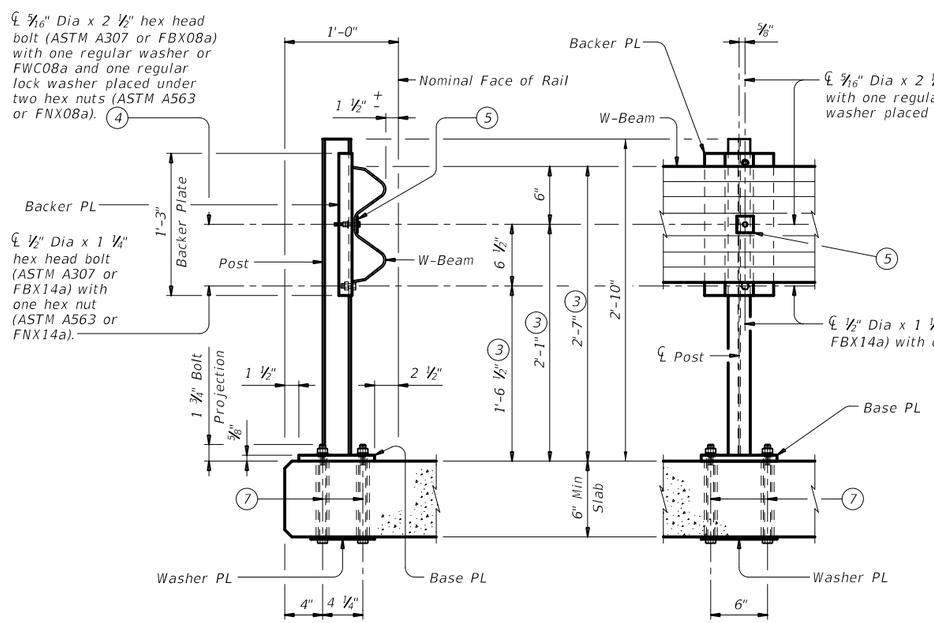
(4) Tighten the first hex nut by hand until the top and bottom edges of the W-Beam engage the Backer Plate (Backer Plate should be snug against the post). Then tighten hex nut one revolution with wrench and secure with the second hex nut.

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

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

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

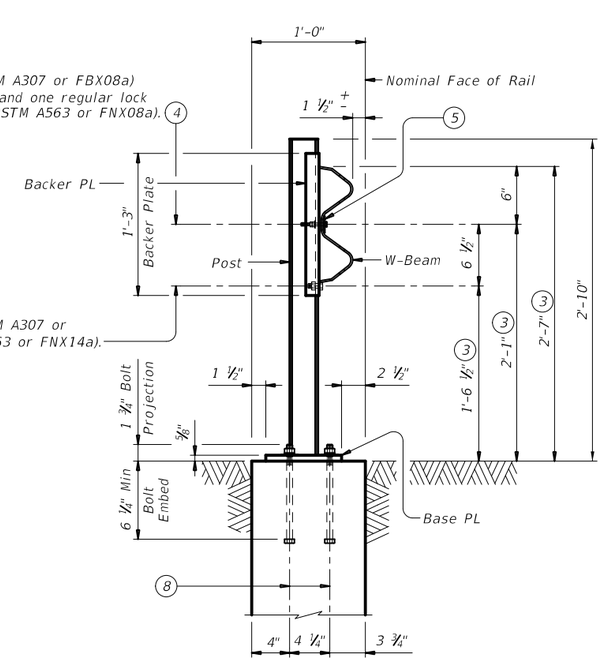
(8) ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each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



RAIL SECTION — TRAFFIC SIDE RAIL VIEW

RAIL DETAILS ON BRIDGE SLAB

Showing without overlay.



RAIL SECTION ON ABUTMENT WINGWALL

Showing without overlay.

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

SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

TRAFFIC RAIL

TYPE T631LS

FILE:	rlstd037-19.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS		1057	03	045	FM 510
		DIST	COUNTY		SHEET NO.
		PHARR	CAMERON		156

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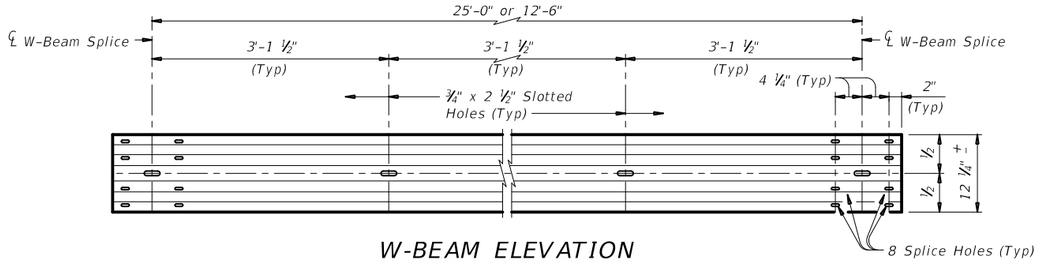
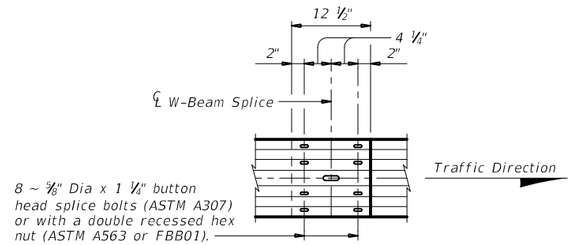
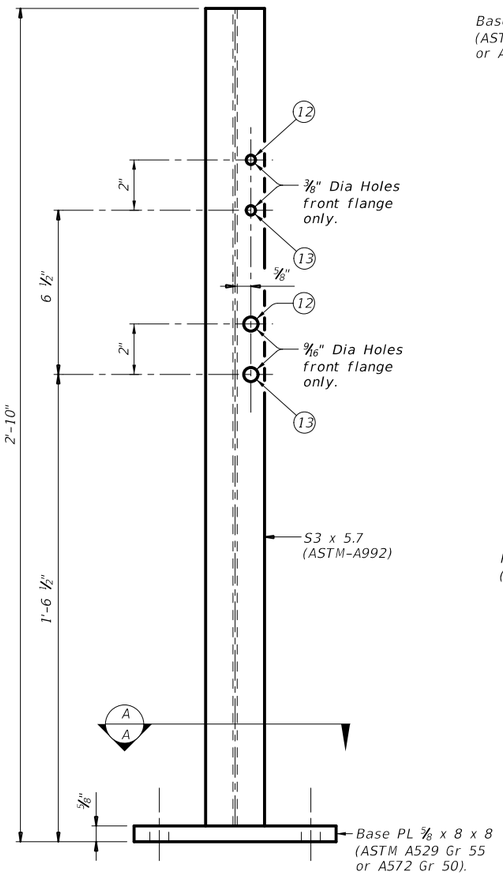


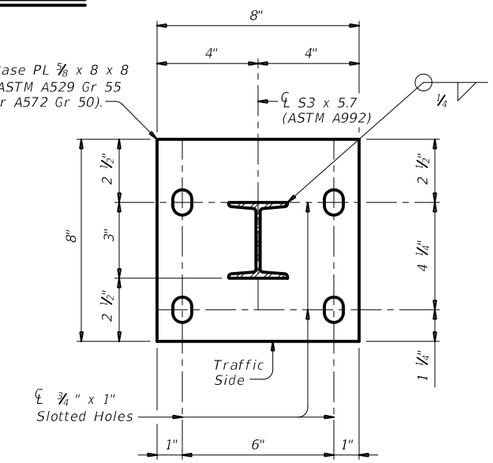
W-BEAM ELEVATION



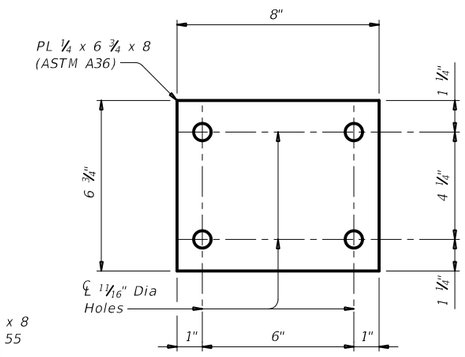
W-BEAM SPLICE ELEVATION



POST ELEVATION

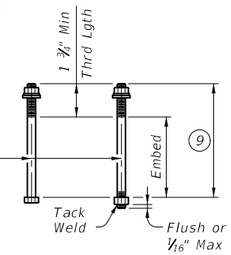


SECTION A-A



WASHER PLATE DETAIL

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



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

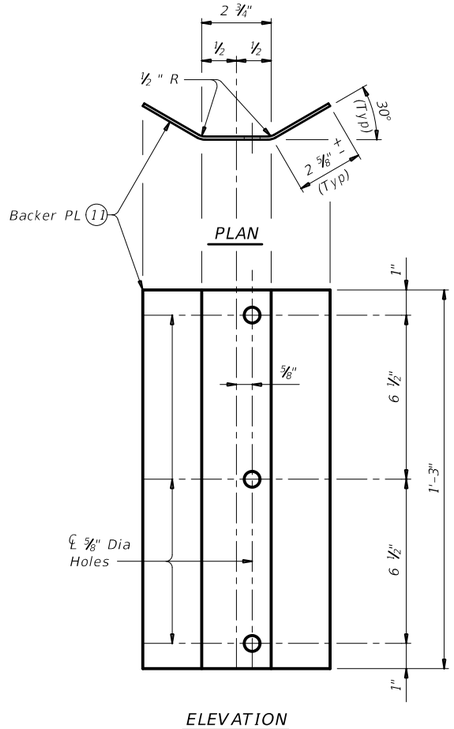
(9) See "Rail Details On Bridge Slab" and/or "Rail Section On Abutment Wingwall".

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

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

(12) Used for structures with overlay.

(13) Used for structures without overlay.



BACKER PLATE

MBGF AND END TREATMENT NOTES:

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

CONSTRUCTION NOTES:

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

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

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

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

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

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

Shop drawings are not required for this rail.

MATERIAL NOTES:

Galvanize all steel components.

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

Optional adhesive anchorage system must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

W-beam must meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'-0", or 12'-6" (Nominal) lengths. W-Beam must have slotted holes at 3'-1 ½".

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

GENERAL NOTES:

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T631LS

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		PHARR	CAMERON		157

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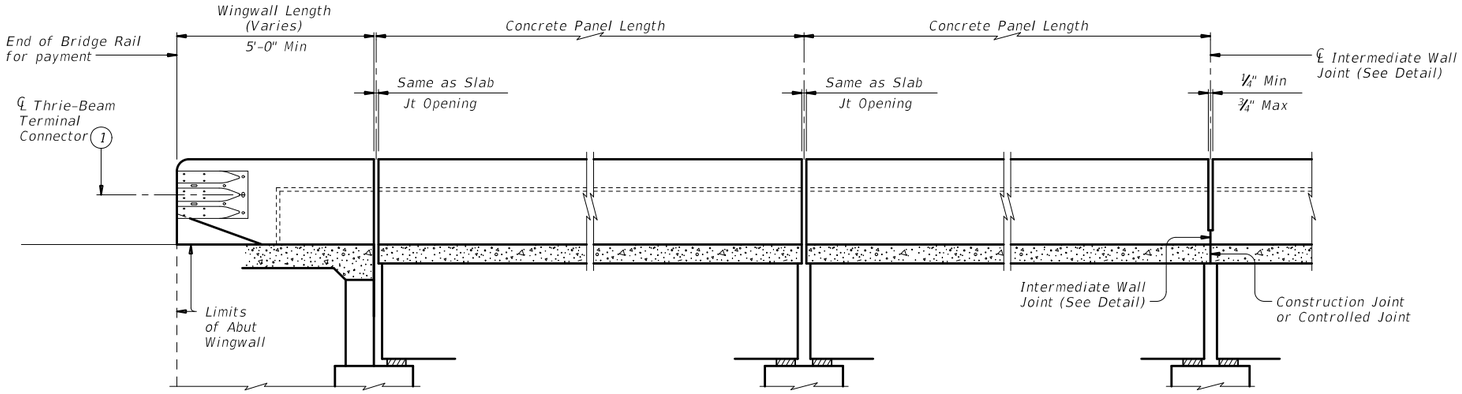
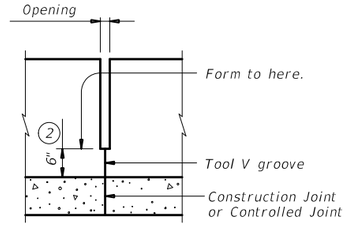


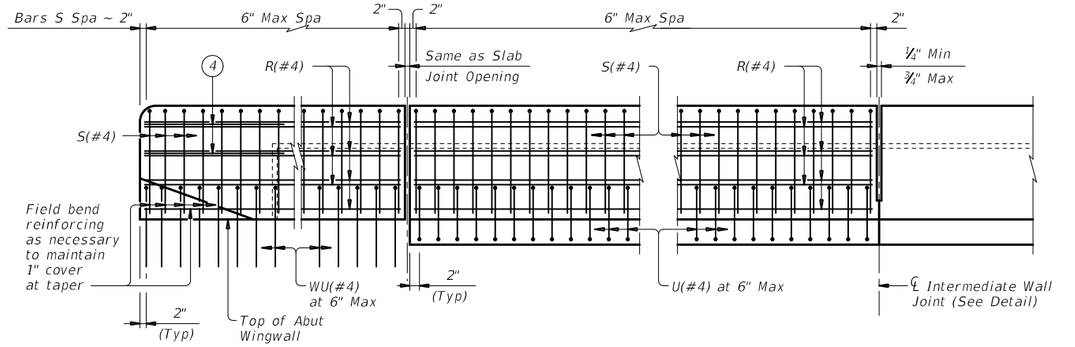
AT ABUTMENTS | AT BENTS WITH SLAB EXP JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL

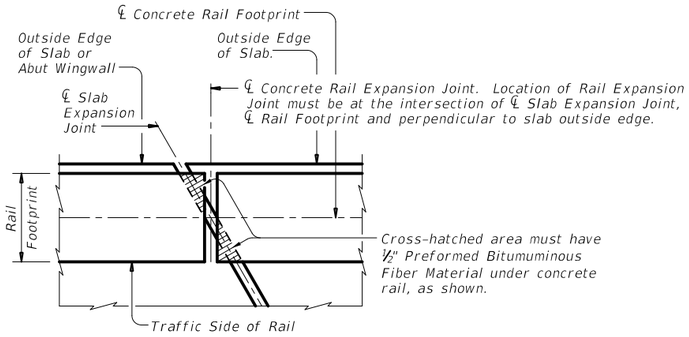


INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.



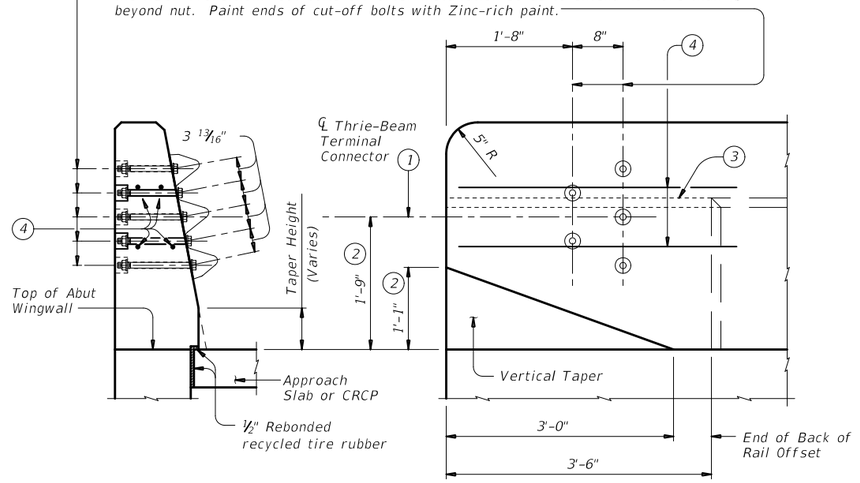
ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

℄ 5 ~ 1" Dia holes and 2 ½" Dia x 2" deep recesses. Form or core holes and recesses. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes and recesses. Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail. Tighten the 5 Terminal Connection Bolts in a well distributed pattern so to prevent damage or distortion of the Thrie-Beam Connection and the MBGF Transition. Cut bolts off after installation so as to extend no more than ¾" beyond nut. Paint ends of cut-off bolts with Zinc-rich paint.



SECTION | ELEVATION

TERMINAL CONNECTION DETAILS

1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. Increase 2" for structures with Overlay.
3. Back of rail offset may, with Engineer's approval, be continued to the end of the railing.
4. Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required.

Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL
SINGLE SLOPE

TYPE SSTR

FILE: rlstd014-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
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REVISIONS	1057	03	045	FM 510
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	PHARR	CAMERON		158

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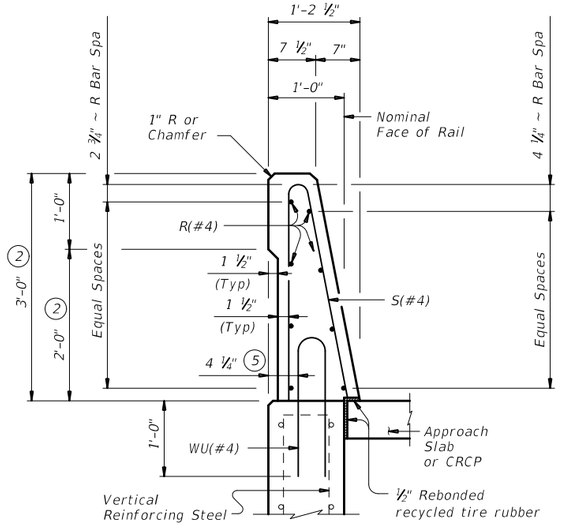
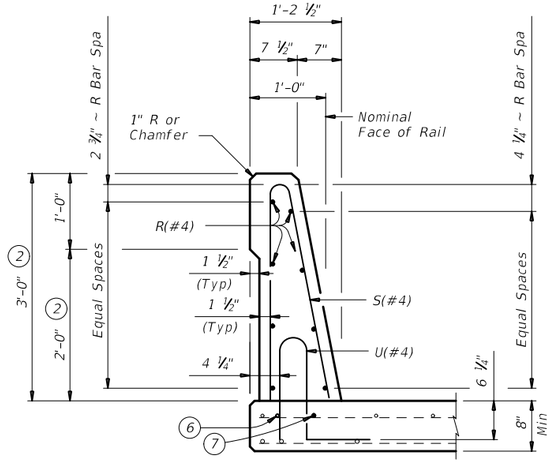


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL

(2) Increase 2" for structures with Overlay.

(5) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

(6) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars must be furnished at the Contractor's expense.

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

(8) No longitudinal wires may be within upper bend.

(9) Bend or cut as required to clear drain slots.

(10) Space U(#4) bars at 4" Max when end region of panel length is less than 6'-0" to side slot drain. Space U(#4) bars at 6" Max when end region of panel length is 6'-0" and greator to side slot drain.

CONSTRUCTION NOTES:

This railing may be constructed by the slipform process when approved by the Engineer, with equipment approved by the Engineer. Provide sensor control for both line and grade. Tack welding to provide bracing for slipform operations is acceptable. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars U, WU and S at any location on the cage. If increased bracing is needed, provide additional anchorage devices and weld in the upper two thirds of the cage. Paint welded areas on epoxy coated and/or galvanized reinforcing with an organic zinc rich paint in accordance with Item 445 "Galvanizing".

If rail is slipformed, apply an heavy epoxy bead 1" behind toe of traffic side of rail to concrete deck just prior to slip forming. Provide a ⅜" width x ¼" tall heavy epoxy bead with Type III, Class C or a Type V epoxy.

The back of railing must be vertical unless otherwise shown in the plans or approved by the Engineer.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM A1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other than shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #4 = 1'-7"

Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

This rail has been successfully evaluated by full-scale crash test to meet MASH TL-4 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Shop drawings will not be required for this rail.

Average weight of railing with no overlay is 376 plf.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

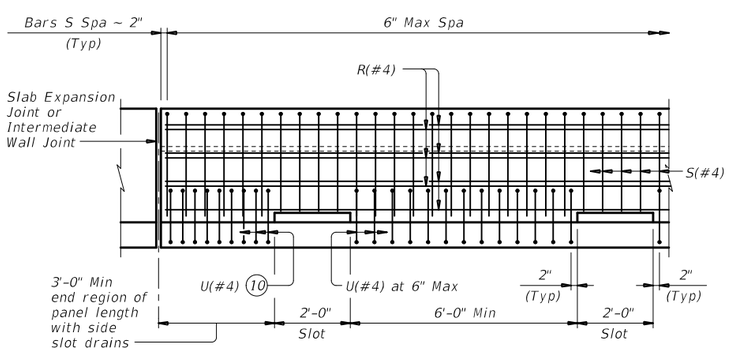
BARS S (#4)

BARS U (#4)

BARS WU (#4)

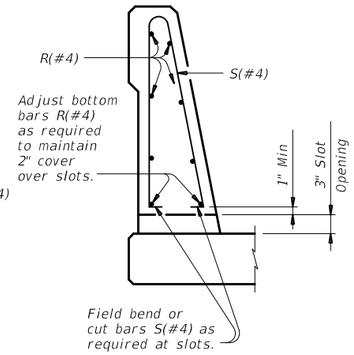
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	1.067 Sq In.	0.267 Sq In. per Ft
	No. of Wires	Spacing
Minimum	8	4"
Maximum	10	8"
Maximum Wire Size Differential	The smaller wire must have an area of 40% or more of the larger wire.	



OPTIONAL SIDE SLOT DRAIN DETAIL

Note: Side Slot Drains may be used where shown elsewhere on the plans or as directed by the Engineer. Drains should not be placed over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway surface and a sidewalk surface, side drain slots will not be permitted.



SECTION THRU OPTIONAL SIDE SLOT DRAIN

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

TYPE SSTR

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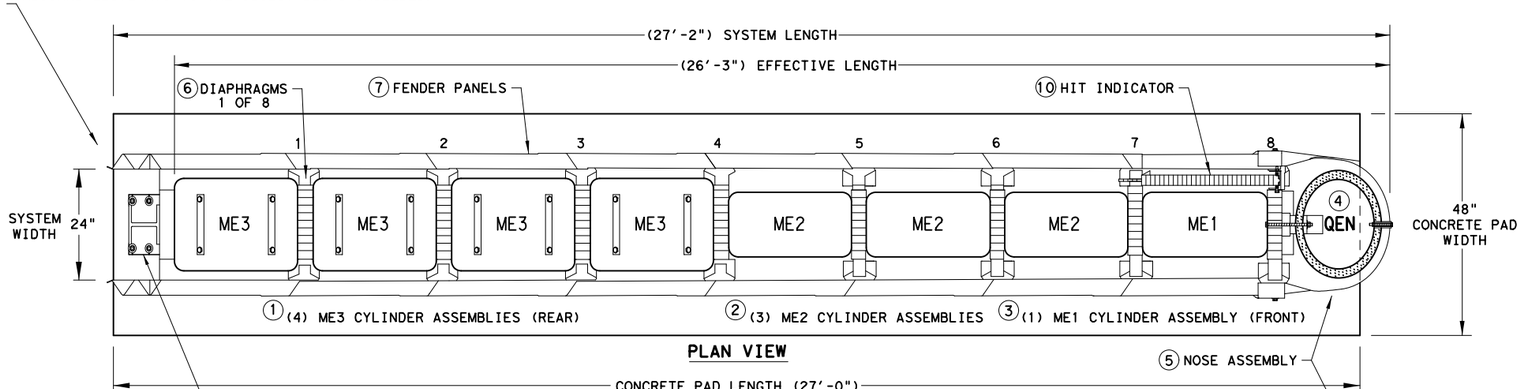
NOTE:
A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD ELITE M10 TO THE OBJECT BEING SHIELDED.

QUADGUARD EITE M10 24" WIDE (8 BAY) SYSTEM



PLAN VIEW

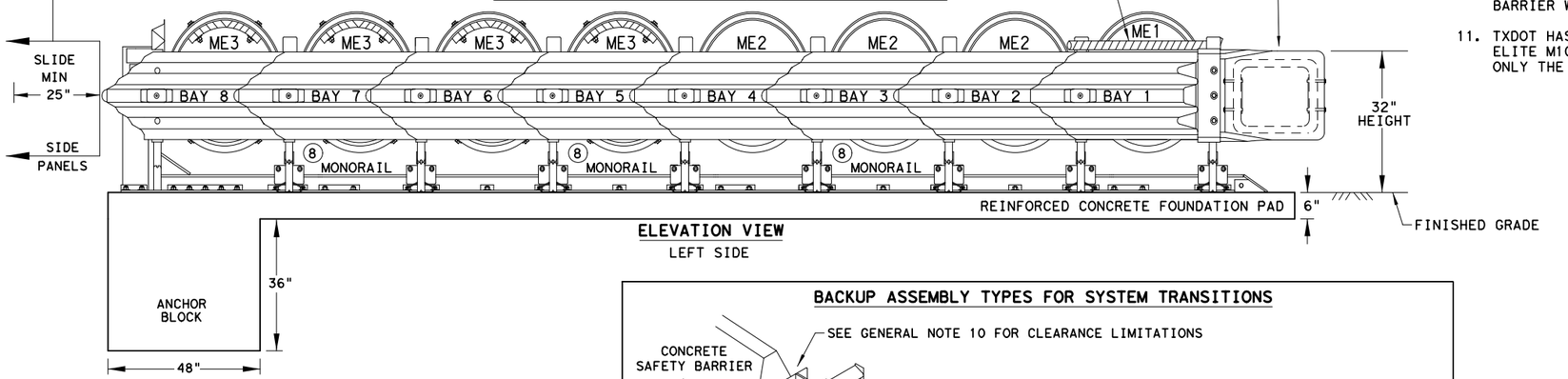
⑨ SHOWN WITH TENSION STRUT BACKUP ASSEMBLY

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:
HIT INDICATOR WILL RAISE UPON IMPACT.
⑩ HIT INDICATOR

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



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.

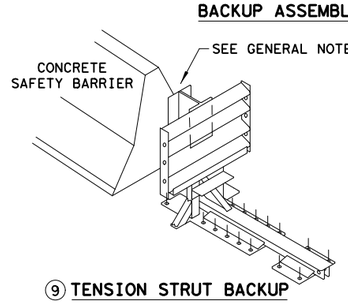
8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

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

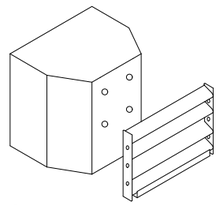


⑨ TENSION STRUT BACKUP

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:

ALL POSTS W6X8.5/9 I-BEAMS (78" 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" - APPROVED ADHESIVE
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: qgel1tem10n20.dgn	DN: TxDOT	CK: KM	DW: VP	CK: AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		160

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CULVERT LAYOUT OVERVIEW.dgn

DRAWING DATE: 6/27/2022

LEGEND:

- (#) CULVERT CROSSING NUMBER - CCID#2 (CAMERON CO. IRRIGATION DISTRICT #2)
- [#] CULVERT CROSSING NUMBER - CCDD#3 (CAMERON CO. DRAINAGE DISTRICT #3)
- △# CULVERT CROSSING NUMBER - CCID#6 (CAMERON CO. IRRIGATION DISTRICT #6)
- ⬡# CULVERT CROSSING NUMBER - CCDD#4 (CAMERON CO. DRAINAGE DISTRICT #4)

FM 3462
TOLD COUNTRY RD
FM 510
STA 14+11.75 EXIST 24" RCP
STA 21+01.85 EXIST 18" X 81' RCP
STA 27+41.76 EXIST 48" X 109' RCP
CASEY RD
STA 55+97.55 EXIST 24" RCP
STA 61+09.36 EXIST 18" X 53' RCP
MORNING GLORY CT
STA 69+67.02 EXIST 48" X 110' RCP
NELSON RD
STA 70+01.66 EXIST 24" RCP
MATCH LINE STA 73+50

MATCH LINE STA 73+50
STA 82+41.59 EXIST 24" X 88' RCP
STA 95+62.96 EXIST 30" X 67' RCP
GLENWOOD RD
STA 110+09.30 EXIST 24" X 51' RCP
STA 135+20.72 EXIST 18" X 62' RCP
STA 139+83.58 EXIST 36"X110' RCP
MATCH LINE STA 145+00

MATCH LINE STA 145+00
STA 161+37.68 EXIST 36" RCP
ADAMS RD
STA 179+78.04 EXIST 48" X 110' RCP
LINE G RD
GREEN VALLEY DR
CCID #2 LIMITS
CCID #6 LIMITS
CCID #2 LIMITS
CCID #6 LIMITS
SAN JOSE RESACA CIR
MATCH LINE STA 218+00

MATCH LINE STA 218+00
STA 231+26.60 EXIST 30" X 81' RCP
STA 243+13.20 EXIST 8' X 8' X 128' RCB
STA 251+72.42 EXIST 24" X 76'RCP
STA 252+13.37 EXIST 36" X 109' RCP
STA 252+76.21 EXIST 36" X 98' RCP
STA 268+98.30 EXIST 24" X 90' RCP
STA 282+47.18 EXIST 18" X 91'RCP
RESACA VIEW CIR
EMILY LN
FM 803 (OLMITO NORTH RD)
NOGALES DR
NOGALITOS
NOGALES DR
STA 282+10.08 EXIST 6' X 6' X 102' RCB
MATCH LINE STA 292+00

MATCH LINE STA 292+00
CCDD #3 LIMITS
CCDD #4 LIMITS
CCDD #4 LIMITS
CCDD #3 LIMITS
STA 321+86.47 EXIST 18" X 78' RCP
STA 334+71.83 EXIST 18" X 59' RCP EXIST 18" X 17' RCP
FM 1575 (OLD ALICE RD)
UPRR CROSSING
MATCH LINE STA 353+00

MATCH LINE STA 353+00
STA 361+93.75 EXIST 8' X 5' X 98' RCB
STA 390+52.95 EXIST 36" X 123' RCP
FM 1874
STA 404+72.79 EXIST 24" X 104' RCP
FM 1874

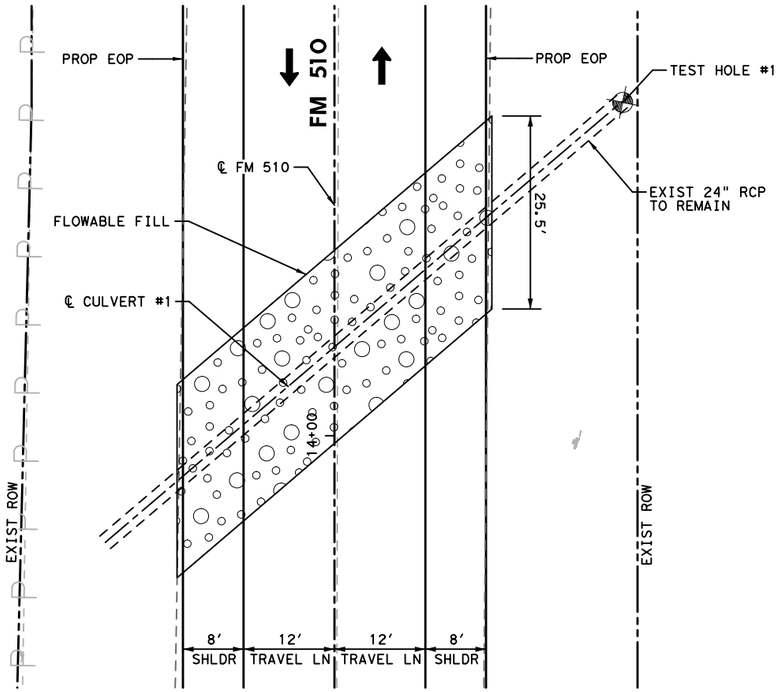
HORZ 0' 250' 500'
SCALE IN FEET

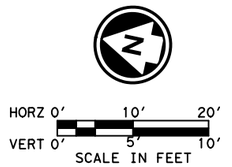
Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT OVERVIEW

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	161
CONTROL	SECTION	JOB	
1057	03	045	

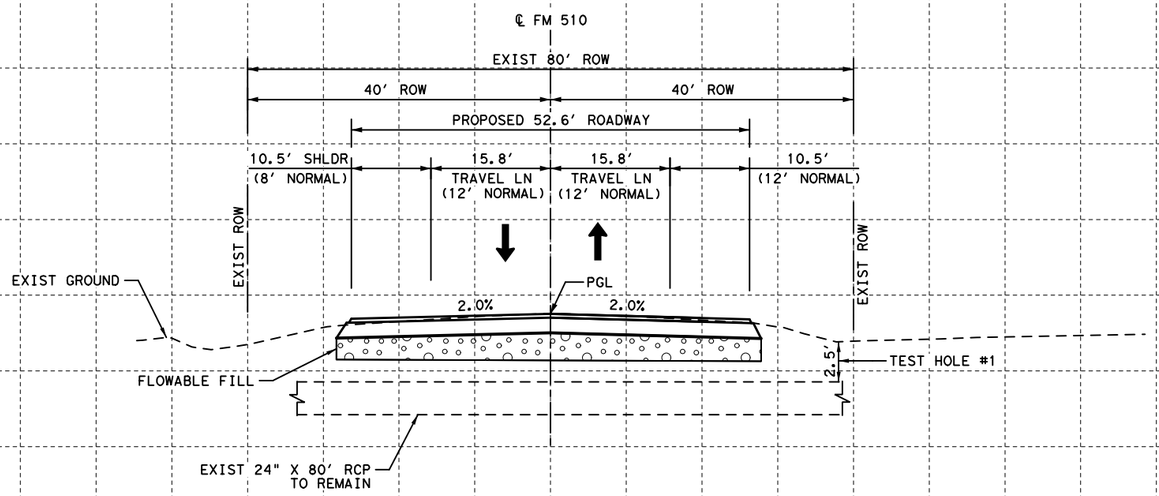




NOTES:

1. NO HYDRAULIC ANALYSIS PERFORMED FOR THIS PROJECT. EXISTING PIPES ARE TO REMAIN.
2. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.
3. EXISTING IRRIGATION AND DRAINAGE CROSSINGS ARE DRAWN BASED ON SURVEY AND THE INFORMATION FOUND IN THE AS-BUILT PLANS. CONTRACTOR SHALL VERIFY ALL EXISTING INFORMATION BEFORE PROCEEDING WITH WORK.
4. CONTRACTOR SHALL PROVIDE DITCH GRADING AT EXIST/PROP CULVERT ENDS FOR SMOOTH FL TRANSITION. THE GRADING WORK IS LIMITED TO A MAXIMUM DISTANCE OF 5FT WITHIN ROW OR PRE-APPROVED EASEMENT AND IS CONSIDERED SUBSIDIARY TO DRAINAGE BID ITEMS OF THE CONTRACT UNLESS OTHERWISE NOTED .
5. PAVEMENT MATERIAL AND THICKNESS ARE THE SAME AS THE PROPOSED TYPICAL SECTIONS.
6. SEE CULVERT LAYOUT MISCELLANEOUS DETAILS SHEET FOR PROPOSED 5" CONCRETE RIPRAP DETAIL AND FLOWABLE FILL DETAIL AS APPLICABLE.
7. CLEAN CULVERTS WITH OPENINGS DAYLIGHTED ON BOTH ENDS UNDER ITEM 480 6001 UNLESS OTHERWISE NOTED.
8. BEFORE STARTING ANY WORK AT THIS LOCATION CONTRACTOR SHALL COORDINATE WITH THE IRRIGATION OR DRAINAGE DISTRICT THAT OWNS THE CROSSING.

SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	59	CY



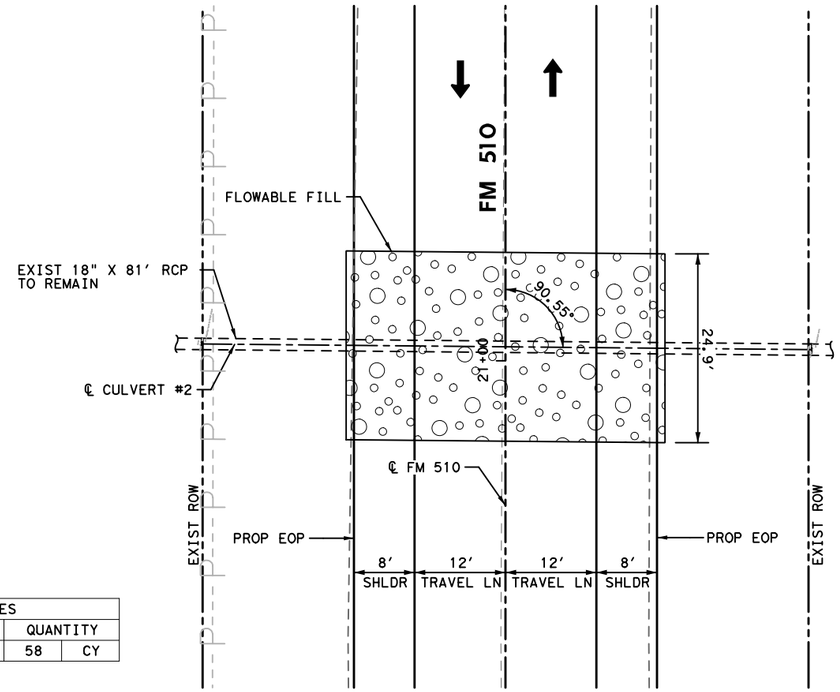
STA 14+11.75

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

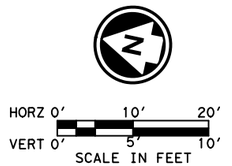
FM 510
CULVERT LAYOUT #1
(CCID#2)
AT STA 14+11.75

SHEET 1 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	162
CONTROL	SECTION	JOB	
1057	03	045	



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	58	CY



NOTES:

1. NO HYDRAULIC ANALYSIS PERFORMED FOR THIS PROJECT. EXISTING PIPES ARE TO REMAIN.
2. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.
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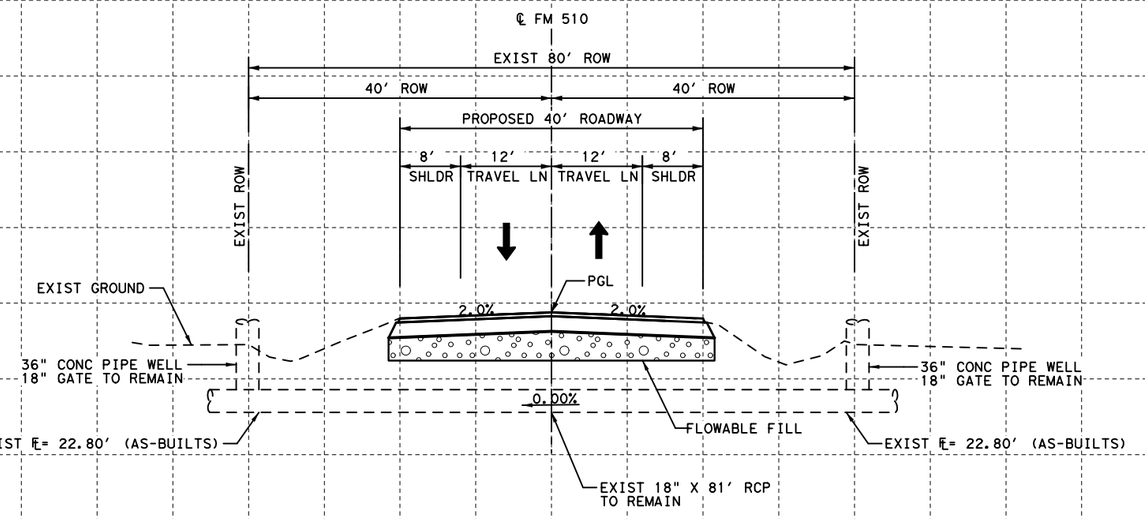
4. CONTRACTOR SHALL PROVIDE DITCH GRADING AT EXIST/PROP CULVERT ENDS FOR SMOOTH FL TRANSITION. THE GRADING WORK IS LIMITED TO A MAXIMUM DISTANCE OF 5FT WITHIN ROW OR PRE-APPROVED EASEMENT AND IS CONSIDERED SUBSIDIARY TO DRAINAGE BID ITEMS OF THE CONTRACT UNLESS OTHERWISE NOTED .
5. PAVEMENT MATERIAL AND THICKNESS ARE THE SAME AS THE PROPOSED TYPICAL SECTIONS.
6. SEE CULVERT LAYOUT MISCELLANEOUS DETAILS SHEET FOR PROPOSED 5" CONCRETE RIPRAP DETAIL AND FLOWABLE FILL DETAIL AS APPLICABLE.
7. CLEAN CULVERTS WITH OPENINGS DAYLIGHTED ON BOTH ENDS UNDER ITEM 480 6001 UNLESS OTHERWISE NOTED.
8. BEFORE STARTING ANY WORK AT THIS LOCATION CONTRACTOR SHALL COORDINATE WITH THE IRRIGATION OR DRAINAGE DISTRICT THAT OWNS THE CROSSING.



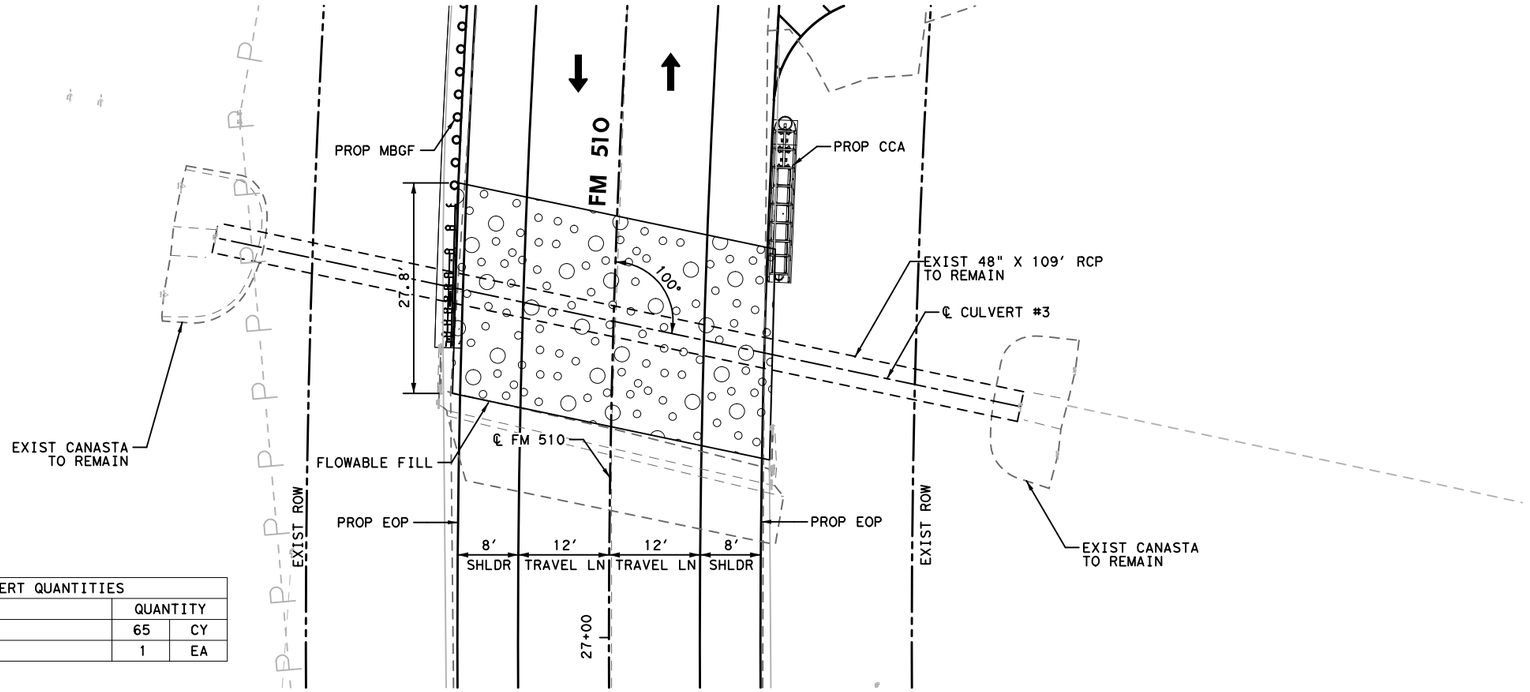
STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #2
(CCID#2)
AT STA 21+01.85

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	163
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#02.dgn
DRAWING DATE: 6/27/2022



HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET

SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	65	CY
480 6001	CLEAN EXIST CULVERTS	1	EA

NOTES:

1. NO HYDRAULIC ANALYSIS PERFORMED FOR THIS PROJECT. EXISTING PIPES ARE TO REMAIN.
2. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.
3. EXISTING IRRIGATION AND DRAINAGE CROSSINGS ARE DRAWN BASED ON SURVEY AND THE INFORMATION FOUND IN THE AS-BUILT PLANS. CONTRACTOR SHALL VERIFY ALL EXISTING INFORMATION BEFORE PROCEEDING WITH WORK.
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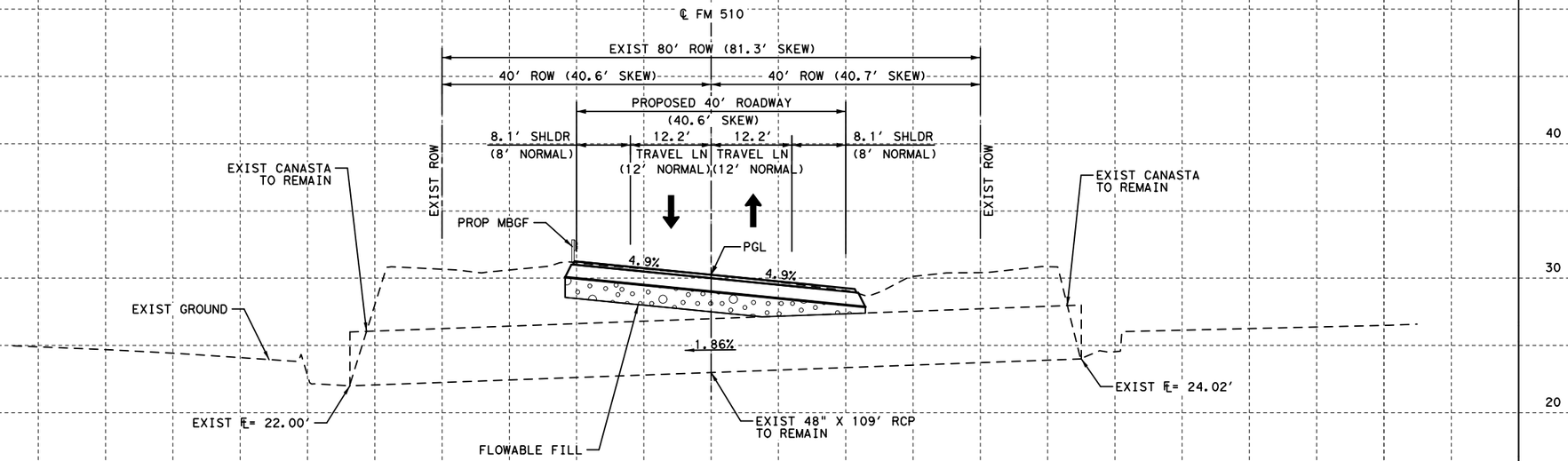

STA 27+41.76

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

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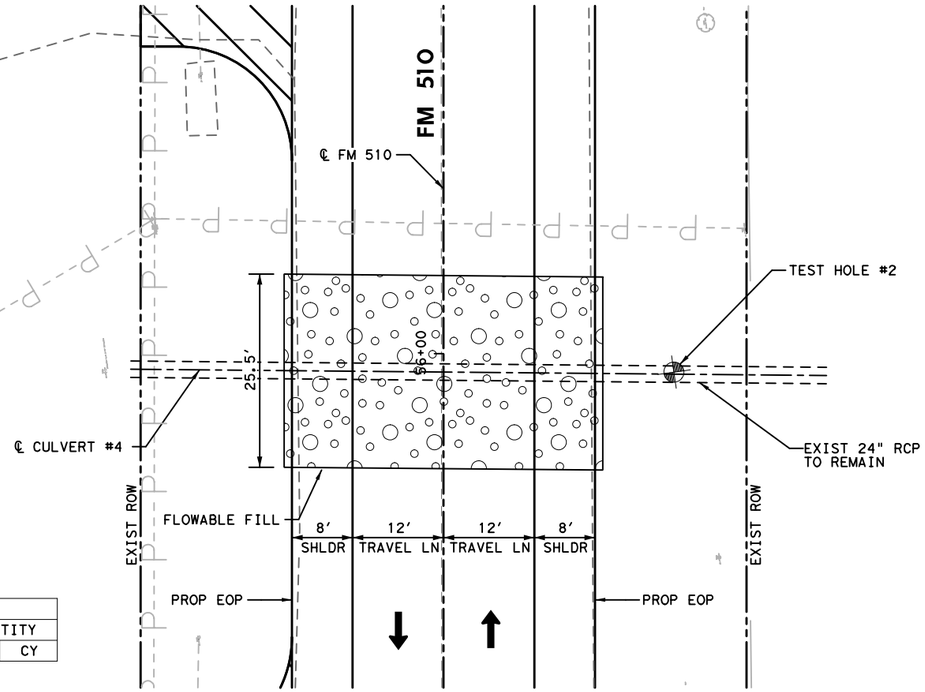
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #3
(CCID#2)
AT STA 27+41.76

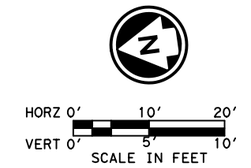
SHEET 3 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	164
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#03.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	60	CY



NOTES:

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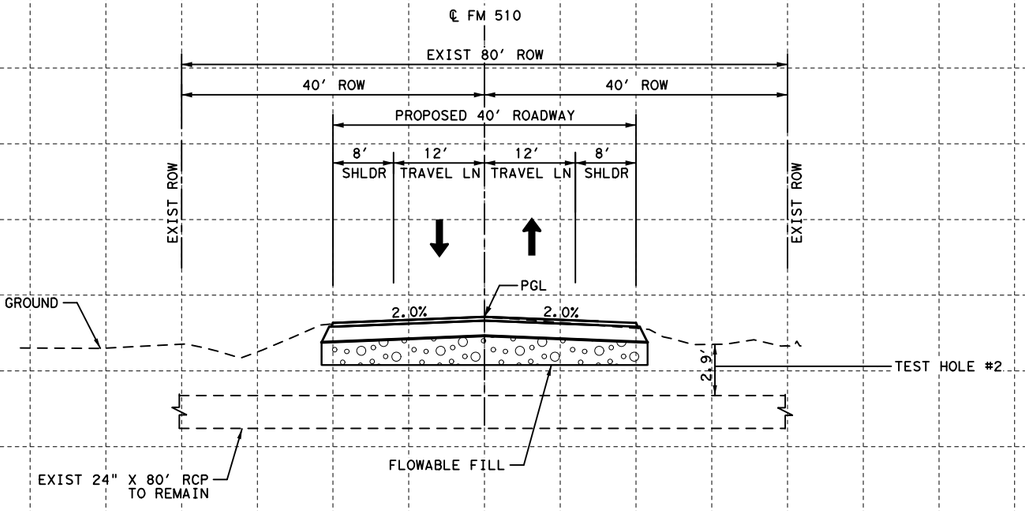
6. SEE CULVERT LAYOUT MISCELLANEOUS DETAILS SHEET FOR PROPOSED 5" CONCRETE RIPRAP DETAIL AND FLOWABLE FILL DETAIL AS APPLICABLE.
7. CLEAN CULVERTS WITH OPENINGS DAYLIGHTED ON BOTH ENDS UNDER ITEM 480 6001 UNLESS OTHERWISE NOTED.
8. BEFORE STARTING ANY WORK AT THIS LOCATION CONTRACTOR SHALL COORDINATE WITH THE IRRIGATION OR DRAINAGE DISTRICT THAT OWNS THE CROSSING.



STA 55+97.55

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

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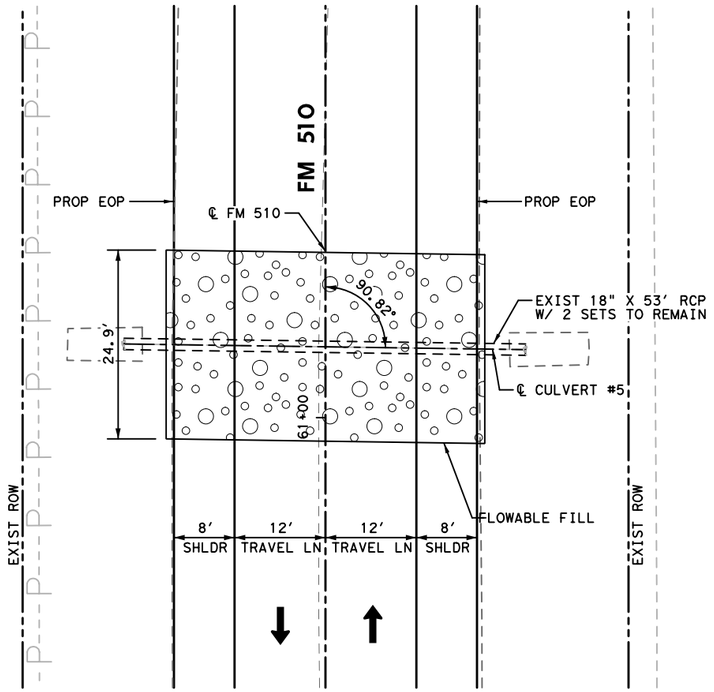
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #4
(CCID#2)
AT STA 55+97.55

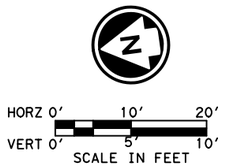
SHEET 4 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	165
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#04.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	58	CY
480 6001	CLEAN EXIST CULVERTS	1	EA
658 6048	INSTL OM ASSM (OM-22)(FLX) GND	2	EA
658 6060	REMOVE DELIN & OBJECT MARKER ASSMS	1	EA



NOTES:

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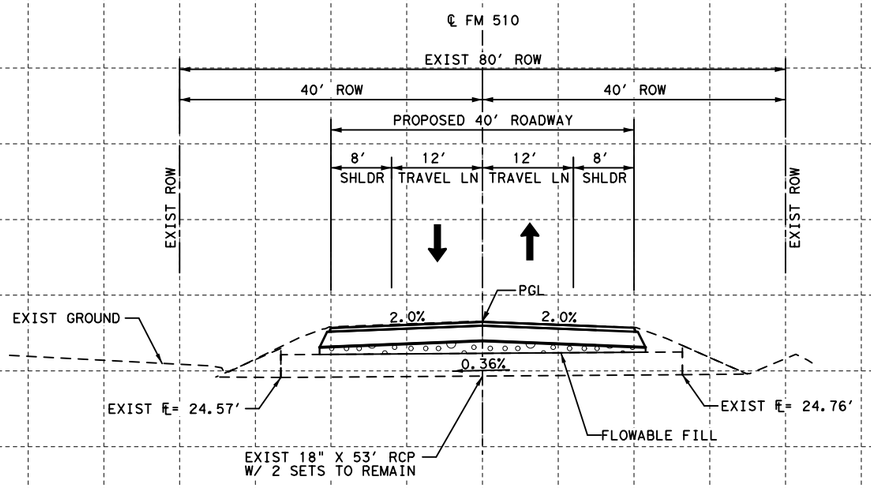

STA 61+09.36

6/27/2022

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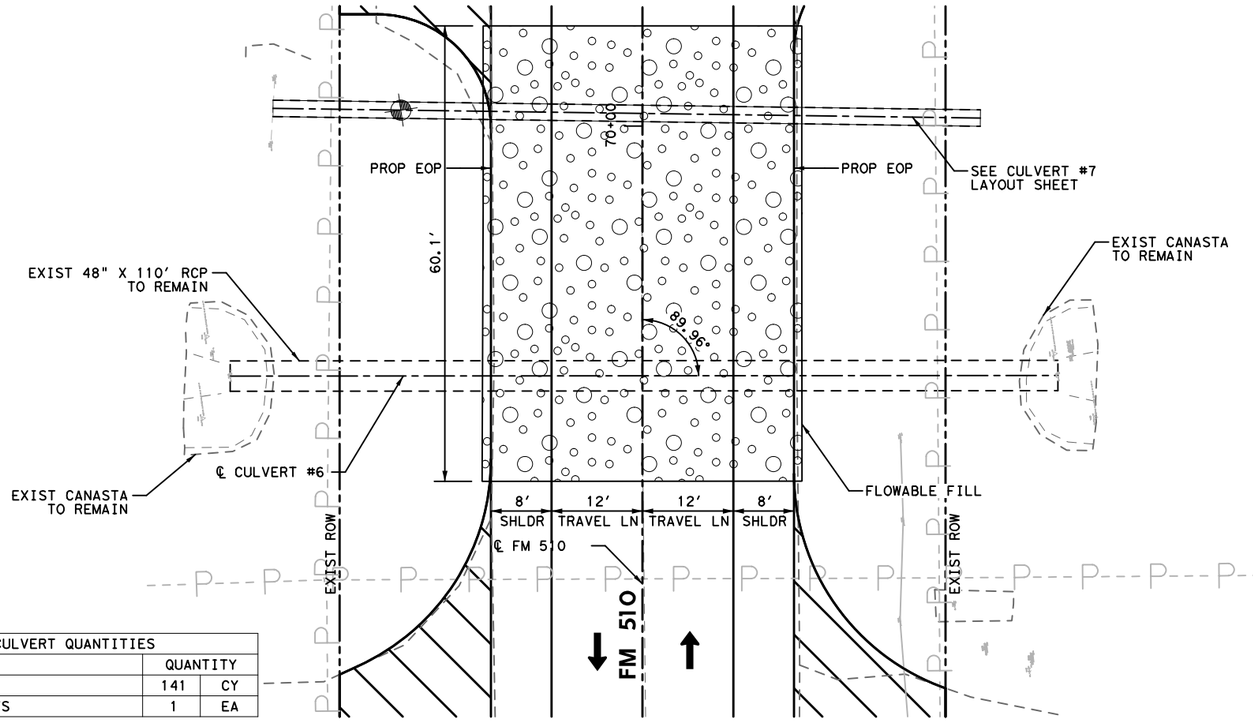
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

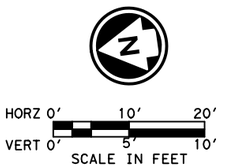
FM 510
CULVERT LAYOUT #5
(CCDD#3)
AT STA 61+09.36

SHEET 5 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	166
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#05.dgn
DRAWING DATE: 6/27/2022





NOTES:

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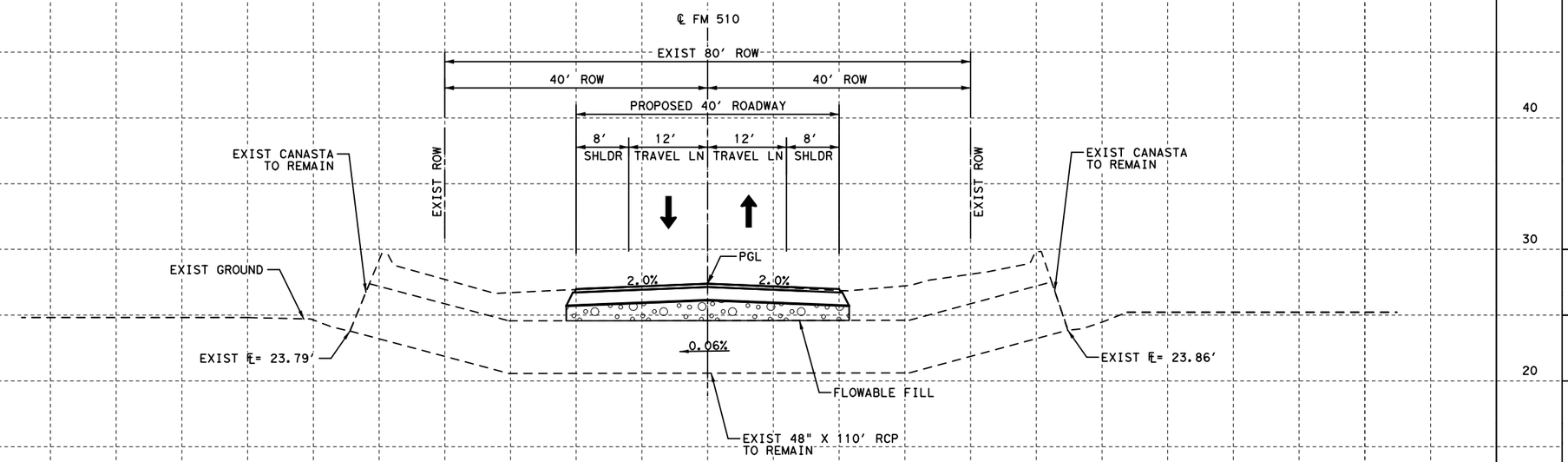
8. BEFORE STARTING ANY WORK AT THIS LOCATION CONTRACTOR SHALL COORDINATE WITH THE IRRIGATION OR DRAINAGE DISTRICT THAT OWNS THE CROSSING.

SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	141	CY
480 6001	CLEAN EXIST CULVERTS	1	EA



STA 69+67.02

6/27/2022

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7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

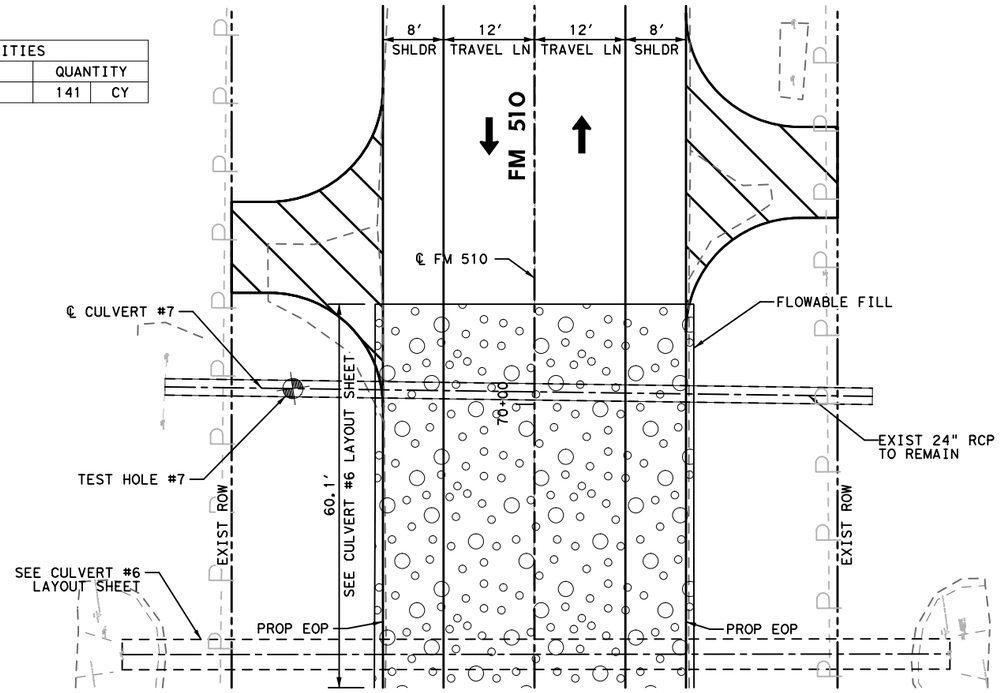
FM 510
CULVERT LAYOUT #6
(CCID#2)
AT STA 69+67.02

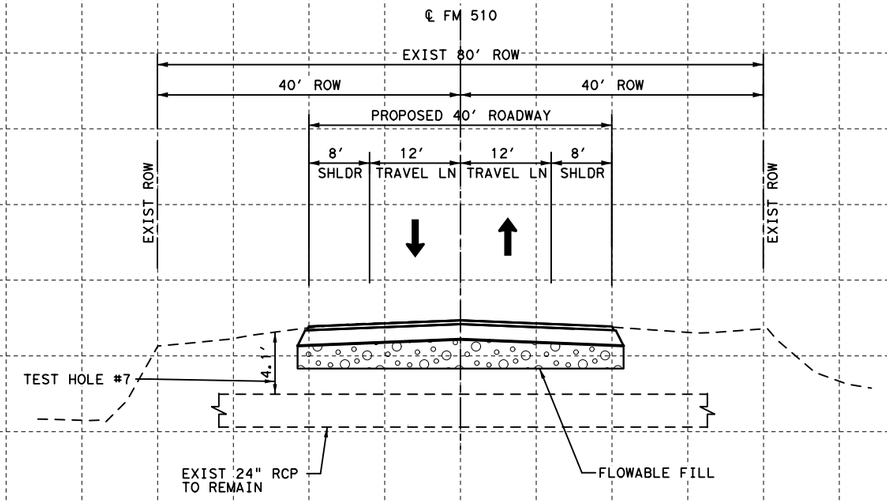
SHEET 6 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	167
CONTROL	SECTION	JOB	
1057	03	045	

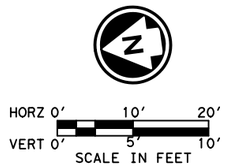
FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#06.dgn
DRAWING DATE: 6/27/2022

SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	141	CY





STA 70+01.66



NOTES:

1. NO HYDRAULIC ANALYSIS PERFORMED FOR THIS PROJECT. EXISTING PIPES ARE TO REMAIN.
2. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.
3. EXISTING IRRIGATION AND DRAINAGE CROSSINGS ARE DRAWN BASED ON SURVEY AND THE INFORMATION FOUND IN THE AS-BUILT PLANS. CONTRACTOR SHALL VERIFY ALL EXISTING INFORMATION BEFORE PROCEEDING WITH WORK.
4. CONTRACTOR SHALL PROVIDE DITCH GRADING AT EXIST/PROP CULVERT ENDS FOR SMOOTH FL TRANSITION. THE GRADING WORK IS LIMITED TO A MAXIMUM DISTANCE OF 5FT WITHIN ROW OR PRE-APPROVED EASEMENT AND IS CONSIDERED SUBSIDIARY TO DRAINAGE BID ITEMS OF THE CONTRACT UNLESS OTHERWISE NOTED .
5. PAVEMENT MATERIAL AND THICKNESS ARE THE SAME AS THE PROPOSED TYPICAL SECTIONS.
6. SEE CULVERT LAYOUT MISCELLANEOUS DETAILS SHEET FOR PROPOSED 5" CONCRETE RIPRAP DETAIL AND FLOWABLE FILL DETAIL AS APPLICABLE.
7. CLEAN CULVERTS WITH OPENINGS DAYLIGHTED ON BOTH ENDS UNDER ITEM 480 6001 UNLESS OTHERWISE NOTED.
8. BEFORE STARTING ANY WORK AT THIS LOCATION CONTRACTOR SHALL COORDINATE WITH THE IRRIGATION OR DRAINAGE DISTRICT THAT OWNS THE CROSSING.

6/27/2022

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

CULVERT LAYOUT #7

(CCDD#3)

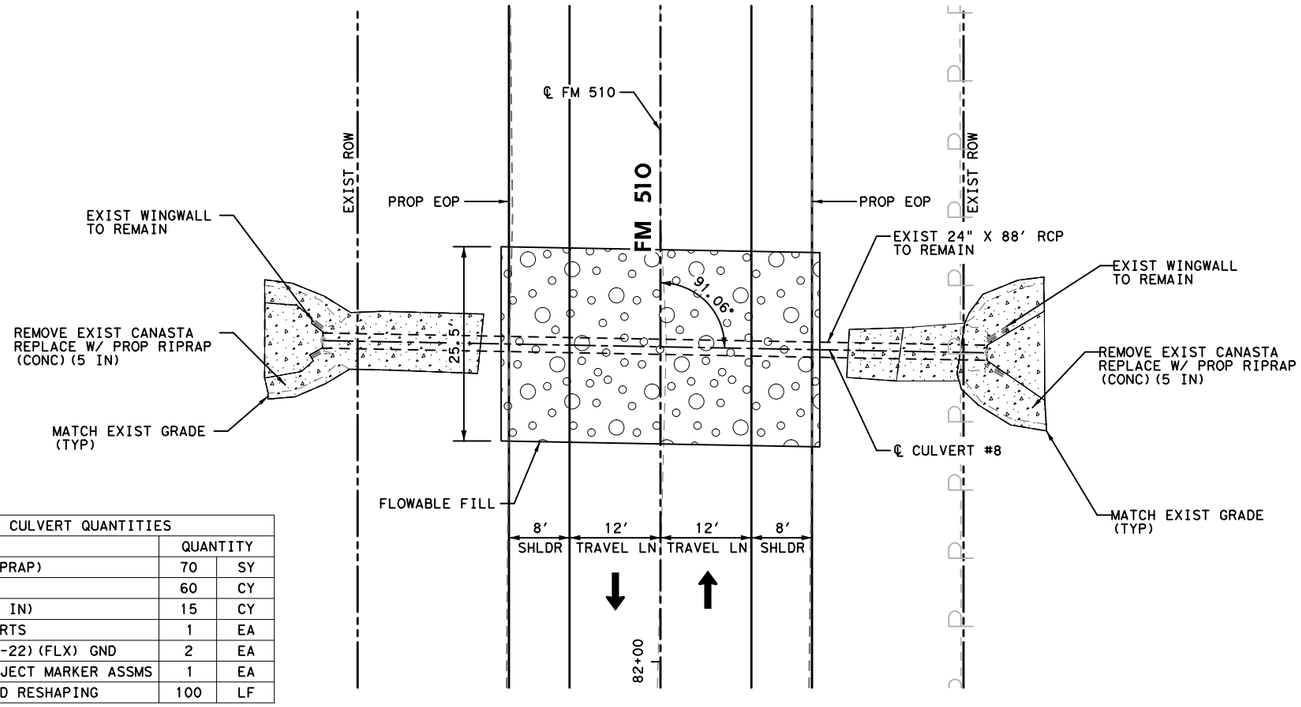
AT STA 70+01.66

SHEET 7 OF 26

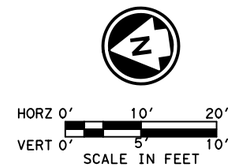
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	168
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#07.dgn

DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
104 6009	REMOVING CONC (RIPRAP)	70	SY
401 6001	FLOWABLE BACKFILL	60	CY
432 6002	RIPRAP (CONC) (5 IN)	15	CY
480 6001	CLEAN EXIST CULVERTS	1	EA
658 6048	INSTL OM ASSM (OM-22)(FLX) GND	2	EA
658 6060	REMOVE DELIN & OBJECT MARKER ASSMS	1	EA
760 6001	DITCH CLEANING AND RESHAPING	100	LF



NOTES:

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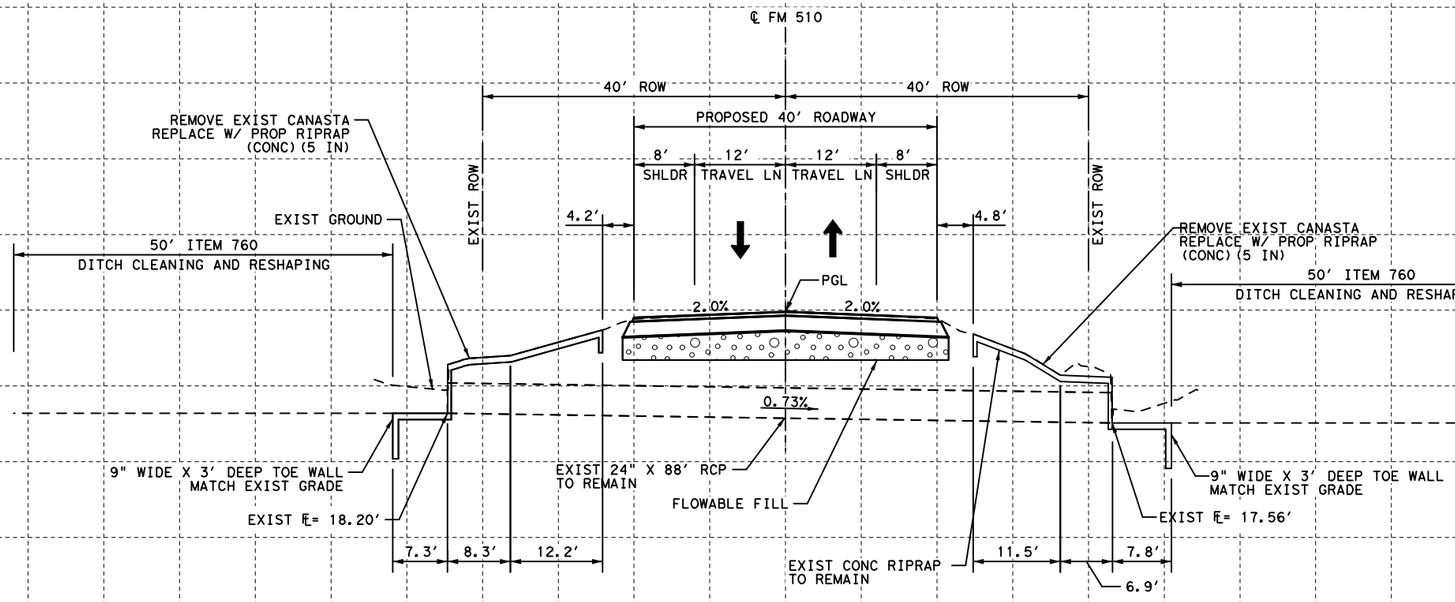
2. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.
3. EXISTING IRRIGATION AND DRAINAGE CROSSINGS ARE DRAWN BASED ON SURVEY AND THE INFORMATION FOUND IN THE AS-BUILT PLANS. CONTRACTOR SHALL VERIFY ALL EXISTING INFORMATION BEFORE PROCEEDING WITH WORK.
4. CONTRACTOR SHALL PROVIDE DITCH GRADING AT EXIST/PROP CULVERT ENDS FOR SMOOTH FL TRANSITION. THE GRADING WORK IS LIMITED TO A MAXIMUM DISTANCE OF 5FT WITHIN ROW OR PRE-APPROVED EASEMENT AND IS CONSIDERED SUBSIDIARY TO DRAINAGE BID ITEMS OF THE CONTRACT UNLESS OTHERWISE NOTED .
5. PAVEMENT MATERIAL AND THICKNESS ARE THE SAME AS THE PROPOSED TYPICAL SECTIONS.
6. SEE CULVERT LAYOUT MISCELLANEOUS DETAILS SHEET FOR PROPOSED 5" CONCRETE RIPRAP DETAIL AND FLOWABLE FILL DETAIL AS APPLICABLE.
7. CLEAN CULVERTS WITH OPENINGS DAYLIGHTED ON BOTH ENDS UNDER ITEM 480 6001 UNLESS OTHERWISE NOTED.
8. BEFORE STARTING ANY WORK AT THIS LOCATION CONTRACTOR SHALL COORDINATE WITH THE IRRIGATION OR DRAINAGE DISTRICT THAT OWNS THE CROSSING.



STA 82+41.59

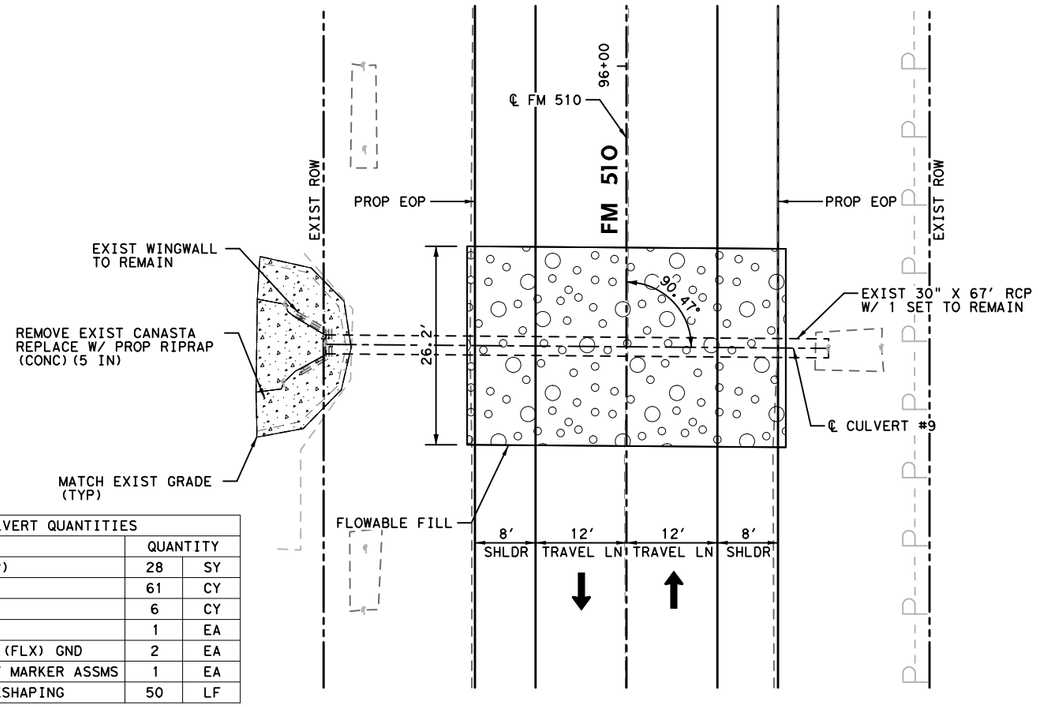
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #8 (CCDD#3) AT STA 82+41.59

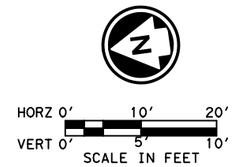
SHEET 8 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	169
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#08.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
104 6009	REMOVING CONC (RIPRAP)	28	SY
401 6001	FLOWABLE BACKFILL	61	CY
432 6002	RIPRAP (CONC) (5 IN)	6	CY
480 6001	CLEAN EXIST CULVERTS	1	EA
658 6048	INSTL OM ASSM (OM-22)(FLX) GND	2	EA
658 6060	REMOVE DELIN & OBJECT MARKER ASSMS	1	EA
760 6001	DITCH CLEANING AND RESHAPING	50	LF



NOTES:

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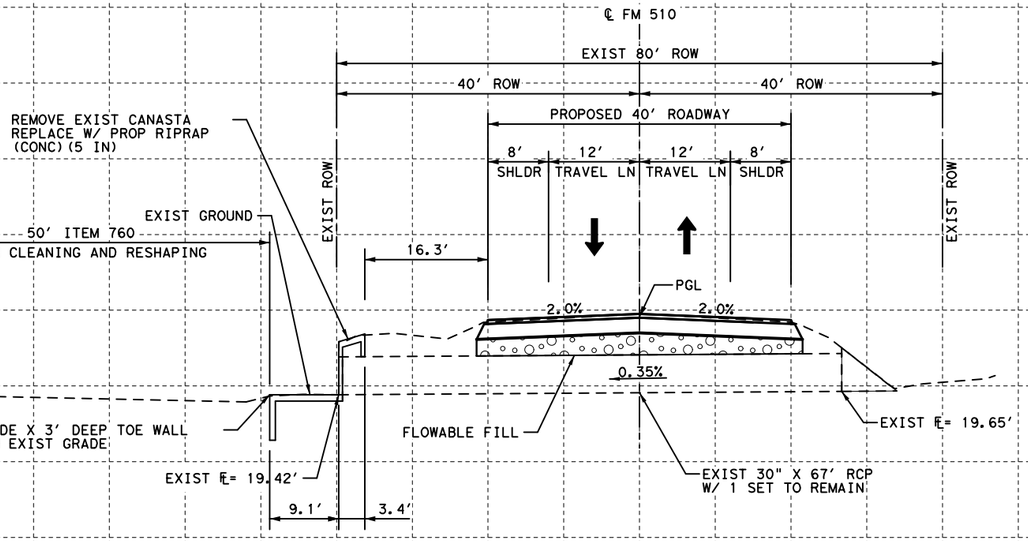

STA 95+62.96

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

Texas Department of Transportation
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I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

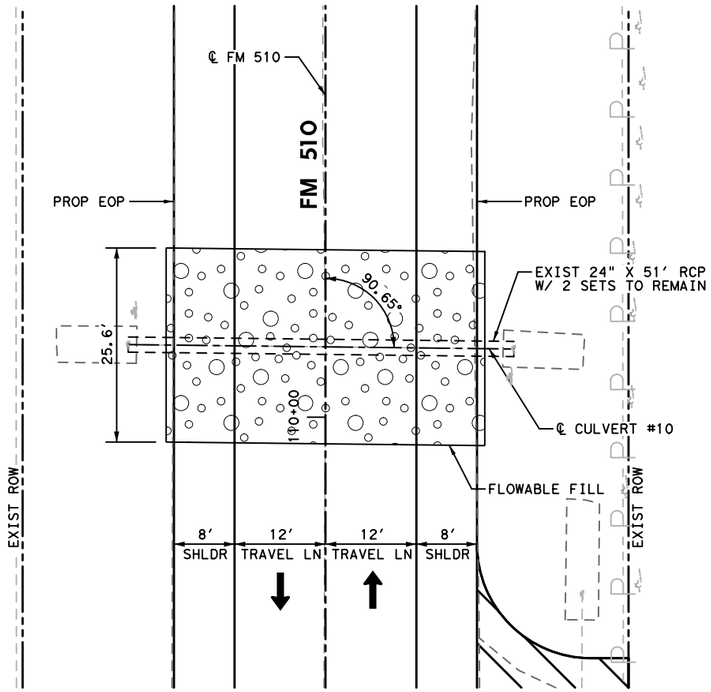
FM 510
CULVERT LAYOUT #9
(CCDD#3)
AT STA 95+62.96

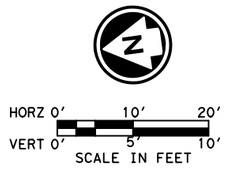
SHEET 9 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	170
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#09.dgn
DRAWING DATE: 6/27/2022

SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	60	CY
480 6001	CLEAN EXIST CULVERTS	1	EA
658 6048	INSTL OM ASSM (OM-22)(FLX) GND	2	EA
658 6060	REMOVE DELIN & OBJECT MARKER ASSMS	2	EA





NOTES:

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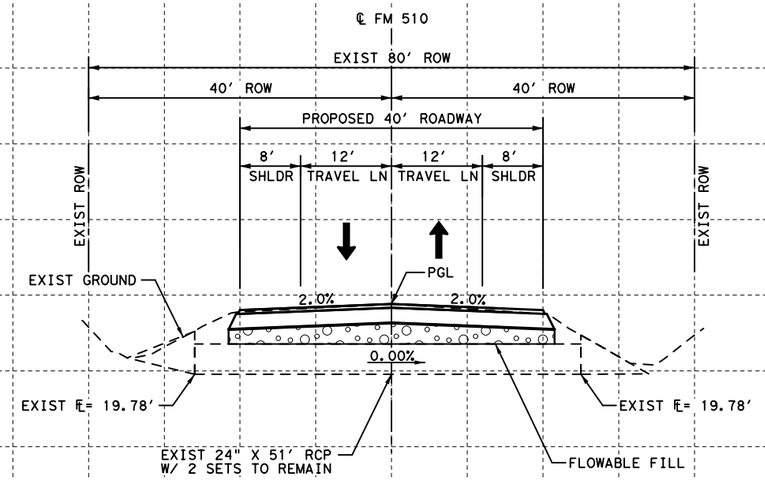
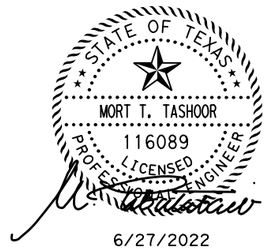


STA 110+09.30



6/27/2022

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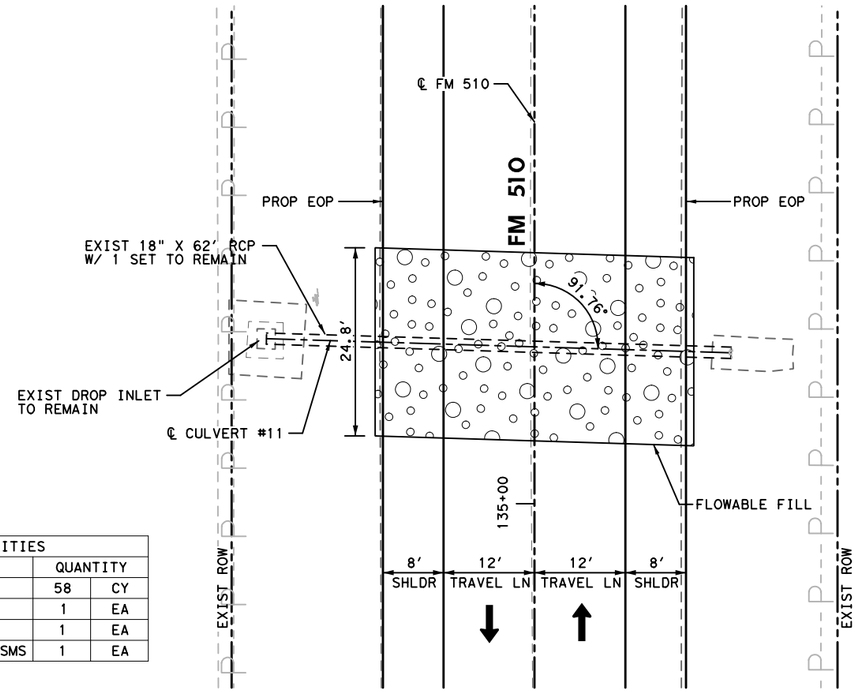
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #10
(CCDD#3)
AT STA 110+09.30

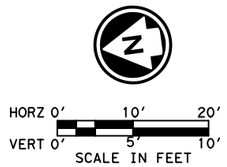
SHEET 10 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	171
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#10.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	58	CY
480 6001	CLEAN EXIST CULVERTS	1	EA
658 6048	INSTL OM ASSM (OM-22)(FLX) GND	1	EA
658 6060	REMOVE DELIN & OBJECT MARKER ASSMS	1	EA



NOTES:

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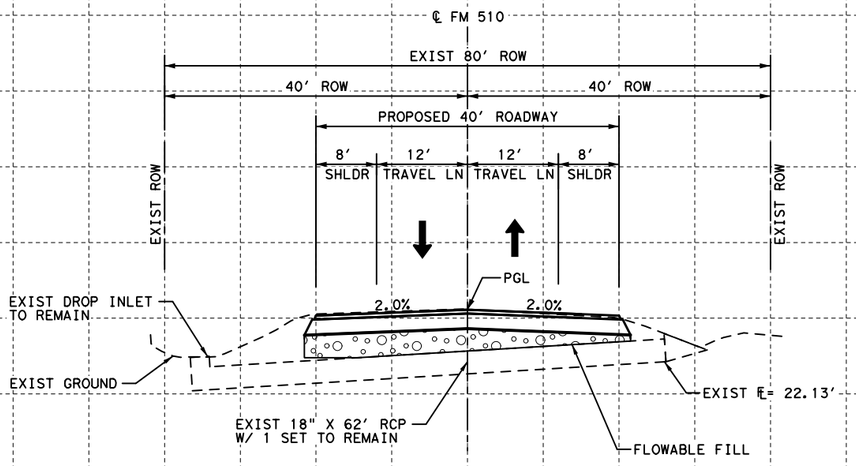
5. PAVEMENT MATERIAL AND THICKNESS ARE THE SAME AS THE PROPOSED TYPICAL SECTIONS.
6. SEE CULVERT LAYOUT MISCELLANEOUS DETAILS SHEET FOR PROPOSED 5" CONCRETE RIPRAP DETAIL AND FLOWABLE FILL DETAIL AS APPLICABLE.
7. CLEAN CULVERTS WITH OPENINGS DAYLIGHTED ON BOTH ENDS UNDER ITEM 480 6001 UNLESS OTHERWISE NOTED.
8. BEFORE STARTING ANY WORK AT THIS LOCATION CONTRACTOR SHALL COORDINATE WITH THE IRRIGATION OR DRAINAGE DISTRICT THAT OWNS THE CROSSING.



STA 135+20.72

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

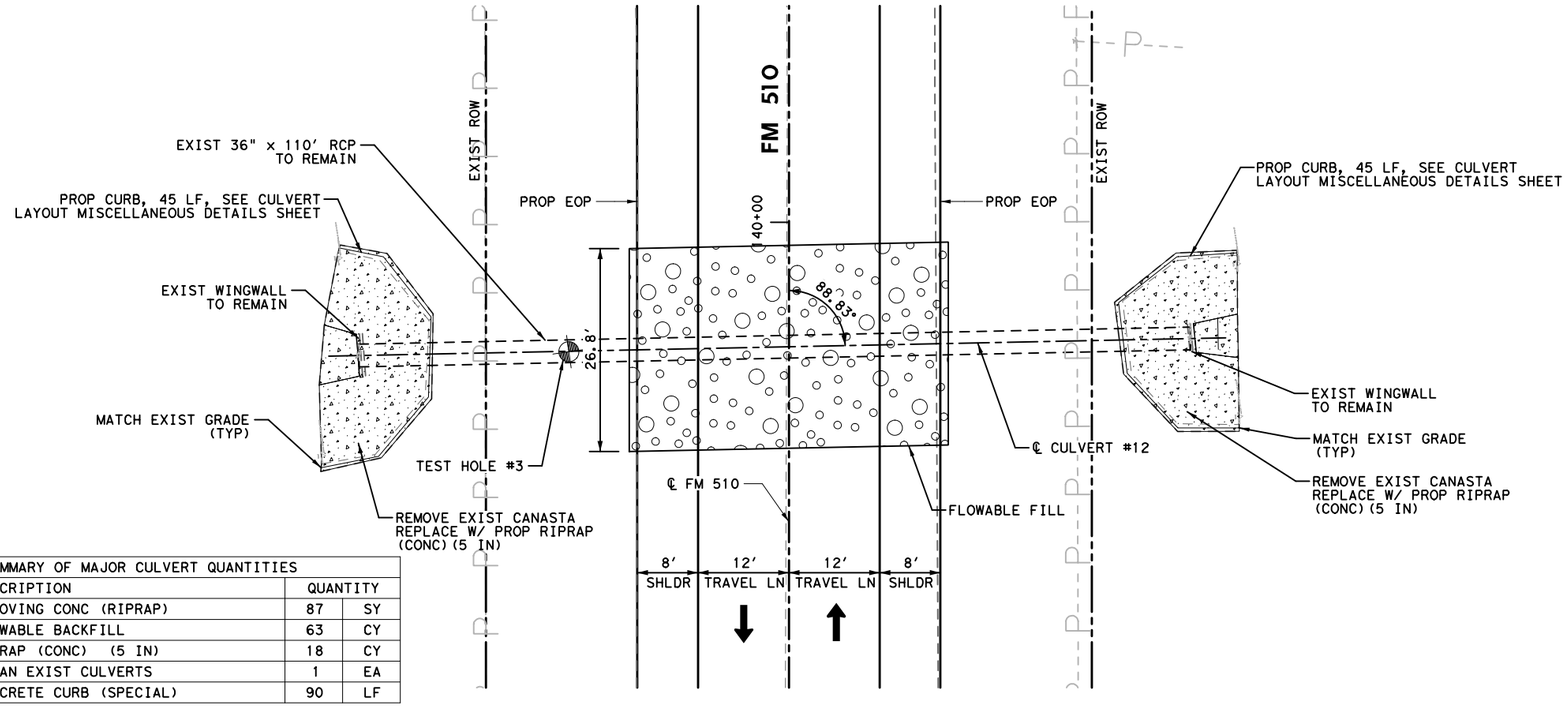
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #11
(CCDD#3)
AT STA 135+20.72

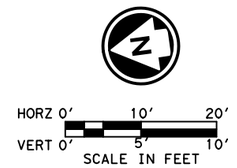
SHEET 11 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	172
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510*CROSS*CULVERT*11.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
104 6009	REMOVING CONC (RIPRAP)	87	SY
401 6001	FLOWABLE BACKFILL	63	CY
432 6002	RIPRAP (CONC) (5 IN)	18	CY
480 6001	CLEAN EXIST CULVERTS	1	EA
529 6036	CONCRETE CURB (SPECIAL)	90	LF



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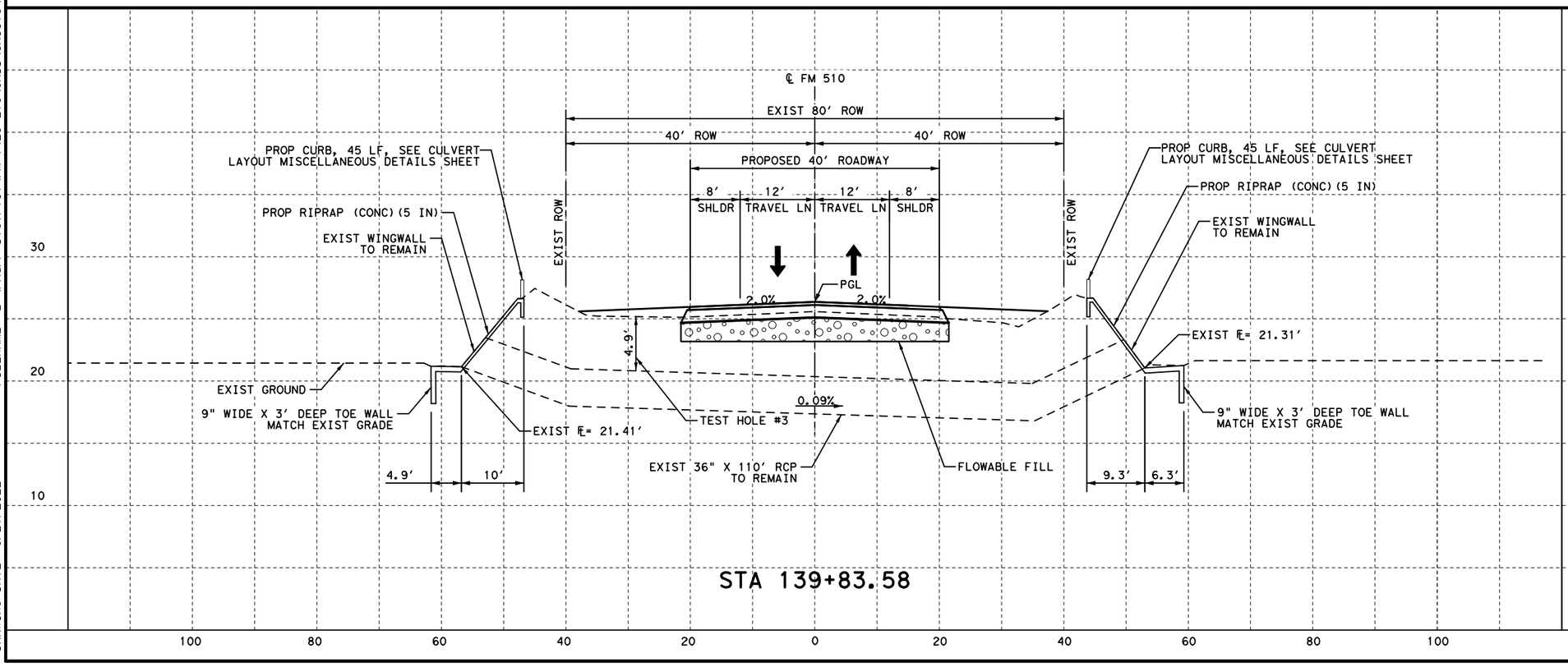

STA 139+83.58

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

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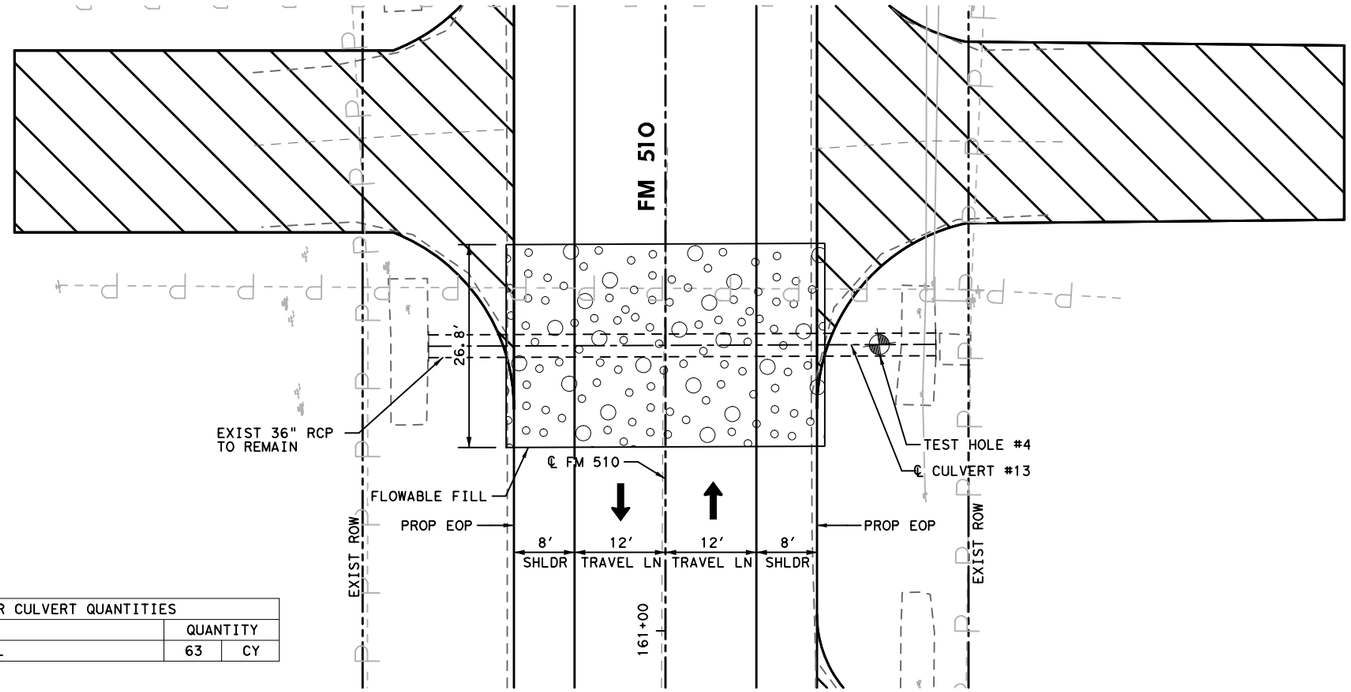
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #12
(CCID#2)
AT STA 139+83.58

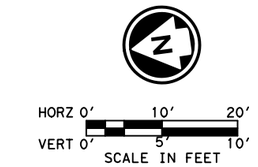
SHEET 12 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	173
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM\1425\ETC\CADD\Sheets\FM510\07 Drainage Details\FM510_CROSS_CULVERT_12.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	63	CY



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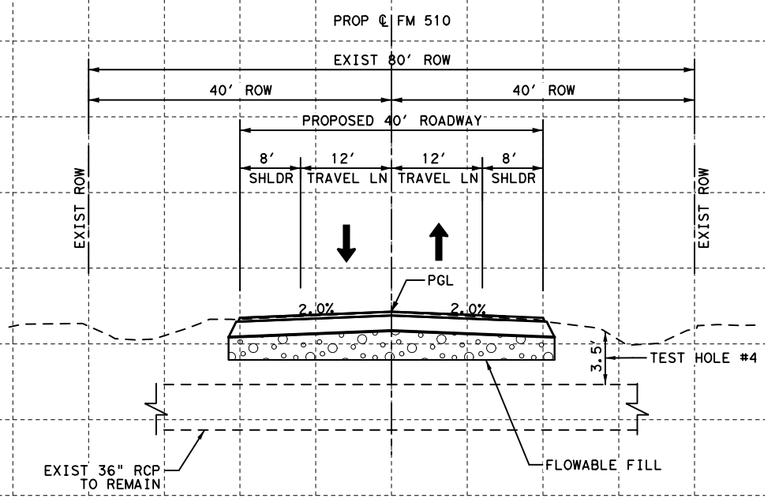


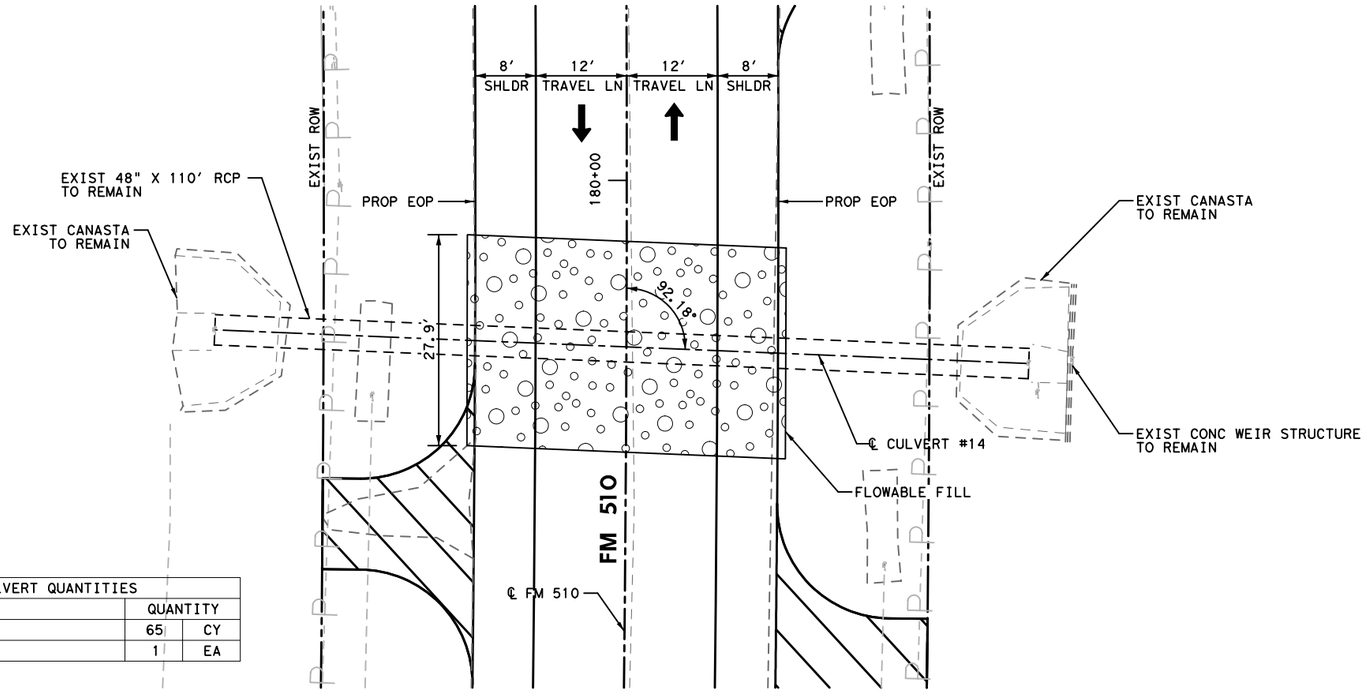
STA 161+37.68

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

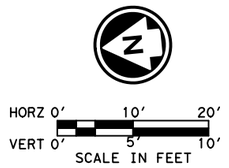
FM 510
CULVERT LAYOUT #13
(CCID#2)
AT STA 161+37.68

SHEET 13 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	174
CONTROL	SECTION	JOB	
1057	03	045	

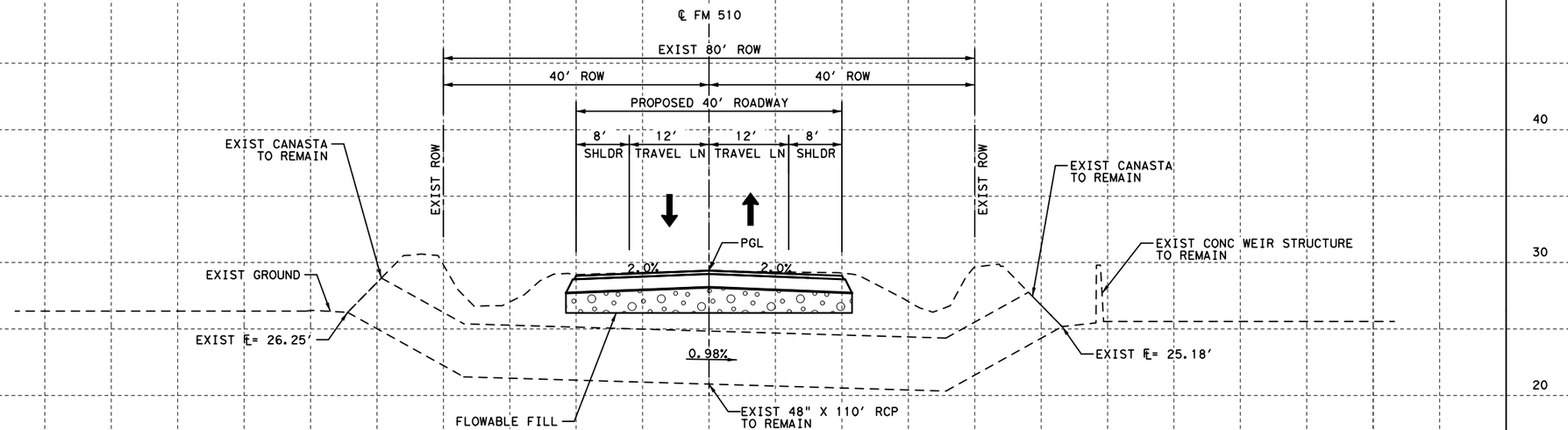


SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	65	CY
480 6001	CLEAN EXIST CULVERTS	1	EA



NOTES:

1. NO HYDRAULIC ANALYSIS PERFORMED FOR THIS PROJECT. EXISTING PIPES ARE TO REMAIN.
2. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.
3. EXISTING IRRIGATION AND DRAINAGE CROSSINGS ARE DRAWN BASED ON SURVEY AND THE INFORMATION FOUND IN THE AS-BUILT PLANS. CONTRACTOR SHALL VERIFY ALL EXISTING INFORMATION BEFORE PROCEEDING WITH WORK.
4. CONTRACTOR SHALL PROVIDE DITCH GRADING AT EXIST/PROP CULVERT ENDS FOR SMOOTH FL TRANSITION. THE GRADING WORK IS LIMITED TO A MAXIMUM DISTANCE OF 5FT WITHIN ROW OR PRE-APPROVED EASEMENT AND IS CONSIDERED SUBSIDIARY TO DRAINAGE BID ITEMS OF THE CONTRACT UNLESS OTHERWISE NOTED .
5. PAVEMENT MATERIAL AND THICKNESS ARE THE SAME AS THE PROPOSED TYPICAL SECTIONS.
6. SEE CULVERT LAYOUT MISCELLANEOUS DETAILS SHEET FOR PROPOSED 5" CONCRETE RIPRAP DETAIL AND FLOWABLE FILL DETAIL AS APPLICABLE.
7. CLEAN CULVERTS WITH OPENINGS DAYLIGHTED ON BOTH ENDS UNDER ITEM 480 6001 UNLESS OTHERWISE NOTED.
8. BEFORE STARTING ANY WORK AT THIS LOCATION CONTRACTOR SHALL COORDINATE WITH THE IRRIGATION OR DRAINAGE DISTRICT THAT OWNS THE CROSSING.



STA 179+78.04

STATE OF TEXAS
MORT T. TASHOOR
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6/27/2022

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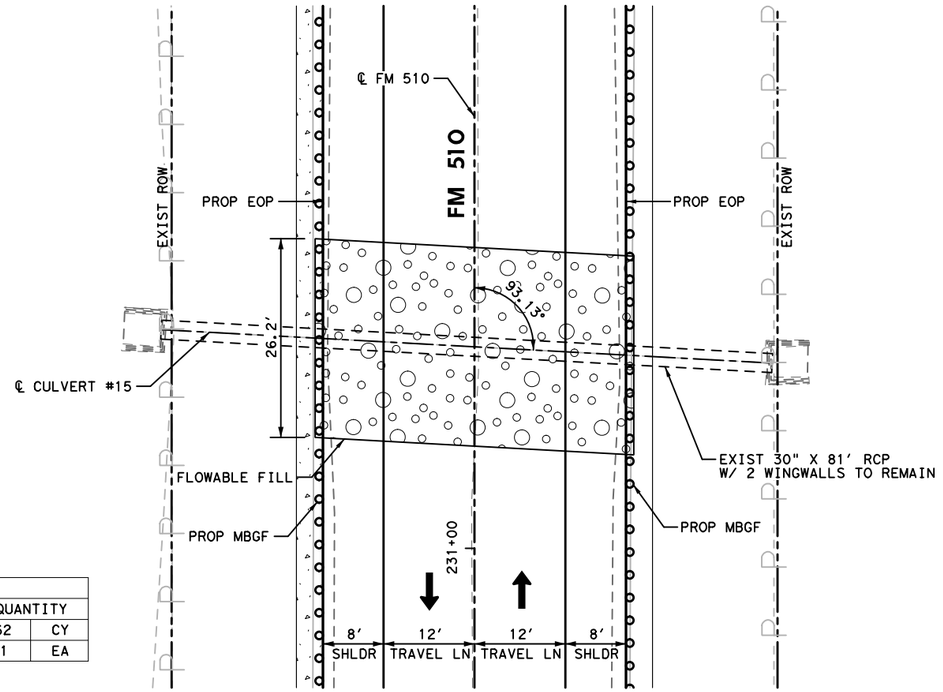
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #14 (CCID#2) AT STA 179+78.04

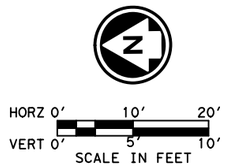
SHEET 14 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	175
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#14.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	62	CY
480 6001	CLEAN EXIST CULVERTS	1	EA



NOTES:

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5. PAVEMENT MATERIAL AND THICKNESS ARE THE SAME AS THE PROPOSED TYPICAL SECTIONS.
6. SEE CULVERT LAYOUT MISCELLANEOUS DETAILS SHEET FOR PROPOSED 5" CONCRETE RIPRAP DETAIL AND FLOWABLE FILL DETAIL AS APPLICABLE.
7. CLEAN CULVERTS WITH OPENINGS DAYLIGHTED ON BOTH ENDS UNDER ITEM 480 6001 UNLESS OTHERWISE NOTED.
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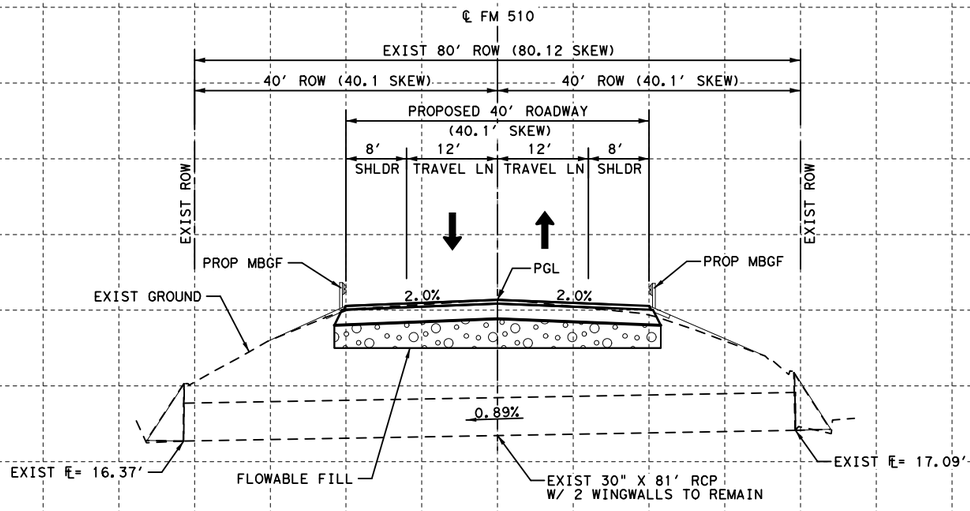

STA 231+26.60

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6/27/2022

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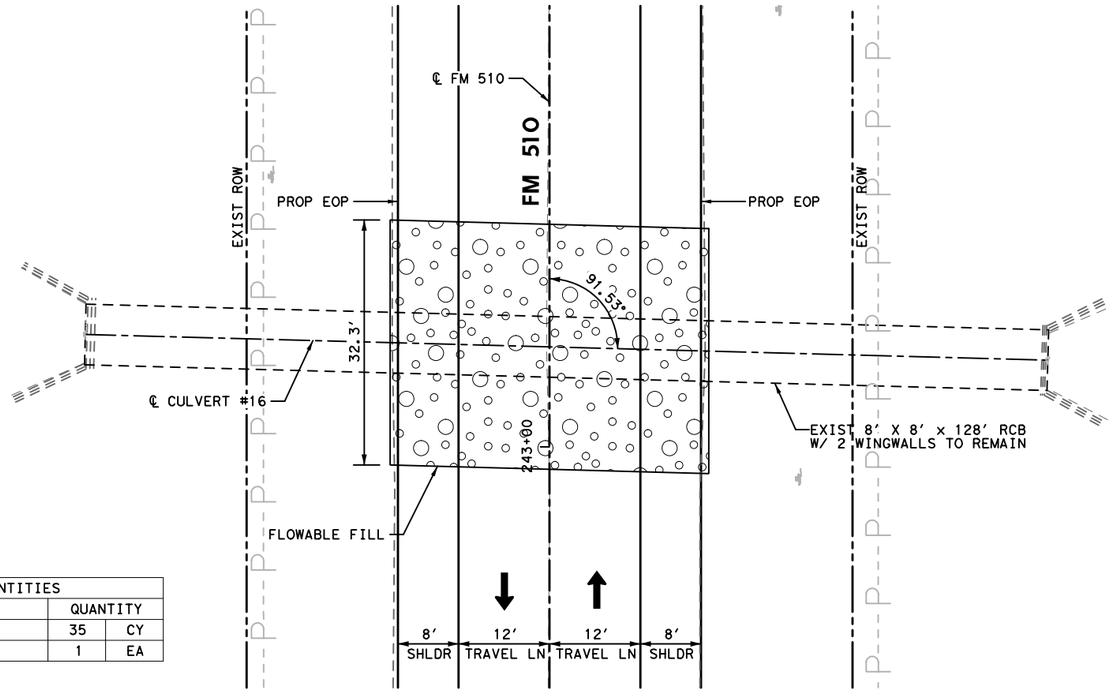
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #15
(CCDD#3)
AT STA 231+26.60

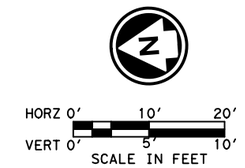
SHEET 15 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	176
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#15.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	35	CY
480 6001	CLEAN EXIST CULVERTS	1	EA



NOTES:

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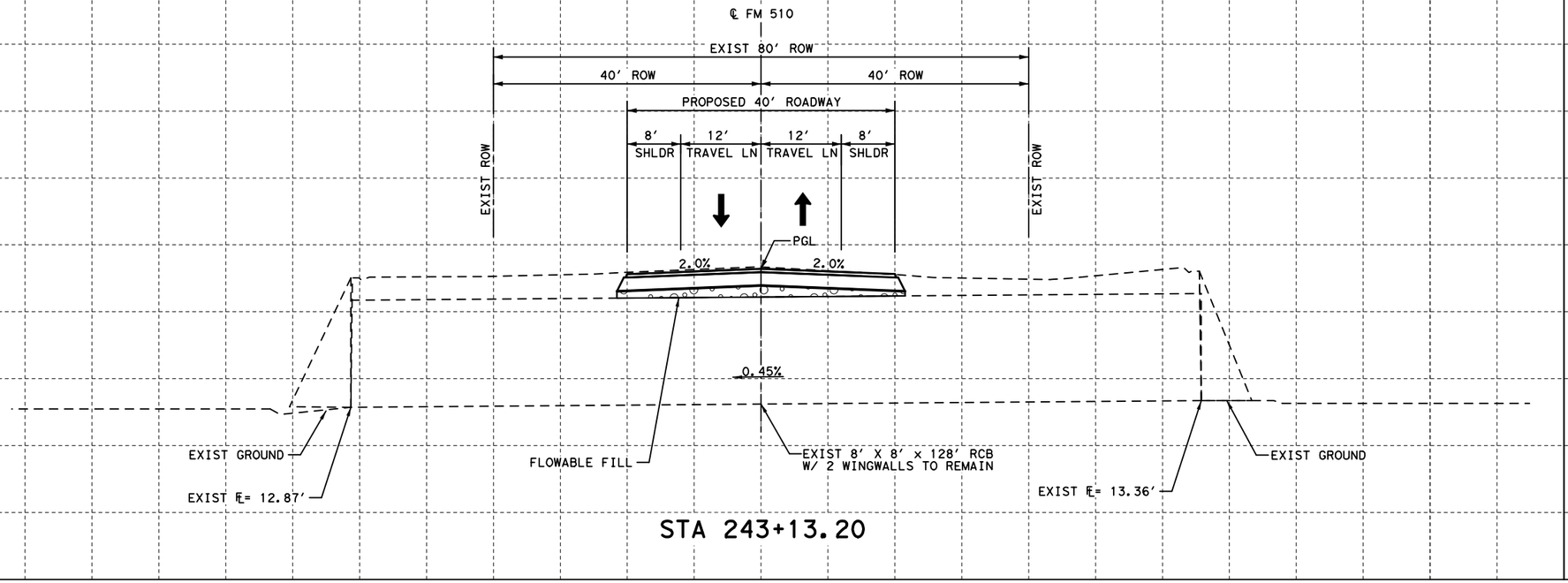

STA 243+13.20

STATE OF TEXAS
MORT T. TASHOOR
116089
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6/27/2022

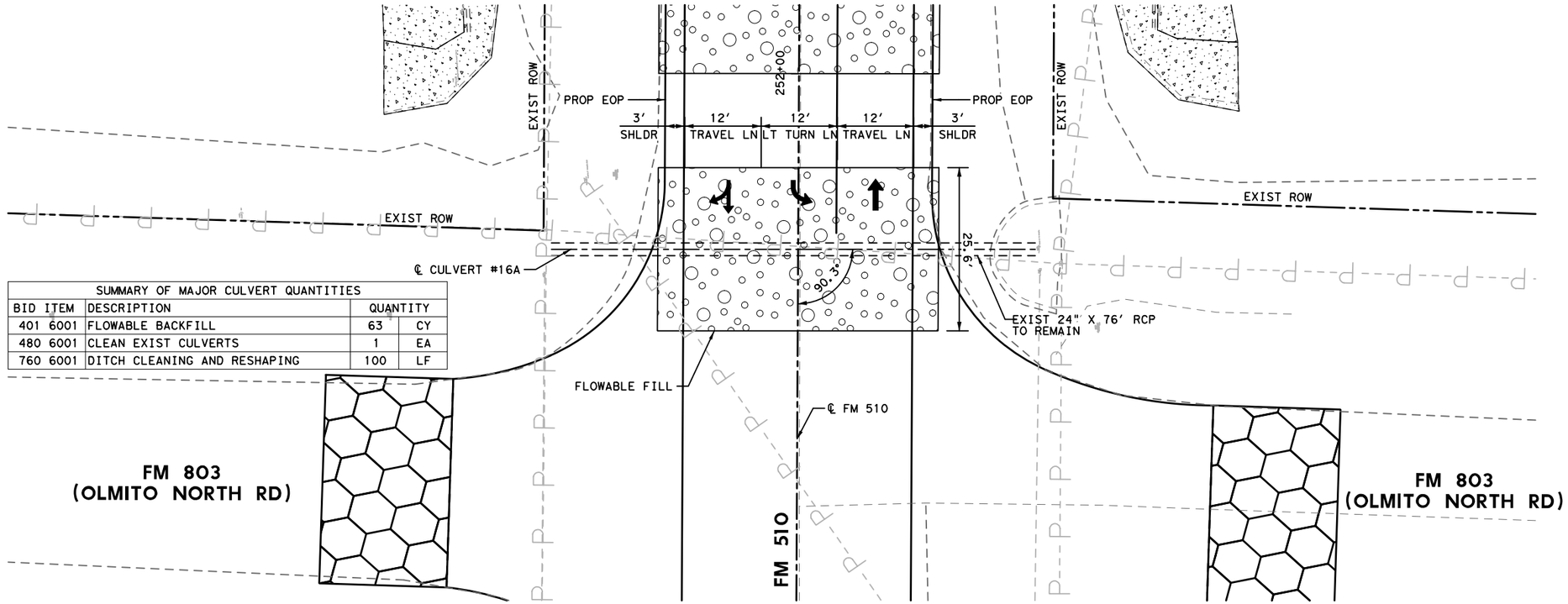
I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #16
(CCDD#3)
AT STA 243+13.20

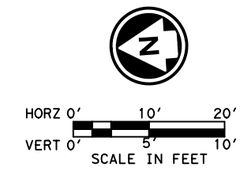
SHEET 16 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	177
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#16.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	63	CY
480 6001	CLEAN EXIST CULVERTS	1	EA
760 6001	DITCH CLEANING AND RESHAPING	100	LF



NOTES:

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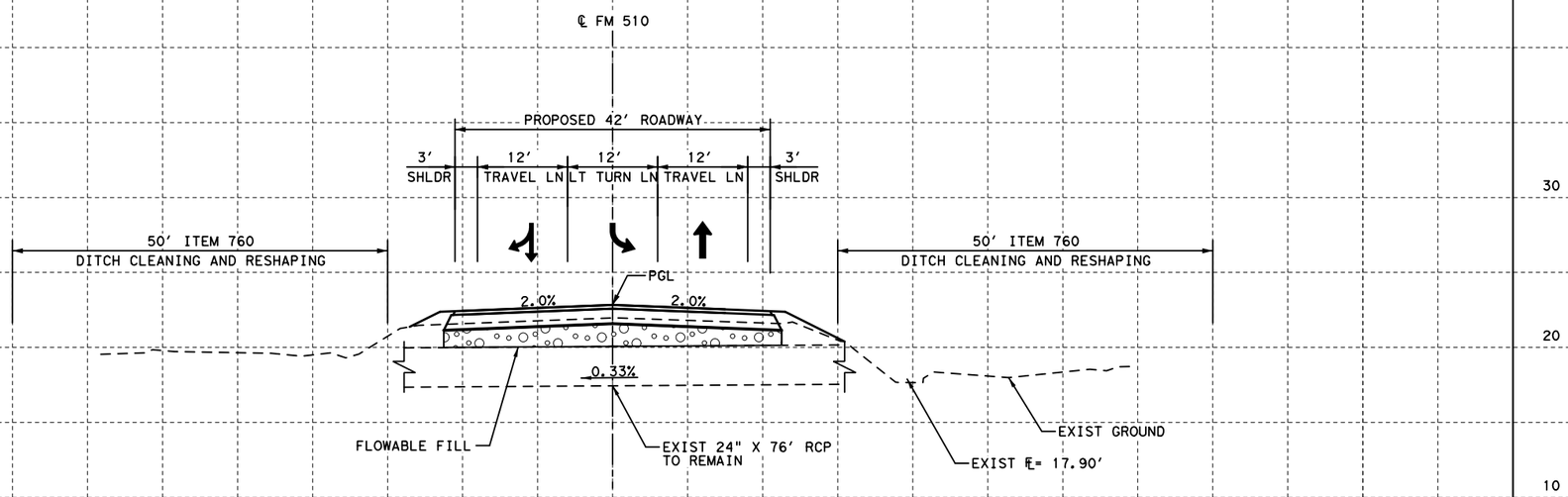

STA 251+72.42

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MORT T. TASHOOR
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LICENSED PROFESSIONAL ENGINEER
6/27/2022

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

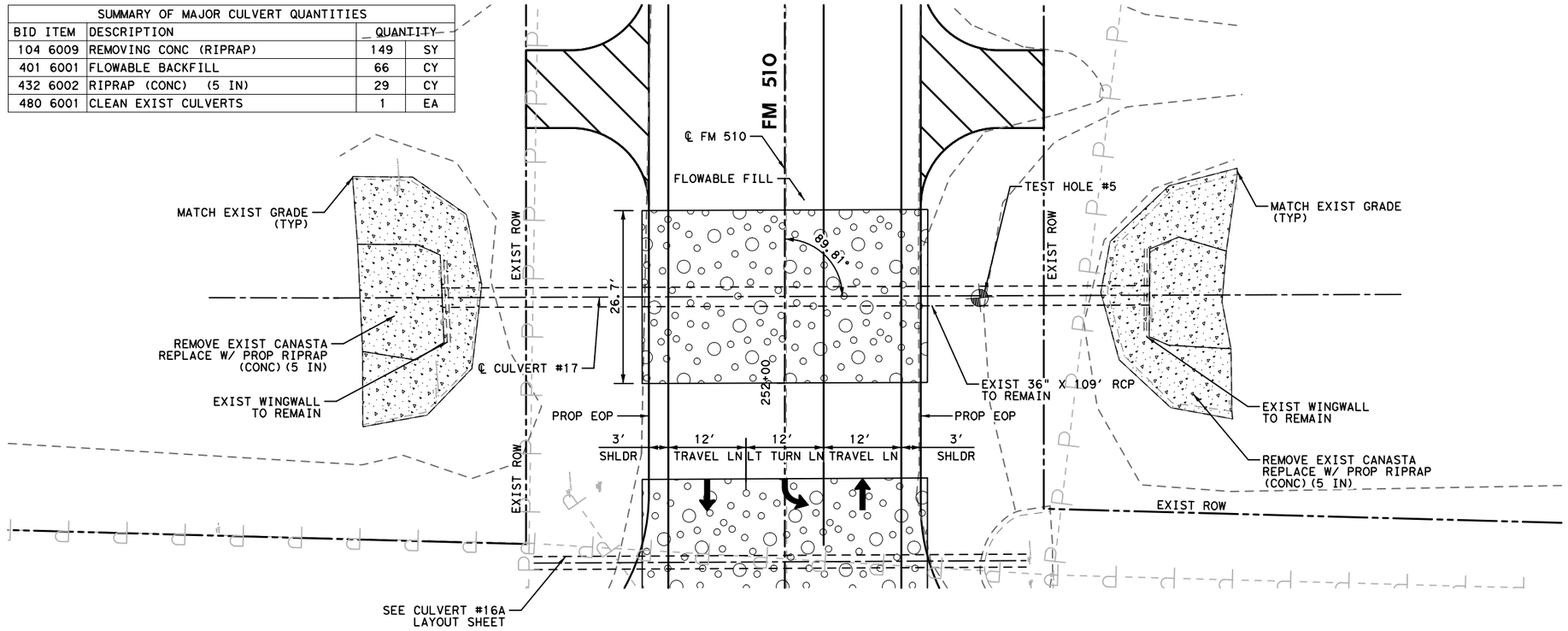
FM 510
CULVERT LAYOUT #16A (CCDD#3)
AT STA 251+72.42

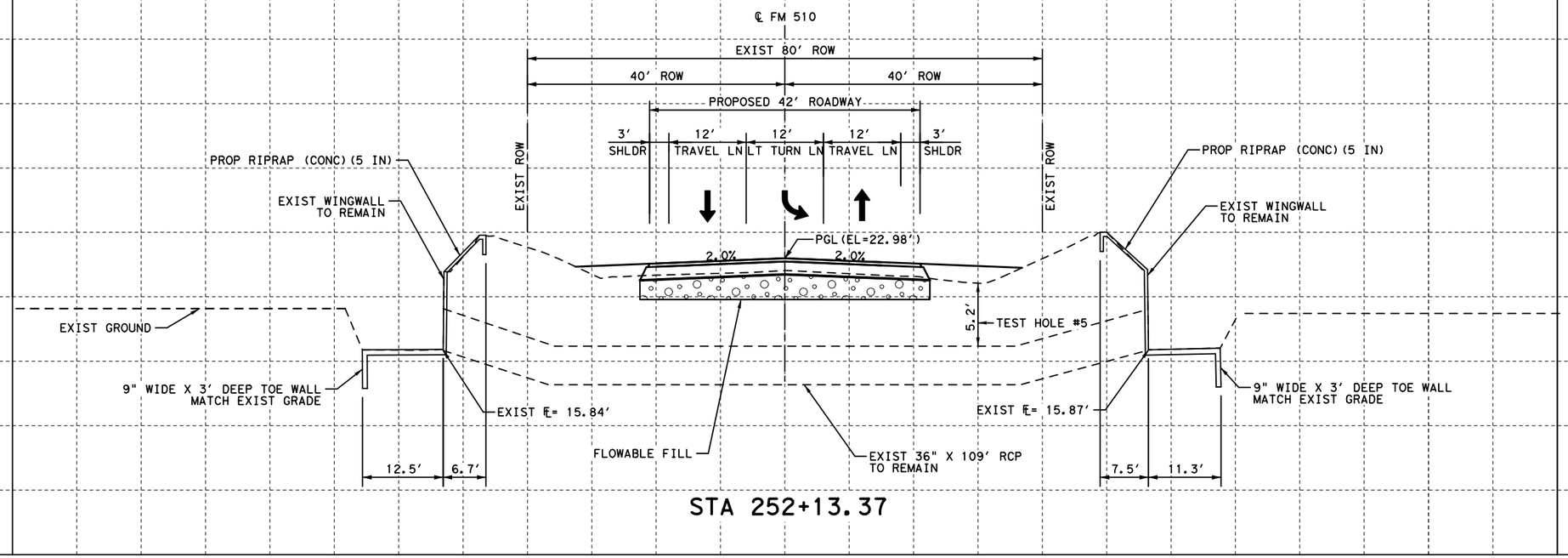
SHEET 17 OF 26

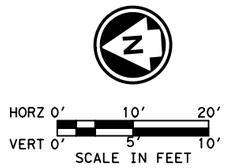
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	178
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#16A.dgn
DRAWING DATE: 6/27/2022

SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
104 6009	REMOVING CONC (RIPRAP)	149	SY
401 6001	FLOWABLE BACKFILL	66	CY
432 6002	RIPRAP (CONC) (5 IN)	29	CY
480 6001	CLEAN EXIST CULVERTS	1	EA







NOTES:

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7. CLEAN CULVERTS WITH OPENINGS DAYLIGHTED ON BOTH ENDS UNDER ITEM 480 6001 UNLESS OTHERWISE NOTED.
8. BEFORE STARTING ANY WORK AT THIS LOCATION CONTRACTOR SHALL COORDINATE WITH THE IRRIGATION OR DRAINAGE DISTRICT THAT OWNS THE CROSSING.

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

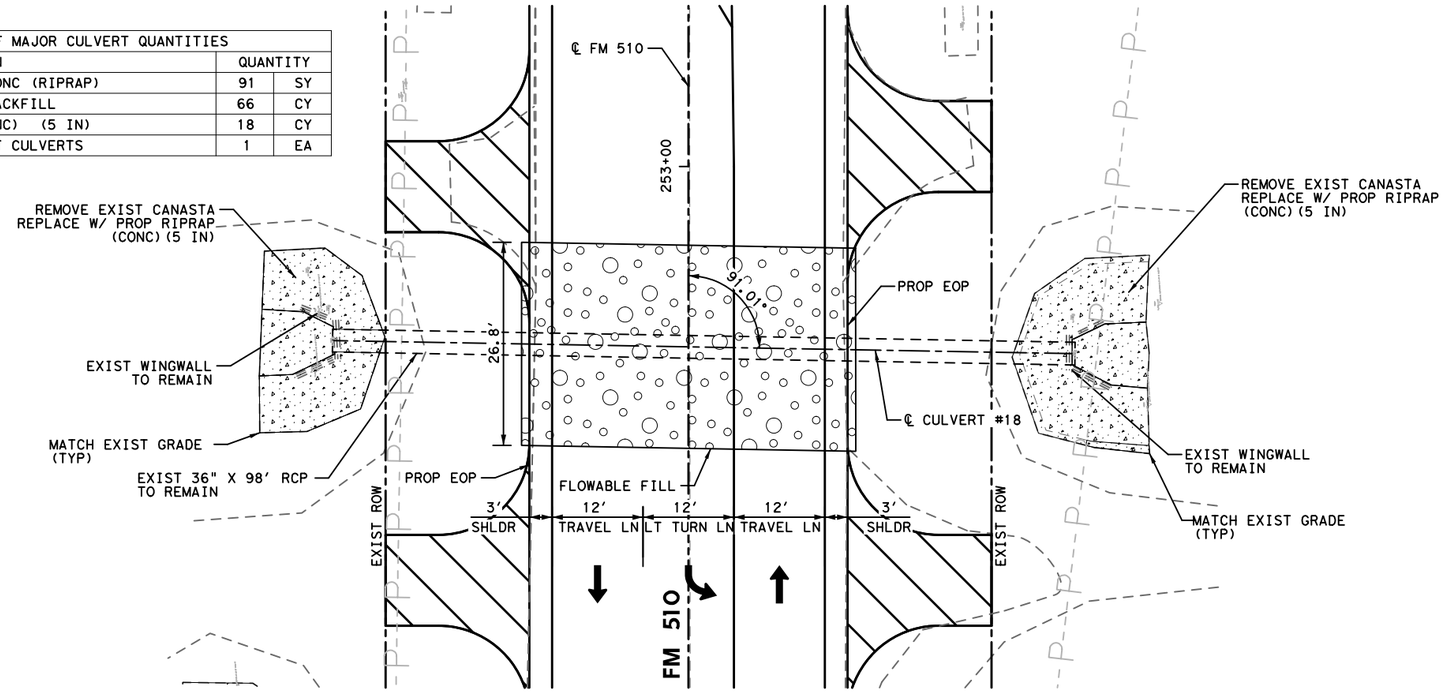
FM 510
CULVERT LAYOUT #17 (CCID#6) AT STA 252+13.37

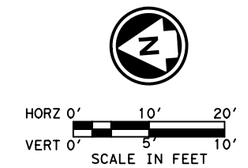
SHEET 18 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	179
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#17.dgn
DRAWING DATE: 6/27/2022

SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
104 6009	REMOVING CONC (RIPRAP)	91	SY
401 6001	FLOWABLE BACKFILL	66	CY
432 6002	RIPRAP (CONC) (5 IN)	18	CY
480 6001	CLEAN EXIST CULVERTS	1	EA





NOTES:

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2. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.
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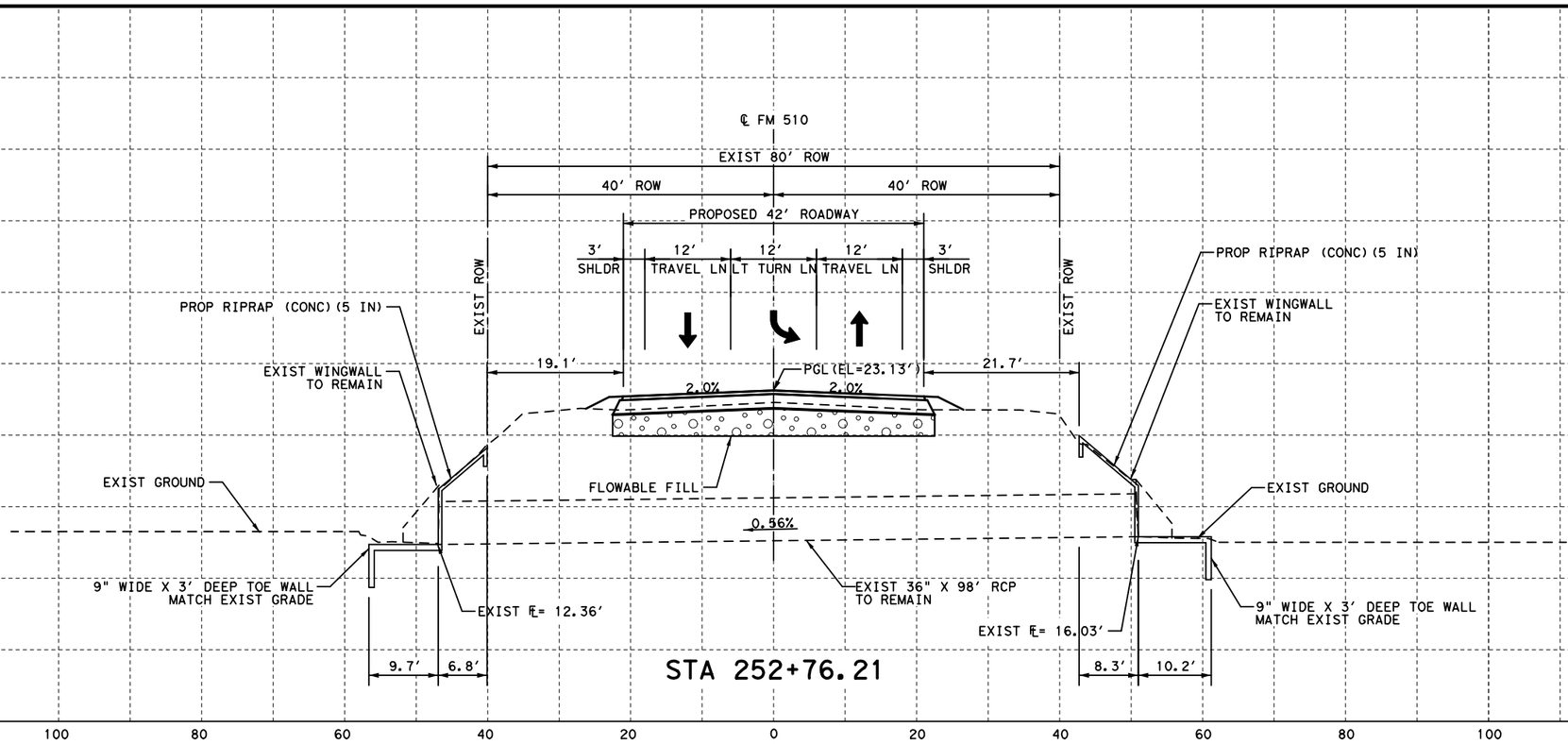

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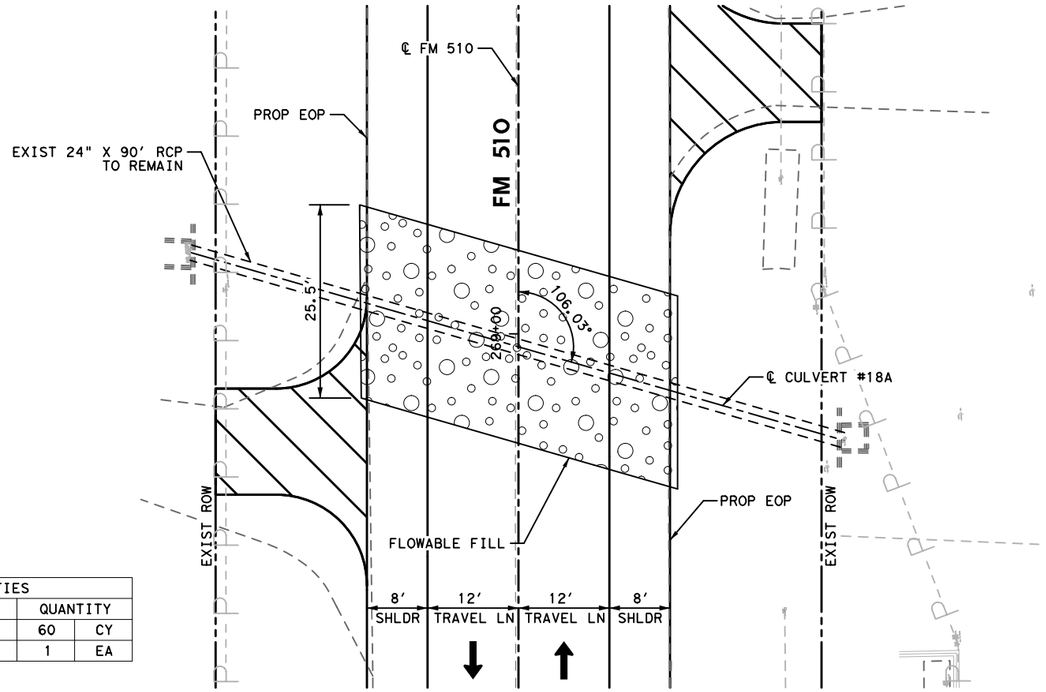
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #18
(CCDD#3)
AT STA 252+76.21

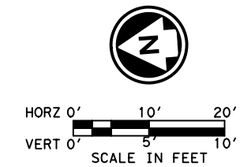
SHEET 19 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	180
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM\1425\ETC\CADD\Sheets\FM510\07 Drainage Details\FM510*CROSS*CULVERT*18.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	60	CY
480 6001	CLEAN EXIST CULVERTS	1	EA



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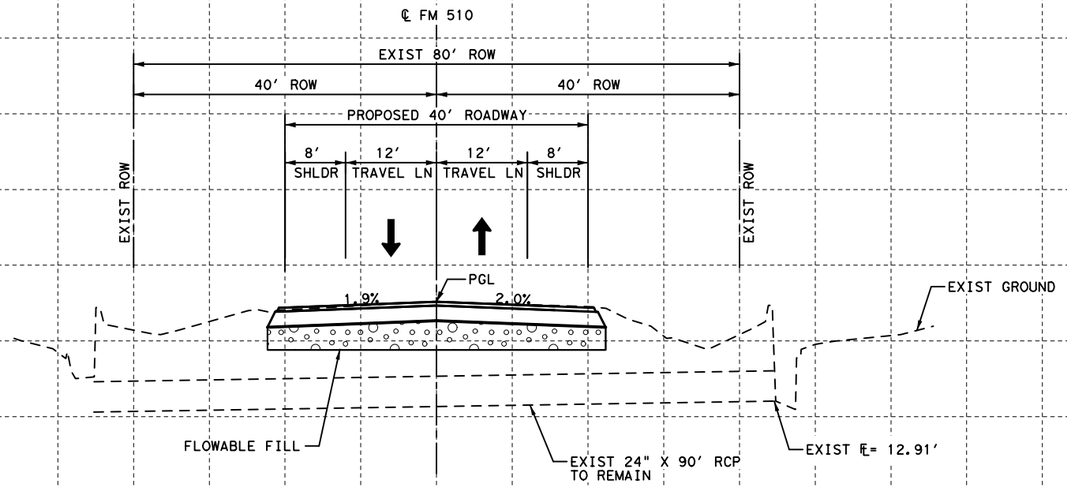

STA 268+98.30

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116089
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

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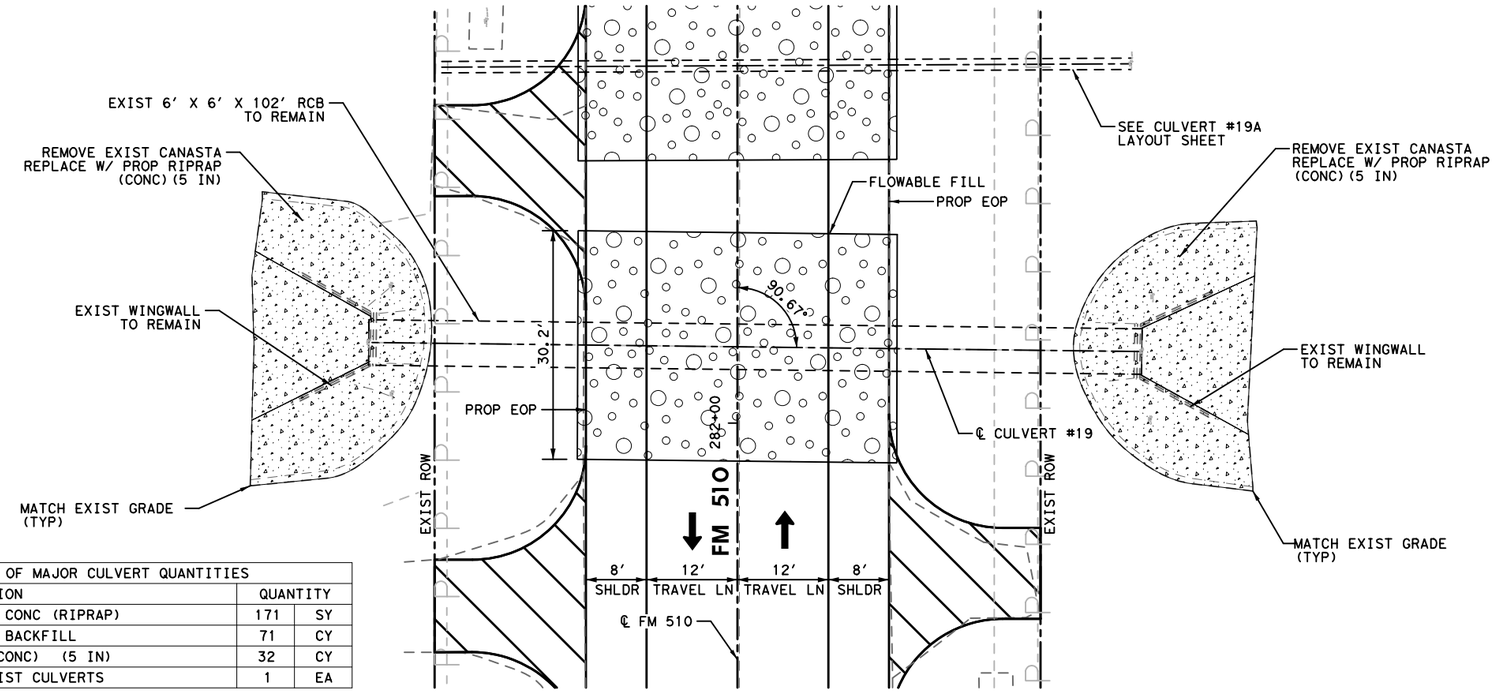
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #18A
(CCID#6)
AT STA 268+98.30

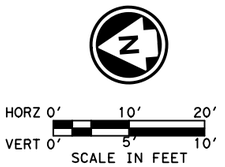
SHEET 20 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	181
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#18A.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
104 6009	REMOVING CONC (RIPRAP)	171	SY
401 6001	FLOWABLE BACKFILL	71	CY
432 6002	RIPRAP (CONC) (5 IN)	32	CY
480 6001	CLEAN EXIST CULVERTS	1	EA



NOTES:

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2. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.
3. EXISTING IRRIGATION AND DRAINAGE CROSSINGS ARE DRAWN BASED ON SURVEY AND THE INFORMATION FOUND IN THE AS-BUILT PLANS. CONTRACTOR SHALL VERIFY ALL EXISTING INFORMATION BEFORE PROCEEDING WITH WORK.
4. CONTRACTOR SHALL PROVIDE DITCH GRADING AT EXIST/PROP CULVERT ENDS FOR SMOOTH FL TRANSITION. THE GRADING WORK IS LIMITED TO A MAXIMUM DISTANCE OF 5FT WITHIN ROW OR PRE-APPROVED EASEMENT AND IS CONSIDERED SUBSIDIARY TO DRAINAGE BID ITEMS OF THE CONTRACT UNLESS OTHERWISE NOTED .
5. PAVEMENT MATERIAL AND THICKNESS ARE THE SAME AS THE PROPOSED TYPICAL SECTIONS.
6. SEE CULVERT LAYOUT MISCELLANEOUS DETAILS SHEET FOR PROPOSED 5" CONCRETE RIPRAP DETAIL AND FLOWABLE FILL DETAIL AS APPLICABLE.
7. CLEAN CULVERTS WITH OPENINGS DAYLIGHTED ON BOTH ENDS UNDER ITEM 480 6001 UNLESS OTHERWISE NOTED.
8. BEFORE STARTING ANY WORK AT THIS LOCATION CONTRACTOR SHALL COORDINATE WITH THE IRRIGATION OR DRAINAGE DISTRICT THAT OWNS THE CROSSING.

STA 282+10.08

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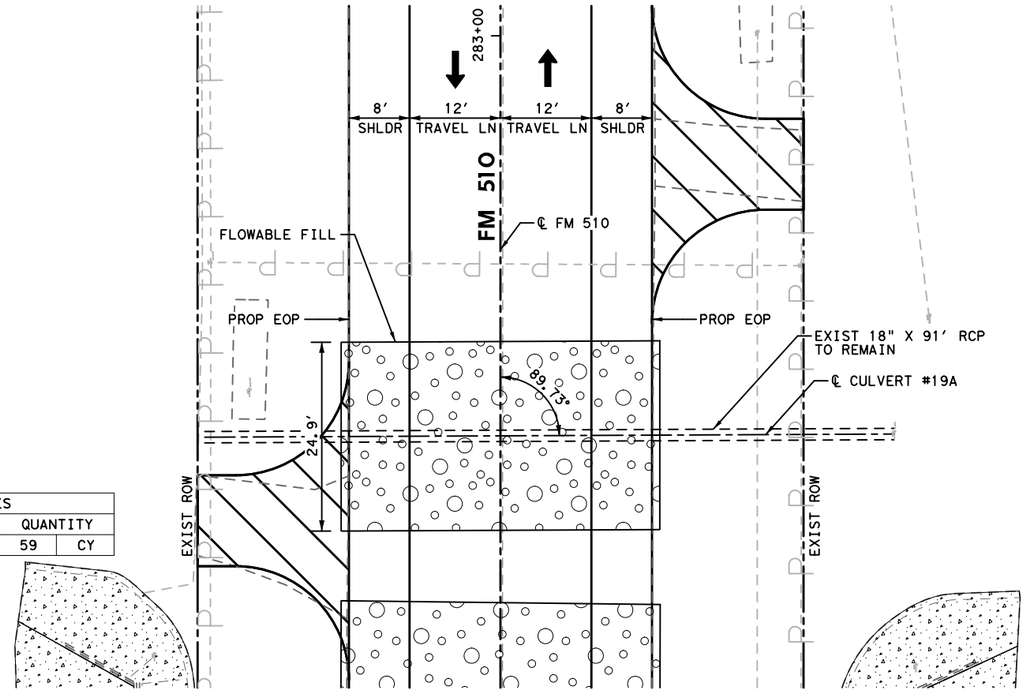
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #19 (CCDD#3) AT STA 282+10.08

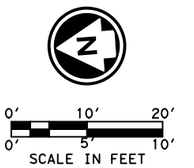
SHEET 21 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	182
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#19.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	59	CY



NOTES:

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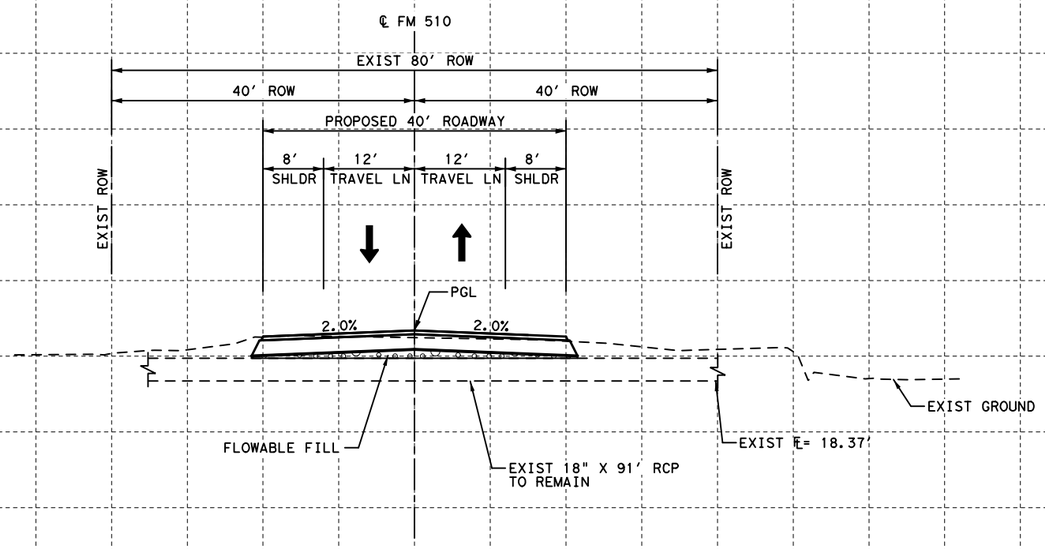
6. SEE CULVERT LAYOUT MISCELLANEOUS DETAILS SHEET FOR PROPOSED 5" CONCRETE RIPRAP DETAIL AND FLOWABLE FILL DETAIL AS APPLICABLE.
7. CLEAN CULVERTS WITH OPENINGS DAYLIGHTED ON BOTH ENDS UNDER ITEM 480 6001 UNLESS OTHERWISE NOTED.
8. BEFORE STARTING ANY WORK AT THIS LOCATION CONTRACTOR SHALL COORDINATE WITH THE IRRIGATION OR DRAINAGE DISTRICT THAT OWNS THE CROSSING.



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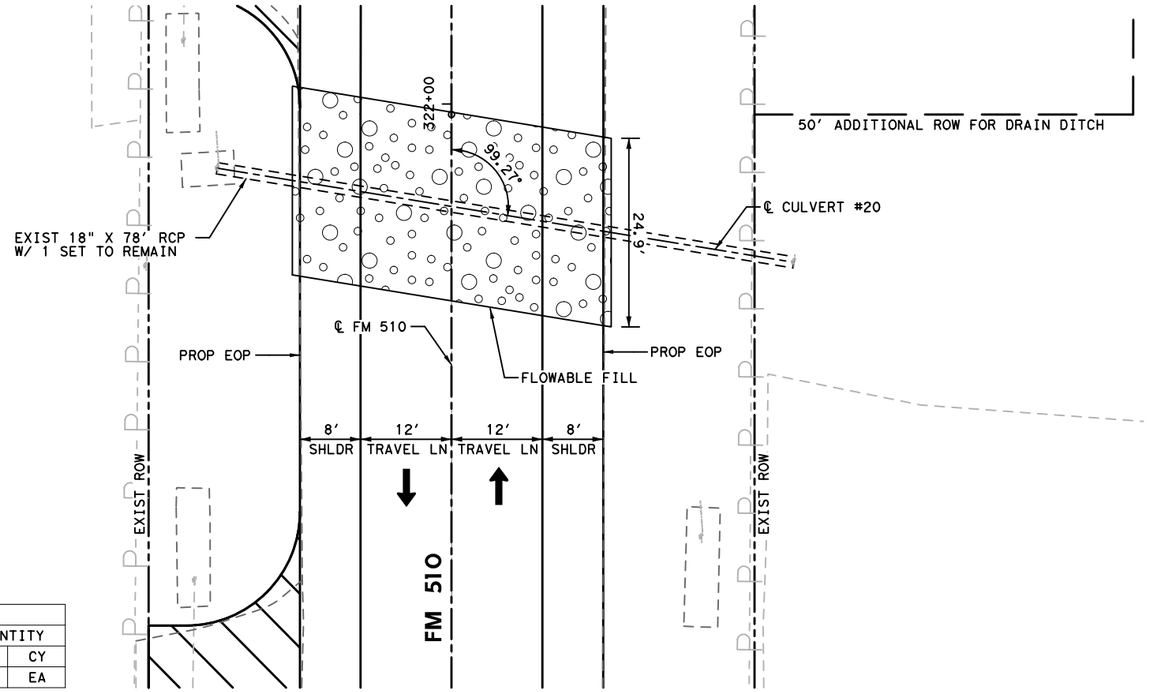
FM 510
CULVERT LAYOUT #19A (CCID#6) AT STA 282+47.18

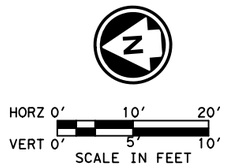
SHEET 22 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	183
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#19A.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	58	CY
480 6001	CLEAN EXIST CULVERTS	1	EA



NOTES:

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2. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.
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6. SEE CULVERT LAYOUT MISCELLANEOUS DETAILS SHEET FOR PROPOSED 5" CONCRETE RIPRAP DETAIL AND FLOWABLE FILL DETAIL AS APPLICABLE.
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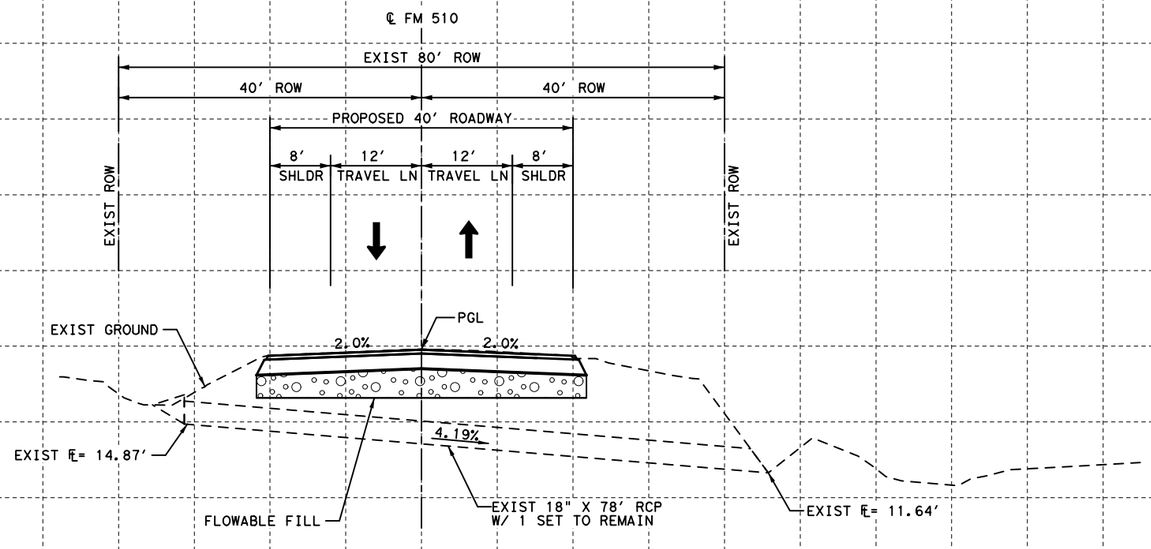

STA 321+86.47

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STATE OF TEXAS
6/27/2022

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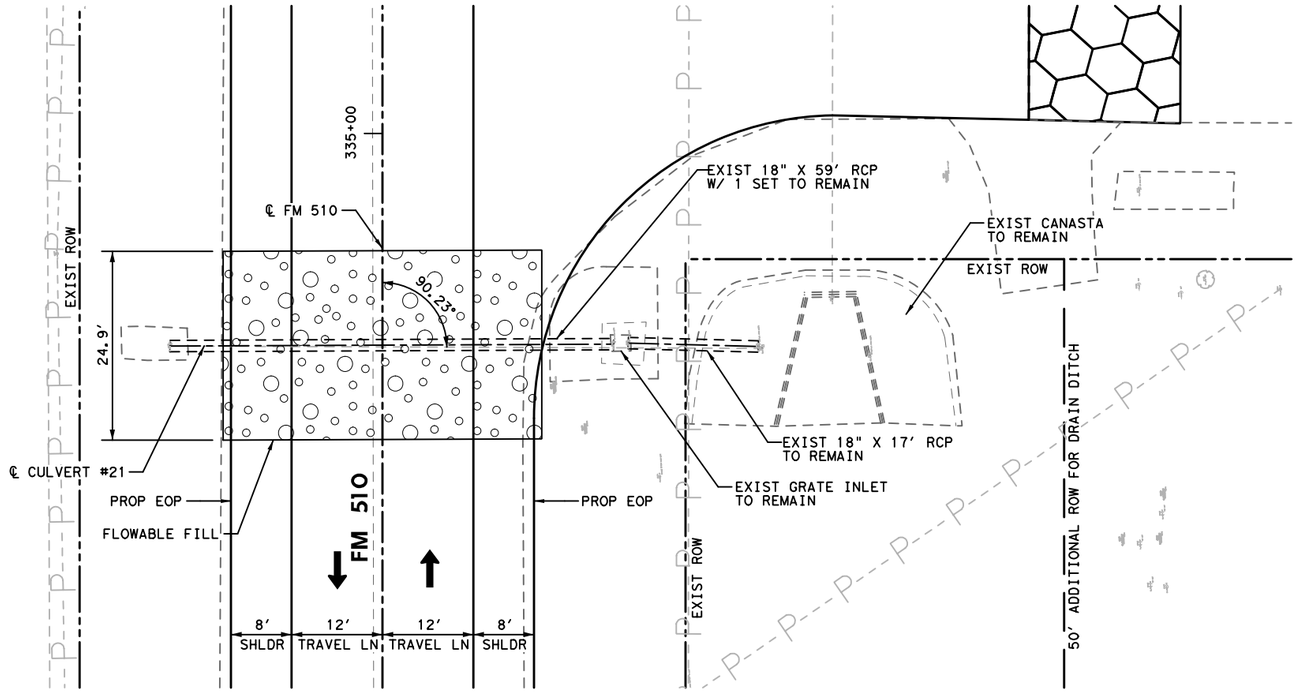
TBPE REG. # F-11657

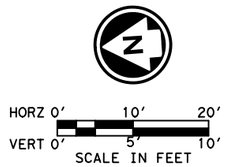
FM 510
CULVERT LAYOUT #20
(CCDD#4)
AT STA 321+86.47

SHEET 23 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	184
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#20.dgn
DRAWING DATE: 6/27/2022





NOTES:

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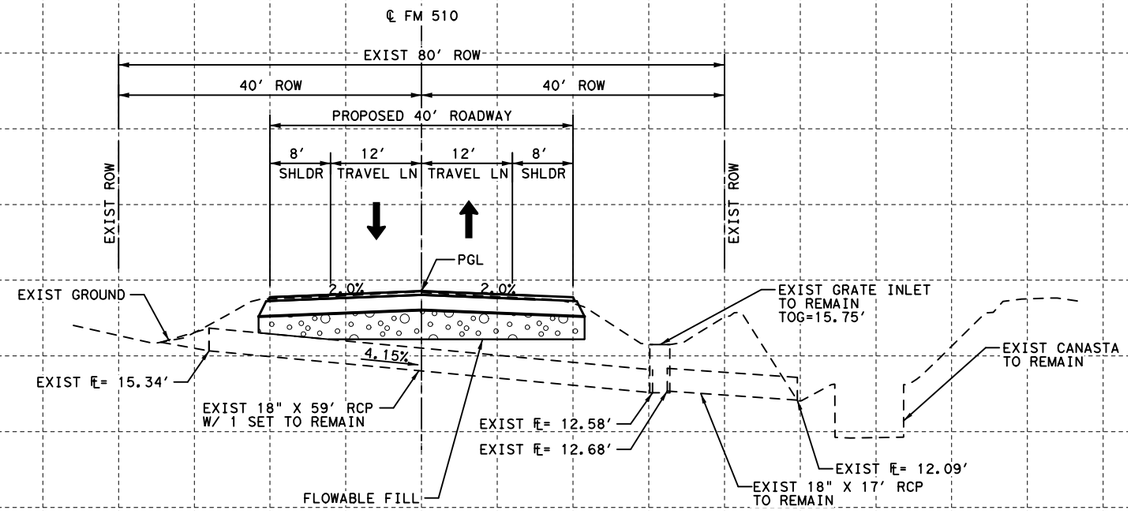
6. SEE CULVERT LAYOUT MISCELLANEOUS DETAILS SHEET FOR PROPOSED 5" CONCRETE RIPRAP DETAIL AND FLOWABLE FILL DETAIL AS APPLICABLE.
7. CLEAN CULVERTS WITH OPENINGS DAYLIGHTED ON BOTH ENDS UNDER ITEM 480 6001 UNLESS OTHERWISE NOTED.
8. BEFORE STARTING ANY WORK AT THIS LOCATION CONTRACTOR SHALL COORDINATE WITH THE IRRIGATION OR DRAINAGE DISTRICT THAT OWNS THE CROSSING.

SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	59	CY
480 6001	CLEAN EXIST CULVERTS	2	EA



STA 334+71.83

STATE OF TEXAS
MORT T. TASHOOR
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6/27/2022

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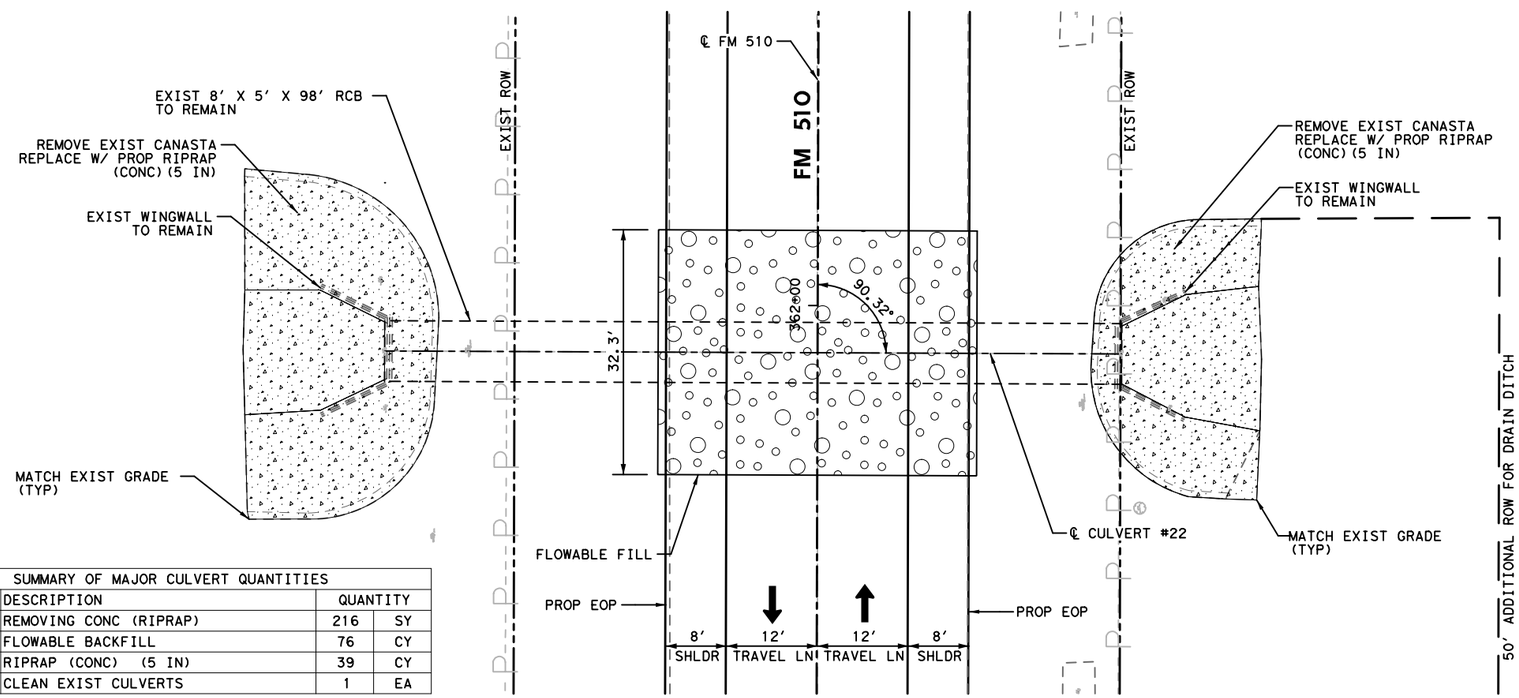
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

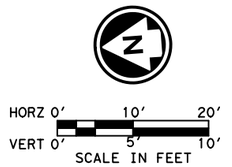
FM 510
CULVERT LAYOUT #21
(CCDD#4)
AT STA 334+71.83

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	185
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\07 Drainage Details\FM510#CROSS#CULVERT#21.dgn
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
104 6009	REMOVING CONC (RIPRAP)	216	SY
401 6001	FLOWABLE BACKFILL	76	CY
432 6002	RIPRAP (CONC) (5 IN)	39	CY
480 6001	CLEAN EXIST CULVERTS	1	EA



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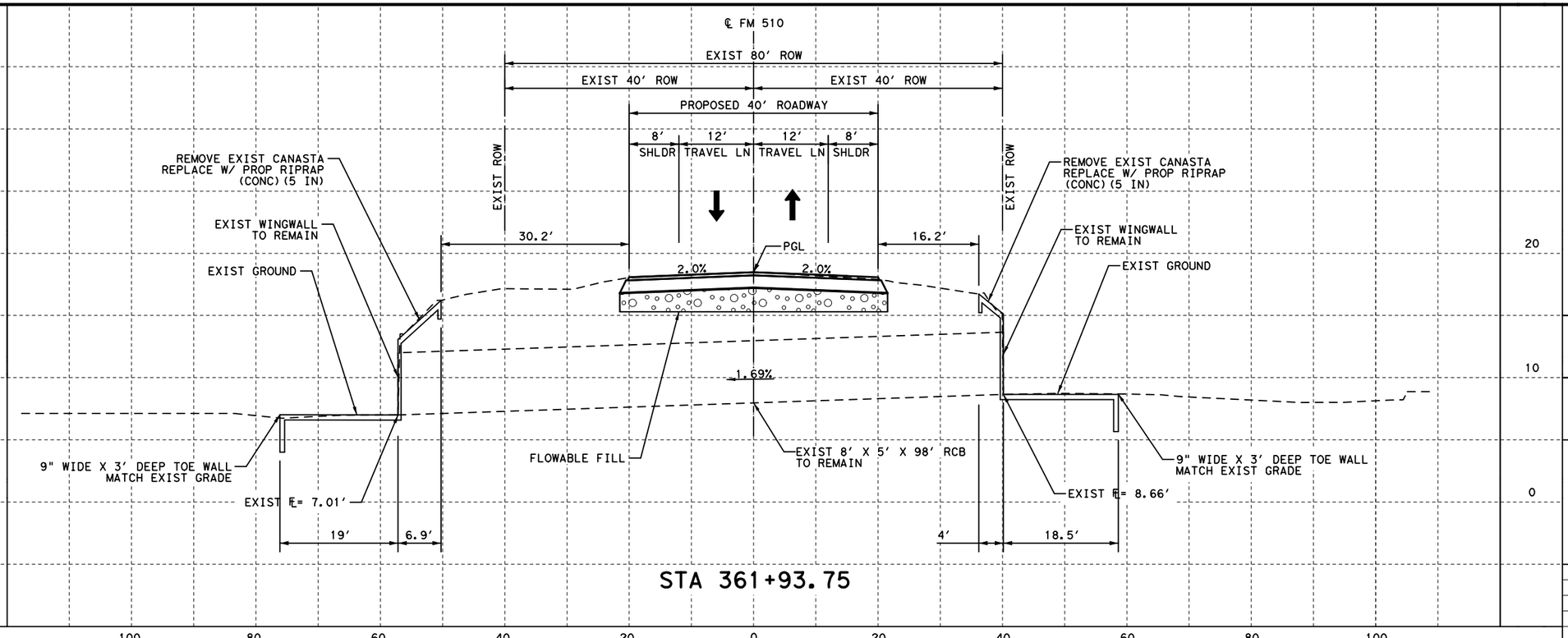

STA 361+93.75

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TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #22 (CCDD#4) AT STA 361+93.75

SHEET 25 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	186
CONTROL	SECTION	JOB	
1057	03	045	

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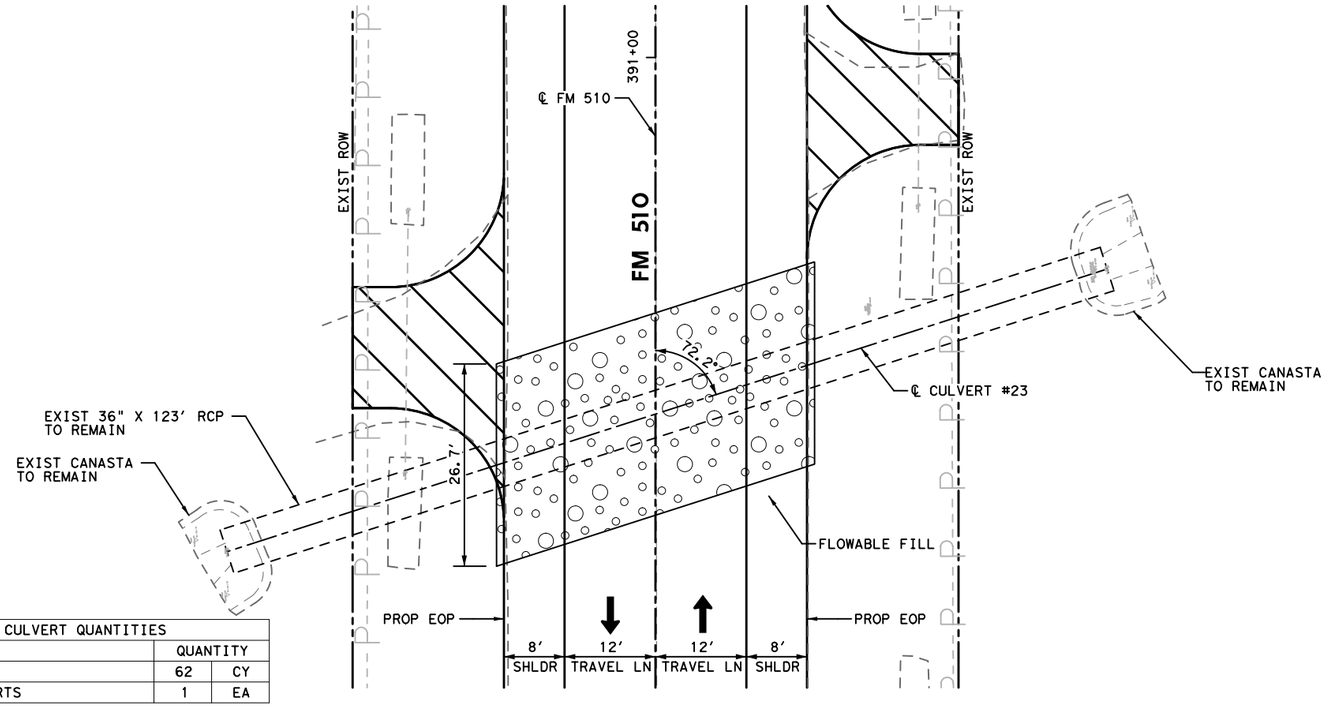
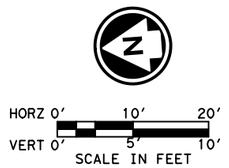
DRAWING DATE: 6/27/2022



SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
401 6001	FLOWABLE BACKFILL	62	CY
480 6001	CLEAN EXIST CULVERTS	1	EA



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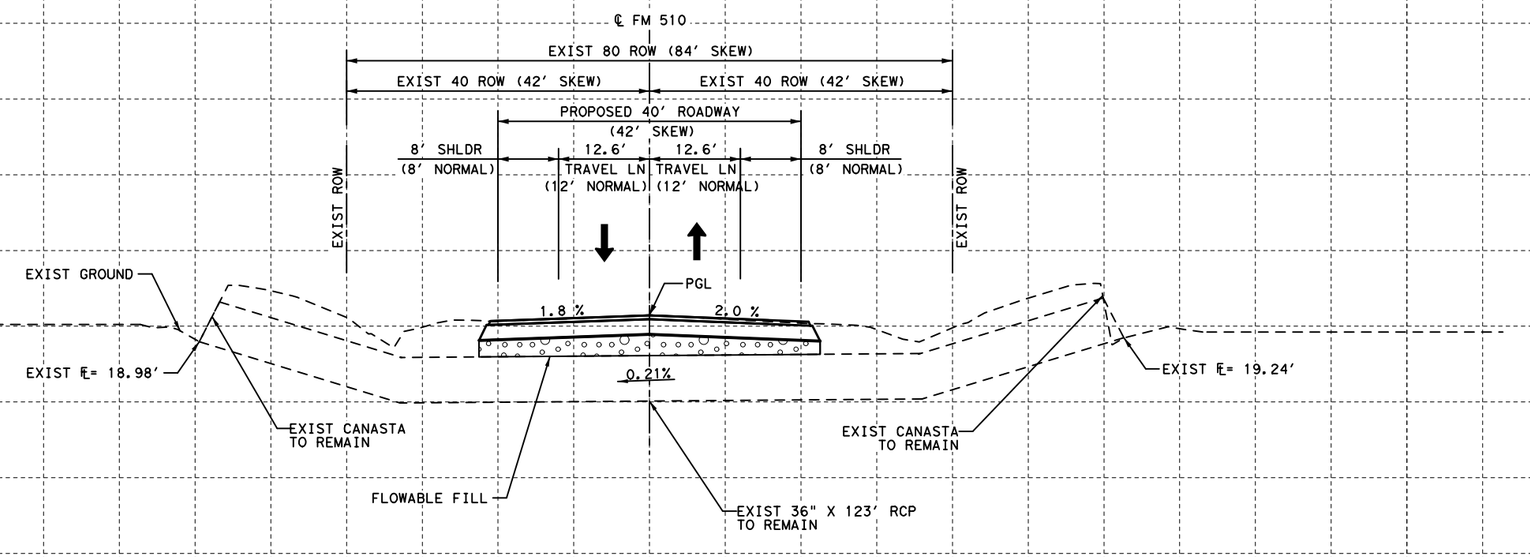

STA 390+52.95

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6/27/2022

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT #23
(CCID#6)
AT STA 390+52.95

SHEET 26 OF 26

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	187
CONTROL	SECTION	JOB	
1057	03	045	

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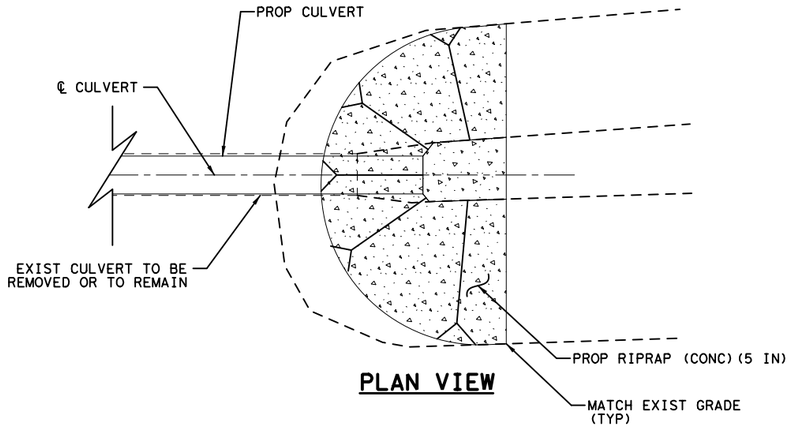
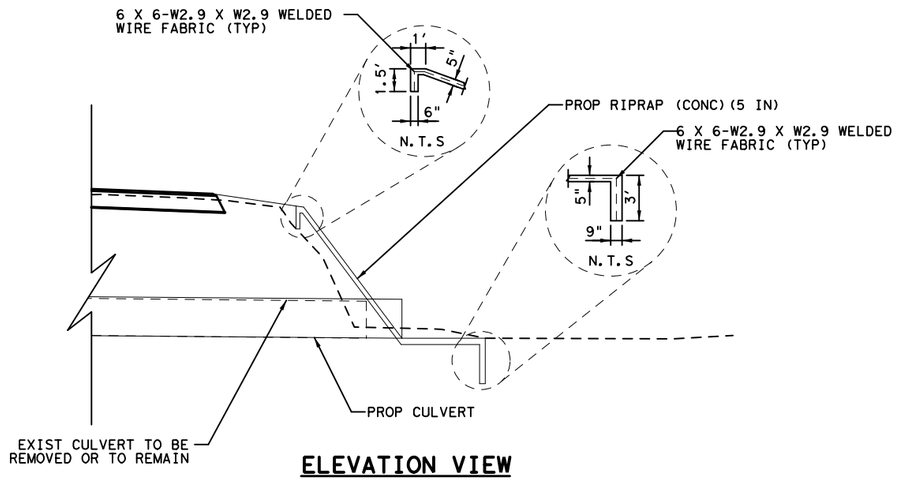
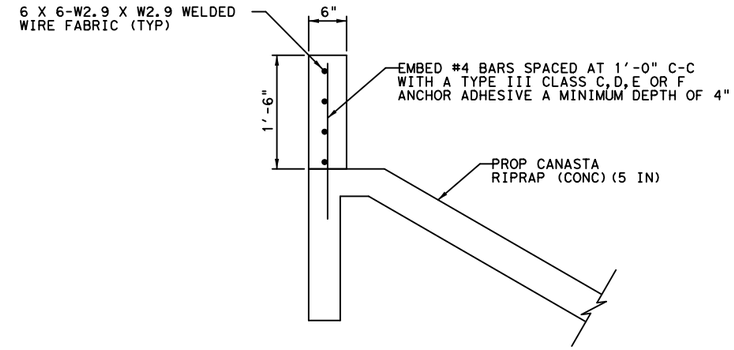


PLAN VIEW



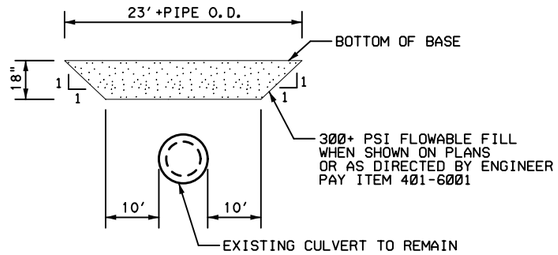
ELEVATION VIEW

DETAIL OF RIPRAP (CONC) (5 IN)
NTS



PROPOSED CURB DETAIL
NTS

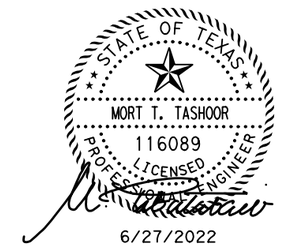
(NOTE: THE PROPOSED CURB IS PAID FOR BY ITEM 529-6036)



FLOWABLE FILL FOR PROTECTION OF EXISTING CULVERTS
NTS

FLOWABLE FILL NOTES:

1. FLOWABLE FILL 28-DAY COMPRESSIVE STRENGTH NEEDS TO BE GREATER THAN 300 PSI. REFER TO NON-EXCAVATABLE FLOWABLE BACKFILL MIX DESIGN TABLE IN ITEM 401 OF TXDOT SPECS.
2. CONTRACTOR TO ALLOW FLOWABLE FILL TO CURE FOR AT LEAST 24 HOURS BEFORE CONSTRUCTION ACTIVITIES RESUME ON TOP OF IT.
3. THICKNESS OF FLOWABLE FILL IS 18" OR DOWN TO THE TOP OF THE EXISTING CULVERTS, WHICHEVER COMES FIRST.
4. CONTRACTOR TO EXERT CAUTION WHEN SELECTING COMPACTION AND ROLLING EQUIPMENT FOR WORK AT THE EXISTING PIPE LOCATIONS. REMOVE AND REPLACE PIPES DAMAGED BY THE CONTRACTOR AT NO EXPENSE TO TXDOT.
5. SEE CULVERT LAYOUT SHEETS FOR LOCATIONS OF FLOWABLE FILL.



6/27/2022

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
CULVERT LAYOUT
MISCELLANEOUS DETAILS

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	188
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\07 Drainage Details\CULVERT MISC DETAILS*01.dgn
DRAWING DATE: 6/27/2022

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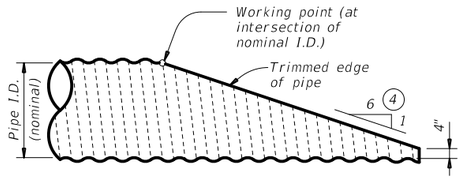
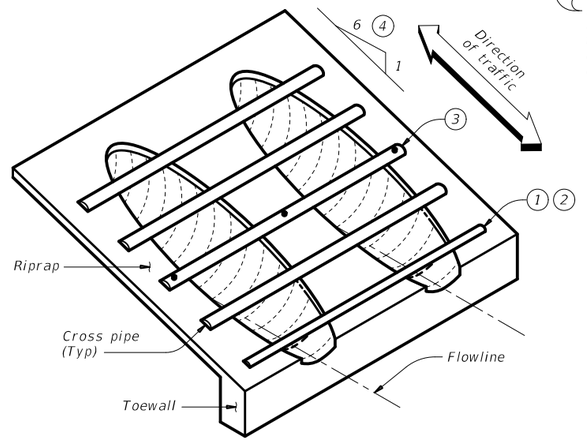


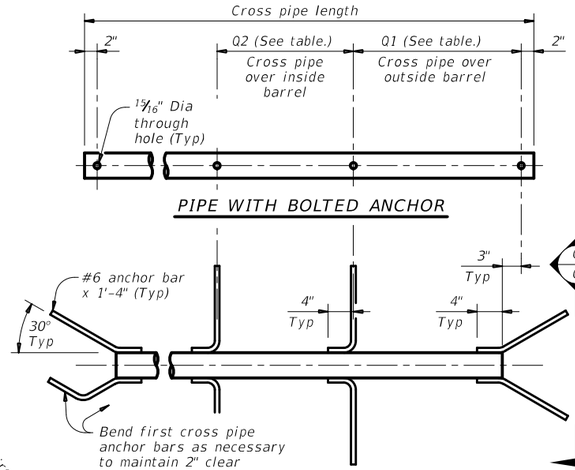
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

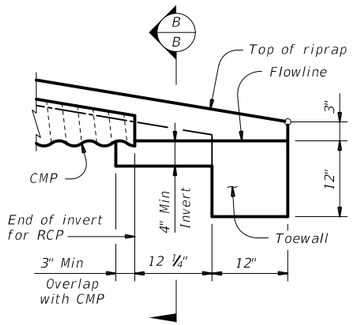
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

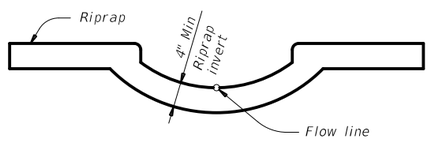


CROSS PIPE DETAILS



DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)



SECTION B-B

(Cross pipes not shown for clarity.)

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' – 9"	N/A	2' – 1"	1' – 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' – 11"	N/A	2' – 5"	2' – 2"		
18"	0.8	1' – 2"	N/A	2' – 10"	2' – 8"		
21"	0.9	1' – 4"	N/A	3' – 2"	3' – 1"		
24"	0.9	1' – 7"	N/A	3' – 6"	3' – 7"		
27"	1.0	1' – 8"	N/A	3' – 10"	3' – 11"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
30"	1.1	1' – 10"	N/A	4' – 2"	4' – 4"	2 or more pipe culverts	
33"	1.2	1' – 11"	4' – 2"	4' – 5"	4' – 8"	All pipe culverts	
36"	1.3	2' – 1"	4' – 5"	4' – 9"	5' – 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' – 4"	4' – 11"	5' – 5"	5' – 10"		
48"	1.7	2' – 7"	5' – 5"	6' – 0"	6' – 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' – 0"	5' – 11"	6' – 9"	7' – 6"		
60"	2.2	3' – 3"	6' – 5"	7' – 4"	8' – 3"		
66"	2.4	3' – 3"	6' – 11"	7' – 10"	8' – 9"		
72"	2.7	3' – 4"	7' – 5"	8' – 5"	9' – 4"		

(1) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

(5) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

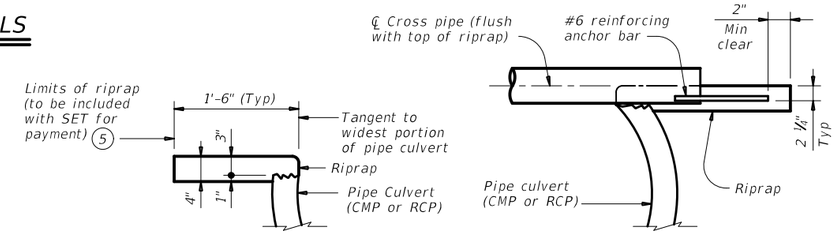
GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

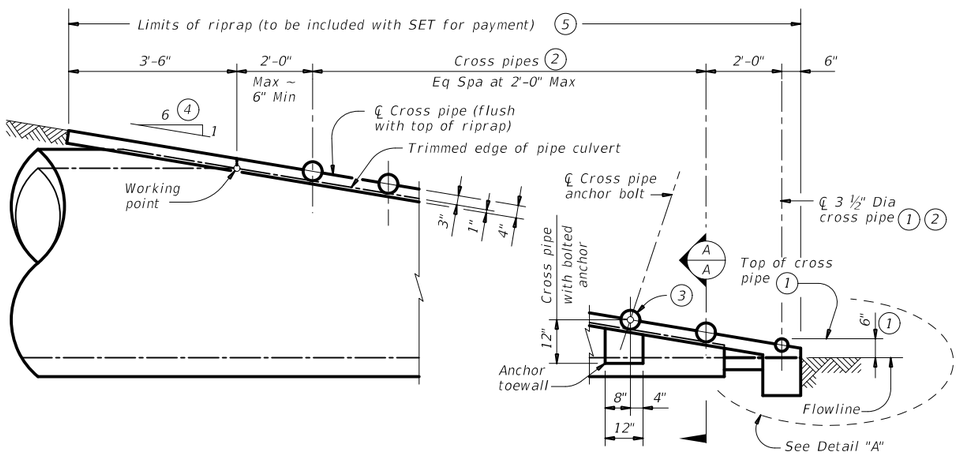
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



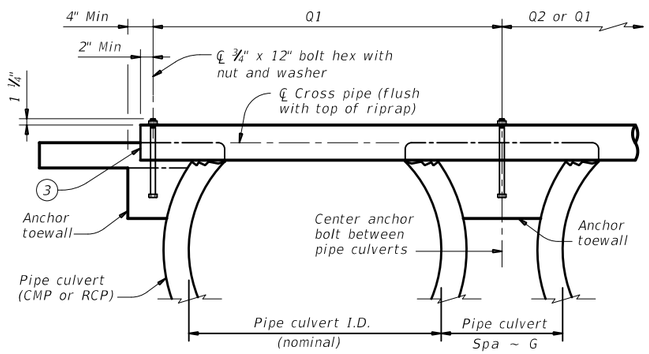
SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 72" DIA
PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		189

DATE: 6/27/2022 4:54:30 PM
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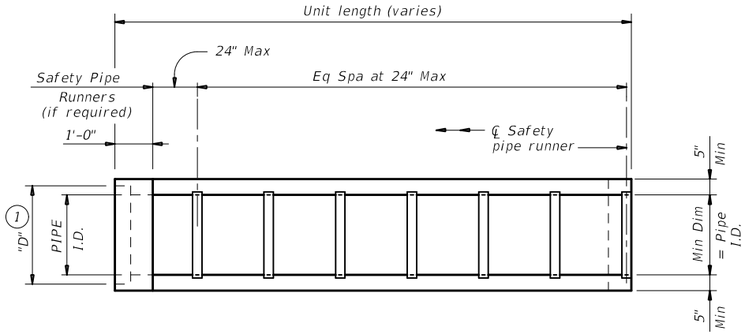
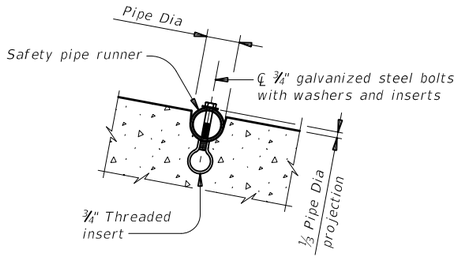


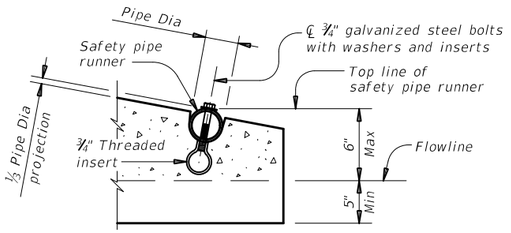
PLAN

(Showing bell end connection.)

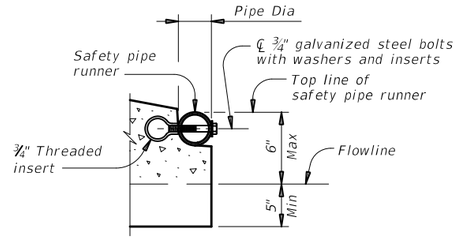


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



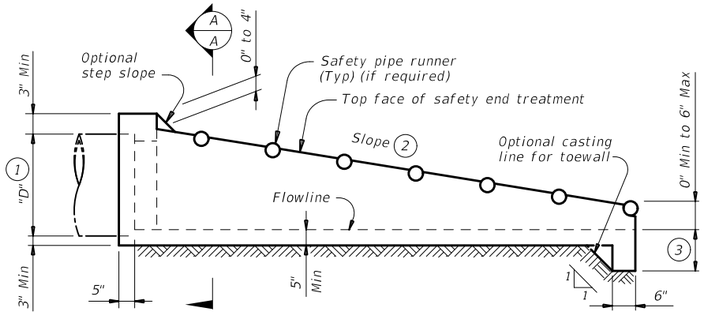
OPTION A



OPTION B

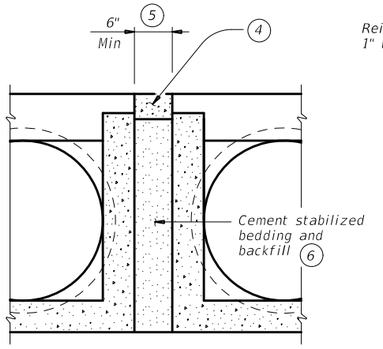
END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

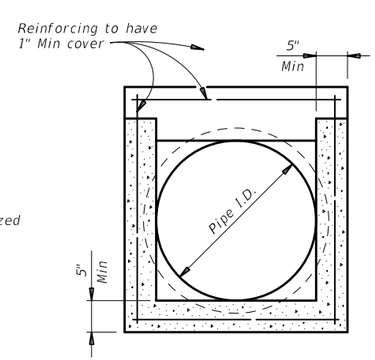


LONGITUDINAL ELEVATION

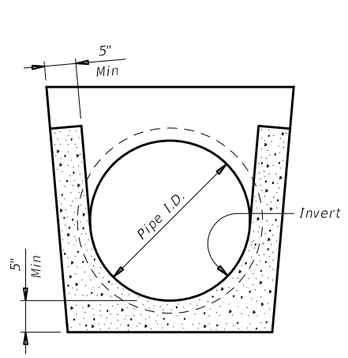
(Showing bell end connection.)



MULTIPLE PIPE INSTALLATION

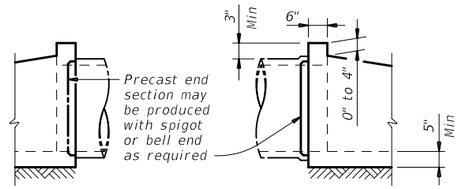


OPTION WITH SQUARE BOTTOM



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	SECT	JOB	HIGHWAY
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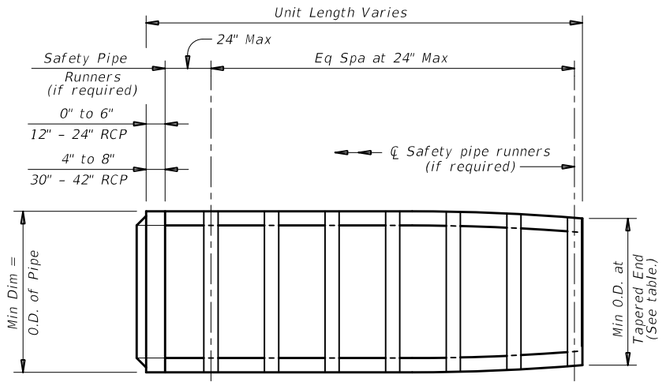
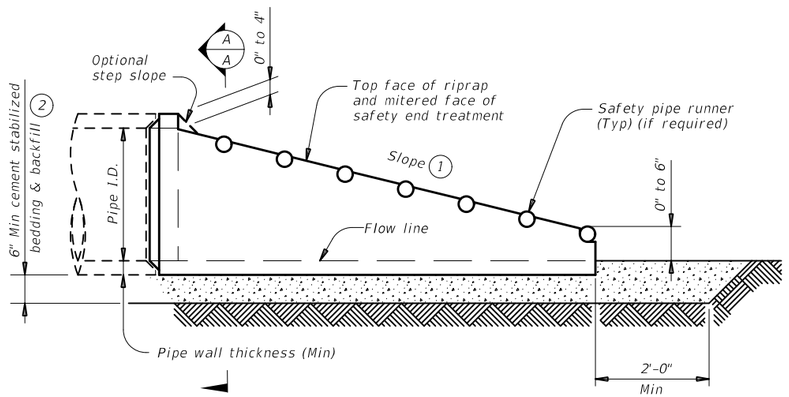
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		190



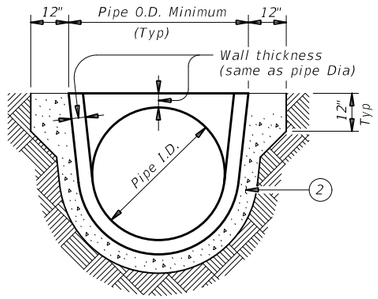
PLAN VIEW – 12" THRU 24"

(Showing spigot end connection.)

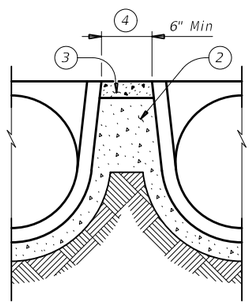


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)



SECTION A-A



MULTIPLE PIPE INSTALLATION

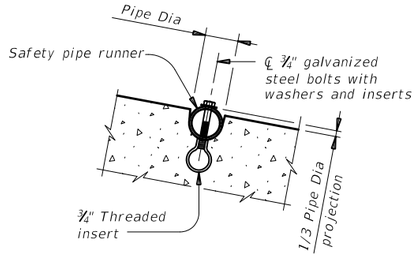
1. Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

   Provide cement stabilized bedding and backfill in accordance with the Item, "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.

3. 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".

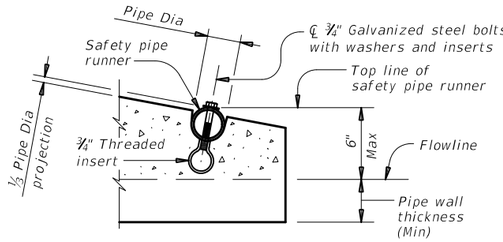
4. Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

5. Safety pipe runners are required for multiple pipe culverts with more than two pipes.

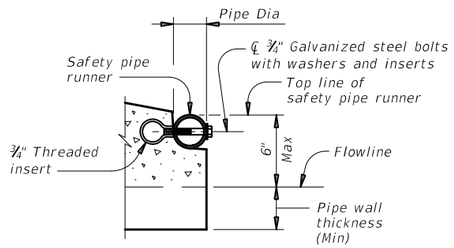


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. per ft. of Pipe)	Max Slope	Min Length of Unit	Pipe Runner Requirements		Required Pipe Runner Sizes		
							Single Pipe	Multiple Pipe	Nominal Dia	O.D.	I.D.
12"	2"	16"	16"	0.07 Circ.	6:1	4'-0"	No	(5)	3" STD	3.500"	3.068"
15"	2 ¼"	19 ½"	19"	0.07 Circ.	6:1	5'-8"	No	(5)	3" STD	3.500"	3.068"
18"	2 ½"	23"	21 ½"	0.07 Circ.	6:1	7'-3"	No	(5)	3" STD	3.500"	3.068"
24"	3"	30"	27"	0.07 Circ.	6:1	10'-6"	No	(5)	3" STD	3.500"	3.068"
30"	3 ½"	37"	31"	0.18 Circ.	6:1	12'-1"	No	Yes	4" STD	4.500"	4.026"
36"	4"	44"	36"	0.19 Ellip.	6:1	15'-4"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	51"	41 ½"	0.23 Ellip.	6:1	18'-7"	Yes	Yes	4" STD	4.500"	4.026"

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Galvanize steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP) may be used for TYPE II end treatment as specified in Item 467, "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.

Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.

Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.

Methods of lifting shall be provided by the manufacturer for ease of loading, unloading and installation.

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.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-RP

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	PHARR	CAMERON		191

DATE: 6/27/2022 4:54:31 PM
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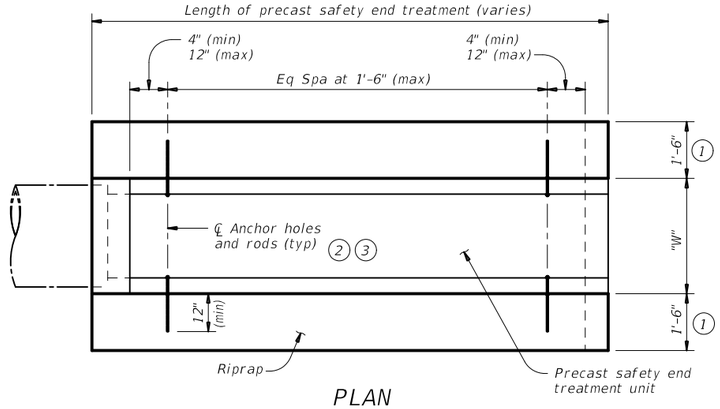
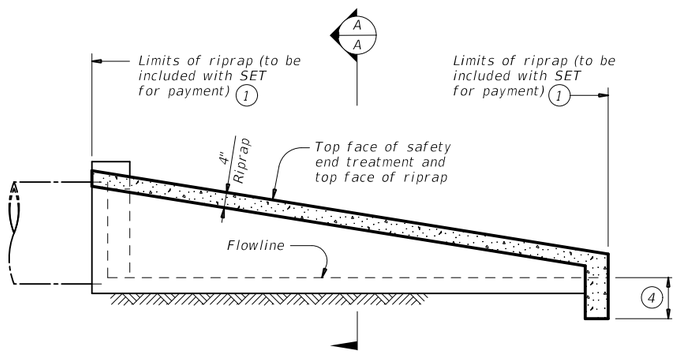
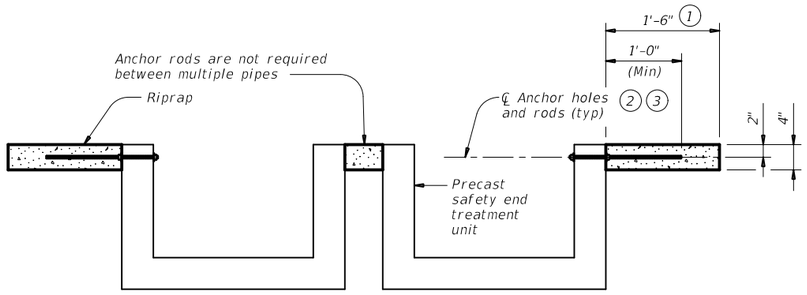


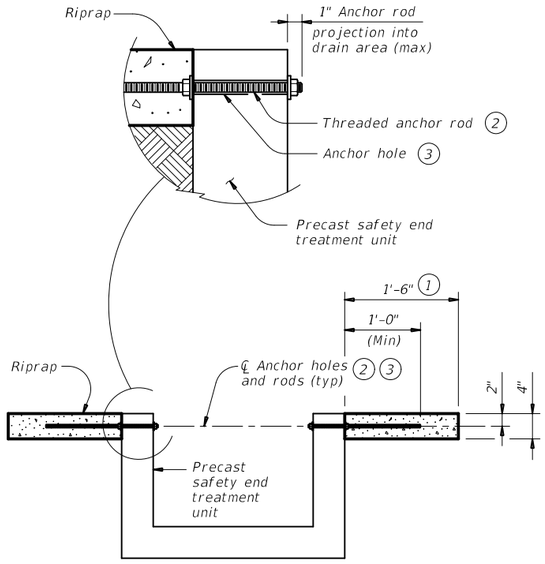
PLAN



LONGITUDINAL ELEVATION



MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) 5

Nominal Culvert (Pipe) I.D.	PSET-SC and PSET-SP Standards				PSET-RC and PSET-RP Standards			
	Unit Width "W"	Side Slope			Unit Width "W"	Side Slope		
		3:1	4:1	6:1		3:1	4:1	6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

(1) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap". When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.

(2) 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing". Repair galvanizing that is damaged during transport or construction in accordance with the specifications.

(3) 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.

(4) Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.

(5) Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Saftey End Treatment (SET) standard sheets.

MATERIAL NOTES:

Provide Class "B" riprap in accordance with Item 432, "Riprap".

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. The anchor rods shown are always required.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown.

For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.

Payment for riprap and toewalls is included in the price bid for each safety end treatment.

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.

Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

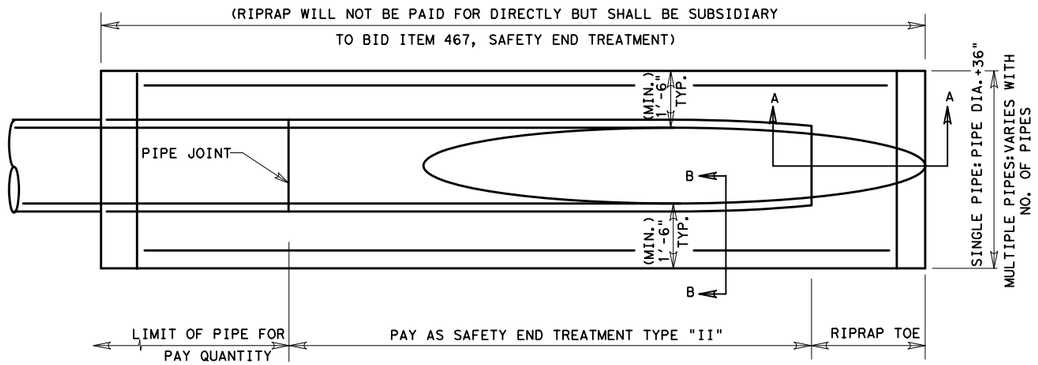
Texas Department of Transportation

Bridge Division Standard

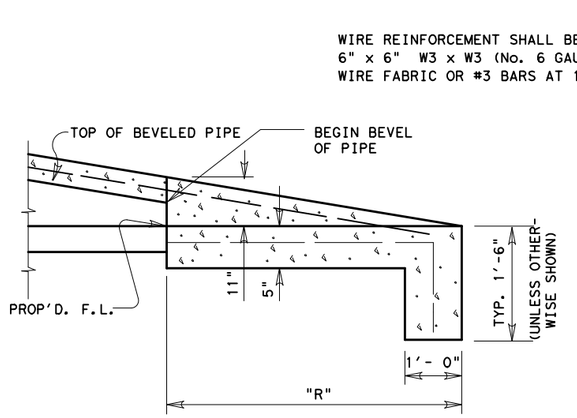
PRECAST SAFETY END TREATMENT
TYPE II
RIPRAP DETAILS

PSET-RR

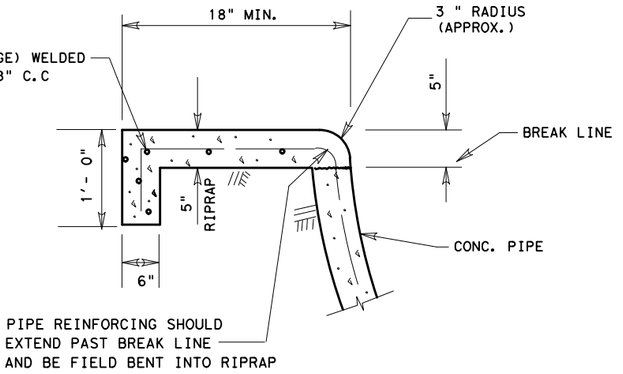
FILE: psetrrse-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		192



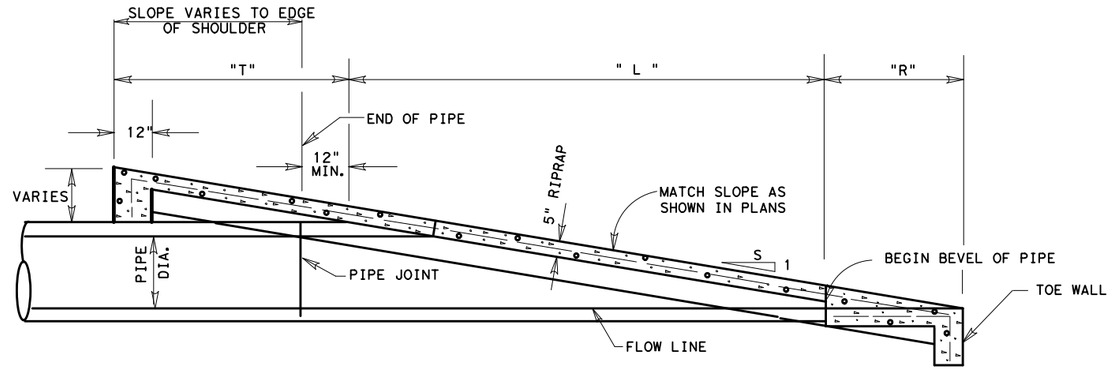
PLAN VIEW



SEC. A-A



SEC. B-B



ELEVATION
SAFETY END TREATMENT

SAFETY END TREATMENT PIPE LENGTHS

PIPE DIA. (IN.)	"L"			
	3:1	4:1	5:1	6:1
12	2'-0"	2'-8"	3'-4"	4'-0"
15	2'-9"	3'-8"	4'-7"	5'-6"
18	3'-6"	4'-8"	5'-10"	7'-0"
24	5'-1½"	6'-10"	8'-6½"	10'-3"
30	6'-9"	9-0"	11'-3"	13'-6"
36	8'-6"	11'-4"	14'-2"	17'-0"
42	10'-1½"	13'-6"	16'-10½"	20'-3"
48	11'-9"	15'-8"	19'-7"	23'-6"

⊛ DRIVEWAYS & TURNOUTS ARE 6:1 ONLY

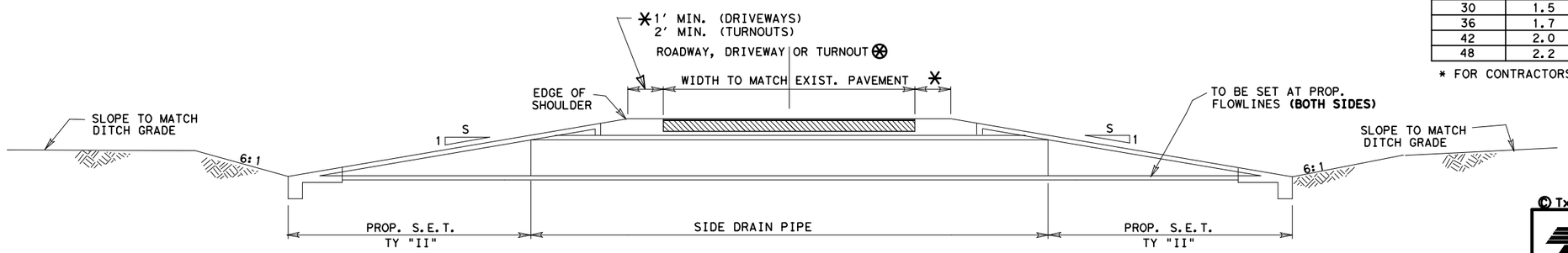
RIPRAP TOE LENGTHS

SLOPE	" R "	"T"
3:1	2'-9"	1'-9"
4:1	3'-8"	2'-4"
5:1	4'-7"	2'-11"
6:1	5'-6"	3'-6"

ESTIMATED RIPRAP VOLUME (CY)

PIPE DIA. (IN.)				
	3:1	4:1	5:1	6:1
12	.9	1.1	1.3	1.6
15	1.0	1.2	1.5	1.8
18	1.1	1.4	1.6	1.9
24	1.3	1.6	2.0	2.3
30	1.5	1.9	2.3	2.7
36	1.7	2.2	2.7	3.2
42	2.0	2.5	3.1	3.6
48	2.2	2.8	3.4	4.1

* FOR CONTRACTORS INFORMATION ONLY (SINGLE PIPE)



TYPICAL SIDEDRAIN SECTION

NOTE:

ALL EXCAVATION AND BACKFILL REQUIRED AT ALL PIPE SIDE DRAIN CONNECTIONS, ADJUSTMENTS AND/OR EXTENSIONS WILL NOT BE PAID FOR DIRECTLY BUT SHALL BE SUBSIDIARY TO THE BID ITEMS INVOLVED AND IN ACCORDANCE WITH ITEM 400 "STRUCTURAL EXCAVATION".

PHARR DISTRICT STANDARDS

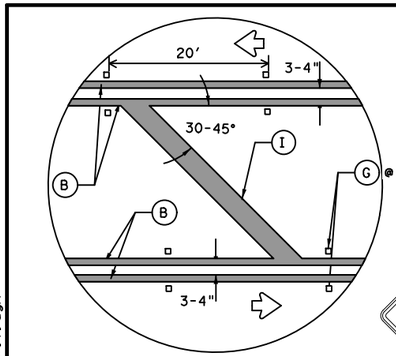
TEXAS DEPARTMENT OF TRANSPORTATION

SAFETY END TREATMENT DETAILS

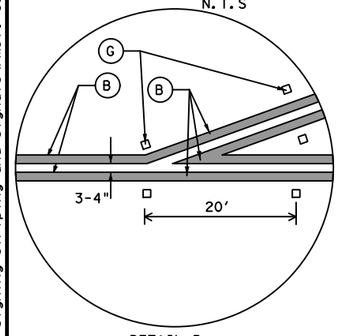
REV. 9/16

SET. DGN

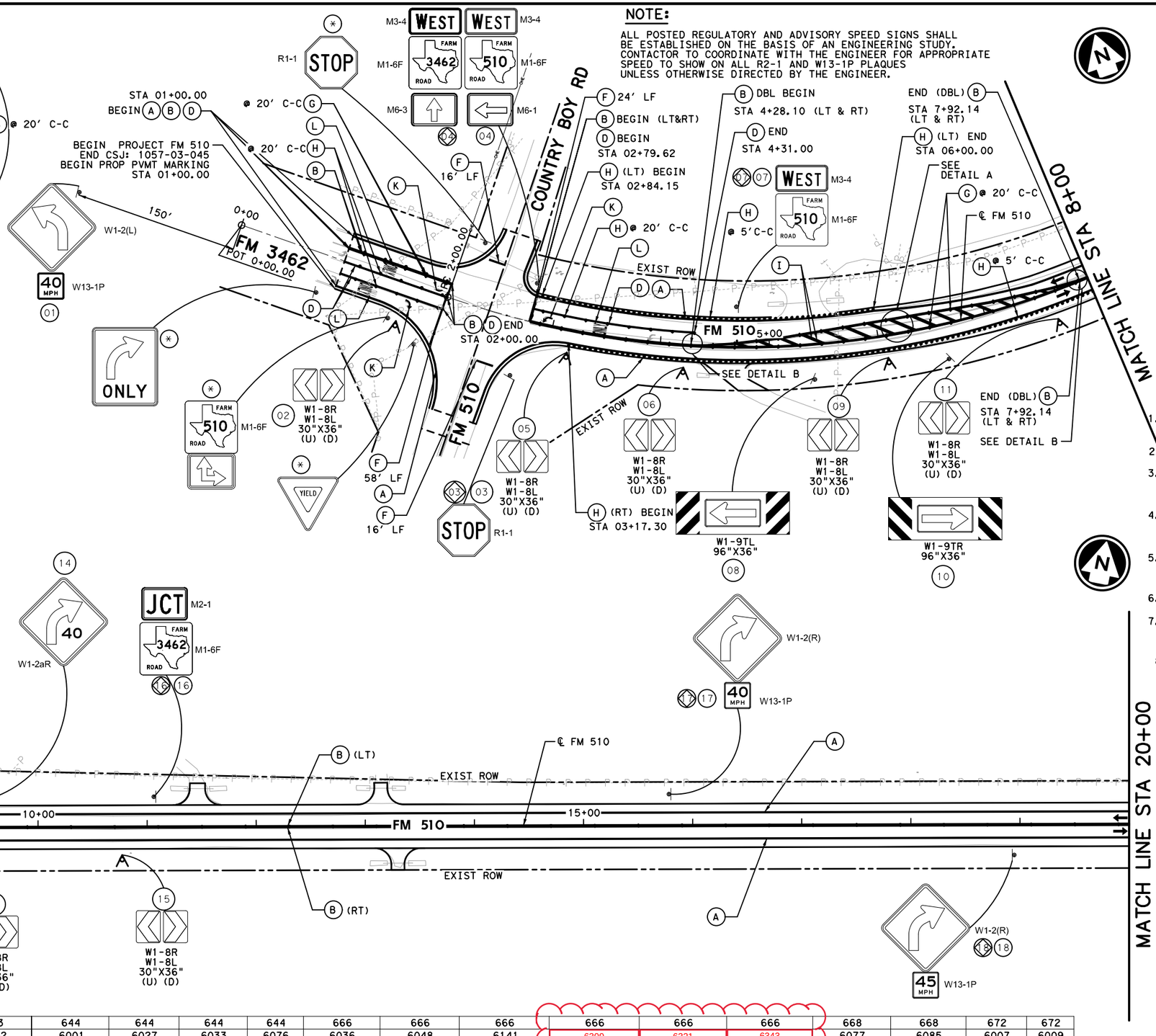
FED. RD. DIV. NO.	STATE AID PROJECT NO.		FILE NO.			SHEET NO.
6						193
STATE	STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
TEXAS	21	HIDALGO/CAMERON	1428	01	027, ETC	FM 510, ETC



DETAIL A
N.T.S



DETAIL B
N.T.S



ITEM	533	644	644	644	644	666	666	666	666	666	666	668	668	672	672
DESC CODE	6002	6001	6027	6033	6076	6036	6048	6141	6309 RE PM W/RET REQ TY I (W)6"(SLD) (100MIL)	6321 RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD) (100MIL)	6077	6085	6007	6009
LOCATION (STA TO STA)	RUMBLE STRIPS (CENTERLINE)	IN SM RD SN SUP&AM TY1 0BWG(1) SA(P)	IN SM RD SN SUP&AM TYS80(1)S A(P)	IN SM RD SN SUP&AM TYS80(1) SA(U)	REMOVE SM RD SN SUP&AM	REFL PAV MRK TY I (W)8"(SLD) (100MIL)	REFL PAV MRK TY I (W)24"(SLD) (100MIL)	REFL PAV MRK TY I (Y)12"(SLD)(100MIL)				PREFAB PAV MRK TY C (W) (ARROW)	PREFAB PAV MRK TY C (W) (WORD)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A
	LF	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA
BEGIN TO 8+00.00	620	5	5	1	7	350	114	535	1,510	1,980	3,020	3	3	170	105
08+00.00 TO 20+00.00	1,200	2	5		4				2,400	2,400	4,800			25	31

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

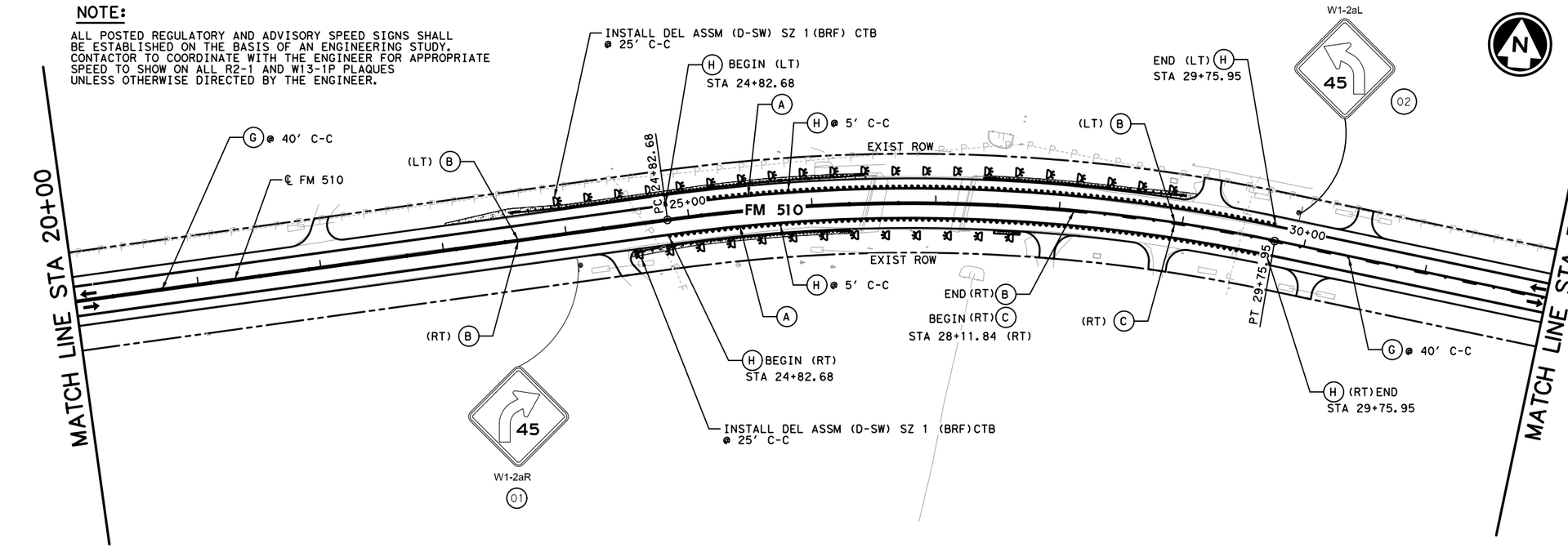
SHEET 1 OF 18

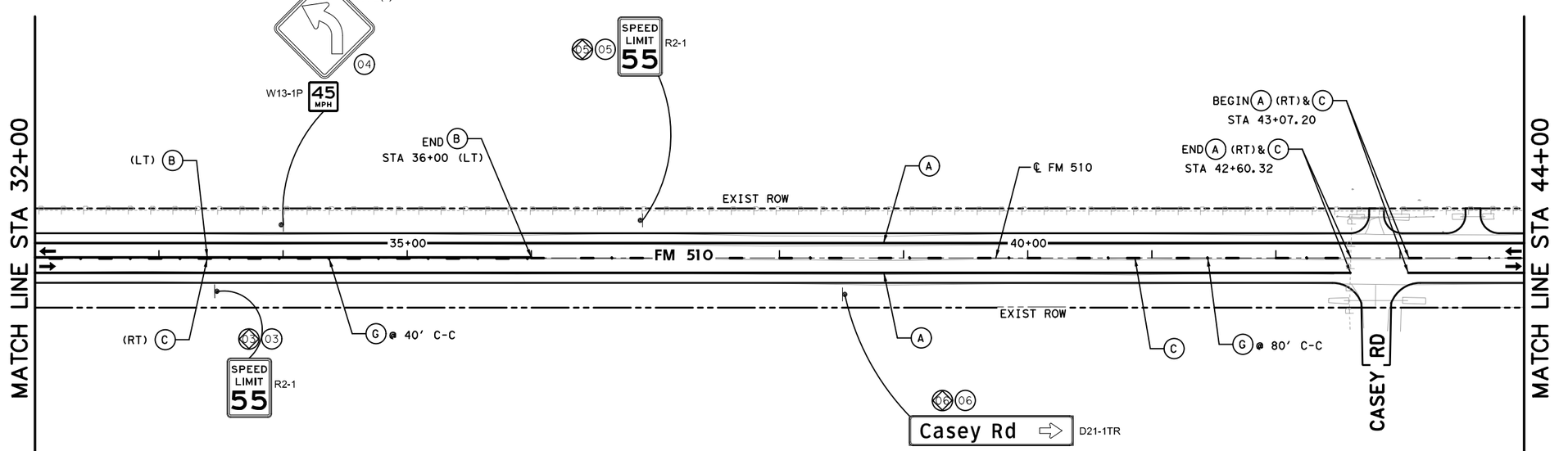
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	194
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&PM#01.dgn
DRAWING DATE: 6/27/2022

NOTE:

ALL POSTED REGULATORY AND ADVISORY SPEED SIGNS SHALL BE ESTABLISHED ON THE BASIS OF AN ENGINEERING STUDY. CONTACTOR TO COORDINATE WITH THE ENGINEER FOR APPROPRIATE SPEED TO SHOW ON ALL R2-1 AND W13-1P PLAQUES UNLESS OTHERWISE DIRECTED BY THE ENGINEER.





LEGEND:

SCALE IN FEET: 0' 50' 100'

- (A) 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
- (B) 6" YELLOW SOLID LINE (SEE NOTES 1 & 2)
- (C) 6" YELLOW BROKEN CENTERLINE (SEE NOTES 1 & 2)
- (D) 8" WHITE SOLID LINE
- (E) 12" WHITE SOLID LINE
- (F) 24" WHITE SOLID LINE
- (G) REFL PAV MRKR TY II-A-A
- (H) REFL PAV MRKR TY I-C
- (I) 12" YELLOW SOLID LINE
- (J) PREFAB PAV MRK TY C (W) (RR XING)
- (K) PREFAB PAV MRK TY C (W) (ARROW)
- (L) PREFAB PAV MRK TY C (W) (WORD)
- (#) SIGN TO BE RELOCATED
- (#) SIGN TO BE REMOVED
- (#) SIGN TO BE INSTALLED
- (×) SIGN TO REMAIN IN PLACE
- (#) SIGN TO BE REMOVED AND REINSTALLED

NOTE:

1. ALONG THE CENTERLINE FURNISH TY II-A-A RAISED PAVEMENT MARKERS IN ACCORDANCE WITH PM(2)-22 STANDARD.
2. ALONG THE CENTERLINE FURNISH MILLED RUMBLE STRIPS PER STANDARD RS(3)-13 OPTION 1.
3. REMOVE EXISTING CITY STREET AND COUNTY ROAD TOPPER AND INSTALL THEM ONTO THE NEW STOP SIGN ASSEMBLIES. THIS WORK SHALL BE CONSIDERED SUBSIDIARY TO ITEM 644.
4. ALL SIGNS IN WORKING AREAS DESIGNATED TO BE RELOCATED CAN BE REMOVED AND STORED AT THE San Benito MAINTANCE YARD TO PREVENT DAMAGE DURING CONSTRUCTION.
5. CONTRACTOR IS RESPONSIBLE FOR ALL SIGNS DAMAGED DURING CONSTRUCTION. THE DAMAGED SIGNS WILL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE.
6. ANY EXISTING SIGN DESIGNATED TO BE RELOCATED CAN BE REPLACED IF DIRECTED BY THE ENGINEER.
7. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANIES TO MAKE ANY ADJUSTMENT DUE TO CONFLICTS ON ANY SIGNS THAT ARE TO BE RELOCATED.
8. EXISTING SIGNS THAT ARE PROPOSED TO BE REPLACED, CAN REMAIN IN PLACE IF APPROVED BY THE ENGINEER. A FIELD INSPECTION BEFORE & AFTER THE CONSTRUCTION OF THIS PROJECT SHALL BE DONE.

ITEM			533	636	644	644	644	666	666	666	666	672	672
DESC CODE			6002	6001	6027	6030	6076	6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	6318 RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	6321 RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)	6007	6009
LOCATION (STA TO STA)			RUMBLE STRIPS (CENTERLINE)	ALUMINUM SIGNS (TY A)	IN SM RD SN SUP&AM TYS80(1)SA(P)	IN SM RD SN SUP&AM TYS80(1)SA(T)	REMOVE SM RD SN SUP&AM					REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A
			LF	SF	EA	EA	EA	LF	LF	LF	LF	EA	EA
20+00.00	TO	32+00.00	1,200		2			2,400	100	2,012	4,800	200	32
32+00.00	TO	44+00.00	1,154	5.50	3	1	3	2,354	300	400	4,708		22

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

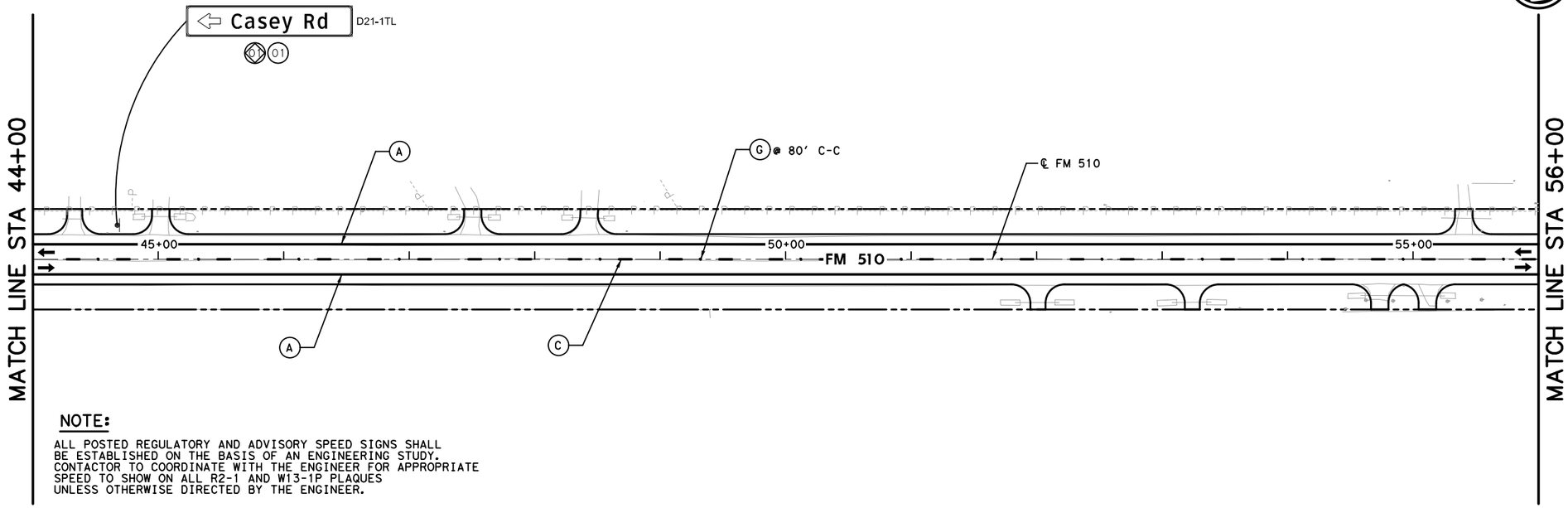
FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 2 OF 18

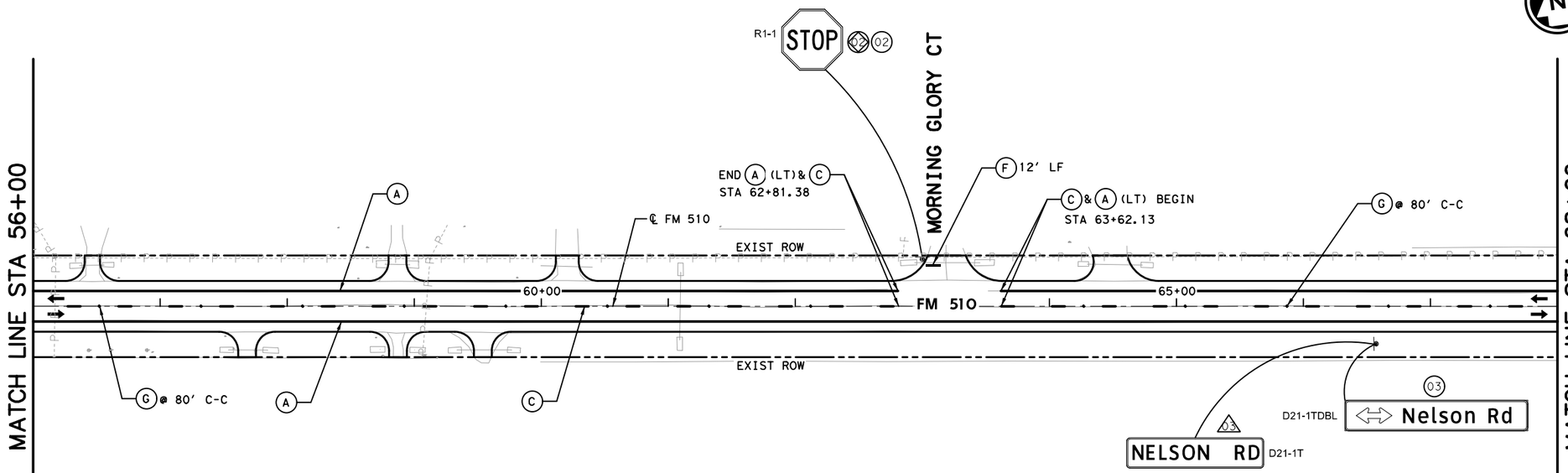
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	195
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&PM#02.dgn
DRAWING DATE: 6/27/2022



NOTE:

ALL POSTED REGULATORY AND ADVISORY SPEED SIGNS SHALL BE ESTABLISHED ON THE BASIS OF AN ENGINEERING STUDY. CONTACTOR TO COORDINATE WITH THE ENGINEER FOR APPROPRIATE SPEED TO SHOW ON ALL R2-1 AND W13-1P PLAQUES UNLESS OTHERWISE DIRECTED BY THE ENGINEER.



ITEM			533	636	644	644	644	666	666	666	666	672
DESC CODE			6002	6001	6027	6030	6076	6048	6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	6318 RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)	6009
LOCATION (STA TO STA)			RUMBLE STRIPS (CENTERLINE)	ALUMINUM SIGNS (TY A)	IN SM RD SN SUP&AM TYS80(1)SA(P)	IN SM RD SN SUP&AM TYS80(1)SA(T)	REMOVE SM RD SN SUP&AM	REFL PAV MRK TY I (W)24"(SLD) (100MIL)				REFL PAV MRKR TY II-A-A
			LF	SF	EA	EA	EA	LF	LF	LF	LF	EA
44+00.00	TO	56+00.00	1,200	5.50		1	1		2,400	300	4,800	16
56+00.00	TO	68+00.00	1,120	6.00	1	1	2	12	2,320	290	4,640	15

LEGEND:

0' 50' 100'
SCALE IN FEET

- (A) 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
- (B) 6" YELLOW SOLID LINE (SEE NOTES 1 & 2)
- (C) 6" YELLOW BROKEN CENTERLINE (SEE NOTES 1 & 2)
- (D) 8" WHITE SOLID LINE
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- (I) 12" YELLOW SOLID LINE
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- (K) PREFAB PAV MRK TY C (W) (ARROW)
- (L) PREFAB PAV MRK TY C (W) (WORD)
- (#) SIGN TO BE RELOCATED
- (#) SIGN TO BE REMOVED
- (#) SIGN TO BE INSTALLED
- (×) SIGN TO REMAIN IN PLACE
- (#) SIGN TO BE REMOVED AND REINSTALLED

NOTE:

1. ALONG THE CENTERLINE FURNISH TY II-A-A RAISED PAVEMENT MARKERS IN ACCORDANCE WITH PM(2)-22 STANDARD.
2. ALONG THE CENTERLINE FURNISH MILLED RUMBLE STRIPS PER STANDARD RS(3)-13 OPTION 1.
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STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation
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I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

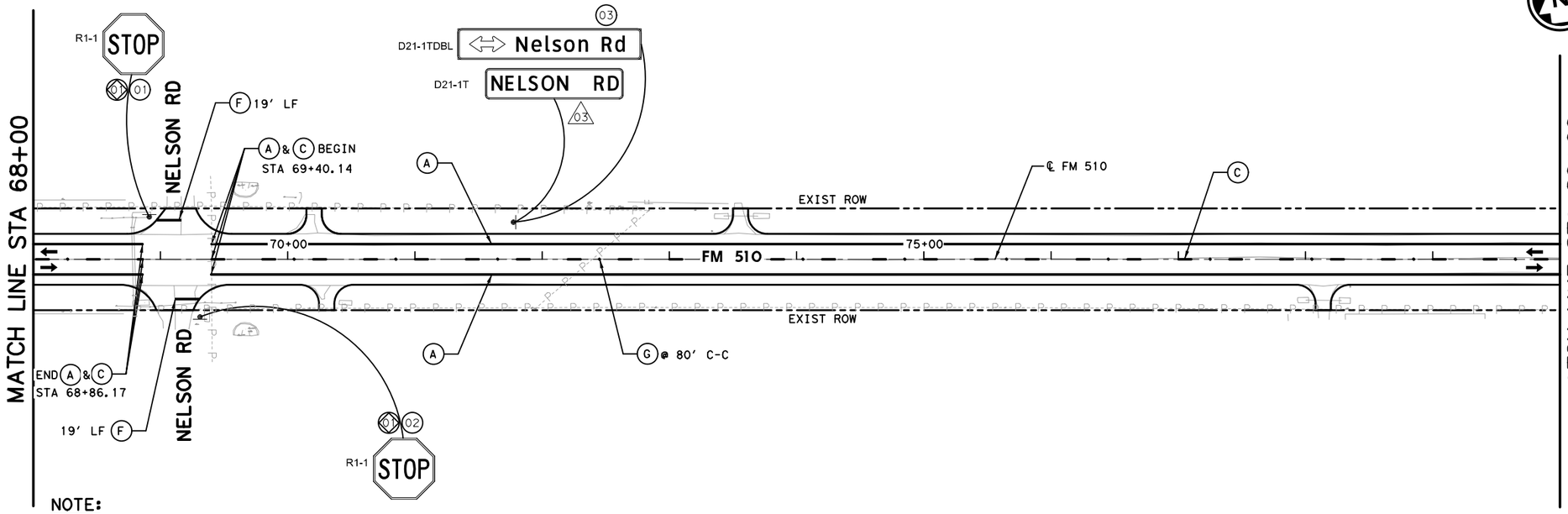
SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 3 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	196
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425*ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510*S&PM#03.dgn

DRAWING DATE: 6/27/2022



NOTE:

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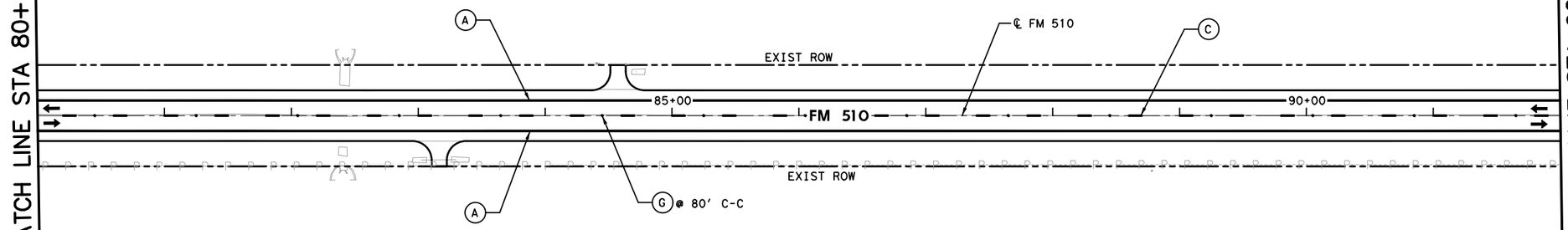

ITEM			533	636	644	644	644	666	666	666	666	672
DESC CODE			6002	6001	6027	6030	6076	6048	6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	6318 RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)	6009
LOCATION (STA TO STA)			RUMBLE STRIPS (CENTERLINE)	ALUMINUM SIGNS (TY A)	IN SM RD SN SUP&AM TYS80(1)SA(P)	IN SM RD SN SUP&AM TYS80(1)SA(T)	REMOVE SM RD SN SUP&AM	REFL PAV MRK TY I (W)24"(SLD) (100MIL)				REFL PAV MRKR TY II-A-A
			LF	SF	EA	EA	EA	LF	LF	LF	LF	EA
68+00.00	TO	80+00.00	1,146	6.00	2	1	3	38	2,292	280	4,584	15
80+00.00	TO	92+00.00	1,200						2,400	300	4,800	16

LEGEND:

0' 50' 100'
SCALE IN FEET

- (A) 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
- (B) 6" YELLOW SOLID LINE (SEE NOTES 1 & 2)
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NOTE:

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STATE OF TEXAS
ENRIQUE ACEVEDO JR.
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6/27/2022

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

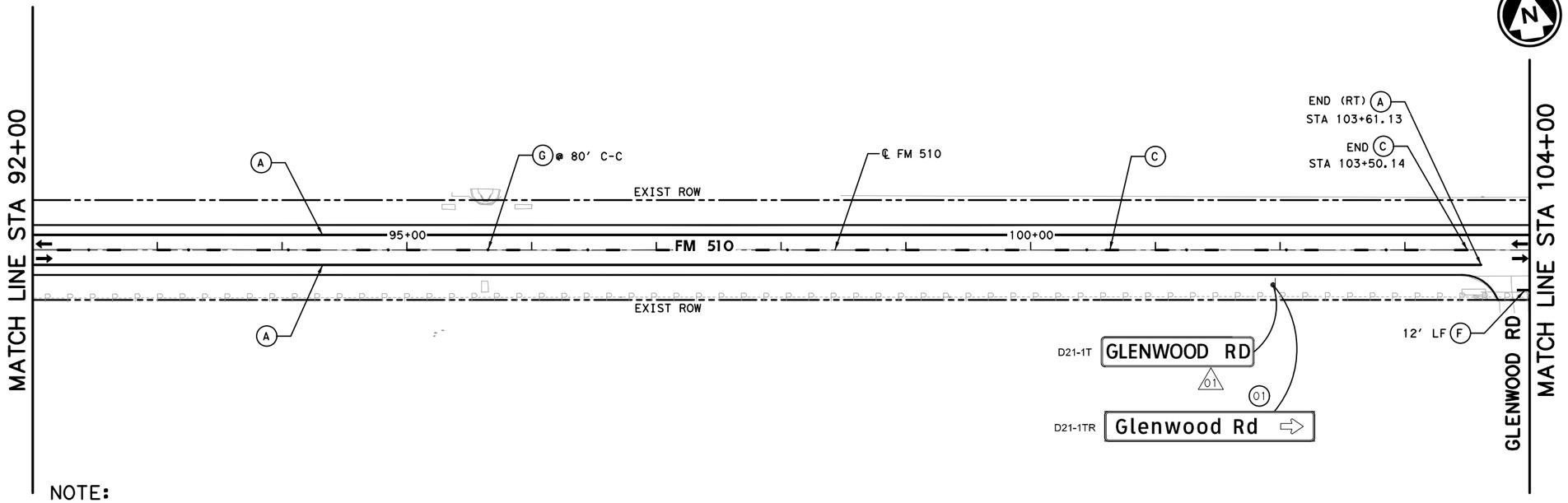
FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 4 OF 18

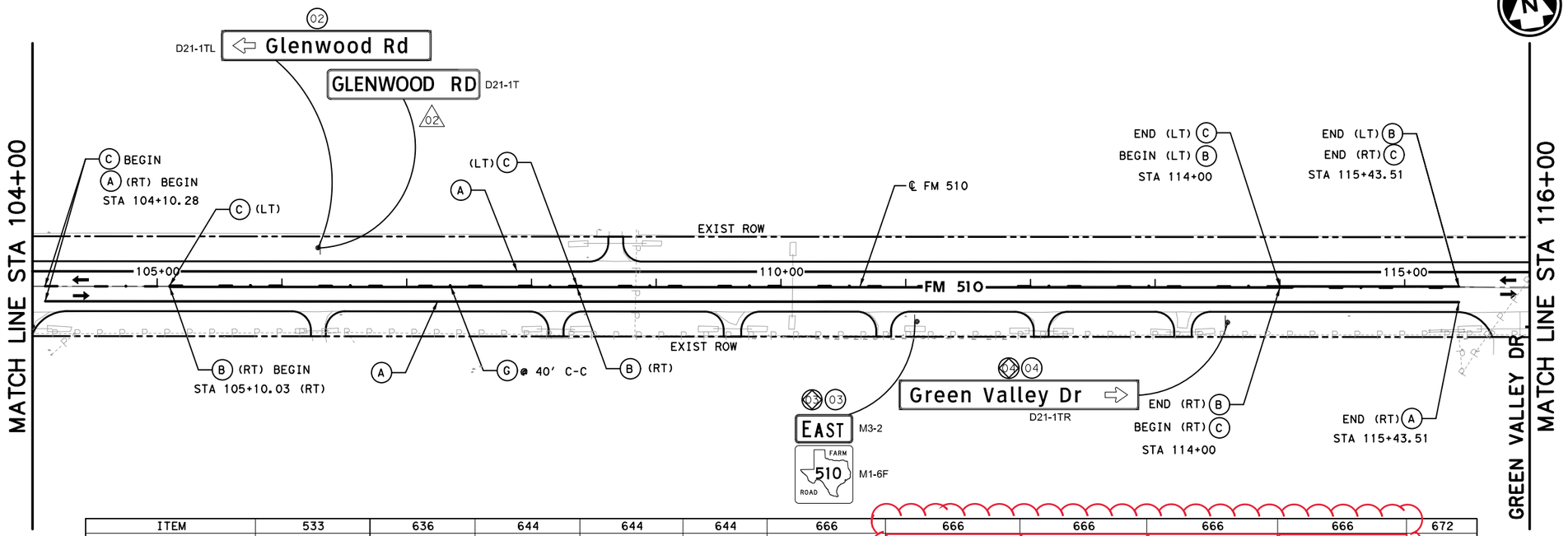
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	197
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&PM#04.dgn
DRAWING DATE: 6/27/2022



NOTE:

ALL POSTED REGULATORY AND ADVISORY SPEED SIGNS SHALL BE ESTABLISHED ON THE BASIS OF AN ENGINEERING STUDY. CONTACTOR TO COORDINATE WITH THE ENGINEER FOR APPROPRIATE SPEED TO SHOW ON ALL R2-1 AND W13-1P PLAQUES UNLESS OTHERWISE DIRECTED BY THE ENGINEER.



ITEM			533	636	644	644	644	666	666	666	666	666	672
DESC CODE			6002	6001	6027	6030	6076	6048	6309	6318	6321	6343	6009
LOCATION (STA TO STA)			RUMBLE STRIPS (CENTERLINE)	ALUMINUM SIGNS (TY A)	IN SM RD SN SUP&AM TYS80(1)SA(P)	IN SM RD SN SUP&AM TYS80(1)SA(T)	REMOVE SM RD SN SUP&AM	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)	REFL PAV MRKR TY II-A-A
			LF	SF	EA	EA	EA	LF	LF	LF	LF	LF	EA
92+00.00	TO	104+00.00	1,162	7.00		1	1	12	2,362	290		4,724	15
104+00.00	TO	116+00.00	1,147	15.00	1	2	3		2,347	290	1,054	4,694	28

LEGEND:

SCALE IN FEET 0' 50' 100'

- (A) 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
- (B) 6" YELLOW SOLID LINE (SEE NOTES 1 & 2)
- (C) 6" YELLOW BROKEN CENTERLINE (SEE NOTES 1 & 2)
- (D) 8" WHITE SOLID LINE
- (E) 12" WHITE SOLID LINE
- (F) 24" WHITE SOLID LINE
- (G) REFL PAV MRKR TY II-A-A
- (H) REFL PAV MRKR TY I-C
- (I) 12" YELLOW SOLID LINE
- (J) PREFAB PAV MRK TY C (W) (RR XING)
- (K) PREFAB PAV MRK TY C (W) (ARROW)
- (L) PREFAB PAV MRK TY C (W) (WORD)
- (#) SIGN TO BE RELOCATED
- # SIGN TO BE REMOVED
- (#) SIGN TO BE INSTALLED
- (×) SIGN TO REMAIN IN PLACE
- (#) # SIGN TO BE REMOVED AND REINSTALLED

NOTE:

1. ALONG THE CENTERLINE FURNISH TY II-A-A RAISED PAVEMENT MARKERS IN ACCORDANCE WITH PM(2)-22 STANDARD.
2. ALONG THE CENTERLINE FURNISH MILLED RUMBLE STRIPS PER STANDARD RS(3)-13 OPTION 1.
3. REMOVE EXISTING CITY STREET AND COUNTY ROAD TOPPER AND INSTALL THEM ONTO THE NEW STOP SIGN ASSEMBLIES. THIS WORK SHALL BE CONSIDERED SUBSIDIARY TO ITEM 644.
4. ALL SIGNS IN WORKING AREAS DESIGNATED TO BE RELOCATED CAN BE REMOVED AND STORED AT THE San Benito MAINTANCE YARD TO PREVENT DAMAGE DURING CONSTRUCTION.
5. CONTRACTOR IS RESPONSIBLE FOR ALL SIGNS DAMAGED DURING CONSTRUCTION. THE DAMAGED SIGNS WILL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE.
6. ANY EXISTING SIGN DESIGNATED TO BE RELOCATED CAN BE REPLACED IF DIRECTED BY THE ENGINEER.
7. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANIES TO MAKE ANY ADJUSTMENT DUE TO CONFLICTS ON ANY SIGNS THAT ARE TO BE RELOCATED.
8. EXISTING SIGNS THAT ARE PROPOSED TO BE REPLACED, CAN REMAIN IN PLACE IF APPROVED BY THE ENGINEER. A FIELD INSPECTION BEFORE & AFTER THE CONSTRUCTION OF THIS PROJECT SHALL BE DONE.

STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

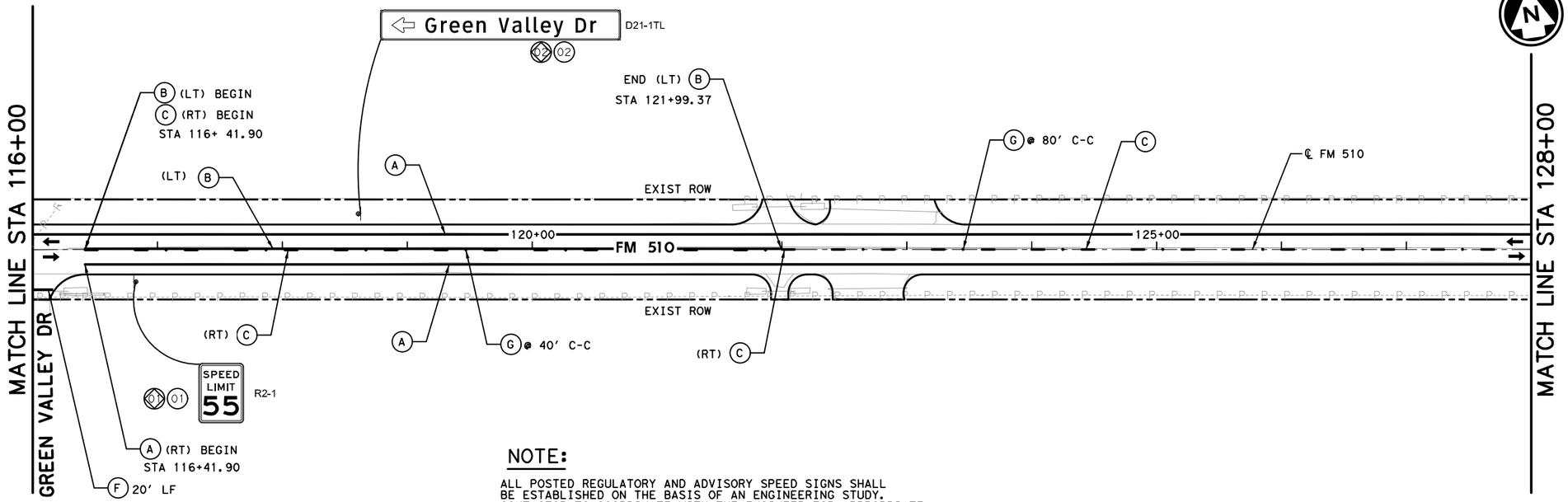
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 5 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	198
CONTROL	SECTION	JOB	
1057	03	045	



NOTE:

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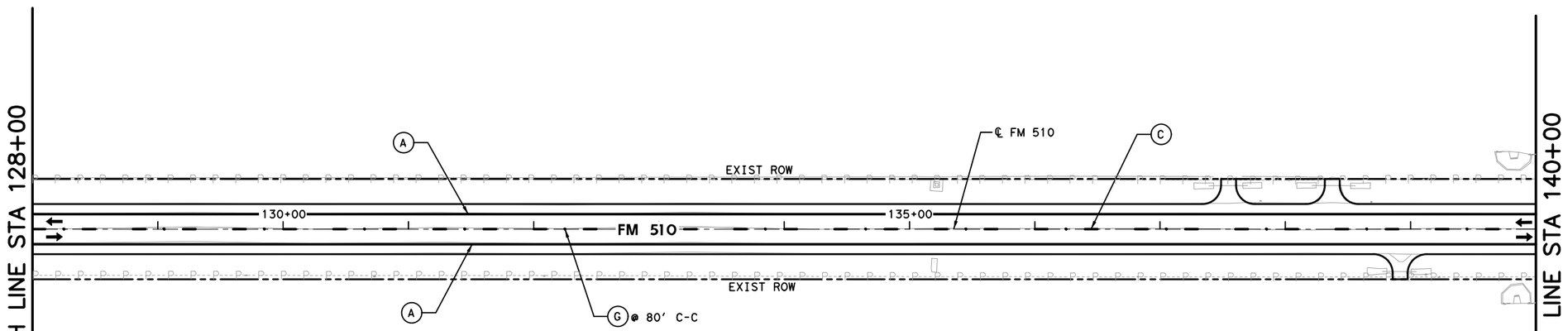

ITEM			533	636	644	644	644	666	666	666	666	666	672
DESC CODE			6002	6001	6027	6030	6076	6048	6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	6318 RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	6321 RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)	6009
LOCATION (STA TO STA)			RUMBLE STRIPS (CENTERLINE)	ALUMINUM SIGNS (TY A)	IN SM RD SN SUP&AM TYS80(1)SA(P)	IN SM RD SN SUP&AM TYS80(1)SA(T)	REMOVE SM RD SN SUP&AM	REFL PAV MRK TY I (W)24"(SLD) (100MIL)					REFL PAV MRKR TY II-A-A
			LF	SF	EA	EA	EA	LF	LF	LF	LF	LF	EA
116+00.00	TO	128+00.00	1,159	8.00	1	1	2	20	2,359	290	542	4,718	22
128+00.00	TO	140+00.00	1,200						2,400	300		4,800	16

LEGEND:

0' 50' 100'
SCALE IN FEET

- (A) 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
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- (C) 6" YELLOW BROKEN CENTERLINE (SEE NOTES 1 & 2)
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- (L) PREFAB PAV MRK TY C (W) (WORD)
- (#) SIGN TO BE RELOCATED
- (#) SIGN TO BE REMOVED
- (#) SIGN TO BE INSTALLED
- (×) SIGN TO REMAIN IN PLACE
- (#)(#) SIGN TO BE REMOVED AND REINSTALLED

NOTE:

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STATE OF TEXAS
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LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation
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7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

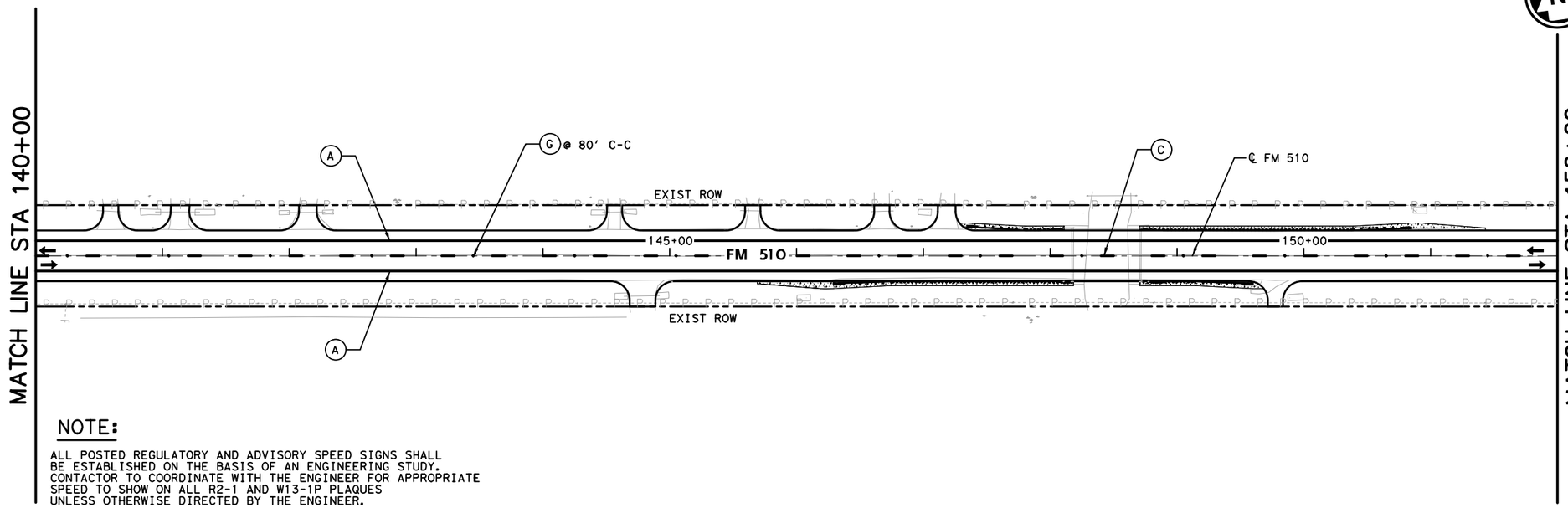
SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 6 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	199
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&PM#06.dgn

DRAWING DATE: 6/27/2022



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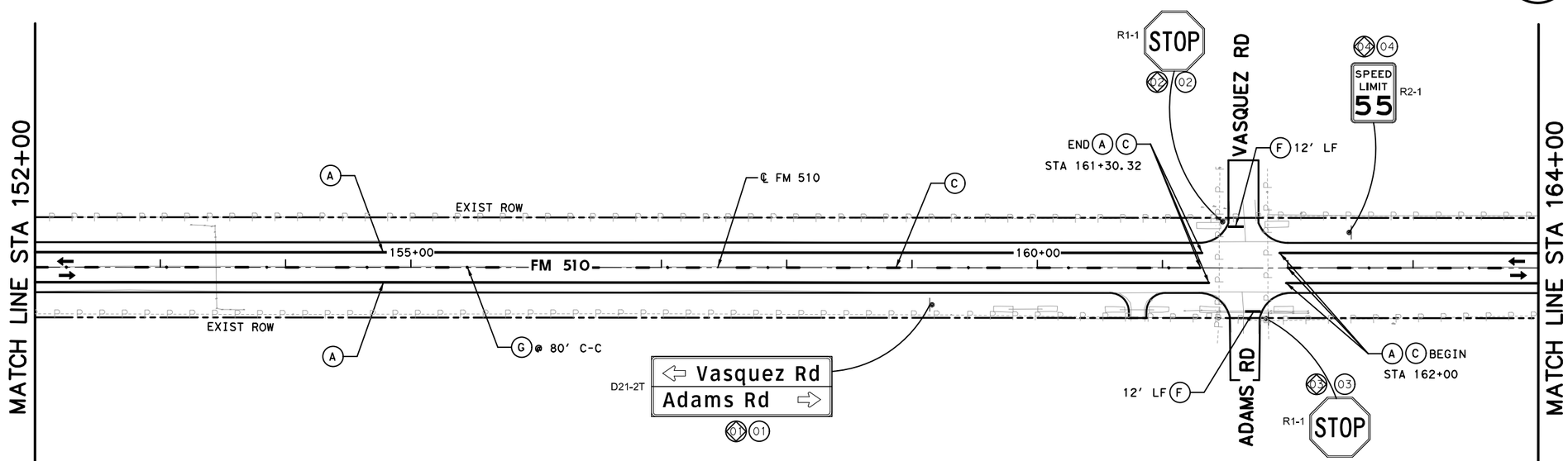

ITEM		533	636	644	644	644	666	666	666	666	672
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		LF	SF	EA	EA	EA	LF	LF	LF	LF	EA
140+00.00	TO 152+00.00	1,200						2,400	300	4,800	16
152+00.00	TO 164+00.00	1,139	12.00	3	1	4	24	2,260	290	4,520	15

LEGEND:

SCALE IN FEET 0' 50' 100'

- A 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
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- H REFL PAV MRKR TY I-C
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6/27/2022

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TBPE REG. # F-11657

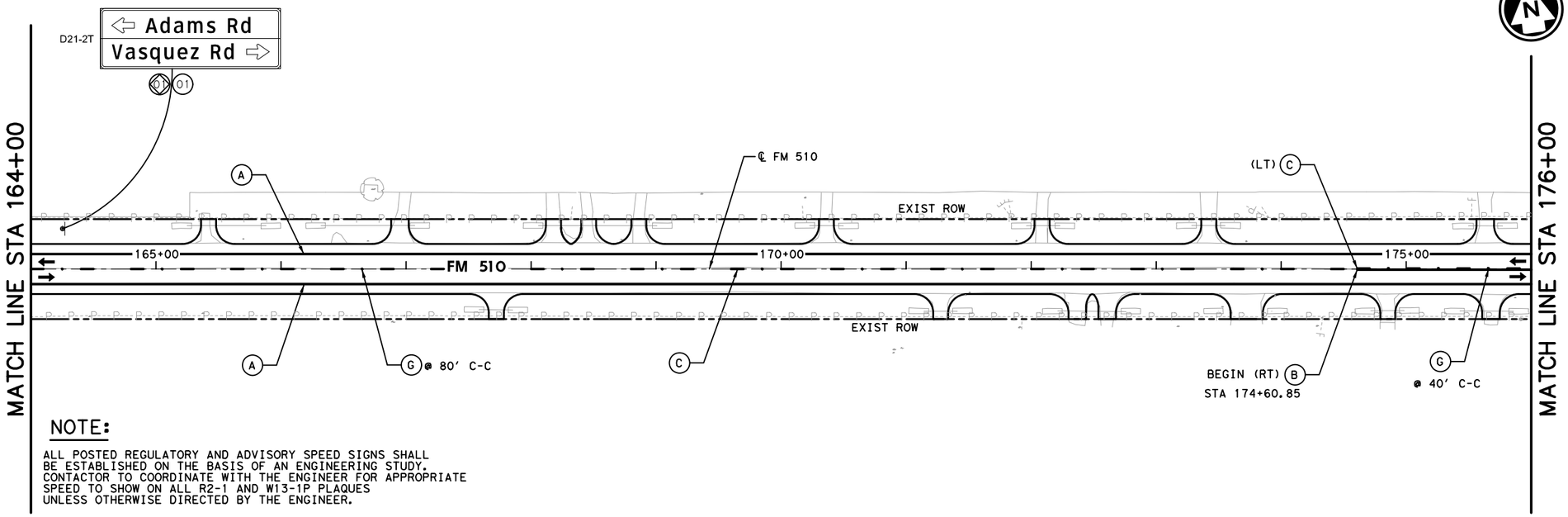
FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 7 OF 18

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	200
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&PM#07.dgn
DRAWING DATE: 6/27/2022



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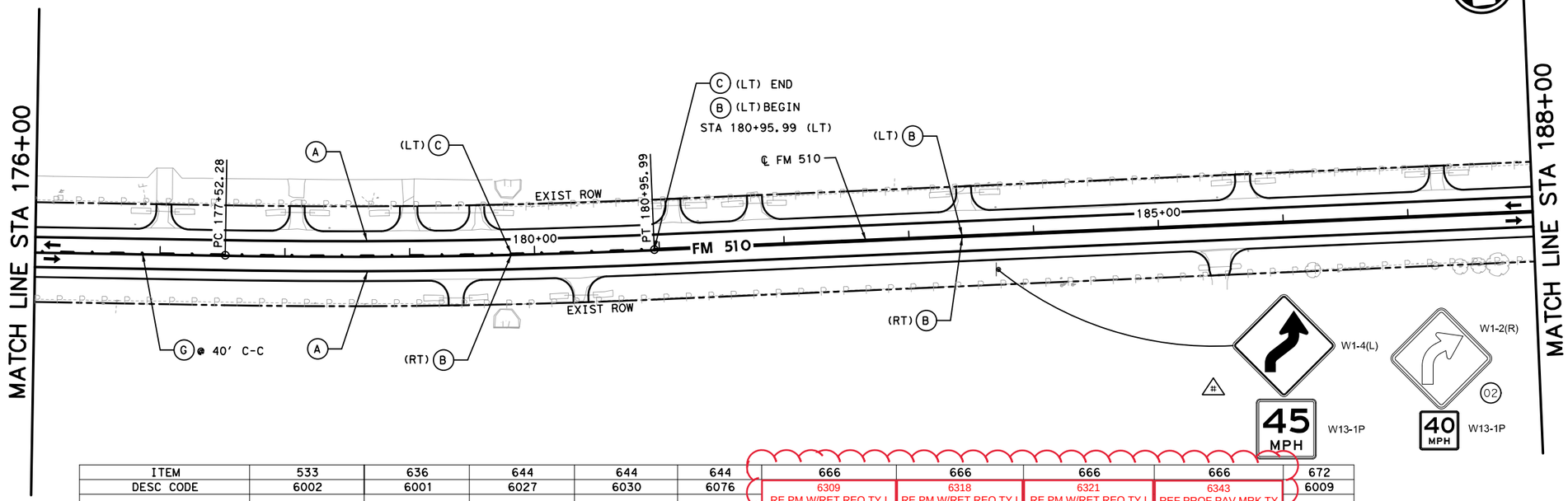

ITEM			533	636	644	644	644	666	666	666	666	672
DESC CODE			6002	6001	6027	6030	6076	6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	6318 RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	6321 RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)	6009
LOCATION (STA TO STA)			RUMBLE STRIPS (CENTERLINE)	ALUMINUM SIGNS (TY A)	IN SM RD SN SUP&AM TYS80(1)SA(P)	IN SM RD SN SUP&AM TYS80(1)SA(T)	REMOVE SM RD SN SUP&AM					REFL PAV MRKR TY II-A-A
			LF	SF	EA	EA	EA	LF	LF	LF	LF	EA
164+00.00	TO	176+00.00	1,200	12.00		1	1	2,400	300	140	4,800	18
176+00.00	TO	188+00.00	1,200		1		1	2,400	150	1,905	4,800	31

LEGEND:

SCALE IN FEET 0′ 50′ 100′

- (A) 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
- (B) 6" YELLOW SOLID LINE (SEE NOTES 1 & 2)
- (C) 6" YELLOW BROKEN CENTERLINE (SEE NOTES 1 & 2)
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- (#) SIGN TO BE RELOCATED
- (#) SIGN TO BE REMOVED
- (#) SIGN TO BE INSTALLED
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- (#) (#) SIGN TO BE REMOVED AND REINSTALLED

NOTE:

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6/27/2022

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 8 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	201
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&PM#08.dgn
DRAWING DATE: 6/27/2022

NOTE:

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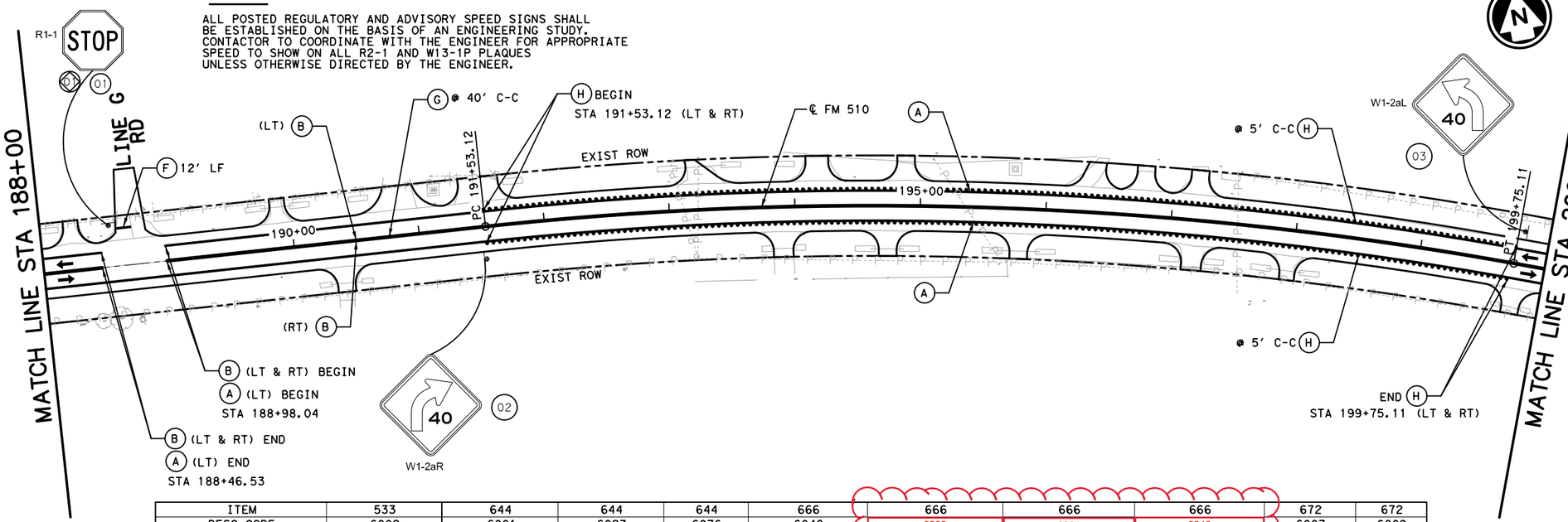
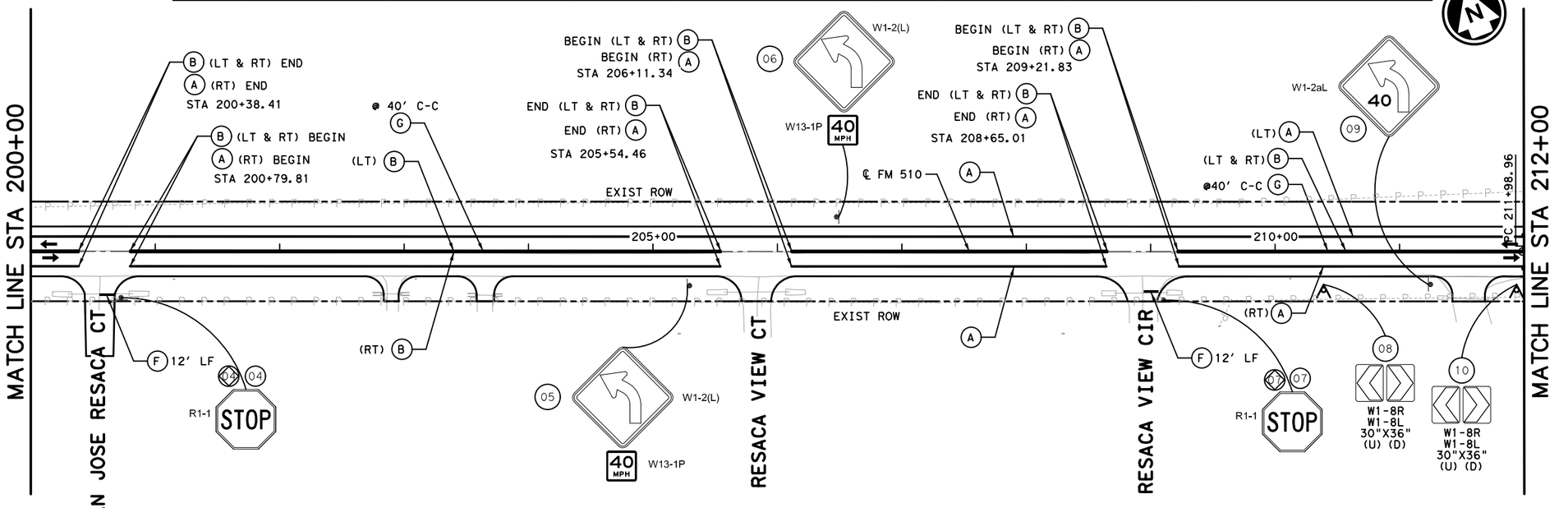


ITEM	533	644	644	644	666	666	666	666	672	672
DESC CODE	6002	6001	6027	6076	6048	6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	6321 RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)	6007	6009
LOCATION (STA TO STA)	RUMBLE STRIPS (CENTERLINE)	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TYS80(1)SA(P)	REMOVE SM RD SN SUP&AM	REFL PAV MRK TY I (W)24"(SLD) (100MIL)				REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A
	LF	EA	EA	EA	LF	LF	LF	LF	EA	EA
188+00.00 TO 200+00.00	1,150		3	1	12	2,350	2,300	4,700	342	29
200+00.00 TO 212+00.00	1,044	2	5	2	24	2,245	2,244	4,490		28



LEGEND:

0' 50' 100'
SCALE IN FEET

- (A) 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
- (B) 6" YELLOW SOLID LINE (SEE NOTES 1 & 2)
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- (#) SIGN TO BE INSTALLED
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STATE OF TEXAS
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6/27/2022

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

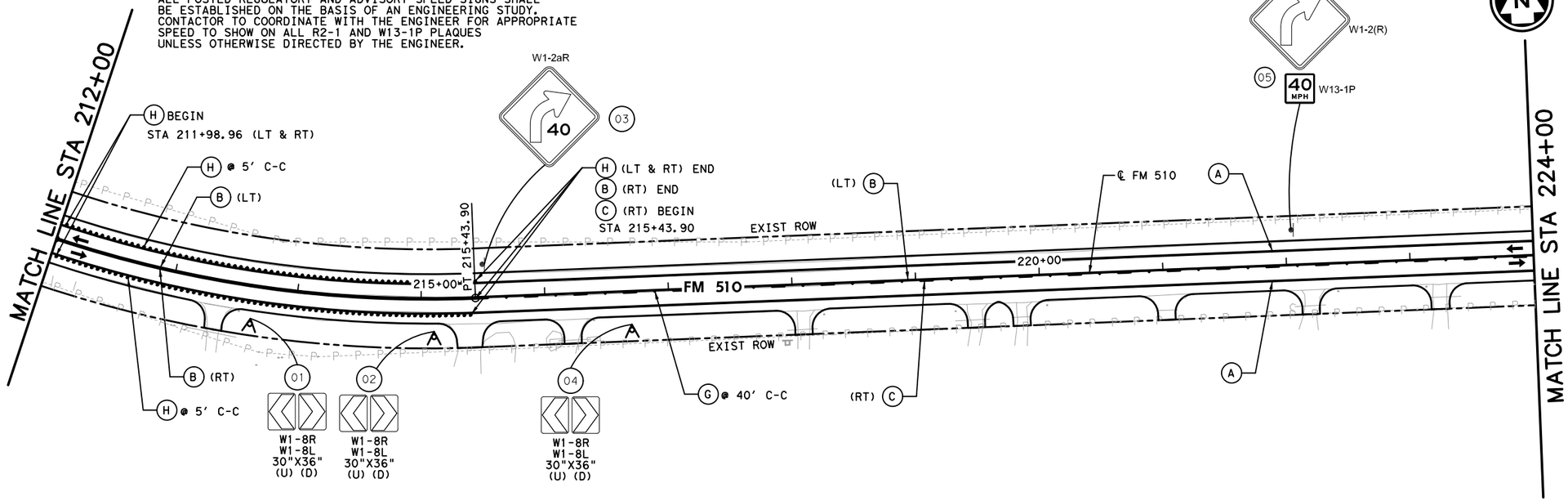
SHEET 9 OF 18

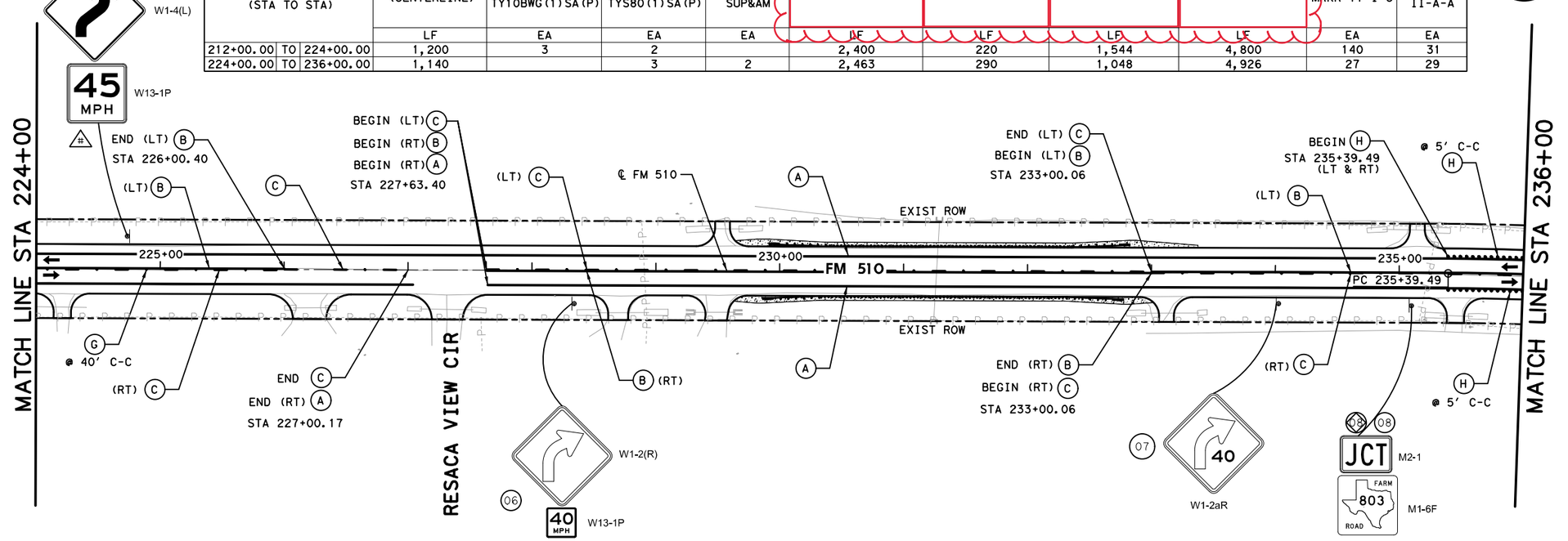
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	202
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022 FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510#S&PM#09.dgn
L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&PM#09.dgn

NOTE:

ALL POSTED REGULATORY AND ADVISORY SPEED SIGNS SHALL BE ESTABLISHED ON THE BASIS OF AN ENGINEERING STUDY. CONTACTOR TO COORDINATE WITH THE ENGINEER FOR APPROPRIATE SPEED TO SHOW ON ALL R2-1 AND W13-1P PLAQUES UNLESS OTHERWISE DIRECTED BY THE ENGINEER.





ITEM	533	644	644	644	666	666	666	666	672	672
DESC CODE	6002	6001	6027	6076	6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	6318 RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	6321 RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)	6007	6009
LOCATION (STA TO STA)	RUMBLE STRIPS (CENTERLINE)	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TYS80(1)SA(P)	REMOVE SM RD SN SUP&AM					REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A
	LF	EA	EA	EA	LF	LF	LF	LF	EA	EA
212+00.00 TO 224+00.00	1,200	3	2		2,400	220	1,544	4,800	140	31
224+00.00 TO 236+00.00	1,140		3	2	2,463	290	1,048	4,926	27	29

LEGEND:

0' 50' 100'
SCALE IN FEET

- (A) 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
- (B) 6" YELLOW SOLID LINE (SEE NOTES 1 & 2)
- (C) 6" YELLOW BROKEN CENTERLINE (SEE NOTES 1 & 2)
- (D) 8" WHITE SOLID LINE
- (E) 12" WHITE SOLID LINE
- (F) 24" WHITE SOLID LINE
- (G) REFL PAV MRKR TY II-A-A
- (H) REFL PAV MRKR TY I-C
- (I) 12" YELLOW SOLID LINE
- (J) PREFAB PAV MRK TY C (W) (RR XING)
- (K) PREFAB PAV MRK TY C (W) (ARROW)
- (L) PREFAB PAV MRK TY C (W) (WORD)
- (#) SIGN TO BE RELOCATED
- (#) SIGN TO BE REMOVED
- (#) SIGN TO BE INSTALLED
- (*) SIGN TO REMAIN IN PLACE
- (#)(#) SIGN TO BE REMOVED AND REINSTALLED

NOTE:

1. ALONG THE CENTERLINE FURNISH TY II-A-A RAISED PAVEMENT MARKERS IN ACCORDANCE WITH PM(2)-22 STANDARD.
2. ALONG THE CENTERLINE FURNISH MILLED RUMBLE STRIPS PER STANDARD RS(3)-13 OPTION 1.
3. REMOVE EXISTING CITY STREET AND COUNTY ROAD TOPPER AND INSTALL THEM ONTO THE NEW STOP SIGN ASSEMBLIES. THIS WORK SHALL BE CONSIDERED SUBSIDIARY TO ITEM 644.
4. ALL SIGNS IN WORKING AREAS DESIGNATED TO BE RELOCATED CAN BE REMOVED AND STORED AT THE San Benito MAINTANCE YARD TO PREVENT DAMAGE DURING CONSTRUCTION.
5. CONTRACTOR IS RESPONSIBLE FOR ALL SIGNS DAMAGED DURING CONSTRUCTION. THE DAMAGED SIGNS WILL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE.
6. ANY EXISTING SIGN DESIGNATED TO BE RELOCATED CAN BE REPLACED IF DIRECTED BY THE ENGINEER.
7. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANIES TO MAKE ANY ADJUSTMENT DUE TO CONFLICTS ON ANY SIGNS THAT ARE TO BE RELOCATED.
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STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 10 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	203
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing and Signals\FM510#S&PM#10.dgn
DRAWING DATE: 6/27/2022

ITEM			533	636	644	644	644	644	666	666	666	666	666	666	666	668
DESC CODE			6002	6001	6027	6030	6033	6076	6036	6048	6141	6309 RE PM W/RET REQ TY I (W)6"(SLD) (100MIL)	6318 RE PM W/RET REQ TY I (Y)6"(BRK) (100MIL)	6321 RE PM W/RET REQ TY I (Y)6"(SLD) (100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)	6077
LOCATION (STA TO STA)			RUMBLE STRIPS (CENTERLINE)	ALUMINUM SIGNS (TY A)	IN SM RD SN SUP&AM TYS80(1)SA (P)	IN SM RD SN SUP&AM TYS80(1)SA (T)	IN SM RD SN SUP&AM TYS80(1) SA(U)	REMOVE SM RD SN SUP&AM	REFL PAV MRK TY I (W)8"(SLD) (100MIL)	REFL PAV MRK TY I (W)24"(SLD) (100MIL)	REFL PAV MRK TY I (Y)12"(SLD) (100MIL)					PREFAB PAV MRK TY C (W) (ARROW)
			LF	SF	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF	LF	EA
236+00.00	TO	248+00.00	1,140		7			5		12	224	2,340	240	1,510	4,680	
248+00.00	TO	260+00.00	1,112	24.00	7	5	2	14	252	96	605	2,140	70	2,615	4,280	2

NOTE:

ALL POSTED REGULATORY AND ADVISORY SPEED SIGNS SHALL BE ESTABLISHED ON THE BASIS OF AN ENGINEERING STUDY. CONTACTOR TO COORDINATE WITH THE ENGINEER FOR APPROPRIATE SPEED TO SHOW ON ALL R2-1 AND W13-1P PLAQUES UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

MATCH LINE STA 236+00

MATCH LINE STA 248+00

MATCH LINE STA 248+00

MATCH LINE STA 260+00

@ 5' C-C (H) END STA 236+72.05 (LT & RT)

PT 236+72.05

(B) (LT)

240+00

@ 40' C-C (G)

(B) (LT) END STA 238+69.72

@ 5' C-C (H)

(C) (RT)

(C) (RT)

W1-2aL 40

W1-2(L) 02

W13-1P 40 MPH

℄ FM 510

@80' C-C (G) DBL

EXIST ROW

(C) (LT)

SPEED LIMIT 55 R2-1

245+00

(B) (DBL) BEGIN STA 245+30.00 (LT & RT)

BEGIN (RT) (A) STA 246+39.40

EXIST ROW

WEST M3-4

FARM 510 ROAD M1-6F

@20' C-C (G) DBL (I)

EMILY LN

STOP R1-1 (F) 12' LF

(A) (RT) END STA 245+79.24

W2-2L

SEE DETAIL A

(B) (RT) BEGIN STA 243+74.55

W3-1

EXIST ROW

(A)

DETAIL A N.T.S

@ 20' C-C (G) (B) 3-4" 3-4" 20'

DETAIL B N.T.S

@ 20' C-C (G) 3-4" (B) (I) 30-45° 20' 3-4"

DETAIL C N.T.S

20' 3-4" (I) (B) 30-45° (B) (G) @ 20' C-C 3-4"

DETAIL D N.T.S

DETAIL E N.T.S

20' 3-4" (B) (G)

BEGIN (LT & RT) (A)

BEGIN (D)

BEGIN (DBL) (B) STA 251+74.87

R1-1 STOP ALL WAY R1-3P

FARM 510 ROAD M1-6F FARM 803 ROAD M1-6F

M6-4 M6-3

END DBL (B)

END (D)

END (LT & RT) (A) STA 250+86.01

SEE DETAIL B

(B) DBL (A) @ 20' C-C (H)

250+00

(F) 16' LF 24' LF

FM 803 (OLMITO NORTH RD)

(F) 16' LF

(G) DBL

BEGIN (D) STA 249+60.00

(I) (K) (L)

D1-2 Port Isabel / Rio Hondo

STOP R1-1 ALL WAY R1-3P

(F) 24' LF

STOP R1-1 ALL WAY R1-3P

PASS WITH CARE R4-2

M6-3 M6-4

M1-6F FARM 510 ROAD M1-6F FARM 803 ROAD M1-6F

STOP R1-1 ALL WAY R1-3P

(K) (D) (L) (H) @ 20' C-C

SEE DETAIL C

EXIST ROW

SEE DETAIL D

DBL (B)

END (RT) (A) STA 256+06.04

℄ FM 510

(A)

BEGIN (RT) (A) STA 256+95.11

255+00

(C)

@ 80' C-C (G)

(D) END

(B) DBL

(A) (I) EXIST ROW

D1-2 San Benito / Rio Hondo

R4-1 DO NOT PASS

END (DBL) (B)

BEGIN (C) STA 257+41.34

SEE DETAIL E

NOGALES DR

R1-1 STOP

SPEED LIMIT 55 R2-1

PASS WITH CARE R4-2

(F) 16' LF

M3-2 EAST

M1-6F FARM 510 ROAD

ITEM			668	672	672
DESC CODE			6085	6007	6009
LOCATION (STA TO STA)			PREFAB PAV MRK TY C (W) (WORD)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A
			EA	EA	EA
236+00.00	TO	248+00.00		32	72
248+00.00	TO	260+00.00	2	15	145

LEGEND:

SCALE IN FEET 0' 50' 100'

- (A) 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
- (B) 6" YELLOW SOLID LINE (SEE NOTES 1 & 2)
- (C) 6" YELLOW BROKEN CENTERLINE (SEE NOTES 1 & 2)
- (D) 8" WHITE SOLID LINE
- (E) 12" WHITE SOLID LINE
- (F) 24" WHITE SOLID LINE
- (G) REFL PAV MRKR TY II-A-A
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- (I) 12" YELLOW SOLID LINE
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- (K) PREFAB PAV MRK TY C (W) (ARROW)
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- (#) SIGN TO BE RELOCATED
- (#) SIGN TO BE REMOVED
- (#) SIGN TO BE INSTALLED
- (#) SIGN TO REMAIN IN PLACE
- (#) SIGN TO BE REMOVED AND REINSTALLED

NOTE:

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2. ALONG THE CENTERLINE FURNISH MILLED RUMBLE STRIPS PER STANDARD RS(3)-13 OPTION 1.
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6/27/2022

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

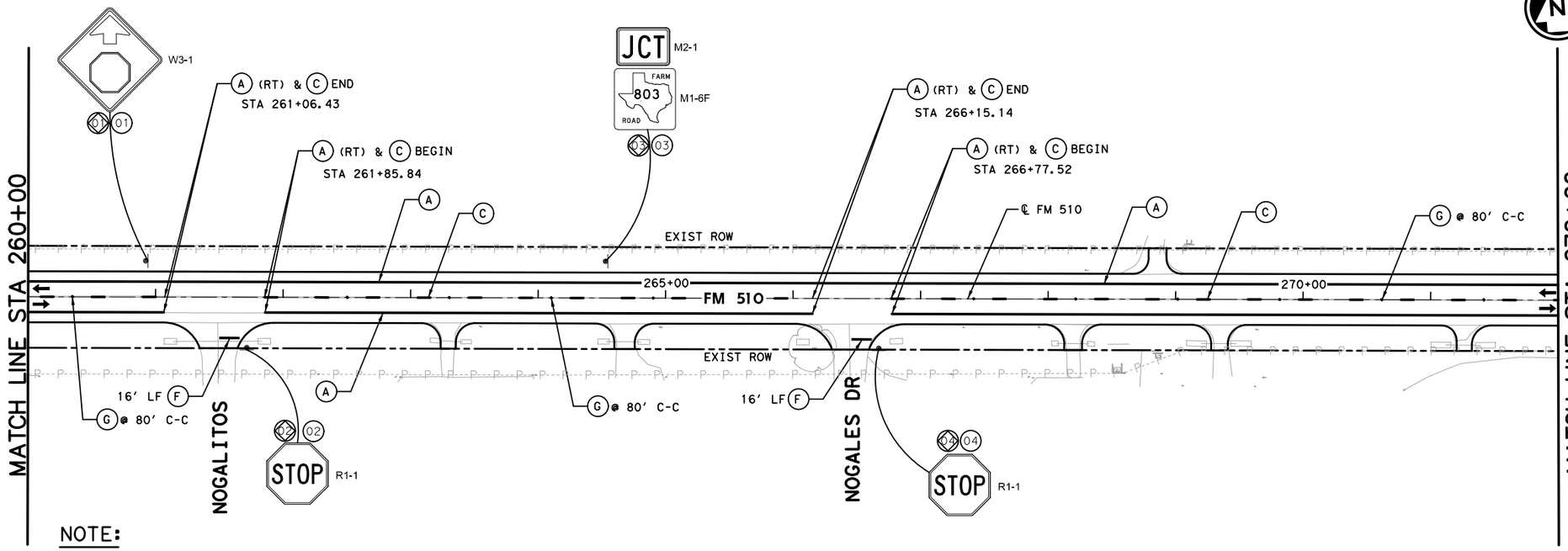
FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 11 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	204
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&PM#11.dgn
DRAWING DATE: 6/27/2022



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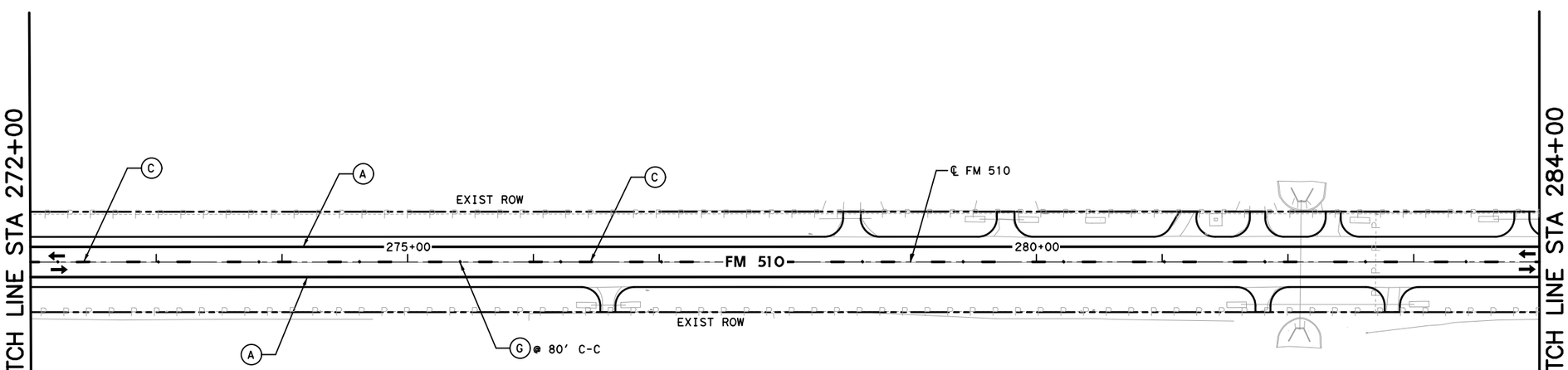

ITEM	533	644	644	666	666	666	666	672
DESC CODE	6002	6027	6076	6048	6309	6318	6343	6009
LOCATION (STA TO STA)	RUMBLE STRIPS (CENTERLINE)	IN SM RD SN SUP&AM TYS80(1)SA(P)	REMOVE SM RD SN SUP&AM	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)	REFL PAV MRKR TY II-A-A
	LF	EA	EA	LF	LF	LF	LF	EA
260+00.00 TO 272+00.00	1,060	4	4	32	2,260	280	4,520	14
272+00.00 TO 284+00.00	1,200				2,400	300	4,800	16

0' 50' 100'
SCALE IN FEET

LEGEND:

- A 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
- B 6" YELLOW SOLID LINE (SEE NOTES 1 & 2)
- C 6" YELLOW BROKEN CENTERLINE (SEE NOTES 1 & 2)
- D 8" WHITE SOLID LINE
- E 12" WHITE SOLID LINE
- F 24" WHITE SOLID LINE
- G REFL PAV MRKR TY II-A-A
- H REFL PAV MRKR TY I-C
- I 12" YELLOW SOLID LINE
- J PREFAB PAV MRK TY C (W) (RR XING)
- K PREFAB PAV MRK TY C (W) (ARROW)
- L PREFAB PAV MRK TY C (W) (WORD)
- # SIGN TO BE RELOCATED
- # SIGN TO BE REMOVED
- # SIGN TO BE INSTALLED
- * SIGN TO REMAIN IN PLACE
- # # SIGN TO BE REMOVED AND REINSTALLED

NOTE:

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PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

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7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

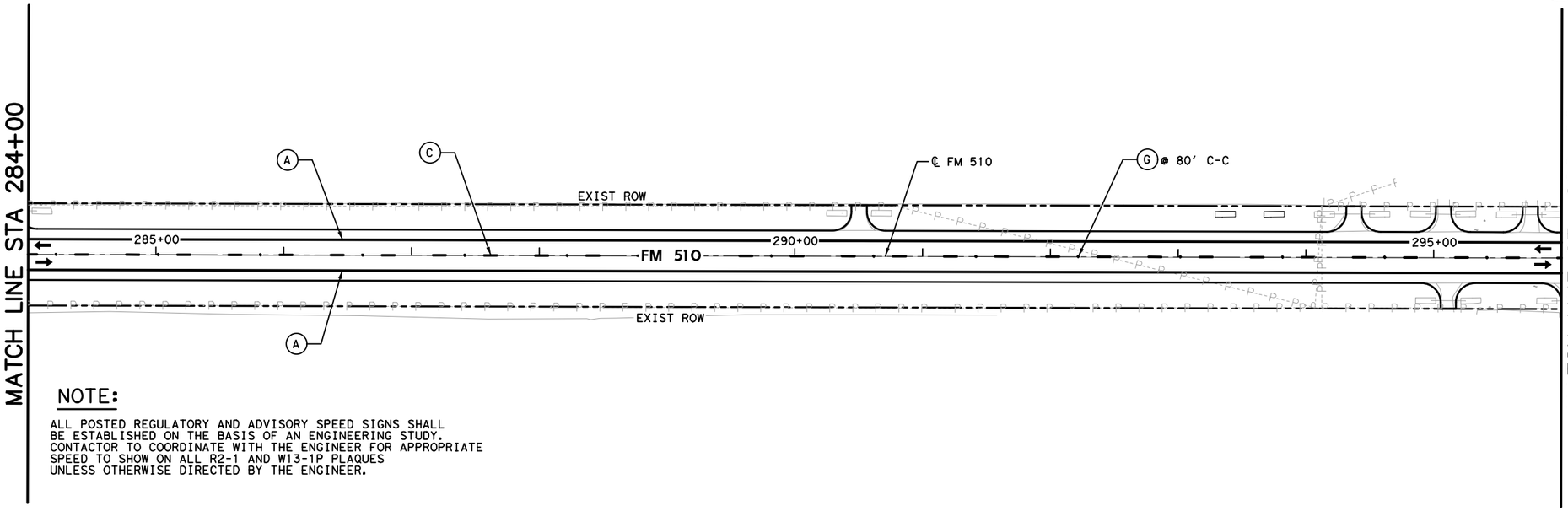
FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 12 OF 18

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	205
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing and Striping and Signals\FM510#S&PM#12.dgn
DRAWING DATE: 6/27/2022



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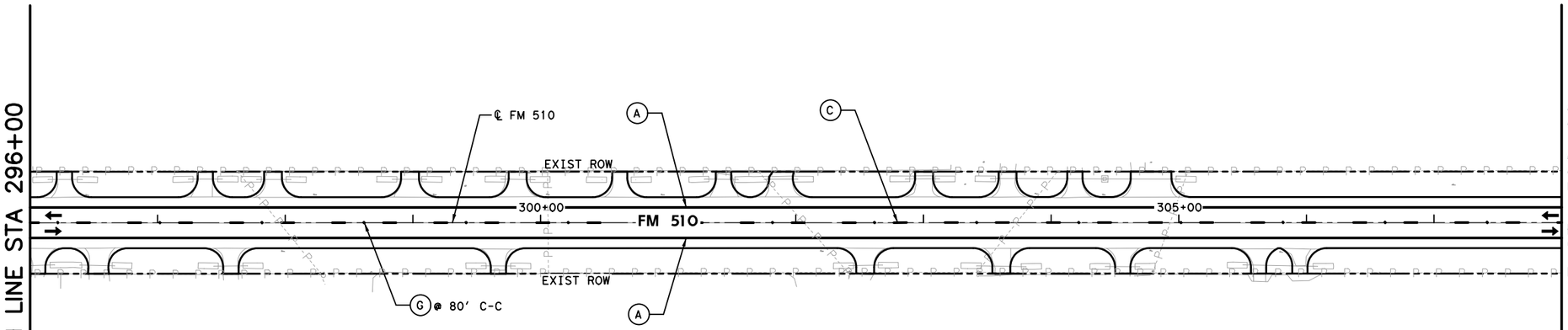

ITEM	533	666	666	666	672
DESC CODE	6002	6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	6318 RE PM W/RET REQ TY I (Y)6"(BRK) (100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD) (100MIL)	6009
LOCATION (STA TO STA)	RUMBLE STRIPS (CENTERLINE)				REFL PAV MRKR TY II-A-A
	LF	LF	LF	LF	EA
284+00.00 TO 296+00.00	1,200	2,400	300	4,800	16
296+00.00 TO 308+00.00	1,200	2,400	300	4,800	16

0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
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6/27/2022

Texas Department of Transportation

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7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 13 OF 18

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	206
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&PM#13.dgn
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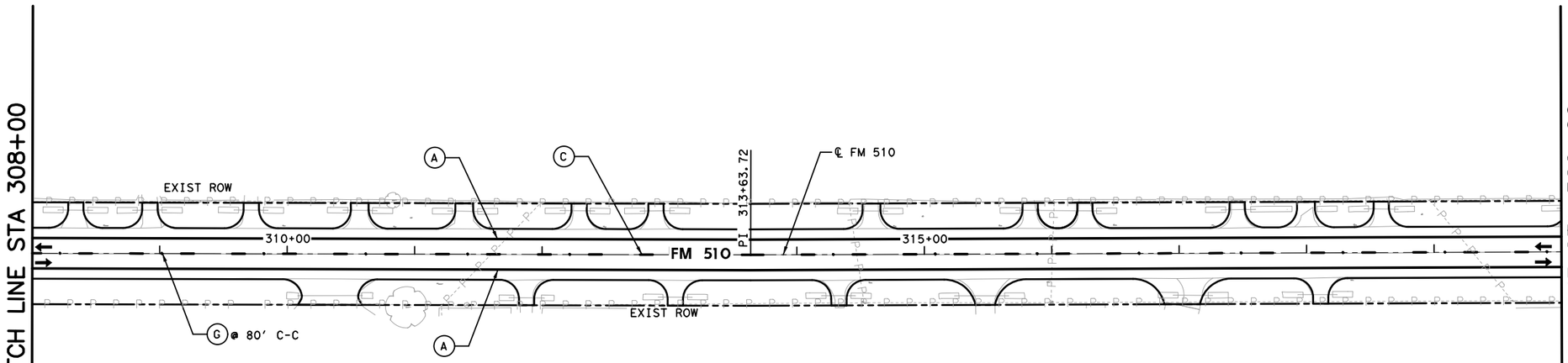

ITEM	533	644	644	666	666	666	666	672
DESC CODE	6002	6027	6076	6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	6318 RE PM W/RET REQ TY I (Y)6"(BRK) (100MIL)	6321 RE PM W/RET REQ TY I (Y)6"(SLD) (100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD) (100MIL)	6009
LOCATION (STA TO STA)	RUMBLE STRIPS (CENTERLINE)	IN SM RD SN SUP&AM TYS80(1)SA(P)	REMOVE SM RD SN SUP&AM					REFL PAV MRKR TY II-A-A
	LF	EA	EA	LF	LF	LF	LF	EA
308+00.00 TO 320+00.00	1,200			2,400	300		4,800	16
320+00.00 TO 332+00.00	1,200	2	2	2,400	270	242	4,800	18

NOTE:

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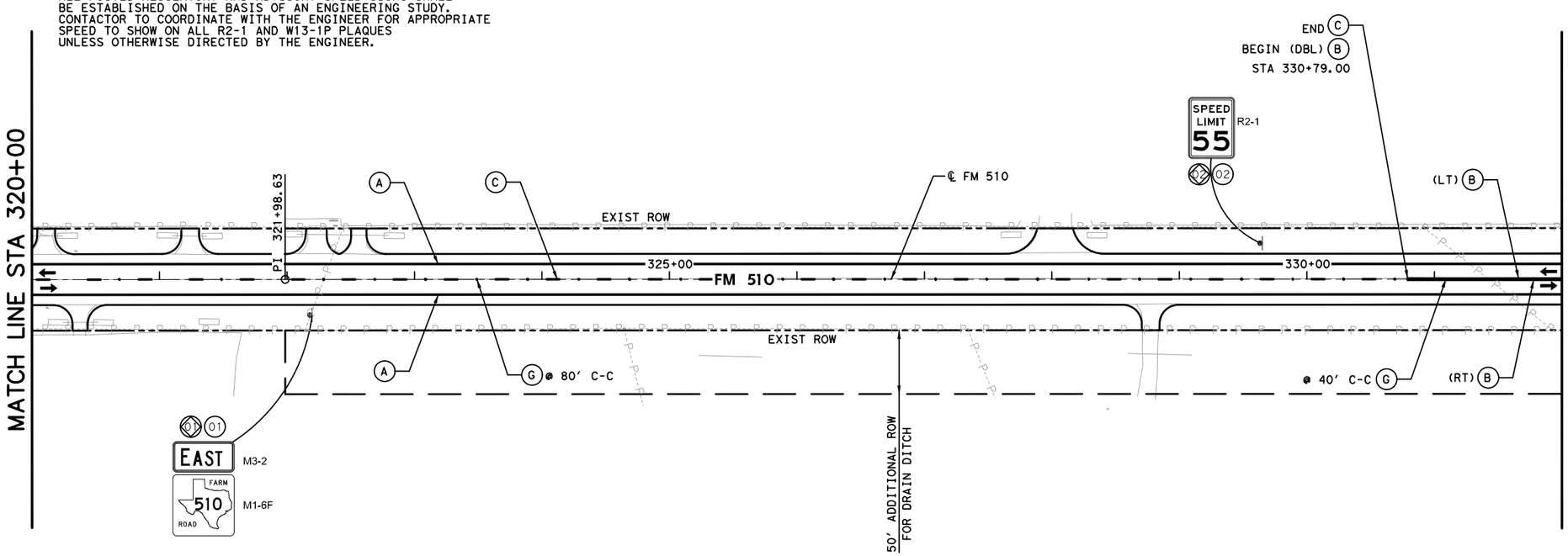

LEGEND:

SCALE IN FEET: 0′ 50′ 100′

- (A) 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
- (B) 6" YELLOW SOLID LINE (SEE NOTES 1 & 2)
- (C) 6" YELLOW BROKEN CENTERLINE (SEE NOTES 1 & 2)
- (D) 8" WHITE SOLID LINE
- (E) 12" WHITE SOLID LINE
- (F) 24" WHITE SOLID LINE
- (G) REFL PAV MRKR TY II-A-A
- (H) REFL PAV MRKR TY I-C
- (I) 12" YELLOW SOLID LINE
- (J) PREFAB PAV MRK TY C (W) (RR XING)
- (K) PREFAB PAV MRK TY C (W) (ARROW)
- (L) PREFAB PAV MRK TY C (W) (WORD)
- (#) SIGN TO BE RELOCATED
- (#) SIGN TO BE REMOVED
- (#) SIGN TO BE INSTALLED
- (*) SIGN TO REMAIN IN PLACE
- (#)(#) SIGN TO BE REMOVED AND REINSTALLED

NOTE:

1. ALONG THE CENTERLINE FURNISH TY II-A-A RAISED PAVEMENT MARKERS IN ACCORDANCE WITH PM(2)-22 STANDARD.
2. ALONG THE CENTERLINE FURNISH MILLED RUMBLE STRIPS PER STANDARD RS(3)-13 OPTION 1.
3. REMOVE EXISTING CITY STREET AND COUNTY ROAD TOPPER AND INSTALL THEM ONTO THE NEW STOP SIGN ASSEMBLIES. THIS WORK SHALL BE CONSIDERED SUBSIDIARY TO ITEM 644.
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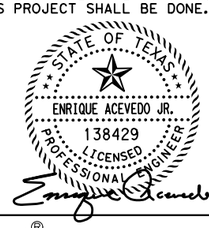


6/27/2022

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

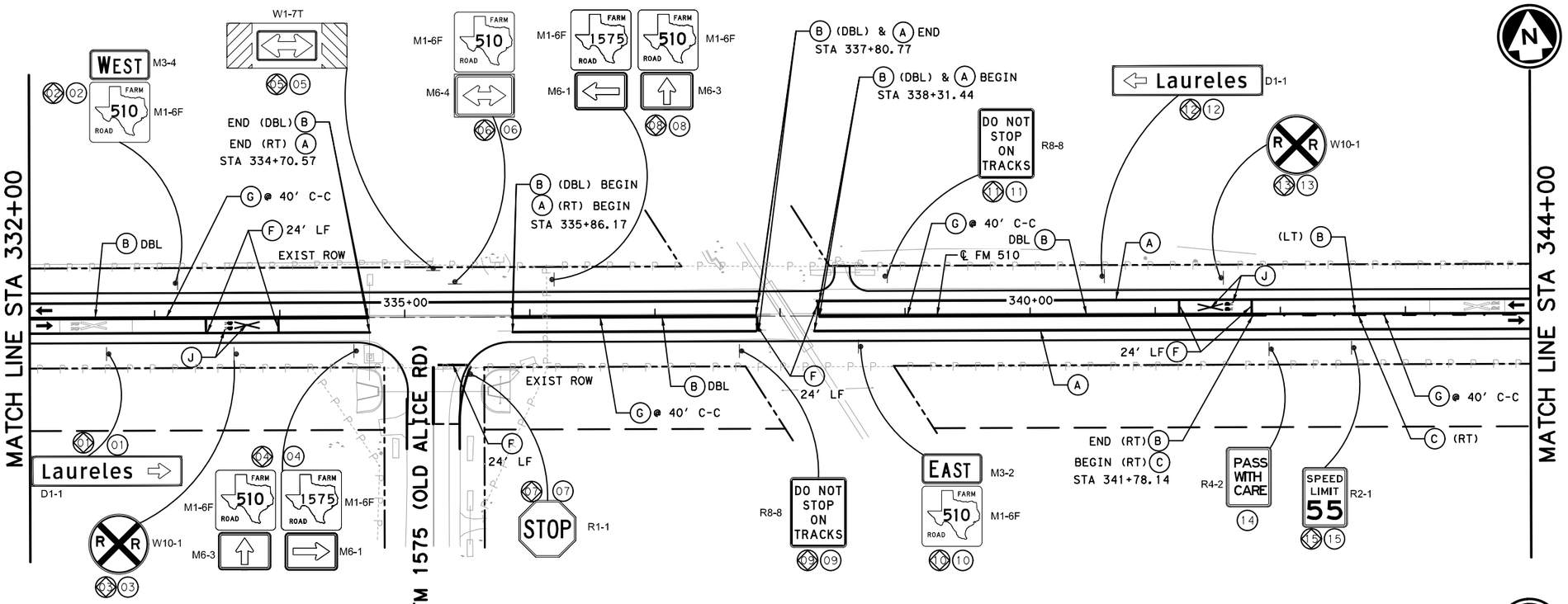
FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 14 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	207
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022 FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&PM#14.dgn



NOTE:

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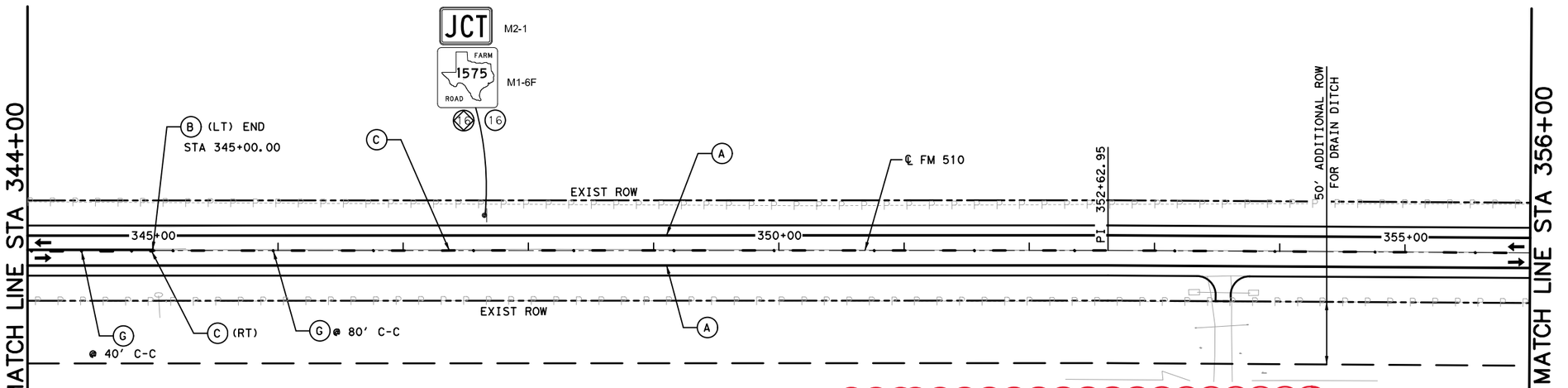

ITEM	533	636	644	644	644	644	666	666	666	666	666	668	672
DESC CODE	6002	6001	6027	6030	6033	6076	6048	6309	6318	6321	6343	6089	6009
LOCATION (STA TO STA)	RUMBLE STRIPS (CENTERLINE)	ALUMINUM SIGNS (TY A)	IN SM RD SN SUP&AM TYS80(1)SA(P)	IN SM RD SN SUP&AM TYS80(1)SA(T)	IN SM RD SN SUP&AM TYS80(1)SA(U)	REMOVE SM RD SN SUP&AM	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)	PREFAB PAV MRK TY C (W)(RR XING)	REFL PAV MRKR TY II-A-A
	LF	SF	EA	EA	EA	EA	LF	LF	LF	LF	LF	EA	EA
332+00.00 TO 344+00.00	1,045	11.00	10	3	2	14	96	2,200	60	1,846	4,400	2	28
344+00.00 TO 356+00.00	1,200		1			1		2,400	280	100	4,800		18

LEGEND:

SCALE IN FEET 0' 50' 100'

- A 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
- B 6" YELLOW SOLID LINE (SEE NOTES 1 & 2)
- C 6" YELLOW BROKEN CENTERLINE (SEE NOTES 1 & 2)
- D 8" WHITE SOLID LINE
- E 12" WHITE SOLID LINE
- F 24" WHITE SOLID LINE
- G REFL PAV MRKR TY II-A-A
- H REFL PAV MRKR TY I-C
- I 12" YELLOW SOLID LINE
- J PREFAB PAV MRK TY C (W) (RR XING)
- K PREFAB PAV MRK TY C (W) (ARROW)
- L PREFAB PAV MRK TY C (W) (WORD)
- (#) SIGN TO BE RELOCATED
- # SIGN TO BE REMOVED
- # SIGN TO BE INSTALLED
- * SIGN TO REMAIN IN PLACE
- (#) # SIGN TO BE REMOVED AND REINSTALLED

NOTE:

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STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

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I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

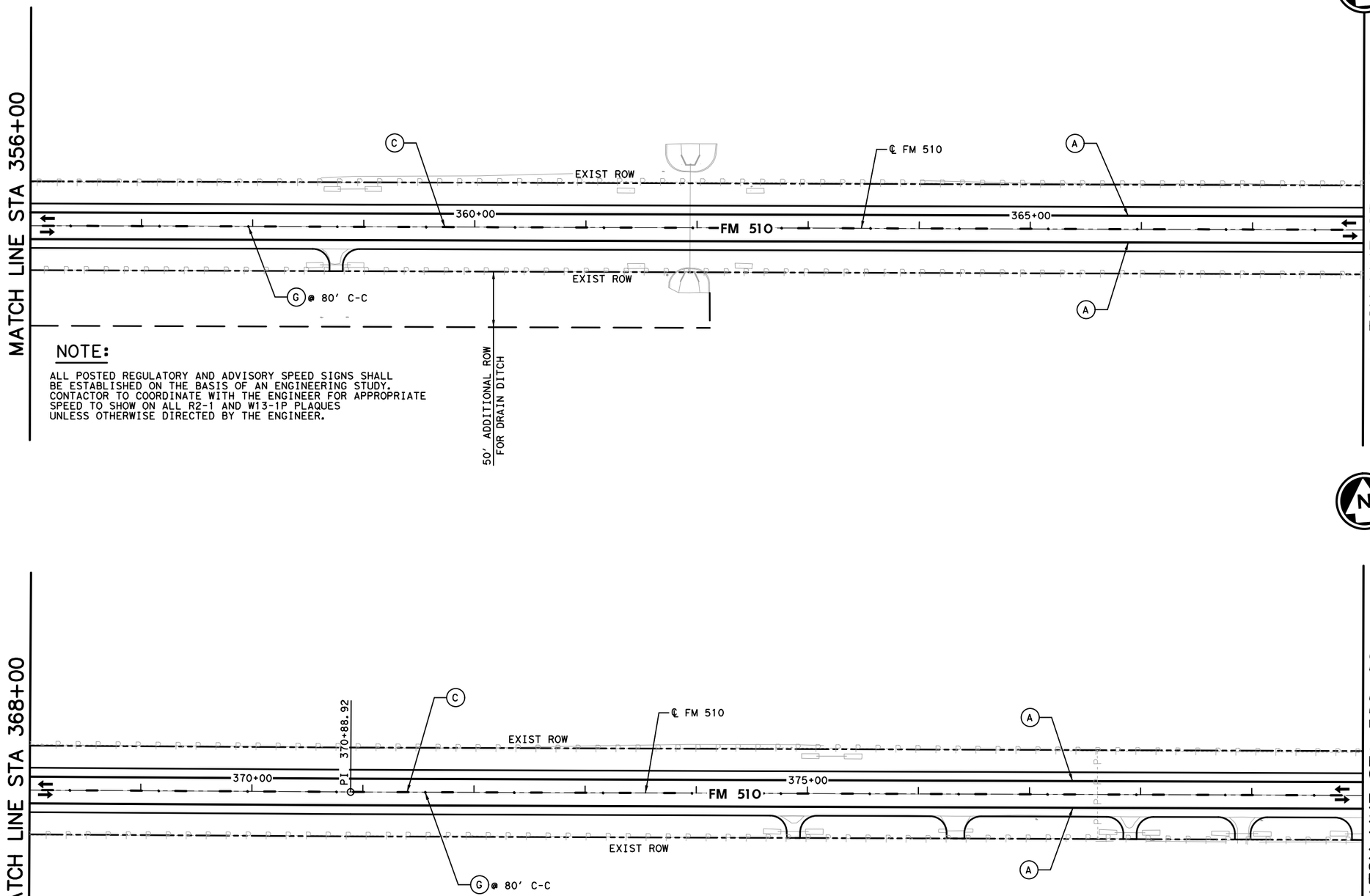
SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 15 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	208
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510*S&PM*15.dgn

DRAWING DATE: 6/27/2022



NOTE:

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ITEM	533	666	666	666	672
DESC CODE	6002	6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	6318 RE PM W/RET REQ TY I (Y)6"(BRK) (100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD) (100MIL)	6009
LOCATION (STA TO STA)	RUMBLE STRIPS (CENTERLINE)				REFL PAV MRKR TY II-A-A
	LF	LF	LF	LF	EA
356+00.00 TO 368+00.00	1,200	2,400	300	4,800	16
368+00.00 TO 380+00.00	1,200	2,400	300	4,800	16

0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
- (B) 6" YELLOW SOLID LINE (SEE NOTES 1 & 2)
- (C) 6" YELLOW BROKEN CENTERLINE (SEE NOTES 1 & 2)
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- (K) PREFAB PAV MRK TY C (W) (ARROW)
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- (#) SIGN TO BE RELOCATED
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NOTE:

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STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

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I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

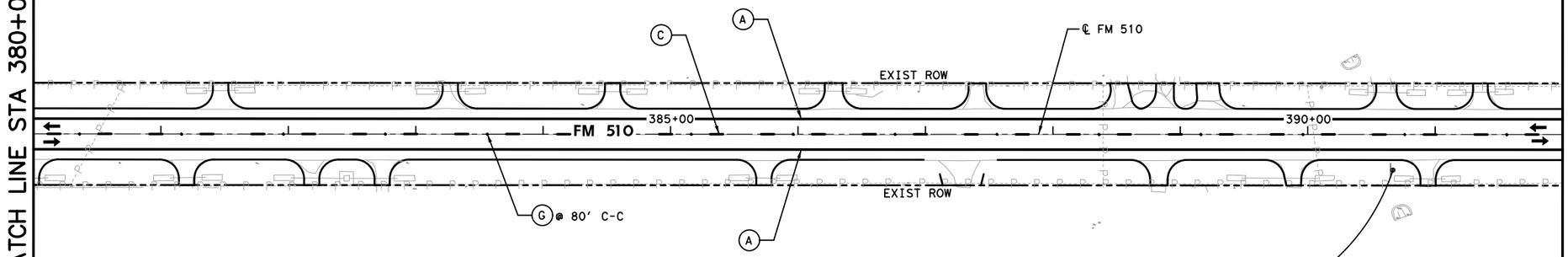
SHEET 16 OF 18

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	209
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&PM#16.dgn

DRAWING DATE: 6/27/2022

ITEM	533	636	644	644	644	666	666	666	666	666	672
DESC CODE	6002	6001	6027	6033	6076	6048	6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	6318 RE PM W/RET REQ TY I (Y)6"(BRK) (100MIL)	6321 RE PM W/RET REQ TY I (Y)6"(SLD) (100MIL)	6343 REF PROF PAV MRK TY I (W)6"(SLD) (100MIL)	6009
LOCATION (STA TO STA)	RUMBLE STRIPS (CENTERLINE)	ALUMINUM SIGNS (TY A)	IN SM RD SN SUP&AM TYS80(1)SA(P)	IN SM RD SN SUP&AM TYS80(1) SA(U)	REMOVE SM RD SN SUP&AM	REFL PAV MRK TY I (W)24"(SLD) (100MIL)					REFL PAV MRKR TY II-A-A
	LF	SF	EA	EA	EA	LF	LF	LF	LF	LF	EA
380+00.00 TO 392+00.00	1,200		1		1		2,400	300		4,800	16
392+00.00 TO 404+00.00	1,177	24.00	6	1	7	47	2,262	290	516	4,524	21



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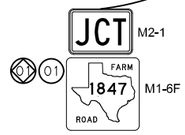

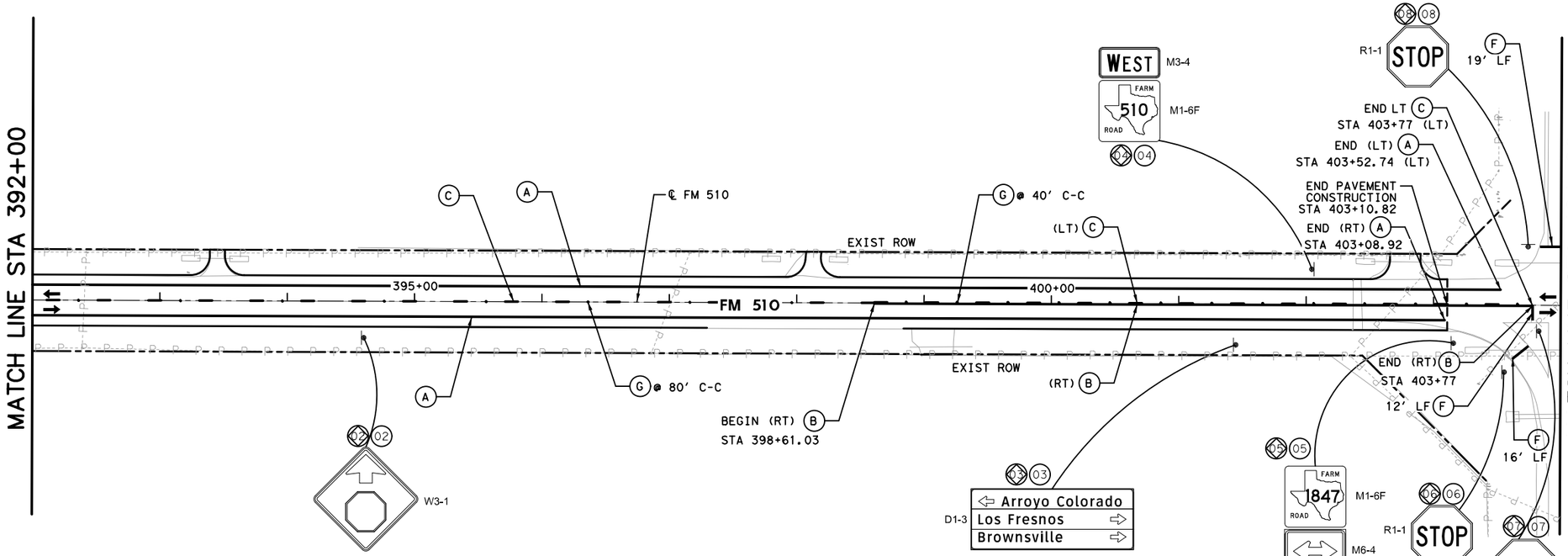

LEGEND:

0' 50' 100'
SCALE IN FEET

- (A) 6" WHITE EDGE LINE (SEE NOTES 1 & 2)
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NOTE:

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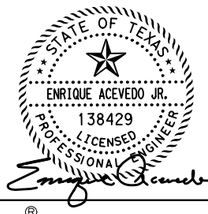

6/27/2022

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I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

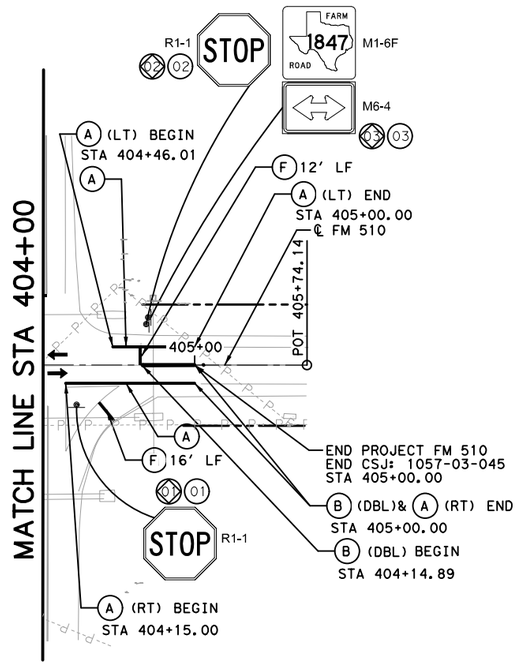
FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 17 OF 18

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	210
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&PM#17.dgn
DRAWING DATE: 6/27/2022



ITEM	533	644	644	666	666	666	666	672
DESC CODE	6002	6027	6076	6048	6309	6321	6343	6009
LOCATION (STA TO STA)	RUMBLE STRIPS (CENTERLINE)	IN SM RD SN SUP&AM TYS80(1)SA(P)	REMOVE SM RD SN SUP&AM	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	REF PROF PAV MRK TY I (W)6"(SLD)(100MIL)	REFL PAV MRKR TY II-A-A
	LF	EA	EA	LF	LF	LF	LF	EA
404+00.00 TO END	35	3	3	28	141	68	282	2

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0' 50' 100'
SCALE IN FEET

LEGEND:

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STATE OF TEXAS
ENRIQUE ACEVEDO JR.
138429
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

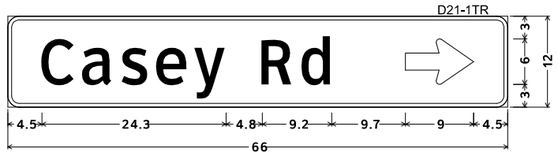
FM 510

SIGNING AND PAVEMENT MARKINGS LAYOUT

SHEET 18 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	211
CONTROL	SECTION	JOB	
1057	03	045	

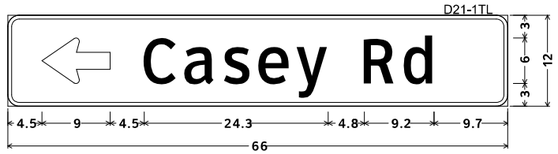
FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510#S&PM#18.dgn
DRAWING DATE: 6/27/2022



1.5" Radius, 0.5" Border, White on Green;
[Casey Rd] ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.0" O{;
Table of letter and object lefts.

C	a	s	e	y	R	d	⇨	
4.5	9.9	15.0	19.7	24.6	33.6	38.8	52.5	

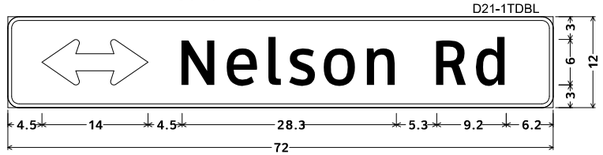
SIGN NO. 06
SHEET 2 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS



1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.0" 180{; [Casey Rd] ClearviewHwy-3-W;
Table of letter and object lefts.

⇦	C	a	s	e	y	R	d	
4.5	18.0	23.4	28.5	33.2	38.1	47.1	52.3	

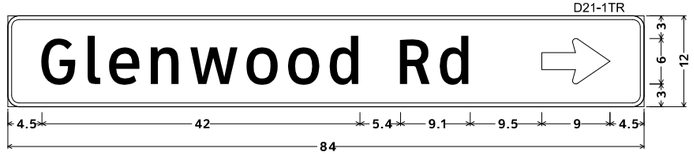
SIGN NO. 01
SHEET 3 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS



1.5" Radius, 0.5" Border, White on Green;
Double Headed Arrow Custom - 14.0" O{; [Nelson Rd] ClearviewHwy-3-W;
Table of letter and object lefts.

⇔	N	e	l	s	o	n	R	d	
4.5	23.0	29.0	34.5	37.1	41.8	47.5	56.6	61.9	

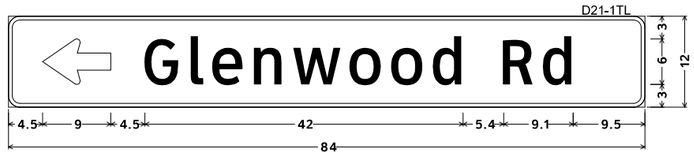
SIGN NO. 03 & 03
SHEET 3 & 4 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS



1.5" Radius, 0.5" Border, White on Green;
[Glenwood Rd] ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.0" O{;
Table of letter and object lefts.

G	l	e	n	w	o	o	d	R	d	⇨
4.5	10.6	13.4	19.0	24.1	31.6	37.1	42.6	51.9	57.1	70.5

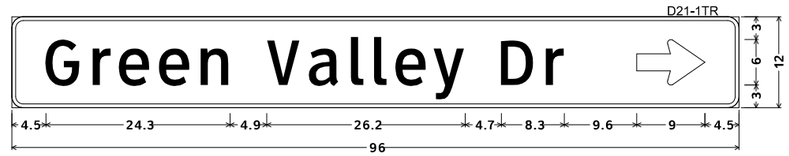
SIGN NO. 01
SHEET 5 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS



1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.0" 180{; [Glenwood Rd] ClearviewHwy-3-W;
Table of letter and object lefts.

⇦	G	l	e	n	w	o	o	d	R	d	
4.5	18.0	24.1	26.9	32.5	37.6	45.1	50.6	56.1	65.4	70.6	

SIGN NO. 02
SHEET 5 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS



1.5" Radius, 0.5" Border, White on Green;
[Green Valley Dr] ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.0" O{;
Table of letter and object lefts.

G	r	e	e	n	V	a	l	l	e	y	D	r	⇨
4.5	10.6	14.2	19.5	25.0	33.7	39.3	44.8	47.9	50.7	55.7	64.6	70.5	82.5

SIGN NO. 04
SHEET 5 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS

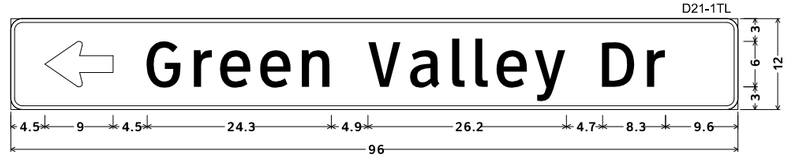
1.9" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.0" 180{; [Vasquez Rd] ClearviewHwy-3-W;
1.9" Radius, 0.8" Border, White on Green;
[Adams Rd] ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.0" O{;
Table of letter and object lefts.

⇦	A	d	a	m	s	R	d							
4.5	18.0	24.0	29.5	35.1	42.6	51.1	56.3							
V	a	s	q	u	e	z	R	d	⇨					
4.5	10.1	15.3	19.9	25.7	30.9	36.1	44.3	49.6	58.5					

⇦	V	a	s	q	u	e	z	R	d	
4.5	18.0	23.6	28.8	33.4	39.2	44.4	49.6	57.8	63.1	
A	d	a	m	s	R	d	⇨			
4.5	10.5	16.0	21.6	29.1	37.6	42.8	58.5			

SIGN NO. 01
SHEET 7 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS

SIGN NO. 01
SHEET 8 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS



1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.0" 180{; [Green Valley Dr] ClearviewHwy-3-W;
Table of letter and object lefts.

⇦	G	r	e	e	n	V	a	l	l	e	y	D	r	
4.5	18.0	24.1	27.7	33.0	38.5	47.2	52.8	58.3	61.4	64.2	69.2	78.1	84.0	

SIGN NO. 02
SHEET 6 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS

NOT TO SCALE

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510

SIGNING DETAILS

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	212
CONTROL	SECTION	JOB	
1057	03	045	

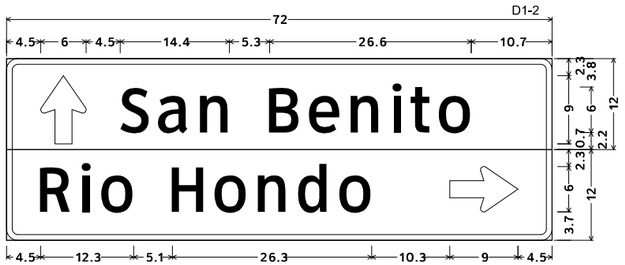
FILENAME: L:\Pharr District\FM1425*ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510*SIGN*DETAIL*01.dgn
DRAWING DATE: 6/27/2022

1.5" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.0" 90{; [Port Isabel] ClearviewHwy-3-W;
1.5" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.0" 180{; [Rio Hondo] ClearviewHwy-3-W;
Table of letter and object lefts.

⇧	P	o	r	t	l	s	a	b	e	l
4.5	17.9	23.1	28.8	32.1	39.7	42.1	46.8	52.3	57.5	63.1

⇦	R	i	o	H	o	n	d	o
4.5	18.0	23.4	26.1	35.4	41.0	46.7	52.0	57.5

SIGN NO. 08
SHEET 11 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS

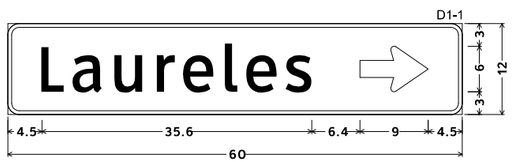


1.5" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.0" 90{; [San Benito] ClearviewHwy-3-W;
1.5" Radius, 0.8" Border, White on Green;
[Rio Hondo] ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.0" 0{;
Table of letter and object lefts.

⇧	S	a	n	B	e	n	l	t	o
4.5	15.0	20.1	25.6	34.7	40.0	45.5	50.9	53.3	57.1

R	i	o	H	o	n	d	o	⇨
4.5	9.9	12.6	21.9	27.5	33.2	38.5	44.0	58.5

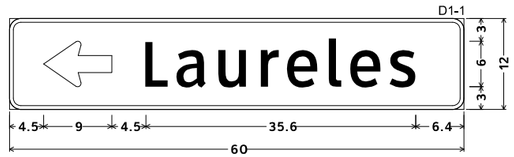
SIGN NO. 17
SHEET 11 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS



1.5" Radius, 0.5" Border, White on Green;
[Laureles] ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.0" 0{;
Table of letter and object lefts.

L	a	u	r	e	l	e	s	⇨
4.5	8.6	14.2	19.7	23.2	28.7	31.6	36.7	46.5

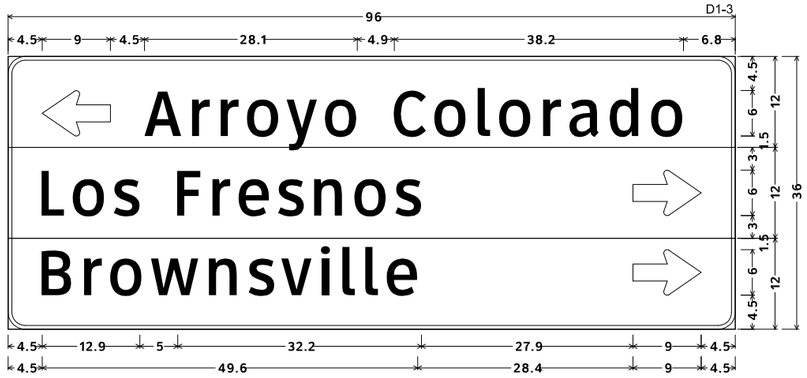
SIGN NO. 01
SHEET 15 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS



1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.0" 180{; [Laureles] ClearviewHwy-3-W;
Table of letter and object lefts.

⇦	L	a	u	r	e	l	e	s
4.5	18.0	22.1	27.7	33.2	36.7	42.2	45.1	50.2

SIGN NO. 12
SHEET 15 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS



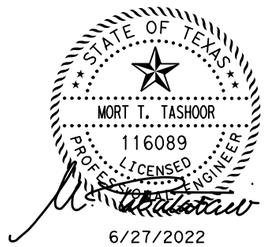
2.3" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.0" 180{; [Arroyo Colorado] ClearviewHwy-3-W;
2.3" Radius, 0.5" Border, White on Green;
[Los Fresnos] ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.0" 0{;
2.3" Radius, 0.5" Border, White on Green;
[Brownsville] ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.0" 0{;
Table of letter and object lefts.

⇦	A	r	r	o	y	o	C	o	l	o	r	a	d	o
4.5	18.0	24.2	28.0	31.6	36.8	41.9	51.0	56.3	62.1	64.9	70.6	74.2	79.5	84.9

L	o	s	F	r	e	s	n	o	s	⇨
4.5	8.6	13.9	22.4	26.9	30.5	35.6	40.5	45.8	51.1	82.5

B	r	o	w	n	s	v	i	l	l	e	⇨
4.5	10.0	13.6	18.9	26.6	31.7	36.1	41.3	44.2	47.2	50.1	82.5

SIGN NO. 05
SHEET 17 OF 18
GREEN REFL. BACKGROUND
WITH WHITE REFL. LETTERS & BORDERS



NOT TO SCALE

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

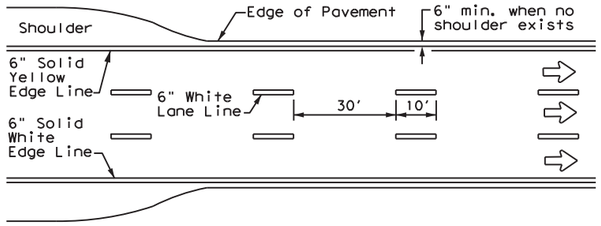
FM 510

SIGNING DETAILS

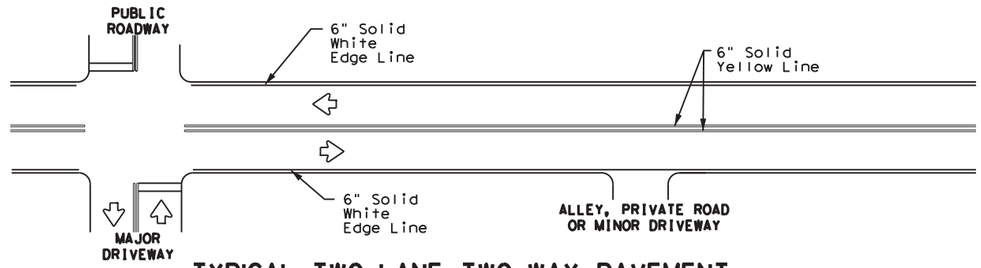
SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	
CONTROL	SECTION	JOB	213
1057	03	045	

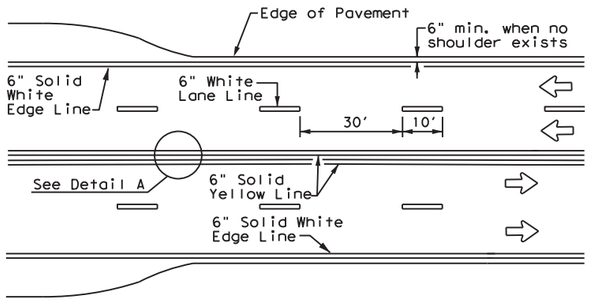
FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\FM510*SIGN*DETAIL*02.dgn
DRAWING DATE: 6/27/2022

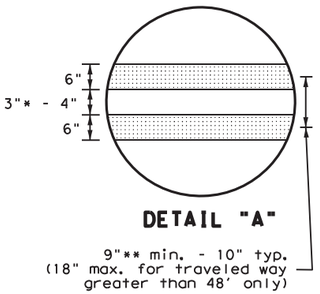


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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

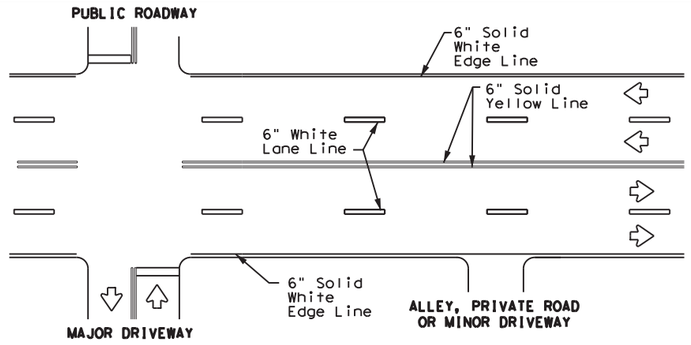




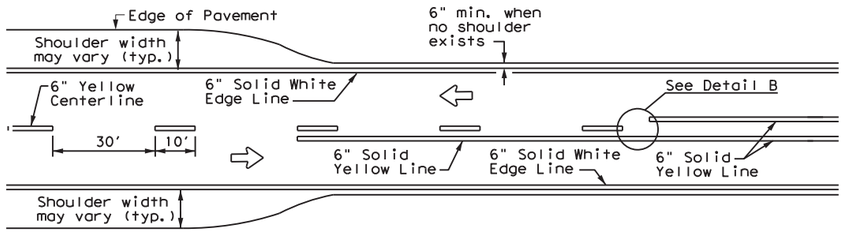
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

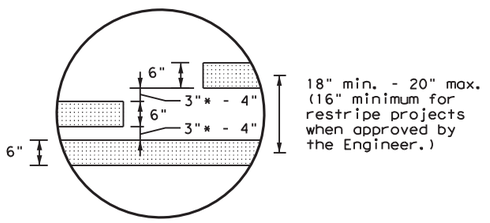
** 8" minimum for restripe projects when approved by the Engineer.



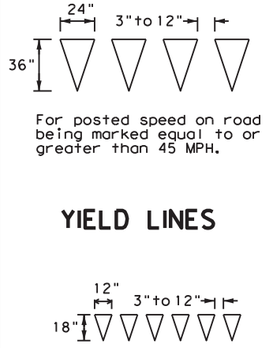
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

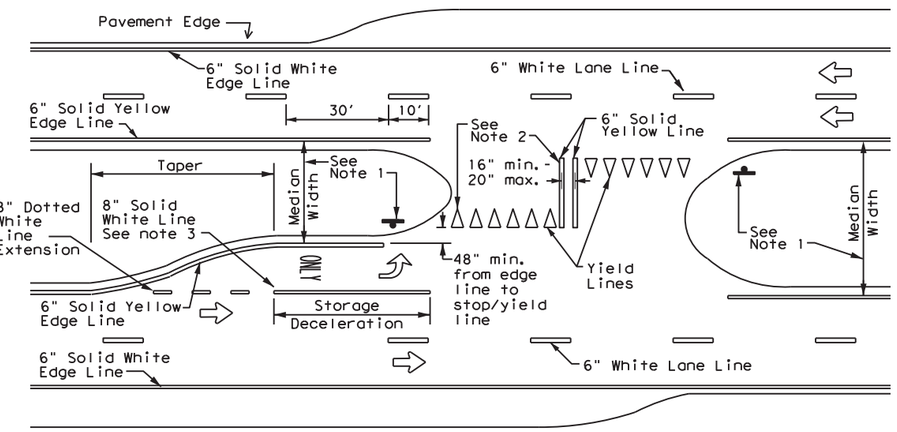


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



* 2" minimum for restripe projects when approved by the Engineer.





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

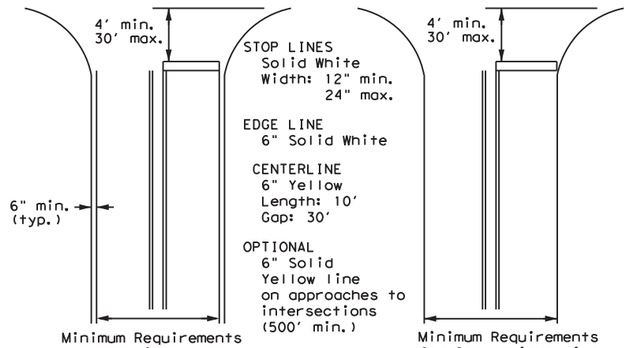
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines 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. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines 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 center of edge line to the center of edge line 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.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

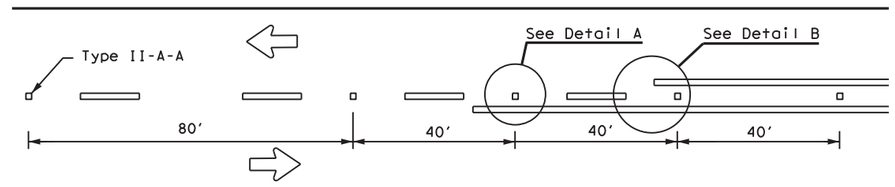
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
11-78 8-00 6-20	DIST	COUNTY		SHEET NO.
8-95 3-03 12-22	PHR	CAMERON		214
5-00 2-12				

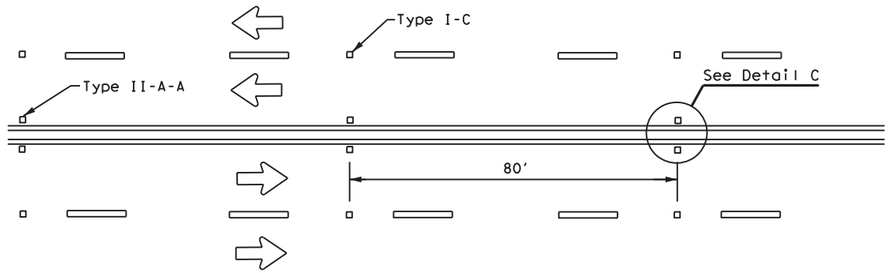
22A

DATE:
FILE:

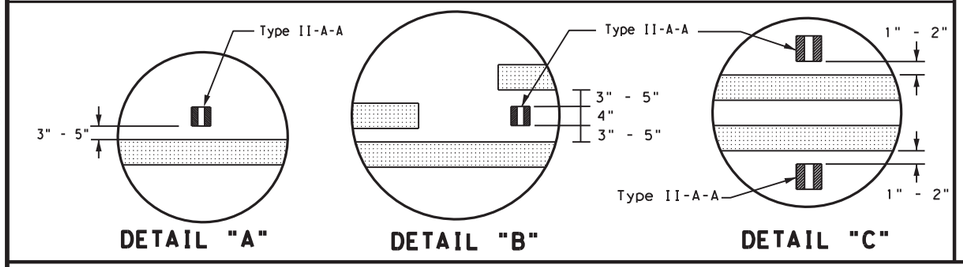
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

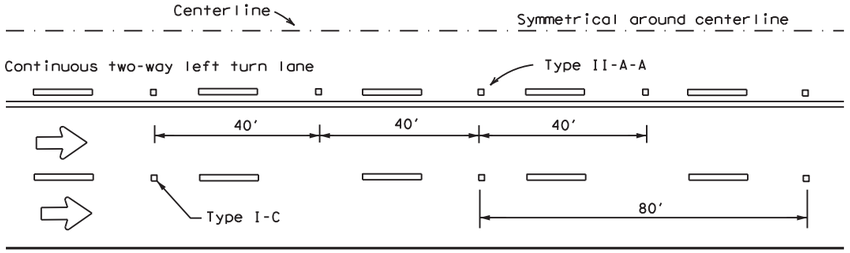


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

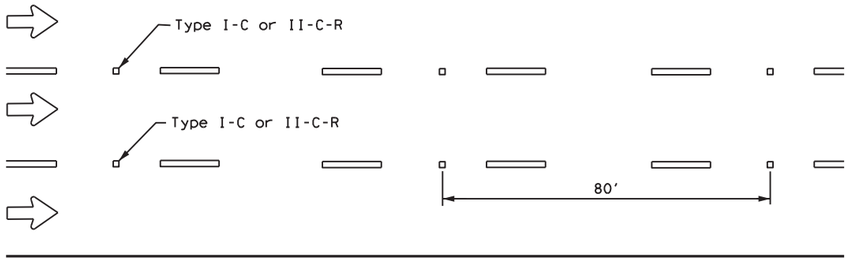


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



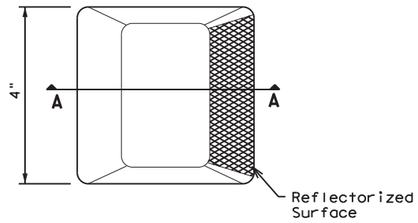
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

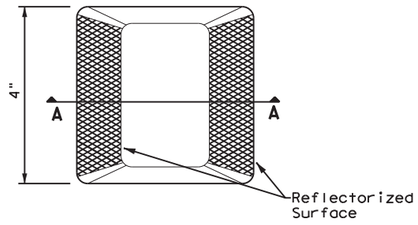
See Note 3.

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

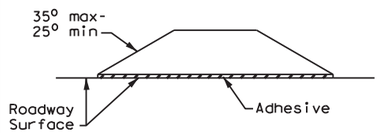
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

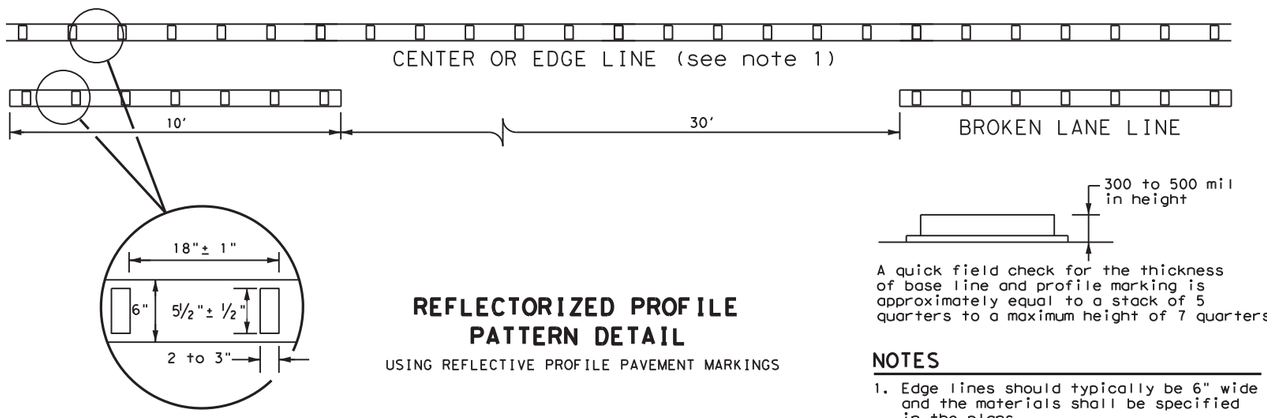


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. 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 along 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.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
4-77 8-00 6-20	DIST	COUNTY		SHEET NO.
4-92 2-10 12-22	PHR	CAMERON		215
5-00 2-12				

22B

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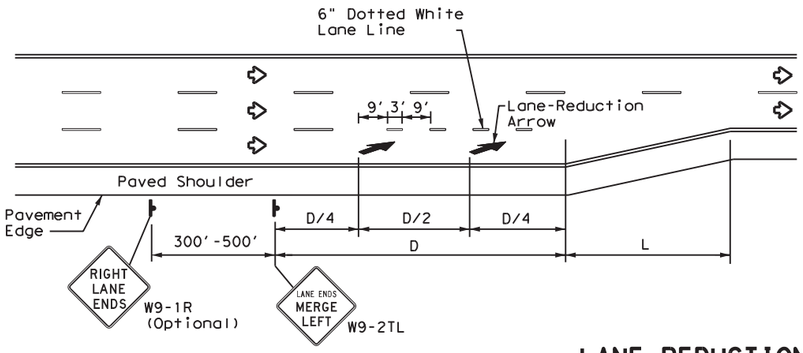
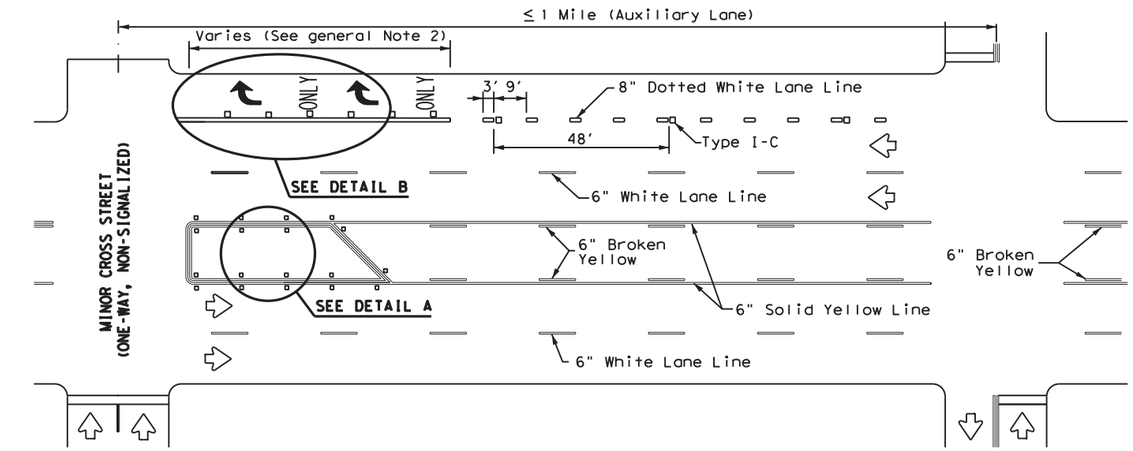


LANE REDUCTION

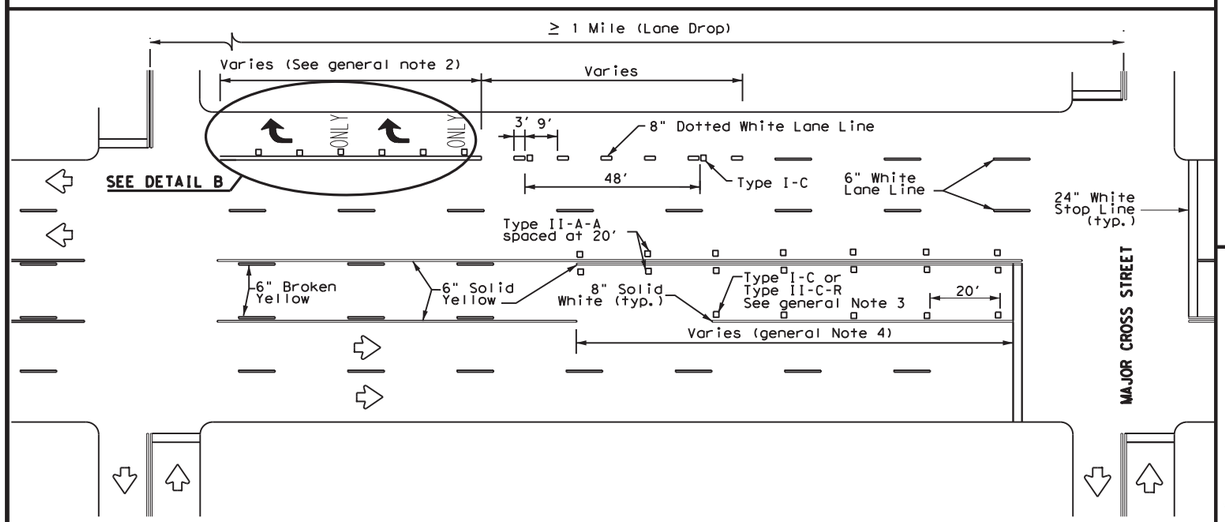
NOTES

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 RIGHT LANE ENDS (W9-1R) 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.

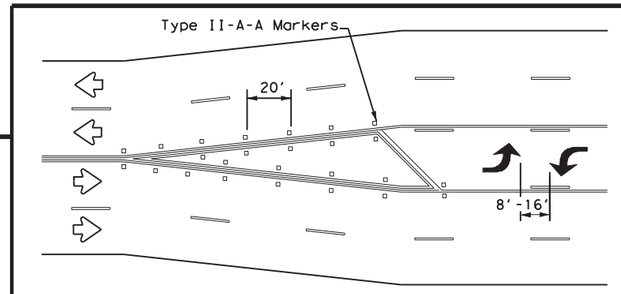
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



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

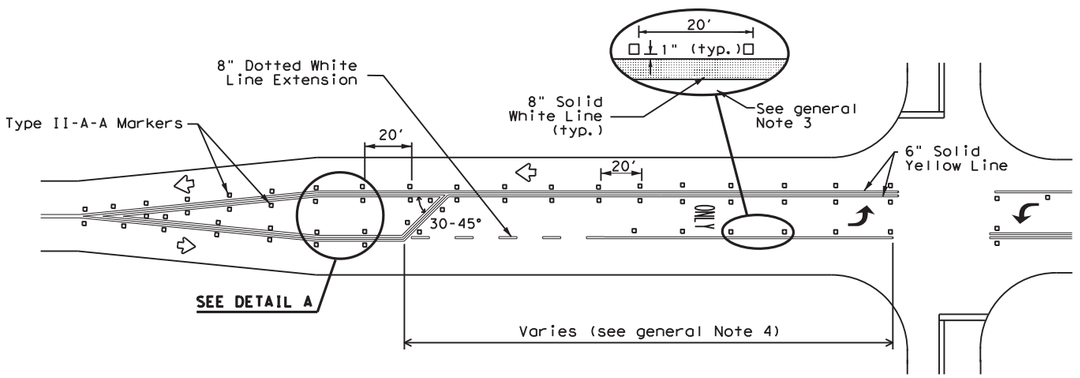


TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP

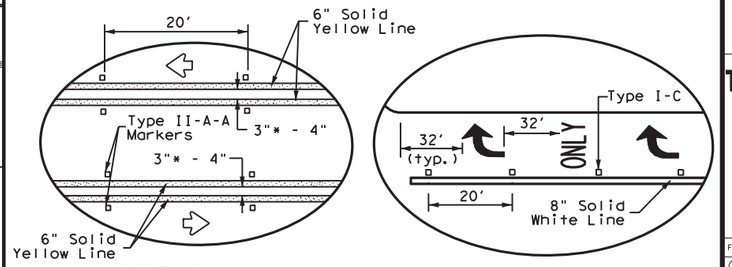


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



* 2" minimum allowed for restripe projects when approved by the Engineer.

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. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

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

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

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHR	CAMERON		216

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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

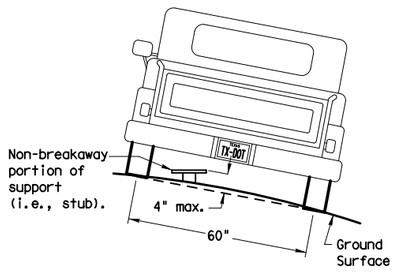
Anchor Type

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

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

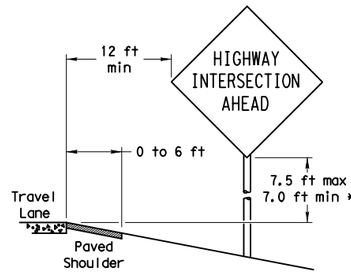
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

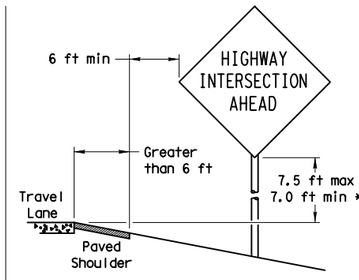
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

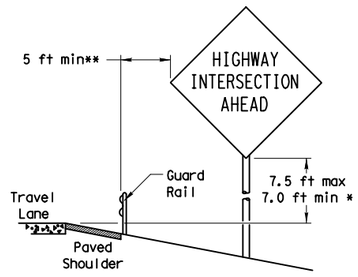
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



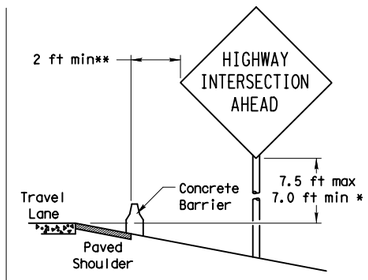
GREATER THAN 6 FT. WIDE

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

BEHIND BARRIER



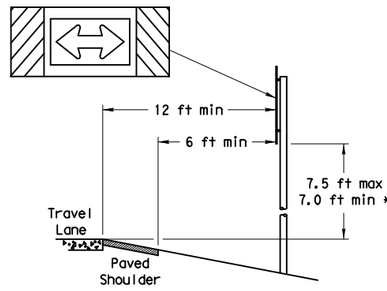
BEHIND GUARDRAIL



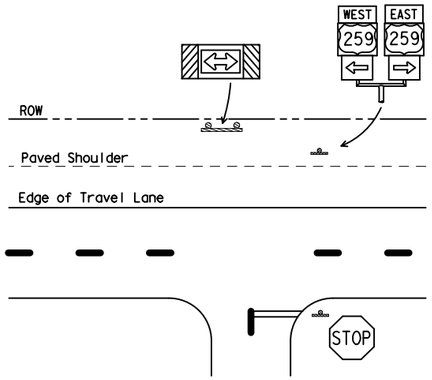
BEHIND CONCRETE BARRIER

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

T-INTERSECTION



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



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

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

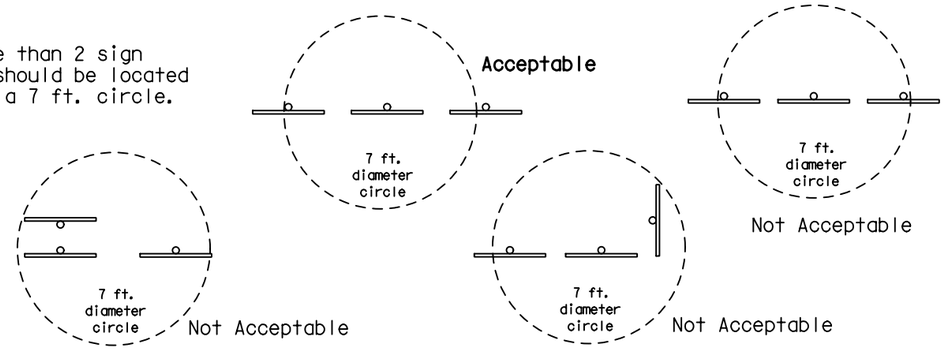
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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

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

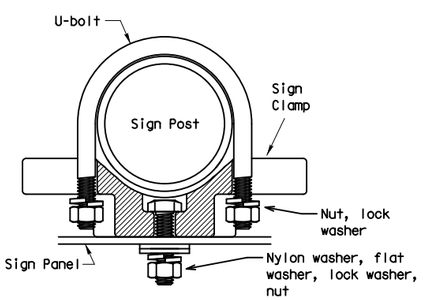
The website address is:
http://www.txdot.gov/publications/traffic.htm

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

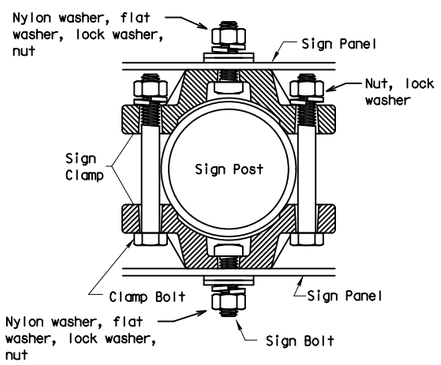


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

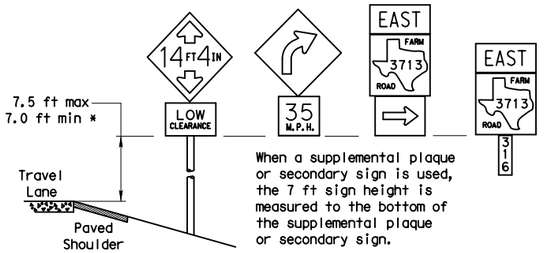
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



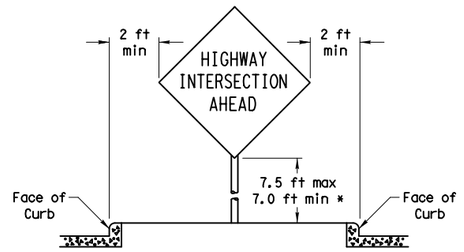
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



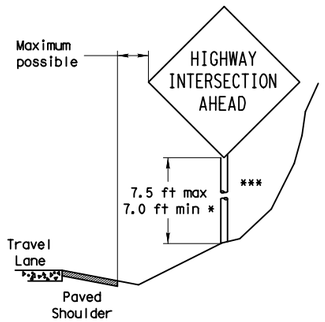
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		217

DATE: 6/27/2022 5:05:00 PM
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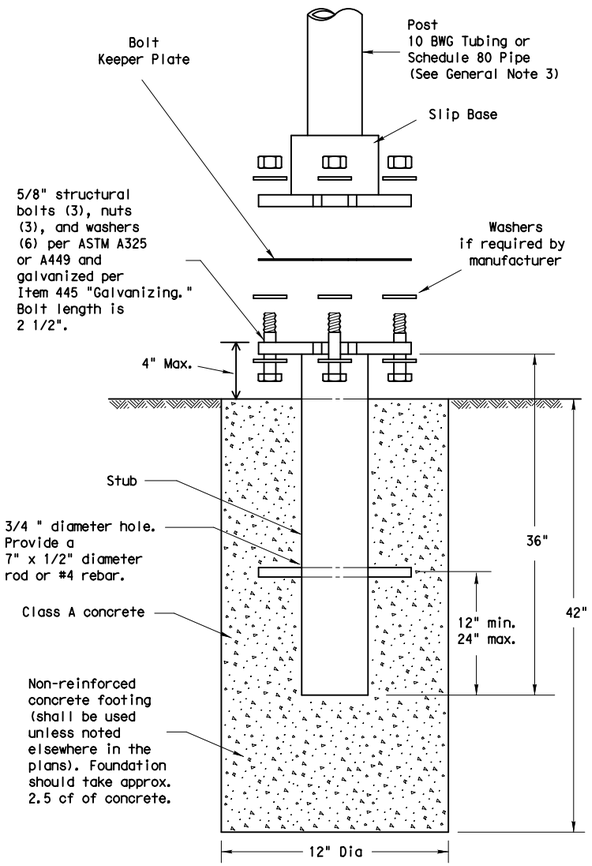
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

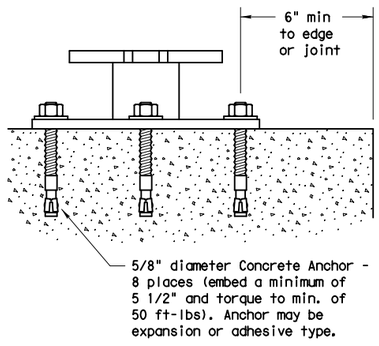
1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)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

ASSEMBLY PROCEDURE

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

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

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
1057	03	045	FM 510

DIST	COUNTY	SHEET NO.
PHARR	CAMERON	218

DATE: 6/27/2022 5:05:00 PM
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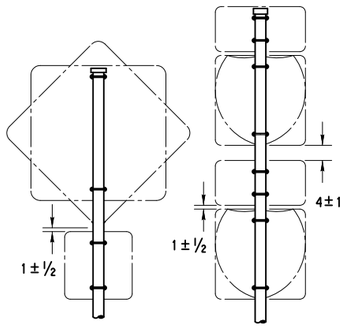
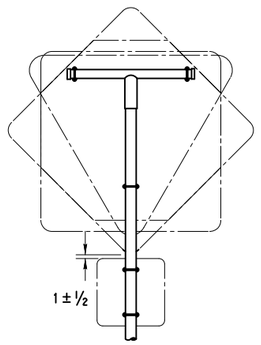


SM RD SGN ASSM TY XXXXX(1)XX(P)



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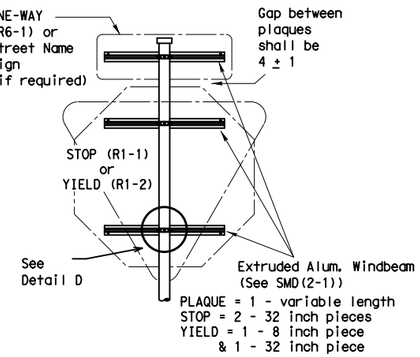
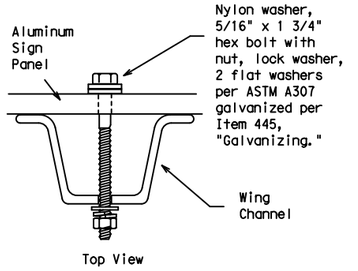
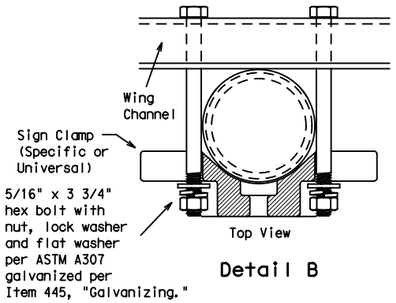


SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Detail A



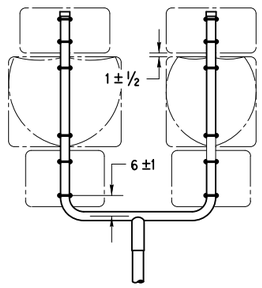
Detail B

GENERAL NOTES:

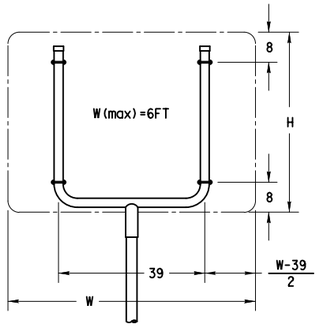
1.

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

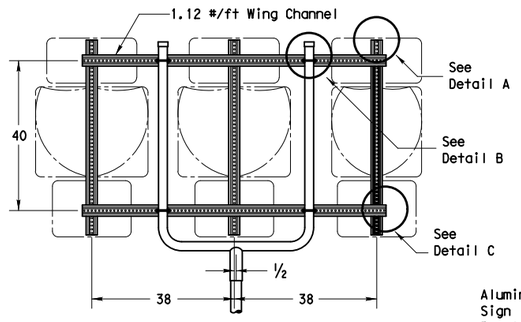
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material 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.



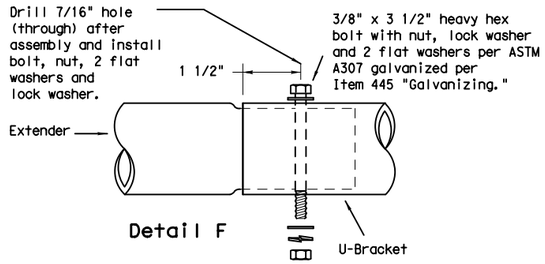
SM RD SGN ASSM TY XXXXX(1)XX(U)



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

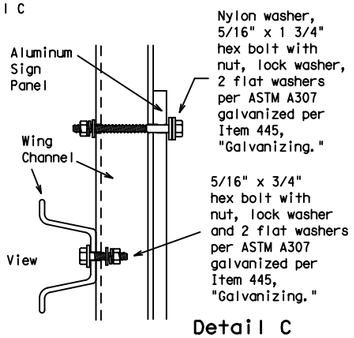


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

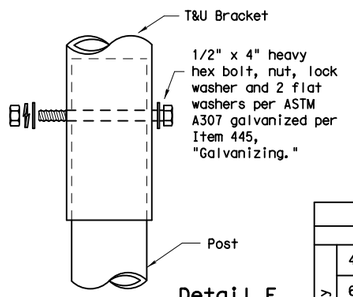


Detail F

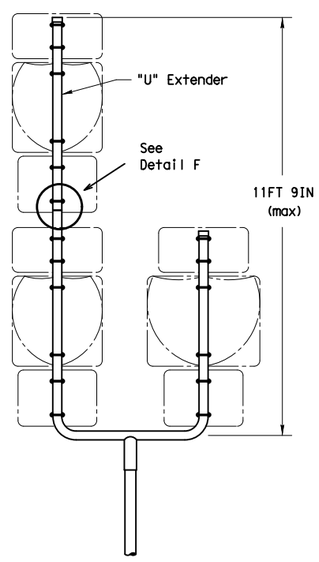
Splices shall only be allowed behind the sign substrate.



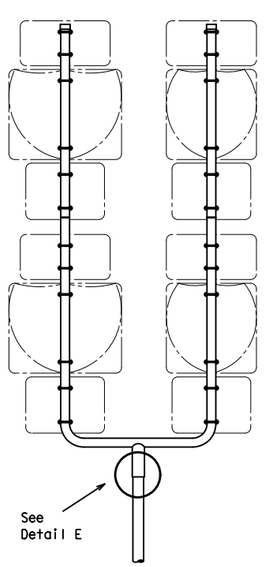
Detail C



Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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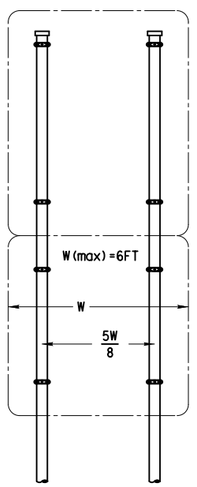
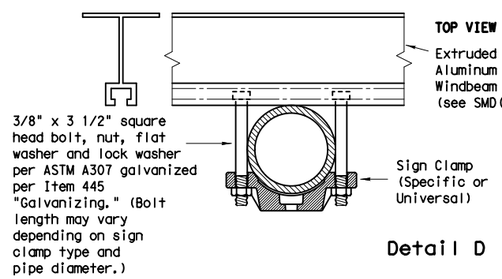
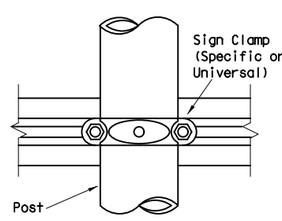


SM RD SGN ASSYM TY XXXXX(2)XX(P)

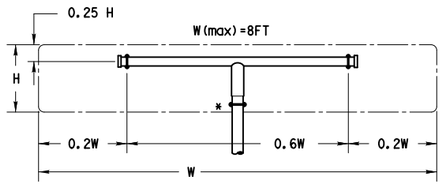
SIDE VIEW



Detail D



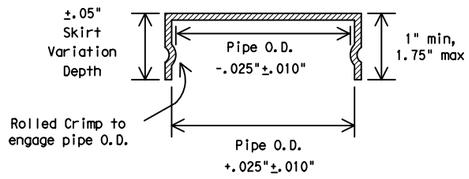
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	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

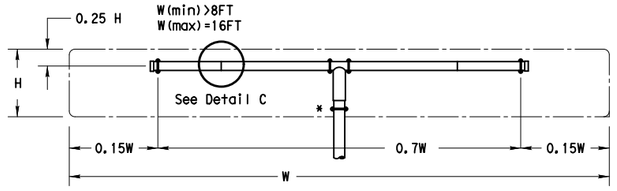
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

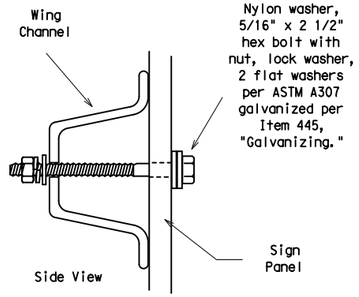
CONT	SECT	JOB	HIGHWAY
1057	03	045	FM 510

DIST	COUNTY	SHEET NO.
PHARR	CAMERON	219

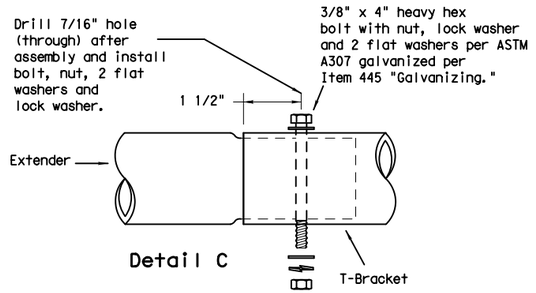
DATE: 6/27/2022 5:05:01 PM
FILE: L:\Pharr District\FM#1425*ETC\CADD\Sheets\FM510\10 Signing Striping and Signals\TxDOT Standards\smds3.dgn



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



Detail B



Detail C

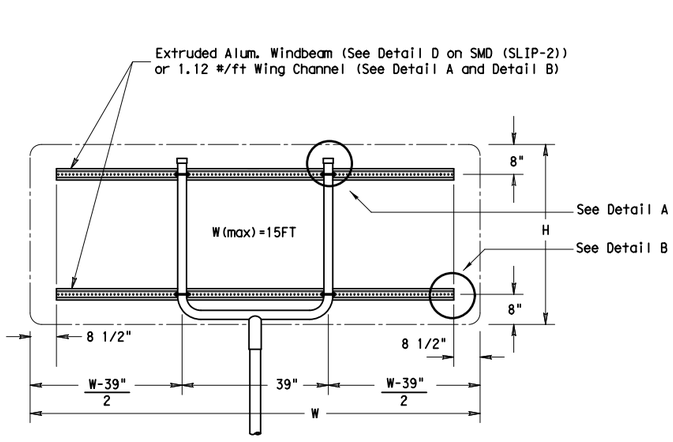
Splices shall only be allowed behind the sign substrate.

GENERAL NOTES:

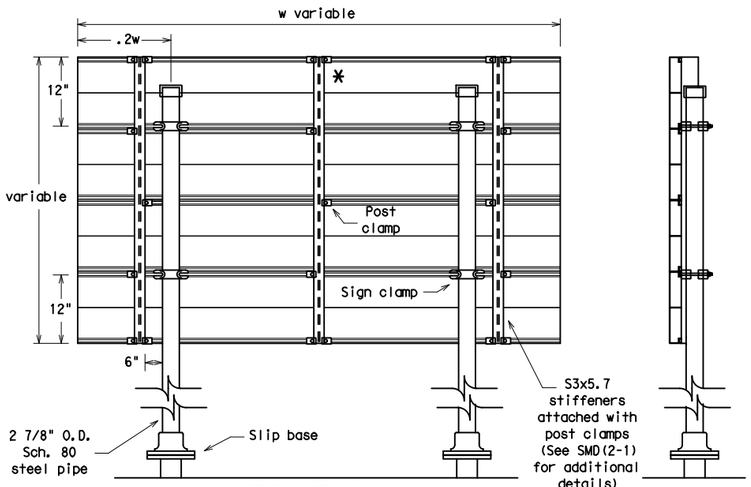
1.

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

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



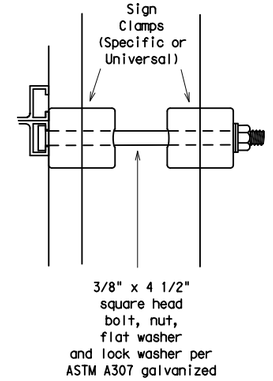
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



Typical Sign Mount

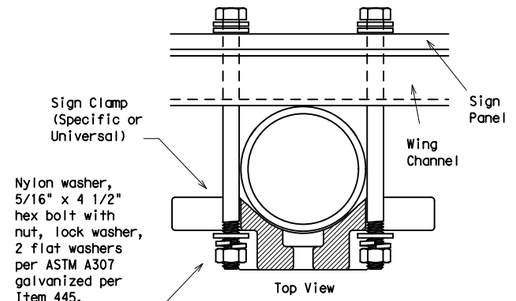
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

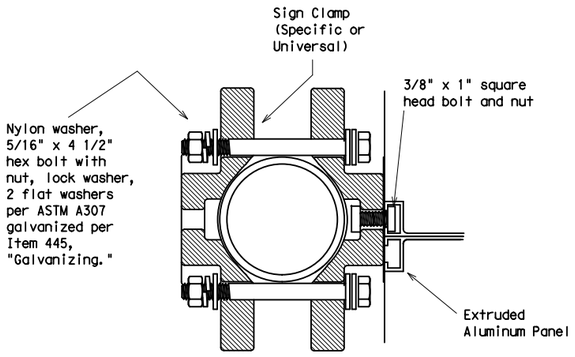


Detail E

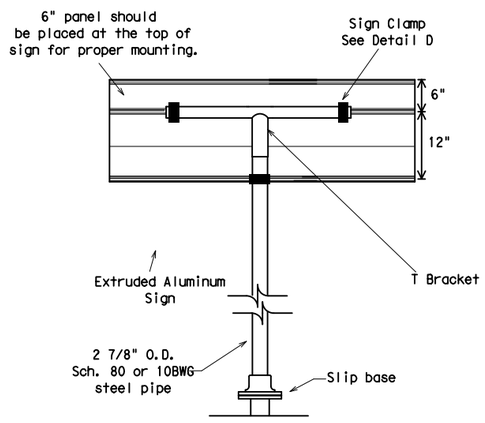
See Detail E for clamp installation



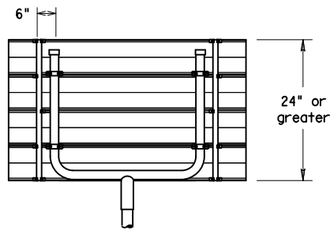
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

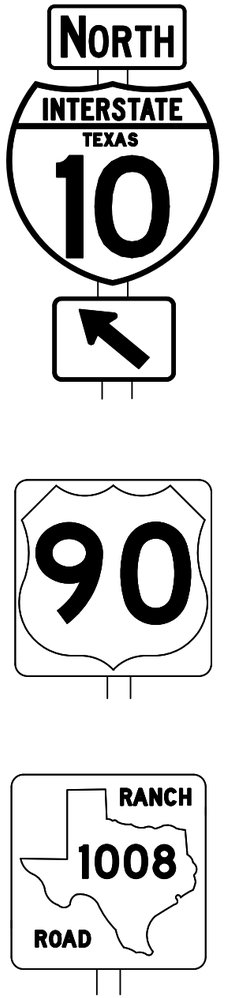
SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		220

DATE: 6/27/2022 5:05:01 PM
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\10 Signing Striping and Traffic Signal\tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

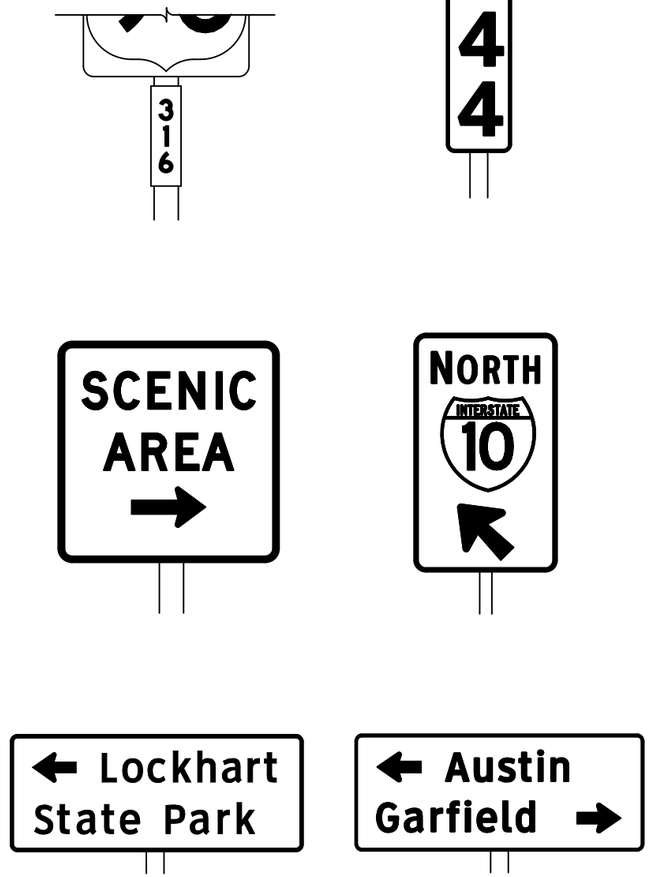
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

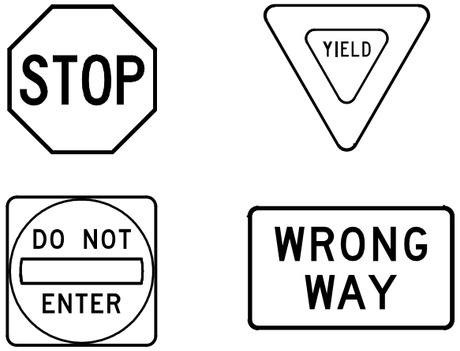
FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	PHARR	CAMERON		221

3

DATE: 6/27/2022 5:05:02 PM
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\10 Signing Striping and Traffic Control\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

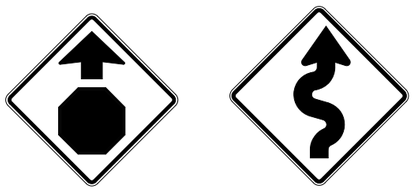
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

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

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

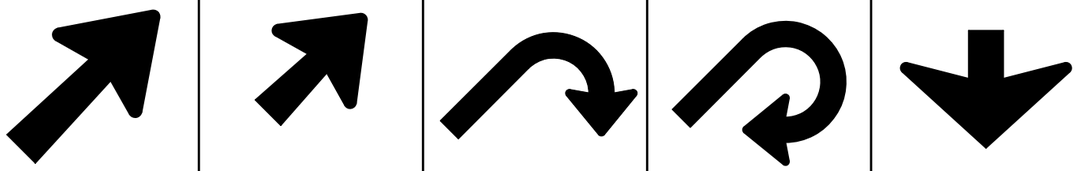
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	PHARR	CAMERON		222

DATE: 6/27/2022 5:05:02 PM
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\10 Signing Striping and Lighting\tsr5-13.dgn

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



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

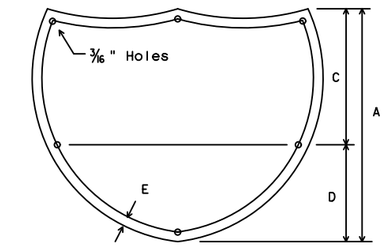
NOTE

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.

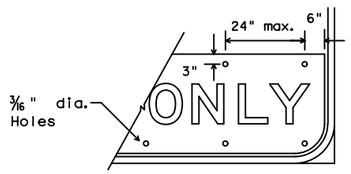
http://www.txdot.gov/

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

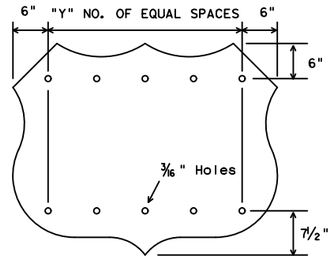


INTERSTATE ROUTE MARKERS

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

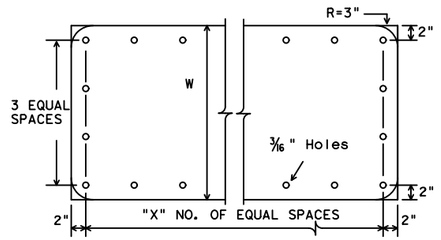


EXIT ONLY PANEL



U.S. ROUTE MARKERS

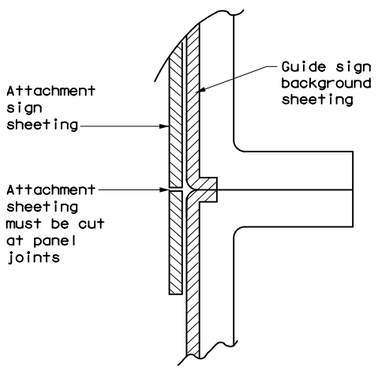
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



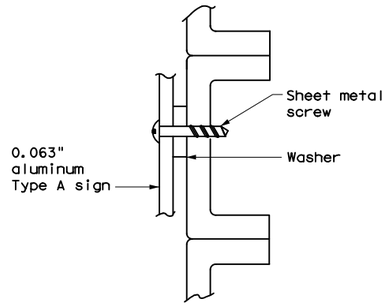
STATE ROUTE MARKERS

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

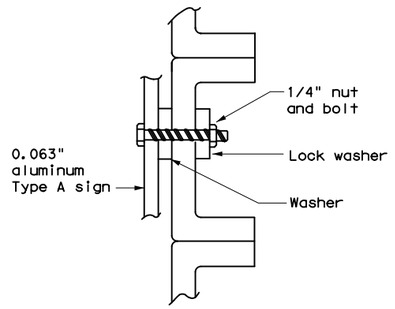
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

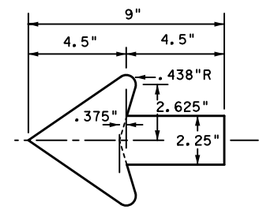
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

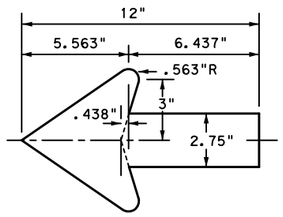
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

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

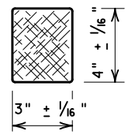
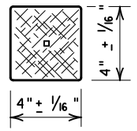
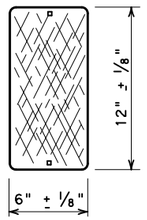
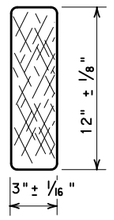
TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	PHARR	CAMERON		223

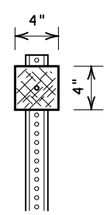
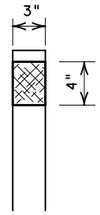
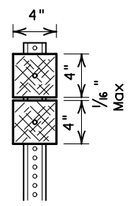
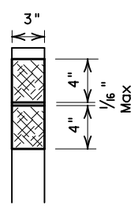
5

DATE: 6/27/2022 5:05:03 PM
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\05 Roadway Details\TxDOT Standard Sheets\dom1-20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

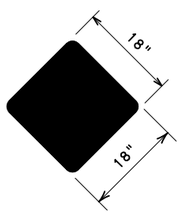
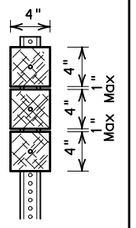
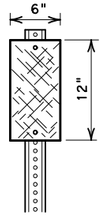
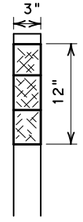
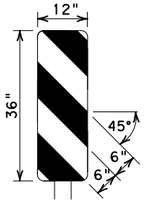
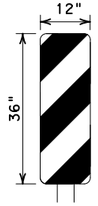
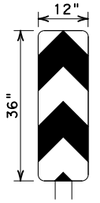
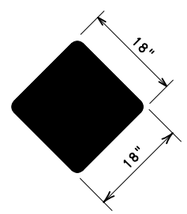
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

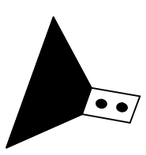
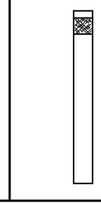
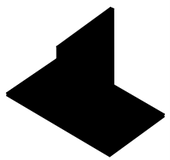
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

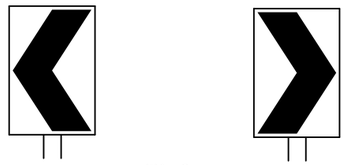
DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

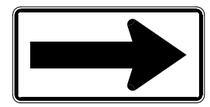
BARRIER REFLECTORS (BRF)

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

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

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

NOTE:

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

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	1057	03	045	FM 510
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	PHARR	CAMERON		224

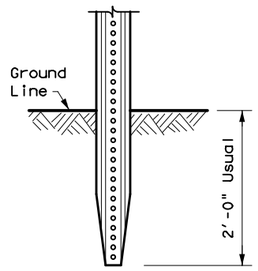
20A

DATE: 6/27/2022 5:05:03 PM
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\05 Roadway Details\TxDOT\dom2-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

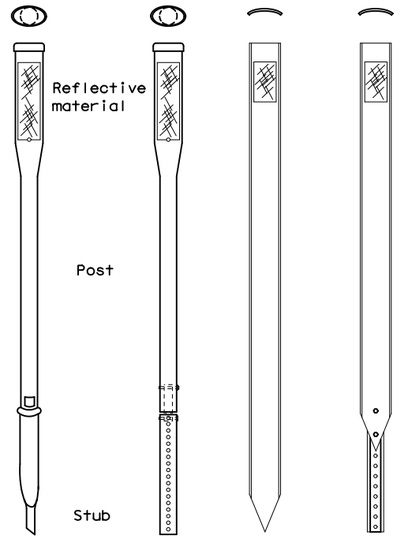


NOTES

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

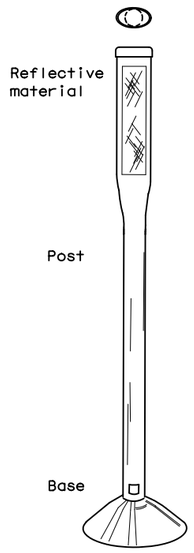
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



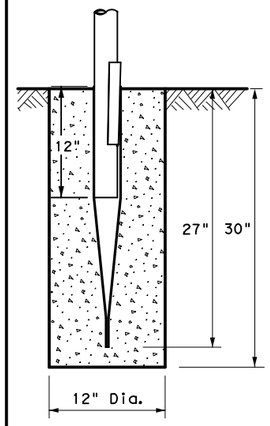
SURFACE MOUNT

NOTES

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

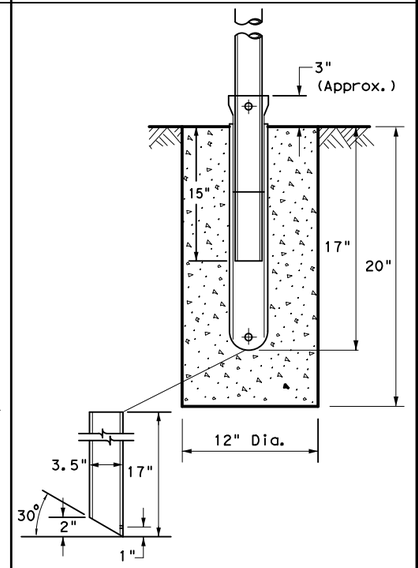
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

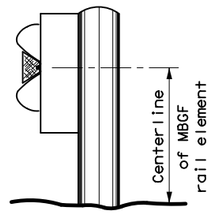
NOTE

1. Install per manufacturer's recommendations.

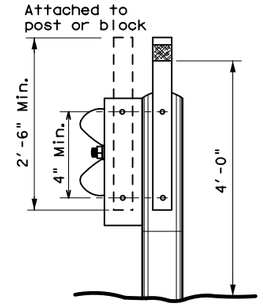
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

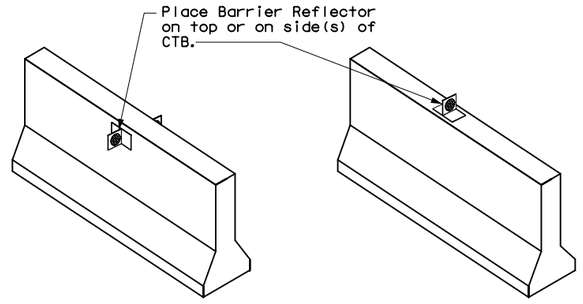
GF1



GF2



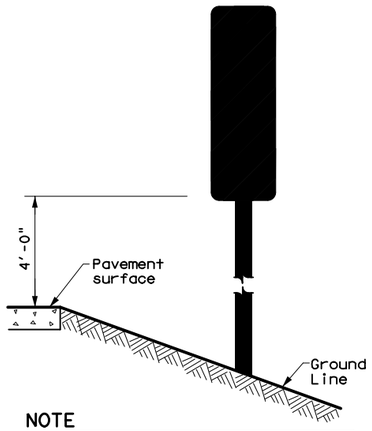
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

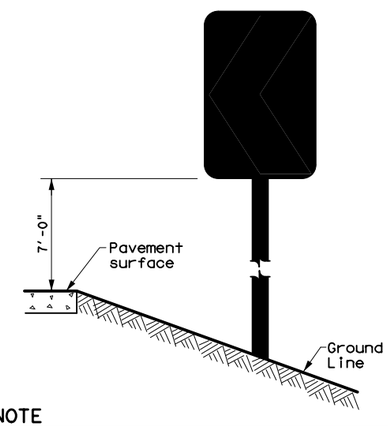
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

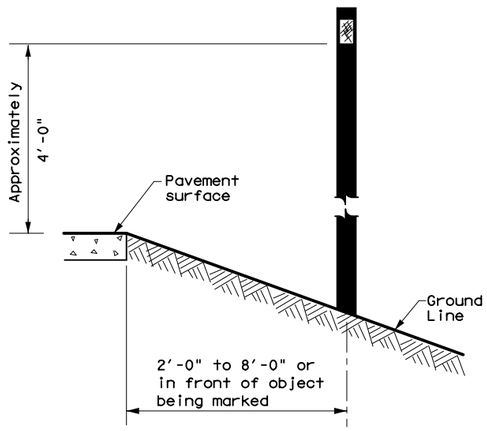
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

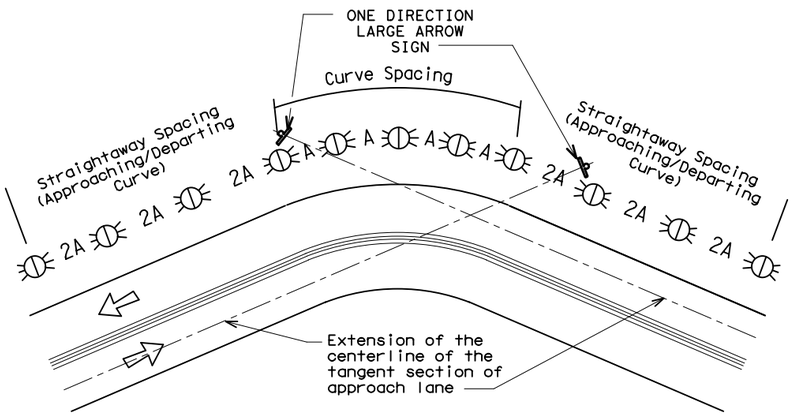
FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	PHARR	CAMERON		225

20B

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

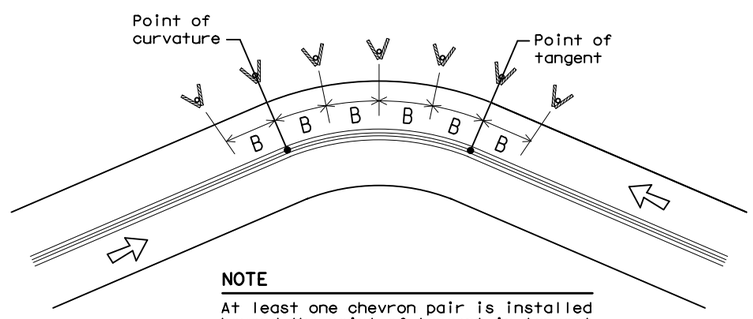
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

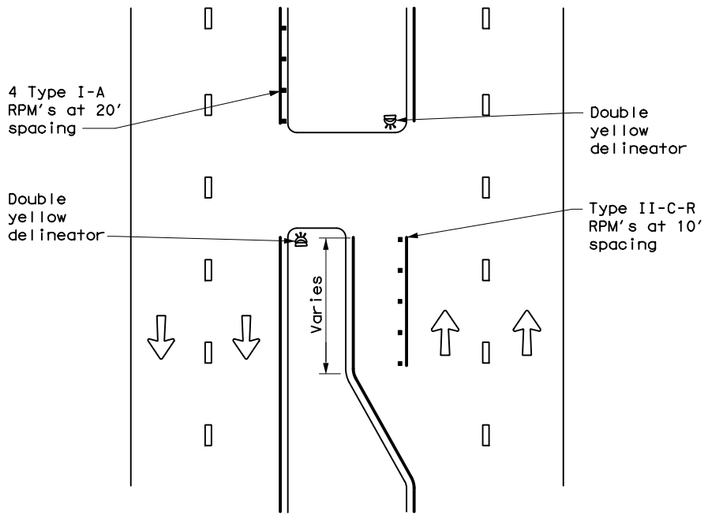
FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	PHARR	CAMERON		226

DATE:
FILE:

20C

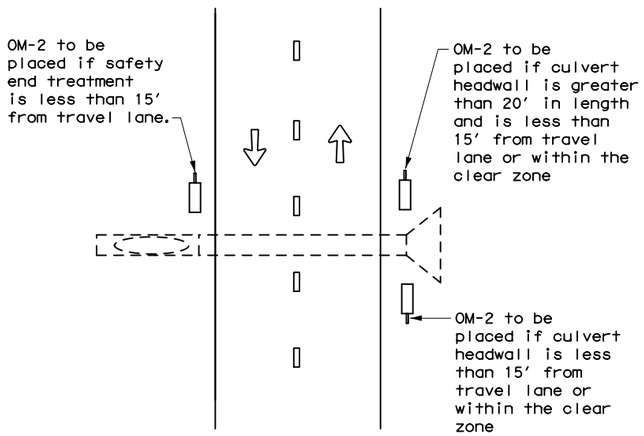
DATE: 6/27/2022 5:05:04 PM
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\05 Roadway Details\TxDOT Standards\dom4-20.dgn

CROSSOVERS



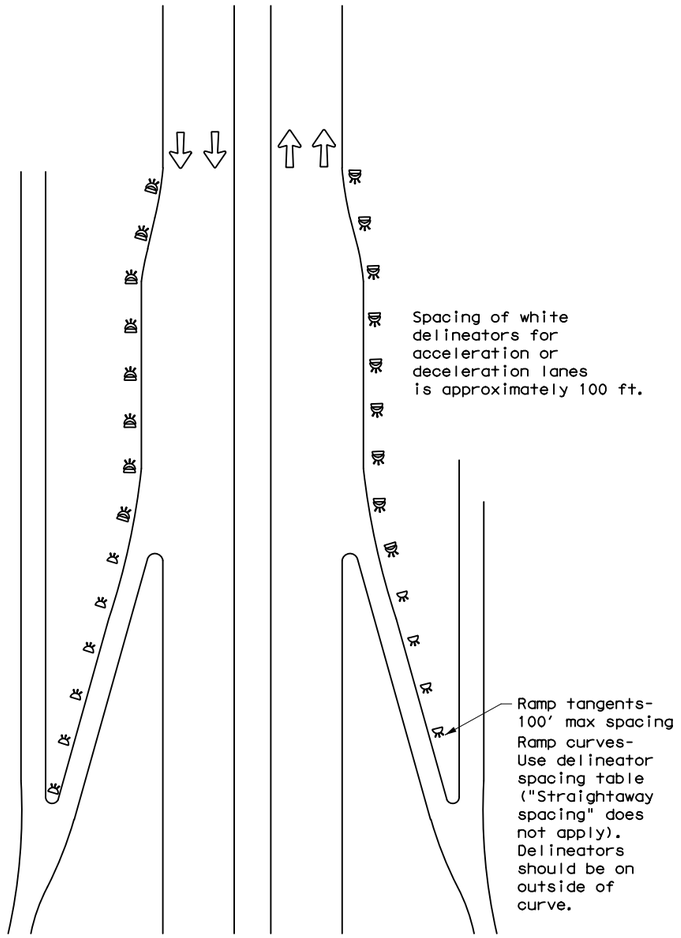
DETAIL 1

FOR CULVERTS WITHOUT MBGF



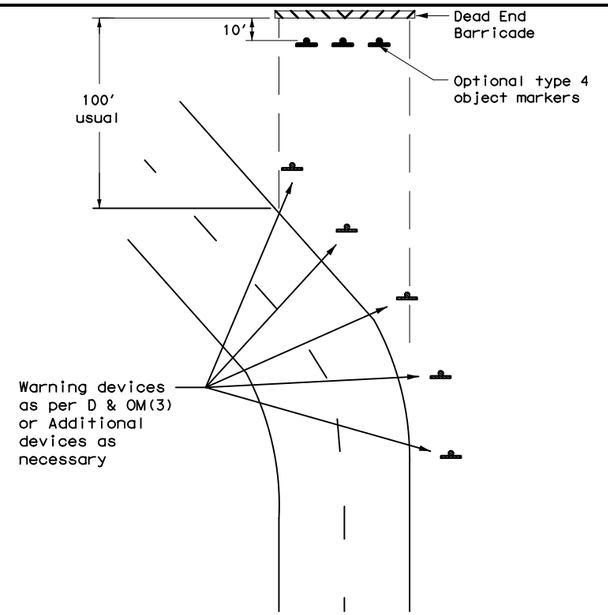
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



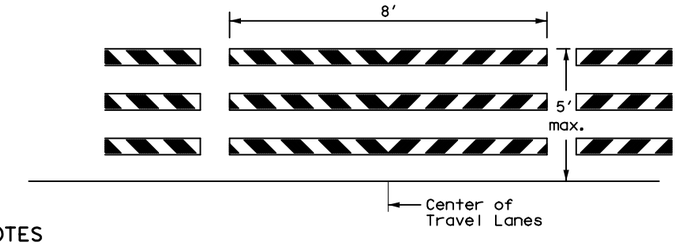
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

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

DETAIL 5

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
3-15	DIST	COUNTY		SHEET NO.
7-20	PHARR	CAMERON		227

20D

DATE: 6/27/2022 5:05:05 PM
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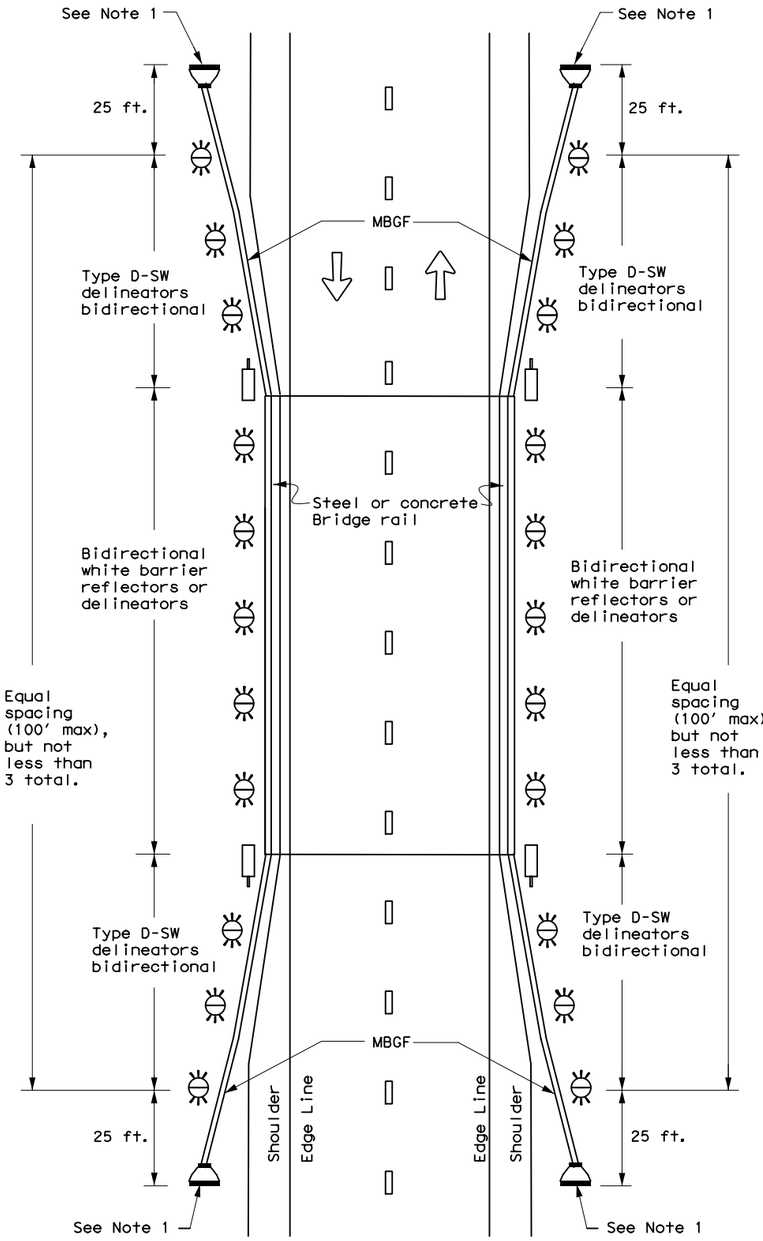
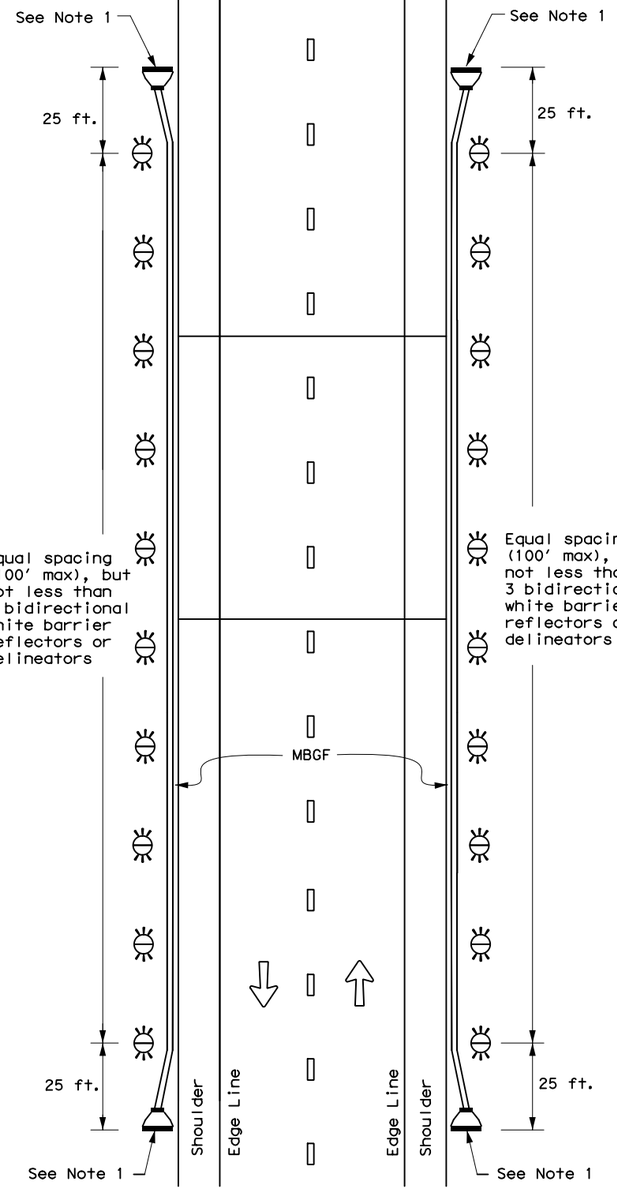
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

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

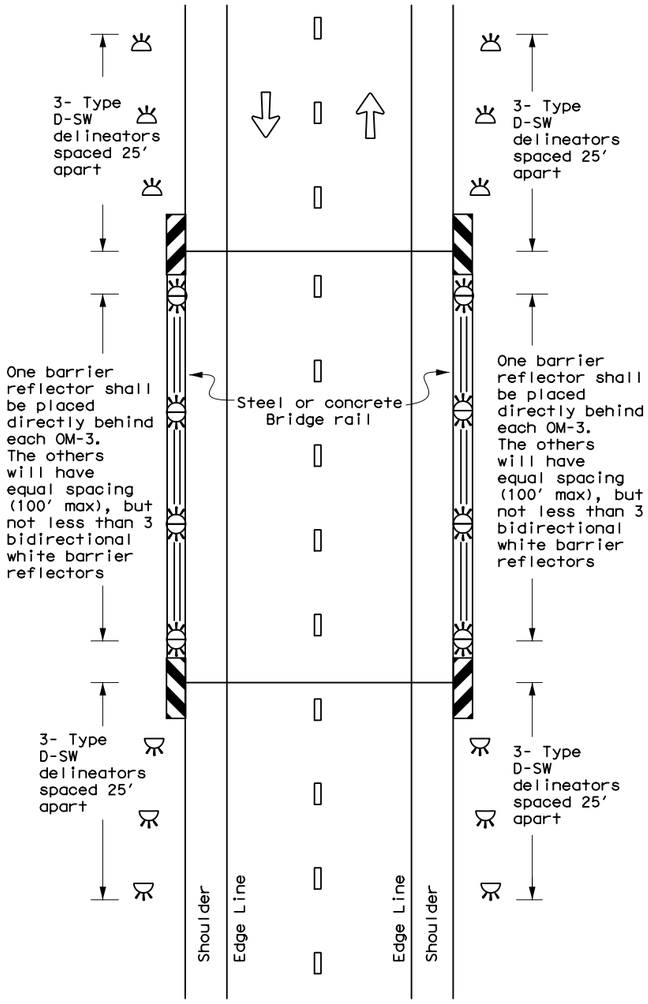
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

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

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



LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
7-20	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		228

20E

DATE: 6/27/2022 5:05:05 PM
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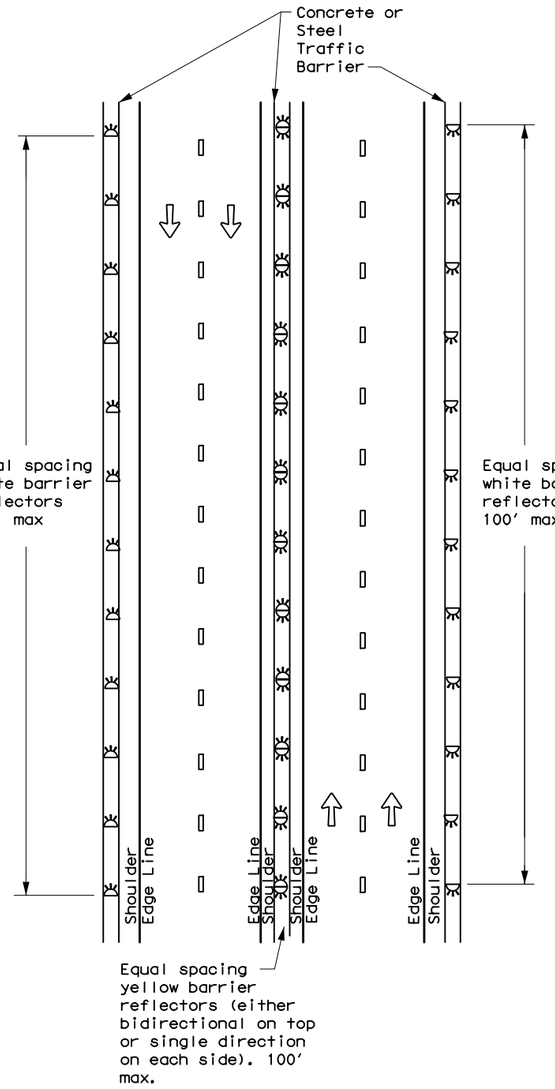
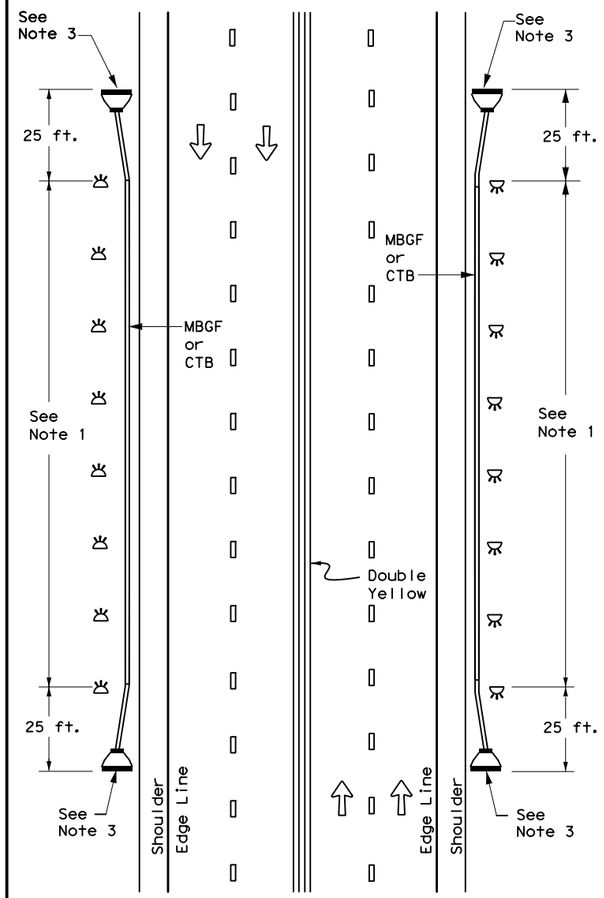
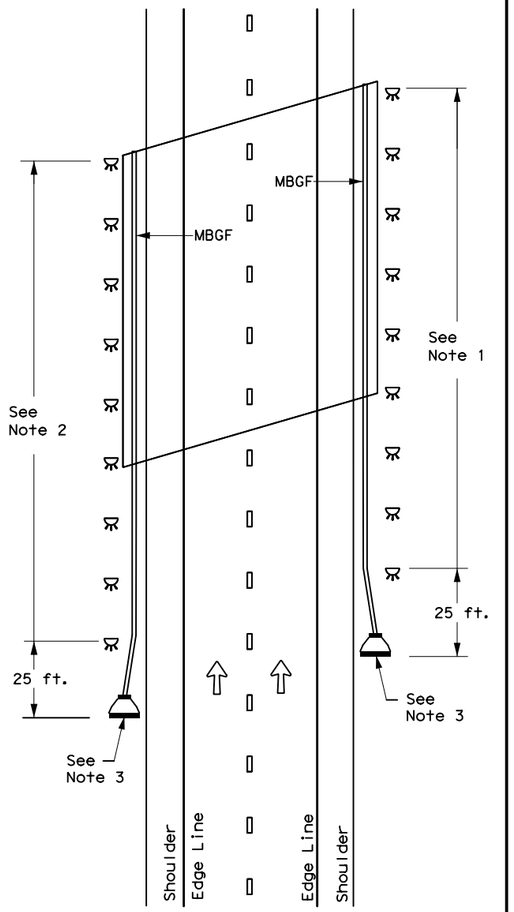
CONTINUOUS CONCRETE OR STEEL BARRIER



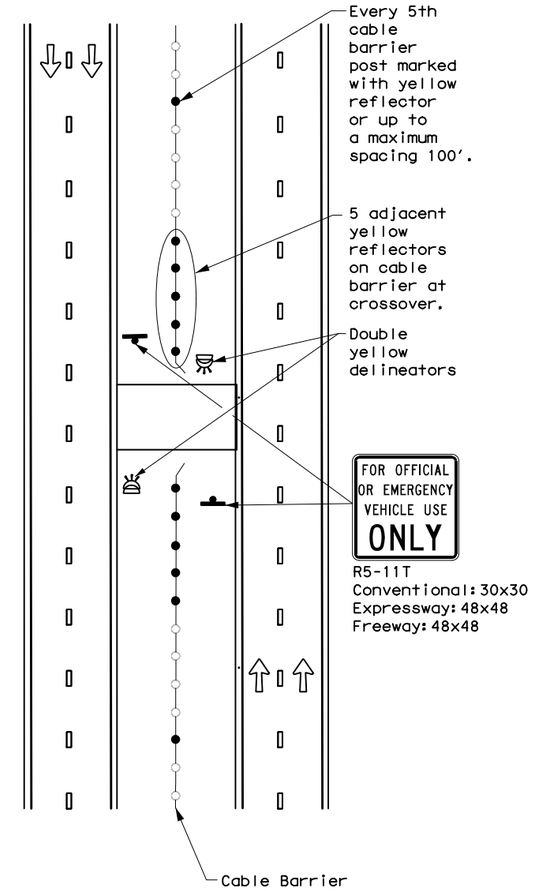
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)
2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3)in front of the terminal end.

LEGEND

	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
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7-20	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		229

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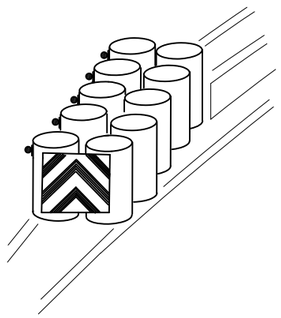
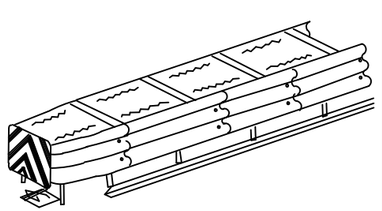
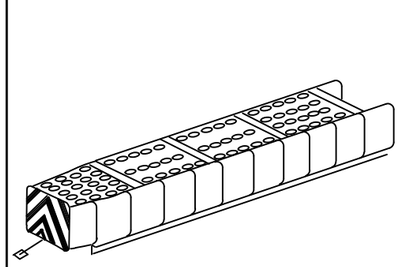
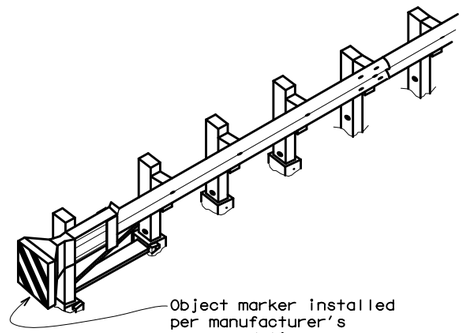
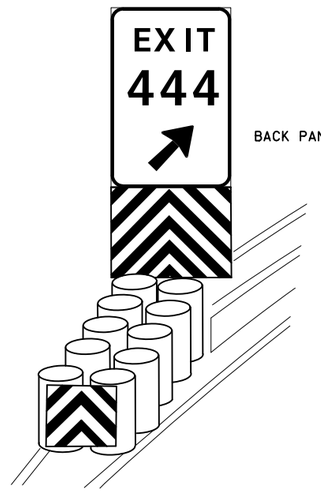


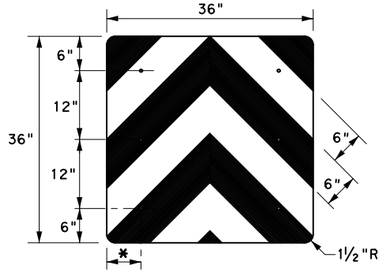


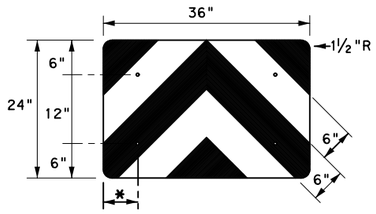




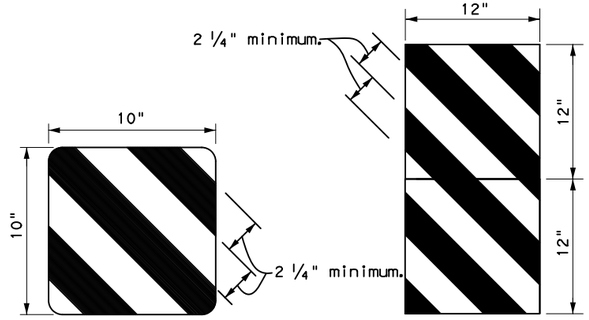


BACK PANEL (OPTIONAL)

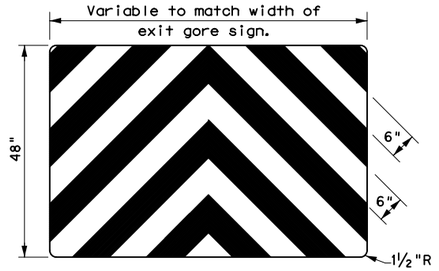


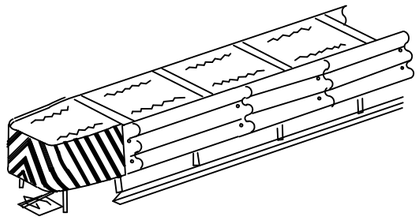


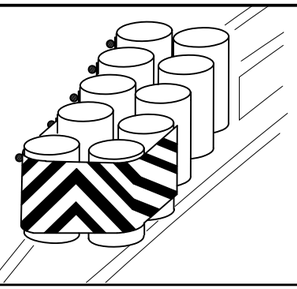
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

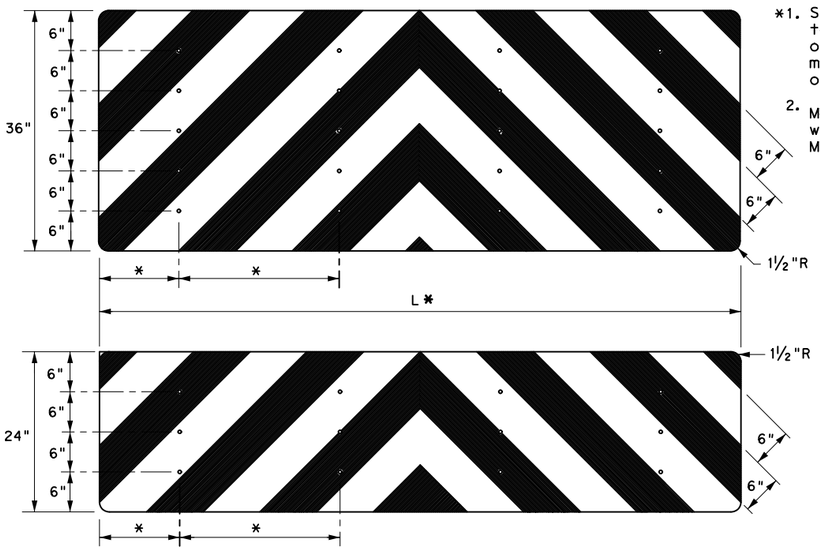


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

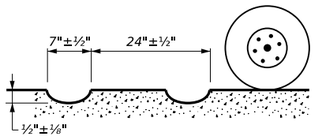
DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

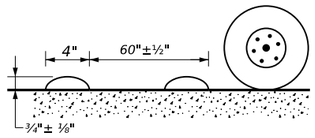
FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	PHARR	CAMERON		230
4-98 7-20				

20G

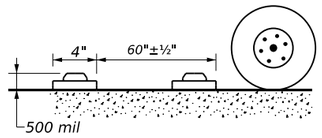
CENTERLINE RUMBLE STRIPS



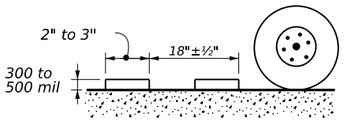
PROFILE VIEW



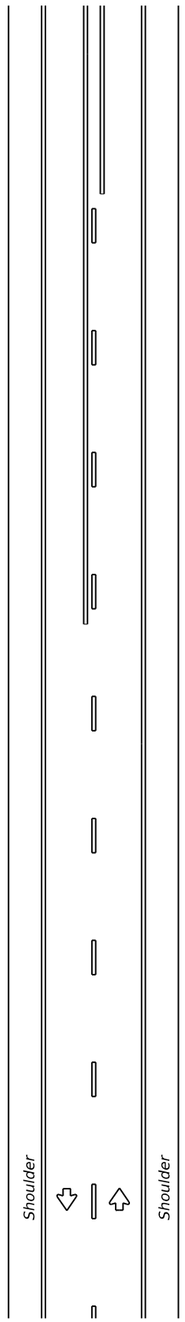
PROFILE VIEW



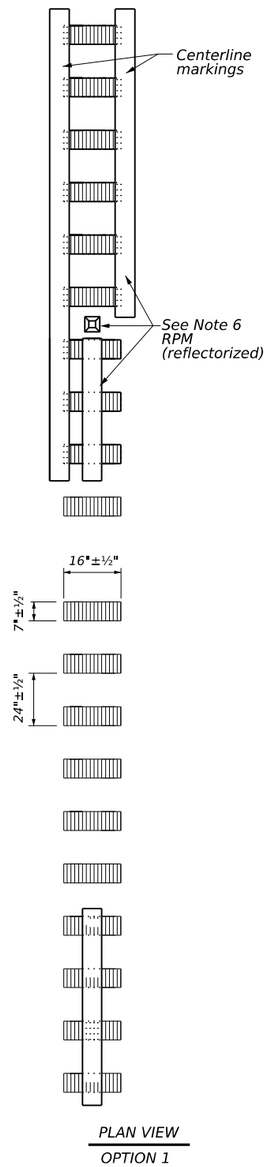
PROFILE VIEW



PROFILE VIEW

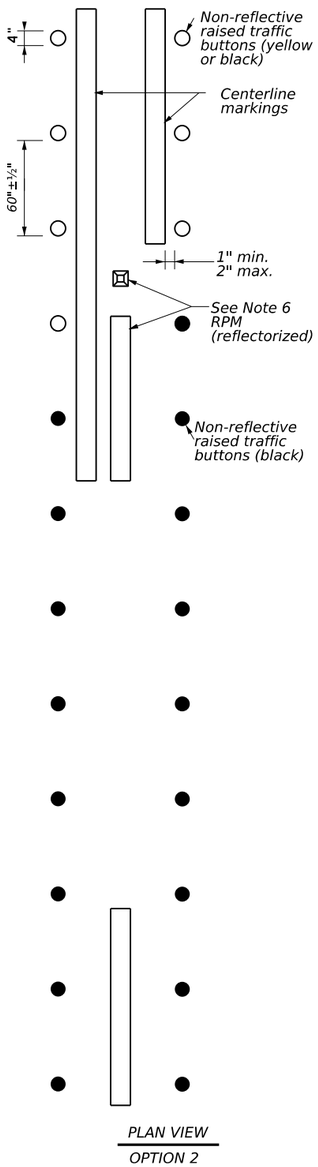


TWO LANE TWO-WAY HIGHWAYS



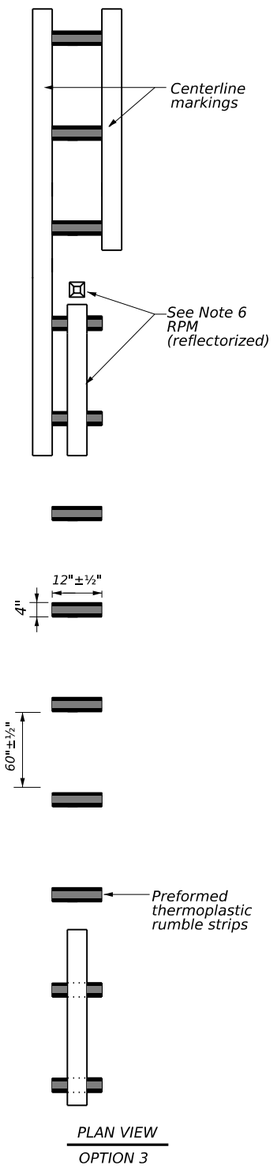
PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS



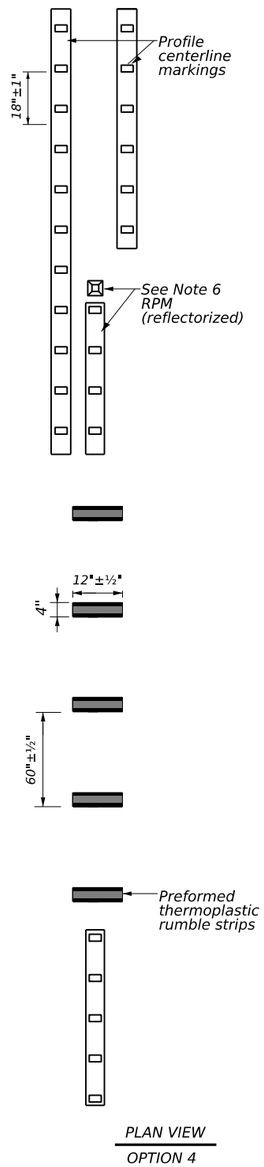
PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PLAN VIEW
OPTION 3

PREFORMED THERMOPLASTIC RUMBLE STRIPS



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC RUMBLE 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 edge line 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 Safety 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 or driveways with high usage of large trucks.
6. Use standard sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) 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.
12. Consideration shall be given to bicyclists. See RS(6).

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

13. See standard sheet RS(2).

DATE:
FILE:

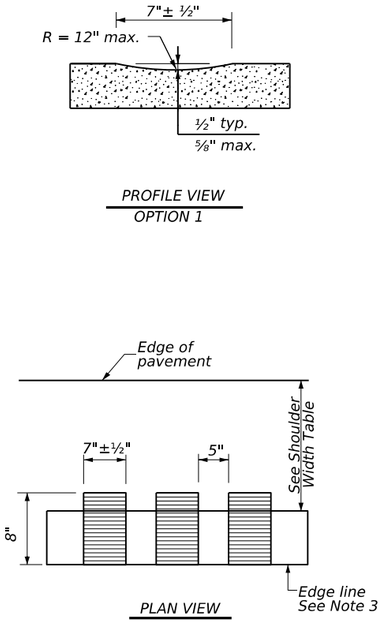
Texas Department of Transportation

Traffic Safety Division Standard

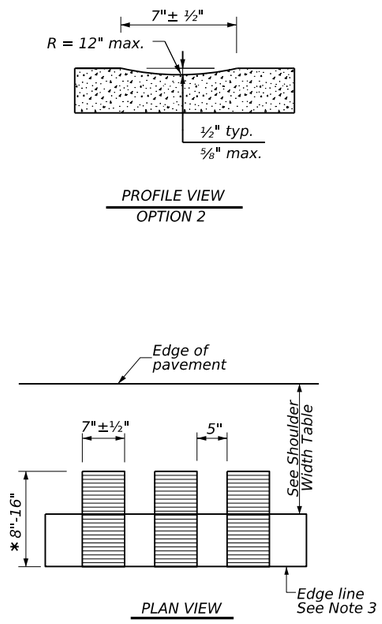
CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS RS(4)-23

FILE: rs(4)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
10-13 1-23	DIST	COUNTY		SHEET NO.
	21	CAMERON		231

DATE:
FILE:

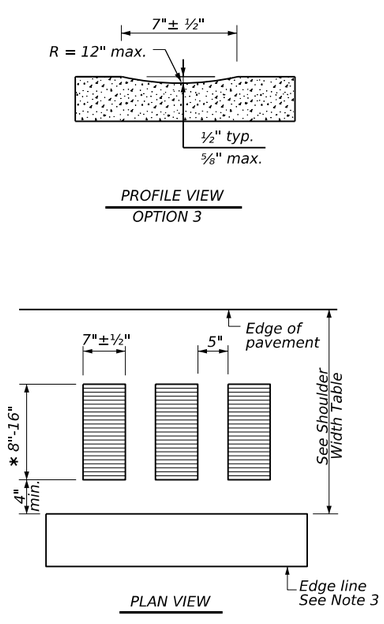


CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



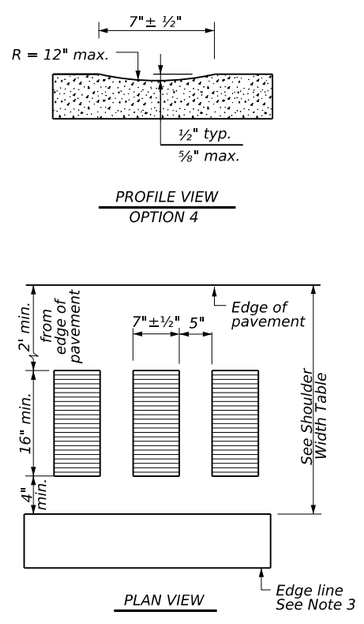
∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

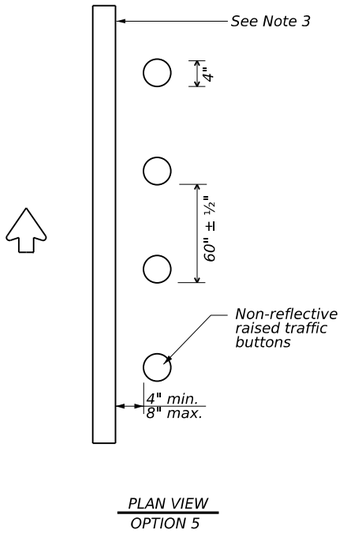


∗ This distance may vary based on width of shoulder

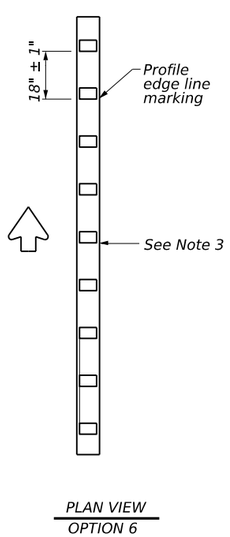
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



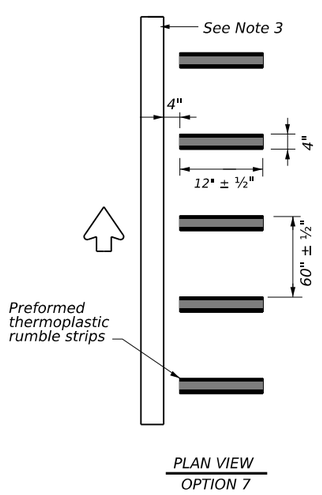
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



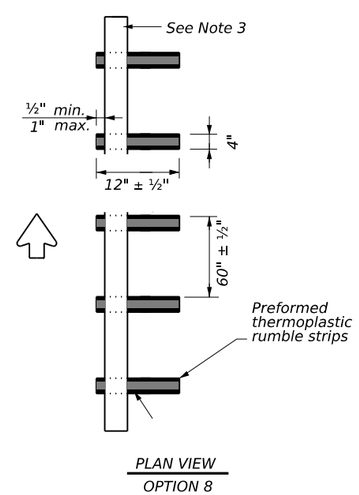
RAISED EDGE LINE (Rumble Strips)



PROFILE EDGE LINE MARKINGS (Rumble Strips)



PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)

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, 6 or 8	Option 1, 2, 3 5, 6 or 7	Option 2, 4, 5 6 or 7

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) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edgeline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble strip.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE 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 edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line 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. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines may substitute for buttons.

Texas Department of Transportation

Traffic Safety Division Standard

EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(2)-23

FILE: rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
10-13 1-23	DIST	COUNTY		SHEET NO.
	21	CAMERON		232

DATE: 6/27/2022 5:05:07 PM
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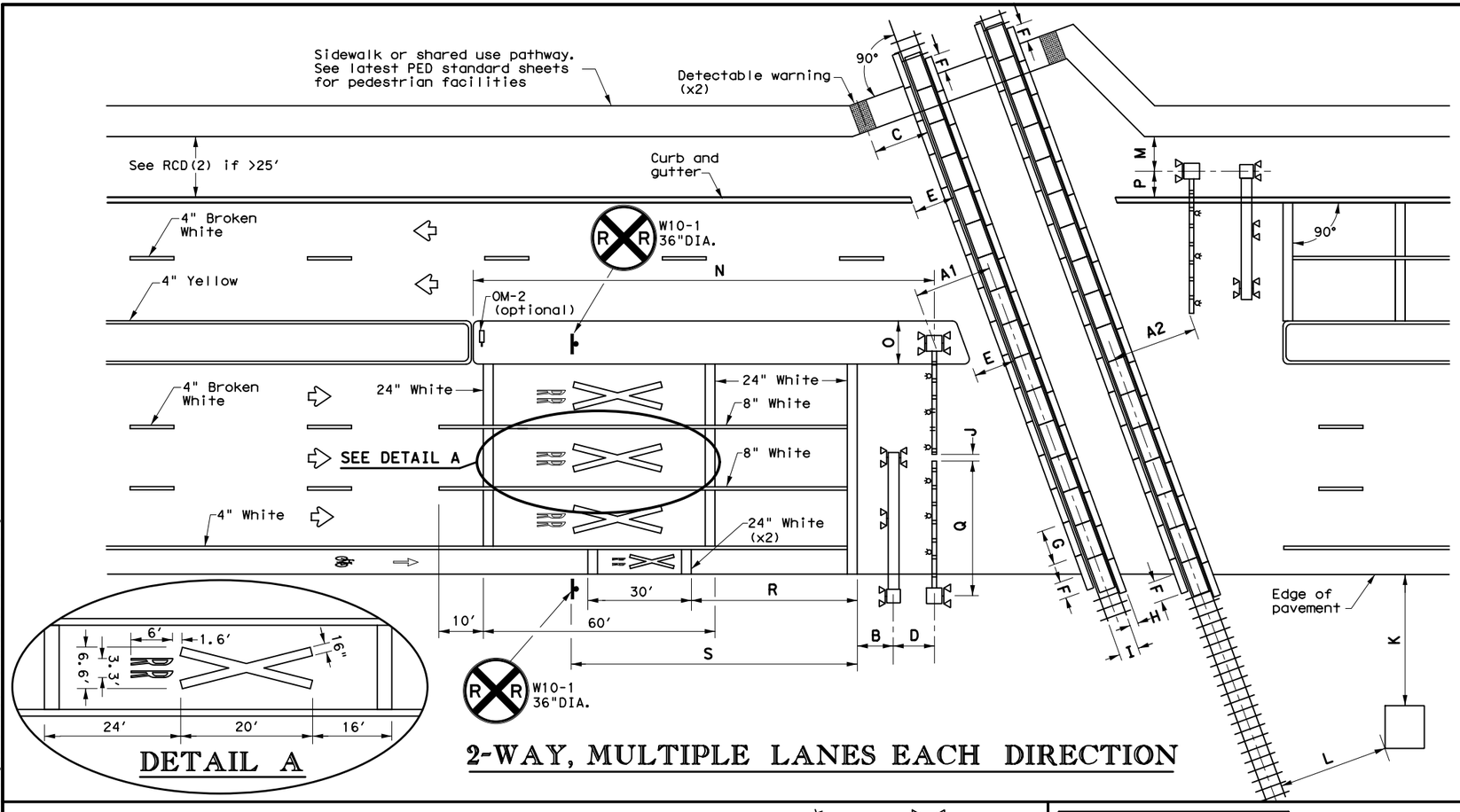


NOTES

A1: Center of RR mast to center of rail: 12′ minimum, 15′ typical.

A2: Tip of gate to center of rail: 12′ minimum, 15′ typical.

B: Center of mast (cantilever, gate, or mast flasher) of nearest active traffic control device to stop line: 8′ (NOTE: Stop line may be moved as needed, but should be at least 8′ back from gates, if present).

C: Center of detectable warning device to nearest rail: 6′ minimum

D: Center of gate mast to center of cantilever mast: 6′ typical. NOTE: Cantilever may be located in front or behind gates.

E: Edge of median or curb to nearest rail: 10′ typical. NOTE: Design median edge to be parallel with rail.

F: Edge of planking panel from edge of pavement or sidewalk: 3′ minimum. NOTE: Field panels need not be in line with gauge panels.

G: Length of panels along rail: 8′ typical.

H: Width of field panel: 2′ typical (check with railroad company).

I: Distance between rails: 4′-8.5".

J: Tip of gate to tip of gate: 2′ maximum for Quiet Zone SSM or 90% of traveled way covered by gates for all other locations.

K: Nearest edge of RR cabin from edge of pavement: 30′ typical. NOTE: Cabinet not required to be parallel to edge of pavement.

L: Nearest edge of RR cabin from nearest rail: 25′ typical.

M: Center of RR mast to edge of sidewalk: 6′ minimum.

N: Center of gate mast to leading edge of non-traversable median: 100′ minimum to qualify as a Quiet Zone SSM. NOTE: 60′will suffice if there is a street intersection within the 100′ and all street intersections within 60′ are closed.

O: Width of median: 8′-6" minimum, 10′ typical when using median gates. NOTE: Center of gate mast minimum 4′-3" from face of curb.

P: Center of RR mast to face of curb: 4′-3" minimum.
Center of RR mast to edge of pavement (with shoulder): 6′ minimum
Center of RR mast to edge of pavement (no shoulder): 8′-3" minimum
NOTE: BNSF prefers 5′-3", 7′, and 9′-3" minimums, respectively.

Q: Gate length: 28′ or less typical, but railroad company may allow up to 32′under special circumstances.

R: Stop line to first RR Crossing transverse line (bike lane): 50′ typical.

S: Stop line to GRADE CROSSING ADVANCE WARNING (W10-1) sign and adjacent RR Crossing pavement markings. See Table 1. See RCD(2) for other signs.

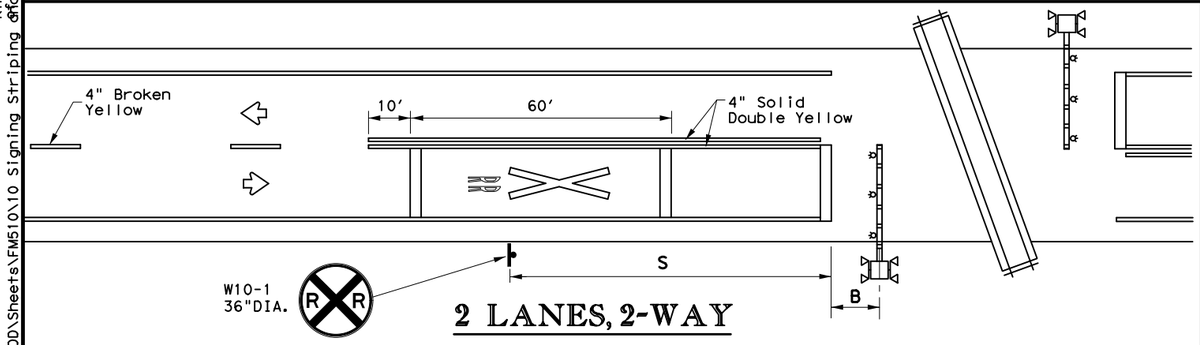
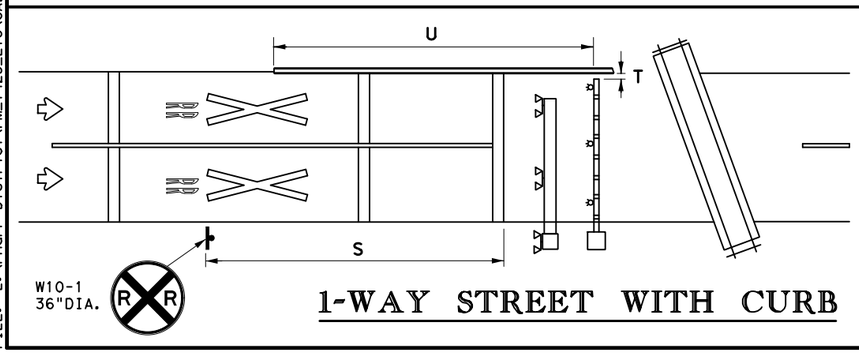


TABLE 1	
Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

LEGEND	
	Sign
	Object Marker
	Traffic Flow
	Cantilever
	Gate Assembly
	Mast Flasher Pair

GENERAL NOTES

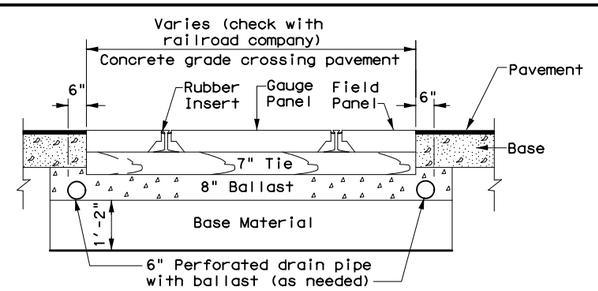
1. Medians and curbs must be non-traversable to qualify as a Quiet Zone Supplementary Safety Measure (SSM). Non-traversable curbs in Quiet Zones are 6" tall minimum and used on roadways where speed does not exceed 40 mph.
2. Raised pavement markers may be used to supplement striping. See PM(2) and PM(3)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



NOTES

T: Tip of gate to edge of curb: 1′ max for Quiet Zone SSM, 90% of traveled way covered by gates for all other locations

U: Non-traversable curb length from gate: 100′ min. for a Quiet Zone SSM, 10′ min for all other locations.



Texas Department of Transportation

Traffic Operations Division Standard

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

FILE: rcd1-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		233

DATE: 6/27/2022 5:05:08 PM
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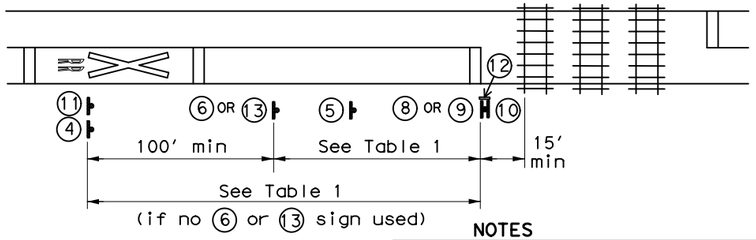
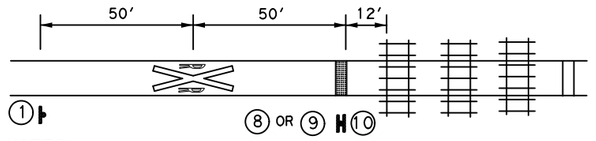


PASSIVE CROSSING

NOTES

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



NOTES

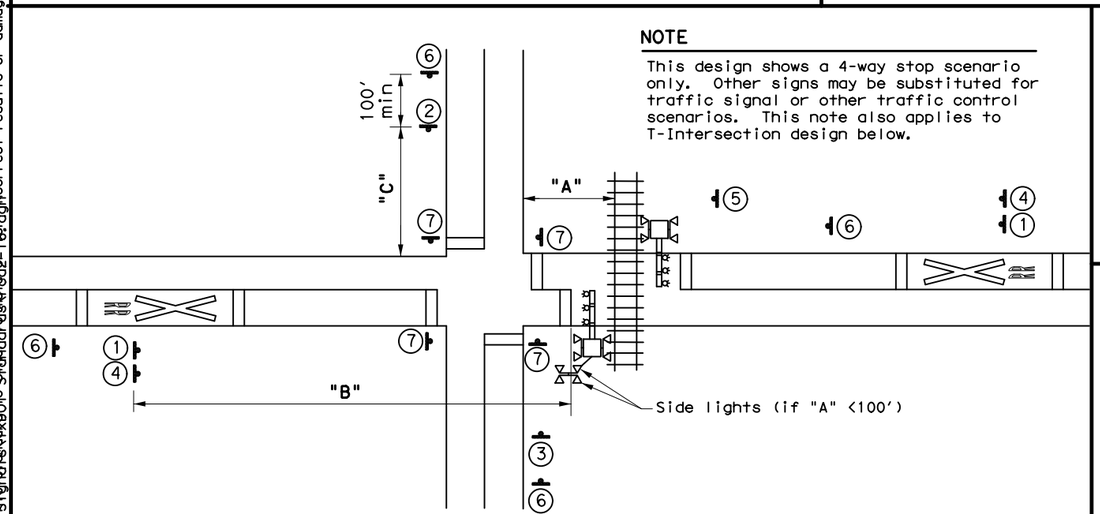
1. A shared use pathway is considered a separate pathway crossing when more than 25′ from traveled way of adjacent roadway.
2. Detectable warning used at stop bar.
3. Smaller sign sizes preferred than shown to the right on this sheet.

PATHWAY CROSSING

TABLE 1	
Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

GENERAL NOTES

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

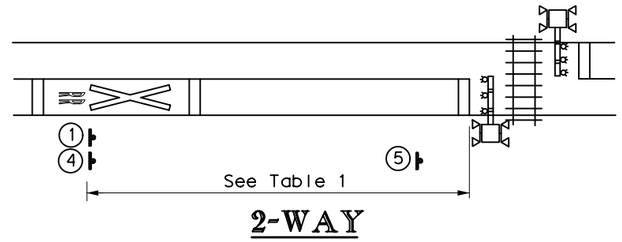


NOTE

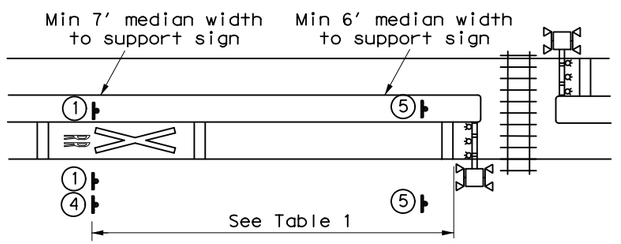
This design shows a 4-way stop scenario only. Other signs may be substituted for traffic signal or other traffic control scenarios. This note also applies to T-Intersection design below.

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

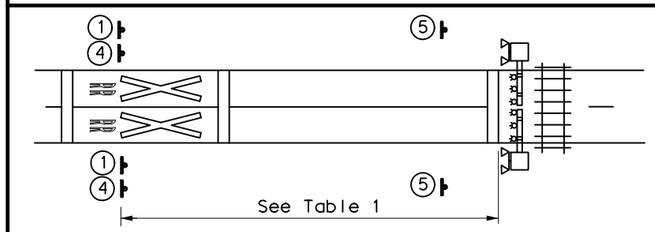
GRADE CROSSING NEAR A PARALLEL STREET



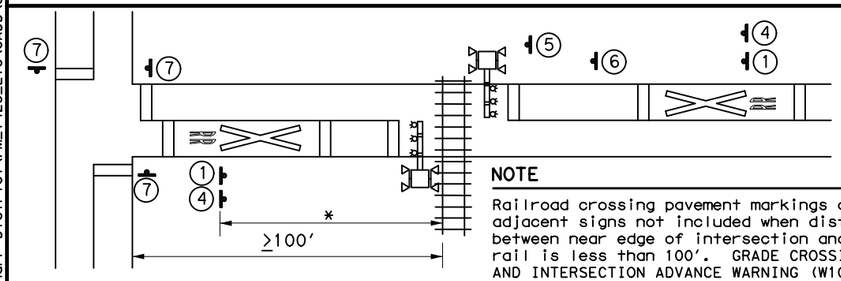
2-WAY



2-WAY WITH MEDIAN



1-WAY

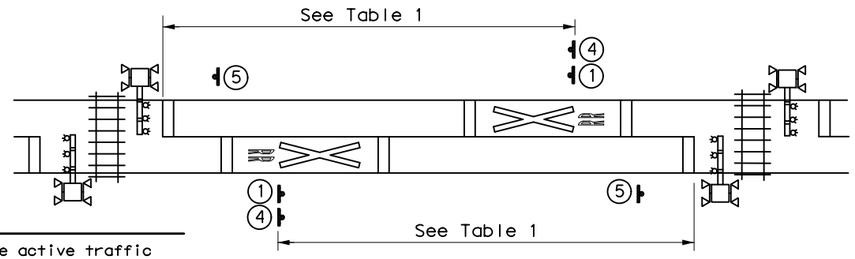


*Use Table 1 if sufficient space exists.

NOTE

Railroad crossing pavement markings and adjacent signs not included when distance between near edge of intersection and near rail is less than 100′. GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-3) signs installed on roadway parallel with rail in this case.

T-INTERSECTION



NOTE

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

2 ADJACENT CROSSINGS

SIGNS

**	**	**	IF NEEDED
① W10-1 36"DIA.	② W10-2L 36"X36"	③ W10-2R 36"X36"	④ W10-5 36"X36" / W10-5P 30"x24"
IF NEEDED	IF NEEDED		
⑤ R8-8 24"X30"	⑥ W3-1 30"X30"	⑦ R1-1 36"X36" / R1-3P 18"X6"	⑧ R15-1 48"X9" / R15-2P 27"X18" / R1-1 36"X36"
⑨ R15-1 48"X9" / R15-2P 27"X18" / R1-2 48"X48"X48"	⑩ R15-1 48"X9" / R15-2P 27"X18"	⑪ ** W10-1 36"DIA. / W10-13P 30"X24"	⑫ Sign may be placed perpend. to travel lanes. / I-13 15"X9"
IF NEEDED			
⑬ W3-2 30"X30"			

** Includes a NO TRAIN HORN Plaque (W10-9P) if crossing is in a Quiet Zone. LOW GROUND CLEARANCE Plaque (W10-5P) if needed is mounted below W10-2/W10-3/W10-4 signs.

NO TRAIN HORN W10-9P 30"X24"

LOW GROUND CLEARANCE W10-5P 30"X24"

Texas Department of Transportation

Traffic Operations Division Standard

RAILROAD CROSSING DETAILS SIGNING & STRIPING

RCD(2)-16

FILE: rcd2-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		234

During the planning phase of project development, the following Environmental Permits, Issues and Commitments have been developed during coordination with resource agencies, local governmental entities and the general public. Any change orders and/or deviations from the final design must be reported to the Engineer prior to the commencement of construction activities as additional environmental clearances may be required.

I. Clean Water Act, Section 402; Stormwater Pollution Prevention

Action Items Required : ☐ No Action Required

1. ☒ The contractor must implement the SW3P by installing Best Management Practices (BMPs) as indicated in the construction plans and maintained appropriately throughout construction. BMPs must be in place prior to the start of construction. The SW3P may need to be revised as necessary as construction progresses.

2. ☒ For all construction PSL's off the ROW, the contractor must certify compliance with all applicable laws, rules and regulations pertaining to the preservation of cultural resources, natural resources and the environment.

3. ☒ Based on the acreage of impact, select the appropriate box below:

   ☐ This project will disturb less than 1 acre of soil and is not part of a larger common plan of development; therefore, a NOI and TPDES Site Notice are not required for this project.

   or

   ☐ This project will disturb equal to or more than 1 acre of soil but less than 5 acres; therefore a NOI is not required but a TPDES Site Notice is required. The Construction Site Notice (CSN) is required to be posted at the construction site in a publicly accessible location for review by the public, TCEQ, EPA and other Inspectors.

   or

   ☒ This project will disturb equal to or more than 5 acres of soil and will require a NOI and TPDES Site Notice. The NOI and Site Notice are required to be posted at the construction site in a publicly accessible location.

4. ☒ Need to address MS4 requirements (Cameron & Hidalgo Counties only) ☐ MS4 requirements not needed

II. Clean Water Act, Sections 401 and 404 Compliance

Action Items Rquired : ☐ No Action Required

1. ☒ Filling, dredging or excavating in any water bodies, rivers, creeks, streams, wetlands or wet areas is prohibited unless specified in the USACE permit and approved by the Engineer. The contractor shall adhere to all agreements, mitigation plans, and BMPs required by the NWP as regulated by the USACE.

   The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

   ☒ No Permit Required

   ☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

   ☐ Nationwide Permit 14 - PCN Required (1/10th to <1/2 acre, 1/3 in tidal waters)

   ☐ Individual 404 Permit Required

   ☐ Other Nationwide Permit Required: NWP#_____

2. ☒ The contractor is responsible for obtaining new or revised Section 404 permit(s) for Contractor initiated changes in construction methods that change Impacts To Waters Of The U.S., including wetlands. The Contractor will ensure that the water quality of the State will be maintained and not degraded.

3. ☐ Best Management Practices for applicable Section 401 General Conditions:

General Condition 12 - Categories I and II BMPs required

Category I (Erosion Control)

☒ Temporary Vegetation	☐ Interceptor Swale	☒ Mulch Filter Berms and/or Socks
☐ Blankets, Matting	☐ Diversion Dike	☐ Compost Filter Berms and/or Socks
☐ Mulch	☐ Erosion Control Compost	☐ Compost Blankets
☐ Sodding		

Category II (Sedimentation Control)

☒ Silt Fence	☐ Hay (Straw) Bale Dike	☒ Mulch Filter Berms and/or Socks
☐ Rock Berm	☐ Brush Berms	☐ Compost Filter Berms and/or Socks
☐ Triangular Filter Dike	☐ Sediment Basins	☐ Stone Outlet Sediment Traps
☐ Sand Bag Berm	☐ Erosion Control Compost	

General Condition 21 - Category III BMPs required

Category III (Post-Construction TSS Control)

☐ Vegetative Filter Strips	☐ Wet Basins	☐ Mulch Filter Berms and/or Socks
☐ Retention/Irrigation	☐ Grassy Swales	☐ Compost Filter Berms and/or Socks
☐ Extended Detention Basin	☐ Vegetation-Lined Ditches	☐ Sand Filter Systems
☐ Constructed Wetlands	☐ Erosion Control Compost	☐ Sedimentation Chambers

II. Clean Water Act, Sections 401 and 404 Compliance - Continued:

4. ☒ The Contractor's designated and qualified Contractor Responsible Person Environmental (CRPe) will monitor the project site daily to ensue compliance with SW3P and TPDES General Permit TXR 150000. Daily Monitoring Reports shall be provided to TxDOT within 48 hours, in accordance with Item 506.3.1.

5. ☒ Other Project Specific Actions:

   1. Irrigation canals and drainage ditches that intersect the highway will be protected against spillage or leaks through the placement of erosion control logs, and silt fencing.

III. Cultural Resources

Action Items Required : ☐ No Action Required

1. ☒ Refer to the 2014 TxDOT Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges, Item 7.7.1., in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

2. ☐ Other Project Specific Actions:

IV. Vegetation Resources

Action Items Required : ☐ No Action Required

1. ☒ In accordance with the 2014 TxDOT Standard Specifications; Item 164 - Seeding For Erosion Control; provide and install temporary or permanent seeding for erosion control as shown on the plans or as directed by the Engineer for all seeding and replanting of right of way where possible. (Required for Urban Settings)

2. ☒ In accordance with Executive Order 13112 on invasive species and the Executive Memorandum on Beneficial Landscaping, native species of plants shall be used for all seeding and replanting of right of way where possible for rural roadways. (Required for Rural Settings)

3. ☒ Preserve vegetation where possible throughout the project and minimize clearing, grubbing and excavation within stream banks, bed and approach sections.

4. ☐ Other Project Specific Actions:

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List of Abbreviations

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Texas Department of Transportation

PHARR DISTRICT

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)- FM 510

SHEET 1 OF 2

FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		FM 510, ETC
STATE	DISTRICT	COUNTY	
TEXAS	PHARR	CAMERON	
CONTROL	SECTION	JOB	SHEET NO.
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V. Federal Listed, and Proposed Threatened and Endangered Species, Critical Habitat, State Listed Species, Candidate Species and Migratory Birds

Action Items Required : ☐ No Action Required

1.☒ Under the Migratory Bird Treaty Act (MBTA) of 1918, codified at 16 U.S.C. §703-712 and as enforced by the USFWS, the proposed construction work will not remove active nests from bridges, trees, ground and other structures during migratory bird nesting season, (February 1st. through October 1st.). If the Contractor needs to perform work within the right of way during nesting season, a qualified Biologist shall conduct a survey to determine if active nests are present. If present, the Contractor shall maintain a buffer zone around the nest(s) as directed by the Biologist. The buffer zone will be protected from clearing and disturbance until such time as the Biologist has determined that the nest(s) is no longer active. Prior to the nesting season, existing bridges and culverts should be treated against migratory bird nesting by utilizing Bird Exclusion Methods. Bird Exclusion Methods should be monitored and maintained throughout the nesting season. Refer to Standard Bird Exclusion Details.

2.☒ There is the potential for the presence of state-listed species & species of concern in the project area and state law prohibits the taking (incidental or otherwise) of state-listed species. Taking is defined as the collection, hooking, hunting, netting, shooting, or share by any means or devices. If any listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately.

3.☒ Other Project Specific Actions:

1. State listed species that may potentially occur withini the habitat features include:
   * Plains Spotted Skunk, Texas Indigo Snake, speckled racer, Texas horned lizard, Texas tortoise, South Texas siren (large form), and Mexican tree frog.

2. Bird BMPs:
   * Not disturbing, destroying, or removing active nests, including ground nesting birds, during the nesting season;
   * Avoiding the removal of unoccupied, inactive nests, as practicable;
   * Prventing the establishment of active nests during the nesting season on TXDOT owned and operated facilities and structures proposed for replacement or repair.
   * Not collecting, capturing, relocating, or transportin birds, eggs, young, or active nests without permit.

Reptile BMPs:
   * Due to increased activity (mating) of reptiles during spring, construction activities like clearing or gradin should attempt to be scheduled outside of the spring (April-May) season. Also, timing ground disturbing activities befor October when reptiles become less active and may be using burrows in the project area is also encouraged.

VI. Hazardous Materials on Contamination Issues

Action Items Required : ☐ No Action Required

General (applies to all projects):

Comply with the Hazard Communication Act (HCA) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the HCA.

Maintain an adequate supply of on-site spill response materials as indicated in the MSDS. In the event of a spill, take immediate action to mitigate the spill as indicated in the MSDS and in accordance with safe work practices. Contact the TxDOT Pharr District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- Dead or distressed vegetation (identified as not normal)
- Trash piles, drums, canisters, barrels, etc.
- Undesirable smells or odors
- Evidence of leaching or seepage of contaminant substances

Any other evidence indicating possible hazardous materials or contamination discovered on site.

1.☒ If potentially hazardous material and/or contaminated media (i.e.: soil, groundwater, surface water, sediment, building materials) are unexpectedly encountered during construction, assure that such materials and contamination are handled according to applicable federal and state regulations, cease work in the immediate area and contact the Engineer immediately.

VI. Hazardous Materials on Contamination Issues - Continued:

2. Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☐ No

If "No", then no further action required.
If "Yes", then TxDOT is responsible for completing an asbestos assessment/inspection.

3. Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a Texas Department of State Health Services (DSHS) licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled abatement activities and/or demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

4.☐ The Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and an Asbestos Consultant in order to minimize construction delays and subsequent claims.

VII. Other Environmental Issues

Action Items Required : ☐ No Action Required

1. ☐ Noise

Contractor shall make every reasonable effort to minimize construction noise through abatement measures such as work hour controls and proper maintenance of equipment mufflers.

2. ☐ Air

Contractor shall practice common dust control techniques such as surface chemical treatment or watering of unpaved road surfaces and vehicle speed reduction shall be implemented to minimize and prevent airborne dust during construction.

Contractor should minimize MSAT by utilizing measures to encourage use of EPA required cleaner diesel fuels, limits on idling, increase use of cleaner burning diesel engines, and other emission limitation techniques, as appropriate.

3. ☒ No work shall occur from dusk till dawn. All work must occur during daylight hours.

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PHARR DISTRICT

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC) - FM 510

SHEET 2 OF 2

FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
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TPWD BMPs

The Programmatic Agreement defines Best Management Practices (BMPs) to be implemented by Texas Department of Transportation (TxDOT) per §2.213 (Programmatic Agreements) of the 2017 Memorandum of Understanding (MOU) between TxDOT and Texas Parks and Wildlife Department (TPWD). These BMPs are measures that TxDOT and TPWD agree will result in avoidance and minimization of potential impacts to natural resources and in some cases apply to particular types of TxDOT projects.

The purpose of this section is to provide BMPs to minimize impacts to species or groups of species. Implementation of these BMPs by TxDOT eliminates the need for coordination under §2.206(1)of the MOU, except as noted.

Due diligence should be used to avoid killing or harming any wildlife species in the implementation of TxDOT projects.

☒ Bird BMPs (Required)

In addition to complying with the Migratory Bird Treaty Act (MBTA) perform the following BMPs:

- ☒ Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed.
- ☒ Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season.
- ☒ Avoid the removal of unoccupied, inactive nests, as practicable.
- ☒ Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair.
- ☒ Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.

☐ Bald Eagle *(Haliaeetus leucocephalus)*

- ☐ Bird BMPs and Bald and Golden Eagle Protection Act compliance

☐ Reddish Egret *(Egretta rufescens)* or
☐ White-faced Ibis *(Plegadis chihi)*

- ☐ Bird BMPs unless project is within 300 meters (984 feet)of a known colonial water bird rookery then coordinate with TPWD.

☐ Rookeries (Recommendations)

In general, nesting dates for herons and egrets range from early February to late August in Texas, depending on the species. Great Blue Herons (GBHE) are usually the first to nest. When GBHE get disrupted from the nest and abandon nesting, then the other species of herons and egrets may not attempt to nest at the colony that year. Breeding dates for rookery species are approximately as follows:

Species	Dates
Cattle Egret	Early April to late October
Little Blue Heron	Late March to late July
Snowy Egret	Late March to early August
Great Egret	Early March to early August
Black-crowned Night Heron	Early February to late July
Great Blue Heron	February to late August

☐ Rookeries (Recommendations) (Continued)

- ☐ Vegetation clearing in a primary buffer area of 300 meters (984 feet) from a heronry periphery should be avoided. Utilizing areas that have already been cleared within this buffer area may be acceptable depending on site-specific characteristics. Additionally, human foot-traffic or machinery use should not occur within this buffer area during the nesting season.
- ☐ Clearing activities or construction using heavy machinery in a secondary buffer area of 1,000 meters (3,281 feet) from the heronry periphery should be avoided during the breeding season (courting and nesting).

☐ Bat BMPs (Required)

To determine the appropriate BMP to avoid or minimize impacts to bats, review the habitat description for the species of interest on the TPWD Rare, Threatened, and Endangered Species of Texas by County List or other trusted resources. All bat surveys and other activities that include direct contact with bats shall comply with TPWD' recommended white-nose syndrome protocols located on the TPWD Wildlife Habitat Assessment Program website under "Project Design and Construction".

The following survey and exclusion protocols should be followed prior to commencement of construction activities. For the purposes of this document, structures are defined as bridges, culverts (concrete or metal), wells, and buildings.

- ☐ For activities that have the potential to impact structures, cliffs or caves, or trees; a qualified biologist will perform a habitat assessment and occupancy survey of the feature(s) with roost potential as early in the planning process as possible or within one year before project letting.
- ☐ For roosts where occupancy is strongly suspected but unconfirmed during the initial survey, revisit feature(s) at most four weeks prior to scheduled disturbance to confirm absence of bats.
- ☐ If bats are present or recent signs of occupation (i.e., piles of guano, distinct musky odor, or staining and rub marks at potential entry points) are observed, take appropriate measures to ensure that bats are not harmed, such as implementing non-lethal exclusion activities or timing or phasing of construction.
- ☐ Exclusion devices can be installed by a qualified individual between September 1 and March 31. Exclusion devices should be used for a minimum of seven days when minimum nighttime temperatures are above 50°F and minimum daytime temperatures are above 70°F. Prior to exclusion, ensure that alternate roosting habitat is available in the immediate area. If no suitable roosting habitat is available, installation of alternate roosts is recommended to replace the loss of an occupied roost. If alternate roost sites are not provided, bats may seek shelter in other inappropriate sites, such as buildings, in the surrounding area. See Additional Bat BMPs (Recommendations) for recommended acceptable methods for excluding bats from structures.
- ☐ If feature(s) used by bats are removed as a result of construction, replacement structures should incorporate bat-friendly design or artificial roosts should be constructed to replace these features, as practicable.
- ☐ Conversion of property containing cave or cliff features to transportation purposes should be avoided where feasible.

☐ Bat BMPs (Required)(Continued)

- ☐ Avoid unnecessary removal of dead fronds on native and ornamental palm trees in south Texas (Cameron, Hidalgo, Willacy, Kenedy, Brooks, Kleberg, Nueces, and San Patricio counties) from April 1st through October 31st. If removal of dead fronds is necessary at other times of the year, limit frond removal to extended warm periods (nighttime temperatures: 55°F for at least two consecutive nights), so bats can move away from the disturbance and find new roosts.
- ☐ Large hollow trees, snags (dead standing trees), and trees with shaggy bark should be surveyed for colonies and, if found, should not be disturbed until the bats are no longer occupying these features. Post-occupancy surveys should be conducted by a qualified biologist prior to tree removal from the landscape.
- ☐ Retain mature, large diameter hardwood forest species and native/ornamental palm trees where feasible.
- ☐ In all instances, avoid harm or death to bats. Bats should only be handled as a last resort and after communication with TPWD.

☐ Mexican Long-tongues Bat *(Choeronycteris mexicana)*

- ☐ Avoid unnecessary impacts to cacti and agave species.
- ☐ Bat BMPs.

☐ Additional Bat BMPs (Recommendations)

- ☐ Bat surveys of structures should include visual inspections of structural fissures (cracked or spalled concrete, damaged or split beams, split or damaged timber railings), crevices (expansion joints, space between parallel beams, spaces above supports piers), and alternative structures (drainage pipes, bolt cavities, open sections between support beams, swallow nests) for the presence of bats.
- ☐ Before excluding bats from any occupied structure, bat species, weather, temperature, season, and geographic location must be incorporated into any exclusion plans to avoid unnecessary harm or death to bats. Winter exclusion must entail a survey to confirm either, 1) bats are absent or 2) present but active (i.e. continuously active - not intermittently active due to arousals from hibernation).
- ☐ Avoid using materials that degrade quickly, like paper, steel wool or rags, to close holes.
- ☐ Avoid using products or making structural modifications that may block natural ventilation, like hanging plastic sheeting over an active roost entrance, thereby altering roost microclimate.
- ☐ Avoid using chemical and ultrasonic repellents.
- ☐ Avoid use of silicone, polyurethane or similar non-water-based caulk products.
- ☐ Avoid use of expandable foam products at occupied sites.
- ☐ Avoid the use of flexible netting attached with duct tape.

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Revised 07/12/2017

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PHARR DISTRICT

EPIC SHEET SUPPLEMENTALS

TPWD BMPs

SHEET 1 OF 3

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☐ Additional Bat BMPs (Recommendations) (Continued)

- ☐ In order to avoid entombing bats, exclusion activities should be only implemented by a qualified individual. A qualified individual or company should possess at least the following minimum qualifications:
  - Experience in bat exclusion (the individual, not just the company).
  - Proof of rabies pre-exposure vaccinations.
  - Demonstrated knowledge of the relevant bat species, including maternity season date range and habitat requirements.
  - Demonstrated knowledge of rabies and histoplasmosis in relation to bat roosts.
- ☐ Contact TPWD for additional resources and information to assist in executing successful bat exclusions that will avoid unnecessary harm or death in bats.

☐ Fossorial Mammal BMPs (Required)

- ☐ If black-tailed prairie dog (BTPD) burrows or pocket gopher mounds are to be excavated/directly impacted coordinate with TPWD WHAB.
- ☐ When a construction zone is adjacent to active BTPD burrows or pocket gopher mounds, erect barriers to discourage individuals moving through or into the construction area.
- ☐ When seeding or revegetation is planned in an area adjacent to BTPD burrows or pocket gopher mounds, a vegetative barrier should be considered in the planting to discourage dispersal into the ROW.

☐ Coues' Rice Rat *(Oryzomys couesi)*

- ☐ Minimize impacts to wetland, Resaca, oxbow lakes, and marsh habitats.
- ☐ Contractors will be advised of potential occurrence in the project area and to avoid harming the species if encountered.
- ☐ Water Quality BMPs.

☐ Plains Spotted Skunk *(Spilogale putorius interrupta)* or
☐ Swift Fox *(Vulpes velox)*

- ☐ Contractor will be advised of potential occurrence in the project area and to avoid harming the species if encountered and to avoid unnecessary impacts to dens.

☐ White nosed Coati *(Nasua narica)*/
☐ Yellow nosed Cotton Rat *(Sigmodon ochrognathus)*

- ☐ Contractors will be advised of potential occurrence in the project area and to avoid harming the species if encountered.

☒ Terrestrial Reptile BMPs (Required)

- ☐ Apply hydro mulching and/or hydro seeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydro mulching and/or hydro seeding are not feasible due to site conditions, utilize erosion control blankets or mats that contain no netting or contain loosely woven, natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.
- ☐ For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1 :1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling.
- ☒ Inform contractors that if reptiles are found on project site allow species to safely leave the project area.
- ☐ Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.
- ☒ Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.

☒ Texas Tortoise *(Gopherus berlandieri)*

- ☒ Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.
- ☒ Utility trenches should be covered overnight or visually inspected before filling to avoid burial of the species.
- ☒ Terrestrial Reptile BMPs.

☒ Texas Horned Lizard *(Phrynosoma cornutum)*

- ☒ Avoid harvester ant mounds in the selection of Project Specific Locations (PSLs) where feasible.
- ☒ Terrestrial Reptile BMPs.

☒ Additional Reptile BMPs (Recommendations)

- ☒ Due to increased activity (mating) of reptiles during the spring, construction activities like clearing or grading should attempt to be scheduled outside of the spring (April-May) season. Also, timing ground disturbing activities before October when reptiles become less active and may be using burrows in the project area is also encouraged.
- ☐ When designing roadways with curbs, consider using Type I or Type III curbs to provide a gentle slope to enable turtles and small animals to get out of roadways.
- ☐ If Texas Tortoises are present in a project area, they should be removed from the area. After removal of the tortoises, the area that will be disturbed during active construction and project specific locations should be fenced off to exclude tortoises and other reptiles. The exclusion fence should be constructed and maintained as follows:
  - a. The exclusion fence should be constructed with metal flashing or drift fence material.
  - b. Rolled erosion control mesh material should not be used.
  - c. The exclusion fence should be buried at least 6 inches deep and be at least 24 inches high.
  - d. The exclusion fence should be maintained for the life of the project and only removed after the construction is completed and the disturbed site has been revegetated.

☒ Amphibian and Aquatic Reptile BMPs (Required)

Unless absence of the species can be demonstrated, assume presence in suitable habitat and implement the following BMPs. Absence can only be demonstrated using TPWD-approved survey efforts (contact TPWD for minimum survey protocols for species and project site conditions).

- ☐ For projects within one mile of a known occupied location or observation of the species recorded from 1980 until the current year and suitable habitat is present, coordinate with TPWD.
- ☐ For new location roadway projects, coordinate with TPWD.
- ☐ For projects within existing right-of-way (ROW) when work is in water or will permanently impact a water feature and potential habitat exists for the target species complete the following:
  - a) Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.
  - b) Minimize impacts to wetland, temporary and permanent open water features, including depressions, and riverine habitats.
  - c) Maintain hydrologic regime and connections between wetlands and other aquatic features.

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☒ Amphibian and Aquatic Reptile BMPs (Continued)

  - d) Use barrier fencing to direct animal movements away from construction activities and areas of potential wildlife-vehicle collisions in construction areas directly adjacent, or that may directly impact, potential habitat for the target species.
  - e) Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, using erosion control blankets or mats that contain no netting, or only contain loosely woven natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.
  - f) Project specific locations (PSLs) proposed within state-owned ROW should be located in uplands away from aquatic features.
  - g) When work is directly adjacent to the water, minimize impacts to shoreline basking sites (e.g., downed trees, sand bars, exposed bedrock) and overwinter sites (e.g., brush and debris piles, crayfish burrows) where feasible.
  - h) Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter, which may be refugia for terrestrial amphibians, where feasible.
  - i) If gutters and curbs are part of the roadway design, where feasible install gutters that do not include the side box inlet and include sloped (i.e. mountable) curbs to allow small animals to leave roadway. If this modification to the entire curb system is not possible, install sections of sloped curb on either side of the storm water drain for several feet to allow small animals to leave the roadway. Priority areas for these design recommendations are those with nearby wetlands or other aquatic features.

- ☐ For projects that require acquisition of additional ROW and work within that new ROW is in water or will permanently impact a water feature, implement a) - i) above plus j) -l) below, where applicable:
  - j) For sections of roadway adjacent to wetlands or other aquatic features, install wildlife barriers that prevent climbing. Barriers should terminate at culvert openings in order to funnel animals under the road. The barriers should be of the same length as the adjacent feature or 80 feet long in each direction, or whichever is the lesser of the two.
  - k) For culvert extensions and culvert replacement/installation, incorporate measures to funnel animals toward culverts such as concrete wingwalls and barrier walls with overhangs.
  - l) When riprap or other bank stabilization devices are necessary, their placement should not impede the movement of terrestrial or aquatic wildlife through the water feature. Where feasible, biotechnical streambank stabilization methods using live native vegetation or a combination of vegetative and structural materials should be used.

Revised 07/12/2017

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PHARR DISTRICT

EPIC SHEET SUPPLEMENTALS

TPWD BMPs

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☒ Sheep Frog *(Hypopachus variolosus)*

- ☒ Minimize disturbance to burrows or downed woody debris.
- ☒ Water Quality BMPs.
- ☒ Amphibian BMPs.

☒ South Texas Siren (Large Form) *(Siren sp 1)*

- ☒ Minimize impacts to warm, shallow waters with vegetative cover such as ponds and ditches.
- ☒ Water Quality BMPs.
- ☒ Amphibian BMPs.

☐ Freshwater Mussel BMPs (Required)

- ☐ When work is in the water; survey project footprints for state listed species where appropriate habitat exists.
- ☐ When work is in the water and mussels are discovered during surveys; relocate state listed and SGCN mussels under TPWD authorization and implement Water Quality BMPs.
- ☐ When work is adjacent to the water; Water Quality BMPs implemented as part of the SWPPP for a construction general permit or any conditions of the Section 401 water quality certification for the project will be implemented.

☐ Fish BMPs (Required)

- ☐ For projects within the range of a SGCN or State-Listed fish and work is adjacent to water: Use Water Quality BMPs. No TPWD Coordination required.
- ☐ For projects within the range of a SGCN or State-Listed fish, and work is in the water: TPWD coordination is required.

☐ Water Quality BMPs (Required)

In addition to BMPs required for a TCEQ Storm Water Pollution Prevention Plan and/or Section 401 water quality permit:

- ☐ Minimize the use of equipment in streams and riparian areas during construction. When possible, equipment access should be from banks, bridge decks, or barges.
- ☐ When temporary stream crossings are unavoidable, remove stream crossings once they are no longer needed and stabilize banks and soils around the crossing.

☐ Additional Water Quality BMPs (Recommendations)

- ☐ Wet-Bottomed detention ponds are recommended to benefit wildlife and downstream water quality. Consider potential wildlife-vehicle interactions when siting detention ponds.
- ☐ Rubbish found near bridges on TxDOT ROW should be removed and disposed of properly to minimize the risk of pollution. Rubbish does not include brush piles or snags.

☐ Aquatic Mitigation (Recommendations)

- ☐ In-kind compensatory mitigation should be considered for all unavoidable impacts to aquatic resources including, but not limited to streams, wetlands, oysters, seagrass and mudflats, regardless of their jurisdictional status.
- ☐ Compensatory mitigation plans should be developed in consultation with TPWD Transportation Conservation Coordinator.

☐ Stream Crossings (Recommendations)

- ☐ Use spanning bridges rather than culverts when feasible.
- ☐ If using a culvert, staggered culverts that concentrate low flows but provide conveyance of higher flows through staggered culverts placed at higher elevations is recommended.
- ☐ Bottomless culverts are recommended to allow for fish and other aquatic wildlife passage in the low flow channel. If bottomless culverts are not feasible, making a low flow channel for fish passage is recommended.
- ☐ Avoid placing riprap across stream channels and instead use alternative stabilization such as biotechnical stream bank stabilization methods including live native vegetation or a combination of vegetative and structural materials. When riprap or other bank stabilization devices are necessary, their placement should not impede the movement of aquatic and terrestrial wildlife underneath the bridge. In some instances, riprap may be buried, back-filled with topsoil and planted with native vegetation.
- ☐ Incorporate bat-friendly design into bridges and culverts.
- ☐ Design bridges for adequate vertical and horizontal clearances under the roadway to allow for terrestrial wildlife to safely pass under the road.
- ☐ A span wide enough to cross the stream and allow for dry ground and a natural surface path under the roadway is encouraged. For culverts, incorporation of an artificial ledge inside the culvert on one or both sides for use by terrestrial wildlife is recommended.
- ☐ Riparian buffer zones should remain undisturbed where possible.

☒ Vegetation BMPs (Recommendations)

- ☒ Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable. Wherever practicable, impacted vegetation should be replaced with in-kind on-site replacement/restoration of native vegetation.
- ☐ To minimize adverse effects, activities should be planned to preserve mature trees, particularly acorn, nut or berry producing varieties. These types of vegetation have high value to wildlife as food and cover.
- ☐ It is strongly recommended that trees greater than 12 inches in diameter at breast height (dbh) that are removed be replaced. TPWD's experience indicates that for ecologically effective replacement, a ratio of three trees for every one (3:1) lost should be provided to the extent practicable either on-site or off-site. Trees less than 12 inches dbh should be replaced at a 1:1 ratio.
- ☐ Replacement trees should be of equal or better wildlife quality than those removed and be regionally adapted native species.
- ☐ When trees are planted, a maintenance plan that ensures at least an 85 percent survival rate after three (3) years should be developed for the replacement trees.
- ☒ The use of any non-native vegetation in landscaping and revegetation is discouraged. Locally adapted native species should be used.
- ☒ The use of seed mix that contains seeds from only locally adapted native species is recommended.
- ☒ Avoid vegetation clearing activities during the general bird nesting season, March through August, to minimize adverse impacts to birds.

☐ Invasive Species BMPs (Recommendations)

- ☐ For all work in waters listed in the distribution of Zebra mussels on http://texasinvasives .org/ as well as those waters specified in 31 TAC §57.972 and any TPWD emergency orders regarding prevention of the spread of Zebra mussels all machinery, equipment, or vehicles coming in contact with such waters should follow clean/drain/dry protocols to prevent the potential spread of invasive Zebra mussels.
- ☐ Care should be taken to avoid the spread of aquatic invasive plants (such as Giant Salvinia, Hydrilla, Hyacinth, Watermilfoil, Water Lettuce, and Alligatorweed) from infested water bodies into areas not currently infested. All machinery/equipment/vehicles coming in contact with waters containing aquatic invasive plant species should follow clean/drain/dry protocols to prevent the potential spread of invasive plants.
- ☐ Colonization by invasive plants should be actively prevented on disturbed sites in terrestrial habitats. Vegetation management should include removing invasive species as soon as practical while allowing the existing native plants to revegetate the disturbed areas. If using hay bales for sediment control, use locally grown weed-free hay to prevent the spread of invasive species. Leave the hay bales in place and allow them to break down, as this acts as mulch assisting in revegetation.

☐ Wildlife Crossings (Recommendations)

- ☐ Design roadways on new location to incorporate wildlife crossings, particularly in areas that bisect wildlife travel corridors or seasonal movement routes.
- ☐ Consider using cable median barrier instead of concrete traffic barrier when feasible to increase permeability for animals encountering barriers.

Pharr District Contact No. 956-702-6100

Revised 07/12/2017

List of Abbreviations

BMP: Best Management Practice	MSAT: Mobile Source Air Toxic	TCEQ: Texas Commission on Environmental Quality
CGP: Construction General Permit	MBTA: Migratory Bird Treaty Act	THC: Texas Historical Commission
CRPe: Contractor Responsible Person Environmental	NOI: Notice of Intent	TPDES: Texas Pollutant Discharge Elimination System
DSHS: Texas Department of State Health Services	NOT: Notice of Termination	TPWD: Texas Parks and Wildlife Department
FEMA: Federal Emergency Management Agency	NWP: Nationwide Permit	TxDOT: Texas Department of Transportation
FHWA: Federal Highway Administration	PCN: Pre-Construction Notification	T&E: Threatened and Endangered Species
MOA: Memorandum of Agreement	PSL: Project Specific Location	USACE: U.S. Army Corp of Engineers
MOU: Memorandum of Understanding	SPCC: Spill Prevention Control and Countermeasure	USFWS: U.S. Fish and Wildlife Service
MS4: Municipal Separate Stormwater Sewer System	SW3P: Storm Water Pollution Prevention Plan	

Texas Department of Transportation

PHARR DISTRICT

EPIC SHEET SUPPLEMENTALS

TPWD BMPs

SHEET 3 OF 3

FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		FM 510, ETC
STATE	DISTRICT	COUNTY	
TEXAS	PHR	CAMERON	
CONTROL	SECTION	JOB	SHEET NO.
1057	03	045	239

Date Printed: X-X-XX

SITE DESCRIPTION

PROJECT LIMITS:
FM 3462 to FM 803
FM 803 to FM 1847

PROJECT SITE MAPS:
Project location Map: Title sheet
Drainage patterns:
Approx. slopes anticipated after major gradings and areas of soil disturbance: Typ sections
Major controls and locations of stabilizaiton practices: SW3P site map sheets
Surface waters and discharge locations: Drainage and culvert layout sheets
Project specific locations: To be specified by project field office and located in the project SW3P file

PROJECT DESCRIPTION:
Reconstruction of existing roadway.
Grading, cross culverts, pavement markings, signing.

MAJOR SOIL DISTURBING ACTIVITIES:
Preparation of Right of Way.
Excavation and embankment for roadway, cross culverts, drilling for MBGF, sign foundations, erosion and sediment controls.

TOTAL PROJECT AREA: 73.57 Acres

TOTAL AREA TO BE DISTURBED: 73.57 Acres

WEIGHTED RUNOFF COEFFICIENT:
N/A

EXISTING CONDITION OF SOIL & VEGETATIVE
N/A

NAME OF RECEIVING WATERS:
RIO GRANDE RIVER

ENDANGERED SPECIES, DESIGNATED CRITICAL HABITAT AND HISTORICAL PROPERTY:
No endangered species, designate critical habitat or historical property has been found on this project site.

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

- T TEMPORARY SEEDING
- ___ MULCHING (Hay or Straw)
- ___ BUFFER ZONES
- ___ PLANTING
- T SEEDING
- ___ SODDING
- T BIODEGRADABLE EROSION CONTROL SOCKS
- ___ PRESERVATION OF NATURAL RESOURCES
- ___ FLEXIBLE CHANNEL LINER
- ___ RIGID CHANNEL LINER
- ___ SOIL RETENTION BLANKET
- ___ COMPOST MANUFACTURED COMPOST
- ___ OTHER: (Specify Practice)

STRUCTURAL PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

- T SILT FENCES
- T BIODEGRADABLE EROSION CONTROL SOCKS
- ___ HAY BALES
- ___ ROCK FILTER DAMS
- ___ 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
- ___ PIPE MATTING OR EQUAL AT CONSTRUCTION EXIT
- ___ CHANNEL LINERS
- T SEDIMENT TRAPS
- ___ SEDIMENT BASINS
- T STORM INLET SEDIMENT TRAP
- ___ STONE OUTLET STRUCTURES
- ___ CURBS AND GUTTERS
- ___ STORM SEWERS
- ___ VELOCITY CONTROL DEVICES
- ___ OTHER: (Specify Practice)

STORM WATER MANAGEMENT:
Storm water drainage willl be provided by V and or flat bottom ditches, drop inlets, culvert pipes, and drainage canals.

STORM WATER MANAGEMENT ACTIVITIES:
The order of activities will be as follows:
1. Install sediment filtration controls for pipe culverts and outfalls.
2. Install perimeter controls, clear R.O.W. and required utility adjustment.
3. Construction proposed roadway.
4. Seed each section completed with temp. seeding from edge of proposed roadway to R.O.W.
5. Once all construction activity is complete, permanent seeding on proposed areas shall be done according to plans or as instructed by the engineer.

NON-STORM WATER MANAGEMENT DISCHARGES:
Non-storm water discharges should be filtered, or held in retention basins, before being allowed to mix with storm water. These discharges consist of non-polluted ground water, spring water, foundation and/or footing drain water; and water used for dust control, pavement washing and vehicle wastewater containing no detergents.

OTHER REQUIREMENTS & PRACTICES

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 areas adjacent to creeks and drainage ways shall have priority followed by devices protecting storm sewer inlets.

INSPECTION: For areas of the construction site that have not been finally stabilized, area used for storage of materials, structural control measures, and locations where vehicles enter or exit the site, personnel provided by the permittee and familiar with the SW3P must inspect disturbed areas at least once every fourteen (14) calendar days and within twenty-four (24) hours of the end of a storm event 0.5 inches or greater.

WASTE MATERIALS: All waste materials will be collected and stored in a securely lidded dumpster. All trash and construction debris from the site will be deposited as necessary at a local dump. No construction waste material will be buried on site.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): At a minimum, any products in the following categories to be hazardous: Paints, Acids for cleaning masonry surfaces, Cleaning Solvents, Asphalt products, Chemical additives for soil stabilization, or Concrete curing compounds and additives. In the event of a spill which may be hazardous, the spill Coordinator should be contacted immediately. Emptying of excess concrete should not be allowed on site. Likewise, washout of concrete trucks should not be performed on site. These discharges are considered non-allowable non-storm water discharges. Concrete trucks should never be allowed to dump into storm drains or sanitary sewers.

SANITARY WASTE: All sanitary waste will be collected from the portable units as necessary or as required by local regulation by a licensed sanitary waste management contractor.

OFFSITE VEHICLE TRACKING: The Contractor shall be required, on a regular basis or as may be directed by the Engineer, to dampen haul roads for dust control, stabilize construction entrances and to remove excess dirt from the roadway.

MANAGEMENT PRACTICES:
1. Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wet land, water body or stream bed.
2. Construction staging areas and vehicle maintenance areas shall be constructed by the Contractor in a manner to minimize the runoff of pollutants.
3. All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, or debris or other obstructions placed during construction operations that are not a part of the finished work.

OTHER:
1. Construction Materials List of materials stored on job site to be provided by Contractor.
2. The project SW3P File shall be located at the project field office or within the Contractor's mobile office at all times and shall contain the N.O.I., CGP, Signature Authorization, Certification/Qualification Statements, Inspection Reports, Required Maps, and the TPDES Permit, Part II. This File to be persented to authorized State and Federal Agents upon request.

Reserved Space For Seal

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

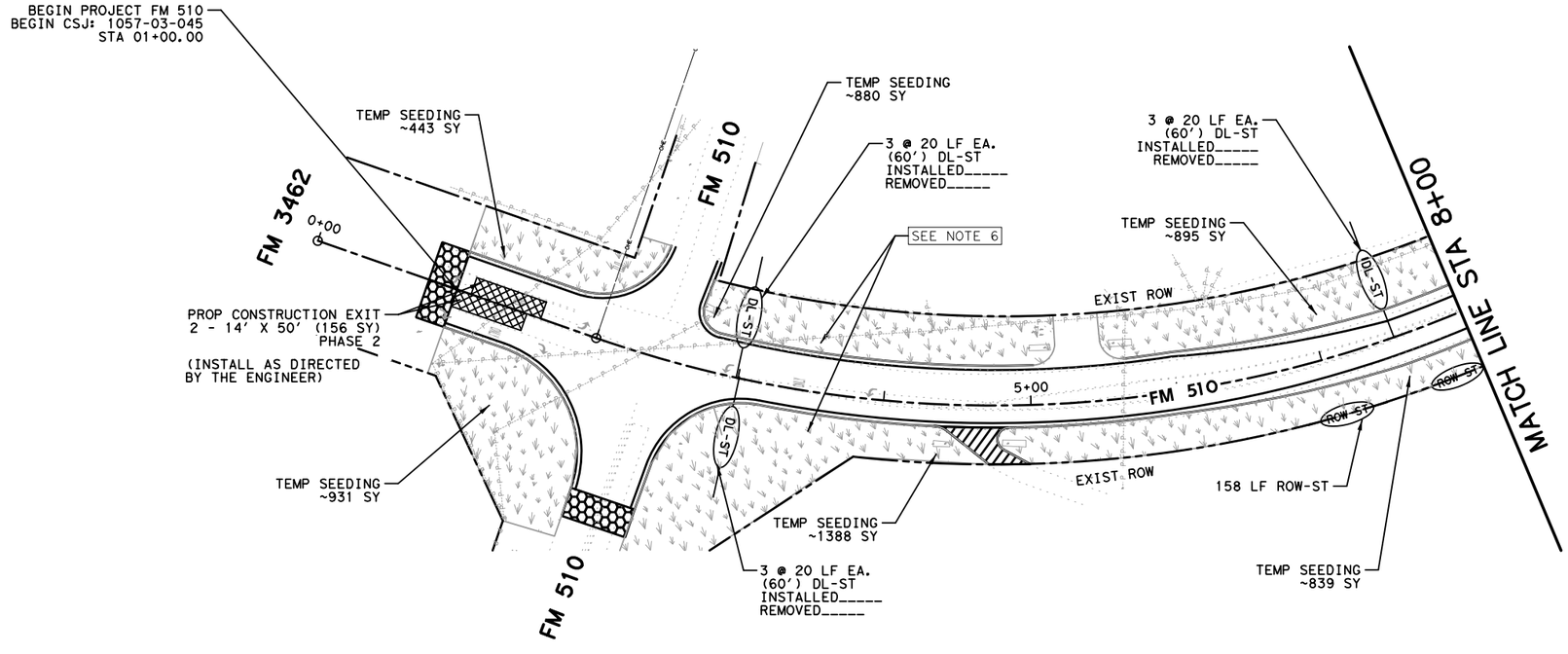
6/27/2022 , P.E.

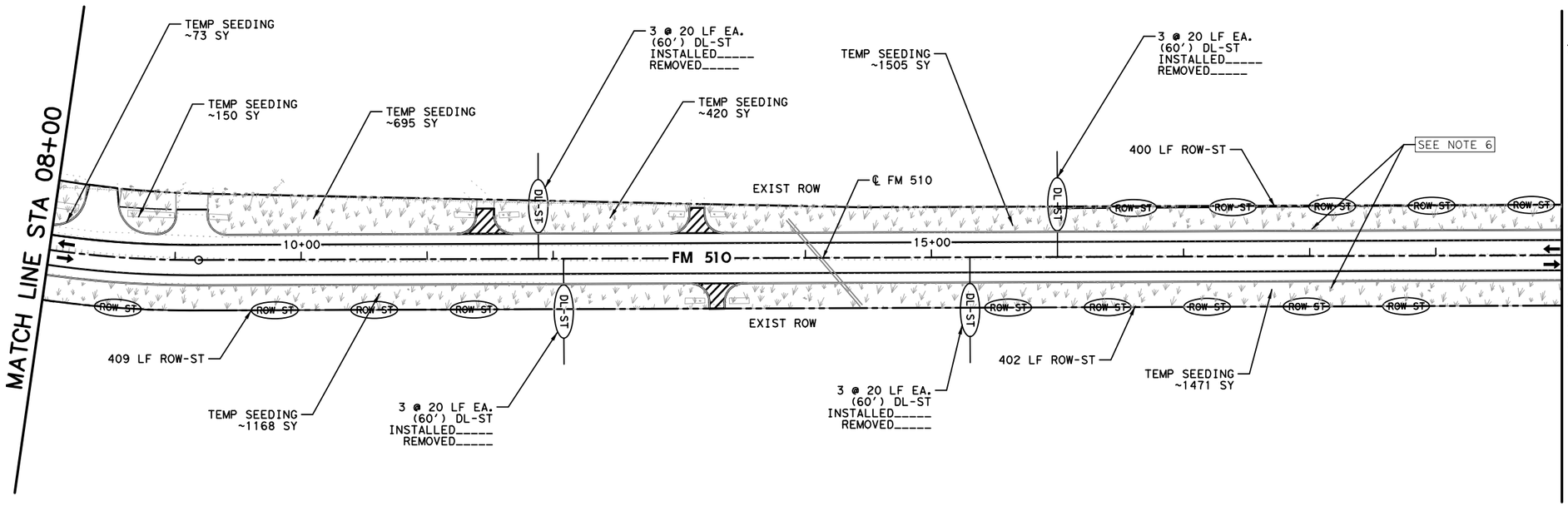
Signature of Registrant & Date

Texas Department of Transportation

FM 510
TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	(SEE TITLE SHEET)		240
STATE	DIST.	COUNTY	
TEXAS	PHARR	CAMERON	
CONT.	SECT.	JOB	HIGHWAY NO.
1057	03	045	FM510





0' 50' 100'

SCALE IN FEET

LEGEND:

- CONSTRUCTION EXIT (TYPE 1)
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE (TEMP)
- ROW-ST — RIGHT OF WAY SEDIMENT TRAP
- DL-ST — DITCH LINE SEDIMENT TRAP
- DI-ST — DROP INLET SEDIMENT TRAP
- 5" RIPRAP
- TEMPORARY SEEDING
- PROP ACP DRIVEWAY

NOTES:

1. EROSION CONTROL DEVICES MAY BE MODIFIED TO MEET FIELD CONDITIONS OR AS DIRECTED BY THE ENGINEER. CONTRACTOR SHALL CONSULT WITH THE FIELD ENGINEER BEFORE ANY EROSION CONTROL DEVICE IS INSTALLED.
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4. APPLY TEMPORARY SEEDING AT ALL PROPOSED VEGETATIVE AREAS. SEE FERTILIZER, SEED, SOD, STRAW, COMPOST, AND WATER STANDARD FOR MORE INFORMATION.
5. CONSTRUCTION EXITS QUANTITY IS ESTIMATED ASSUMING TWO EXITS PER TRAFFIC CONTROL STEP. LOCATIONS WILL BE IDENTIFIED BY THE ENGINEER.
6. MAINTAIN EXIST DITCH AS PERIMETER CONTROL UNTIL ROADWAY IS COMPLETED AS PER EACH PHASE OF TCP. DISTURB WHEN FINAL GRADING OF DITCH IS NEEDED.
7. SW3P DEVICES TO BE INSTALLED IN PHASE 2 AND LEFT THROUGH THE DURATION OF PHASE 3 UNLESS OHTERWISE NOTED IN THE PLANS.

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 1 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	241
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022
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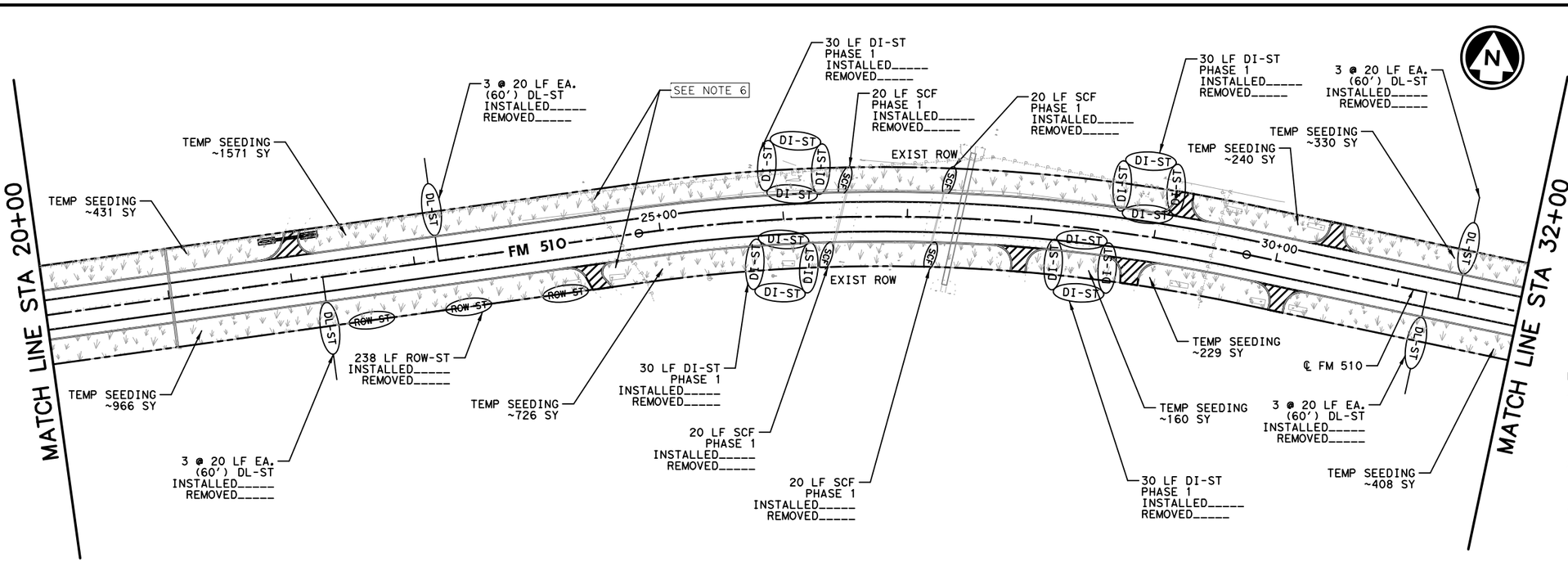

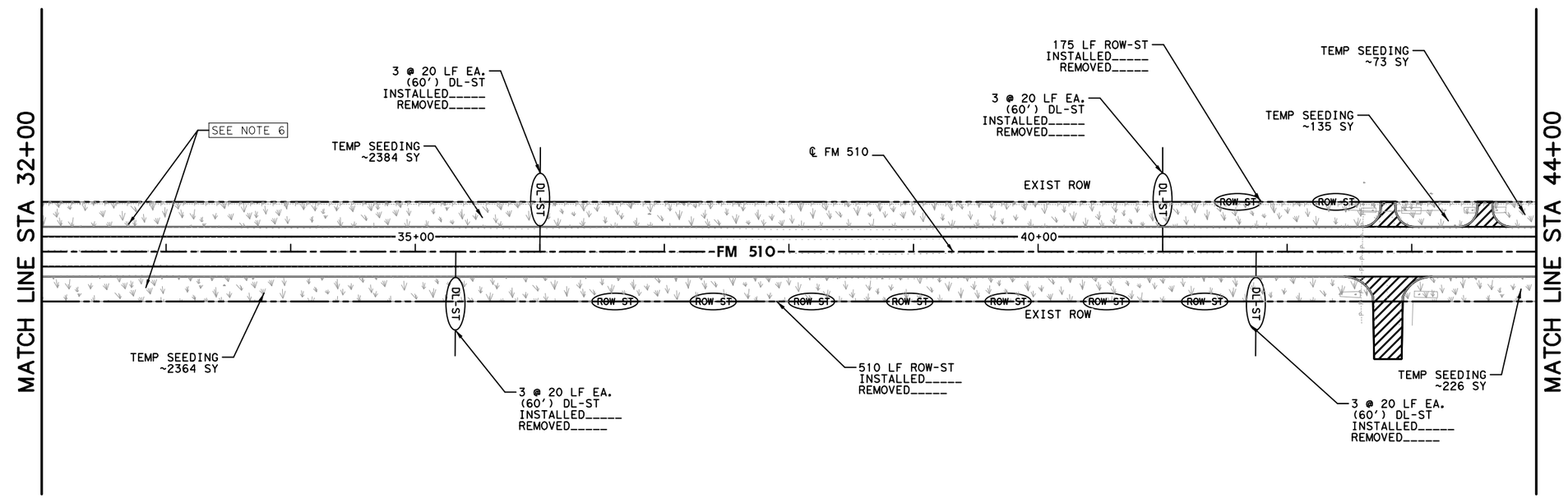

0′ 50′ 100′

SCALE IN FEET

LEGEND:

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- PROP ACP DRIVEWAY

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7. SW3P DEVICES TO BE INSTALLED IN PHASE 2 AND LEFT THROUGH THE DURATION OF PHASE 3 UNLESS OHTERWISE NOTED IN THE PLANS.

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

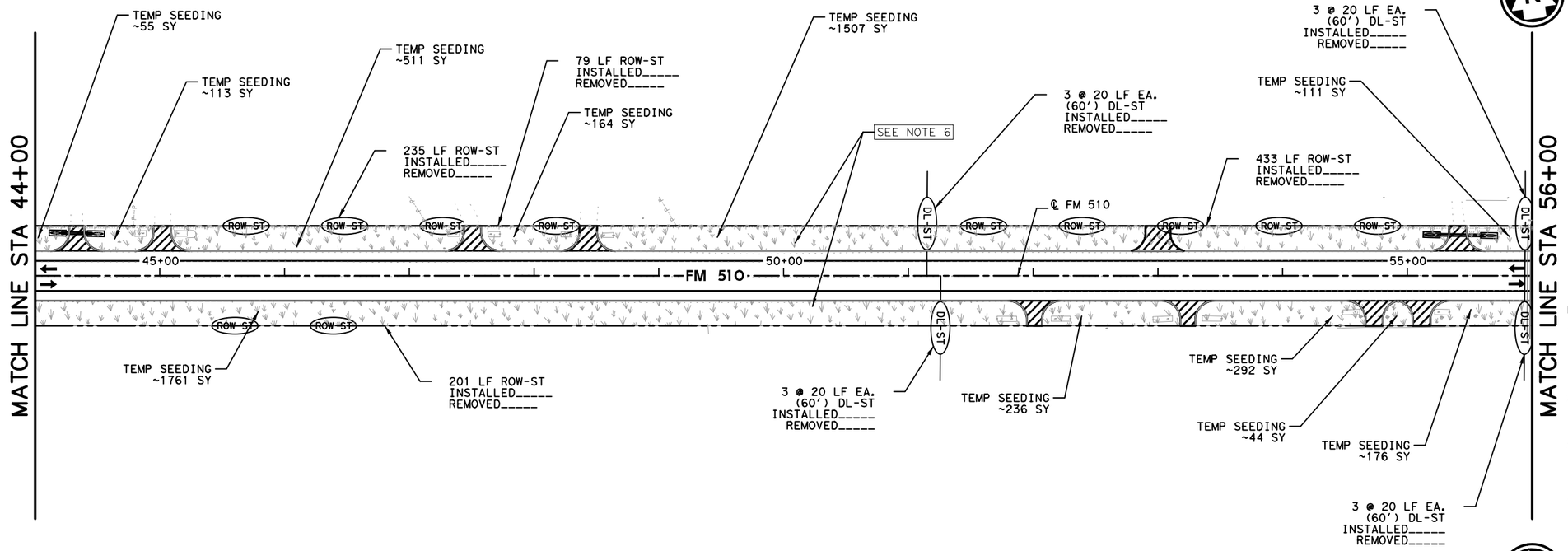
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

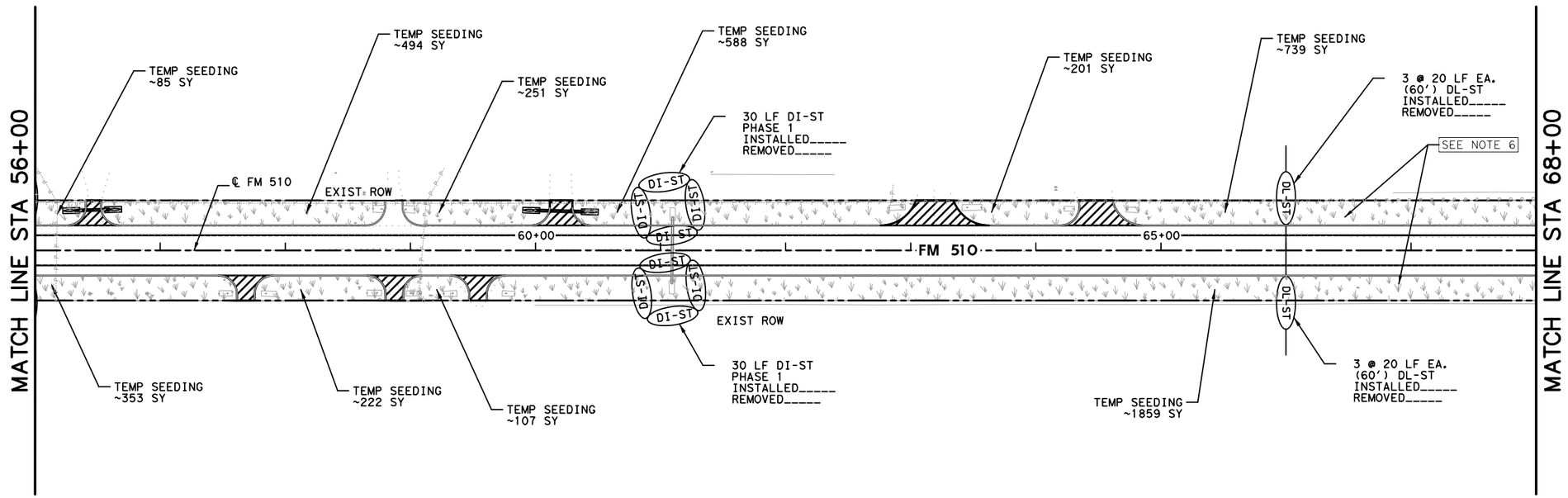
FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 2 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	242
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022 FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510*SW3P*02.dgn





0' 50' 100'

SCALE IN FEET

LEGEND:

- CONSTRUCTION EXIT (TYPE 1)
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STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 3 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	243
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022
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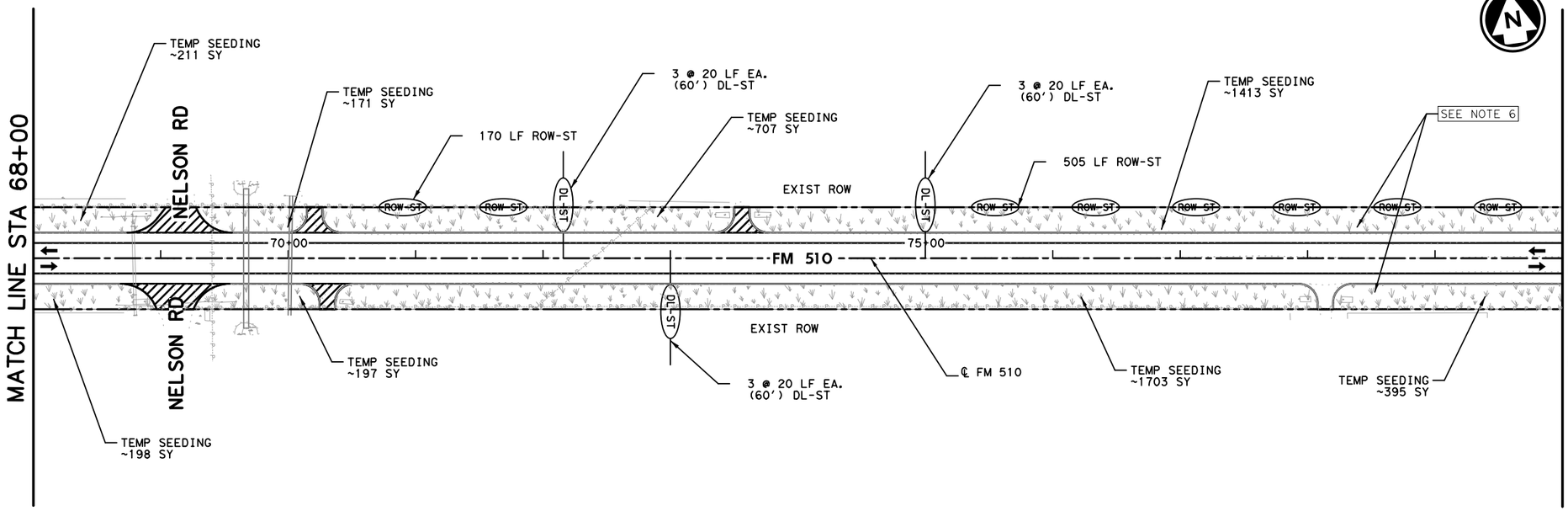

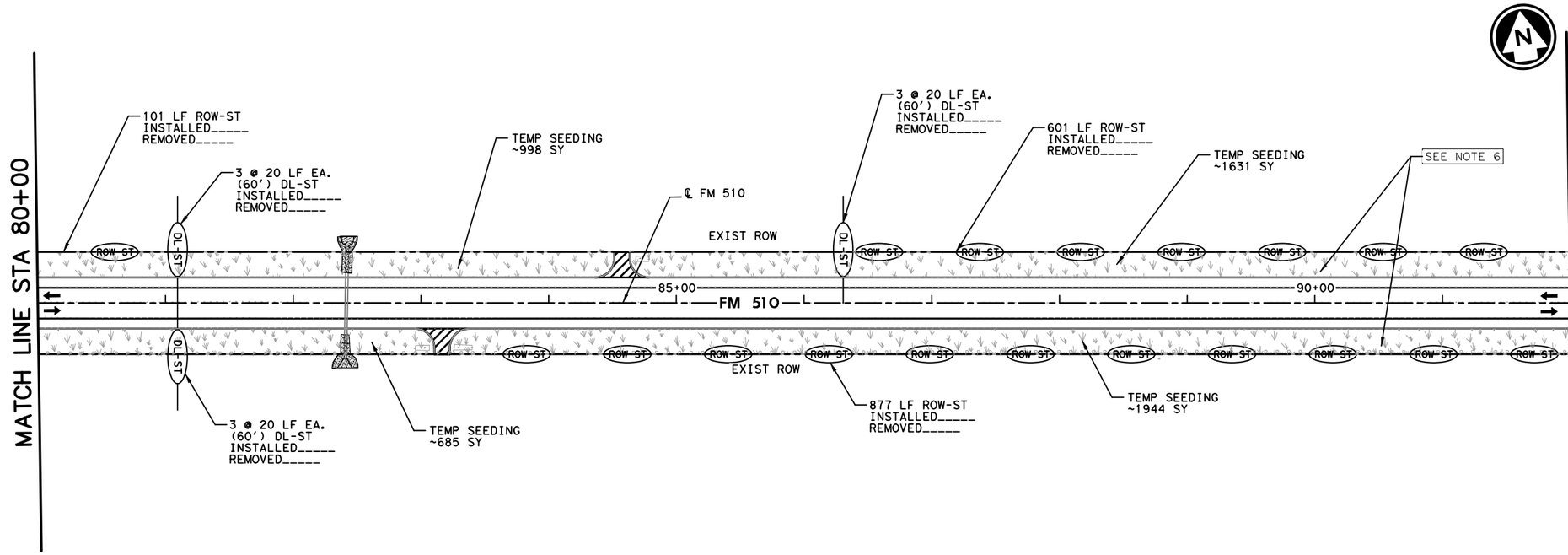

0' 50' 100'

SCALE IN FEET

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STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 4 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	
CONTROL	SECTION	JOB	244
1057	03	045	

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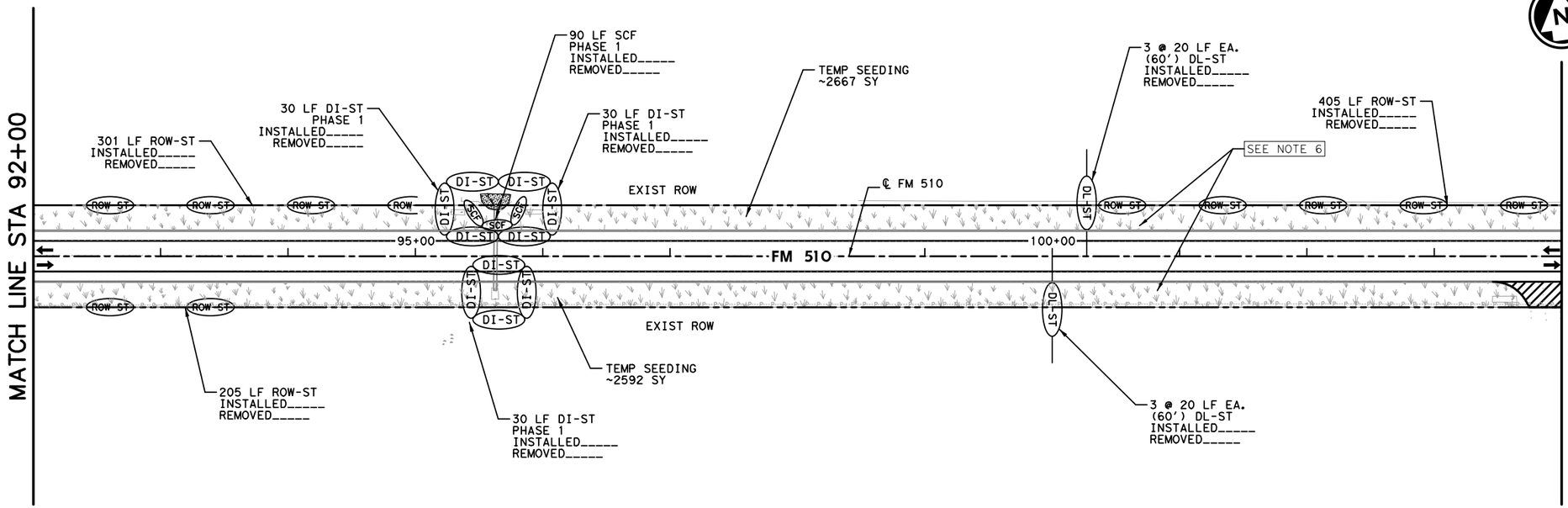
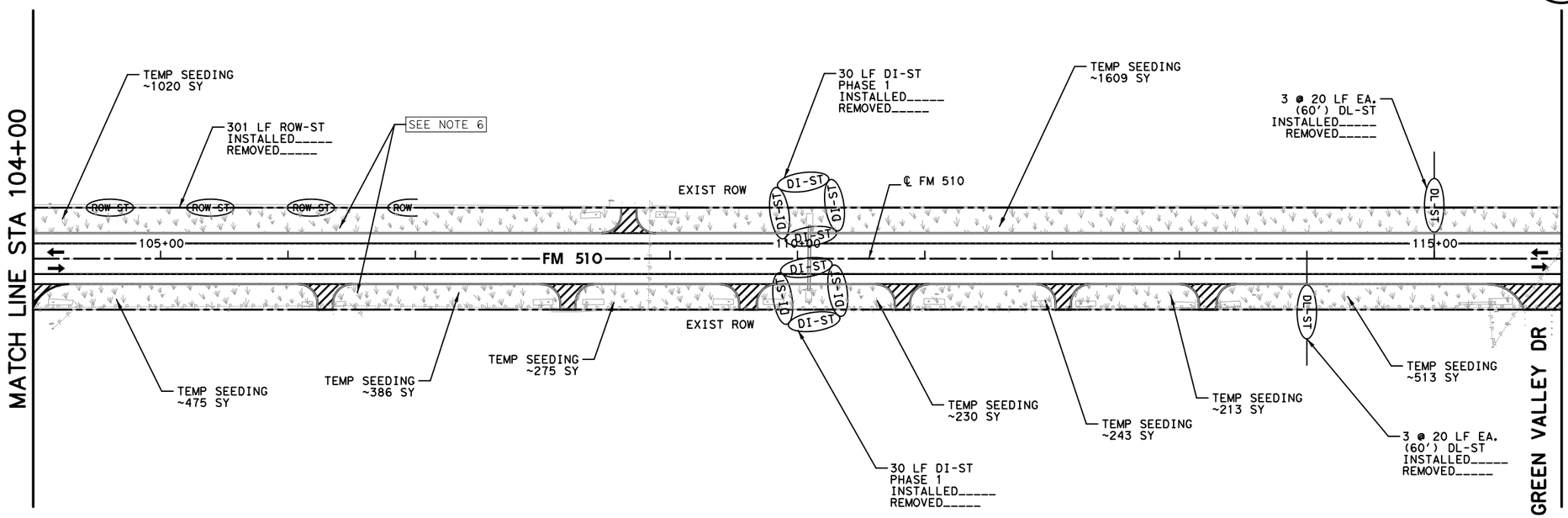
DRAWING DATE: 6/27/2022





0' 50' 100'

SCALE IN FEET

LEGEND:

- CONSTRUCTION EXIT (TYPE 1)
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE (TEMP)
- ROW-ST — RIGHT OF WAY SEDIMENT TRAP
- DL-ST — DITCH LINE SEDIMENT TRAP
- DI-ST — DROP INLET SEDIMENT TRAP
- 5" RIPRAP
- TEMPORARY SEEDING
- PROP ACP DRIVEWAY

NOTES:

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7. SW3P DEVICES TO BE INSTALLED IN PHASE 2 AND LEFT THROUGH THE DURATION OF PHASE 3 UNLESS OHTERWISE NOTED IN THE PLANS.

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

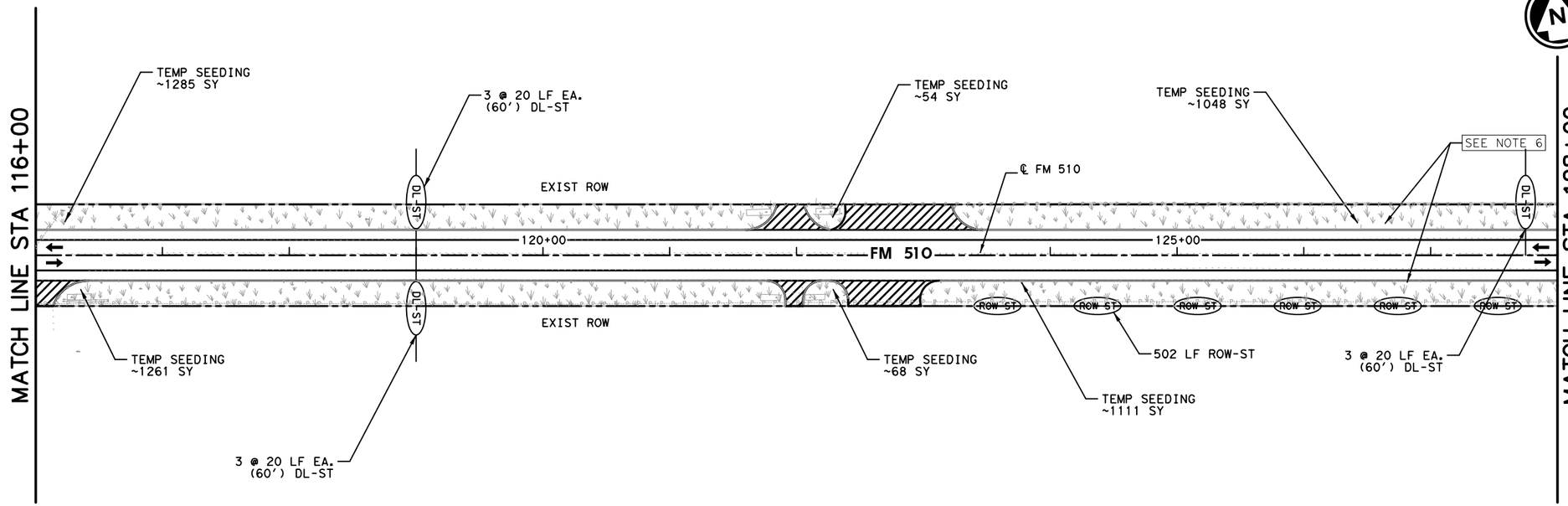
I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

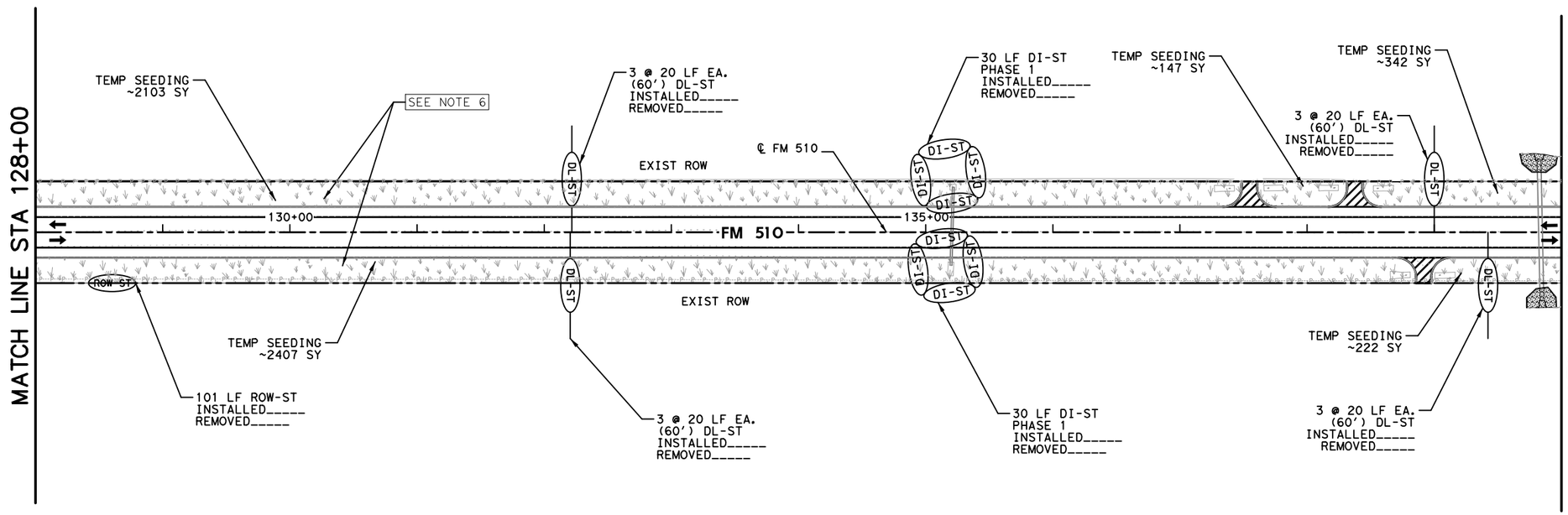
FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 5 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	245
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022
FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510#SW3P#05.dgn





0' 50' 100'

SCALE IN FEET

LEGEND:

- CONSTRUCTION EXIT (TYPE 1)
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE (TEMP)
- ROW-ST — RIGHT OF WAY SEDIMENT TRAP
- DL-ST — DITCH LINE SEDIMENT TRAP
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- TEMPORARY SEEDING
- PROP ACP DRIVEWAY

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STATE OF TEXAS
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LICENSED
PROFESSIONAL ENGINEER

6/27/2022

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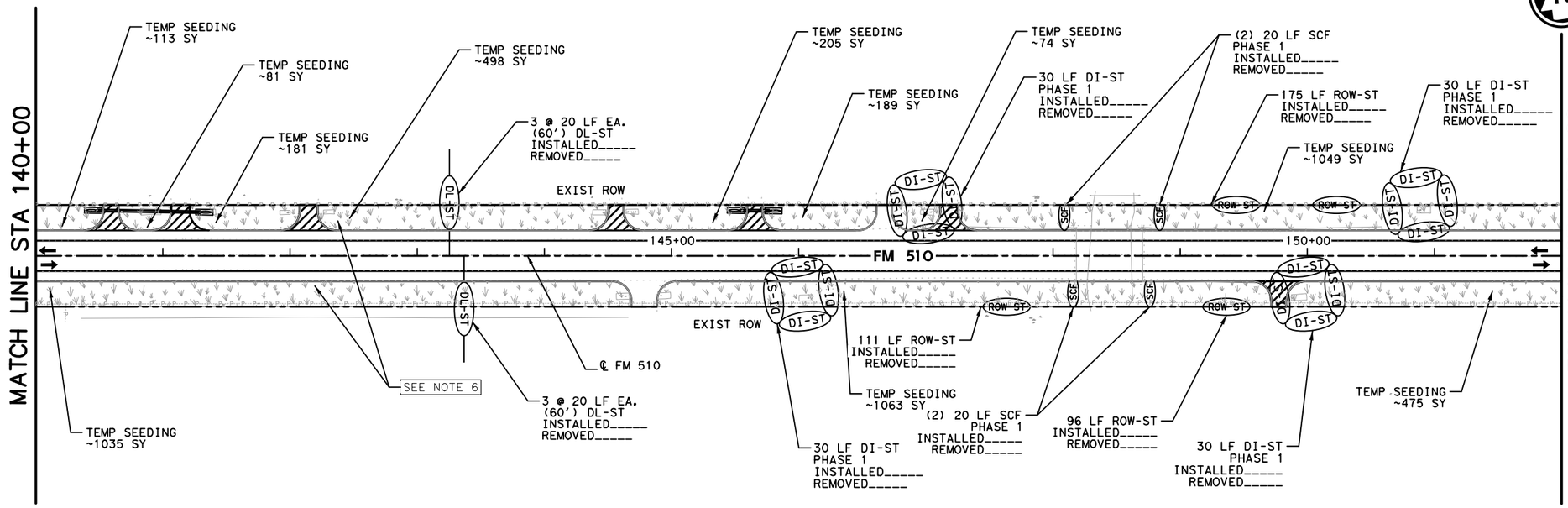
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

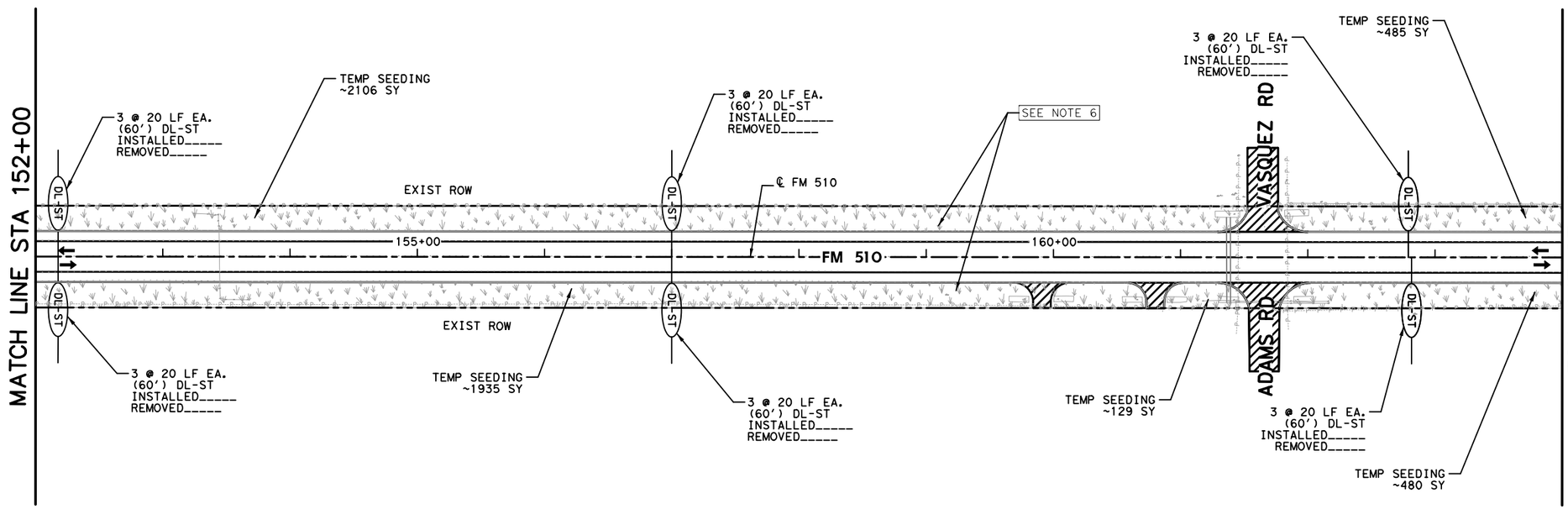
FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 6 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	246
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022 FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510#SW3P#06.dgn





0′ 50′ 100′

SCALE IN FEET

LEGEND:

- CONSTRUCTION EXIT (TYPE 1)
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE (TEMP)
- ROW-ST — RIGHT OF WAY SEDIMENT TRAP
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STATE OF TEXAS
MORT T. TASHOOR
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PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

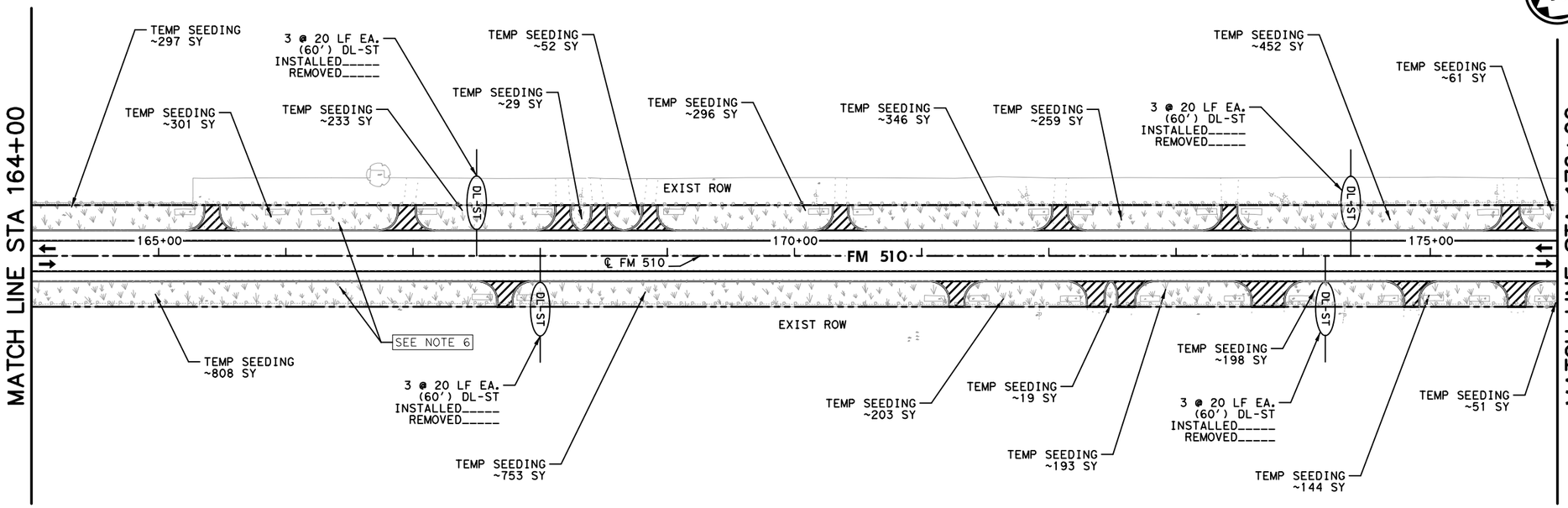
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

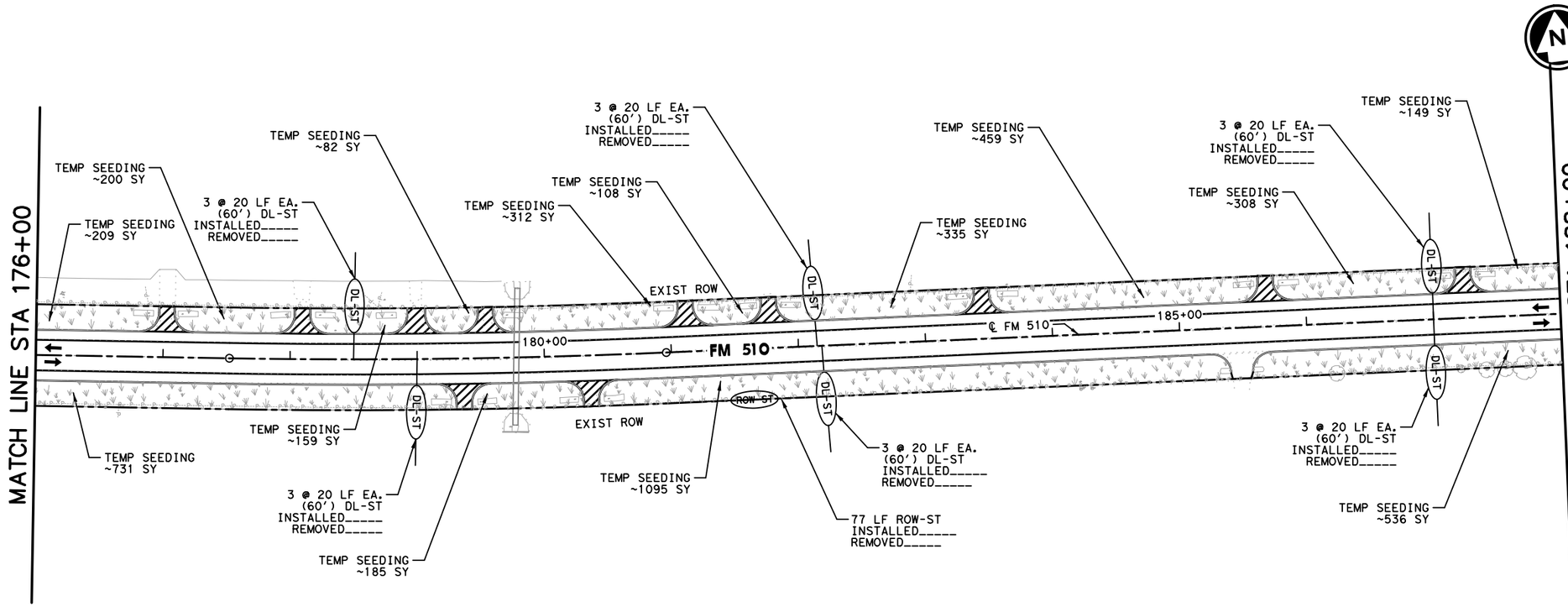
FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 7 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	247
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022
FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510#SW3P#07.dgn





0′ 50′ 100′

SCALE IN FEET

LEGEND:

- CONSTRUCTION EXIT (TYPE 1)
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE (TEMP)
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STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

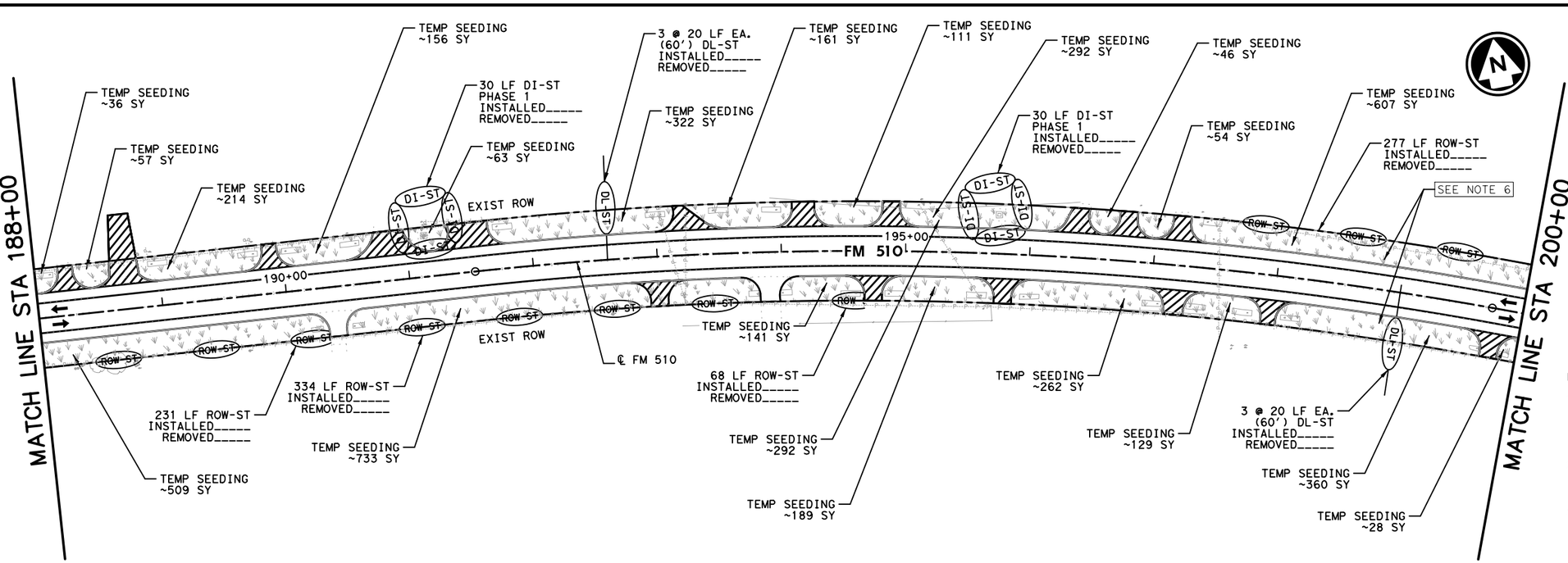
I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

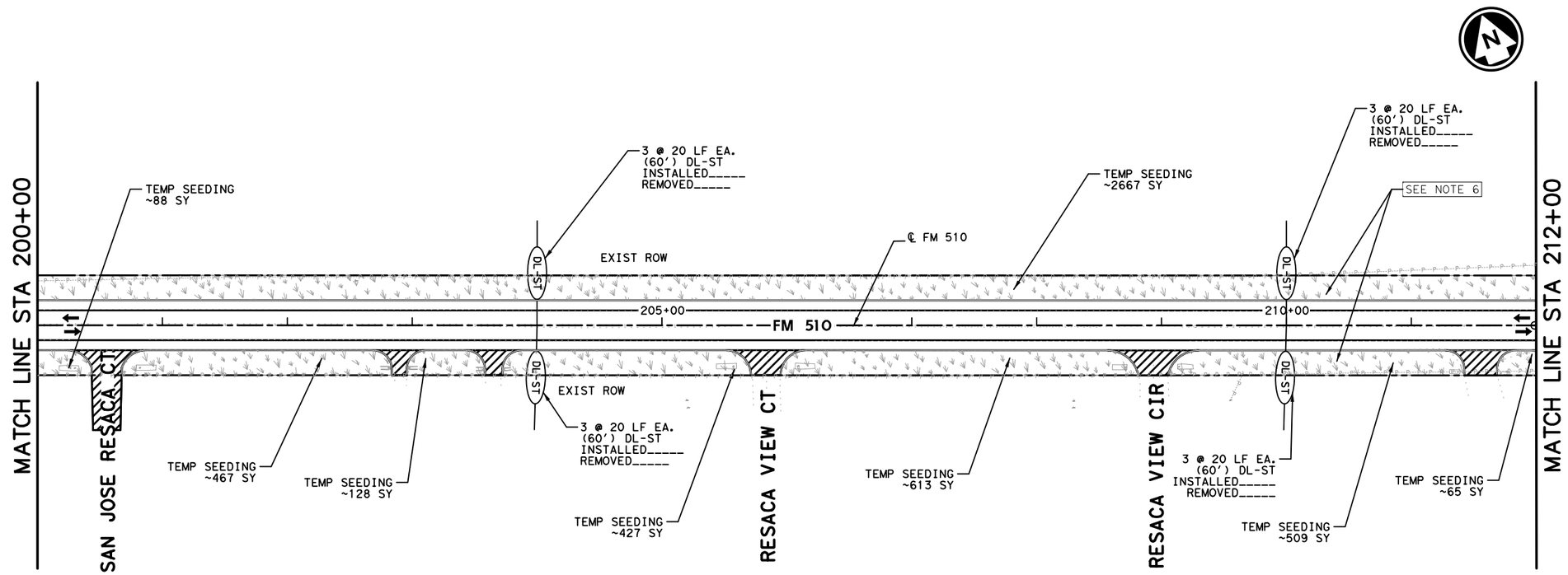
FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 8 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	248
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022 FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510#SW3P#08.dgn





0′ 50′ 100′

SCALE IN FEET

LEGEND:

- CONSTRUCTION EXIT (TYPE 1)
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE (TEMP)
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STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

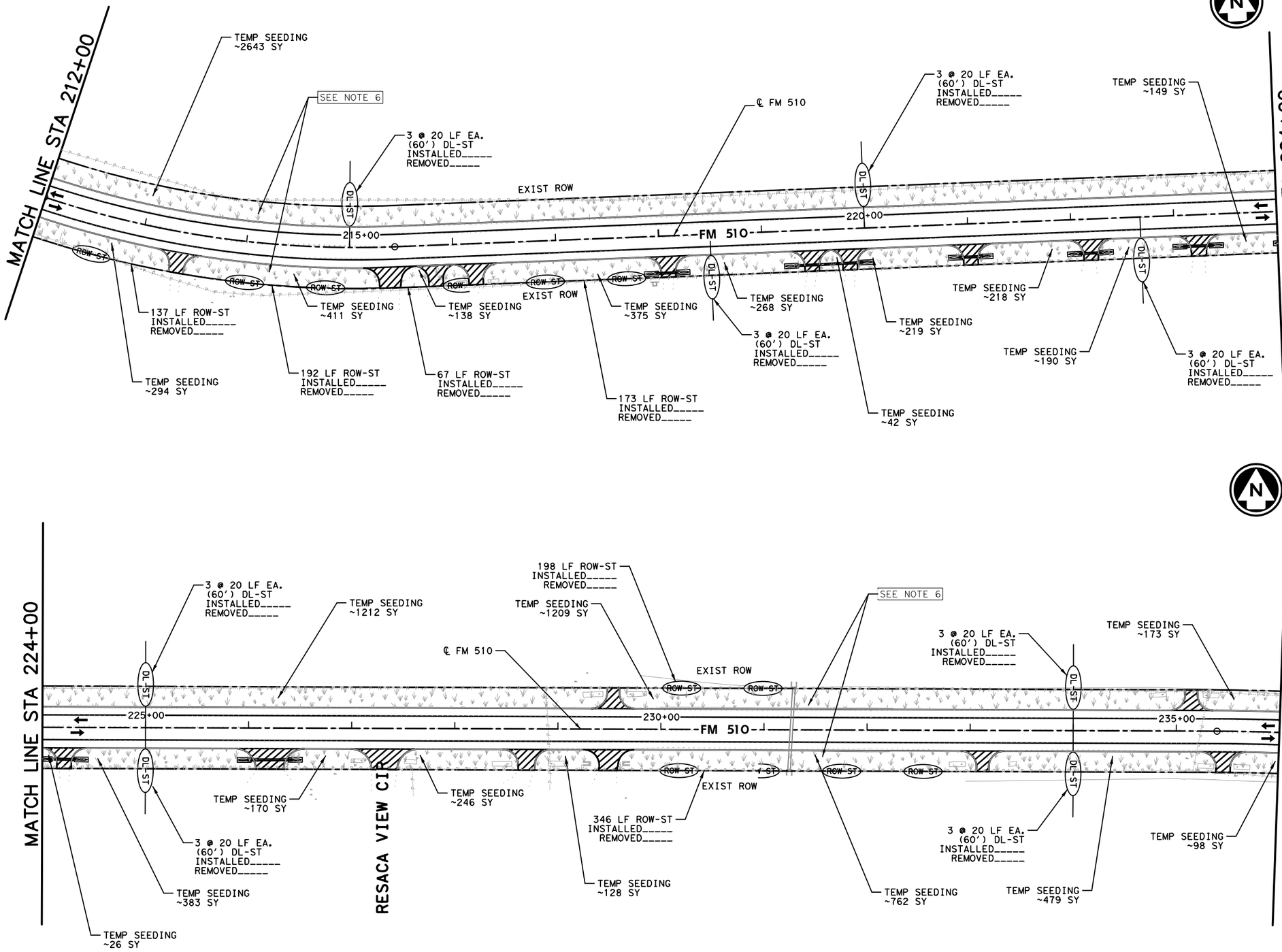
I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 9 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	
CONTROL	SECTION	JOB	249
1057	03	045	

FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510*SW3P*09.dgn
DRAWING DATE: 6/27/2022



0′ 50′ 100′

SCALE IN FEET

LEGEND:

- CONSTRUCTION EXIT (TYPE 1)
- DIRECTION OF FLOW
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6/27/2022

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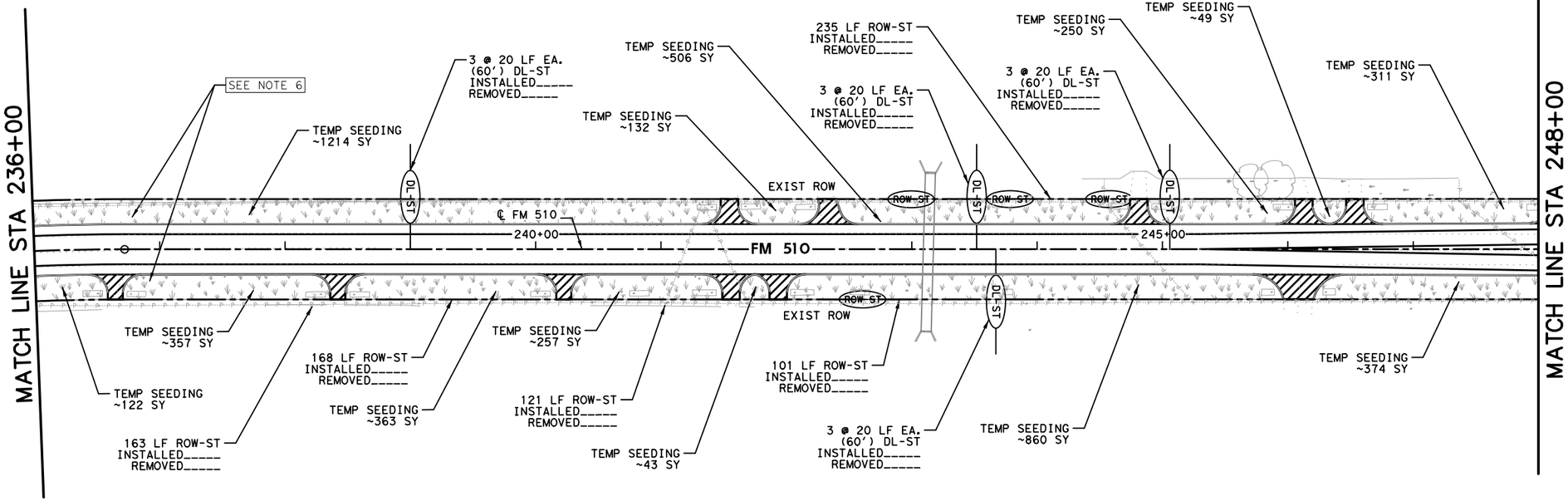
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

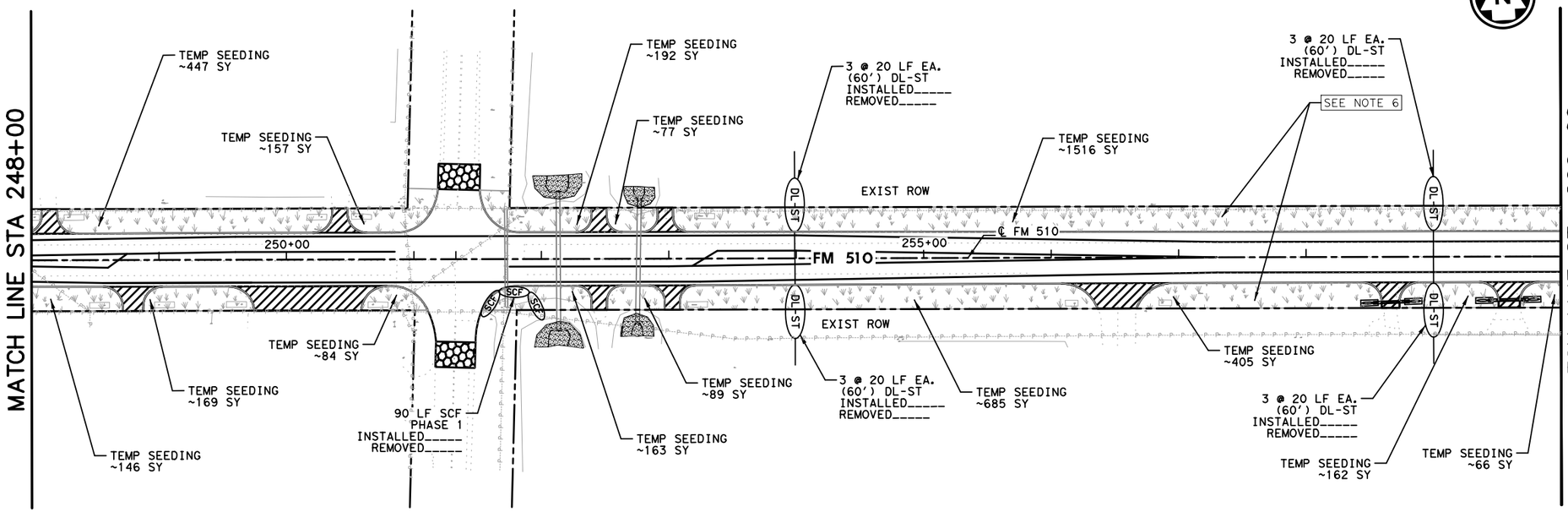
FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 10 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	
CONTROL	SECTION	JOB	250
1057	03	045	

DRAWING DATE: 6/27/2022 FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510*SW3P*10.dgn





0' 50' 100'

SCALE IN FEET

LEGEND:

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- DIRECTION OF FLOW
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6/27/2022

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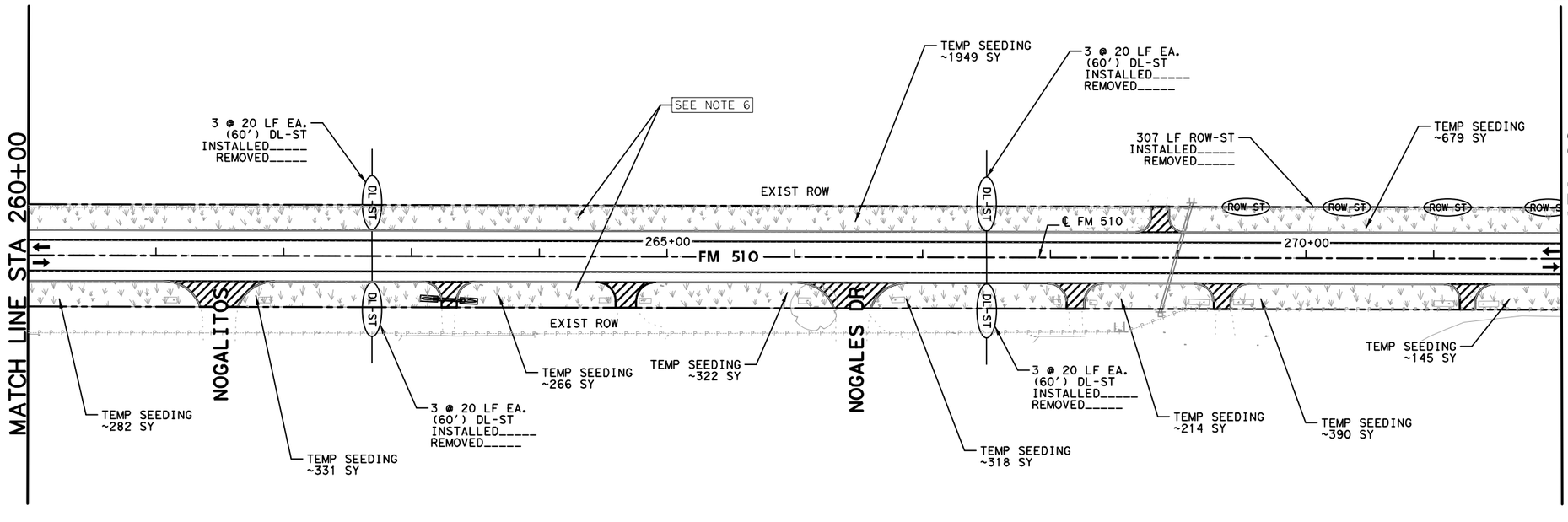
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

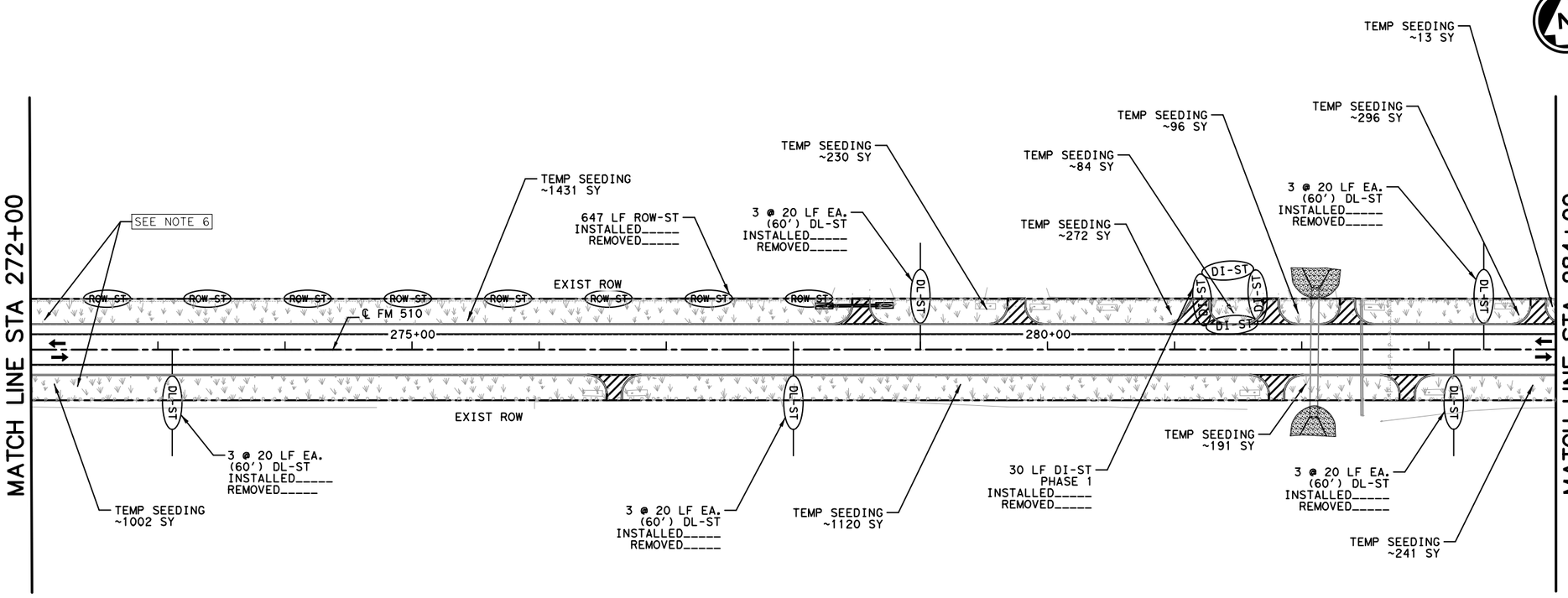
FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 11 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	251
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022 FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510#SW3P#11.dgn





0′ 50′ 100′

SCALE IN FEET

LEGEND:

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- DIRECTION OF FLOW
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6/27/2022

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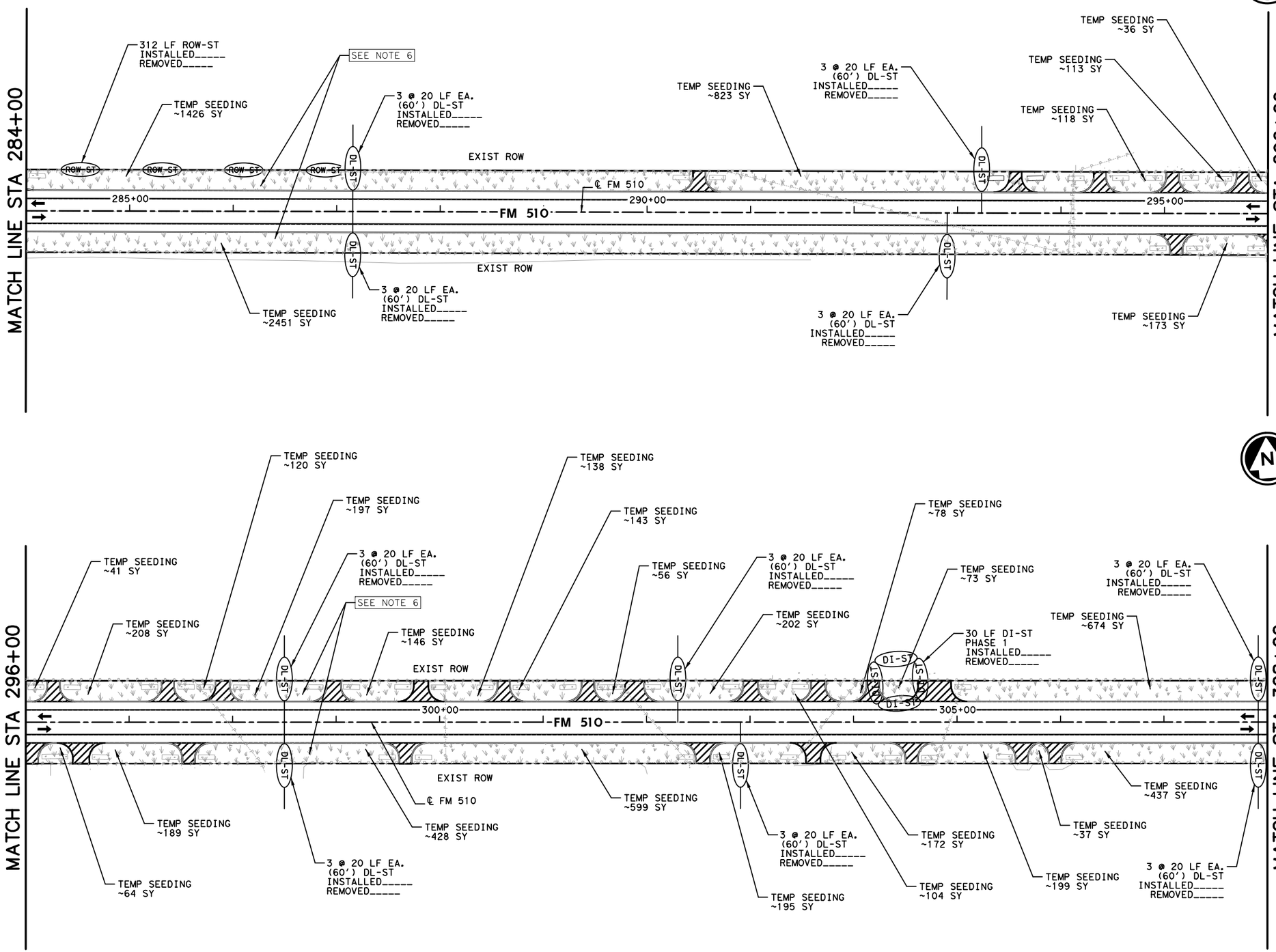
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 12 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	252
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022 FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510#SW3P#12.dgn



0′ 50′ 100′

SCALE IN FEET

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- PROP ACP DRIVEWAY

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7. SW3P DEVICES TO BE INSTALLED IN PHASE 2 AND LEFT THROUGH THE DURATION OF PHASE 3 UNLESS OHTERWISE NOTED IN THE PLANS.

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022

Texas Department of Transportation

I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 13 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	253
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022
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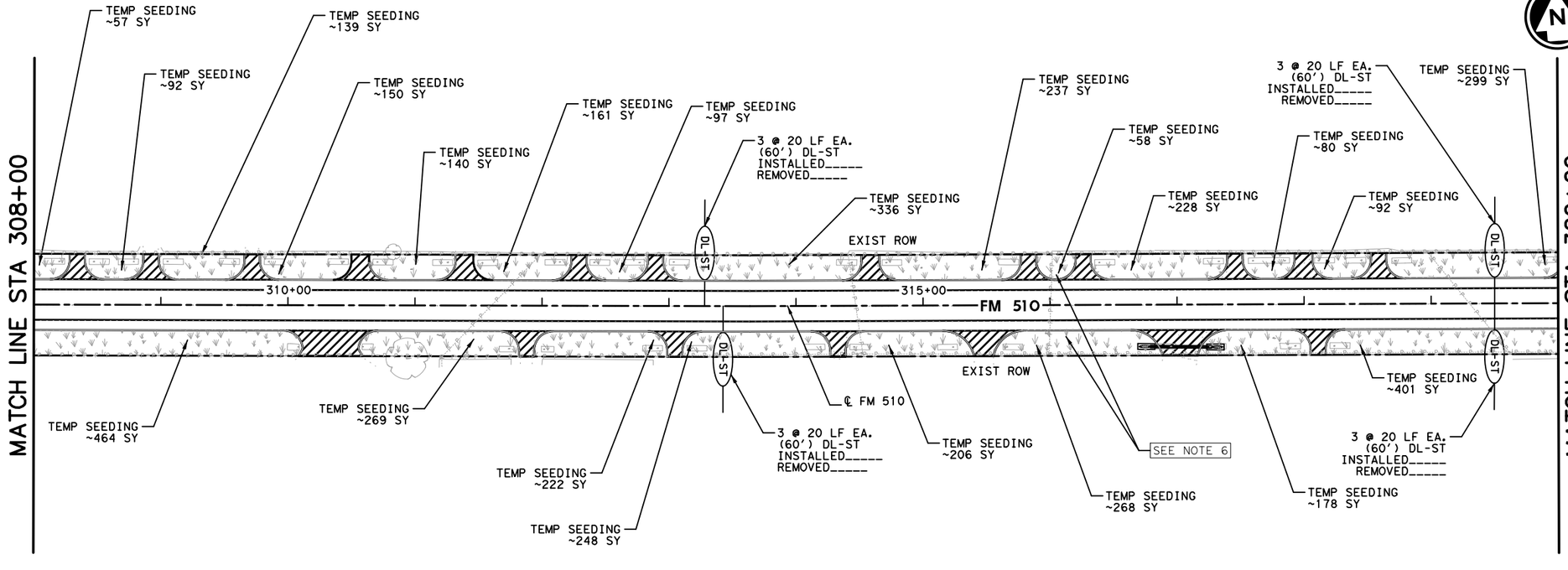

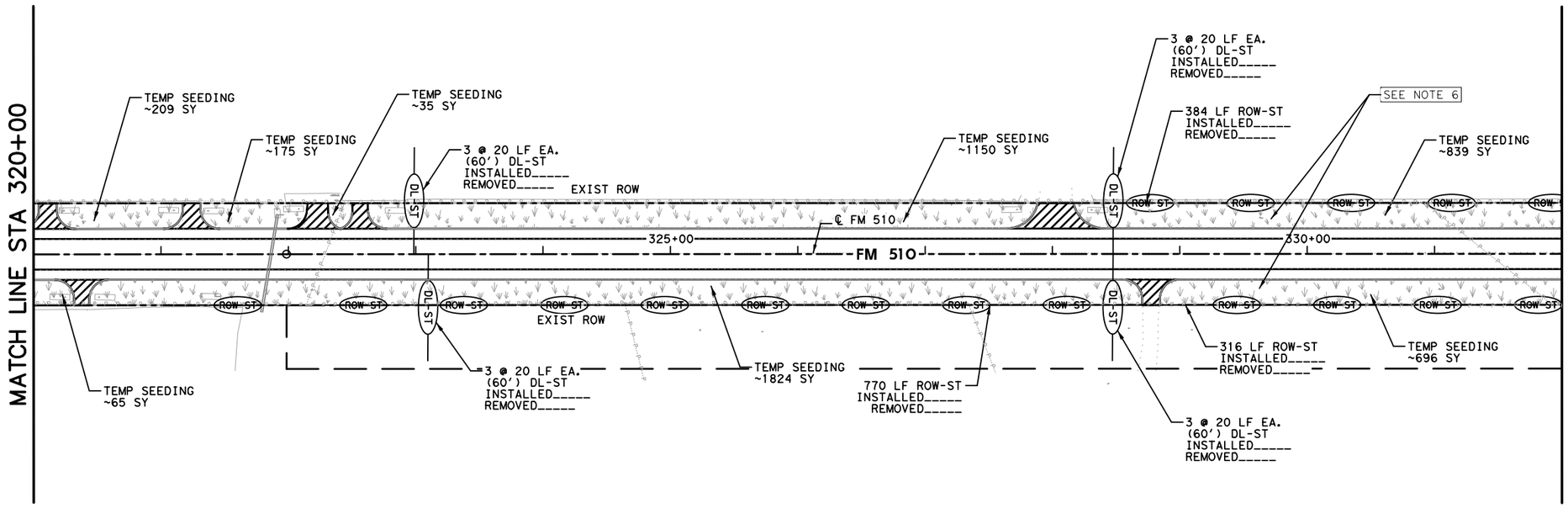

0′ 50′ 100′

SCALE IN FEET

LEGEND:

- CONSTRUCTION EXIT (TYPE 1)
- DIRECTION OF FLOW
- SCF — SEDIMENT CONTROL FENCE (TEMP)
- ROW-ST — RIGHT OF WAY SEDIMENT TRAP
- DL-ST — DITCH LINE SEDIMENT TRAP
- DI-ST — DROP INLET SEDIMENT TRAP
- 5" RIPRAP
- TEMPORARY SEEDING
- PROP ACP DRIVEWAY

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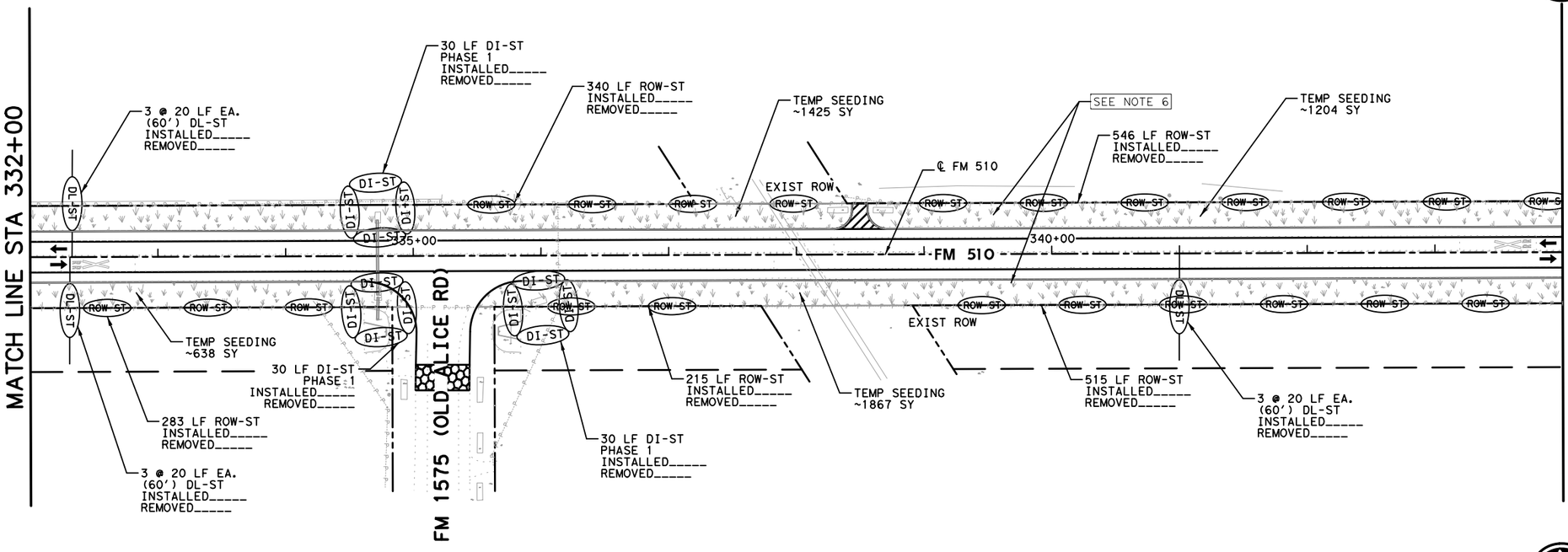
TBPE REG. # F-11657

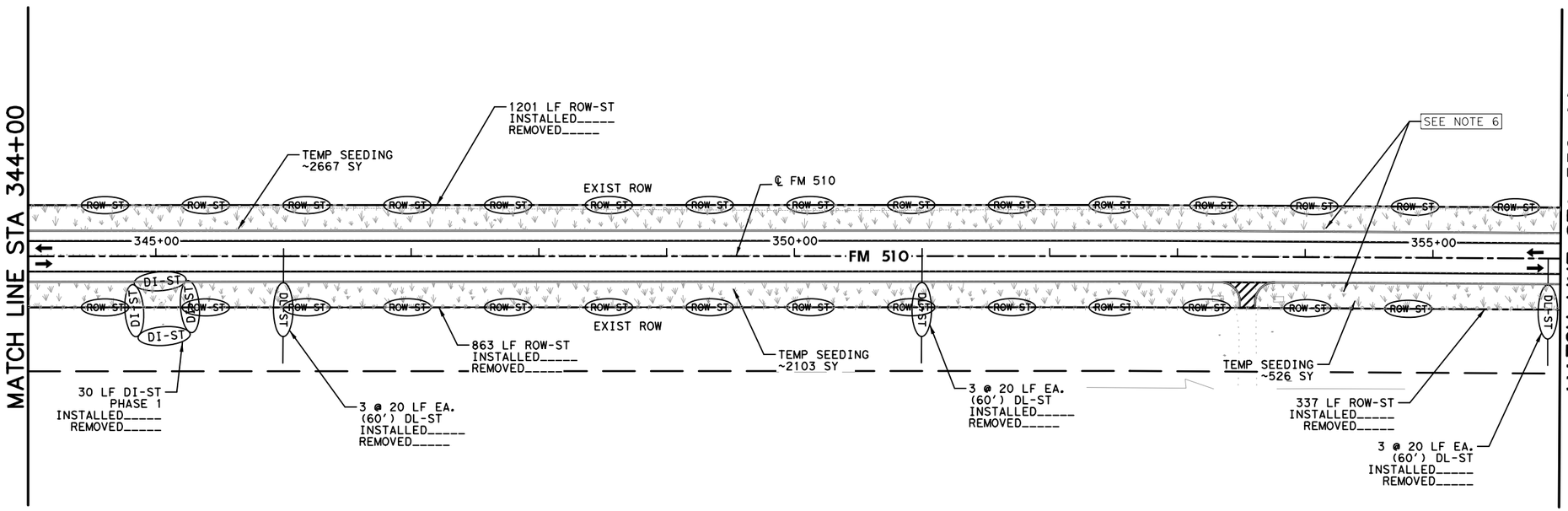
FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 14 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	254
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510#SW3P#14.dgn
DRAWING DATE: 6/27/2022





0' 50' 100'

SCALE IN FEET

LEGEND:

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- DIRECTION OF FLOW
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- TEMPORARY SEEDING
- PROP ACP DRIVEWAY

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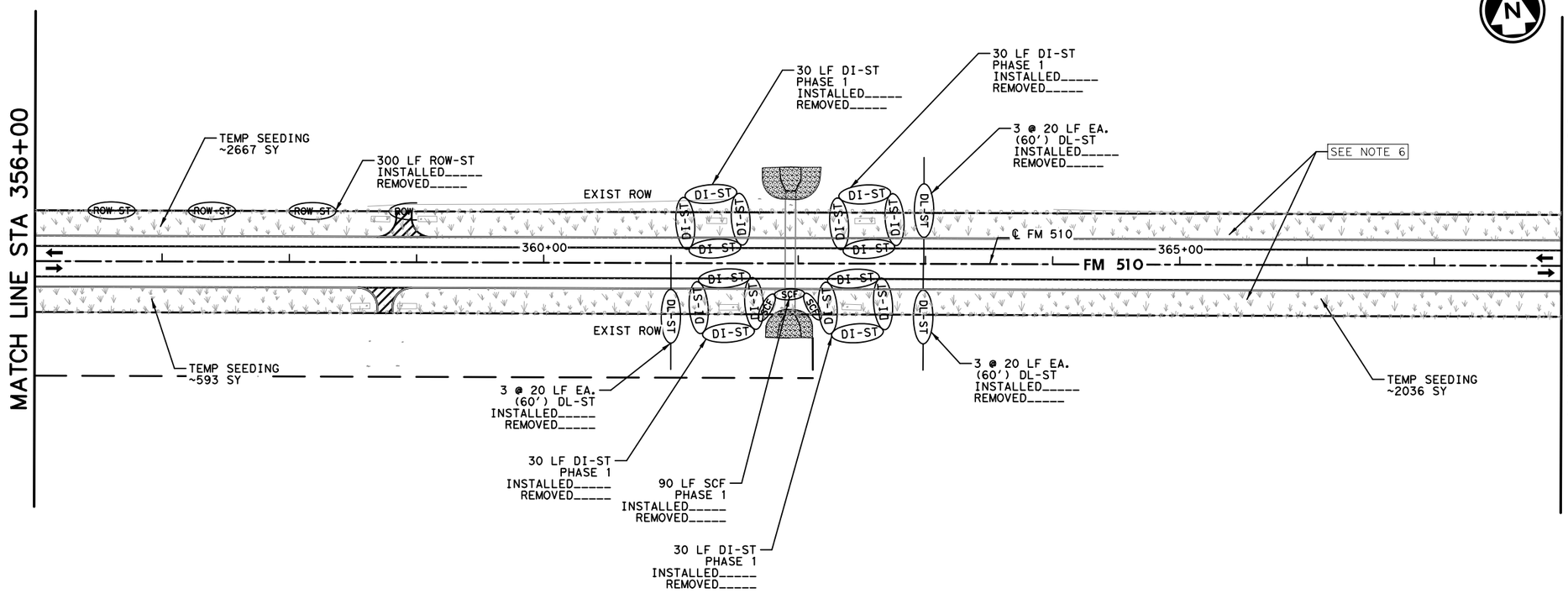
TBPE REG. # F-11657

FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 15 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	255
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022
FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510*SW3P*15.dgn



0′ 50′ 100′

SCALE IN FEET

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6/27/2022

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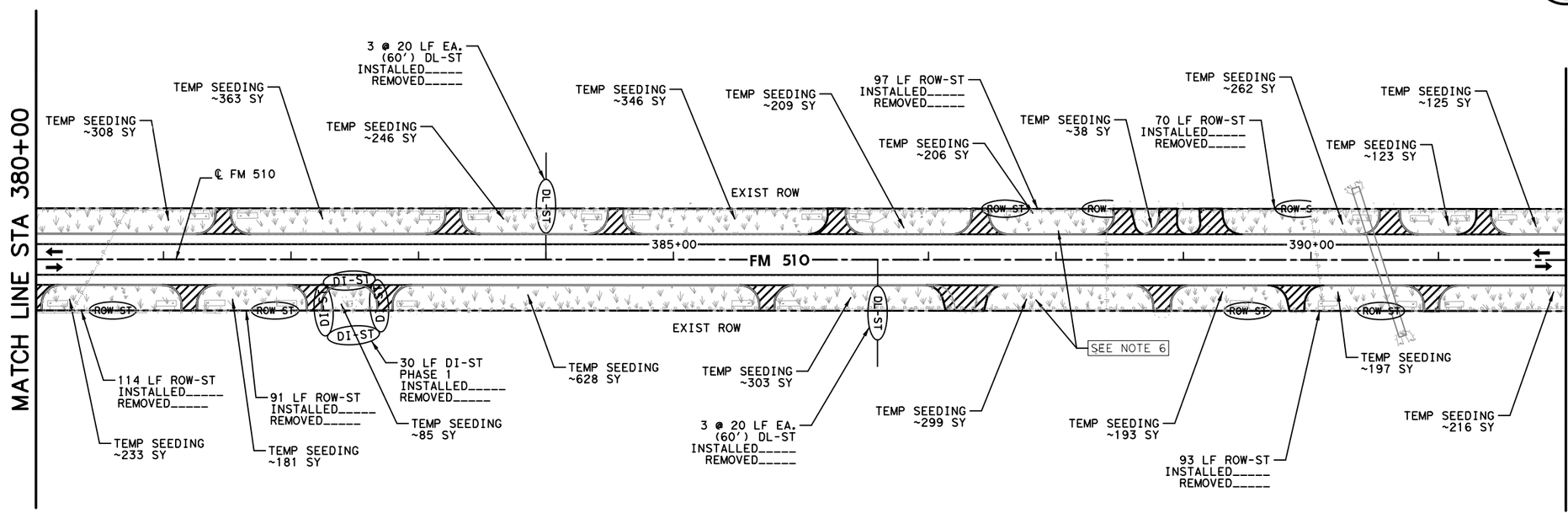
TBPE REG. # F-11657

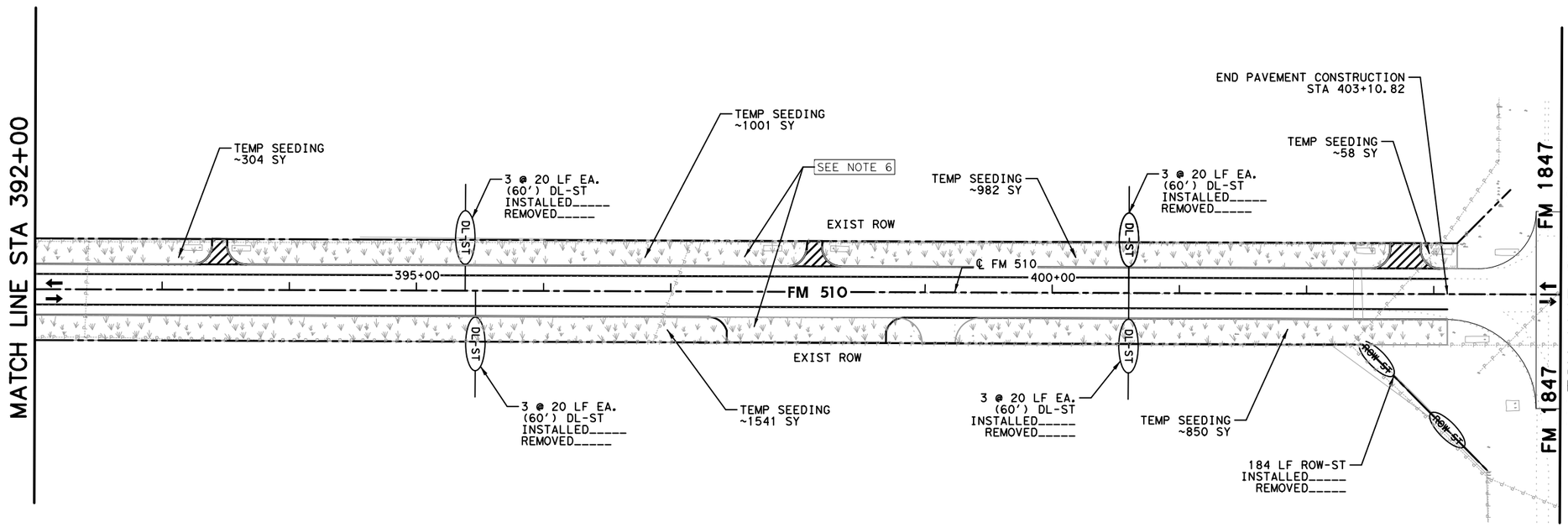
FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 16 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	256
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510#SW3P#16.dgn
DRAWING DATE: 6/27/2022





0' 50' 100'

SCALE IN FEET

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Texas Department of Transportation
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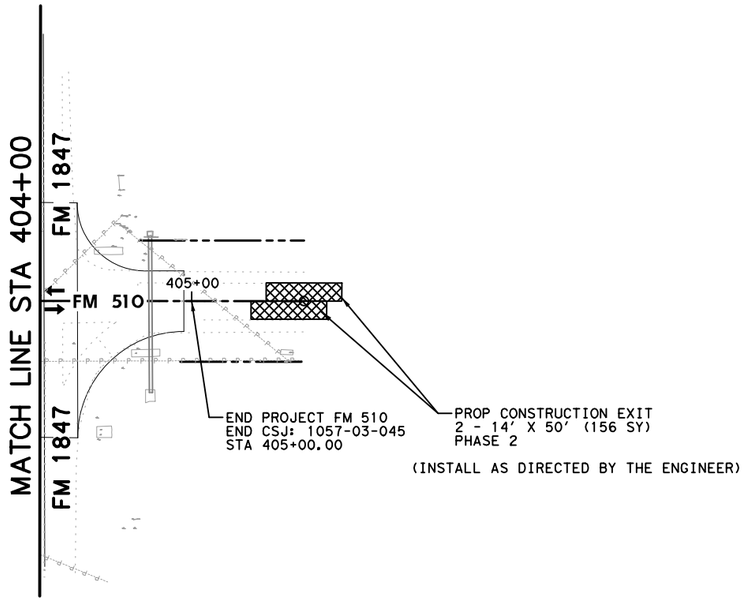
FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 17 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	257
CONTROL	SECTION	JOB	
1057	03	045	

DRAWING DATE: 6/27/2022
FILENAME: L:\Pharr District\FM*1425*ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510*SW3P*17.dgn



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HOUSTON, TEXAS 77063
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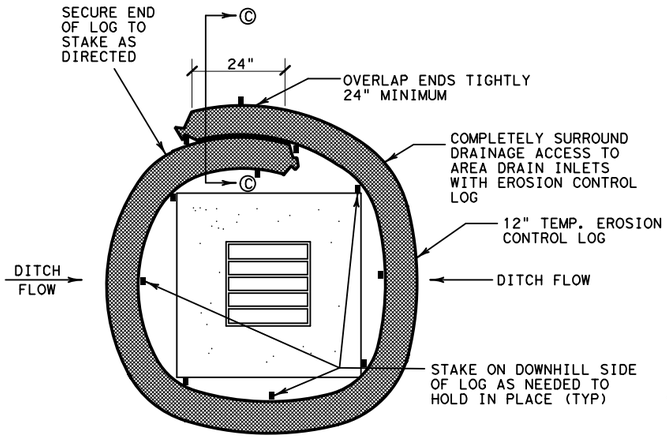
FM 510
STORMWATER POLLUTION PREVENTION PLAN

SHEET 18 OF 18

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	258
CONTROL	SECTION	JOB	
1057	03	045	

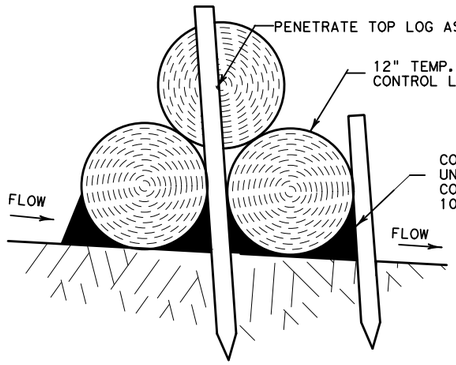
DRAWING DATE: 6/27/2022
FILENAME: L:\Pharr District\FM#1425#ETC\CADD\Sheets\FM510\11 Erosion Control Plan\FM510#SW3P#18.dgn



DROP INLET SEDIMENT TRAP

NTS

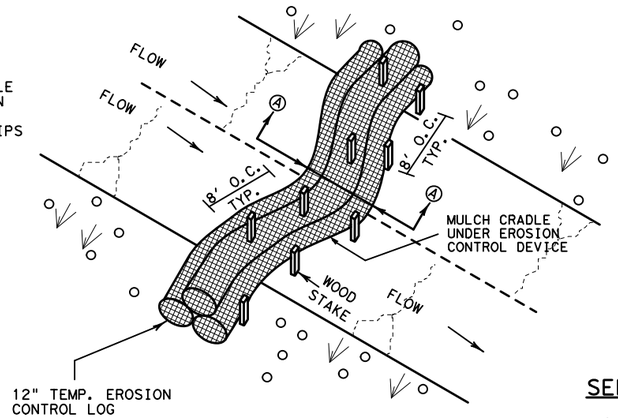
DI-ST



SECTION A-A

DITCH LINE SEDIMENT TRAP A-A

DL-ST



DITCH LINE SEDIMENT TRAP

DL-ST

PLANS SHEET LEGEND

DI-ST — DROP INLET SEDIMENT TRAP

DL-ST — DITCH LINE SEDIMENT TRAP

BOCI-ST — BACK OF CURB INLET SEDIMENT TRAP

ROW-ST — RIGHT OF WAY SEDIMENT TRAP

CI-ST — CURB INLET SEDIMENT TRAP

SEDIMENT BASIN & TRAP USAGE GUIDELINES

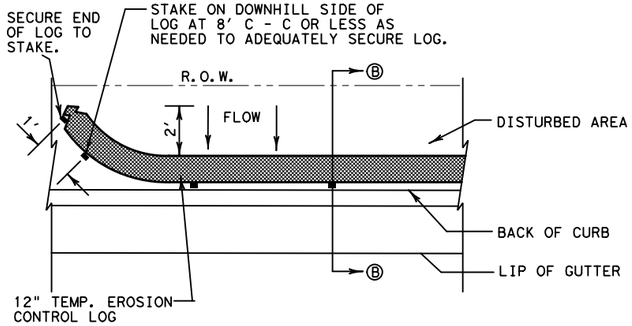
A sediment trap may be used to precipitate sediment out of runoff draining from an unstabilized area.

Traps: the drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Sediment traps should be placed in the following locations:

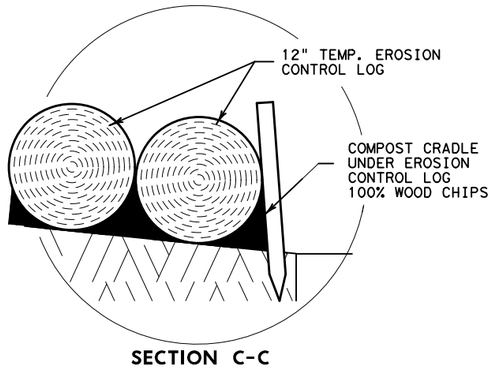
1. Immediately preceding drain inlets
2. Just before the drainage enters a water course
3. Just before the drainage leaves the right of way
4. Just before the drainage leaves the construction limits where drainage flows away from the project

The trap should be cleaned when the capacity has been reduced by ½ or the sediment has accumulated to a depth of 1', whichever is less. Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for seperately.



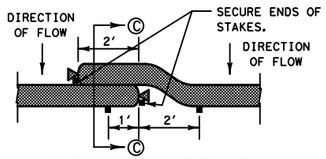
PLAN VIEW

NTS



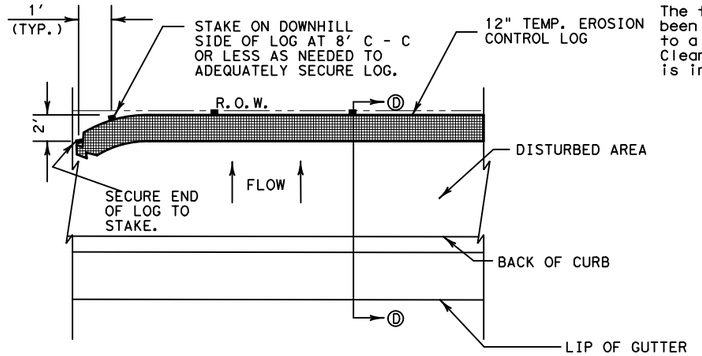
SECTION C-C

OVERLAP WITH COMPOST CRADLE



OVERLAP DETAIL PLAN VIEW

NTS

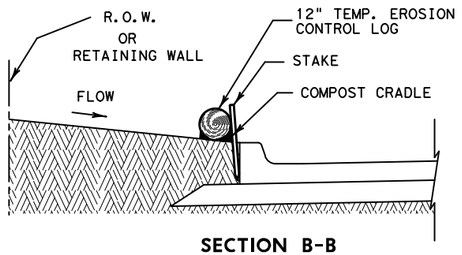


PLAN VIEW

NTS

GENERAL NOTES

1. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED. MAXIMUM LENGTH OF LOGS SHALL BE 30' FOR 12" DIAMETER LOGS.
2. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
3. STUFF LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE DENSITY THAT WILL HOLD SHAPE WITHOUT EXCESSIVE DEFORMATION.
4. STAKES SHALL BE 2" X 2" WOOD 4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG.
5. COMPOST CRADLE MATERIAL IS INCIDENTAL AND WILL NOT BE PAID FOR SEPARATELY.

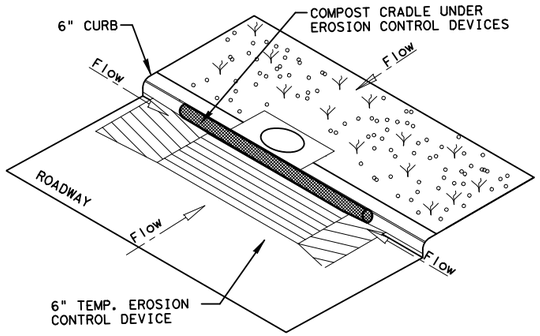


SECTION B-B

BACK OF CURB INLET SEDIMENT TRAP

NTS

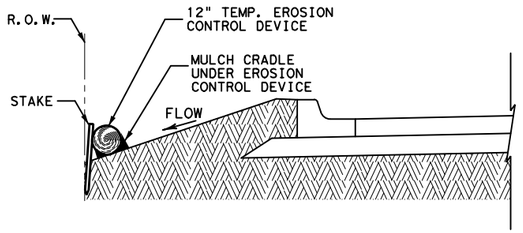
BOCI-ST



CURB INLET SEDIMENT TRAP

NTS

CI-ST



SECTION D-D

RIGHT-OF-WAY SEDIMENT TRAP

NTS

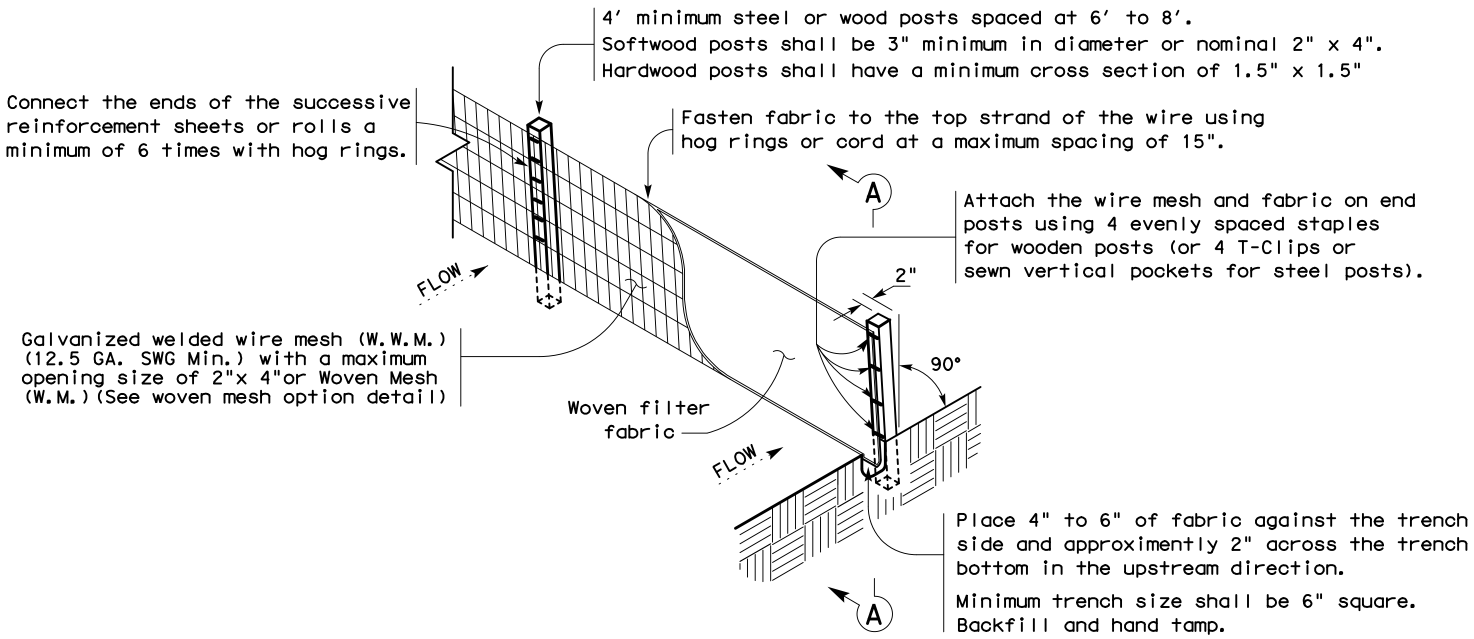
ROW-ST

PHARR DISTRICT STANDARD

Texas Department of Transportation

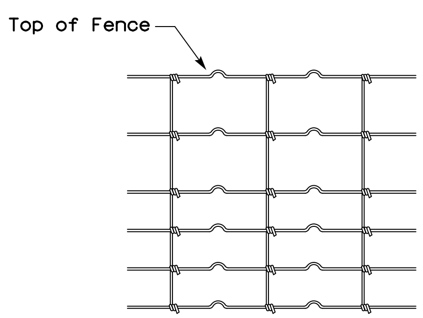
TEMPORARY EROSION CONTROL LOGS
TECL-17 (PHR)

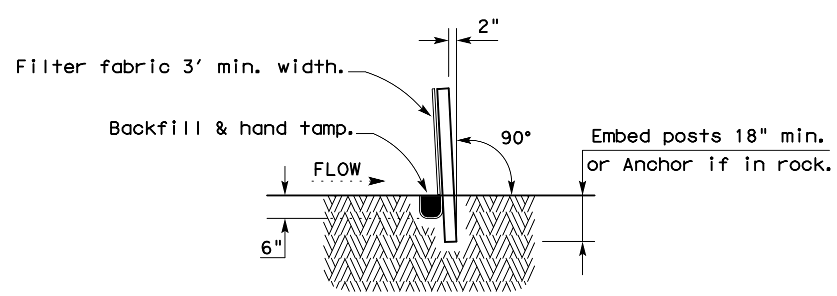
FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		FM510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	259
CONTROL	SECTION	JOB	
1057	03	045	



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.

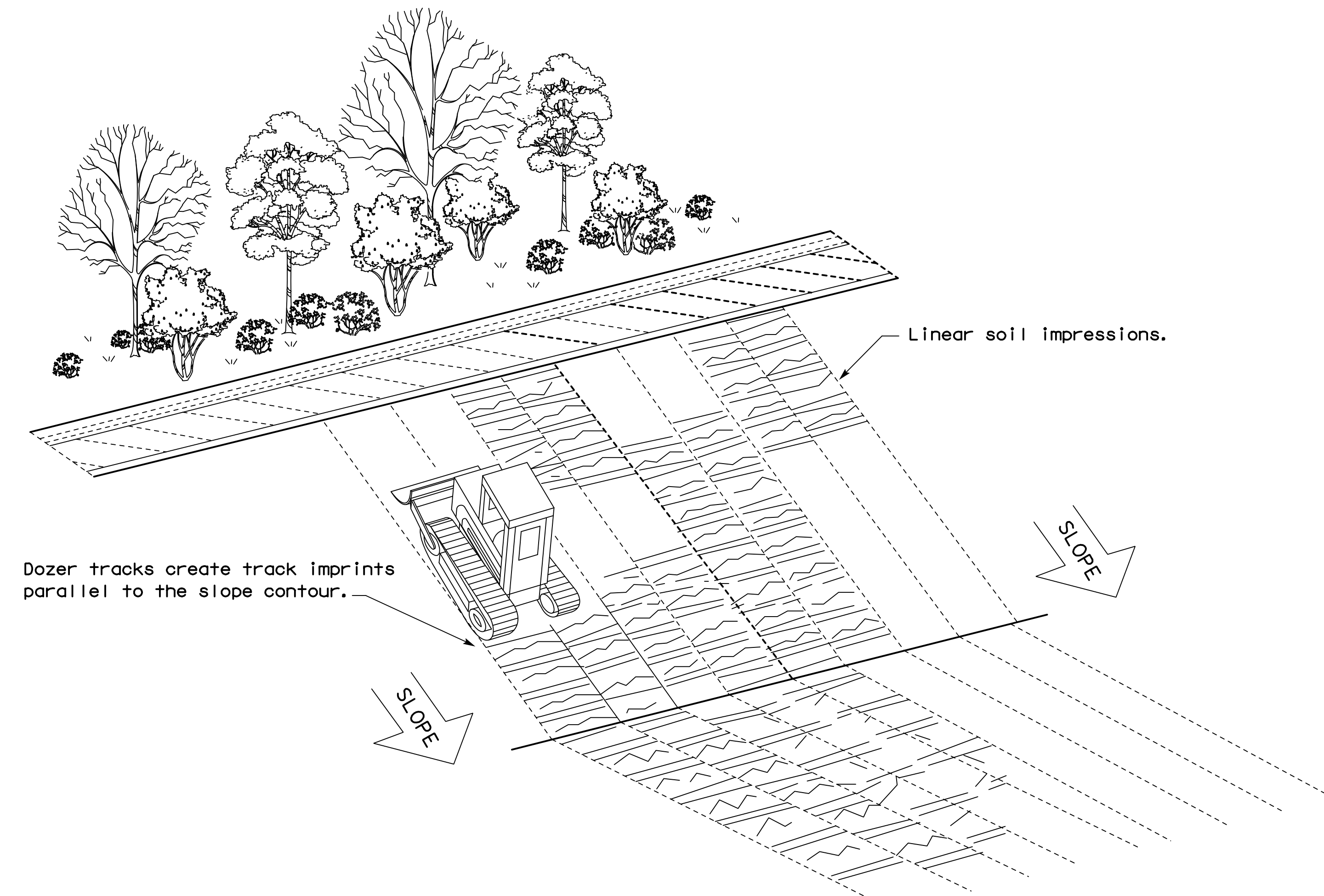
LEGEND

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	1057	03	045	FM 510
	DIST		COUNTY	SHEET NO.
	PHARR		CAMERON	260

DATE: 6/27/2022
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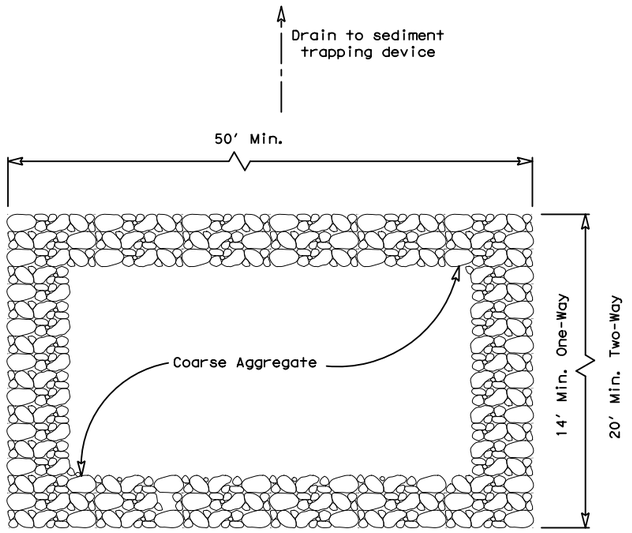
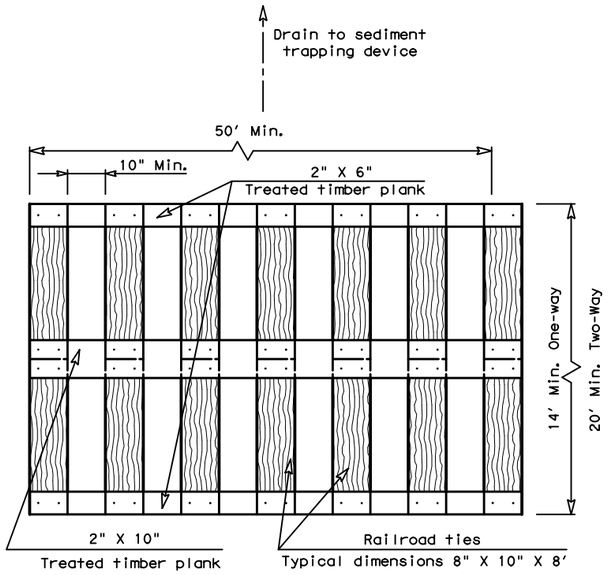
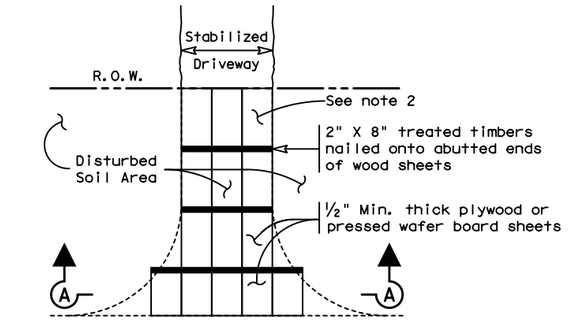


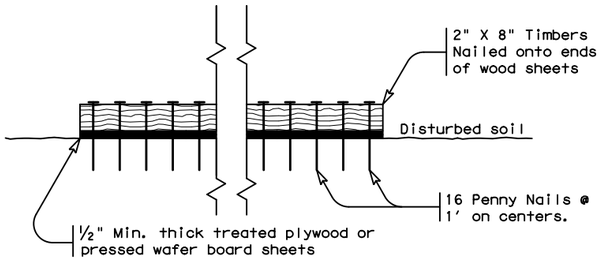
PLAN VIEW



PLAN VIEW



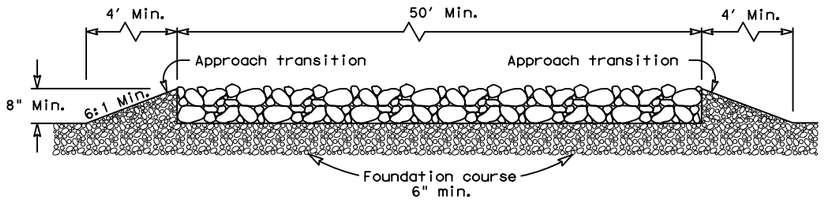
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

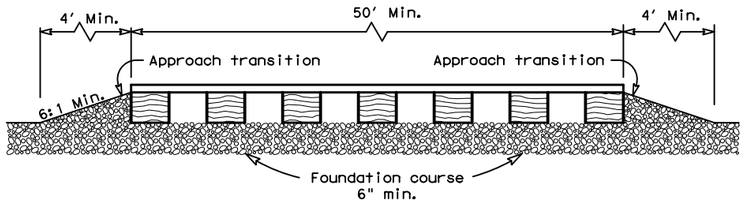
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

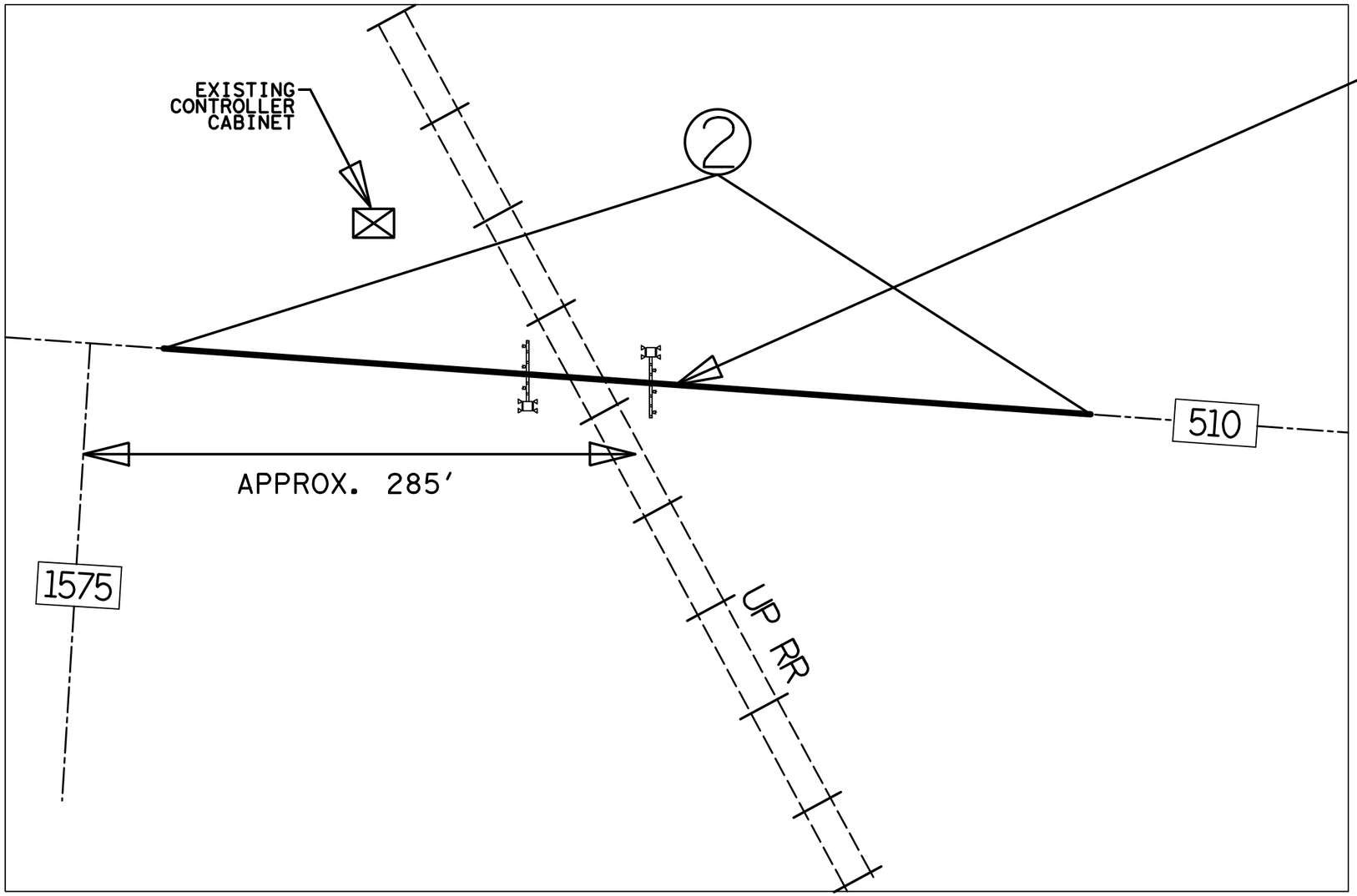
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		261



LOCATION 2
FM 510 RAIL ROAD
CROSSING LOCATION MAP
CAMERON COUNTY

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER
6/27/2022

Texas Department of Transportation

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

PHARR DISTRICT

"EXHIBIT A"
LOCATION MAP
LOCATION NO. 2
FM 510 AND UPRR

DOT 758 602M **RR MP 16.83**

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	262
CONTROL	SECTION	JOB	
1057	03	045	

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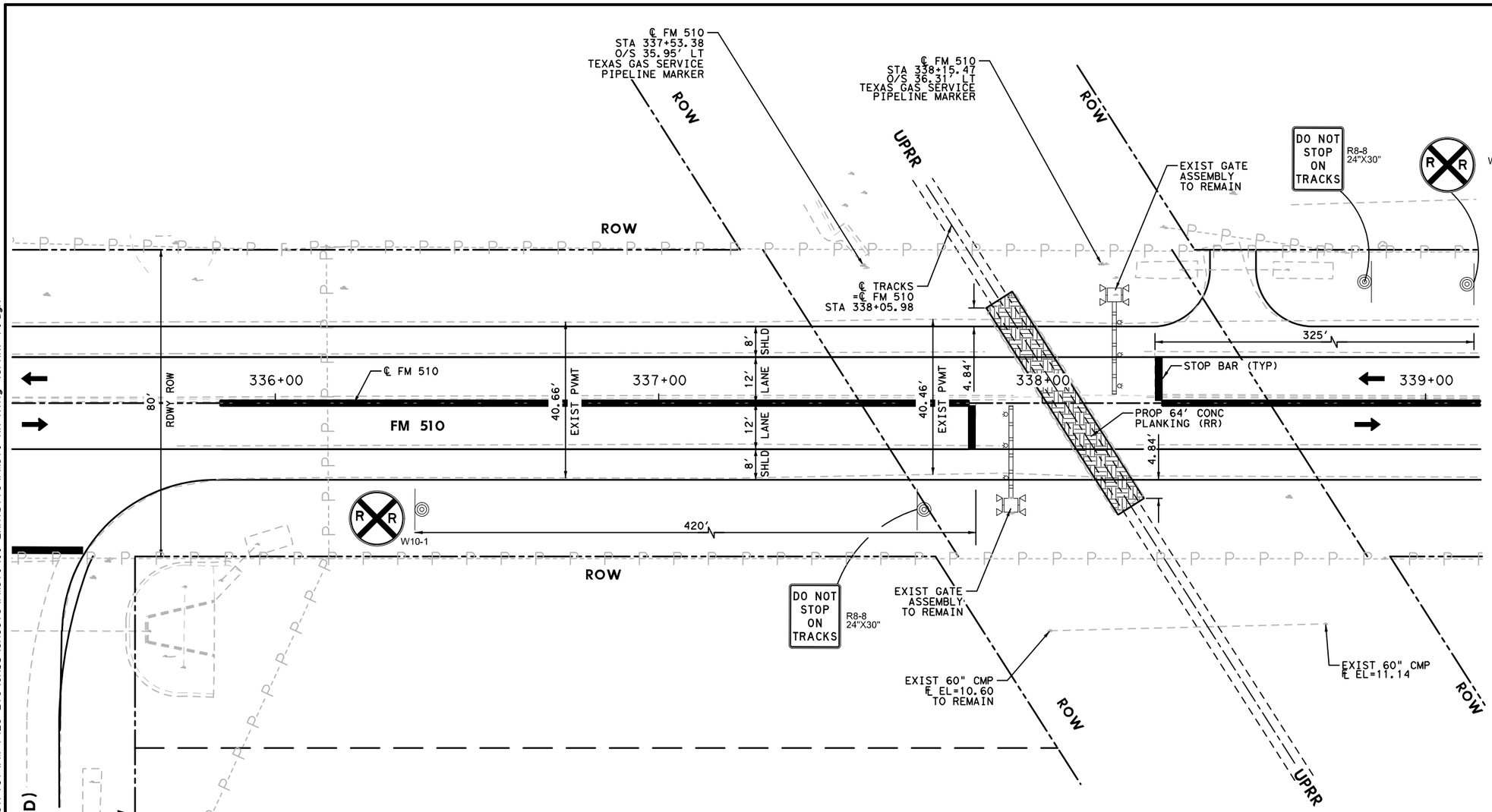
DRAWING DATE: 6/27/2022



HORZ 0' 15' 30'

SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- OVERHEAD POWER LINE

GENERAL NOTES:

1. 3 THROUGH TRAINS PER DAY AT 25 M.P.H.
2. AVARAGE DAILY TRAFFIC (2017): 4731
3. EXISTING 63' CONCRETE CROSSING
4. EXISTING 112 LB RAIL
5. FULL WIDTH CLOSURE

WORK TO BE DONE BY RAILROAD

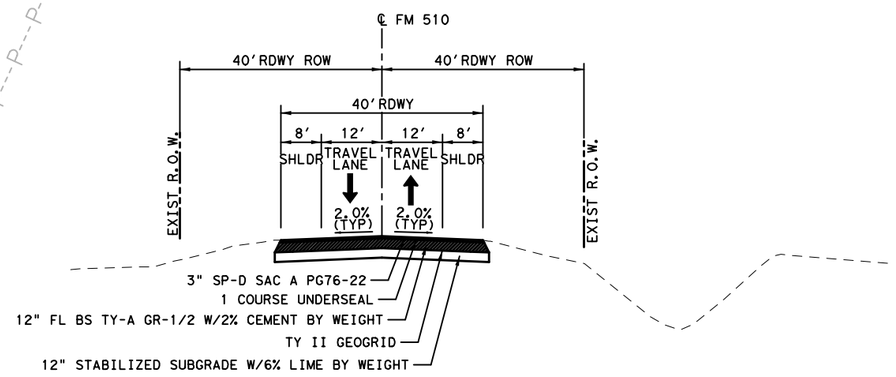
1. INSTALL A 64' CONCRETE PANEL CROSSING IN FULL WIDTH
2. MAKE NECCERRARY TRACK ADJUSTMENTS
3. WELD RAIL CONTINUOUSLY WITHIN THE LIMITS OF THE CROSSING
4. WORK SHALL BE DONE SO AS TO PERMIT TWO-WAY TRAFFIC AT NIGHT

WORK TO BE DONE BY STATE CONTRACTOR

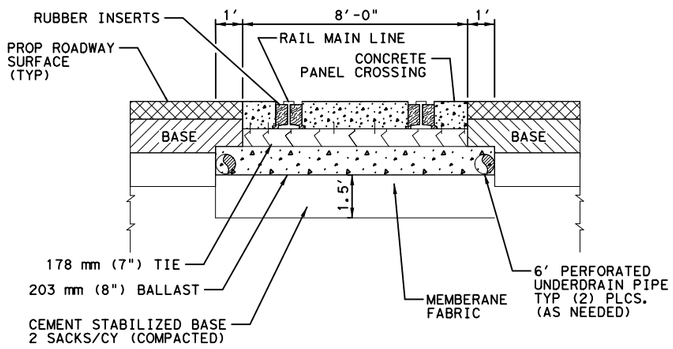
1. RECONSTRUCT THE ROADWAY AS SHOWN ON PLANS
2. FURNISH AND INSTALL BARRICADES FOR TRAFFIC CONTROL IN ACCORDANCE WITH THE TMUTCD
3. FURNISH AND INSTALL STABILIZED BASE
4. REPAIR ROADWAY APPROCHES TO RAILROAD CROSSING

STATE OF TEXAS
MORT T. TASHOOR
116089
LICENSED
PROFESSIONAL ENGINEER

6/27/2022



PROPOSED ROADWAY TYPICAL SECTION IN VICINITY OF CROSSING (N.T.S)



TYPICAL SECTION FOR CONCRETE PANEL CROSSING (N.T.S)

Texas Department of Transportation

I.S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

FM 510
EXHIBIT "A"
PROPOSED PLANKING LAYOUT
FM 510 AND UPRR

DOT 758602M — RR MP 16.83

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 510
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHARR	CAMERON	263
CONTROL	SECTION	JOB	
1057	03	045	

FILENAME: L:\Pharr District\FM#1425*ETC\CADD\Sheets\FM510\00 Exhibits\FM510*RR Xing (UPRR)*P.dgn
DRAWING DATE: 6/27/2022

DATE: 6/27/2022 5:06:44 PM
FILE: L:\Pharr District\FM_1425_ETC\CADD\Sheets\FM510\00 Exhibits\510scope.dgn

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

DOT #: 758 602M
Crossing Type: PUBLIC AT GRADE
RR Company Owning Track at Crossing: UNION PACIFIC COMPANY
Operating RR Company at Track: UNION PACIFIC COMPANY
RR MP: 16.83
RR Subdivision: HARLINGEN
City: LAURELES, TX
County: CAMERON
CSJ at this Crossing: 1057-03-045
Highway/Roadway name crossing the railroad: FM 510
# of regularly scheduled trains per day at this crossing: 3
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 1%

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

Rehab of existing roadway consisting of grading, FL BS (limestone), ACP, signing, pavement markings, provide Traffic Control for railroad to install new concrete crossing surface.

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

Flagging service, remove existing crossing surface and install a new concrete crossing surface.

** Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

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

NONE

III. FLAGGING & INSPECTION

of Days of Railroad Flagging Expected: 10

On this project, night or weekend flagging is:

☐ Expected
☒ Not Expected

Flagging services will be provided by:

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

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

Contact Information for Flagging:

☒ UPRR - UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging

☐ BNSF - BNSF.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging

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

☐ OTHERS _____

Contractor must incorporate Construction Inspection into anticipated construction schedule.

☒ Not Required

☐ Required: Contact Information for Construction Inspection:

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

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

☐ Required
☒ Not Required

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

V. RAILROAD INSURANCE REQUIREMENTS

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

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

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

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

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000 combined single limit
Railroad Protective Liability	
☒ Not Required	
☐ Non - Bridge Projects	$2,000,000 / $6,000,000
☐ Bridge Projects	$5,000,000 / $10,000,000
☐ Other	

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

On this project, an ROE agreement is:

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

With the following railroad companies: _____

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

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

Approved ROE Agreement templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed ROE agreement between the Contractor and the Railroad if required on project.

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:

☐ Not Required
☒ Required

See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are required to maintain the same insurance coverage as required of the Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call Union Pacific Railroad (UPRR)
Railroad Emergency Line at 888-877-7267
Location: DOT 758 602M
RR Milepost 16.83
Subdivision HARLINGEN

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK

PROJECT SPECIFIC DETAILS

FILE: RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:
©TxDOT June 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
3/2020	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		264

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.

B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.

C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.

D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.

E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.

F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.

G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.

B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.

C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:

1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.

2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.

B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.

C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.

D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
1. Exactly what the work entails.
2. The days and hours that work will be performed.
3. The exact location of work, and proximity to the tracks.
4. The type of window requested and the amount of time requested.
5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.

E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."

B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF)(UPRR)and 14'-0" (KCS) horizontal from centerline of track
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

A. Maintain minimum track clearances during construction as specified in Section 3.07.

B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.

C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		265

3.09 MAINTENANCE OF RAILROAD FACILITIES

A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.

B. Perform all such maintenance and repair of damages due to the Contractors's operations at Contractor's expense.

C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
   1. Pre-construction meetings.
   2. Pile driving/drilling of caissons or drilled shafts.
   3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
   4. Erection of precast concrete or steel bridge superstructure.
   5. Placement of waterproofing (prior to placing ballast on bridge deck).
   6. Completion of the bridge structure.

B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.

C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.

B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.

C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.

D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.

E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".

B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

   UPRR 1-800-336-9193
   7:00 AM to 9:00 PM CST Monday-Friday except holidays,
   staffed 24 hrs/day for emergencies
   48 hrs notice required

   BNSF 1-800-533-2891
   24 hour number
   5 working days notice required

   KCS 1-800-344-8377
   Texas One Call, a 24 hour number
   48 hrs notice required, excluding weekends and holidays

   If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.

C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of $\frac{1}{4}$ inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

3.16 CLEANING OF RIGHT-OF-WAY

When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		266

CULVERT 22 SHEETS

THE SHEETS IN THIS LIST HAVE BEEN DEVELOPED BY ME OR UNDER MY RESPONSIBLE SUPERVISION

STATE OF TEXAS
ANDRES A. SALAZAR
95010
LICENSED
PROFESSIONAL ENGINEER

ANDRES A. SALAZAR
PE 95010
07/06/2023

OMEGA ENGINEERS, INC.
16360 PARK TEN PLACE, Ste. #325
HOUSTON TEXAS, 77084
OMEGAENGINEERS.COM
TX PE Firm Reg. No. F-2147
P:281 647 9182 F:281 647 9184

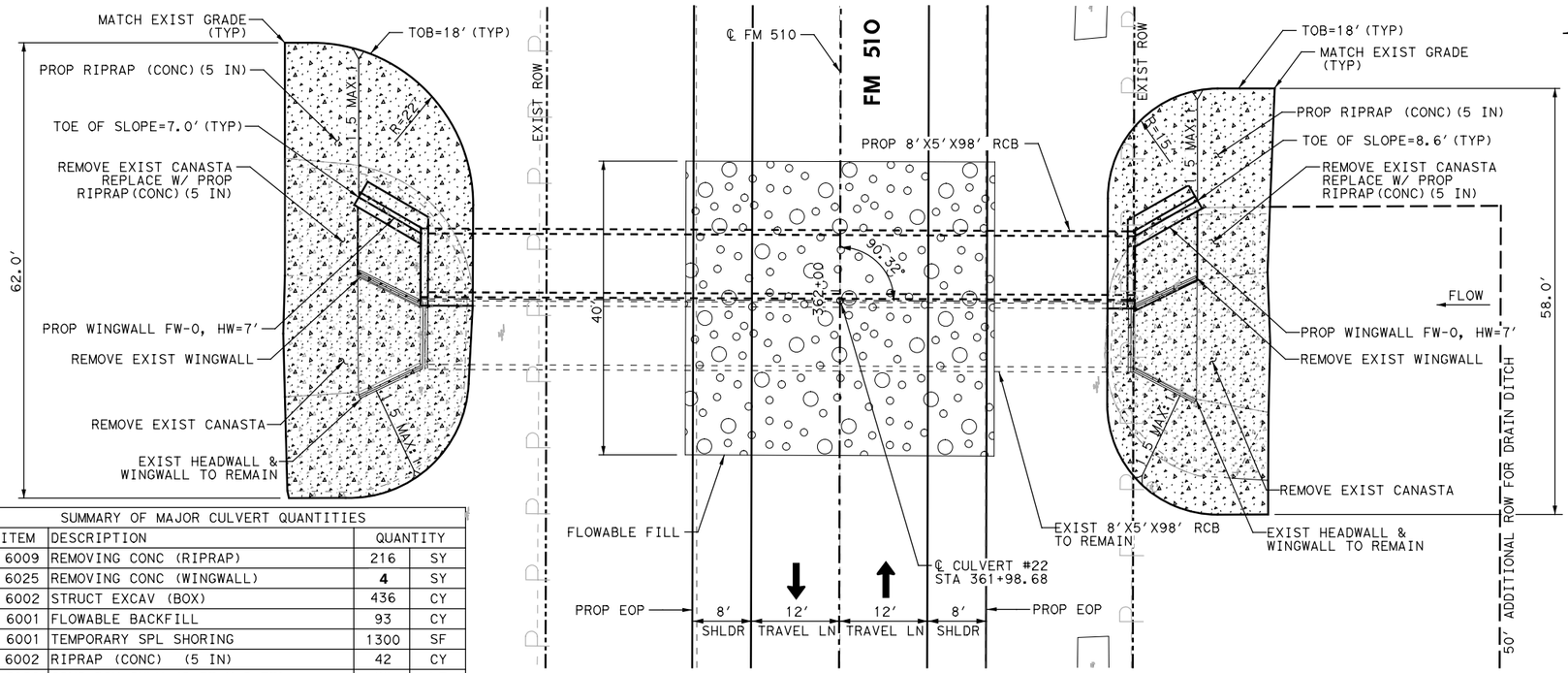
Texas Department of Transportation

FM 510

INDEX OF SHEETS FOR CULVERT 22 MODIFICATIONS

SHEET 1 OF 1

DSN:	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
CK:	6	SEE COVER SHEET		267
DRN:	STATE	DIST.	COUNTY	
APPVD:	TEXAS	PHARR	CAMERON	
CONT.	SECT.	JOB	HIGHWAY NO.	
1057	03	45	FM 510	

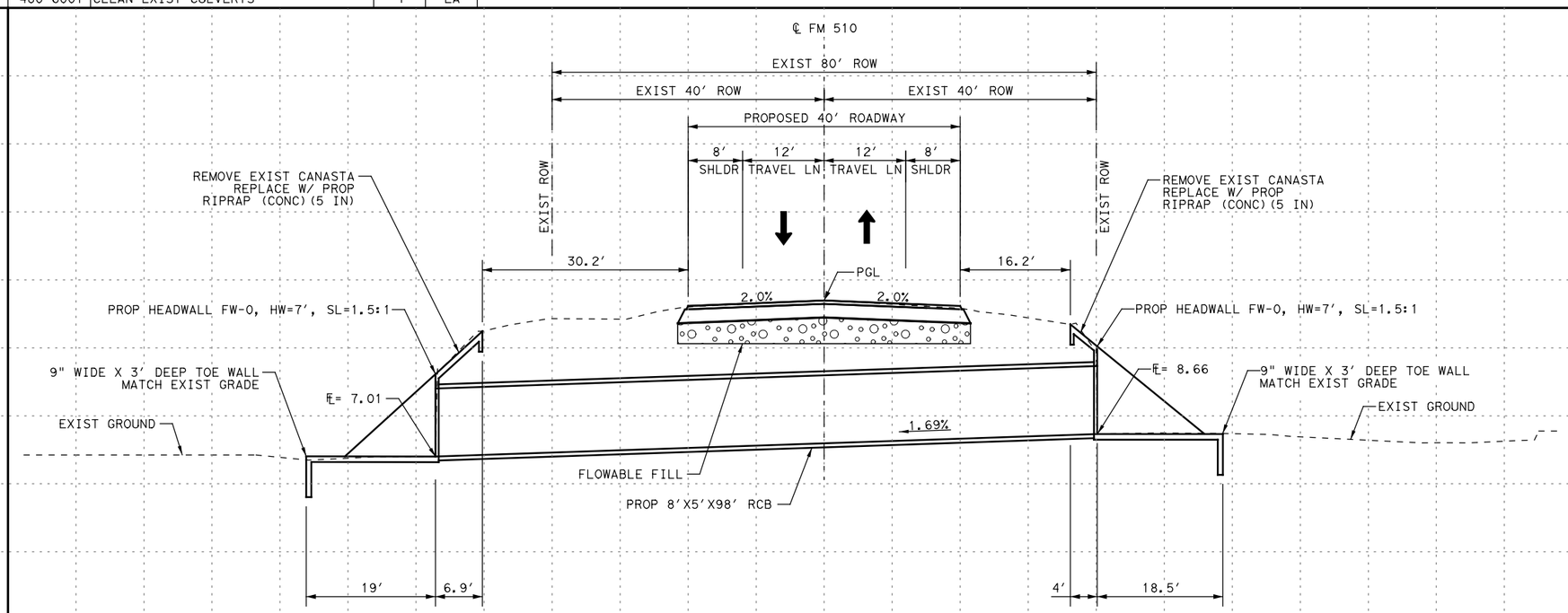


SUMMARY OF MAJOR CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
104 6009	REMOVING CONC (RIPRAP)	216	SY
104 6025	REMOVING CONC (WINGWALL)	**4**	SY
400 6002	STRUCT EXCAV (BOX)	436	CY
401 6001	FLOWABLE BACKFILL	93	CY
403 6001	TEMPORARY SPL SHORING	1300	SF
432 6002	RIPRAP (CONC) (5 IN)	42	CY
462 6020	CONC BOX CULV (8 FT X 5 FT)	98	LF
466 6154	WINGWALL (FW-0)(HW=7 FT)	**84**	SF
480 6001	CLEAN EXIST CULVERTS	1	EA

NOTES:

1. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO CONSTRUCTION.
2. EXISTING IRRIGATION AND DRAINAGE CROSSINGS ARE DRAWN BASED ON SURVEY AND THE INFORMATION FOUND IN THE AS-BUILT PLANS. CONTRACTOR SHALL VERIFY ALL EXISTING INFORMATION BEFORE PROCEEDING WITH WORK.
3. CONTRACTOR SHALL PROVIDE DITCH GRADING AT EXIST/PROP CULVERT ENDS FOR SMOOTH FL TRANSITION. THE GRADING WORK IS LIMITED TO A MAXIMUM DISTANCE OF 5FT WITHIN ROW OR PRE-APPROVED EASEMENT AND IS CONSIDERED SUBSIDIARY TO DRAINAGE BID ITEMS OF THE CONTRACT UNLESS OTHERWISE NOTED .
4. PAVEMENT MATERIAL AND THICKNESS ARE THE SAME AS THE PROPOSED TYPICAL SECTIONS.
5. SEE CULVERT LAYOUT MISCELLANEOUS DETAILS SHEET FOR PROPOSED 5" CONCRETE RIPRAP DETAIL AND FLOWABLE FILL DETAIL AS APPLICABLE.
6. CLEAN CULVERTS WITH OPENINGS DAYLIGHTED ON BOTH ENDS UNDER ITEM 480 6001 UNLESS OTHERWISE NOTED.
7. BEFORE STARTING ANY WORK AT THIS LOCATION CONTRACTOR SHALL COORDINATE WITH THE IRRIGATION OR DRAINAGE DISTRICT THAT OWNS THE CROSSING.

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET



STA 361+98.68

STATE OF TEXAS
ANDRES A. SALAZAR
95010
LICENSED PROFESSIONAL ENGINEER
5/25/2023

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16360 PARK TEN PLACE, Ste. #325
HOUSTON TEXAS, 77084
OMEGAENGINEERS.COM
TX PE Firm Reg. No. F-2147
P:281 647 9182 F:281 647 9184

FM 510

CULVERT 22 LAYOUT

STA 361+98.68

SHEET 1 OF 1

DSN:	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	SHEET NO.
CK:	6	SEE COVER SHEET	268
DRN:	STATE	DIST.	COUNTY
APPVD:	TEXAS	PHARR	CAMERON
CONT.	SECT.	JOB	HIGHWAY NO.
1057	03	045	FM 510

5/25/2023 11:13:38 AM
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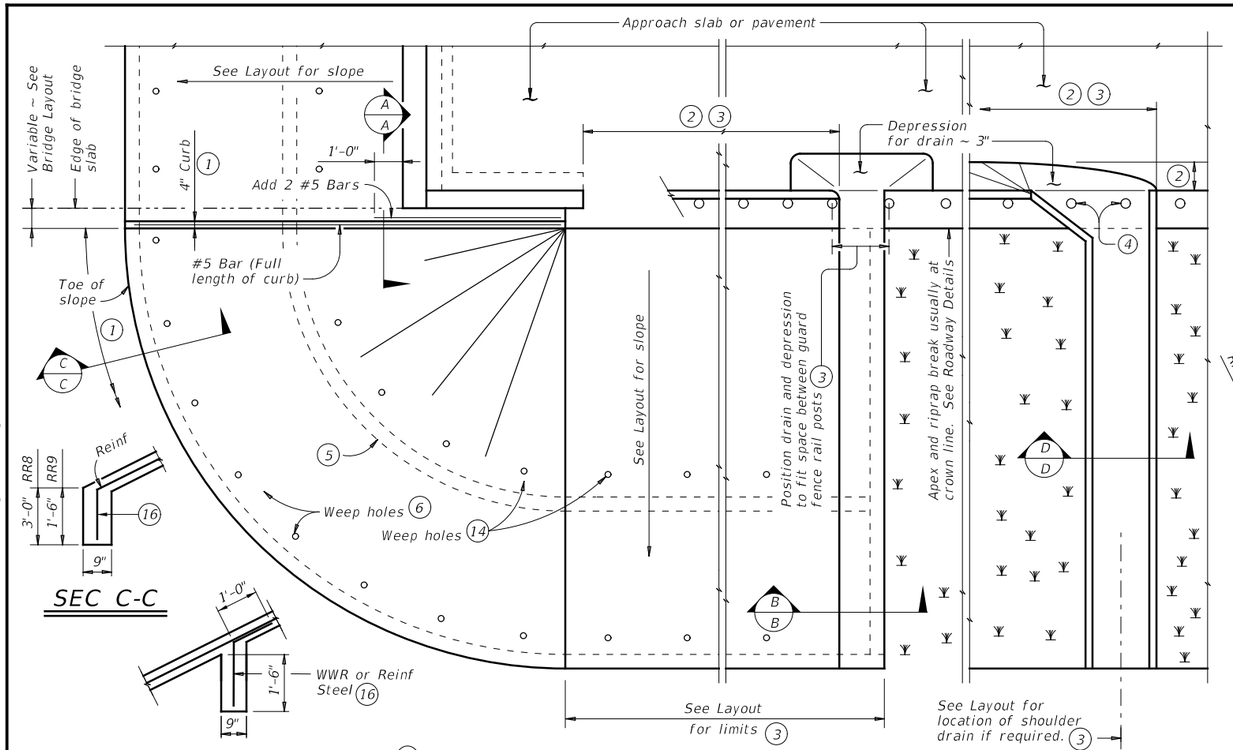
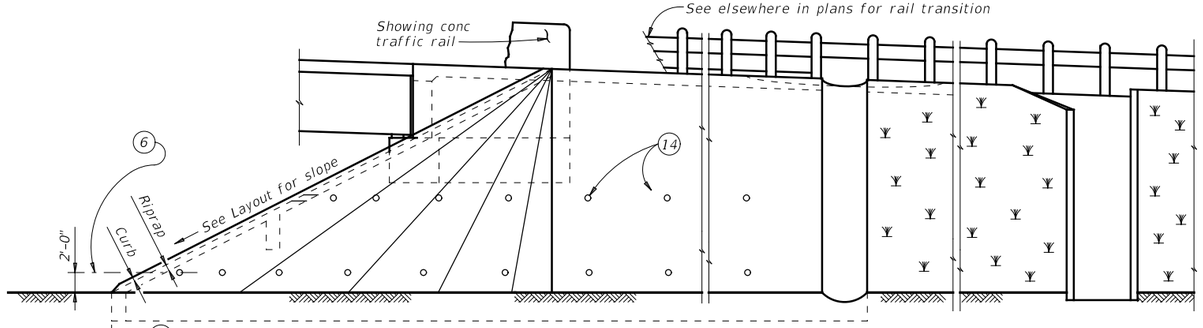
DATE:
FILE:



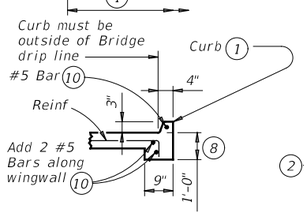
PLAN

SEC C-C

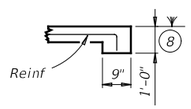
INTERMEDIATE TOEWALL (5)



ELEVATION

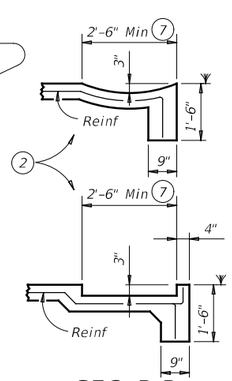


SEC A-A



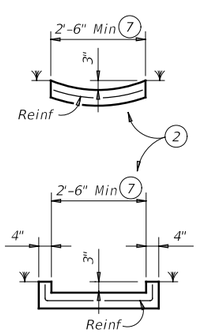
SEC B-B

(No drain)



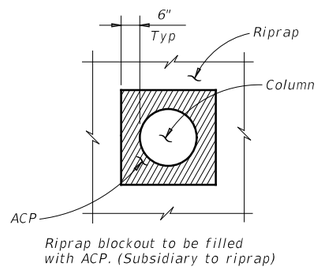
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

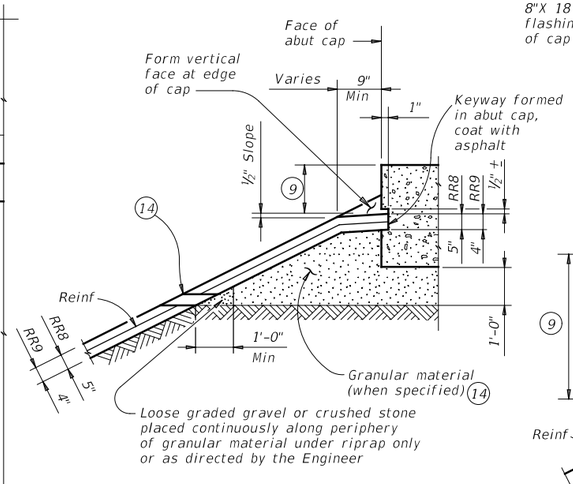
(Shoulder drain)



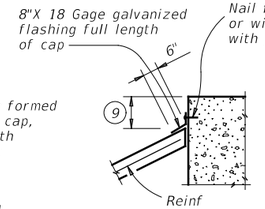
Riprap blockout to be filled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

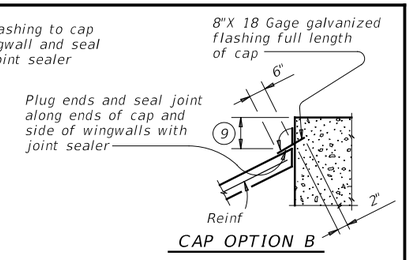
(As directed by the Engineer)



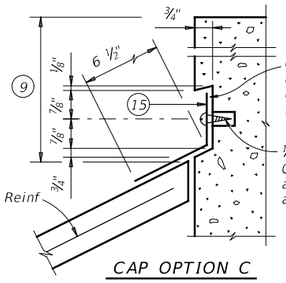
SHOWING KEYWAY OPTION



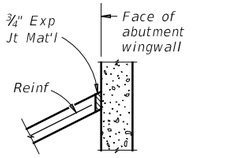
CAP OPTION A



CAP OPTION B

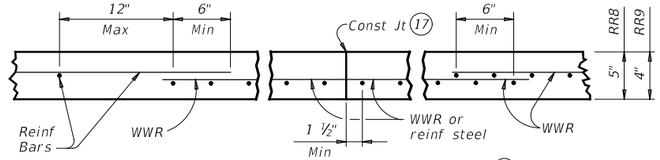


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

1. When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
2. Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
3. Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
4. See details elsewhere in plans for installation of guard fence posts through concrete riprap.
5. Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
6. Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
7. Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
8. Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
9. Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
10. #5 bars shown are required even when synthetic fiber reinforcing option is selected.
11. Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
12. Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
13. Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
14. If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
15. 8" x 18 Gage Galv Sheet Metal
16. Provide WWR or #3 bars, with 1'-0" extension into slope.
17. WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

FOR CONTRACTOR'S INFORMATION ONLY:
5" of RR8 = 0.015 CY/SF
4" of RR9 = 0.012 CY/SF
#3 Reinf at 18" c-c = 0.501 Lbs/SF
6x6-D3xD3 = 0.408 Lbs/SF

GENERAL NOTES:

Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.

Provide Grade 60 reinforcing steel.

Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.

Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.

Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.

Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.

Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap".

See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

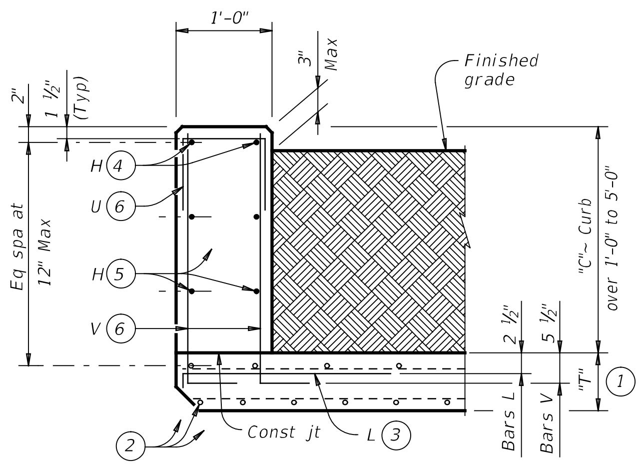
Texas Department of Transportation

Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

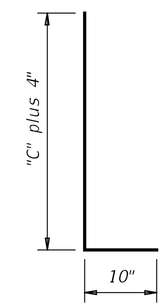
CRR

FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	21	CAMERON		269

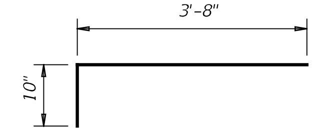


TYPICAL SECTION

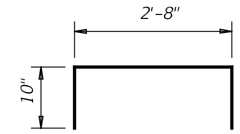
Used for curbs over 1'-0" to 5'-0"



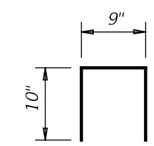
BARS V (#5) 6
Spaced at 12" Max



BARS L (#5) 3
Spaced at 12" Max



OPTIONAL
BARS L (#5) 3 7
Spaced at 12" Max

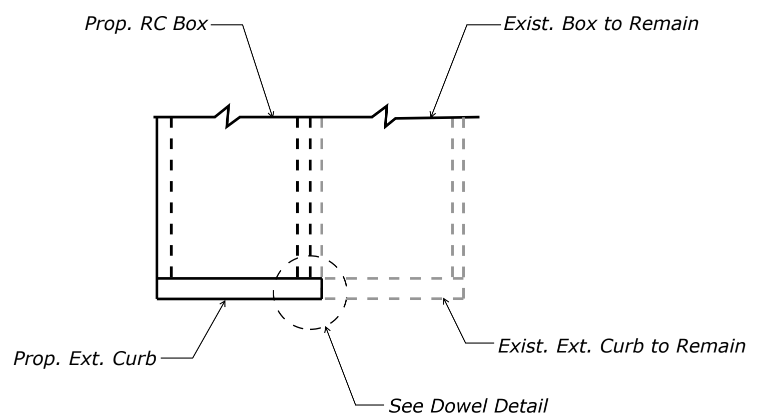


BARS U (#4) 6
Spaced at 12" Max

1. "T" is equal to the culvert top slab thickness. For precast boxes with slabs less than 8" thick, see SCP-MD standard for additional details.
2. Adjust normal culvert slab bars as necessary to clear obstructions.
3. Place bars L as shown. Tilt hook as necessary to maintain cover.
4. Place normal culvert curb bars H(#4) as shown. Adjust as necessary to clear obstructions.
5. Additional bars H(#4) as required to maintain 12" Max spacing.
6. Replace normal culvert curb bars K with one bar U and two bars V as shown spaced at 12" Max. Adjust length of bars V as necessary to maintain clear cover.
7. Optional bars L are to be used only for precast box culverts with 3'-0" closure pour.
8. Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The value in table can be interpolated for intermediate values of curb height, "C". Quantity includes bars K (when applicable).

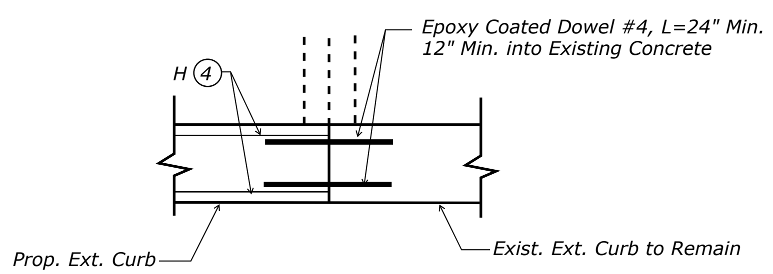
TABLE OF ESTIMATED CURB QUANTITIES 8

Curb Height "C"	Conc (CY/LF)	Reinf Steel (Lb/LF)
1'-0"	0.037	10.4
1'-6"	0.056	14.5
2'-0"	0.074	15.6
2'-6"	0.093	18.0
3'-0"	0.111	19.0
3'-6"	0.130	21.3
4'-0"	0.148	22.4
4'-6"	0.167	24.8
5'-0"	0.185	25.9



CONNECTION TO EXISTING EC

PLAN



DOWEL DETAIL

PLAN

MOD

CONSTRUCTION NOTES:

Adjust reinforcing steel as necessary to provide 1 ¼" cover.
For vehicle safety, top of the curb must not project more than 3" above the finished grade.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class "C" concrete (f'c = 3,600 psi) minimum for curbs.
Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
These extended curb details have sufficient strength to allow for future retrofit of Type T631 or T631LS railing. These details are suitable for use with PR11, PR22 and PR3 type rails. These details are not suitable for the mounting of other rail types. For new construction using T631 or T631LS railing, use the T631-CM standard.
This Curb is considered as part of the Box Culvert for payment.

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

07/06/2023

Texas Department of Transportation
Bridge Division Standard

EXTENDED CURB DETAILS

FOR BOX CULVERTS WITH CURBS OVER 1'-0" TO 5'-0" TALL

ECD MOD

FILE: ecdstde1-20.dgn	DN: GAF	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2020	CONT 1057	SECT 03	JOB 045	HIGHWAY FM 510
REVISIONS	DIST 21		COUNTY CAMERON	SHEET NO. 270

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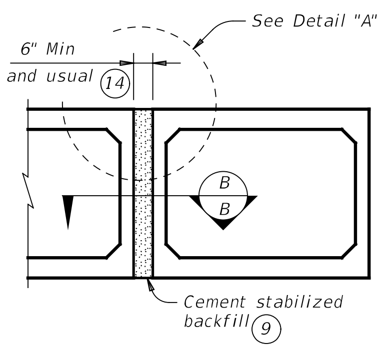
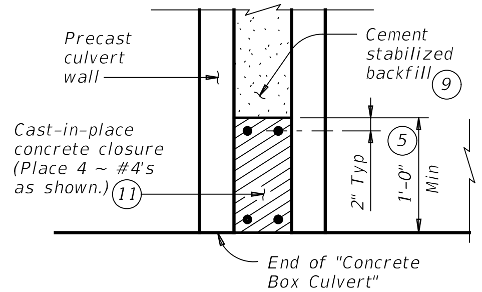
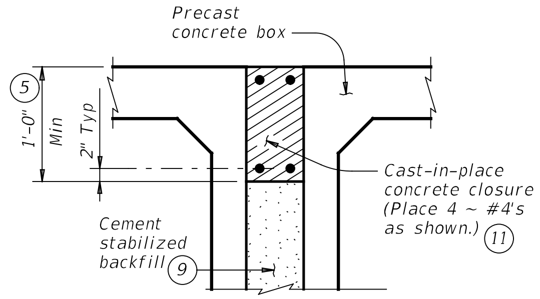


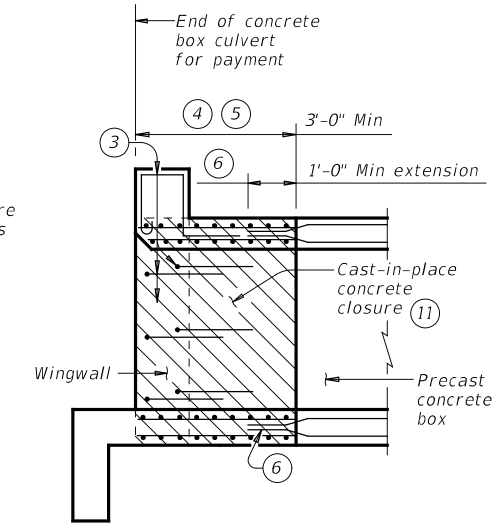
MULTIPLE UNIT PLACEMENT



SECTION B-B

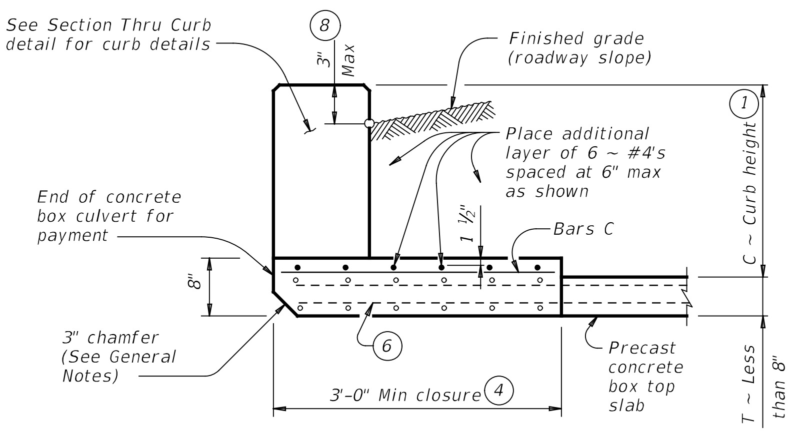


DETAIL "A" 13

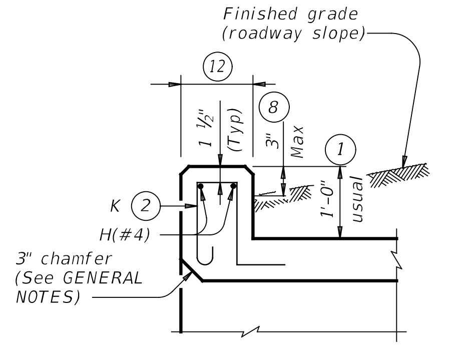


WINGWALL CONNECTION

(Also applies to safety end treatment.)

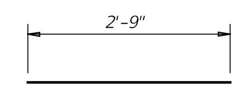


SECTION THRU TOP SLABS LESS THAN 8"

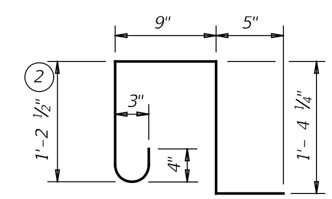


SECTION THRU CURB

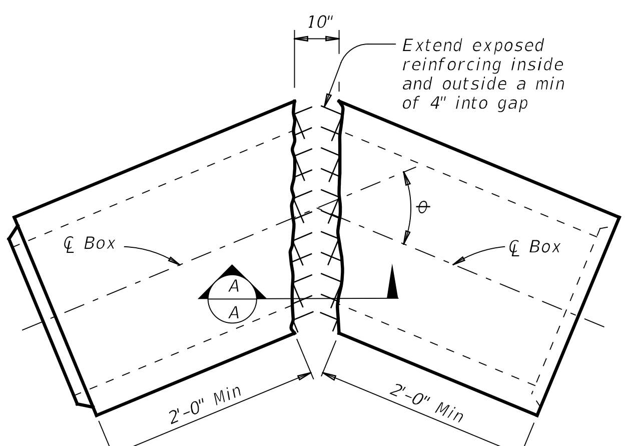
QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



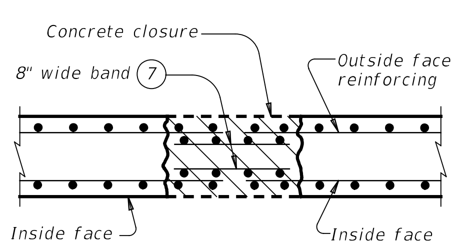
BARS C (#4)
(Spa = 1'-0" Max)



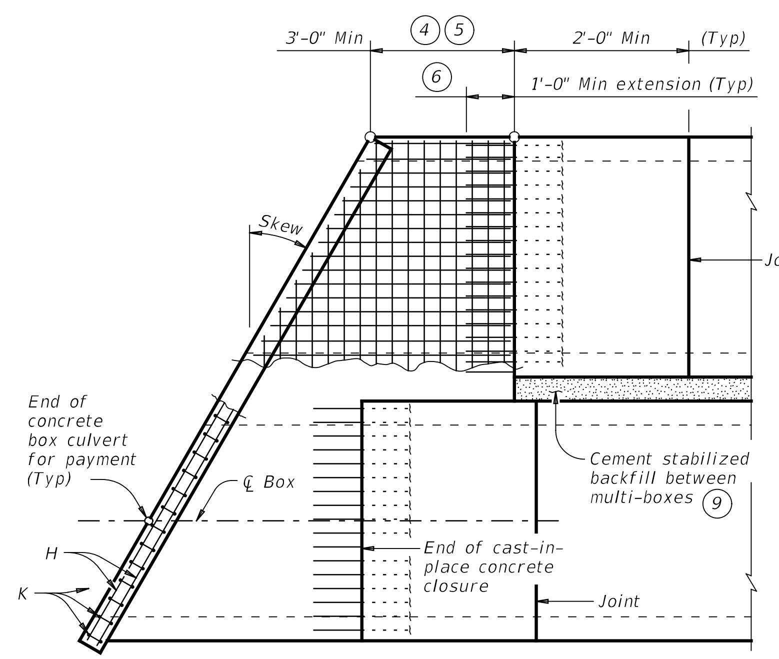
BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
2. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
3. Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.
4. Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast-in-place closure flush with the inside and outside faces of the precast box section.
5. For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'-0" Min cast-in-place closure in the top slab, bottom slab, and exterior wall. See Section B-B detail when interior walls are cast full length.
6. Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).
7. Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.
8. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. Cement stabilized backfill between boxes is considered part of the box culvert for payment.
10. All curb concrete and reinforcing is considered part of the box culvert for payment.
11. Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
12. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
13. For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".
14. This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

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

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

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©TxDOT February 2020	CONT 1057	SECT 03	JOB 045	HIGHWAY FM 510
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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing length (2~wings) (3)	
					Bars J1		Bars J2			
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9	6"	#6	6"	297.02	1.234

TABLE OF WINGWALL REINFORCING
(2~wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

WING DIMENSION FORMULAS:
(All values are in feet.)

Hw = H + T + C – 0.250'
A = (Hw – 0.333') (SL)
B = (A) tangent (30°)
Lw = (A) ÷ cosine (30°)

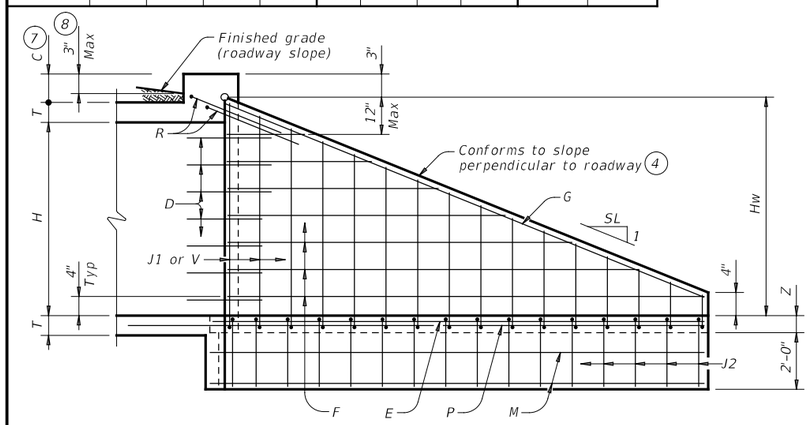
For cast–in–place culverts:
Ltw = (N) (S) + (N + 1) (U)

For precast culverts:
Ltw = (N) (2U + S) + (N – 1) (0.5')

Total wingwall area (two wings ~ SF) = (Hw + 0.333') (Lw)

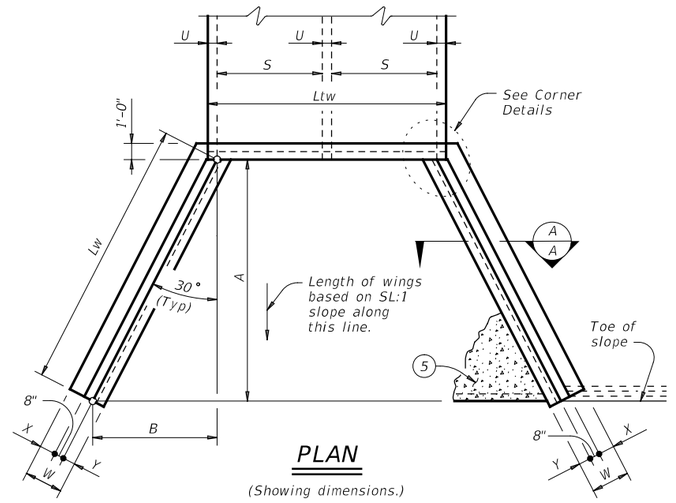
Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans

See applicable box culvert standard sheet for H, S, T, and U values.



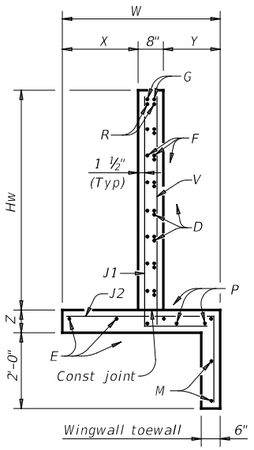
INSIDE ELEVATION

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

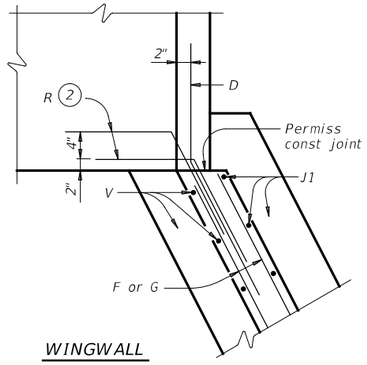


PLAN

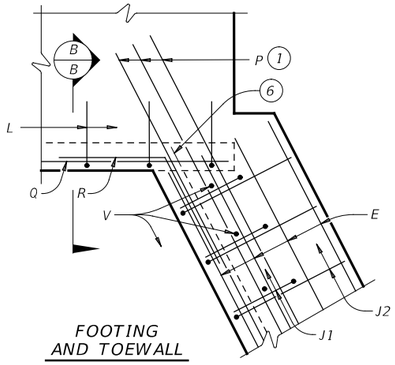
(Showing dimensions.)



SECTION A-A



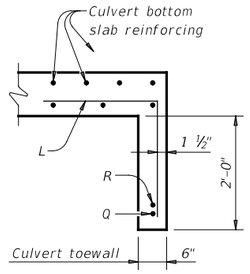
WINGWALL



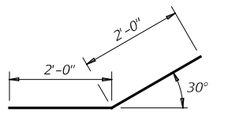
FOOTING AND TOEWALL

CORNER DETAILS

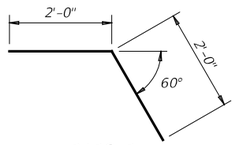
(Culvert and culvert toewall reinforcing not shown for clarity.)



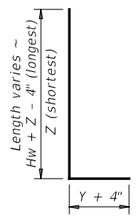
SECTION B-B (5)



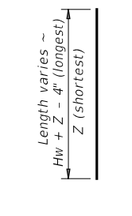
BARS D



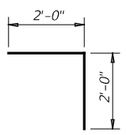
BARS R



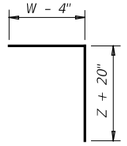
BARS J1



BARS V



BARS L



BARS J2

(1) Extend Bars P 3'-0" minimum into bottom slab of box culvert.

(2) Adjust as necessary to maintain 1 1#2" clear cover and 4" minimum between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings, multiply the tabulated values by Lw.

(4) Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'-6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of flow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B–B will not be required.

(6) At Contractor's option, culvert toewall may be ended flush with wingwall toewall. Adjust reinforcing as needed.

(7) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(8) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
In riprap concrete synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing unless noted otherwise.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

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

Texas Department of Transportation

Bridge Division Standard

CONCRETE WINGWALLS
WITH FLARED WINGS FOR 0° SKEW BOX CULVERTS

FW-0

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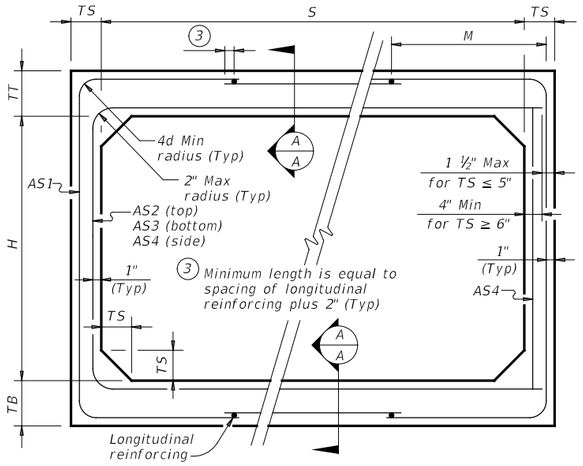
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
8	3	8	8	8	< 2	–	0.31	0.35	0.25	0.19	0.19	0.19	0.19	10.4
8	3	8	8	8	2 < 3	55	0.35	0.29	0.28	0.19	–	–	–	10.4
8	3	8	8	8	3 – 5	50	0.28	0.23	0.24	0.19	–	–	–	10.4
8	3	8	8	8	10	45	0.29	0.25	0.26	0.19	–	–	–	10.4
8	3	8	8	8	15	45	0.39	0.33	0.34	0.19	–	–	–	10.4
8	3	8	8	8	20	45	0.51	0.43	0.44	0.19	–	–	–	10.4
8	3	8	8	8	25	45	0.63	0.53	0.54	0.19	–	–	–	10.4
8	4	8	8	8	< 2	–	0.27	0.38	0.29	0.19	0.19	0.19	0.19	11.2
8	4	8	8	8	2 < 3	50	0.31	0.34	0.32	0.19	–	–	–	11.2
8	4	8	8	8	3 – 5	50	0.25	0.27	0.27	0.19	–	–	–	11.2
8	4	8	8	8	10	45	0.26	0.28	0.29	0.19	–	–	–	11.2
8	4	8	8	8	15	41	0.34	0.37	0.38	0.19	–	–	–	11.2
8	4	8	8	8	20	41	0.44	0.48	0.49	0.19	–	–	–	11.2
8	5	8	8	8	< 2	–	0.24	0.40	0.32	0.19	0.19	0.19	0.19	12.0
8	5	8	8	8	2 < 3	50	0.28	0.37	0.35	0.19	–	–	–	12.0
8	5	8	8	8	3 – 5	45	0.23	0.29	0.30	0.19	–	–	–	12.0
8	5	8	8	8	10	45	0.23	0.31	0.32	0.19	–	–	–	12.0
8	5	8	8	8	15	41	0.30	0.41	0.42	0.19	–	–	–	12.0
8	5	8	8	8	20	41	0.39	0.52	0.54	0.19	–	–	–	12.0
8	6	8	8	8	< 2	–	0.22	0.42	0.35	0.19	0.19	0.19	0.19	12.8
8	6	8	8	8	2 < 3	50	0.25	0.40	0.38	0.19	–	–	–	12.8
8	6	8	8	8	3 – 5	50	0.21	0.32	0.33	0.19	–	–	–	12.8
8	6	8	8	8	10	45	0.22	0.33	0.34	0.19	–	–	–	12.8
8	6	8	8	8	15	41	0.28	0.43	0.45	0.19	–	–	–	12.8
8	6	8	8	8	20	41	0.36	0.55	0.57	0.19	–	–	–	12.8
8	7	8	8	8	< 2	–	0.20	0.44	0.37	0.19	0.19	0.19	0.19	13.6
8	7	8	8	8	2 < 3	55	0.23	0.43	0.41	0.19	–	–	–	13.6
8	7	8	8	8	3 – 5	55	0.19	0.34	0.35	0.19	–	–	–	13.6
8	7	8	8	8	10	50	0.20	0.34	0.36	0.19	–	–	–	13.6
8	7	8	8	8	15	41	0.26	0.45	0.47	0.19	–	–	–	13.6
8	7	8	8	8	20	41	0.33	0.57	0.60	0.19	–	–	–	13.6
8	8	8	8	8	< 2	–	0.20	0.45	0.40	0.19	0.19	0.19	0.19	14.4
8	8	8	8	8	2 < 3	65	0.21	0.45	0.44	0.19	–	–	–	14.4
8	8	8	8	8	3 – 5	65	0.19	0.36	0.38	0.19	–	–	–	14.4
8	8	8	8	8	10	55	0.19	0.35	0.38	0.19	–	–	–	14.4
8	8	8	8	8	15	45	0.24	0.46	0.49	0.19	–	–	–	14.4
8	8	8	8	8	20	45	0.31	0.59	0.62	0.19	–	–	–	14.4

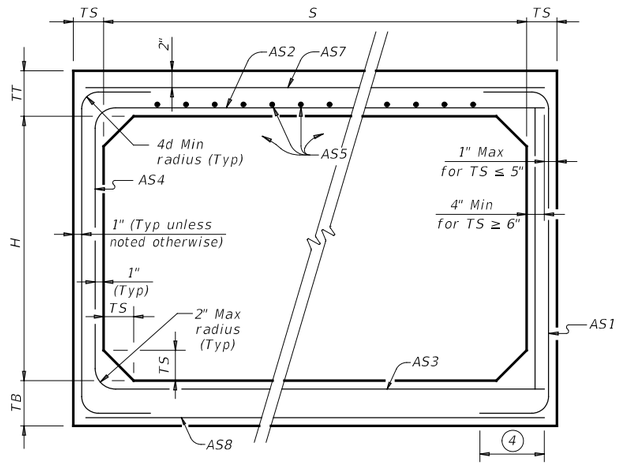
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

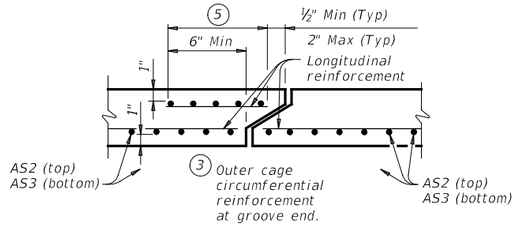
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

8'-0" SPAN

SCP-8

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	DIST	COUNTY		SHEET NO.
	21	CAMERON		273

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" (2) Conc (Curb) (CY)	Class "C" (3) Conc (Wingwall) (CY)	Total Wingwall Area (SF)
361+98.68 (Both) (5)	1 - 8'x5'	7'	SCP-8	FW-0	0	1.5:1	8"	8"	1.30	7.0'	10'	5.77'	11.54'	9.16'	N/A	0	0.8	9.5	84

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment

SL:1 = Horizontal : 1 Vertical
- Side slope at culvert for flared or straight wingwalls.
- Channel slope for parallel wingwalls.
- Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

(5) Quantities shown exclude existing box culverts and wingalls to remain in place.

SPECIAL NOTE:

This sheet is a supplement to the box culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

STATE OF TEXAS
ANDRES A. SALAZAR
95010
LICENSED
PROFESSIONAL ENGINEER
05/25/2023

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1057	03	045	FM 510
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		274

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