FINAL SUBMITTAL

SEE SHEET 2 FOR
INDEX OF SHEETS

DESIGN SPEED = 40, 45, 50, 55 MPH
A.D.T. (2019) = (SH 20) 16,464 (FM 1281) 30,018
A.D.T. (2021) = (SH 20) 17,130 (FM 1281) 31,231

CONT	SECT	JOB	HIGHWAY
3451	01	035, ETC	FM 1281, ETC.
DIST	COUNTY		SHEET NO.
ELP	EL PASO		1

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NO. STP 2021 (624) HES

FM 1281 (HORIZON BLVD)
SH 20 (ALAMEDA AVE)

EL PASO COUNTY

CSJ: 0002-01-099: NET LENGTH OF ROADWAY= 34,911.36 FT. = 6.612 MI.
3451-01-035: NET LENGTH OF ROADWAY= 15,391.20 FT. = 2.915 MI.
3451-01-036: NET LENGTH OF ROADWAY= 22,593.12 FT. = 4.279 MI.
3451-01-041: NET LENGTH OF PROJECT= 22,577.28 FT. = 4.276 MI.

FINAL PLANS

CONTRACTOR:_____
TIME CHARGES BEGAN:_____
DATE CONTRACTOR BEGAN WORK:_____
DATE WORK WAS COMPLETED:_____
DATE WORK WAS ACCEPTED:_____
TOTAL DAYS CHARGED:_____
ORIGINAL CONTRACT AMOUNT: $_____
AMOUNT OF CONTRACT AMENDMENTS: $_____
FINAL CONTRACT COST: $_____
_____ 20____

_____
EL PASO AREA ENGINEER

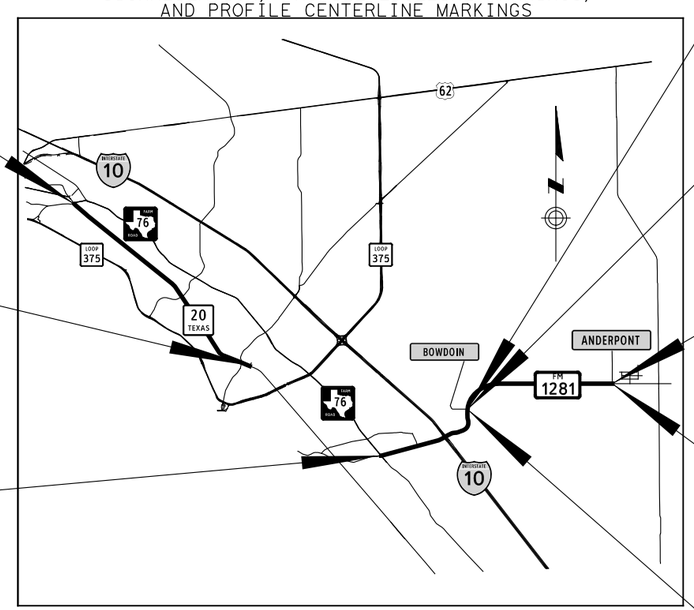
LIMITS: CSJ 0002-01-099: SH 20 - FROM 0.085 MILES SOUTH OF FM 76 TO 0.17 MILES WEST OF COLINA
CSJ 3451-01-035: FM 1281 - FROM FM 76 TO 1.194 MILES NORTH OF IH-10 (BOWDOIN)
CSJ 3451-01-036: FM 1281 - FROM 1.194 MILES NORTH OF IH-10 (BOWDOIN) TO 5.474 MILES EAST OF IH-10 (ANDERPONT)
CSJ 3451-01-041: FM 1281 - FROM 1.194 MILES NORTH OF IH-10 (BOWDOIN) TO 5.474 MILES EAST OF IH-10 (ANDERPONT)

FOR THE CONSTRUCTION OF HAZARD ELIMINATION AND SAFETY CONSISTING OF THE INSTALL OF A RAISED MEDIAN, ILLUMINATION, SIGNALIZATION, PROFILE EDGELINE MARKINGS, AND PROFILE CENTERLINE MARKINGS

BEGIN PROJECT
CSJ: 0002-01-099
LAT: 31.7598384
LON: -106.3995487
RM: 334-0.211

END PROJECT
CSJ: 0002-01-099
LAT: 31.6904975
LON: -106.3246001
RM: 340+0.446

BEGIN PROJECT
CSJ: 3451-01-035
LAT: 31.6516368
LON: -106.2674559
RM: 30-0.026



EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

REGISTERED ACCESSIBILITY SPECIALIST (RAS) INSPECTION REQUIRED
TDLR NO. TABS2021012624

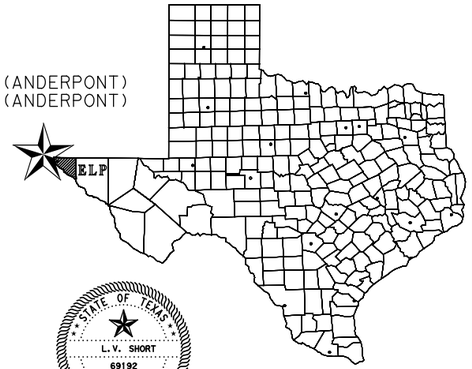
BEGIN PROJECT
CSJ: 3451-01-036
LAT: 31.6718020
LON: -106.2301339
RM: 32+0.917

BEGIN PROJECT
CSJ: 3451-01-041
LAT: 31.6717990
LON: -106.2301342
RM: 32+0.917

END PROJECT
CSJ: 3451-01-036
LAT: 31.6827585
LON: -106.1642435
RM: 36+1.203

END PROJECT
CSJ: 3451-01-041
LAT: 31.6827585
LON: -106.1642413
RM: 36+1.203

END PROJECT
CSJ: 3451-01-035
LAT: 31.6717971
LON: -106.2301344
RM: 32+0.917



STATE OF TEXAS
L. V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER

L.V. Short
04-05-21

RECOMMENDED FOR LETTING: 4/5/2021
DocuSigned by: Eduardo Perales, P.E.
SAFETY REVIEW COMMITTEE CHAIRMAN

RECOMMENDED FOR LETTING: 4/6/2021
DocuSigned by: L. Raul Ortega Jr., P.E.
DISTRICT DIRECTOR OF TRANSPORTATION
PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 4/6/2021
DocuSigned by: Tomas Trevino, P.E.
DISTRICT ENGINEER

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

REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH BC (1)- 14 THRU BC (12)- 14 AND THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

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FINAL SUBMITTAL

SHEET NO.	DESCRIPTION
	GENERAL
1	TITLE SHEET
2	INDEX OF SHEETS
3 - 4	PROJECT LAYOUT SH 20
5 - 7	PROJECT LAYOUT FM 1281
8 - 9	TYPICAL SECTIONS ROADWAY
10 - 12	TYPICAL SECTIONS SIDEWALK
13 - 13J	GENERAL NOTES
14, 14A - 14C	ESTIMATE AND QUANTITY SHEETS
	SUMMARY OF QUANTITIES
15	REMOVALS SUMMARY SHEET
16	SUMMARY OF ROADWAY IMPROVEMENTS
17	SUMMARY OF SIDEWALK AND EROSION CONTROL
18	SUMMARY OF QUANTITIES ILLUMINATION
19	SH 20 & FM 1281 DRAINAGE SUMMARY SHEET
20	SIGNING & PAVEMENT MARKINGS SUMMARY SHEET
21	SUMMARY OF SIGNING AND PAVEMENT MARKINGS
22	PEDESTRIAN TRAFFIC SIGNAL SUMMARY SHEET
	TRAFFIC CONTROL PLAN
23	TMA SUMMARY
24	TRAFFIC CONTROL PLAN NARRATIVE
25 - 26	TRAFFIC CONTROL PLAN TYPICAL SECTION
27	TRAFFIC CONTROL PLAN PEDESTRIAN DETOUR LAYOUT
	TRAFFIC CONTROL PLAN STANDARDS
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29	BC(2)-14
30	BC(3)-14
31	BC(4)-14
32	BC(5)-14
33	BC(6)-14
34	BC(7)-14
35	BC(8)-14
36	BC(9)-14
37	BC(10)-14
38	BC(11)-14
39	BC(12)-14
40	TCP(2-1)-18
41	TCP(2-4)-18
42	TCP(3-1)-13
43	TCP(3-2)-13
44	WZ(BRK)-13
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53	HORIZONTAL ALIGNMENT DATA SHEET - SH 20
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60 - 75	FM 1281 REMOVAL
76	TYPICAL MEDIAN LAYOUT DETAIL
77 - 80	MEDIAN LAYOUT SH 20
81 - 95	MEDIAN LAYOUT FM 1281
96 - 103	SIDEWALK LAYOUT
104	CURB & MEDIAN DETAIL
105	COLORED CONCRETE AND MISCELLANEOUS DETAILS
	ROADWAY STANDARDS
106	TAU(M)(N)-19
107	QGUARD(M10)(N)-20
108 - 109	CSB110
110	CRASH CUSHION SUMMARY SHEET
111	SSCB(1F)-10
112	SSCB(4)-19
113	CCCG-21
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	DRAINAGE
118 - 124	INTERIOR DRAINAGE AREA LAYOUTS
125	INTERIOR DRAINAGE AREA HYDRAULIC CALCULATIONS
126 - 127	DITCH HYDRAULIC CALCULATIONS
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	UTILITIES
129 - 140	UTILITY LAYOUT
141	ILLUMINATION GENERAL NOTES
142 - 157	ILLUMINATION LAYOUTS
158 - 162	ILLUMINATION CIRCUIT DIAGRAM
163	PEDESTRIAN CROSSING GEORGE ORR ROAD INTERSECTION LAYOUT
164	PEDESTRIAN CROSSING BRIO ALAMEDA AVENUE CORRIDOR LAYOUT 1
165	PEDESTRIAN CROSSING MIDWAY DRIVE INTERSECION LAYOUT
166	PEDESTRIAN CROSSING MCCARTHY AVENUE INTERSECTION LAYOUT
167	PEDESTRIAN CROSSING BRIO ALAMEDA AVENUE CORRIDOR LAYOUT 2
168	PEDESTRIAN CROSSING RAPID FLASHING BEACON LAYOUT 1
169	PEDESTRIAN CROSSING RAPID FLASHING BEACON LAYOUT 2
170	PEDESTRIAN CROSSING SCHOOL FLASHER LAYOUT 1
171	PEDESTRIAN CROSSING SCHOOL FLASHER LAYOUT 2

SHEET NO.	DESCRIPTION
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173	ED(3)-14
174	ED(4)-14
175	ED(5)-14
176	ED(6)-14
177	ED(7)-14
178	ED(8)-14
179	ED(10)-14
180	ED(11)-14
181	ED(12)-14
182	RID(1)-20
183	RID(2)-20
184	RIP(1)-19
185	RIP(2)-19
186	RIP(3)-19
187	RIP(4)-19
188	RFBA-13
189	SPRFBA(1)-13
190	SPRFBA(3)-13
191	SMA-80(1)-12
192	SMA-80(2)-12
193	MA-C-12
194	MA-D-12
195	TS-FD-12
196	TS-BP-20
197	RRFB
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199	SCHOOL FLASHER DETAIL
	SIGNING AND PAVEMENTMARKINGS
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207 - 210	SUMMARY OF SMALL SIGNS (FM 1281)
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244	SMD(SLIP-1)-08
245	SMD(SLIP-2)-08
246	SMD(SLIP-3)-08
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Texas Department of Transportation

NO.	REVISION	BY	DATE

THE STANDARD SHEETS HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
L.V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER

04-2021

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

INDEX OF SHEETS

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO		3451	01	035, ETC.	2

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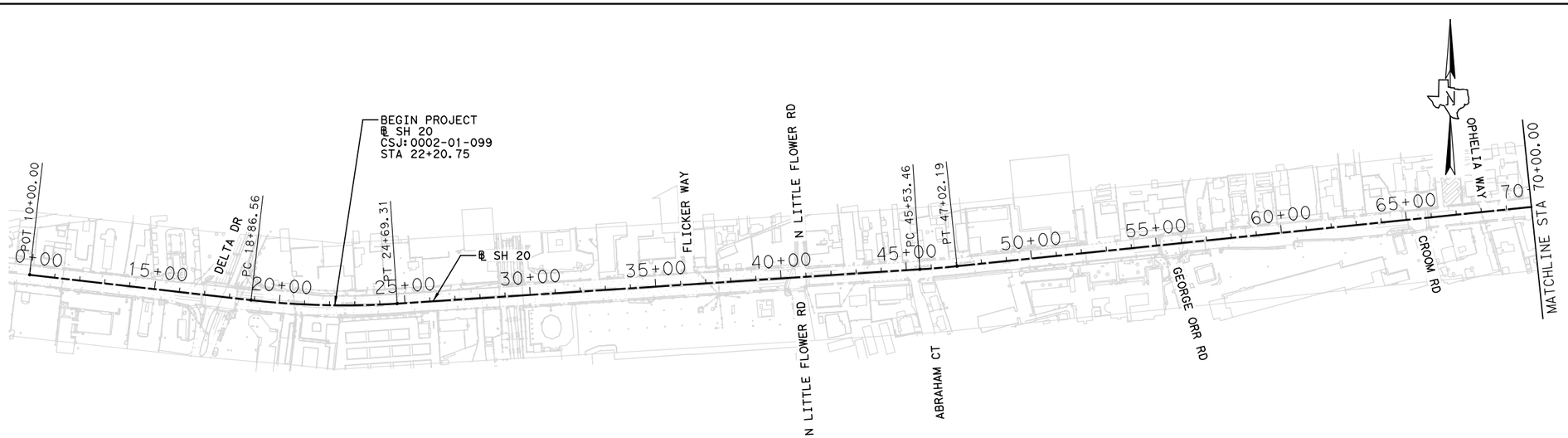

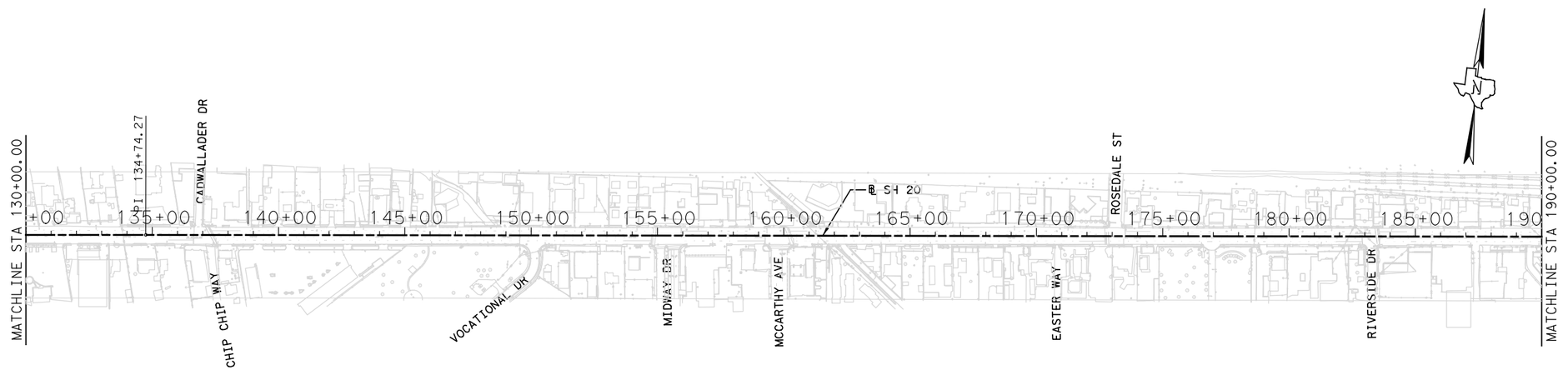

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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
09/24/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

PROJECT LAYOUT
SH 20

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
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CHECKED:	ELP	EL PASO	3451	01	036, ETC. / 003

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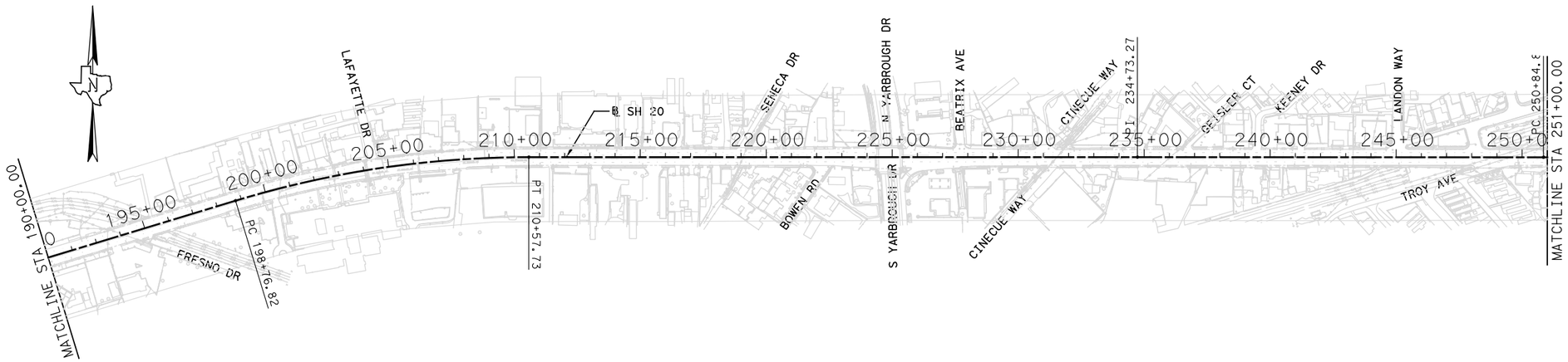

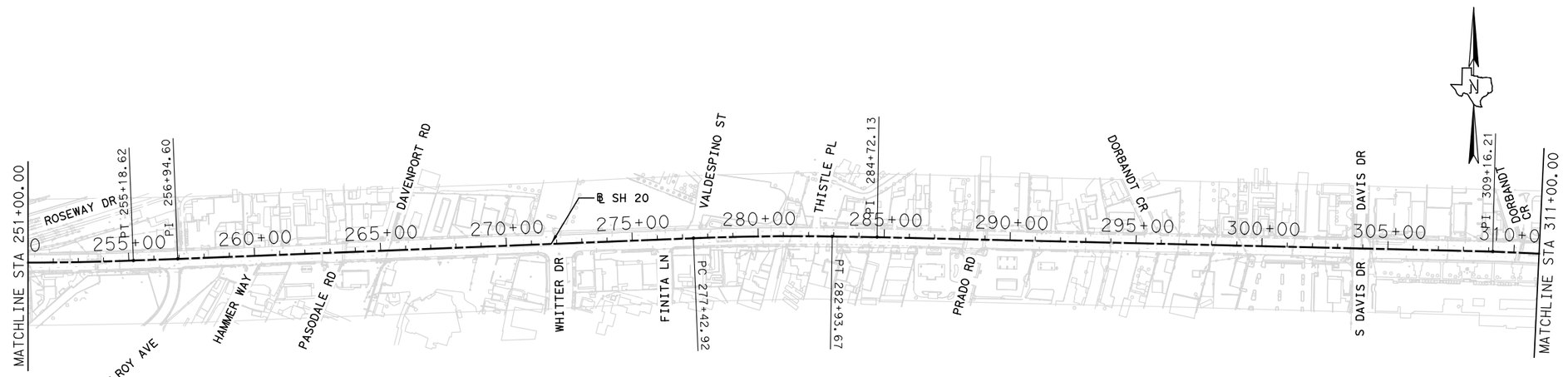

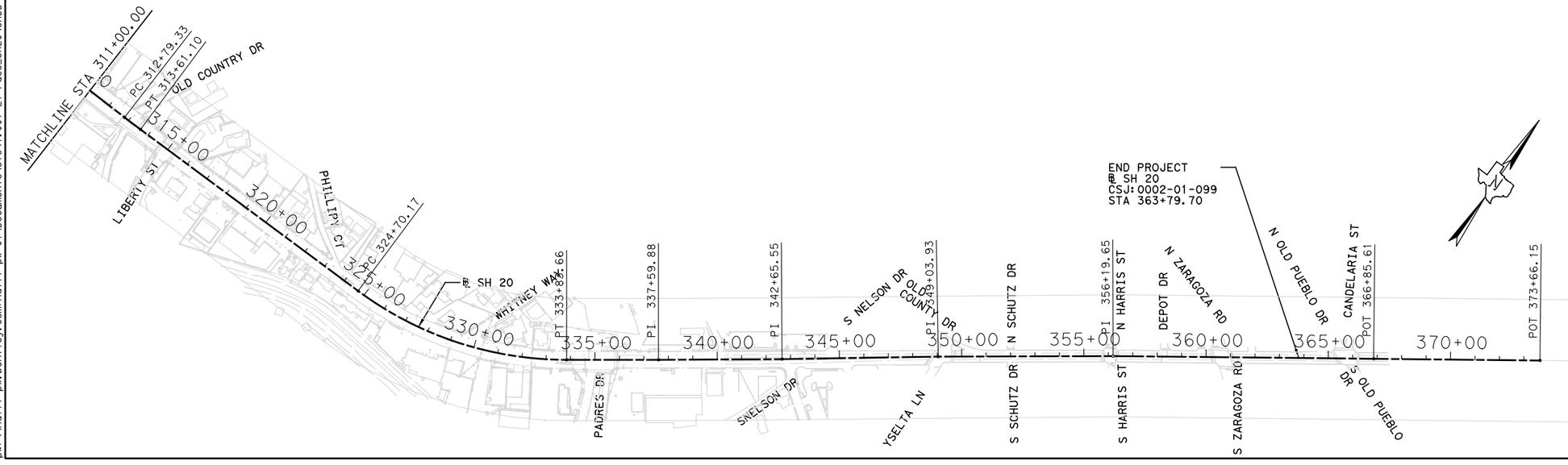

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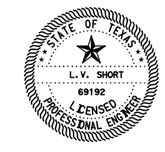
Texas Department of Transportation

NO.	REVISION	BY	DATE



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9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

PROJECT LAYOUT SH 20

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO	3451	01	026, ETC.	004

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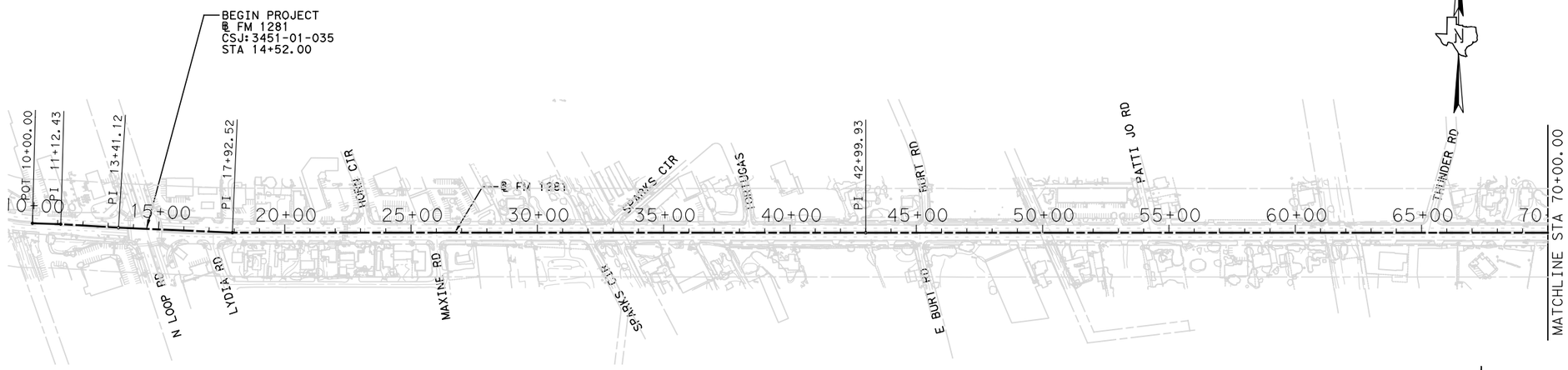

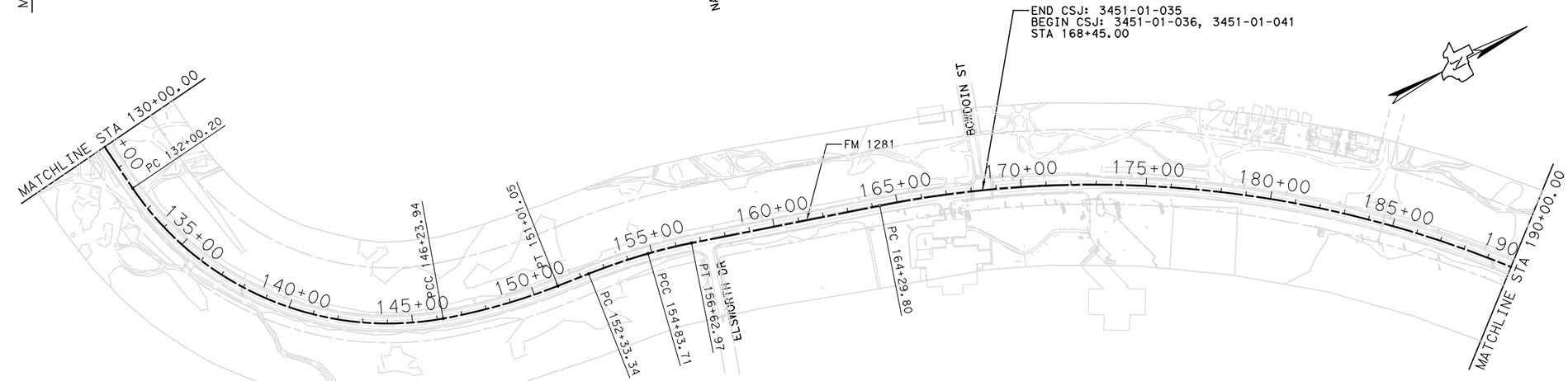

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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

PROJECT LAYOUT FM 1281

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO		3451	01	035, ETC.	005

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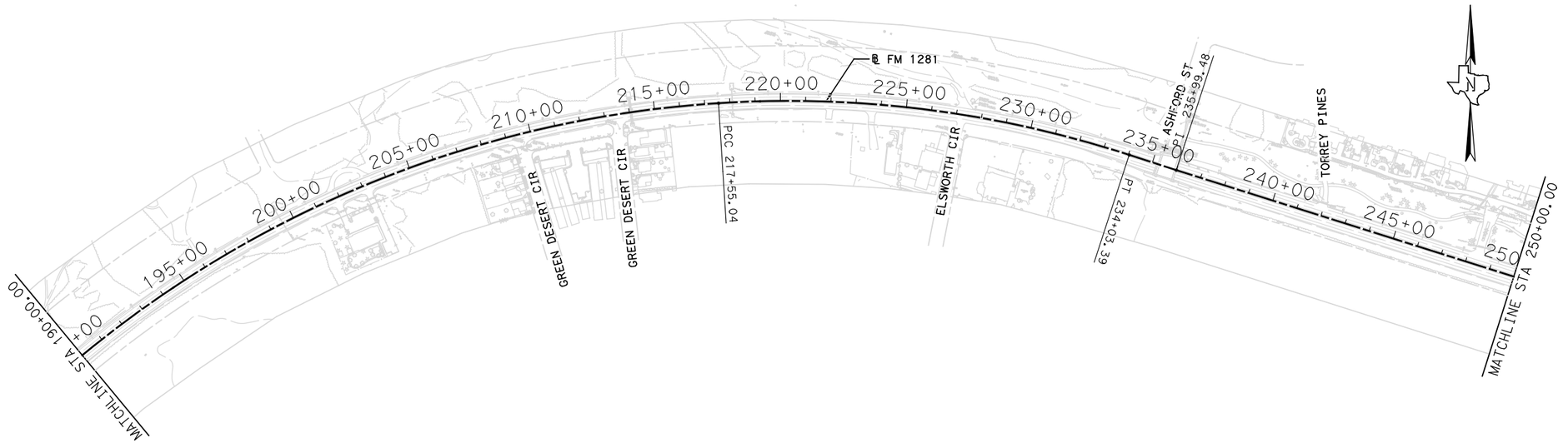

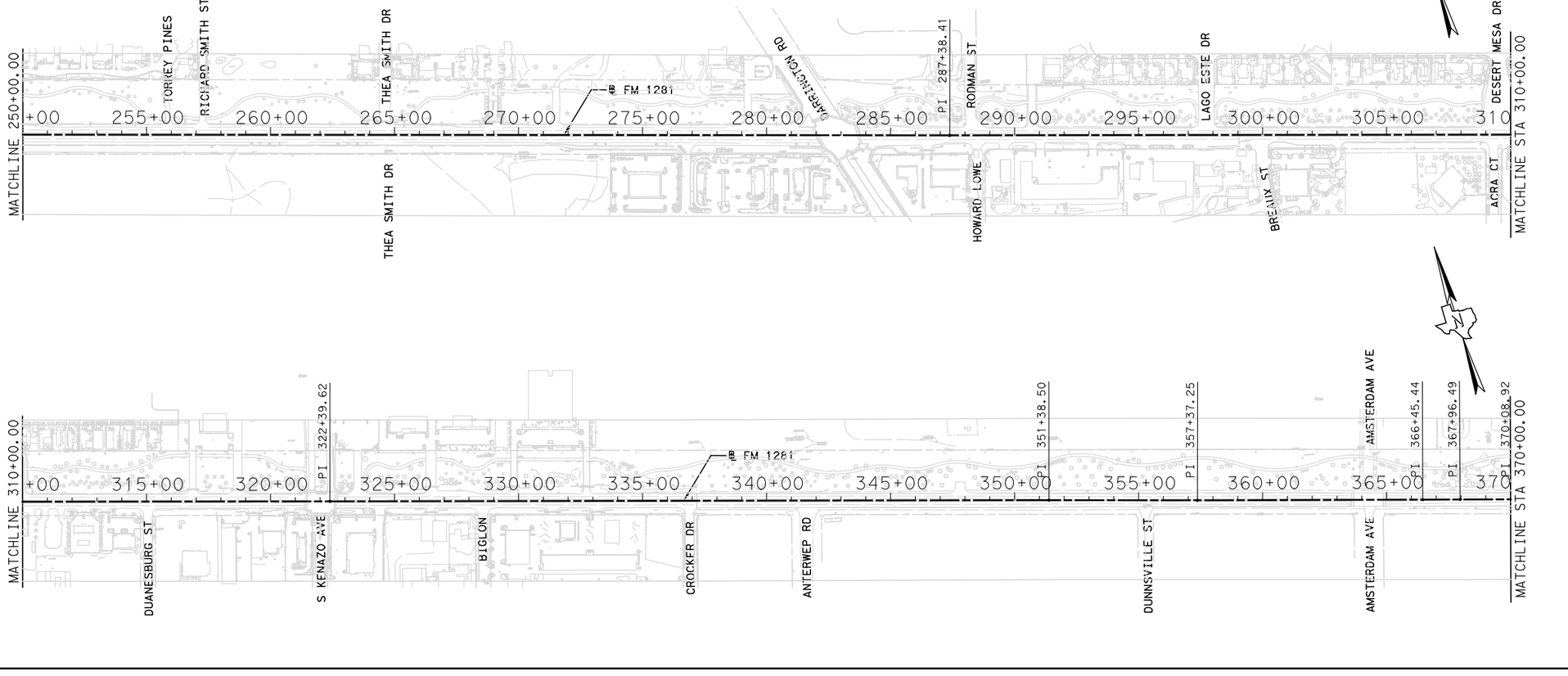

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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
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TBPELS FIRM NO. F-312

SH 20 & FM 1281

PROJECT LAYOUT
FM 1281

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
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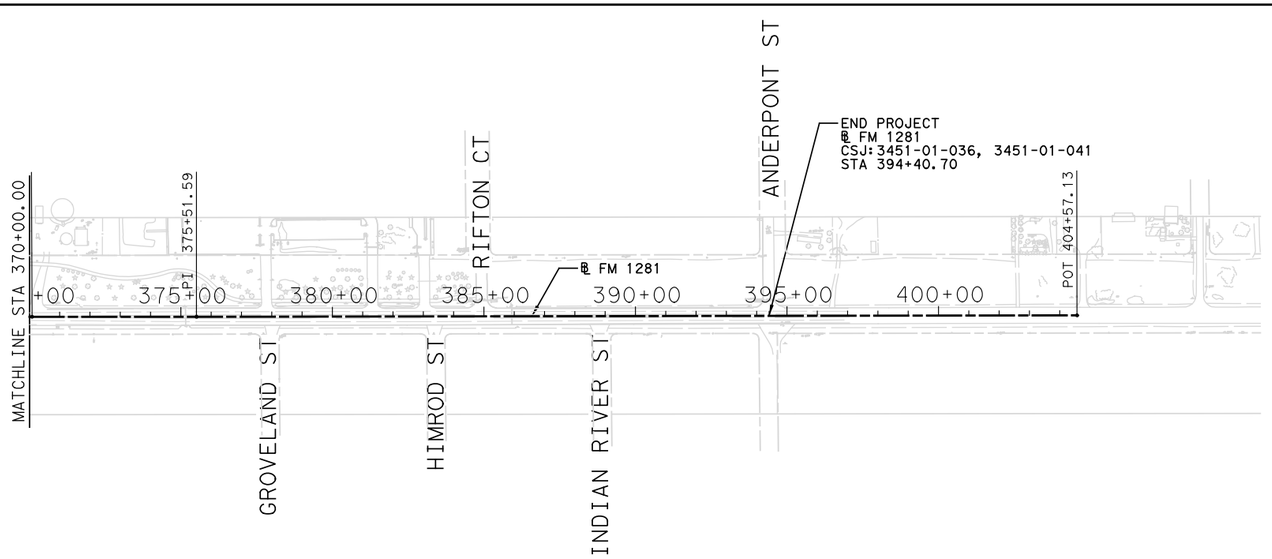

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Texas Department of Transportation

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03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
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SH 20 & FM 1281

PROJECT LAYOUT FM 1281

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CHECKED:	ELP	EL PASO	3451	01	036, ETC. / 007

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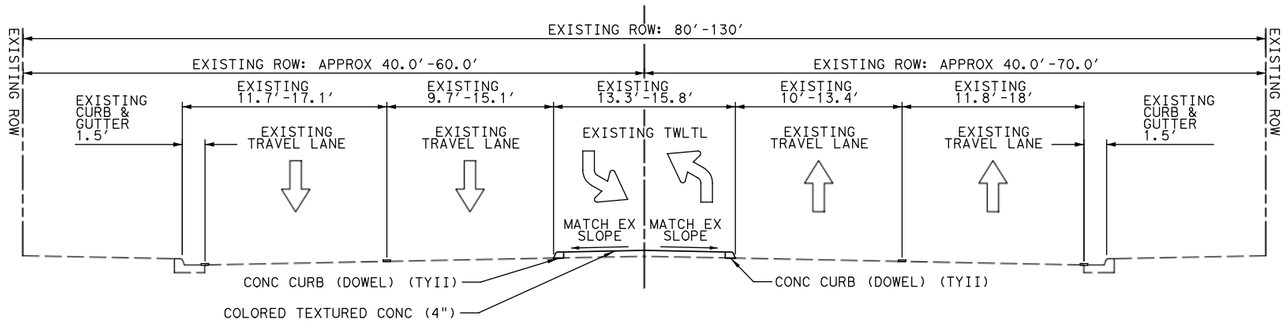
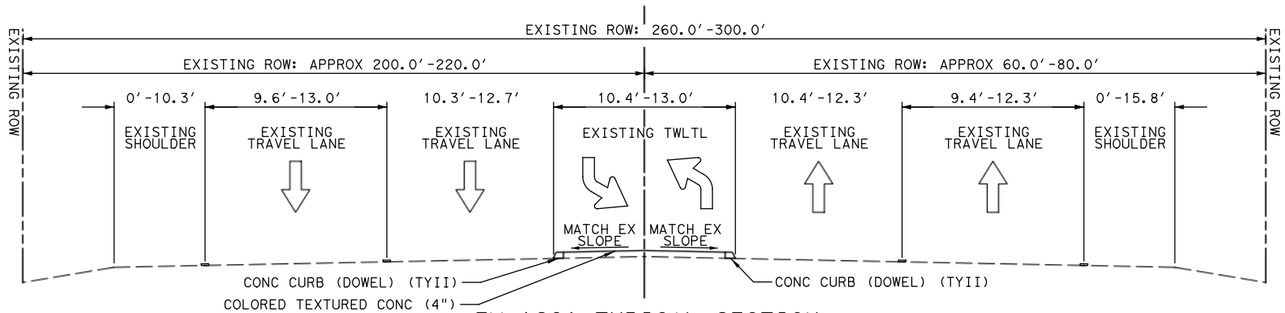


FM 1281 TYPICAL SECTION

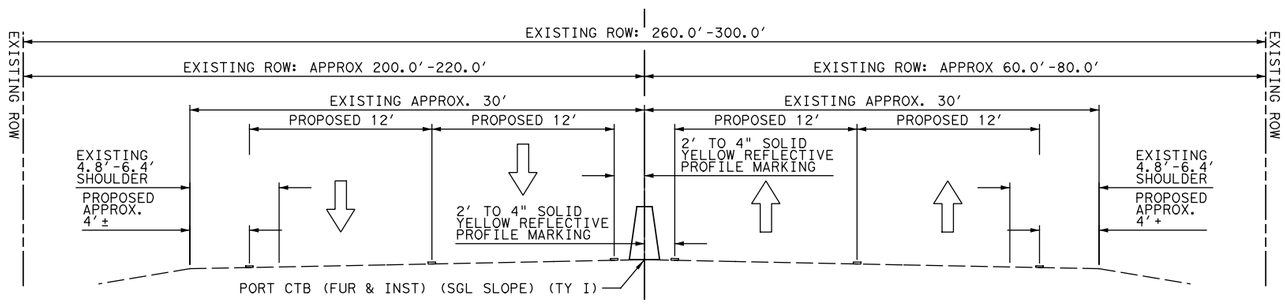
EXISTING OUTSIDE LANE CURB
FROM: STA 14+52.00 TO: 114+00.00
FROM: STA 14+52.00 TO: 114+00.00



FM 1281 TYPICAL SECTION

EXISTING OUTSIDE LANE SHOULDER
FROM: STA 114+00.00 TO: 130+46.19
FROM: STA 155+62.70 TO: 170+01.94
FROM: STA 207+84.52 TO: 394+40.70

NOTE: PROPOSED SIDEWALK IS SHOWN IN SIDEWALK TYPICAL SECTIONS A-E



FM 1281 TYPICAL SECTION

EXISTING OUTSIDE LANE SHOULDER WITH PROPOSED CONCRETE TRAFFIC BARRIER
FROM: STA 175+05.00 TO: 207+15.00

NOTES:

1. SEE SIDEWALK TYPICAL SECTIONS FOR SIDEWALK CONSTRUCTION.
2. CONCRETE TRAFFIC BARRIER IS TYPE SSCB(4)-19 WHERE DUAL ARM ILLUMINATION IS PRESENT. SEE ILLUMINATION SHEETS FOR MORE INFORMATION.

Texas Department of Transportation

NO.	REVISION	BY	DATE

03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

TYPICAL SECTIONS ROADWAY

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO		3451	01	035, ETC.	008

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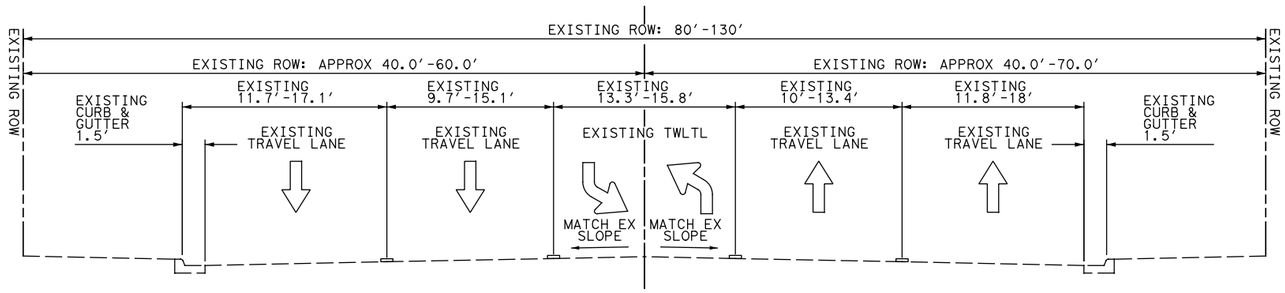
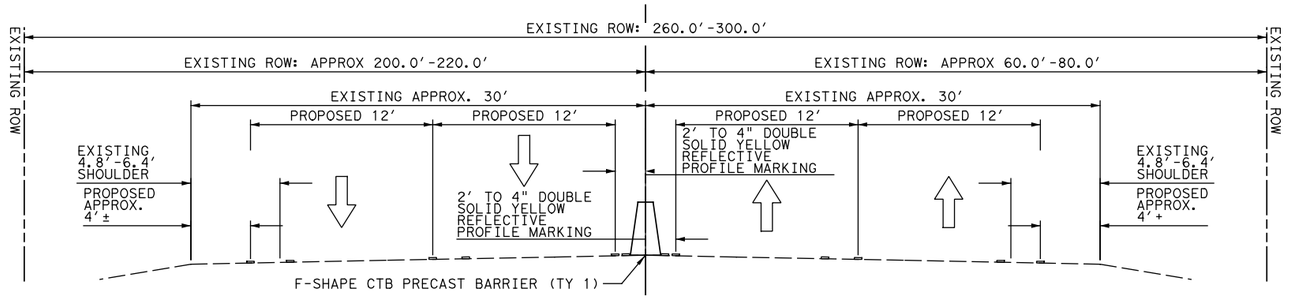


SH 20/ FM 1281 TYPICAL SECTION

EXISTING OUTSIDE LANE CURB

FM 1281 FROM: STA 31+04.03 TO: 39+35.38
FM 1281 FROM: STA 118+25.61 TO: 127+13.15
FM 1281 FROM: STA 375+31.89 TO: 378+43.33
SH 20 FROM: STA 22+20.75 TO: 54+24.49
SH 20 FROM: STA 55+02.46 TO: 146+20.17
SH 20 FROM: STA 147+45.79 TO: 212+96.57
SH 20 FROM: STA 214+24.19 TO: 252+63.25
SH 20 FROM: STA 253+68.81 TO: 363+79.40



FM 1281 TYPICAL SECTION

FROM: STA 130+46.19 TO: 155+62.70

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

TYPICAL SECTIONS ROADWAY

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO	3451	01	032, ETC.	009

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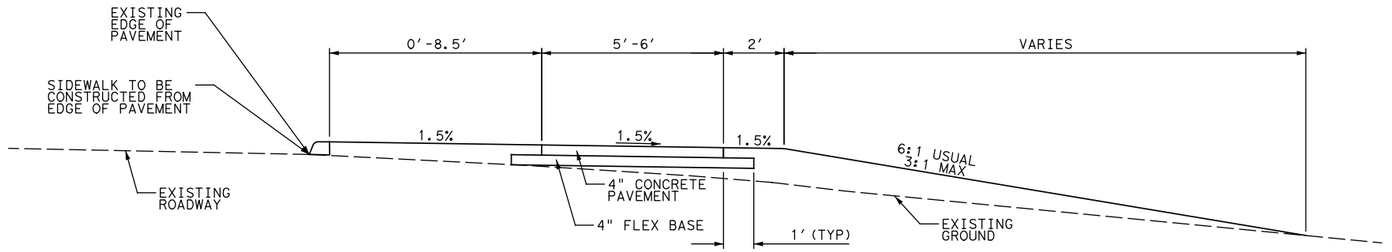
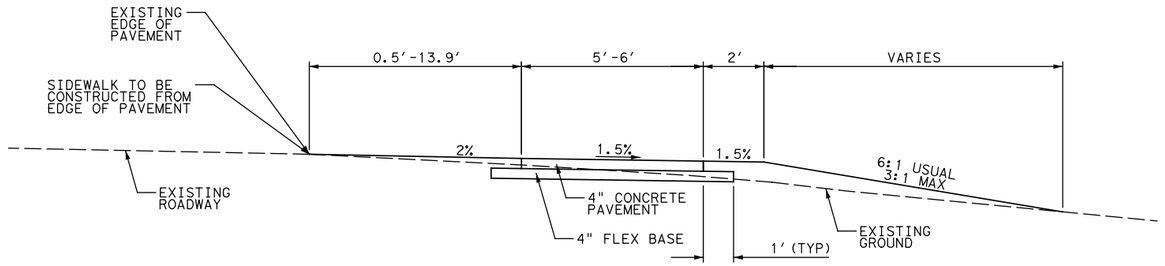
FINAL SUBMITTAL

NOT TO SCALE



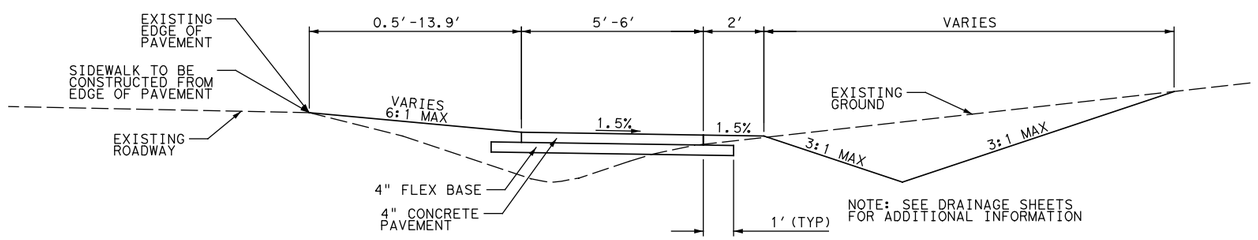
FM 1281 SIDEWALK TYPICAL SECTION

FROM: STA 169+37.71 TO: 169+69.87
FROM: STA 172+24.56 TO: 172+63.81
FROM: STA 173+13.29 TO: 173+60.07
FROM: STA 201+39.22 TO: 201+69.96
FROM: STA 202+03.04 TO: 202+99.28
FROM: STA 230+31.69 TO: 203+75.25
FROM: STA 208+46.42 TO: 209+19.10
FROM: STA 209+84.22 TO: 210+27.11
FROM: STA 212+79.86 TO: 213+16.93
FROM: STA 213+77.61 TO: 214+51.79
FROM: STA 234+60.13 TO: 234+85.69
FROM: STA 320+23.65 TO: 320+59.24



FM 1281 SIDEWALK TYPICAL SECTION

FROM: STA 169+69.87 TO: 172+24.56
FROM: STA 173+60.07 TO: 177+87.84
FROM: STA 181+60.47 TO: 187+34.66
FROM: STA 196+08.74 TO: 201+39.22
FROM: STA 203+75.25 TO: 208+46.42
FROM: STA 210+27.11 TO: 212+79.86
FROM: STA 214+51.29 TO: 221+81.66
FROM: STA 230+07.27 TO: 234+60.13



FM 1281 SIDEWALK TYPICAL SECTION

FROM: STA 177+87.84 TO: 181+60.47
FROM: STA 187+34.66 TO: 196+08.74

NOTES:

1. EXISTING GROUND MAY HAVE CHANGED SINCE TIME OF SURVEY. CONTRACTOR SHALL IMMEDIATELY CONTACT ENGINEER IF SLOPE SHOWN ON TYPICAL SECTIONS IS NOT FEASIBLE.

Texas Department of Transportation

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TYPICAL SECTIONS SIDEWALK

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
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FINAL SUBMITTAL

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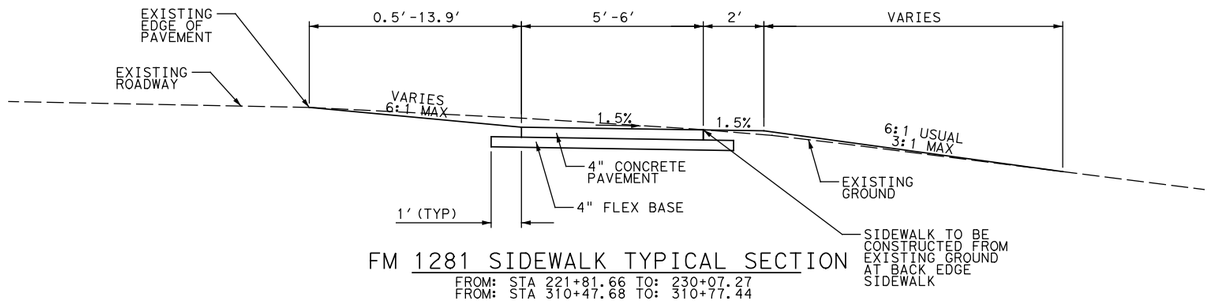
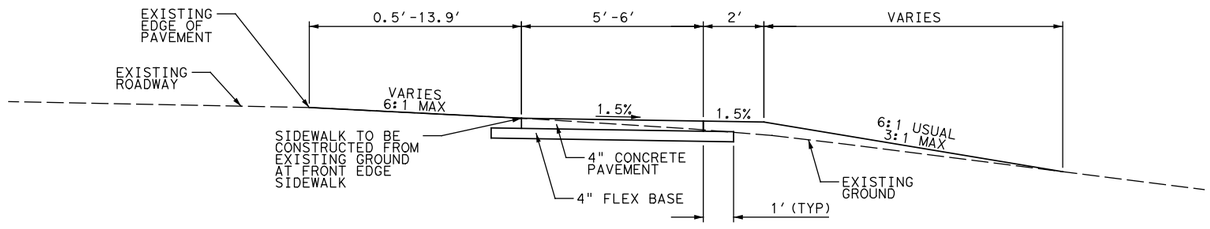


FM 1281 SIDEWALK TYPICAL SECTION

FROM: STA 221+81.66 TO: 230+07.27
FROM: STA 310+47.68 TO: 310+77.44



FM 1281 SIDEWALK TYPICAL SECTION

FROM: STA 311+03.53 TO: 311+43.05
FROM: STA 311+67.89 TO: 312+20.92
FROM: STA 312+71.78 TO: 313+19.86
FROM: STA 313+45.62 TO: 314+81.39
FROM: STA 315+28.78 TO: 319+11.44
FROM: STA 319+53.31 TO: 320+23.65

NOTES:

1. EXISTING GROUND MAY HAVE CHANGED SINCE TIME OF SURVEY. CONTRACTOR SHALL IMMEDIATELY CONTACT ENGINEER IF SLOPE SHOWN ON TYPICAL SECTIONS IS NOT FEASIBLE.

Texas Department of Transportation

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STATE OF TEXAS
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TYPICAL SECTIONS SIDEWALK

DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
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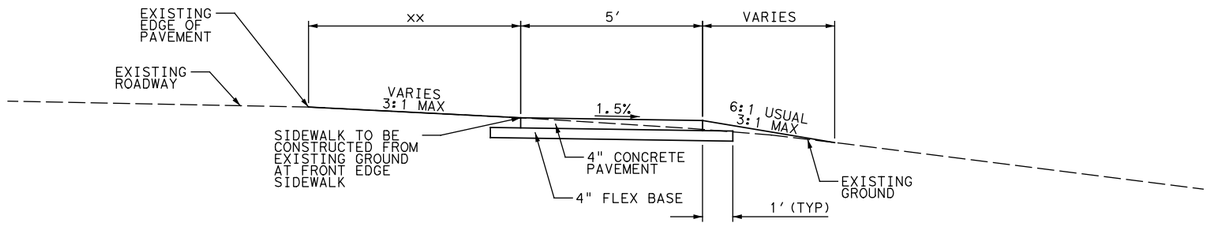
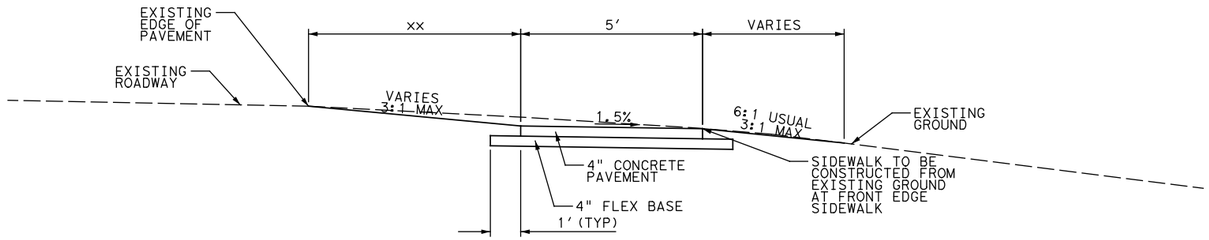
FINAL SUBMITTAL

NOT TO SCALE



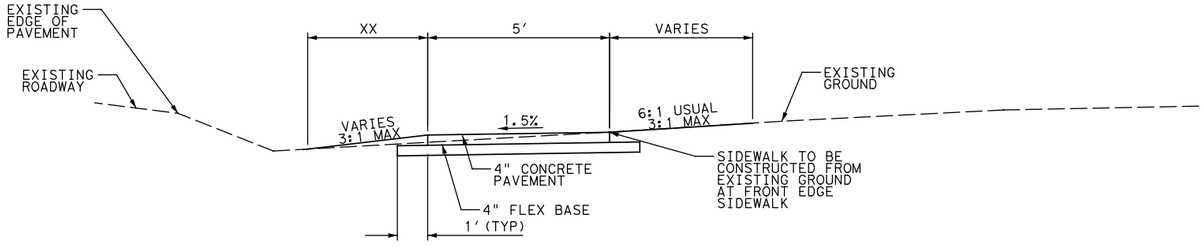
FM 1281 SIDEWALK TYPICAL SECTION

FROM: STA 303+33.01 TO: 309+11.19



FM 1281 SIDEWALK TYPICAL SECTION

FROM: STA 264+97.81 TO: 265+27.26
FROM: STA 271+64.20 TO: 273+54.13
FROM: STA 280+51.40 TO: 280+93.42
FROM: STA 288+99.57 TO: 289+84.20
FROM: STA 294+25.42 TO: 294+55.41



FM 1281 SIDEWALK TYPICAL SECTION

FROM: STA 265+27.26 TO: 271+64.20
FROM: STA 273+54.13 TO: 273+70.65
FROM: STA 280+20.18 TO: 280+51.40
FROM: STA 289+84.20 TO: 290+14.32

NOTES:

1. EXISTING GROUND MAY HAVE CHANGED SINCE TIME OF SURVEY. CONTRACTOR SHALL IMMEDIATELY CONTACT ENGINEER IF SLOPE SHOWN ON TYPICAL SECTIONS IS NOT FEASIBLE.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
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LICENSED PROFESSIONAL ENGINEER
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SH 20 & FM 1281

TYPICAL SECTIONS SIDEWALK

5 OF 5

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
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General Notes:

General Requirements

Maintain the entire project area in a neat and orderly manner throughout the duration of the work. Remove all construction litter and undesirable vegetation within the right of way inside the project limits. This work will be subsidiary to the various bid items.

Become familiar with project site prior to submitting bids.

Comply with all Occupational Safety & Health Administration (OSHA) and United States Environmental Protection Agency (EPA) regulations as well as all local and State requirements.

Refer to the various traffic control plan project overview sheets for the proposed sequence of work. Changes will not be permitted, except as approved in writing by the Engineer.

Electronic copies of earthwork cross-sections are available for copying, at bidding Contractor's expense, at the Area Engineer's office. Horizontal and vertical alignment data and design roadway cross-section data are available in print or electronic format upon request.

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

Ricardo Romero Ricardo.Romero@txdot.gov

Aldo Madrid Aldo.Madrid@txdot.gov

Contractor questions will be accepted through email, phone, and in person by the above individuals.

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:

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

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

Each Contract awarded by the Department stands on its own and as such, is separate from other contracts. A contractor awarded multiple contracts, must be capable and sufficiently staffed to concurrently process any or all contracts at the same time.

Item 4 – Scope of Work

Provide vehicular and pedestrian access at all times, including Saturdays, Sundays, and holidays. This access includes, but is not limited to, driveways, streets, parking areas, and walkways. This shall be considered subsidiary to the various bid items.

Schedule and perform all work to assure proper drainage during the course of construction operations. All labor, tools, equipment and supervision required, to ensure drainage, removal, and handling of water shall be considered incidental work.

Repair any existing pavement, utilities, structures, etc., damaged as a result of construction operations, at no additional cost to the Department.

Maintain all Contract items until final acceptance of the project.

Item 5 – Control of the Work

The Department will furnish horizontal and vertical reference points. Contractor must verify horizontal and vertical reference points with conventional survey methods before proceeding with construction activities. Verification must be submitted for review and approval to the Department's R.P.L.S. prior to start of construction. Any discrepancies not reported will be at no additional cost to the Department.

Inform the Engineer and the respective utility companies, when it becomes apparent that the utility lines will interfere with the work in progress.

Contractor shall deliver all illumination and signal related equipment removed, i.e. poles and flashers, to:

TEXAS DEPARTMENT OF TRANSPORTATION
ATTN: TRAFFIC SIGNAL SHOP
13301 GATEWAY BLVD. WEST
EL PASO, TX 79928
915-790-4245

This work shall not be measured or paid separately, but shall be considered subsidiary to the various bid items. Contact the Traffic Signal Shop Supervisor 24 hours in advance of returning materials.

Item 7 – Legal Relations and Responsibilities

Comply with all requirements of the Environmental Permits Issues and Commitments (EPIC) Sheet.

Dispose of all waste materials in compliance with Local, State, and Federal regulations. Submit list of all approved waste sites to the Engineer for review.

Do not discharge any liquid pollutant from vehicles onto the roadside. Immediately clean spills and dispose in compliance with local, state, and federal regulations to the satisfaction of the Engineer at no additional cost to the Department.

Occupational Safety & Health Administration (OSHA) regulations prohibit operations that bring people or equipment within 10 ft. of an energized electrical line. Where workers and/or equipment may be close to an energized electrical line, notify the electrical power company and make all necessary adjustments to ensure the safety of workers near the energized line.

No significant traffic generator events identified.

Item 8 – Prosecution and Progress

Working days will be calculated in accordance with Section 8.3.1.4., “Standard Workweek.”

A bar chart schedule is required for this project conforming to Section 8.5.5.1., “Bar Chart.” Provide updates as directed by the Engineer.

Prior to beginning operations, schedule and attend a preconstruction conference with the Engineer. Provide the Department a written outline of the proposed sequence of work (Bar Chart Schedule) and an estimated progress schedule.

Keep traveled surfaces used in hauling operations clear and free of dirt or other material.

Existing pavement, utilities, structures, etc. damaged as a result of the operations will be repaired at no additional cost to the Department.

Protect from damage and destruction all areas of the right of way, which are not included in the actual limits of the proposed construction areas. Exercise care to prevent damage to trees, vegetation, and other natural features.

Protect trees, shrubs, and other landscape features from abuse, marring, or damage within the actual construction and/or fenced protection areas designated for preservation. Restore any area disturbed or damaged to a condition “as good as” or “better than” prior to start of construction operation. This work will be at the Contractor’s expense.

Item 9 – Measurement and Payment

Submit Material on Hand (MOH) payment requests at least **two (2)** working days before the end of the month for payment consideration on that month’s estimate.

Item 100 – Preparing Right of Way

Refer to Specification for a list of items covered under this Item.

This Item shall cover all items requiring removal as directed by the Engineer not governed otherwise by individual removal pay items elsewhere in the plans.

Item 110 – Excavation (Special)

Pothole and identify possible utility conflicts at proposed illumination pole drill shaft foundations. When a conflict exists notify the Engineer.

Fill the potholes up to the bottom of the pavement surface after excavation with material from the hole and compact to 95% density. The holes must be patched with a suitable hot mix asphalt concrete material or earthen material as directed by the Engineer. Maintain these patches in good repair until the completion of work. All equipment, labor, and materials associated with this work will be consider subsidiary to the various bid items.

Inform the Engineer and the respective utility companies when it becomes apparent that utility lines will interface with work in progress.

Item 204 – Sprinkling

This Item will be used to prevent wind erosion of exposed soil as required, or as directed.

Provide a flow meter of an approved type for the measurement of the water to be subsidiary to this Item.

:

Item 340 – Dense-Graded Hot-Mix Asphalt (Small Quantity)

Provide aggregates with a Surface Aggregate Classification (SAC) of "A" for all surface mixes. Provide aggregates with a minimum SAC of B for all other layers unless otherwise shown on the plans.

In place of typical tack materials shown in Table 18 under Item 300, use a tracking resistant asphalt interlayer (TRAIL) material as a tack coat. Approved TRAIL products are found on TxDOT's Material Producer List under Asphalt Interlayer (Tracking Resistant) through http://www.txdot.gov/business/resources/materials.html.

Hydrated Lime shall be added as an additive as per Item 301 "Asphalt Antistripping Agents" between the rates of 1% minimum and 2.0% maximum by weight. 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.

Supply Warm-Mix Asphalt (WMA) under this Item.

When Reclaimed Asphalt Pavement (RAP) is used in the production of hot-mix asphaltic concrete, use fractionated RAP. Do not exceed 10.0% of Fractionated RAP on surface mixtures.

Use of RAS is not allowed for any mixtures.

Substitute PG Binders (grade dumping) will not be allowed for any mixtures.

Obtain the current version of the templates at http://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/forms/site-manager.html. Submit electronically to the Engineer.

Design the mixture at 50 gyrations (Ndesign).

Do not cover with asphaltic material, any existing survey monuments, manholes, or valve covers, etc. Adjustments will be done in coordination with the respective utility owners.

Place a string line or other suitable marking to ensure smooth, neat lines, or as directed. Provide smooth transitions to existing driveways and intersections.

Place longitudinal joints approximately 6 in. from the broken striping, or as directed, to avoid placing under the wheel path.

Operate the spreading and finishing machine at a uniform forward speed consistent with the plant production rate, hauling capability, and roller train capacity to result in a continuous operation. The speed will be slow enough, so that stopping between trucks is not ordinarily required. If the Engineer determines non-uniform delivery of material is affecting the HMA placement, the

Engineer may require the paving operations to cease until acceptable methods are employed to minimize starting and stopping of the paver.

Item 416 – Drilled Shaft Foundations

Stake all foundations and locations approved by the Engineer prior to commencement of drilling operations in order to ensure no conflicts with utility lines. Coordinate with the Utility companies for utility location within the project limits. Repair any damage to existing utilities to the satisfaction of the Engineer and the utility owner at no additional cost to the Department.

Use Class "C" concrete.

All foundations must be staked by the Contractor and locations approved by the Engineer prior to drilling operations in order to ensure that there is not a conflict with utility lines.

When the Contractor drills pole foundation, the foundation must be covered with plywood and delineated with traffic cones satisfactory to the Engineer.

All foundations must comply with the TxDOT foundation details as shown in the plans.

Cover drilled shafts with plywood and delineate them with cones, to the satisfaction of the Engineer, when not working in them and after work hours.

Replace faulty anchor bolts as directed. Do not weld anchor bolts.

Remove spoils, daily, out of the drainage areas or as directed.

Concrete shall be allowed a minimum of 7 days curing time before any loads are applied to the foundation.

Item 502 – Barricades, Signs, and Traffic Handling

Prior to beginning construction, the Engineer will approve the routing of traffic and sequence of work.

Additional signs and barricades, placed as directed, will be considered subsidiary to this Item.

In accordance with Section 7.2.6.1, designate, in writing, a Contractor Responsible Person (CRP) and a CRP alternate to take full responsibility for the set-up, maintenance, and necessary corrective measures of the traffic control plan. The CRP or CRP alternate must be present at site and implement the initial set up of every traffic control phase/stage, at each location, and/or each call out, for the entire duration of the project.

At the written request of the Engineer, immediately remove the CRP or CRP alternate from the project if, in the opinion of the Engineer, is not competent, not present at initial TCP set-ups, or does not perform in a proper, skillful, or safe manner. These individuals shall not be reinstated without written consent of the Engineer.

CRP and CRP alternate must be trained using Department approved training. Provide a copy of the certificate of completion to the Engineer for project records. Refer to Table 1 for Department approved Training.

Table 1

Contractor Responsible Person and Alternate

Provider	Course Number	Course Title	Duration	Notes
American Traffic Safety Services Association	TCS	Traffic Control Supervisor	2 days	
National Highway Institute	133112 133113	Design and Operation of Work Zone Traffic Control Work Zone Traffic Control for Maintenance Operations	1 day 1 day	Both courses are required to meet minimum required training.
Texas Engineering Extension Services	133112A	Design and Operation of Work Zone Traffic Control	3 days	
University of Texas Arlington Division for Enterprise Development	WKZ421	Traffic Control Supervisor	16 hours	Contact UTA for training needs.

All contractor workers involved with the traffic control implementation and maintenance must participate and complete a Department approved training course. Provide a copy of the certificate of completion to the Engineer for project records. Refer to Table 2 for Department approved training.

Table 2

Other Work Zone Personnel

Provider	Course Number	Course Title	Duration	Notes
American Traffic Safety Services Association	TCT	Traffic Control Technician	1 day	
Texas Engineering Extension Services	HWS002	Work Zone Traffic Control	16 hours	Identical to HWS-410. Counts for 3 year CRP requirement.
National Highway Institute	133116	Maintenance of Traffic for Technicians	5 hours	Web based
National Highway Institute	134109-I	Maintenance Training Series: Basics of Work Zone Traffic Control	1 hour	Free, Web based
University of Texas at Arlington, Division for Enterprise Development	WKZ100	Work Zone Safety: Temporary Traffic Control	4 hours	Note name change. Free, Web based
TxDOT/AGC Joint Development	N/A	Safe Workers Awareness Highway Construction Work Zone Hazards	16 minutes 18 minutes	Videos available through AGC of Texas offices. English & Spanish
AGC America	N/A	Highway Work Zone Safety Training	1 day	
Texas Engineering Extension Service	HWS400	Temporary Traffic Control Worker	4 hours	Contact TEEX, if interested in course
TxDOT/AGC Joint Development	N/A	Work Zone Fundamentals	10 minutes	Videos available through ACT of Texas offices. English & Spanish

Contractor may choose to train workers involved with the traffic control implementation and maintenance with a contractor developed training in lieu of Department approved training.

Contractor developed training must be equivalent to the Department approved training shown in Table 2. Provide the Engineer a copy of the course curriculum for pre-approval, prior to conducting the contractor developed training. Provide the Engineer a copy of the log of attendees after training completion for project records.

Notify the Department officials when major traffic changes are to be made, such as detours. Coordinate with the Department on all traffic changes. Advance notification for the following week's work must be made by 5 P.M. on Wednesdays.

If Law Enforcement Personnel is required by the Engineer, coordinate with local law enforcement as directed or agreed. Complete the weekly tracking form provided by the Department and submit invoices with 5% allowance for Law Enforcement payments by Contractor that agree with the tracking form for payment at the end of each month where approved services were provided.

Provide access to intersecting side roads and driveways at all times, unless otherwise directed.

Any approved change to the sequence of work or TCP, must be signed and sealed by a Contractor's Licensed Professional Engineer assuming full responsibility for any additional barricade signs and devices needed.

Use striping operations to channelize traffic into the newly completed roadway, as directed. Maintain shoulders and median areas in a condition capable of serving as emergency paths, as approved. This work will be subsidiary to this Item.

Use portable changeable message signs (PCMS) to alert public of construction two weeks prior to construction.

Use flaggers when directed. Provide two-way radio communication for all flaggers.

Place and maintain sufficient additional warning signs, beacons, delineators, and barricades to warn and guide the public of all hazards through the construction zone at all times, and as directed.

Use flashing arrow boards on all tapers for each lane closure.

Some signs, barricades, and channelization devices may not be shown at the precise or measured position. Place the barricades, devices, or signs, with approval, in positions to meet field conditions.

Fill any holes left by barricade or sign supports and restore the area to its original condition.

For additional information pertaining to channelization, signing, spacing details, and flagging procedures required to regulate, warn, and guide traffic through project, refer to the "Barricade and Construction Standards," BC(1)-14 and to the current *Texas Manual on Uniform Traffic Control Devices(TMUTCD).*

Remove or cover signs that do not apply to current conditions at the end of each day's work.

Repair and/or replace all signs damaged by the public or due to weather events.

Safety Contingency

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

Item 506 – Temporary Erosion, Sedimentation, and Environmental Controls

Place Best Method Practices (BMP's) in locations as designated in the plans or as directed to meet field conditions.

Place rain gauge(s) at locations as designated.

The total disturbed area for this project is **4.4** acres. Establish the authorization requirements for Storm Water Discharges for soil disturbed area in this project, all project locations in the Contract, and Contractor Project Specific Locations (PSLs), within one mile of the project limits. Both the Department and the Contractor shall obtain an authorization to discharge storm water from TCEQ for the construction activities shown on the plans. Obtain required authorization from the TCEQ for any Contractor PSLs for construction support activities on or off right of way.

Best Method Practices (BMP's) may be adjusted to meet field conditions, or as directed. The Engineer will verify all locations prior to placement of BMPs. Maintain and properly place the erosion control measures to prevent storm water pollution to the Waters of the United States, as directed. Within the project limits, keep all inlets functional as long as possible to accept storm water as part of the Storm Water Pollution Prevention Plan (SWP3), as directed.

Grading operations will be limited to the catch point of the proposed cross-section.

Preserve any vegetation outside these limits.

Birds: TxDOT commits to implementing the Bird BMPs (below) as outlined in the BMP-PA.

Bird BMPs:

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.

For the **Western Burrowing Owl:**

- In addition to implementing the Bird BMPs from the BMP-PA, avoid disturbance of mammal burrows or other suitable habitat during the construction of the proposed project, where feasible. Conduct project activities outside the breeding season (March through September). If nesting owls are found inhabiting the project area, disturbance should be avoided until the eggs have hatched and the young have fledged. Advise contractors of the potential for this species to occur in the project area (year-round), and to avoid harming this species and their nests/burrows if encountered.

For the **Desert pocket gopher:**

Fossorial Mammal BMPs:

- 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.

For the **Pecos River muskrat**:

- Minimize impacts to water crossings/drainages, marshes, drainage ditches, and irrigation canals
- Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered
- Avoid unnecessary impacts to dens and lodges

For the **big brown bat, Townsend's big-eared bat, western small-footed myotis bat, and the western yellow bat**:

Bat BMPs:

- 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 l 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 Section 2: Standard 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.
- 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.
- In all instances, avoid harm or death to bats. Bats should only be handled as a last resort and after communication with TPWD.

For **sand prickly-pear and Wheeler's spurge:**

Vegetation BMPs:

- Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable.
- 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.

For the **American badger and mountain lion:**

General BMPs:

- Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.

For the **Texas horned lizard and western rattlesnake:**

Terrestrial Reptile BMPs and Additional Reptile BMPs:

- 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, 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 (I: I) 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.
- 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.
- For Texas horned lizard, avoid harvester ant mounds in the selection of Project Specific Locations (PSLs) where feasible.

Item 528 – Colored Textured Concrete and Landscape Pavers

Wire mesh will not be allowed for this Item. Reinforce all colored textured concrete using bar reinforcement conforming to Item 440, “Reinforcement for Concrete,” as shown in the plans or as directed.

Apply color sealant to all Colored Textured Concrete (4”) per the manufacturer’s specifications subsidiary to this Item.

For Colored Textured Concrete (4”) on SH 20, use the following:

Manufacturer: Scofield Stamped Pattern combination: Wood Pave Cobble 24” border: Large Brick Soldier Course (brick is 12” long) Dry shake powder Hardener colors: Walnut or Russet Dry shake powder Release/Antiquing colors: Swiss Coffee, Deep Charcoal or Arizona Tan	Manufacturer: Butterfield Colors Stamped Pattern combination: Baltic Coble Stone For 24” border: Coarse Stone Texture Mat Dry shake powder Hardener colors: Terracotta, Soapstone or Colina Tan Dry shake powder Release/Antiquing colors: Chestnut, Deep Charcoal or Wheat

For Colored Textured Concrete (4”) on FM 1281, use the following:

Manufacturer: Scofield Stamped Pattern combination: Hadley Creek Shale Mat For 24” border: Large Brick Soldier Course (brick is 12” long) Dry shake powder Hardener colors: Terracotta, Steadman buff or Arizona Tan Dry shake powder Release/Antiquing colors: La Crecenta Brown, Deep Charcoal or Pecan Tan	Manufacturer: Butterfield Colors Stamped Pattern combination: Chiseled Slate Texture Mat For 24” border: 12” Wood Plank Dry shake powder Hardener colors: Canyon, Soapstone or Walnut Dry shake powder Release/Antiquing colors: Arena Buff or Charcoal

Install Colored Textured Concrete (4”) on the locations shown on roadway layout sheets in the Ashlar Slate pattern as indicated on the Typical Median Layout Detail Sheet.

Expansion, longitudinal and contraction joints, all saw-cuts, incidentals, and materials required to complete this work will be as shown in the Median Layout sheets and are subsidiary to this Item.

Item 529 – Concrete Curb, Gutter and Combined Curb and Gutter

Use Class A concrete for these Items, unless otherwise shown on the plans. Wire mesh and fibers for concrete will not be allowed. Reinforce all concrete using reinforcement conforming to Item 440, “Reinforcement for concrete,” as shown on the plans or as directed.

Construct the curb opening with metal plate configuration detailed in the plans, or as directed, to ensure roadway drainage to the earthen ditch. No direct payment will be made for these features. Payment will be made under this Item. All required manipulations or incidentals required to complete the work will be considered subsidiary to these items.

Perform all required grading for proposed concrete curb, gutter, and combined curb and gutter construction as shown on the plans. All grading, including excavation and fill/embankment will be subsidiary to this Item.

After construction, restore the adjacent surface to a condition approved by the Engineer. Consider this work subsidiary to this Item.

Item 531 – Sidewalk

The wheelchair ramp dimensions and locations shown in the plans may be adjusted, as directed, to match the field conditions. Any such modification will not be paid directly, but will be subsidiary to this Item.

Modify the sidewalk expansion joint spacing to 20 ft. spacing where waterlines may exist under the sidewalk. This work will not be paid for directly but will be subsidiary to this Item.

Provide textured finish for wheelchair ramps as directed.

Perform all work under this Item to conform to ADA and TDLR standards.

Perform all requiring grading for proposed sidewalks construction as shown on the plans. All grading, including excavation, fill, and embankment will be subsidiary to this Item.

Detectable warning surface for new ramps shall be made from a Department approved surface applied vitrified polymer composite tile, red in color.

Item 610 – Roadway Illumination Assemblies

Conductor runs in Illumination Layouts contain 5 ft. of slack.

Limitations on Use of the RIP-19 Standard

The Roadway Illumination Pole (RIP-19) Standard Details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25 ft. above the elevation of surrounding terrain, in accordance with the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 6th Edition (2013) (AASHTO Design Specifications). For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25-ft. above the surrounding terrain, provide poles meeting the following requirements:

Submittals. Submit fabrication drawings and calculations sealed by a licensed professional engineer. Follow the electronic shop drawing submittal process (see Guide Electronic Shop Drawing Submittal), to submit fabrication drawings and calculations for approval.

Luminaire Structural Support Requirements. Lighting poles, arms, and anchor bolt assemblies shall have a 25-year design life to resist dead loads, ice loads, and the required basic wind speeds safely at the location of installation in accordance with the current edition of the

AASHTO Design Specifications. For transformer base poles, the fabricator shall include transformer base and connecting hardware in calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.

Fabricate steel roadway illumination poles in accordance with Department standards RIP-2019 (Roadway Illumination Poles – RIP (1)-19). Poles fabricated according to RIP-2019 require no shop drawings. Alternate designs to RIP-2019 or the use of aluminum to fabricate poles will require the submission of shop drawings electronically.

For instructions on submitting shop drawings electronically go to the Texas Department of Transportation (TxDOT) home page, http://txdot.gov, Business with TxDOT, Bridge information, Shop drawings. File is titled: Guide to Electronic Shop Drawing Submittal.

Item 618 – Conduit

The location of conduit is diagrammatic and may be varied to meet local conditions upon approval of the Engineer.

When shown on the plans, use underground warning tape in the trench installation of conduit (PVC).

For conduit placement in pavement, an earth-saw may be used provided the cut does not exceed 6 in. Backfill as shown on the trench details in the plans.

For all underground conduit bends of 45°, provide rigid metal conduit. Where the rigid metal conduit is exposed at any point and where rigid metal extends into ground boxes, bond the metal conduit to the grounding conductor with grounding type bushings or by other UL-listed grounding connectors, approved by the Engineer. Rigid metal bends will not be paid for directly but will be considered incidental to the PVC conduit system.

Use rigid metal conduit when crossing bridges or culverts. All clamps, expansion joints, bolts and accessories necessary to install the rigid metal will be subsidiary to this Item.

Backfill roadway and driveway trench with cement-stabilized backfill at the end of each working day. Place an ACP patch at the end of the week or as directed by the Engineer.

All conduit elbows and rigid metal extensions required to be installed on PVC conduit systems will not be paid for separately but will be considered subsidiary to the various bid items.

All bore items shall be directional and shall be paid for under this item. Bore quantities include the distance beneath the roadway plus an additional 2 ft. on either side of the curb, sidewalk, or edge of pavement.

For conduits install by open trench method, backfill the trench as shown on the plans.

Place conduit for fiber optic cable at a minimum of 48 in. below pavement surface. Place all other conduit at a minimum depth of 18 in. below the pavement surface. Place conduit prior to the new pavement construction.

Fit both ends of each raceway with a temporary cap to prevent dirt and debris from entering during construction.

Install a continuous green insulated copper wire No. 8 AWG or larger in every conduit throughout the electrical system in accordance with the electrical detail sheets, and the latest edition of the National Electrical Code.

When conduit is to be installed where riprap presently exists, take care in breaking the existing riprap for placement of the conduit. Do not break out a greater area that is required for placement of the conduit. Replace broken riprap with Class “C” concrete to the exact slope, pattern, color and thickness of the existing riprap. Replacement of riprap will be subsidiary to this Item.

Item 620 – Electrical Conductors

Use NEC type XHHW for all conductors.

Insulate grounding conductors with a green jacket and neutral conductors with a white jacket.

At every accessible point, bond together the grounding conductors which share the same conduit, junction box, ground box or structure in accordance with the electrical detail sheets and the latest edition of the National Electrical Code.

For both transformer and shoe-base type illumination poles, provide double-pole breakaway fuse holder as shown on the Department’s Materials Producers List under “Roadway Illumination and Electrical Supplies.” category. Fuse holder is shown on the list under Item 610, “Roadway Illumination Assemblies,” and Item 620, “Electrical Conductors.” Provide 10 amp time delay fuses.

Include extra cable length in each ground box or foundation for each run, to provide adequate slack, as provided in the plans or as directed.

Ensure a properly bonded electrical system by running one No. 8 wire between foundations and grounding it at each foundation ground-rod.

Bond metal junction boxes and metal conduit to the circuit grounding conductors in accordance with the National Electrical Code.

Refer to Article 7.18, “Electrical Requirements,” for electrical certification and electrical licensing requirements

The required electrical certifications course is available and is scheduled periodically by Texas Engineering Extension Service (TEEX). Alternatively, Contractors may purchase an entire course for their personnel to be held at a time and location of their choice as negotiated through TEEX. For more information contact:

Texas Engineering Extension Service (TEEX)
TxDOT Electrical System Course
(979) 845-6563

Item 624 – Ground Boxes

Remove all conductors in ground boxes as shown on the plans to be abandoned. Payment for removal of conductors will be subsidiary to this Item.

Item 628 – Electrical Services

Meet at the service locations with representatives of the Department, electrical utility company, City of El Paso (Traffic Section), and Horizon City (Traffic Section) at least four weeks before electric power is needed to finalize exact service pole placement and resolve any issues.

Any electrical costs for connection, test, and operation will be the responsibility of the government agency that will have the final operational control of the items built.

Remove the existing service enclosure and conduit on service poles that are to be reused or abandoned. Payment for removal will be considered subsidiary to this Item.

Item 644 – Small Roadside Sign Assemblies

Stake all sign locations and receive approval prior to sign placement.

The 2-1/2 inch, Schedule 10 post will meet the following requirements:

- 0.120 in. nominal wall thickness
- Seamless or electric-resistance welded steel tubing or pipe
- Steel will be HSLAS Grade 55 per ASTM A1011 or ASTM A1008

Other steel may be used, if it meets the following:

55,000 psi minimum yield strength

70,000 psi minimum tensile strength

20% minimum elongation in 2 in.

Wall thickness (uncoated) to be within the range of 0.108 in. to 0.132 in. galvanization per ASTM A123 or ASTM A653 G90

For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metalizing with zinc wire per ASTM B833.

Verify all post lengths to ensure the proper sign height. Remove and replace any sign installed incorrectly. This work will be done at no expense to the Department.

Provide Texas Universal Triangular Slip Base Bolt clamp type for all signs as shown on SMD (Slip-1)-08.

As directed, some regulatory and guide signs will be relocated before construction begins. Mark and locate each reference marker perpendicular to the road and along the right of way, or as directed, prior to removal. Re-erect reference markers at their original location upon completion of construction.

All signs removed will remain property of the Department.

Item 658 – Delineator and Object Marker Assemblies

Verify all locations with the Engineer prior to installation.

Removal and proper disposal of all existing delineators, object markers, and any non-standard hardware assemblies are not paid directly, but will be considered subsidiary to pertinent items for payment.

Item 666 – Retroreflectorized Pavement Markings

Use a pilot line for final striping and remove pilot line after all striping is complete. Removal will be in accordance with the methods specified in Item 677, “Eliminating Existing Pavement Markings and Markers,” and will be subsidiary to this Item.

Air blasting is required as pavement surface preparation.

In those areas where existing pavement markings are to be covered or removed, field locate and record the existing pavement markings by survey or other approved method by the Engineer as directed. Place final striping on these locations.

Item 672 – Raised Pavement Markers

Use a pilot line for final striping and remove pilot line after all striping is complete. Removal will be in accordance with the methods specified in Item 677, “Eliminating Existing Pavement Markings and Markers,” and will be subsidiary to this Item.

Air blasting is required for pavement surface preparation.

Furnish adhesives that conform to DMS-6100, “Epoxies and Adhesives,” and DMS-6130, “Bituminous Adhesive for Pavement Markers,” for this Item.

Do not place raised pavement markers when the pavement surface temperature is below 60°F.

Removal of all existing raised pavement markers will be considered subsidiary to the various bid items.

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

All TMA Operators must participate in a TMA workshop to be conducted by the El Paso District Safety Office, on the proper use of TMAs, prior to working on Department Right of Way (ROW). A certificate of completion will be issued to TMA Operators that successfully complete the TMA workshop. The certificate of completion must be carried by TMA Operators at all times while working on Department right of way.

Acquire the TCP and TMA Operator's certificates of completion prior to the authorization to begin work. No time suspension will be granted and no traffic control work will be allowed without certificates of completion.

The supporting vehicle for the TMA shall have a minimum gross (i.e., ballasted) vehicular weight of 19,000 pounds.

TABLE 3: BASIS OF ESTIMATE FOR STATIONARY TMAS

		TMA(Stationary)		
Phase	Standard	Required	Additional	TOTAL
SH 20 I, Step 2	TCP(2-4)-18	2	0	2
SH 20 I, Step 3	TCP(2-1)-18	2	0	2
SH 20 II, Step I	TCP(3-1)-13	2	0	2
FM 1281 I, Step 2	TCP(2-4)-18	2	0	2
FM 1281 II, Step 1	TCP(3-1)-13	2	0	2
FM 1281 I, Step 3	TCP(2-1)-18	2	0	2

TABLE 4: BASIS OF ESTIMATE FOR MOBILE TMAS

	TMA(Mobile)		
Standard	Required	Additional	TOTAL
TCP(2-1)-18	2	0	2
TCP(3-1)-13	2	0	2

QUANTITY SHEET

CONTROLLING PROJECT ID 3451-01-035 **DISTRICT** El Paso **COUNTY** El Paso
HIGHWAY FM 1281, SH 20

			CONTROL SECTION JOB	0002-01-099		3451-01-035		3451-01-036		3451-01-041		TOTAL EST.	TOTAL FINAL
			PROJECT ID	A00066143		A00066083		A00066084		A00133665			
			COUNTY	El Paso		El Paso		El Paso		El Paso			
			HIGHWAY	SH 20		FM 1281		FM 1281		FM 1281			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW	STA	80.000		167.000		179.000				426.000	
	104-6015	REMOVING CONC (SIDEWALKS)	SY	303.000		62.000		119.000				484.000	
	104-6021	REMOVING CONC (CURB)	LF					6.000				6.000	
	105-6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	93.000		35.000		99.000				227.000	
	105-6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	231.000		2,987.000		4,745.000				7,963.000	
	110-6001	EXCAVATION (ROADWAY)	CY							2,399.000		2,399.000	
	110-6003	EXCAVATION (SPECIAL)	CY							87.000		87.000	
	132-6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	28.000		64.000		168.000		5,399.000		5,659.000	
	150-6001	BLADING	STA							139.000		139.000	
	204-6003	SPRINKLING (DUST CONTROL)	MG							139.000		139.000	
	247-6381	FL BS (CMP IN PLC)(TY A GR 5)(4")	SY							7,560.000		7,560.000	
	340-6050	D-GR HMA(SQ) TY-C PG70-22	TON	19.000		186.000		293.000				498.000	
	340-6272	TACK COAT	GAL	15.000		135.000		340.000				490.000	
	416-6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF							800.000		800.000	
	416-6030	DRILL SHAFT (TRF SIG POLE) (24 IN)	LF	102.000		18.000						120.000	
	416-6031	DRILL SHAFT (TRF SIG POLE) (30 IN)	LF					42.000				42.000	
	416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF					14.000				14.000	
	420-6007	CL A CONC (FLUME)	CY					55.000				55.000	
	432-6006	RIPRAP (CONC)(CL B)	CY							42.000		42.000	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY					128.000				128.000	
	442-6012	STR STEEL (RAILS / POSTS / PLATES)	LB					11,025.000				11,025.000	
	500-6001	MOBILIZATION	LS	15.70%		12.10%		24.50%		47.70%		100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO			12.000						12.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY							666.000		666.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY							666.000		666.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF							259.000		259.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF							259.000		259.000	
	514-6001	PERM CTB (SGL SLOPE) (TY 1) (42)	LF			341.000		3,102.000				3,443.000	
	514-6013	PERM CTB (F-SHAPE) (TY 1)	LF			2,174.000						2,174.000	
	528-6001	COLORED TEXTURED CONC (4")	SY	541.000		1,325.000		3,545.000				5,411.000	
	529-6005	CONC CURB (MONO) (TY II)	LF	391.000				30.000				421.000	
	529-6013	CONC CURB (SPECIAL) (TYPE II)	LF	959.000		9,888.000		15,983.000		676.000		27,506.000	
	531-6001	CONC SIDEWALKS (4")	SY	87.000						5,589.000		5,676.000	
	531-6004	CURB RAMPS (TY 1)	EA							6.000		6.000	
	531-6013	CURB RAMPS (TY 10)	EA							11.000		11.000	
	531-6019	CURB RAMPS (TY 2)	SY	12.000		2.000						14.000	
	531-6030	CURB RAMPS (TY 21)	SY	4.000		1.000						5.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 3451-01-035 **DISTRICT** El Paso **COUNTY** El Paso
HIGHWAY FM 1281, SH 20

				0002-01-099		3451-01-035		3451-01-036		3451-01-041		TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB											
		PROJECT ID		**A00066143**		**A00066083**		**A00066084**		**A00133665**			
		COUNTY		**El Paso**		**El Paso**		**El Paso**		**El Paso**			
		HIGHWAY		**SH 20**		**FM 1281**		**FM 1281**		**FM 1281**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	545-6013	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	EA			3.000		1.000				4.000	
	610-6007	REMOVE RD IL ASM (SHOE-BASE)	EA							26.000		26.000	
	610-6102	REPLACE LUMINAIRE W/LED (250W EQ)	EA							28.000		28.000	
	610-6191	IN RD IL (TY SP) 38S-8-8 (250W EQ) LED	EA							20.000		20.000	
	610-6216	IN RD IL (TY SA) 40T-10 (250W EQ) LED	EA							6.000		6.000	
	610-6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA							94.000		94.000	
	618-6023	CONDT (PVC) (SCH 40) (2")	LF							19,795.000		19,795.000	
	618-6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF							2,315.000		2,315.000	
	618-6029	CONDT (PVC) (SCH 40) (3")	LF	288.000		71.000		1,283.000				1,642.000	
	618-6030	CONDT (PVC) (SCH 40) (3") (BORE)	LF	671.000		52.000		1,451.000				2,174.000	
	620-6010	ELEC CONDR (NO.6) INSULATED	LF	998.000		123.000		2,639.000		71,430.000		75,190.000	
	624-6002	GROUND BOX TY A (122311)W/APRON	EA	13.000		3.000		17.000		55.000		88.000	
	624-6028	REMOVE GROUND BOX	EA							3.000		3.000	
	628-6002	REMOVE ELECTRICAL SERVICES	EA							1.000		1.000	
	628-6041	ELC SRV TY A 240/480 060(NS)SS(E)GC(O)	EA							4.000		4.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	64.000		10.000		12.000				86.000	
	644-6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	3.000								3.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	1.000		2.000						3.000	
	658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA			126.000		156.000				282.000	
	666-6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	6,040.000		6,860.000		5,738.000				18,638.000	
	666-6041	REFL PAV MRK TY I (W)12"(SLD)(090MIL)	LF	3,570.000								3,570.000	
	666-6047	REFL PAV MRK TY I (W)24"(SLD)(090MIL)	LF	8,130.000		482.000		902.000				9,514.000	
	666-6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	162.000		35.000		36.000				233.000	
	666-6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	38.000		33.000		36.000				107.000	
	666-6098	REF PAV MRK TY I(W)18"(YLD TRI)(090MIL)	EA	218.000		18.000						236.000	
	666-6155	REFL PAV MRK TY I(Y)(MED NOSE)(090MIL)	EA	20.000								20.000	
	666-6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	4,600.000		6,253.000		24,637.000				35,490.000	
	666-6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	23,870.000		6,940.000		8,110.000				38,920.000	
	666-6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	6,040.000		6,860.000		5,738.000				18,638.000	
	666-6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	3,570.000								3,570.000	
	666-6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	8,130.000		482.000		902.000				9,514.000	
	666-6184	REFL PAV MRK TY II (W) (ARROW)	EA	162.000		35.000		36.000				233.000	
	666-6192	REFL PAV MRK TY II (W) (WORD)	EA	38.000		33.000		36.000				107.000	
	666-6198	REFL PAV MRK TY II (W) 18" (YLD TRI)	EA	218.000		18.000						236.000	
	666-6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	24,940.000		410.000		1,100.000				26,450.000	
	666-6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	61,340.000		12,221.000		15,785.000				89,346.000	
	666-6217	REFL PAV MRK TY II (Y) (MED NOSE)	EA	20.000								20.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 3451-01-035 **DISTRICT** El Paso **COUNTY** El Paso
HIGHWAY FM 1281, SH 20

												TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0002-01-099**		**3451-01-035**		**3451-01-036**		**3451-01-041**			
		PROJECT ID		**A00066143**		**A00066083**		**A00066084**		**A00133665**			
		COUNTY		**El Paso**		**El Paso**		**El Paso**		**El Paso**			
		HIGHWAY		**SH 20**		**FM 1281**		**FM 1281**		**FM 1281**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	666-6283	REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	LF	4,600.000		6,253.000		29,214.000				40,067.000	
	666-6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF			12,220.000		15,677.000				27,897.000	
	666-6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	23,870.000		6,940.000		8,110.000				38,920.000	
	666-6311	RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)	LF	24,940.000		2,210.000		1,100.000				28,250.000	
	666-6344	REF PROF PAV MRK TY I(Y)4"(BRK)(100MIL)	LF	61,340.000								61,340.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	26,002.000		307.000		509.000				26,818.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	2,511.000		520.000		796.000				3,827.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	94,092.000		43,171.000		63,110.000				200,373.000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	3,860.000		534.000		1,500.000				5,894.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	8,985.000		321.000		552.000				9,858.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	1,860.000		174.000		957.000				2,991.000	
	677-6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	13.000		11.000		7.000				31.000	
	677-6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	9.000		15.000		6.000				30.000	
	677-6019	ELIM EXT PAV MRK & MRKS (36")(YLD TRI)	EA	138.000								138.000	
	678-6001	PAV SURF PREP FOR MRK (4")	LF	90,880.000		19,738.000		54,160.000				164,778.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	23,870.000		6,940.000		8,110.000				38,920.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF	6,040.000		6,860.000		5,738.000				18,638.000	
	678-6006	PAV SURF PREP FOR MRK (12")	LF	3,570.000								3,570.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	8,130.000		482.000		902.000				9,514.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	162.000		35.000		36.000				233.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA	38.000		33.000		36.000				107.000	
	678-6022	PAV SURF PREP FOR MRK (18")(YLD TRI)	EA	218.000								218.000	
	678-6024	PAV SURF PREP FOR MRK (MED NOSE)	EA	20.000								20.000	
	682-6018	PED SIG SEC (LED)(COUNTDOWN)	EA	18.000								18.000	
	684-6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	1,179.000		108.000						1,287.000	
	684-6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF					3,582.000				3,582.000	
	684-6014	TRF SIG CBL (TY A)(12 AWG)(9 CONDR)	LF	414.000		56.000						470.000	
	684-6082	TRF SIG CBL (TY C)(18 AWG)(2 CONDR)	LF	1,470.000		182.000						1,652.000	
	685-6003	REMOVE RDSD FLASH BEACON ASSEMBLY	EA					4.000				4.000	
	685-6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA					4.000				4.000	
	686-6029	INS TRF SIG PL AM (S)1 ARM(28')	EA					3.000				3.000	
	686-6037	INS TRF SIG PL AM(S)1 ARM(36')	EA					1.000				1.000	
	687-6001	PED POLE ASSEMBLY	EA	17.000		3.000						20.000	
	688-6002	PED DETECT PUSH BUTTON (STANDARD)	EA	17.000		3.000						20.000	
	690-6030	REMOVAL OF PEDESTRIAN PUSH BUTTONS	EA	8.000								8.000	
	690-6094	REMOV PED SIG LED TRAF SIG LAMP UNIT	EA	9.000								9.000	
	6084-6001	MODIFY EXISTING ELECTRICAL SERVICE	EA							1.000		1.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 3451-01-035 **DISTRICT** El Paso **COUNTY** El Paso
HIGHWAY FM 1281, SH 20

													TOTAL EST.	TOTAL FINAL
CONTROL SECTION JOB				**0002-01-099**		**3451-01-035**		**3451-01-036**		**3451-01-041**				
PROJECT ID				**A00066143**		**A00066083**		**A00066084**		**A00133665**				
COUNTY				**El Paso**		**El Paso**		**El Paso**		**El Paso**				
HIGHWAY				**SH 20**		**FM 1281**		**FM 1281**		**FM 1281**				
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL			
	6185-6002	TMA (STATIONARY)	DAY	58.000		117.000		117.000		50.000			342.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	8.000		2.000		2.000		4.000			16.000	
	08	LAW ENFORCEMENT	LS			1.000							1.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS			1.000							1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS			1.000							1.000	

FINAL SUBMITTAL

SHEET	LOCATION	104 6015 REMOVING CONC (SIDEWALKS)	104 6021 REMOVING CONC (CURB)	105 6011 REMOVING STAB BASE AND ASPH PAV (2"-6")	105 6035 REMOVING STAB BASE & ASPH PAV (0-2")
		SY	LF	SY	SY
CSJ: 0002-01-099					
1 OF 4	10+00.00 TO 40+0.00	0	0	26	42
2 OF 4	140+00.00 TO 160+00.00	0	0	22	66
3 OF 4	200+00.00 TO 220+00.00	0	0	26	66
4 OF 4	240+00.00 TO 260+00.00	0	0	19	57
	CSJ TOTALS	0	0	93	231
CSJ: 3451-01-035					
1 OF 16	10+00.00 TO 33+00.00	0	0	32	338
2 OF 16	33+00.00 TO 57+00.00	0	0	0	503
3 OF 16	57+00.00 TO 81+00.00	0	0	0	716
4 OF 16	81+00.00 TO 105+00.00	0	0	0	507
5 OF 16	105+00.00 TO 129+00.00	0	0	0	81
6 OF 16	129+00.00 TO 153+00.00	0	0	0	547
7 OF 16	153+00.00 TO 177+00.00	0	0	3	295
	CSJ TOTALS	0	0	35	2987
CSJ: 3451-01-036					
8 OF 16	177+00.00 TO 201+00.00	0	0	45	500
9 OF 16	201+00.00 TO 225+00.00	0	0	15	178
10 OF 16	225+00.00 TO 249+00.00	0	0	0	922
11 OF 16	273+00.00 TO 297+00.00	119	0	39	0
12 OF 16	297+00.00 TO 321+00.00	0	6	0	500
13 OF 16	321+00.00 TO 345+00.00	0	0	0	1021
14 OF 16	345+00.00 TO 369+00.00	0	0	0	1174
15 OF 16	369+00.00 TO 393+00.00	0	0	0	409
16 OF 16	393+00.00 TO 404+57.13	0	0	0	41
	CSJ TOTALS	119	6	99	4,745
	PROJECT TOTALS	119	6	227	7,963

Texas Department of Transportation

NO.	REVISION	BY	DATE

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

REMOVALS SUMMARY SHEET

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO	3451	01	036, ETC.	015

FINAL SUBMITTAL

SHEET	LOCATION	0100 6002 PREPARING ROW	0150 6001 BLADING	0204 6003 SPRINKLING (DUST CONTROL)	0132 6001 EMBANKMENT (FINAL) (ORD COMP) (TY A)	0340 6050 D-GR HMA (SQ) TY-C PG70-22	0340 6272 TACK COAT	0514 6001 PERM CTB (SGL SLOPE) (TY 1) (42")	0514 6013 PERM CTB (F-SHAPE) (TY 1)	0528 6001 COLORED TEXTURED CONC (4")	0529 6013 CONC CURB (SPECIAL) (TYPE II)	0545 6013 CRASH CUSH ATTEN (INSTL) (R)(N)(TL3)
		STA	STA	MG	CY	TON	GAL	LF	LF	SY	LF	EA
CSJ: 0002-01-099												
1 OF 4	40+00.00 TO 60+00.00	20	0	0	4	4	3	0	0	90	177	0
2 OF 4	140+00.00 TO 160+00.00	20	0	0	8	5	4	0	0	161	275	0
3 OF 4	200+00.00 TO 220+00.00	20	0	0	8	5	4	0	0	163	276	0
4 OF 4	240+00.00 TO 260+00.00	20	0	0	8	5	4	0	0	127	231	0
CSJ TOTALS		80	0	0	28	19	15	0	0	541	959	0
CSJ: 3451-01-035												
1 OF 15	10+00.00 TO 33+00.00	23	0	0	10	26	19	0	0	211	1,402	0
2 OF 15	33+00.00 TO 57+00.00	24	0	0	4	38	28	0	0	79	2,036	0
3 OF 15	57+00.00 TO 81+00.00	24	0	0	15	55	40	0	0	315	2,970	0
4 OF 15	81+00.00 TO 105+00.00	24	0	0	7	38	28	0	0	146	2,084	0
5 OF 15	105+00.00 TO 129+00.00	24	0	0	7	6	4	0	0	144	336	0
6 OF 15	129+00.00 TO 153+00.00	24	0	0	4	6	4	0	2,174	79	141	2
7 OF 15	153+00.00 TO 177+00.00	24	0	0	17	17	12	341	0	351	919	1
CSJ TOTALS		167	0	0	64	186	135	341	2,174	1,325	9,888	3
CSJ: 3451-01-036												
8 OF 15	177+00.00 TO 201+00.00	24	0	0	0	0	0	2,400	0	0	0	0
9 OF 15	201+00.00 TO 225+00.00	24	0	0	2	3	2	702	0	34	128	1
10 OF 15	225+00.00 TO 249+00.00	24	0	0	45	70	51	0	0	914	3,823	0
11 OF 15	297+00.00 TO 321+00.00	24	0	0	3	38	28	0	0	62	2,074	0
12 OF 15	321+00.00 TO 345+00.00	24	0	0	34	76	56	0	0	710	4,056	0
13 OF 15	345+00.00 TO 369+00.00	24	0	0	65	78	57	0	0	1,436	4,219	0
14 OF 15	369+00.00 TO 393+00.00	24	0	0	19	28	21	0	0	389	1,512	0
15 OF 15	393+00.00 TO 404+57.13	11	0	0	0	0	125	0	0	0	171	0
CSJ TOTALS		179	0	0	168	293	340	3,102	0	3,545	15,983	1
CSJ: 3451-01-041												
1 OF 8	160+00.00 TO 189+00.00	0	29	29	0	0	0	0	0	0	0	0
2 OF 8	189+00.00 TO 213+00.00	0	24	24	0	0	0	0	0	0	0	0
3 OF 8	213+00.00 TO 237+00.00	0	24	24	0	0	0	0	0	0	0	0
4 OF 8	262+00.00 TO 274+00.00	0	12	12	0	0	0	0	0	0	0	0
5 OF 8	274+00.00 TO 286+00.00	0	12	12	0	0	0	0	0	0	0	0
6 OF 8	286+00.00 TO 298+00.00	0	12	12	0	0	0	0	0	0	0	0
7 OF 8	298+00.00 TO 309+00.00	0	11	11	0	0	0	0	0	0	0	0
8 OF 8	309+00.00 TO 324+00.00	0	15	15	0	0	0	0	0	0	0	0
CSJ TOTALS		0	139	139	0	0	0	0	0	0	0	0
PROJECT TOTALS		426	139	139	260	498	490	3,443	2,174	5,411	26,830	4

Texas Department of Transportation

NO.	REVISION	BY	DATE

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SUMMARY OF ROADWAY IMPROVEMENTS

1 OF 1

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO	3451	01	036, ETC.	016

FINAL SUBMITTAL

SHEET	LOCATION	0110 6001	0132 6001	0247 6381	0529 6013	0531 6001	0531 6004	0531 6013
		EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY A)	FL BS (CMP IN PLC) (TY A GR 5) (4")	CONC CURB (SPECIAL) (TYPE II)	CONC SIDEWALKS (4")	CURB RAMPS (TY 1)	CURB RAMPS (TY 10)
		CY	CY	SY	LF	SY	EA	EA
CSJ: 3451-01-041								
1 OF 8	160+00.00 TO 189+00.00	798	1,975	1,684	196	1,269	0	2
2 OF 8	189+00.00 TO 213+00.00	248	2,439	1,983	337	1,488	0	6
3 OF 8	213+00.00 TO 237+00.00	1,254	6	1,864	107	1,384	2	2
4 OF 8	262+00.00 TO 274+00.00	31	52	688	0	491	1	0
5 OF 8	274+00.00 TO 286+00.00	5	1	63	0	44	0	0
6 OF 8	286+00.00 TO 298+00.00	16	1	190	0	130	0	0
7 OF 8	298+00.00 TO 310+00.00	11	44	445	0	325	1	0
8 OF 8	309+00.00 TO 334+00.00	36	881	643	36	458	2	1
PROJECT TOTALS		2,399	5,399	7,560	676	5,589	6	11

SHEET	LOCATION	0506 6020	0506 6024	0506 6038	0506 6039
		CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
		SY	SY	LF	LF
CSJ: 3451-01-041					
1 OF 4	160+00.00 TO 189+00.00	111	111	96	96
2 OF 4	189+00.00 TO 213+00.00	222	222	32	32
3 OF 4	213+00.00 TO 237+00.00	111	111	131	131
4 OF 4	309+00.00 TO 334+00.00	222	222	0	0
PROJECT TOTALS		666	666	259	259

Texas Department of Transportation

NO.	REVISION	BY	DATE

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SUMMARY OF SIDEWALK AND EROSION CONTROL

1 OF 1

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO	3451	01	036, ETC.	017

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FINAL SUBMITTAL

SHEET	LOCATION	0110 6003	0416 6029	0432 6006	0610 6007	0610 6102	0610 6191	0610 6216	0610 6218
		EXCAVATION (SPECIAL)	DRILL SHAFT (RDWY ILL POLE) (30 IN)	RIPRAP (CONC)(CL B)	REMOVE RD IL ASM (SHOE-BASE)	REPLACE LUMINAIRE W/LED (250W EQ)	IN RD IL (TY SP) 38S-8-8 (250W EQ) LED	IN RD IL (TY SA) 40T-10 (250W EQ) LED	IN RD IL (TY SA) 40T-12 (250W EQ) LED
		CY	LF	CY	EA	EA	EA	EA	EA
CSJ: 3451-01-041									
1 OF 16	168+45.00 TO 178+00.00	3	32	2	1	4	2	3	1
2 OF 16	178+00.00 TO 190+00.00	0	0	0	6	0	7	0	0
3 OF 16	190+00.00 TO 202+00.00	0	0	0	6	0	8	0	0
4 OF 16	202+00.00 TO 214+00.00	6	32	2	3	4	3	3	1
5 OF 16	214+00.00 TO 226+00.00	9	48	3	0	6	0	0	6
6 OF 16	226+00.00 TO 238+00.00	9	48	3	0	7	0	0	6
7 OF 16	238+00.00 TO 250+00.00	9	48	3	0	6	0	0	6
8 OF 16	298+00.00 TO 310+00.00	0	0	0	0	0	0	0	0
9 OF 16	310+00.00 TO 322+00.00	5	56	3	3	1	0	0	7
10 OF 16	322+00.00 TO 334+00.00	9	88	4	3	0	0	0	11
11 OF 16	334+00.00 TO 346+00.00	8	88	4	4	0	0	0	11
12 OF 16	346+00.00 TO 358+00.00	9	88	4	0	0	0	0	11
13 OF 16	358+00.00 TO 370+00.00	5	80	4	0	0	0	0	10
14 OF 16	370+00.00 TO 382+00.00	6	88	4	0	0	0	0	11
15 OF 16	382+00.00 TO 394+00.00	9	96	5	0	0	0	0	12
16 OF 16	394+00.00 TO 404+57.13	0.0	8	1	0	0	0	0	1
PROJECT TOTALS		87	800	42	26	28	20	6	94

SHEET	LOCATION	0618 6023	0618 6024	0620 6010	0624 6002	0624 6028	0628 6002	0628 6041	6084 6001
		CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (2") (BORE)	ELEC CONDR (NO. 6) INSULATED	GROUND BOX TY A (122311)W /APRON	REMOVE GROUND BOX	REMOVE ELECTRICAL SERVICES	ELC SRV TY A 240/480 060(NS)SS (E)GC(O)	MODIFY EXISTING ELECTRICAL SERVICE
		LF	LF	LF	EA	EA	EA	EA	EA
CSJ: 3451-01-041									
1 OF 16	168+45.00 TO 178+00.00	1355	65	4380	3	0	0	0	0
2 OF 16	178+00.00 TO 190+00.00	1290	55	4380	1	0	0	1	0
3 OF 16	190+00.00 TO 202+00.00	1280	0	3960	0	0	0	0	0
4 OF 16	202+00.00 TO 214+00.00	735	195	2925	3	0	0	0	0
5 OF 16	214+00.00 TO 226+00.00	1245	0	3840	1	0	0	0	0
6 OF 16	226+00.00 TO 238+00.00	1000	205	3825	5	0	0	1	0
7 OF 16	238+00.00 TO 250+00.00	770	0	2610	0	0	0	0	0
8 OF 16	298+00.00 TO 310+00.00	0	0	0	0	0	0	0	0
9 OF 16	310+00.00 TO 322+00.00	985	375	5620	7	1	0	0	1
10 OF 16	322+00.00 TO 334+00.00	1630	560	7140	13	0	0	0	0
11 OF 16	334+00.00 TO 346+00.00	2180	260	7875	6	2	1	1	0
12 OF 16	346+00.00 TO 358+00.00	2340	75	7440	2	0	0	0	0
13 OF 16	358+00.00 TO 370+00.00	1035	0	3195	1	0	0	0	0
14 OF 16	370+00.00 TO 382+00.00	1760	285	6680	7	0	0	1	0
15 OF 16	382+00.00 TO 394+00.00	2175	145	7200	5	0	0	0	0
16 OF 16	394+00.00 TO 404+57.13	15	95	360	1	0	0	0	0
PROJECT TOTALS		19795	2315	71430	55	3	1	4	1

NO.	REVISION	BY	DATE

WSP USA Inc
9311 San Pedro St., Suite 700
San Antonio, TX 78216
TEL: 210-247-4360
TBPE F-2263

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SUMMARY OF QUANTITIES ILLUMINATION

01 OF 01

DESIGNED: BD	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	026, ETC.	018

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FINAL SUBMITTAL

SHEET	LOCATION	420 6007	432 6031	442 6012
		CL A CONC (FLUME)	RIPRAP (STONE PROTECTION) (12 IN)	STR STEEL (RAILS/POST/PLATES)
		CY	CY	LB
	CSJ: 3451-01-035			
1 OF 7	10+00.00 TO 82+00.00	0	0	0
2 OF 7	82+00.00 TO 130+00.00	0	0	0
3 OF 7	130+00.00 TO 178+00.00	0	0	0
	CSJ TOTALS	0	0	0
	CSJ: 3451-01-036			
3 OF 7	130+00.00 TO 178+00.00	11	21	1,654
4 OF 7	178+00.00 TO 226+00.00	38	93	8,268
5 OF 7	226+00.00 TO 298+00.00	6	14	1,103
6 OF 7	298+00.00 TO 370+00.00	0	0	0
7 OF 7	370+00.00 TO 404+57.13	0	0	0
	CSJ TOTALS	55	128	11,025
	PROJECT TOTALS	55	128	11,025

NO.	REVISION	BY	DATE

PLANNING ENGINEERING PROJECT MANAGEMENT
MCi Moreno Cardenas Inc.
EL PASO * SAN ANTONIO
TBPE Firm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281
DRAINAGE SUMMARY SHEET

1 OF 1

DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	019

FINAL SUBMITTAL

SHEET	LOCATION	644 6001	644 6068	666 6035	666 6041	666 6047	666 6053	666 6077	666 6155	666 6098	666 6170	666 6171	666 6178	666 6180	666 6182	666 6184	666 6192	666 6198	666 6205	666 6207	666 6217	666 6283	666 6305	666 6311
		IN SM RD SN SUP&AM TY 10BWG (1) SA(P)	RELOCATE SM RD SN SUP&AM TY 10BWG	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	REFL PAV MRK TY I (W) (ARROW) (090MIL)	REFL PAV MRK TY I (W) (WORD) (090MIL)	REFL PAV MRK TY I(Y)(MED NOSE)(090MIL)	REFL PAV MRK TY I (W) 18" (YLD TRI) (090 MIL)	REFL PAV MRK TY II (W)4" (SLD)	REFL PAV MRK TY II (W)6" (BRK)	REFL PAV MRK TY II (W) 8" (SLD)	REFL PAV MRK TY II (W) 12" (SLD)	REFL PAV MRK TY II (W) 24" (SLD)	REFL PAV MRK TY II (W) (ARROW)	REFL PAV MRK TY II (W) (WORD)	REFL PAV MRK TY II (W) 18" (YLD TRI)	REFL PAV MRK TY II (Y) 4" (BRK)	REFL PAV MRK TY II (Y) (SLD)	REFL PAV MRK TY II (Y) (MED NOSE)	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	RE PM W/RET REQ TY I(W) 6" (BRK) (090MIL)	REF PROF PAV MRK TY I (Y) 4" (BRK) (090MIL)
		EA	EA	LF	LF	LF	EA	EA	EA	EA	LF	LF	LF	LF	LF	EA	EA	EA	LF	LF	EA	LF	LF	LF
	CSJ: 0002-01-099																							
1 OF 17	18+26.10 TO 40+00.00	0	0	560	0	100	4	4	9	34	300	4,400	560	0	100	4	4	34	250	1,200	9	300	4,400	250
2 OF 17	40+00.00 TO 60+00.00	11	2	320	330	510	11	3	5	0	310	4,320	320	330	510	11	3	0	690	2,820	5	310	4,320	690
3 OF 17	60+00.00 TO 80+00.00	0	0	290	140	380	11	2	0	0	310	1,000	290	140	380	11	2	0	1,900	3,800	0	310	1,000	1,900
4 OF 17	80+00.00 TO 100+00.00	2	0	0	170	260	6	0	0	40	0	1,000	0	170	260	6	0	40	2,000	4,000	0	0	1,000	2,000
5 OF 17	100+00.00 TO 120+00.00	0	0	770	520	520	12	4	0	0	430	1,000	770	520	520	12	4	0	1,800	3,800	0	430	1,000	1,800
6 OF 17	120+00.00 TO 140+00.00	0	0	570	110	200	11	4	0	0	220	1,000	570	110	200	11	4	0	1,840	3,680	0	220	1,000	1,840
7 OF 17	140+00.00 TO 160+00.00	13	1	100	190	570	12	2	2	40	270	1,000	100	190	570	12	2	40	1,900	3,800	2	270	1,000	1,900
8 OF 17	160+00.00 TO 180+00.00	3	0	300	160	320	12	2	0	0	300	1,000	300	160	320	12	2	0	1,890	3,780	0	300	1,000	1,890
9 OF 17	180+00.00 TO 200+00.00	1	0	390	150	250	10	1	0	0	200	1,000	390	150	250	10	1	0	1,870	3,740	0	200	1,000	1,870
10 OF 17	200+00.00 TO 220+00.00	10	0	380	200	340	10	3	2	40	220	1,000	380	200	340	10	3	40	1,190	3,910	2	220	1,000	1,190
11 OF 17	220+00.00 TO 240+00.00	1	0	730	170	980	10	2	0	0	200	1,000	730	170	980	10	2	0	1,180	3,770	0	200	1,000	1,180
12 OF 17	240+00.00 TO 260+00.00	21	0	0	160	420	6	0	2	40	0	1,000	0	160	420	6	0	40	1,660	3,310	2	0	1,000	1,660
13 OF 17	260+00.00 TO 280+00.00	0	0	230	230	670	12	2	0	0	260	1,000	230	230	670	12	2	0	1,340	3,520	0	260	1,000	1,340
14 OF 17	280+00.00 TO 300+00.00	0	0	200	110	400	9	1	0	0	230	1,000	200	110	400	9	1	0	1,730	3,800	0	230	1,000	1,730
15 OF 17	300+00.00 TO 320+00.00	2	0	800	430	800	16	6	0	24	450	1,000	800	430	800	16	6	24	900	3,640	0	450	1,000	900
16 OF 17	320+00.00 TO 340+00.00	0	0	400	130	310	8	2	0	0	300	900	400	130	310	8	2	0	1,500	3,720	0	300	900	1,500
17 OF 17	340+00.00 TO 365+00.00	0	0	0	370	1,100	2	0	0	0	600	1,250	0	370	1,100	2	0	0	1,300	5,050	0	600	1,250	1,300
PROJECT TOTALS		64	3	6,040	3,570	8,130	162	38	20	218	4,600	23,870	6,040	3,570	8,130	162	38	218	24,940	61,340	20	4,600	23,870	24,940

SHEET	LOCATION	666 6344	672 6009	672 6010	677 6001	677 6003	677 6005	677 6007	677 6008	677 6012	677 6019	678 6001	678 6002	678 6004	678 6006	678 6008	678 6009	678 6016	678 6022	678 6024
		REF PROF PAV MRK TY I (Y) 4" (SLD) (090MIL)	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY II-C-R	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (8")	ELIM EXT PAV MRK & MRKS (12")	ELIM EXT PAV MRK & MRKS (24")	ELIM EXT PAV MRK & MRKS (ARROW)	ELIM EXT PAV MRK & MRKS (WORD)	ELIM EXT PAV MRK & MRKS (36") (YLD TRI)	PAV SURF PREP FOR MRK (4")	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (8")	PAV SURF PREP FOR MRK (12")	PAV SURF PREP FOR MRK (24")	PAV SURF PREP FOR MRK (ARROW)	PAV SURF PREP FOR MRK (WORD)	PAV SURF PREP FOR MRK (18") (YLD TRI)	PAV SURF PREP FOR MRK (MED NOSE)
		LF	EA	EA	LF	LF	LF	LF	EA	EA	EA	LF	LF	LF	LF	LF	EA	EA	EA	EA
	CSJ: 0002-01-099																			
1 OF 17	18+26.10 TO 40+00.00	1,200	480	505	1,725	545	0	100	3	2	34	1,750	4,400	560	0	100	4	4	34	9
2 OF 17	40+00.00 TO 60+00.00	2,820	2,080	126	4,924	0	895	190	1	1	0	3,820	4,320	320	330	510	11	3	0	5
3 OF 17	60+00.00 TO 80+00.00	3,800	1,536	109	5,650	200	340	0	0	0	0	6,010	1,000	290	140	380	11	2	0	0
4 OF 17	80+00.00 TO 100+00.00	4,000	1,600	100	6,000	0	203	110	0	0	0	6,000	1,000	0	170	260	6	0	40	0
5 OF 17	100+00.00 TO 120+00.00	3,800	1,510	144	8,500	600	723	180	3	2	0	6,030	1,000	770	520	520	12	4	0	0
6 OF 17	120+00.00 TO 140+00.00	3,680	1,534	140	5,740	210	238	0	0	0	0	5,740	1,000	570	110	200	11	4	0	0
7 OF 17	140+00.00 TO 160+00.00	3,800	1,553	103	5,315	100	688	110	0	0	40	5,970	1,000	100	190	570	12	2	40	2
8 OF 17	160+00.00 TO 180+00.00	3,780	1,568	130	5,600	300	442	0	0	0	0	5,970	1,000	300	160	320	12	2	0	0
9 OF 17	180+00.00 TO 200+00.00	3,740	1,524	120	5,585	200	288	80	0	0	0	5,810	1,000	390	150	250	10	1	0	0
10 OF 17	200+00.00 TO 220+00.00	3,910	1,624	120	5,710	190	200	210	0	0	40	5,320	1,000	380	200	340	10	3	40	2
11 OF 17	220+00.00 TO 240+00.00	3,770	1,574	155	5,370	200	917	0	2	2	0	5,150	1,000	730	170	980	10	2	0	0
12 OF 17	240+00.00 TO 260+00.00	3,310	1,323	100	6,000	0	210	100	0	0	0	4,970	1,000	0	160	420	6	0	40	2
13 OF 17	260+00.00 TO 280+00.00	3,520	1,456	115	5,145	670	603	0	4	2	0	5,120	1,000	230	230	670	12	2	0	0
14 OF 17	280+00.00 TO 300+00.00	3,800	1,542	115	5,650	200	508	0	0	0	0	5,760	1,000	200	110	400	9	1	0	0
15 OF 17	300+00.00 TO 320+00.00	3,640	1,562	188	5,510	245	1,068	510	0	0	24	4,990	1,000	800	430	800	16	6	24	0
16 OF 17	320+00.00 TO 340+00.00	3,720	1,516	115	5,508	200	532	0	0	0	0	5,520	900	400	130	310	8	2	0	0
17 OF 17	340+00.00 TO 365+00.00	5,050	2,020	126	6,160	0	1,130	270	0	0	0	6,950	1,250	0	370	1,100	2	0	0	0
PROJECT TOTALS		61,340	26,002	2,511	94,092	3,860	8,985	1,860	13	9	138	90,880	23,870	6,040	3,570	8,130	162	38	218	20

Texas Department of Transportation

NO.	REVISION	BY	DATE

GRV Integrated Engineering Solutions LLC
11385 JAMES WATT DR., SUITE B-13
EL PASO, TEXAS 79936
PH: (915) 351-6701 FAX: (915) 243-6010
www.integratedengineeringsolutions.com
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9500 AMBERGLEN BLVD
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AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281
HAZARD ELIMINATION & SAFETY

SIGNING & PAVEMENT MARKINGS SUMMARY SHEET

1 OF 1

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	ELP	EL PASO	3451	01	035, ETC.	020	

FINAL SUBMITTAL

SHEET	LOCATION	644 6001	644 6076	658 6026	666 6035	666 6047	666 6053	666 6077	666 6098	666 6170	666 6171	666 6178	666 6182	666 6184	666 6192	666 6198	666 6205	666 6207
		IN SM RD SN SUP&AM TY10BWG(1)SA(P)	REMOVE SM RD SN SUP&AM	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	REFL PAV MRK TY I (W)24"(SLD)(090MIL)	REFL PAV MRK TY I (W)(ARROW)(090MIL)	REFL PAV MRK TY I (W)(WORD)(090MIL)	REF PAV MRK TY I(W)18"(YLD TRI)(090MIL)	REFL PAV MRK TY II (W) 4" (SLD)	REFL PAV MRK TY II (W) 6" (BRK)	REFL PAV MRK TY II (W) 8" (SLD)	REFL PAV MRK TY II (W) 24" (SLD)	REFL PAV MRK TY II (W) (ARROW)	REFL PAV MRK TY II (W) (WORD)	REFL PAV MRK TY II (W) 18" (YLD TRI)	REFL PAV MRK TY II (Y) 4" (BRK)	REFL PAV MRK TY II (Y) 4" (SLD)
		EA	EA	EA	LF	LF	EA	EA	EA	LF	LF	LF	LF	EA	EA	EA	LF	LF
	CSJ: 3451-01-035																	
1 OF 15	STA 14+52.00 TO STA 33+00.00	7	1	0	866	80	6	6	18	0	750	866	80	6	6	18	100	1,281
2 OF 15	STA 33+00.00 TO STA 57+00.00	1	0	0	1,232	0	7	7	0	0	1,200	1,232	0	7	7	0	310	1,045
3 OF 15	STA 57+00.00 TO STA 81+00.00	0	0	0	1,426	0	8	7	0	0	1,200	1,426	0	8	7	0	0	722
4 OF 15	STA 81+00.00 TO STA 105+00.00	0	0	0	836	146	5	6	0	0	600	836	146	5	6	0	0	0
5 OF 15	STA 105+00.00 TO STA 129+00.00	0	0	0	433	56	4	2	0	1,520	850	433	56	4	2	0	0	2,433
6 OF 15	STA 129+00.00 TO STA 153+00.00	0	0	109	0	0	0	0	0	4,733	1,200	0	0	0	0	0	0	4,451
7 OF 15	STA 153+00.00 TO STA 177+00.00	2	0	17	2,067	200	5	5	0	0	1,140	2,067	200	5	5	0	0	2,289
	CSJ TOTALS	10	1	126	6,860	482	35	33	18	6,253	6,940	6,860	482	35	33	18	410	12,221
	CSJ 3451-01-036																	
8 OF 15	STA 177+00.00 TO STA 201+00.00	0	0	120	0	0	0	0	0	4,800	1,200	0	0	0	0	0	0	4,800
9 OF 15	STA 201+00.00 TO STA 225+00.00	1	0	36	730	114	5	5	0	4,577	1,180	730	114	5	5	0	200	4,248
10 OF 15	STA 225+00.00 TO STA 249+00.00	2	0	0	1,116	339	6	6	0	4,266	1,110	1,116	339	6	6	0	0	324
11 OF 15	STA 249+00.00 TO STA 273+00.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 OF 15	STA 273+00.00 TO STA 297+00.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 OF 15	STA 397+00.00 TO STA 321+00.00	1	0	0	1,105	0	7	8	0	3,948	1,150	1,105	0	7	8	0	310	2,140
14 OF 15	STA 321+00.00 TO STA 345+00.00	4	0	0	1,143	278	9	8	0	3,762	1,110	1,143	278	9	8	0	0	0
15 OF 15	STA 345+00.00 TO STA 369+00.00	1	0	0	425	171	3	3	0	3,917	1,110	425	171	3	3	0	0	558
16 OF 15	STA 369+00.00 TO STA 393+00.00	3	0	0	1,134	0	5	5	0	3,774	1,200	1,134	0	5	5	0	590	3,715
15 OF 15	STA 393+00.00 TO STA 395+00.00	0	0	0	85	0	1	1	0	170	50	85	0	1	1	0	0	0
	CSJ TOTALS	12	0	156	5,738	902	36	36	0	29,214	8,110	5,738	902	36	36	0	1,100	15,785
	PROJECT TOTALS	22	1	282	12,598	1,384	71	69	18	35,467	15,050	12,598	1,384	71	69	18	1,510	28,006

SHEET	LOCATION	666 6283	666 6287	666 6305	666 6311	672 6009	672 6010	677 6001	677 6003	677 6005	677 6007	677 6008	677 6012	678 6001	678 6002	678 6004	678 6008	678 6009	678 6016
		REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY II-C-R	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (8")	ELIM EXT PAV MRK & MRKS (12")	ELIM EXT PAV MRK & MRKS (24")	ELIM EXT PAV MRK & MRKS (ARROW)	ELIM EXT PAV MRK & MRKS (WORD)	PAV SURF PREP FOR MRK (4")	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (8")	PAV SURF PREP FOR MRK (24")	PAV SURF PREP FOR MRK (ARROW)	PAV SURF PREP FOR MRK (WORD)
		LF	LF	LF	LF	EA	EA	LF	LF	LF	LF	EA	EA	LF	LF	LF	LF	EA	EA
	CSJ: 3451-01-035																		
1 OF 15	STA 14+52.00 TO STA 33+00.00	0	1,280	750	100	45	13	3,799	0	0	109	4	5	1,480	750	866	80	6	6
2 OF 15	STA 33+00.00 TO STA 57+00.00	0	1,045	1,200	310	120	109	6,786	0	0	0	0	0	310	1,200	1,232	0	7	7
3 OF 15	STA 57+00.00 TO STA 81+00.00	0	722	1,200	110	10	131	6,888	0	0	0	0	4	832	1,200	1,426	0	8	7
4 OF 15	STA 81+00.00 TO STA 105+00.00	0	0	600	0	0	66	3,044	273	201	0	2	1	0	600	836	146	5	6
5 OF 15	STA 105+00.00 TO STA 129+00.00	1,520	2,433	850	1,690	64	55	4,322	160	0	0	2	2	5,643	850	433	56	4	2
6 OF 15	STA 129+00.00 TO STA 153+00.00	4,733	4,451	1,200	0	60	0	10,088	0	0	0	0	0	9,184	1,200	0	0	0	0
7 OF 15	STA 153+00.00 TO STA 177+00.00	0	2,289	1,140	0	8	146	8,244	101	120	65	3	3	2,289	1,140	2,067	200	5	5
	CSJ TOTALS	6,253	12,220	6,940	2,210	307	520	43,171	534	321	174	11	15	19,738	6,940	6,860	482	35	33
	CSJ 3451-01-036																		
8 OF 15	STA 177+00.00 TO STA 201+00.00	4,800	4,800	1,200	0	0	60	10,800	0	0	0	0	0	9,600	1,200	0	0	0	0
9 OF 15	STA 201+00.00 TO STA 225+00.00	4,577	4,140	1,180	200	206	95	4,343	0	0	0	0	0	9,117	1,180	730	114	5	5
10 OF 15	STA 225+00.00 TO STA 249+00.00	4,266	324	1,110	0	16	116	11,324	135	300	170	2	1	4,590	1,110	1,116	339	6	6
11 OF 15	STA 249+00.00 TO STA 273+00.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 OF 15	STA 273+00.00 TO STA 297+00.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 OF 15	STA 397+00.00 TO STA 321+00.00	3,948	2,140	1,150	310	76	213	11,270	130	0	0	1	1	6,708	1,150	1,105	0	7	8
14 OF 15	STA 321+00.00 TO STA 345+00.00	3,762	0	1,110	0	0	113	9,562	130	0	670	0	0	3,762	1,110	1,143	278	9	8
15 OF 15	STA 345+00.00 TO STA 369+00.00	3,917	558	1,110	0	25	77	10,225	600	252	117	3	3	4,475	1,110	425	171	3	3
16 OF 15	STA 369+00.00 TO STA 393+00.00	3,774	3,715	1,200	590	181	117	4,686	505	0	0	1	1	15,568	1,200	1,134	0	5	5
15 OF 15	STA 393+00.00 TO STA 395+00.00	170	0	50	0	5	5	900	0	0	0	0	0	340	50	85	0	1	1
	CSJ TOTALS	29,214	15,677	8,110	1,100	509	796	63,110	1,500	552	957	7	6	54,160	8,110	5,738	902	36	36
	PROJECT TOTALS	35,467	27,897	15,050	3,310	816	1,316	106,281	2,034	873	1,131	18	21	73,898	15,050	12,598	1,384	71	69

Texas Department of Transportation

NO.	REVISION	BY	DATE

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512)777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SUMMARY OF SIGNING AND PAVEMENT MARKINGS

1 OF 1

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO	3451	01	036, ETC.	

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SHEET	LOCATION	104 6015	416 6030	416 6031	416 6032	529 6005	531 6001	531 6019	531 6030	618 6029	618 6030	620 6010	624 6002	644 6076
		REMOVING CONC (SIDEWALKS)	DRILL SHAFT (TRF SIG POLE) (24 IN)	DRILL SHAFT (TRF SIG POLE) (30 IN)	DRILL SHAFT (TRF SIG POLE) (36 IN)	CONC CURB & GUTTER (MONO) (TY II)	CONC SIDEWALKS (4")	CURB RAMPS (TY 2)	CURB RAMPS (TY 21)	CONDT (PVC) (SCH 40) (3")	CONDT (PVC) (SCH 40) (3") BORE	ELEC CONDR (NO. 6) INSULATED GROUND	GROUND BOX TY A (122311) W/ APRON	REMOVE SM RD SN SUP&AM
		SY	LF	LF	LF	LF	SY	EA	EA	LF	LF	LF	EA	EA
CSJ: 0002-01-099														
1 OF 9	GEORGE ORR ROAD INTERSECTION LAYOUT	43	18	0	0	133	0	2	1	22	173	195	3	0
2 OF 9	BRIO ALAMEDA AVENUE CORRIDOR LAYOUT 1	0	6	0	0	0	0	1	0	41	36	77	1	0
3 OF 9	MIDWAY DRIVE INTERSECTION LAYOUT	173	30	0	0	123	43	4	1	101	184	285	3	0
4 OF 9	McCARTHY AVENUE INTERSECTION LAYOUT	85	24	0	0	135	44	3	0	77	161	238	3	0
5 OF 9	BRIO ALAMEDA AVENUE CORRIDOR LAYOUT 2	0	6	0	0	0	0	0	1	14	43	57	1	0
6 OF 9	RAPID FLASHING BEACON LAYOUT 1	2	18	0	0	0	0	2	1	33	74	146	2	1
CSJ TOTALS		303	102	0	0	391	87	12	4	288	671	998	13	1
CSJ: 3451-01-035														
7 OF 9	RAPID FLASHING BEACON LAYOUT 2	62	18	0	0	0	0	2	1	71	52	123	3	1
CSJ TOTALS		62	18	0	0	0	0	2	1	71	52	123	3	1
CSJ: 3451-01-036														
8 OF 9	RAPID FLASHING BEACON LAYOUT 3	0	0	14	14	0	0	0	0	401	1,236	1,542	12	0
9 OF 9	RAPID FLASHING BEACON LAYOUT 4	0	0	28	0	30	0	0	0	882	215	1,097	5	0
CSJ TOTALS		0	0	42	14	30	0	0	0	1,283	1,451	2,639	17	0
PROJECT TOTALS		365	120	42	14	421	87	14	5	1,642	2,174	3,760	33	2

SHEET	LOCATION	682 6018	684 6010	684 6012	684 6014	684 6082	685 6003	685 6004	686 6029	686 6037	687 6001	688 6002	690 6030	690 6094
		PED SIG SEC (LED) (COUNTDOWN)	TRAF SIG CBL (TY A) (12 AWG) (5 CONDR)	TRAF SIG CBL (TY A) (12 AWG) (7 CONDR)	TRAF SIG CBL (TY A) (12 AWG) (9 CONDR)	TRAF SIG CBL (TY C) (18 AWG) (2 CONDR)	REMOVE RDSD FLASH BEACON ASSEMBLY	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	INS TRF SIG PL AM (S)1 ARM(28')	INS TRF SIG PL AM(S)1 ARM(36')	PED POLE ASSEM (STL) (10 FT)	PED DETECT (2 INCH) (PUSH BTN)	REMOVAL OF PEDESTRIAN PUSH BUTTONS	REMOV PED SIG LED TRAF SIG LAMP UNIT
		EA	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA
CSJ: 0002-01-099														
1 OF 9	GEORGE ORR ROAD INTERSECTION LAYOUT	4	317	0	155	448	0	0	0	0	3	3	1	1
2 OF 9	BRIO ALAMEDA AVENUE CORRIDOR LAYOUT 1	2	0	0	93	89	0	0	0	0	1	1	0	0
3 OF 9	MIDWAY DRIVE INTERSECTION LAYOUT	6	352	0	93	395	0	0	0	0	5	5	4	4
4 OF 9	McCARTHY AVENUE INTERSECTION LAYOUT	4	345	0	0	305	0	0	0	0	4	4	3	4
5 OF 9	BRIO ALAMEDA AVENUE CORRIDOR LAYOUT 2	2	0	0	73	69	0	0	0	0	1	1	0	0
6 OF 9	RAPID FLASHING BEACON LAYOUT 1	0	165	0	0	164	0	0	0	0	3	3	0	0
CSJ TOTALS		18	1,179	0	414	1,470	0	0	0	0	17	17	8	9
CSJ: 3451-01-035														
7 OF 9	RAPID FLASHING BEACON LAYOUT 2	0	108	0	56	182	0	0	0	0	3	3	0	0
CSJ TOTALS		0	108	0	56	182	0	0	0	0	3	3	0	0
CSJ: 3451-01-036														
8 OF 9	RAPID FLASHING BEACON LAYOUT 3	0	0	2,166	0	0	2	2	1	1	0	0	0	0
9 OF 9	RAPID FLASHING BEACON LAYOUT 4	0	0	1,416	0	0	2	2	2	0	0	0	0	0
CSJ TOTALS		0	0	3,582	0	0	4	4	3	1	0	0	0	0
PROJECT TOTALS		18	1,287	3,582	470	1,652	4	4	3	1	20	20	8	9

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www.integratedengineeringsolutions.com
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TBPELS FIRM NO. F-312

SH 20 & FM 1281
HAZARD ELIMINATION & SAFETY

PEDESTRIAN TRAFFIC SIGNAL SUMMARY SHEET

1 OF 1

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:			STP 2021 (624) HES			FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	ELP	EL PASO	3451	01	035, ETC.	022	

FINAL SUBMITTAL

TCP PHASE	SPECIFIC TCP PLAN SHEET OR TCP STANDARD SHEET	6185-6002 TMA (STATIONARY)	6185-6005 TMA (MOBILE OPERATION)
	SHEET NUMBER	DAY	DAY
CSJ 0002-01-099			
SH 20 PHASE I, STEP 2	TCP (2-4) - 18	4	0
SH 20 PHASE I, STEP 3	TCP (2-1) - 18	50	4
SH 20 PHASE II, STEP I	TCP (3-1) - 13	4	4
CSJ TOTALS		**58**	**8**
CSJ 3451-01-035			
FM 1281 PHASE I, STEP 2	TCP (2-4) - 18	115	0
FM 1281 PHASE II, STEP I	TCP (3-1) - 13	2	2
CSJ TOTALS		**117**	**2**
CSJ 3451-01-036 SUBTOTAL			
FM 1281 PHASE I, STEP 2	TCP (2-4) - 18	115	0
FM 1281 PHASE II, STEP I	TCP (3-1) - 13	2	2
CSJ TOTALS		**117**	**2**
CSJ 3451-01-041 SUBTOTAL			
FM 1281 PHASE I, STEP 3	TCP (2-1) - 18	50	4
CSJ TOTALS		**50**	**4**
PROJECT TOTALS		**342**	**16**

NOTES:

1. REFER TO GENERAL NOTES ITEM 6185 FOR TMA BASIS OF ESTIMATE.

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TMA SUMMARY

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO	3451	01	036, ETC.	023

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FINAL SUBMITTAL

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

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

GENERAL:

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

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

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

4. THE CONTRACTOR SHALL PROVIDE ADVANCE NOTIFICATION TO THE ENGINEER OF UPCOMING LANE CLOSURES FOR ALL TEMPORARY OR PERMANENT LANE, SHOULDER, ETC. CLOSURES OR DETOURS. SEE GENERAL NOTES FOR NOTIFICATION REQUIREMENTS.

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

6. TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR.

7. AT NO TIME SHALL TWO CONSECUTIVE INTERSECTING ROADWAYS BE CLOSED AT ONE TIME DURING CONSTRUCTION.

8. UNLESS OTHERWISE NOTED IN THE PLANS OR AS DIRECTED BY THE ENGINEER, LANE CLOSURES FOR CONSTRUCTION IN THE CENTER MEDIAN SHALL BE LIMITED TO NIGHTIME HOURS: SUNDAY THRU THURSDAY - 9PM TO 6AM.

9. UNLESS OTHERWISE NOTED IN THE PLANS OR AS DIRECTED BY THE ENIGINEER, LANE CLOSURES FOR CONSTRUCTION BETWEEN THE OUTSIDE EDGE OF PAVEMENT AND THE RIGHT-OF-WAY BOUNDARY SHALL BE LIMITED TO DAYTIME HOURS: SUNDAY THRU THURSDAY - 9AM TO 4PM.

10. NO LANE CLOSURES WILL BE PERMITTED DURING THE FOLLOWING DAYS:

    - BETWEEN DECEMBER 15 AND JANUARY 1
    - WEDNESDAY BEFORE THANKSGIVING THRU SUNDAY AFTER THANKSGIVING
    - SATURDAY AND SUNDAY BEFORE MEMORIAL DAY AND LABOR DAY
    - SATURDAY OR SUNDAY WHEN JULY 4TH FALLS ON A FRIDAY OR MONDAY
    - ELECTION DAYS
    - FRIDAY, SATURDAY, AND SUNDAY OF EASTER WEEKEND

11. COORDINATE WITH ADJACENT PROJECTS SO AS NOT TO AFFECT THE CONTINUOUS MOVEMENT OF TRAFFIC.

12. COVER EXISTING PERMANENT SIGNS THAT DO NOT APPLY DURING CONSTRUCTION OPERATAION. REMOVE COVER AFTER CONSTRUCTION ACTIVITIES ARE COMPLETE IN THE AREA. THIS IS SUBSIDIARY TO ITEM 502.

14. THE CONTRACTOR SHALL INSTALL AND MAINTAIN AN ADEQUATE NUMBER OF BARRICADES, WARNING AND DIRECTIONAL SIGNS TO DELINEATE TRAFFIC FOR ANY DETOURS OR CLOSURES. THE CONTRACTOR MAY, WITH THE APPROVAL OF THE ENGINEER, BE REQUIRED TO VARY THE NUMBER AND LOCATION OF SIGNS AND BARRICADES FROM THAT INDICATED ON THE PLANS. ADDITIONAL SIGNS WILL BE SUBSIDIARY TO ITEM 502.

15. ALL REFERENCED LOCATIONS SHALL HAVE TEMPORARY PAVEMENT MARKERS (TABS) OR WORK ZONE PAVEMENT MARKINGS FOR LANE DELINEATION.

16. PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) ARE INCLUDED IN THE CONTRACT AND PAYMENT IS BY THE DAY.

17. CONTRACTOR SHALL UTILIZE TCP (3-1)-13 WHEN RELOCATING WORK ZONE PAVEMENT MARKINGS, SIGNAGE, BARRIERS, AND CHANNELIZING DEVICES, UNLESS DIRECTED OTHERWISE BY THE ENGINEER.

SH 20

SEQUENCE OF WORK

1. THIS ROADWAY WILL BE CONSTRUCTED IN TWO (2) PHASES. BEFORE THE COMMENCEMENT OF EACH PHASE OR STEP, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS, AND BARRICADES AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. DROP OFF CONDITIONS OF GREATER THAN 2 INCHES MUST HAVE A 3:1 SLOPE AT THE END OF EACH WORKDAY.

2. A BRIEF DESCRIPTION OF THESE PHASES ARE AS FOLLOWS:

PHASE I

1. INSTALL SWP3 ITEMS, TRAFFIC CONTROL WARNING DEVICES, TEMPORARY PAVEMENT MARKINGS AND SIGNS.

2. CONSTRUCT CURB AND MEDIAN UTLIZING TCP (2-4)-18 TO SHIFT TRAFFIC TO OUTSIDE LANE.

3. CONSTRUCT CURB RAMPS AND PEDESTRIAN SIGNAL IMPROVEMENTS UTILIZING TCP (2-1)-18 TO SHIFT TRAFFIC TO INSIDE LANE.

4. OPEN ALL LANES TO TRAFFIC.

PHASE II
1. PLACE FINAL PAVEMENT MARKINGS.

2. INSTALL SIGNS AND DELINEATION.

3. REMOVE BARRICADES AND ADVANCE WARNING SIGNS ONLY AFTER WORK ON SH 20 HAS BEEN ACCEPTED AS COMPLETE BY THE ENGINEER.

FM 1281

SEQUENCE OF WORK

1. THIS ROADWAY WILL BE CONSTRUCTED IN TWO (2) PHASES. BEFORE THE COMMENCEMENT OF EACH PHASE OR STEP, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS, AND BARRICADES AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. DROP OFF CONDITIONS OF GREATER THAN 2 INCHES MUST HAVE A 3:1 SLOPE AT THE END OF EACH WORKDAY.
2. A BRIEF DESCRIPTION OF THESE PHASES ARE AS FOLLOWS:

PHASE I

1. INSTALL SWP3 ITEMS, TRAFFIC CONTROL WARNING DEVICES, TEMPORARY PAVEMENT MARKINGS AND SIGNS.

2. CONSTRUCT CURB AND MEDIAN UTLIZING TCP (2-4)-18 TO SHIFT TRAFFIC TO OUTSIDE LANE.

3. CONSTRUCT SIDEWALK, CURB RAMPS AND PEDESTRIAN SIGNAL IMPROVEMENTS UTILIZING TCP (2-1)-18 TO SHIFT TRAFFIC TO INSIDE LANE.

4. OPEN ALL LANES TO TRAFFIC.

PHASE II

1. PLACE FINAL PAVEMENT MARKINGS.

2. INSTALL SIGNS AND DELINEATION.

3. REMOVE BARRICADES AND ADVANCE WARNING SIGNS ONLY AFTER WORK ON FM 1281 HAS BEEN ACCEPTED AS COMPLETE BY THE ENGINEER.

SAFETY:

1. THE CONTRACTOR SHALL PROVIDE, CONSTRUCT AND MAINTAIN BARRICADES AND SIGNS IN ACCORDANCE WITH STATE STANDARDS BC (1-12)-14. ANY SIGNS REQUIRED THAT ARE NOT DETAILED IN THE STANDARD SHEETS SHALL BE IN CONFORMANCE WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS AND THE STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS.

2. BARRICADES AND WARNING SIGNS SHALL BE PLACED AS INDICATED ON PLANS. THIS SHALL BE CONSIDERED THE MINIMUM REQUIRED TO PROVIDE FOR THE SAFETY OF THE TRAVELING PUBLIC DURING CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN OTHER SUCH BARRICADES AND SIGNS DEEMED NECESSARY BY THE ENGINEER OR AS NEEDED DUE TO FIELD CONDITIONS, TO PROVIDE FOR THE SAFE PASSAGE OF TRAFFIC AT ALL TIMES.

3. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN FLAGGERS AS DIRECTED BY THE ENGINEER, AT SUCH POINTS AND LOCATIONS, AND FOR SUCH PERIODS OF TIMES AS MAY BE REQUIRED TO PROVIDE FOR THE SAFETY OF THE TRAVELING PUBLIC AND FOR THE CONTRACTOR'S PERSONNEL.

4. THE CONTRACTOR SHALL KEEP THE ROADWAY CLEAN AND FREE OF DIRT OR OTHER ROADWAY DEBRIS DURING HAULING OPERATIONS AT ALL TIMES. IF THE CONTRACTOR DOES NOT MAINTAIN A CLEAN ROADWAY, AS DETERMINED BY THE ENGINEER, THEY SHALL CEASE ALL CONSTRUCTION OPERATIONS WHEN DIRECTED BY THE ENGINEER AND CLEAN THE ROADWAY TO SATISFACTION OF THE ENGINEER. THIS SHALL BE CONSIDERED SUBSIDIARY TO PERTINENT BID ITEMS.

HAULING EQUIPMENT:

1. THE USE OF CONSTRUCTION VEHICLES EQUIPPED WITH RUBBER TIRES WILL BE REQUIRED FOR MOVING DIRT OR OTHER MATERIALS ALONG OR ACROSS PAVED SURFACES. WHERE THE CONTRACTOR DESIRES TO MOVE ANY EQUIPMENT NOT LICENSED FOR OPERATION ON PUBLIC HIGHWAYS, ON OR ACROSS PAVEMENT, THEY SHALL PROTECT THE PAVEMENT FROM DAMAGE AS DIRECTED BY THE ENGINEER.

2. THROUGHOUT CONSTRUCTION OPERATIONS, THE CONTRACTOR WILL BE REQUIRED TO CONDUCT THEIR HAULING OPERATIONS IN A MANNER SUCH THAT VEHICLES WILL NOT HAUL OVER PREVIOUSLY RECOMPACTED SUBGRADE OR COMPACTED BASE MATERIAL, EXCEPT IN SHORT SECTIONS FOR DUMPING MANIPULATIONS.

FINAL CLEAN UP:

1. UPON COMPLETION OF THE WORK AND BEFORE FINAL ACCEPTANCE AND FINAL PAYMENT IS MADE, THE CONTRACTOR SHALL CLEAR AND REMOVE FROM THE SITE ALL SURPLUS AND DISCARDED MATERIALS AND DEBRIS OF EVERY KIND AND LEAVE THE ENTIRE PROJECT IN A SMOOTH, NEAT, AND SIGHTLY CONDITION.

PAYMENT:

1. ALL BARRICADES, SIGNS, AND FLAGGERS SHALL BE SUBSIDIARY TO ITEM 502 BARRICADES, SIGNS, AND TRAFFIC HANDLING. ALL OTHER WORK AND MATERIALS SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEMS UNLESS OTHERWISE INDICATED IN THE PLANS.

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STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER

04-05-21

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TBPELS FIRM NO. F-312

SH 20 & FM 1281

TRAFFIC CONTROL PLAN NARRATIVE

1 OF 1

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
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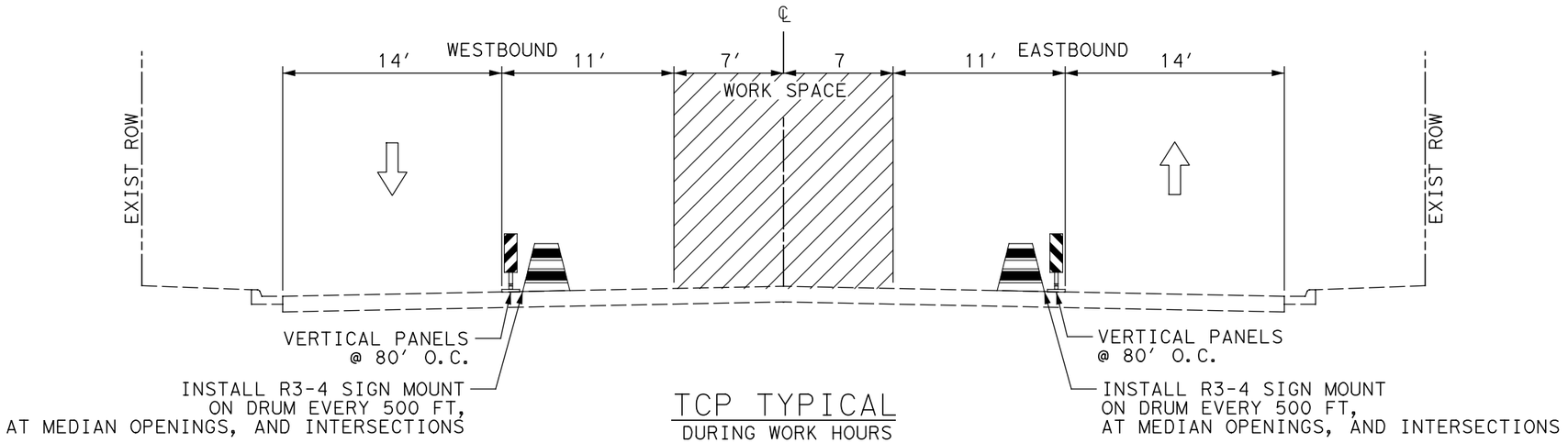
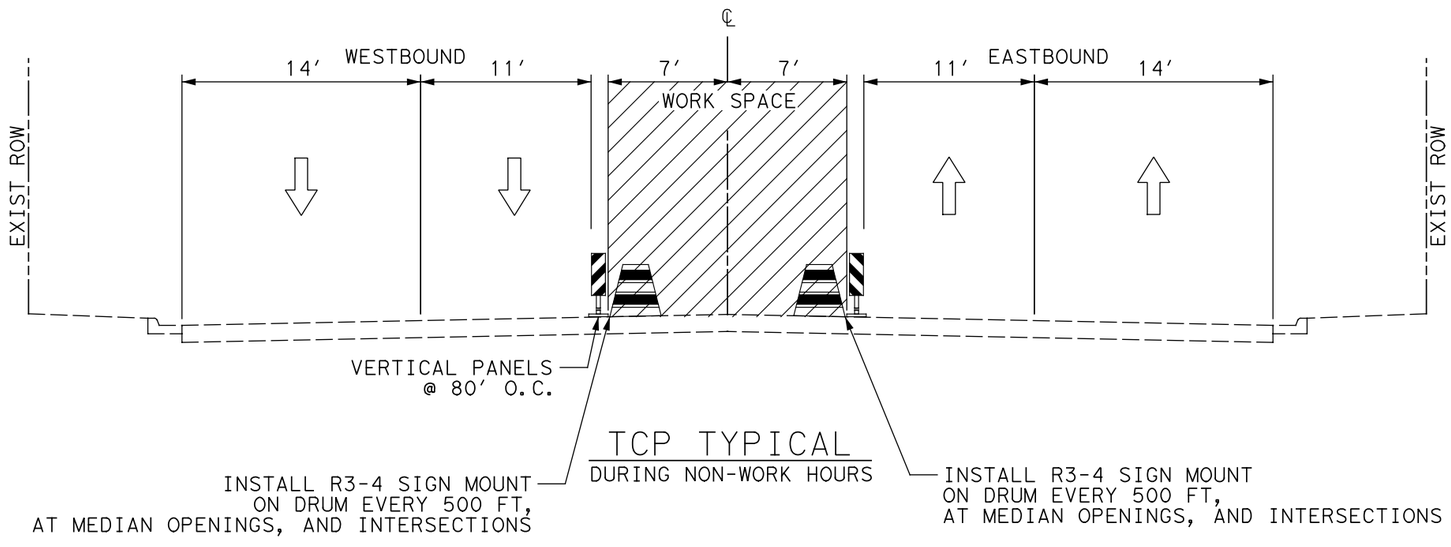


TCP TYPICAL
DURING WORK HOURS



TCP TYPICAL
DURING NON-WORK HOURS

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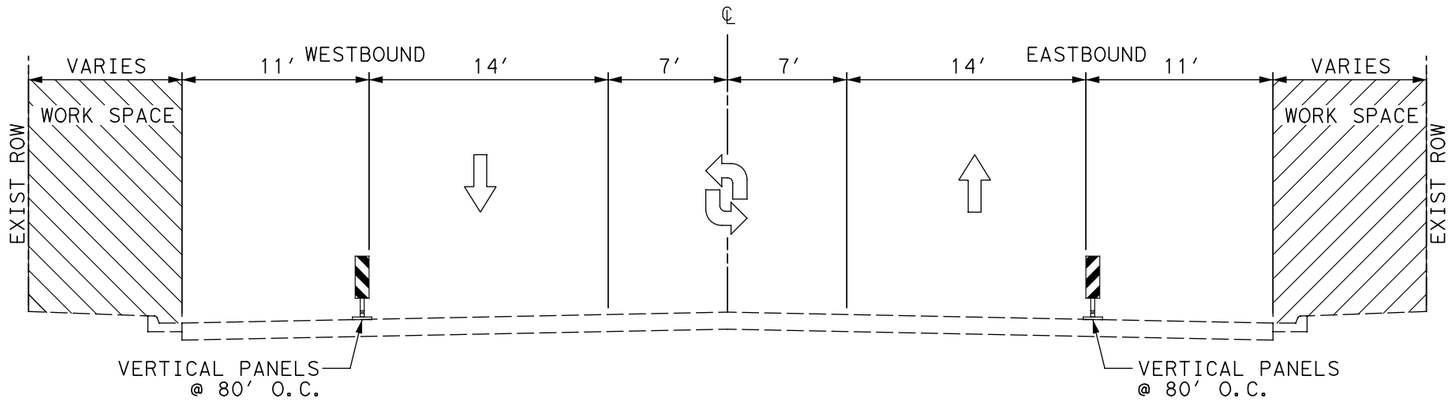
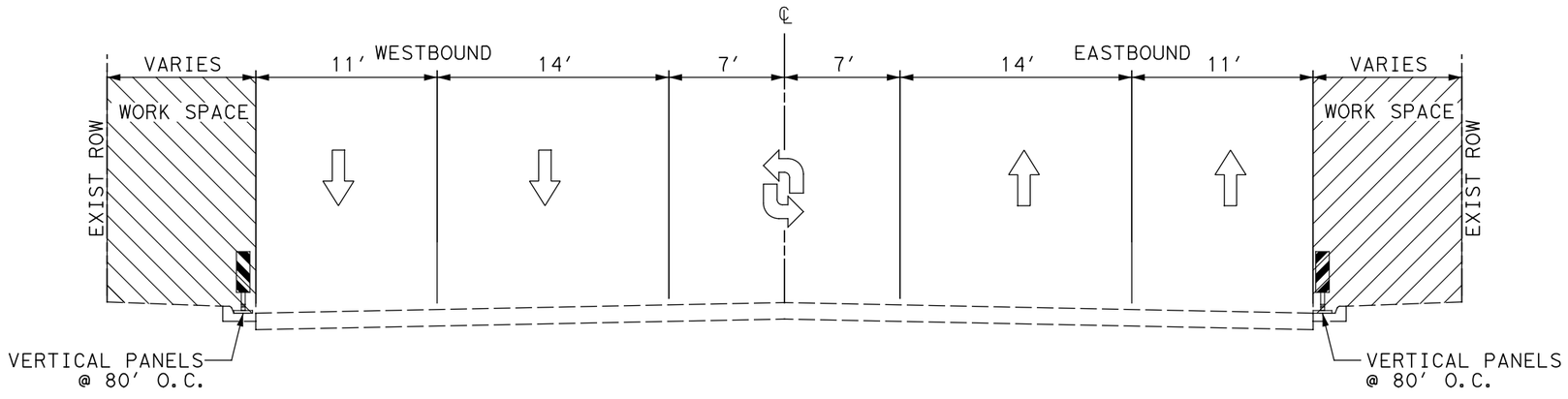
SH 20 & FM 1281

TRAFFIC CONTROL PLAN TYPICAL SECTION

DESIGNED: JK	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: JK	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	030 ETC.	025



TCP TYPICAL
DURING WORK HOURS



TCP TYPICAL
DURING NON-WORK HOURS

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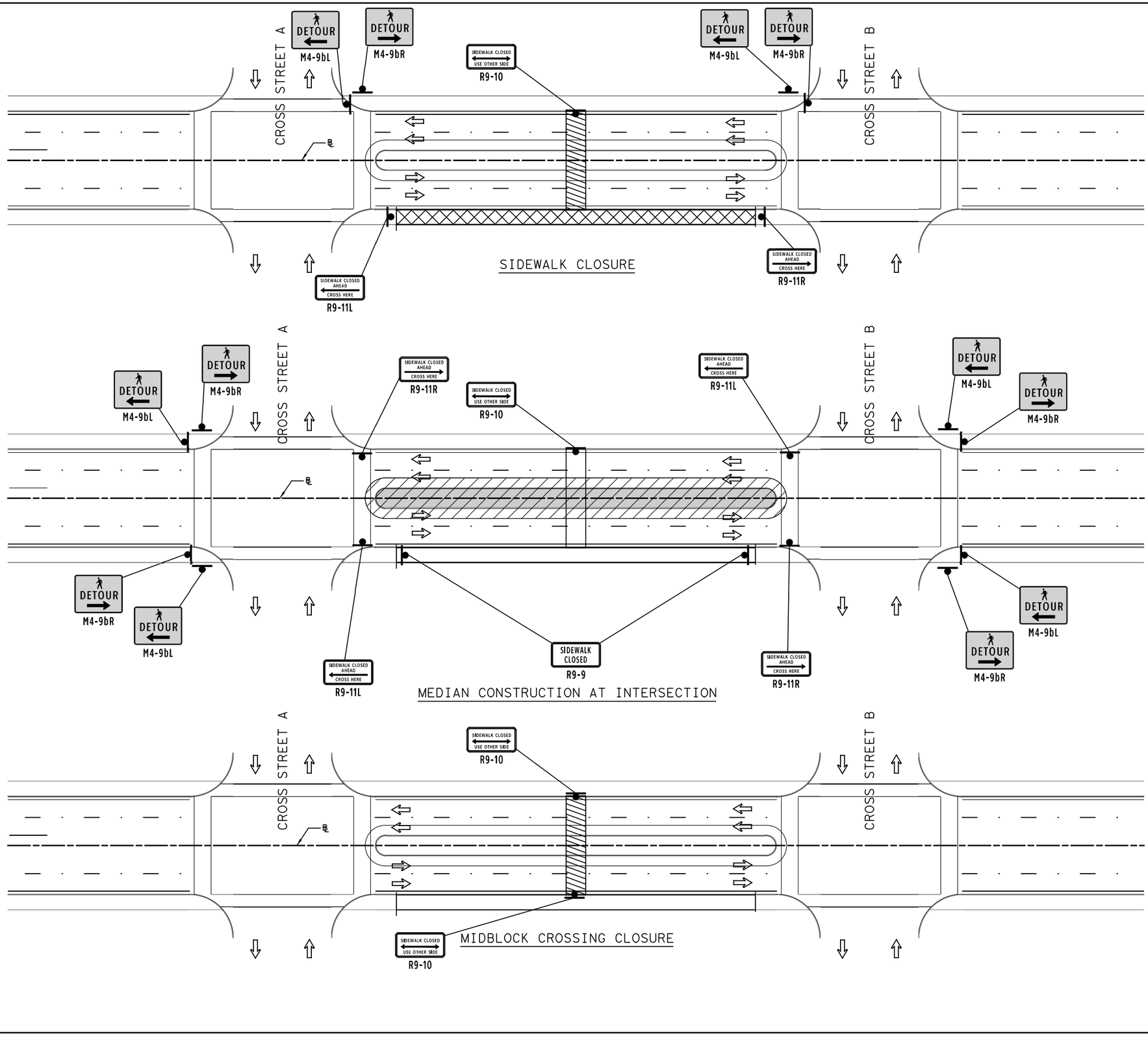
TRAFFIC CONTROL PLAN TYPICAL SECTION

DESIGNED: JK	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: JK	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	030 ETC.	026

FINAL SUBMITTAL



NOT TO SCALE

LEGEND

- WORK SPACE
- SIDEWALK CONSTRUCTION
- CROSS WALK CONSTRUCTION
- MEDIAN CONSTRUCTION
- SIGN
- TYPE III BARRICADE
- DIRECTION OF TRAFFIC FLOW
- PEDESTRIAN TRAFFIC FLOW

Texas Department of Transportation

NO.	REVISION	BY	DATE

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03/30/21

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TBPELS FIRM NO. F-312

SH 20 & FM 1281

TRAFFIC CONTROL PLAN PEDESTRIAN DETOUR LAYOUT

1 OF 1

	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
DESIGNED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
CHECKED:							
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	ELP	EL PASO	3451	01	030, ETC.	027	

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

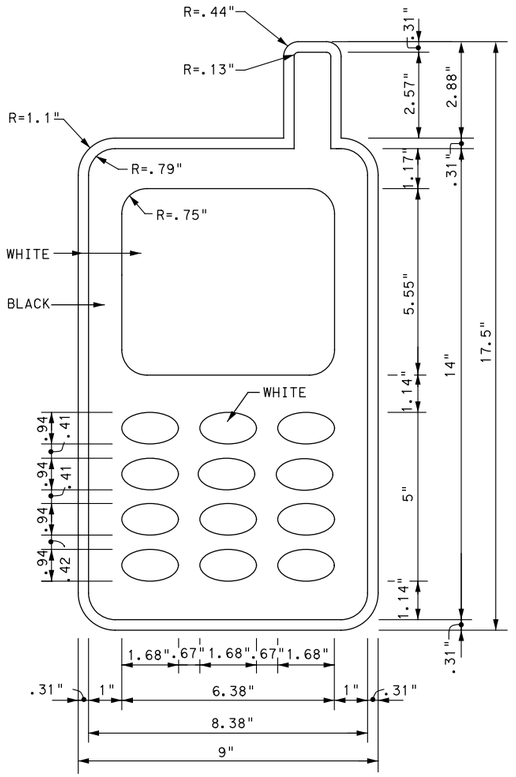
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

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

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

WORKER SAFETY APPAREL NOTES:

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



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

SIGN DETAIL (G20-10T)

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

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REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
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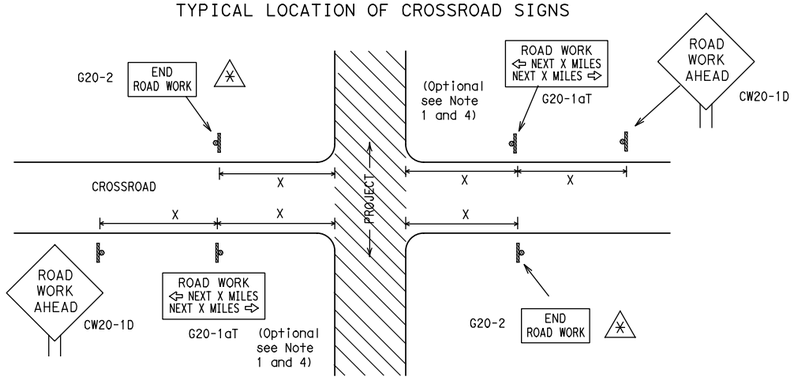
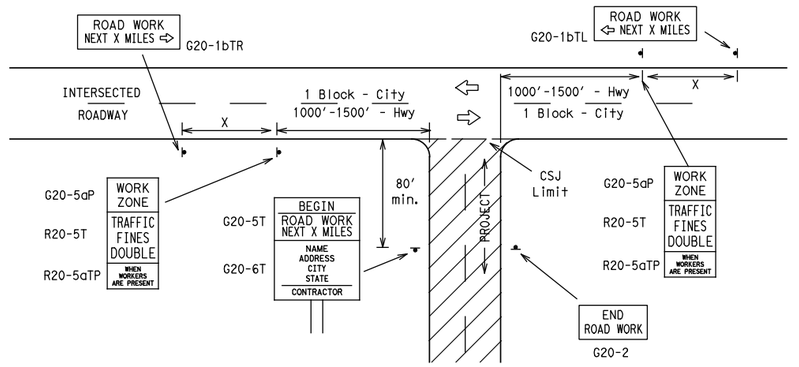
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

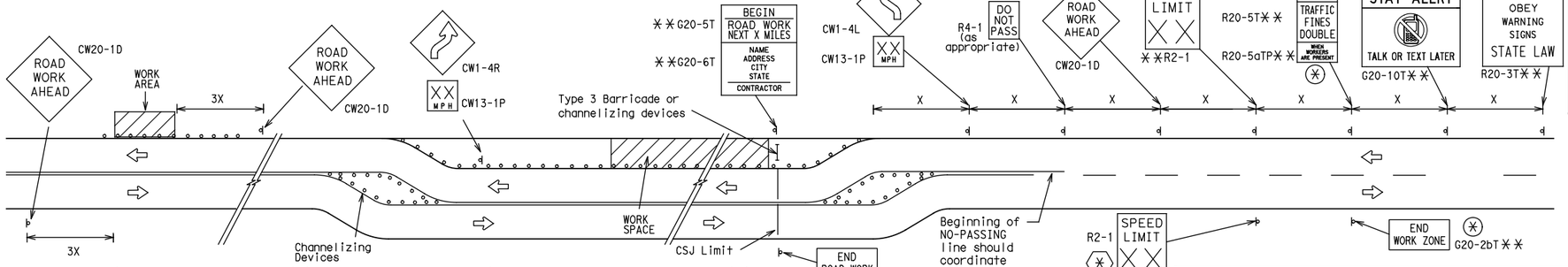
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

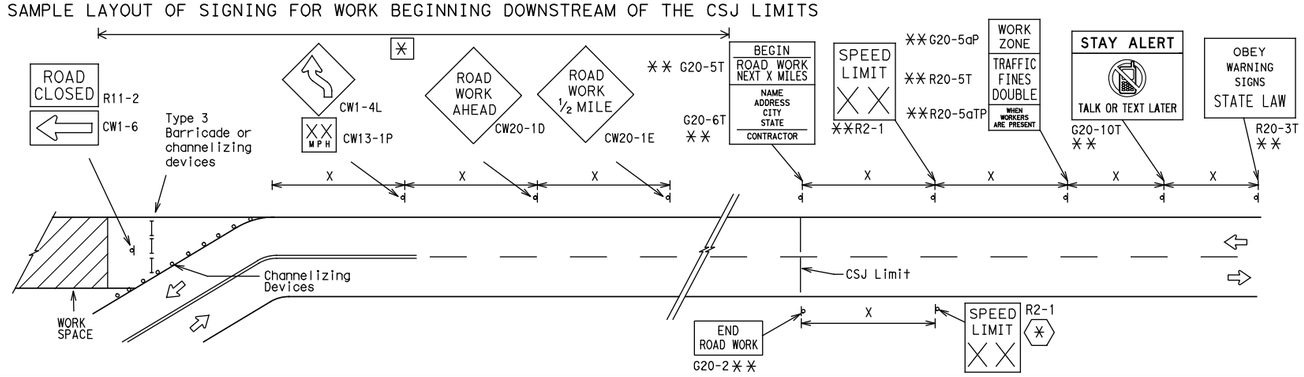
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

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7-13	ELP	EL PASO		029

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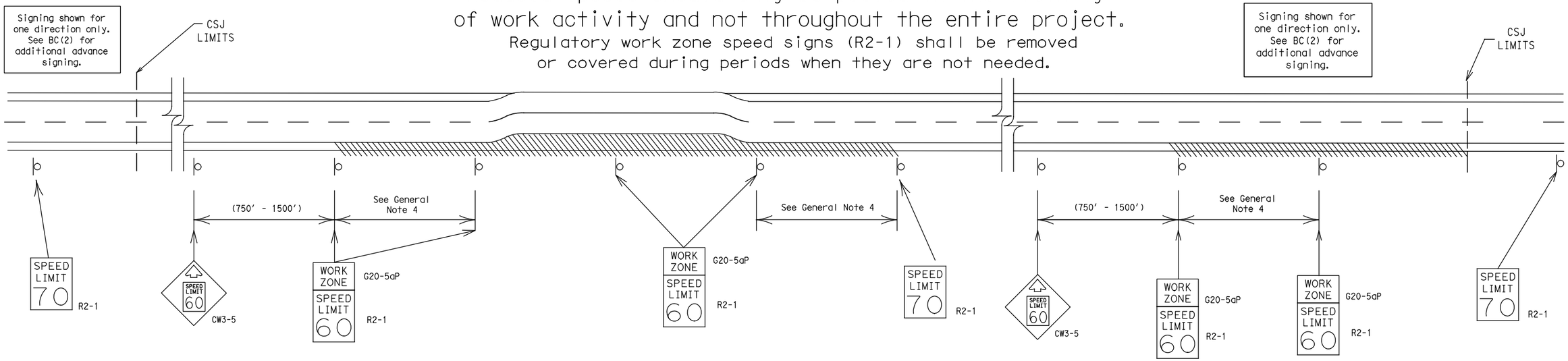
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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 travelled way.

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		030

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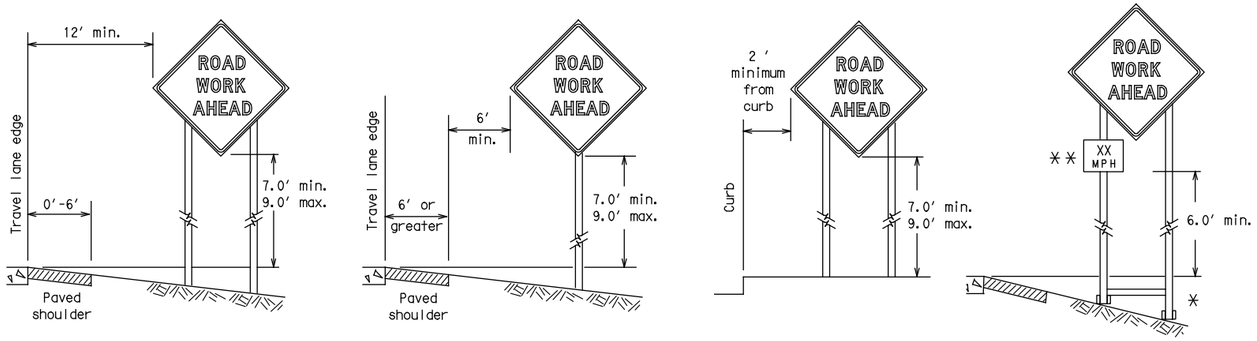
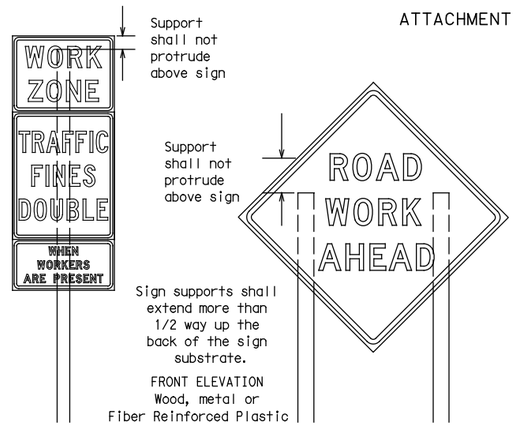
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



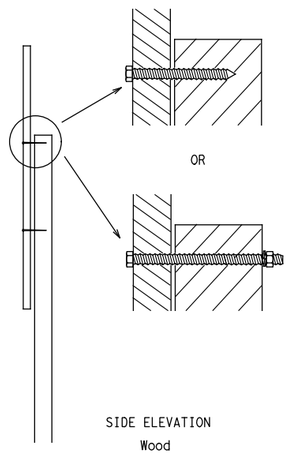
⚹ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



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

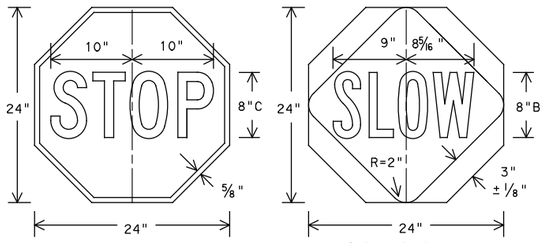


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

STOP/SLOW PADDLES

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



CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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7-13	ELP	EL PASO		031

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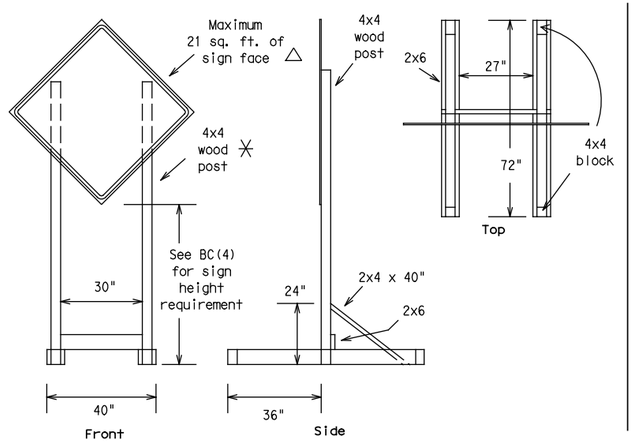
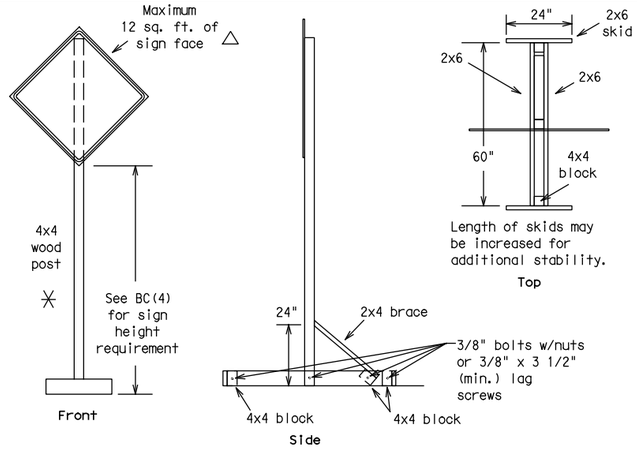
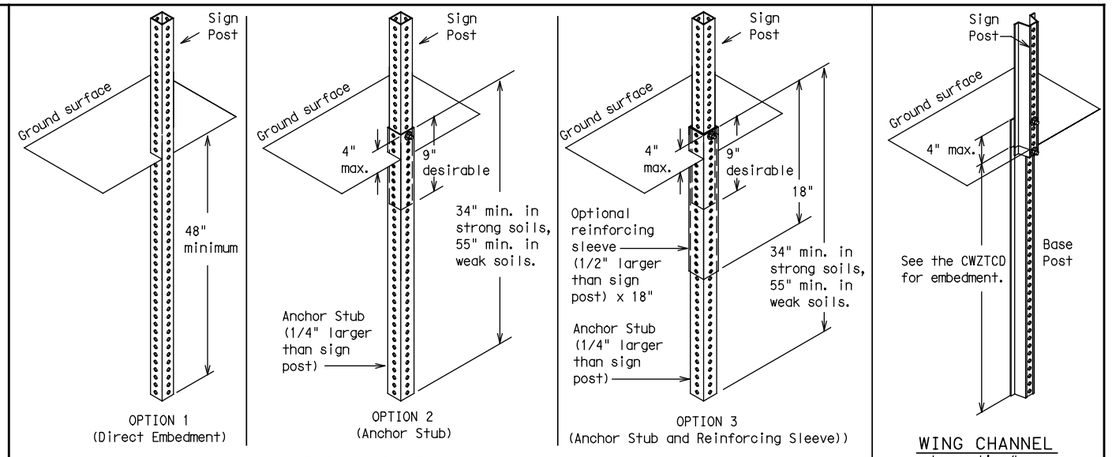




SKID MOUNTED WOOD SIGN SUPPORTS

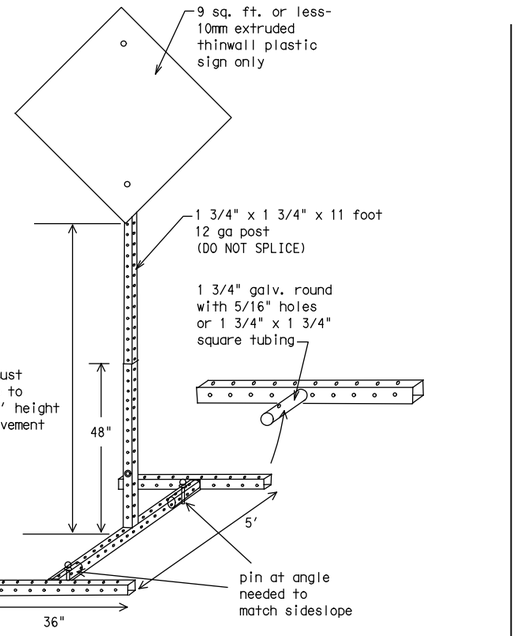
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

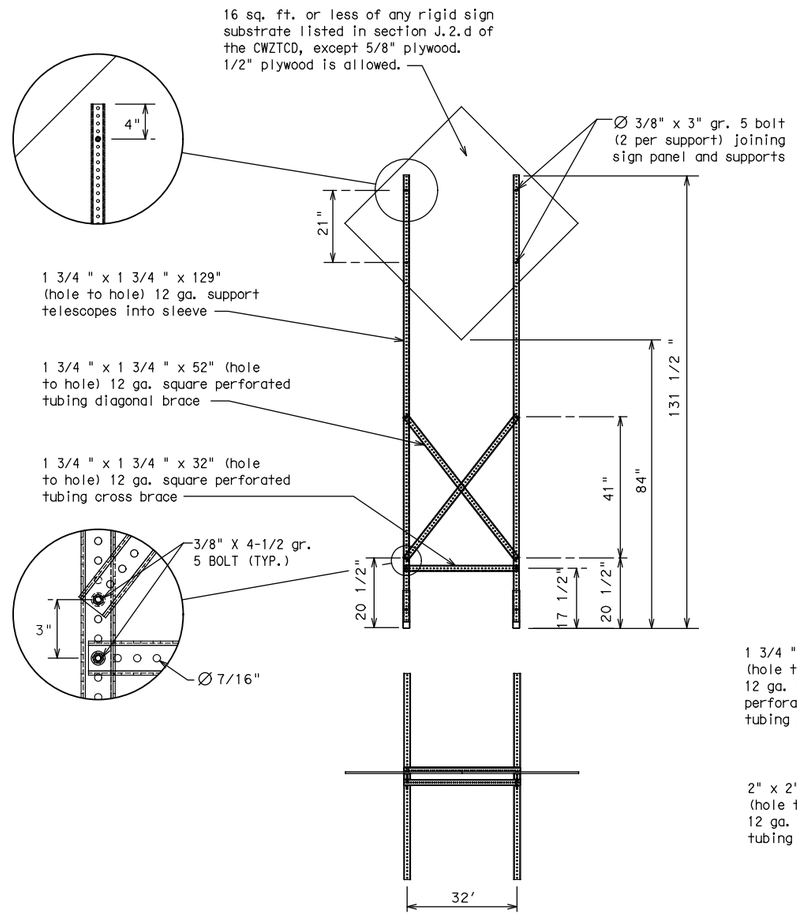


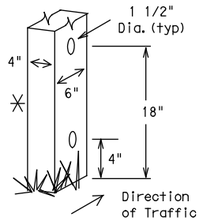
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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

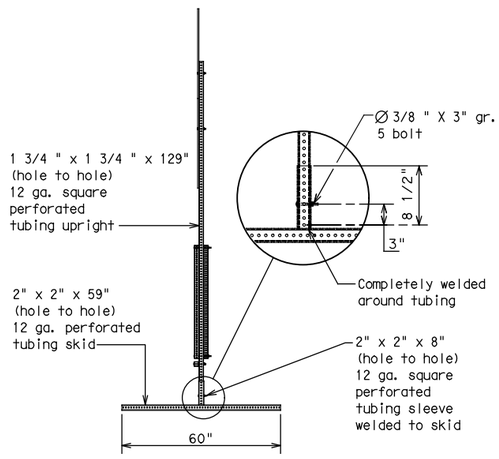






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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7-13	ELP	EL PASO		032

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 Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

FILE:	bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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7-13		ELP	EL PASO		033

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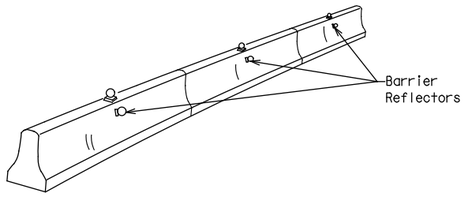
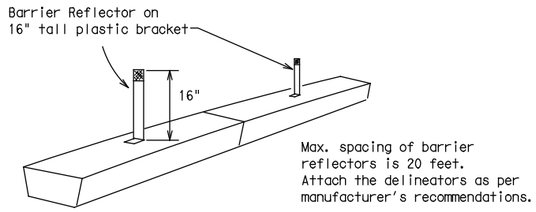
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

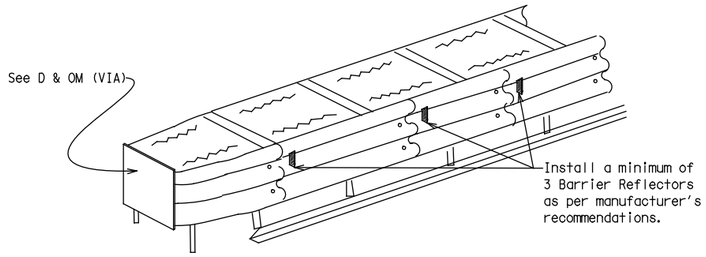


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)

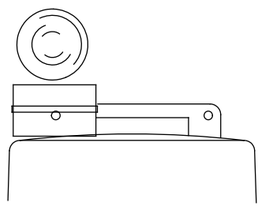


DELINEATION OF END TREATMENTS

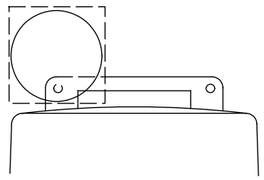
END TREATMENTS FOR
CTB'S USED
IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

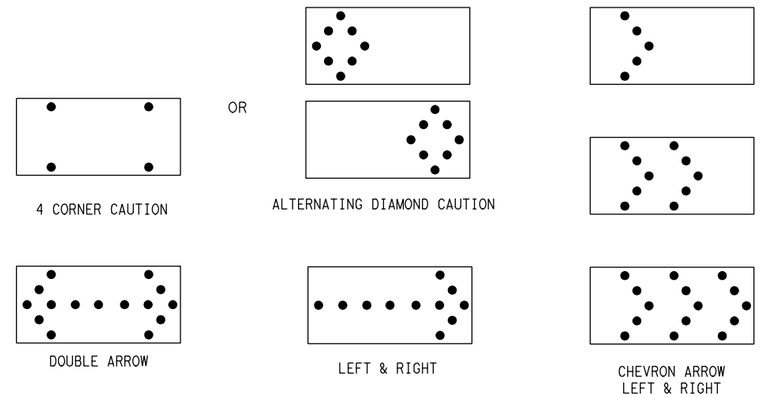
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

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

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Operations Division Standard

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

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	ELP	EL PASO		034

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

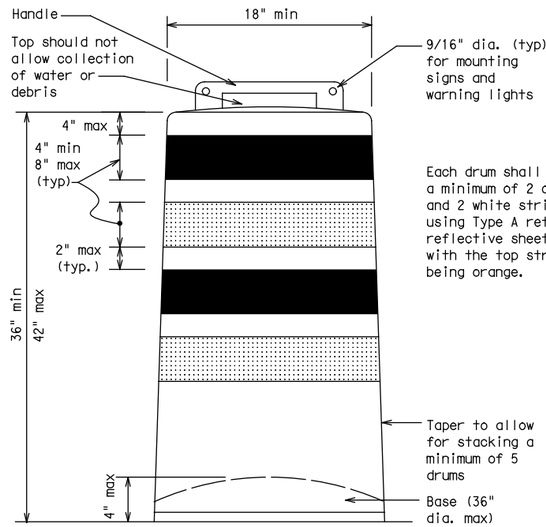
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

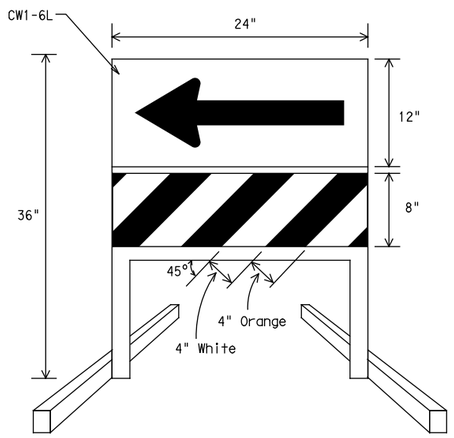
RETROREFLECTIVE SHEETING

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

BALLAST

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

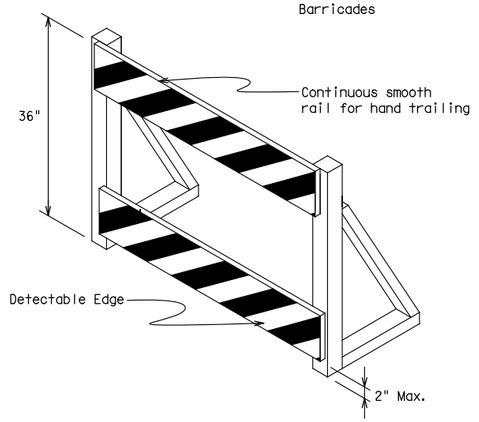




DIRECTION INDICATOR BARRICADE

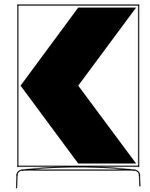
1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3.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

This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

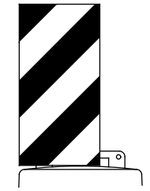


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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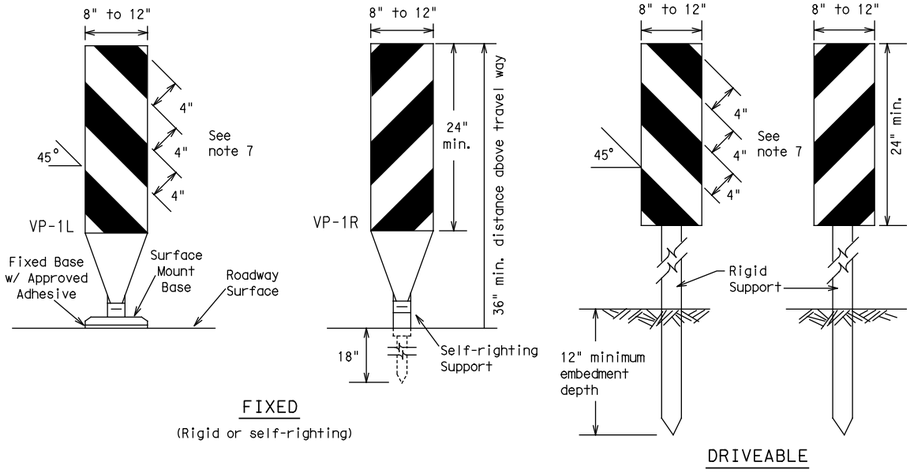
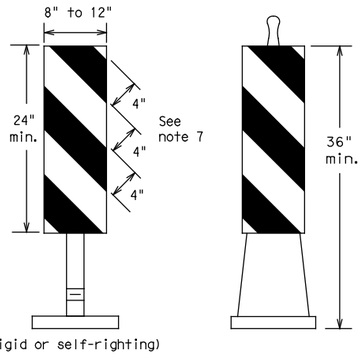
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	ELP	EL PASO		035



FIXED

(Rigid or self-righting)

DRIVEABLE

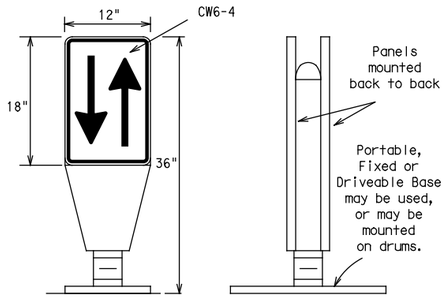


(Rigid or self-righting)

PORTABLE

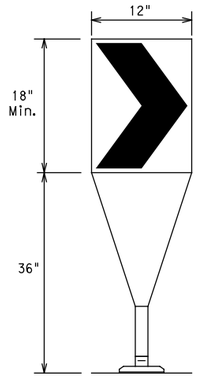
VERTICAL PANELS (VPs)

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 Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of VP's for drop-offs.
3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

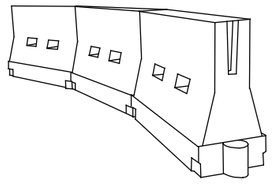
1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The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



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

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

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

GENERAL NOTES

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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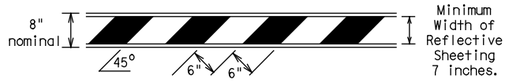
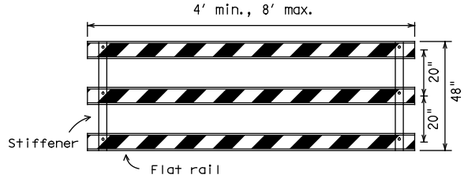
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



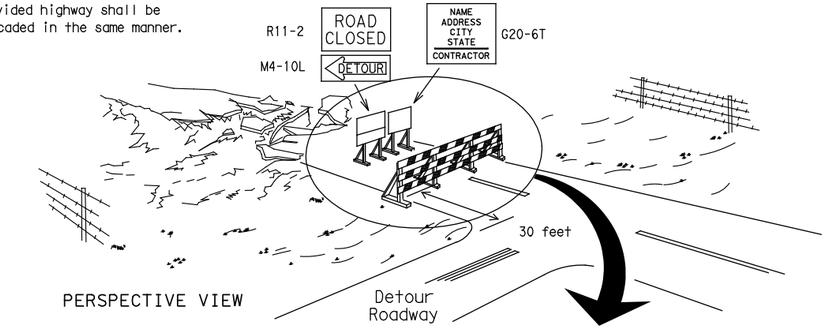
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

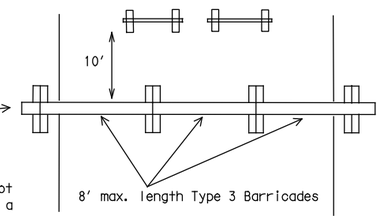
TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

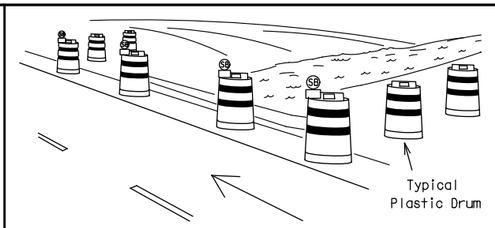
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

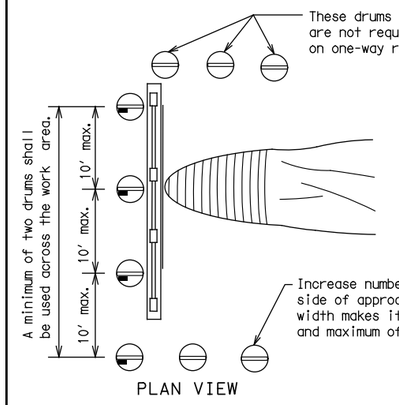
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

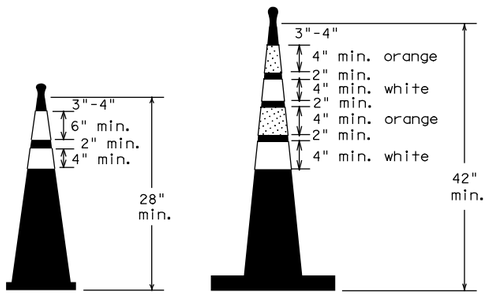
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones

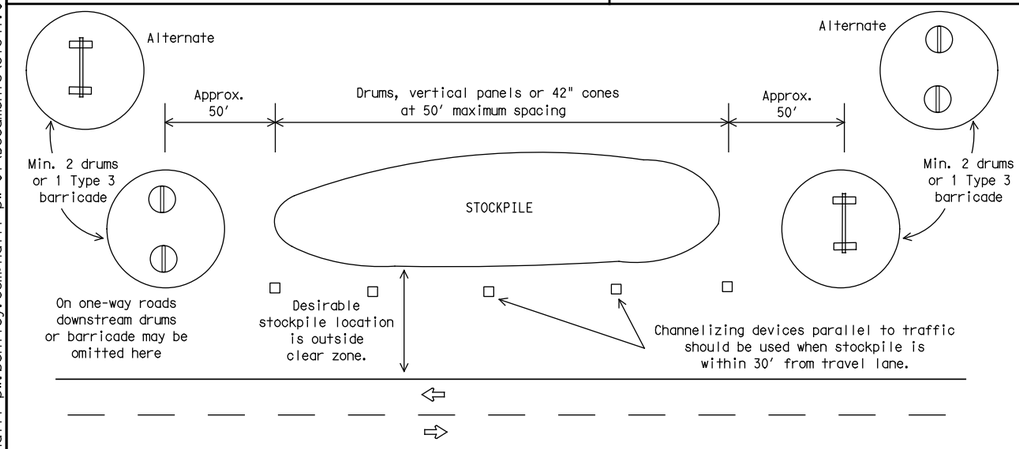
One-Piece cones

Tubular Marker

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

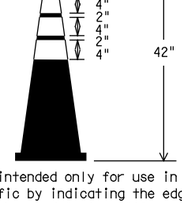
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



EDGELINE CHANNELIZER

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	ELP	EL PASO		037

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

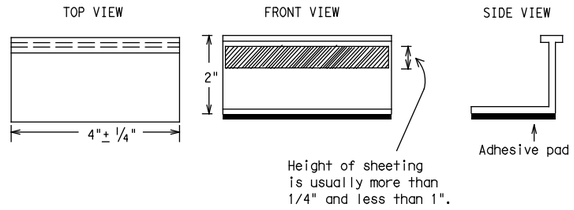
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

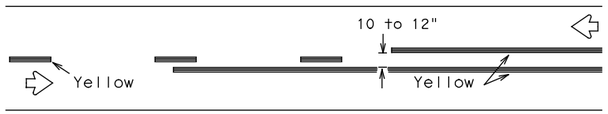
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

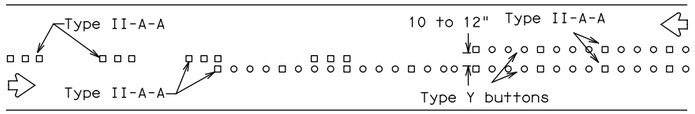
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
2-98 9-07	DIST	COUNTY		SHEET NO.
1-02 7-13	ELP	EL PASO		038
11-02 8-14				

3/30/2021
pw:\\halff-pw.bentley.com:halff-pw-01\Documents\37547.001 El Paso*SH20\CADD\Sheets\HALFF\STANDARDS\bc-14.dgn

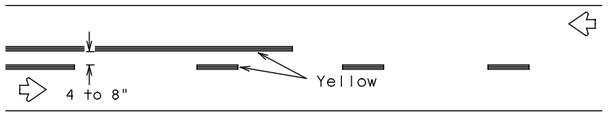
PAVEMENT MARKING PATTERNS



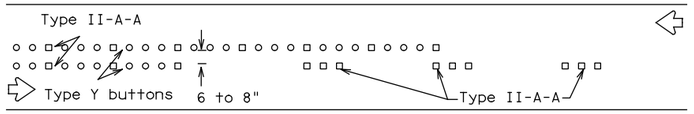
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



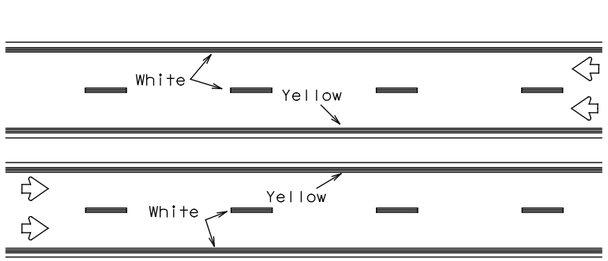
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



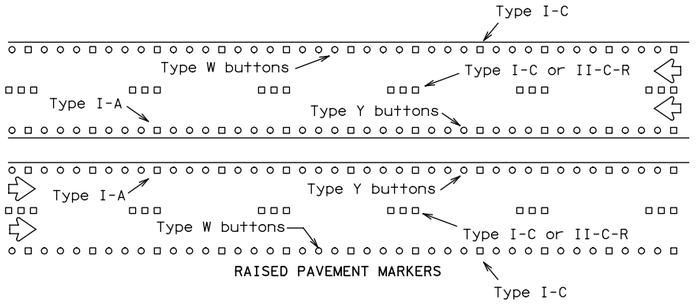
RAISED PAVEMENT MARKERS - PATTERN B

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

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



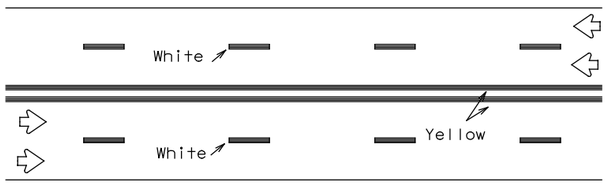
REFLECTORIZED PAVEMENT MARKINGS



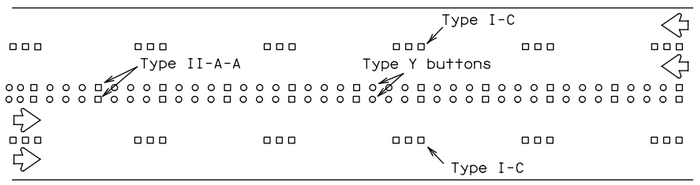
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



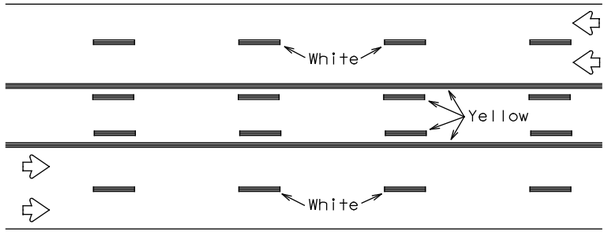
REFLECTORIZED PAVEMENT MARKINGS



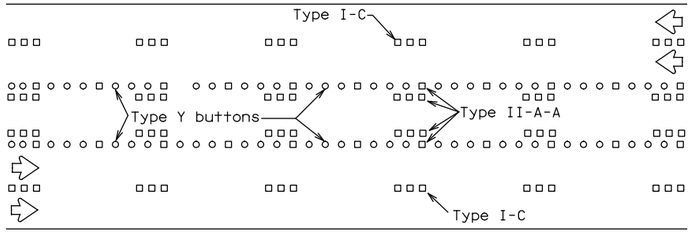
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

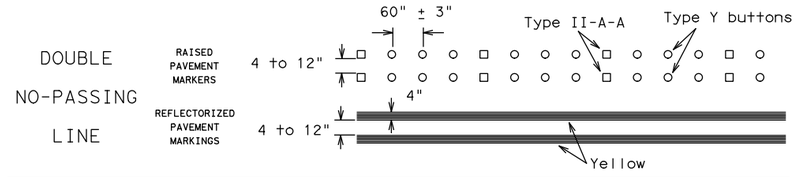
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

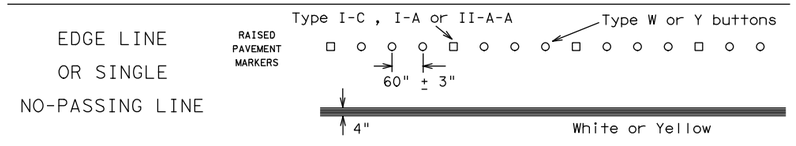
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

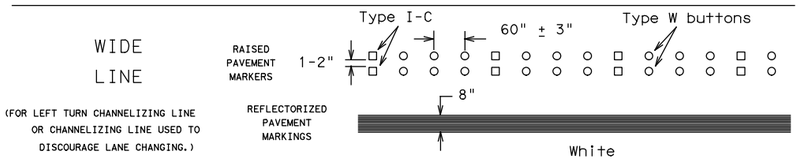


EDGE LINE OR SINGLE NO-PASSING LINE



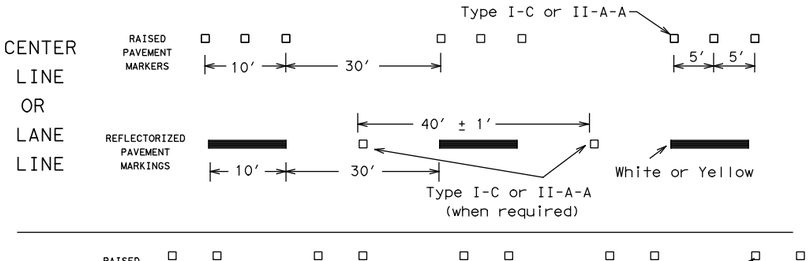
WIDE LINE

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

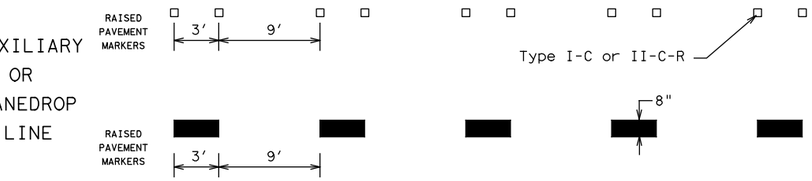


BROKEN LINES

CENTER LINE OR LANE LINE

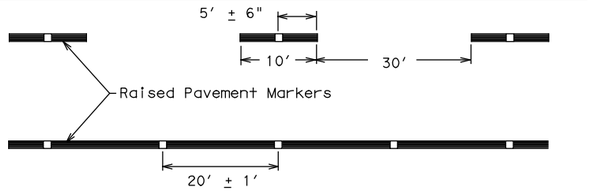


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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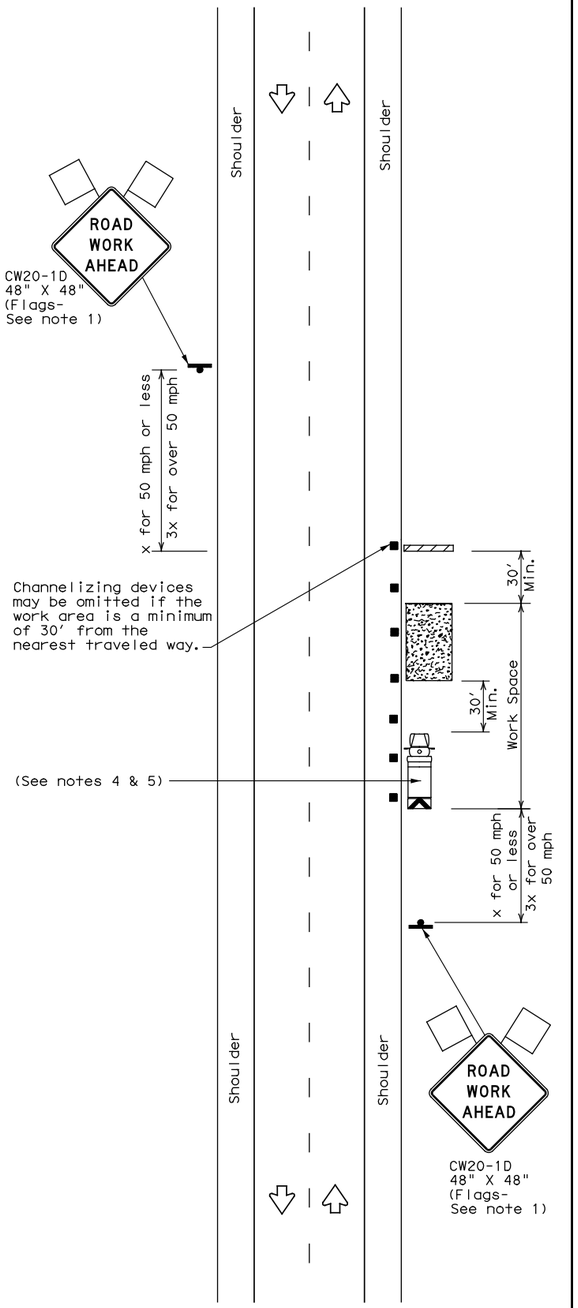
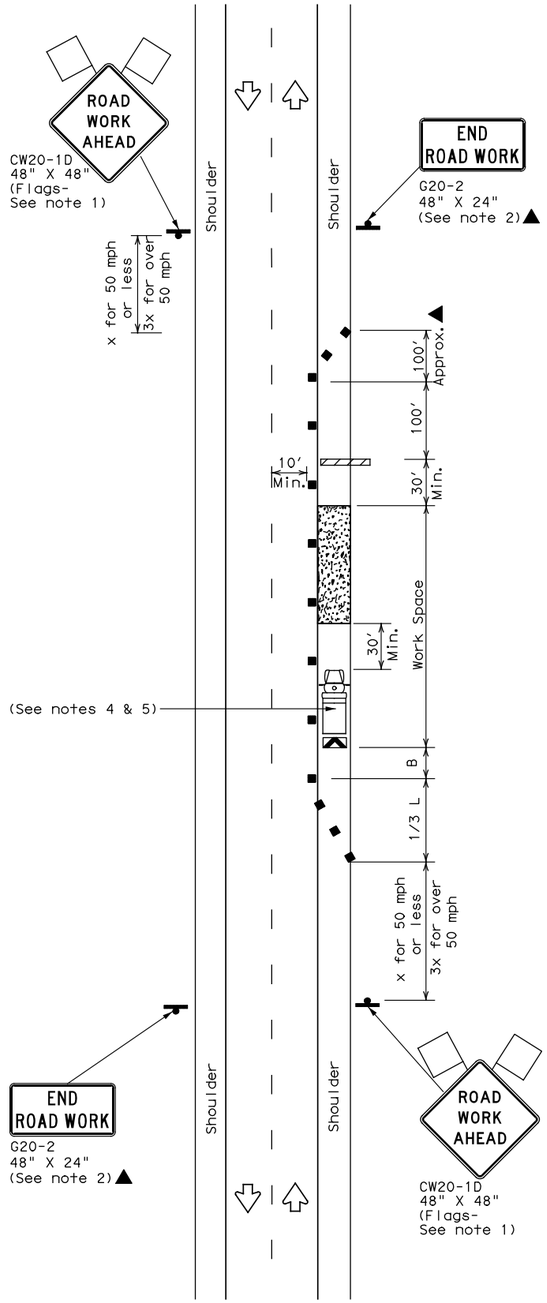
1-97 9-07	DIST	COUNTY		SHEET NO.
2-98 7-13	ELP	EL PASO		039
11-02 8-14				



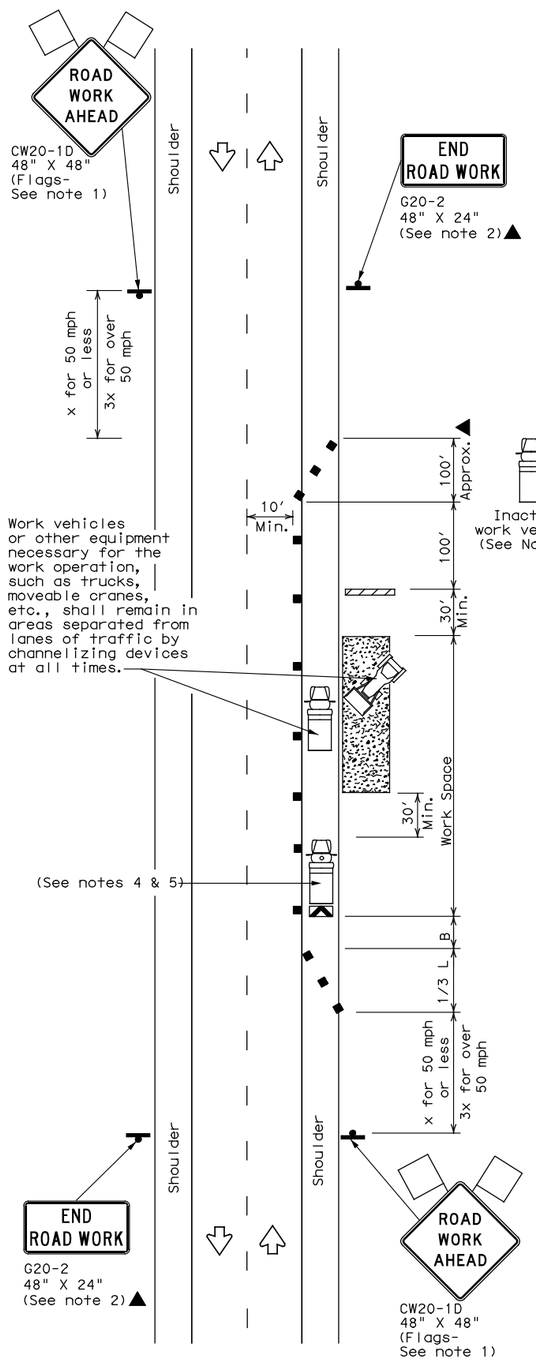
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

Texas Department of Transportation

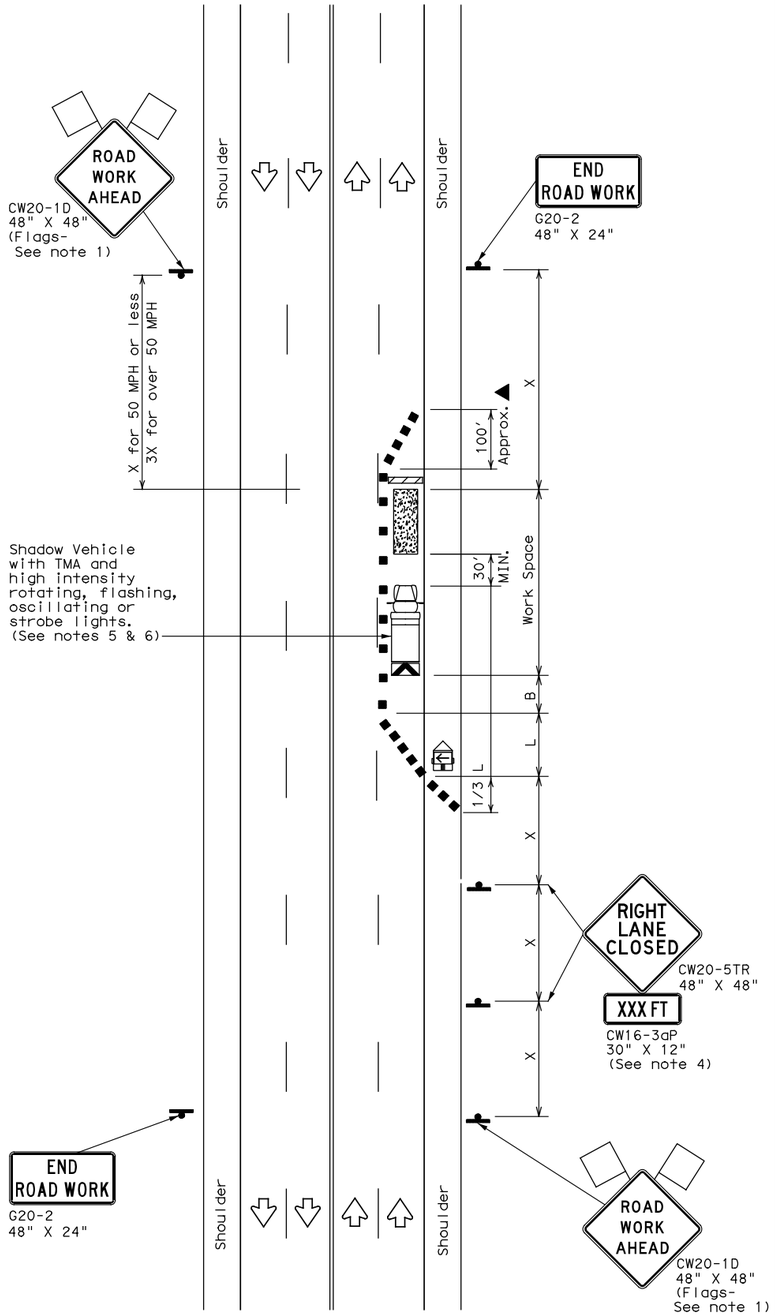
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

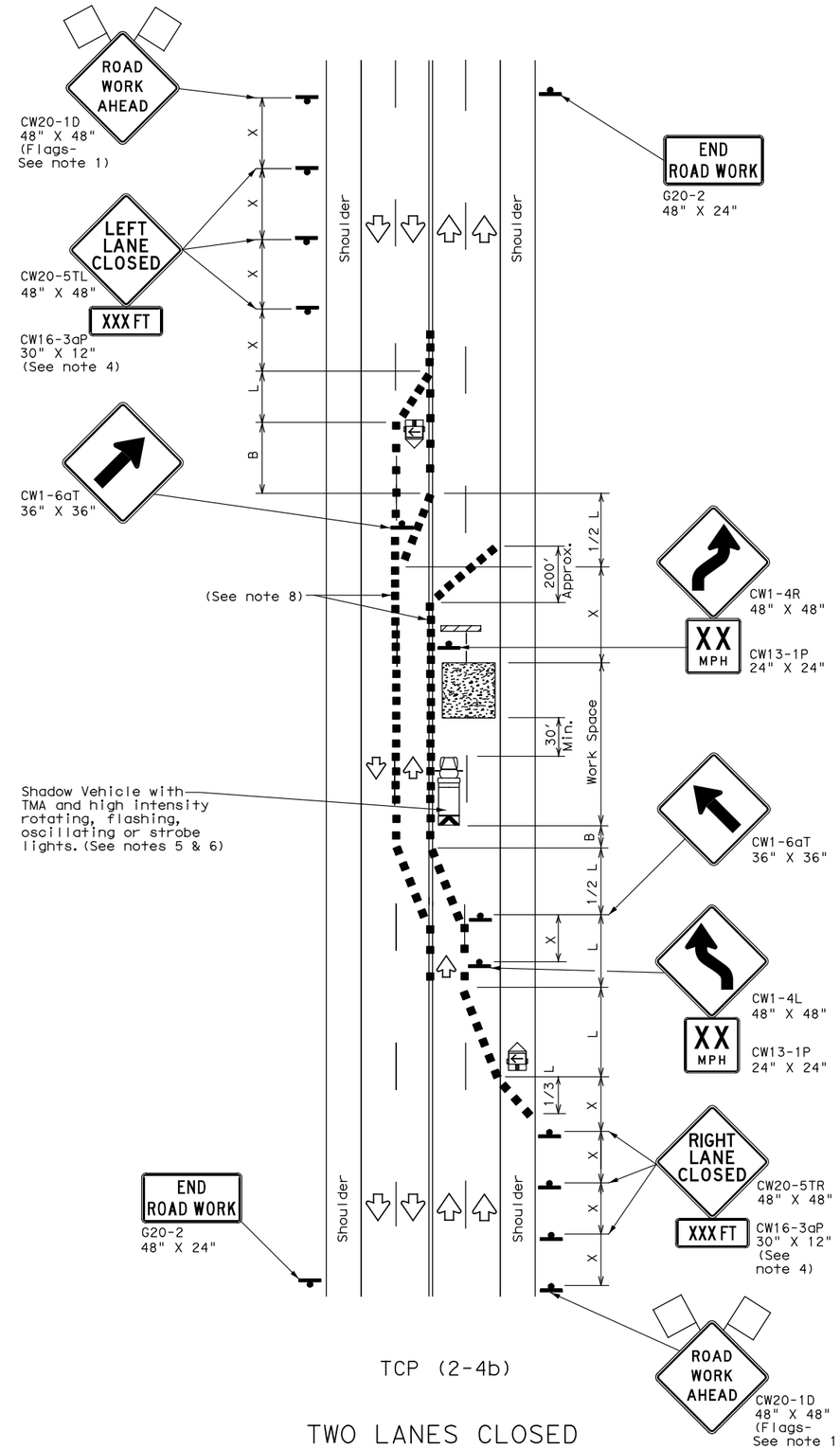
FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	ELP	EL PASO		040
1-97 2-18				

3/30/2021
3547.001 El Paso*SH20\CADD\Sheets\HALFF\STANDARDS\tcp2-1-18.dgn



TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

TCP (2-4a)

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

TCP (2-4b)

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

Texas Department of Transportation

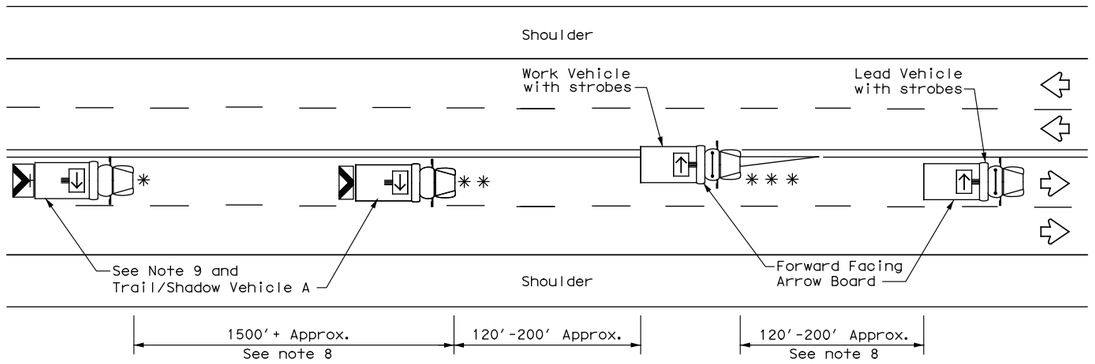
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

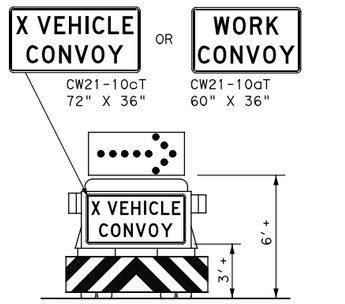
FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	3451	01	035, ETC.	FM 1281, ETC.
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	ELP	EL PASO		041

3/30/2021
3547.001 El Paso*SH20\CADD\Sheets\HALFF\STANDARDS\tcp2-4-18.dgn



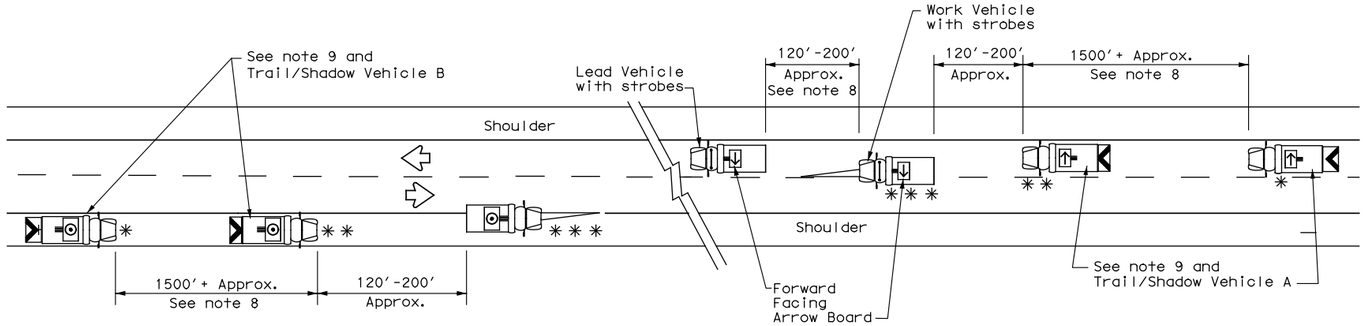
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

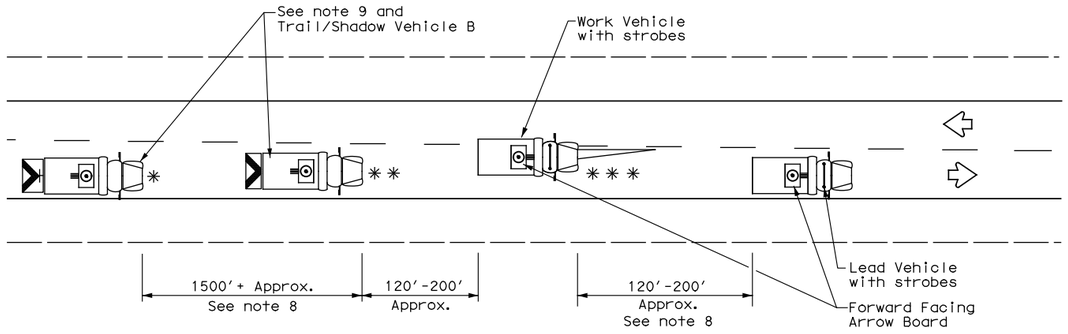


WORK ON SHOULDER

WORK ON TRAVEL LANE

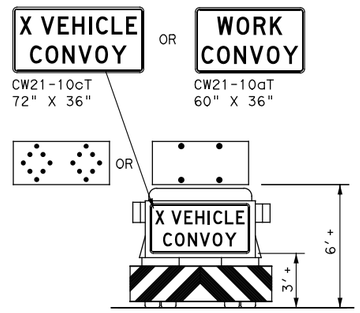
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

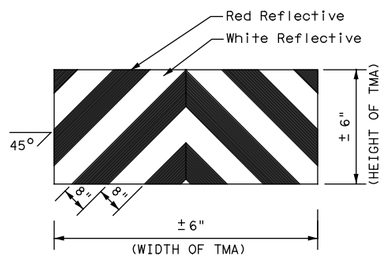
with Flashing Arrow Board in CAUTION display

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

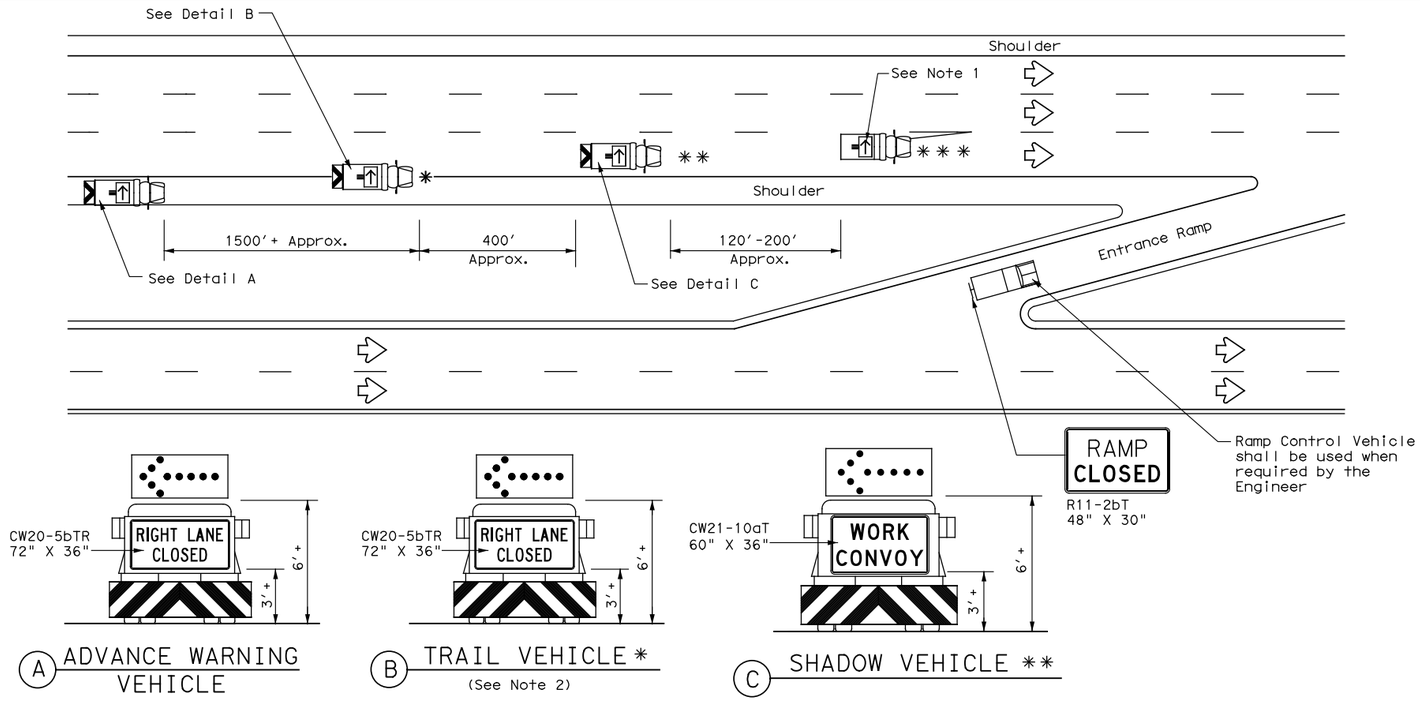
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

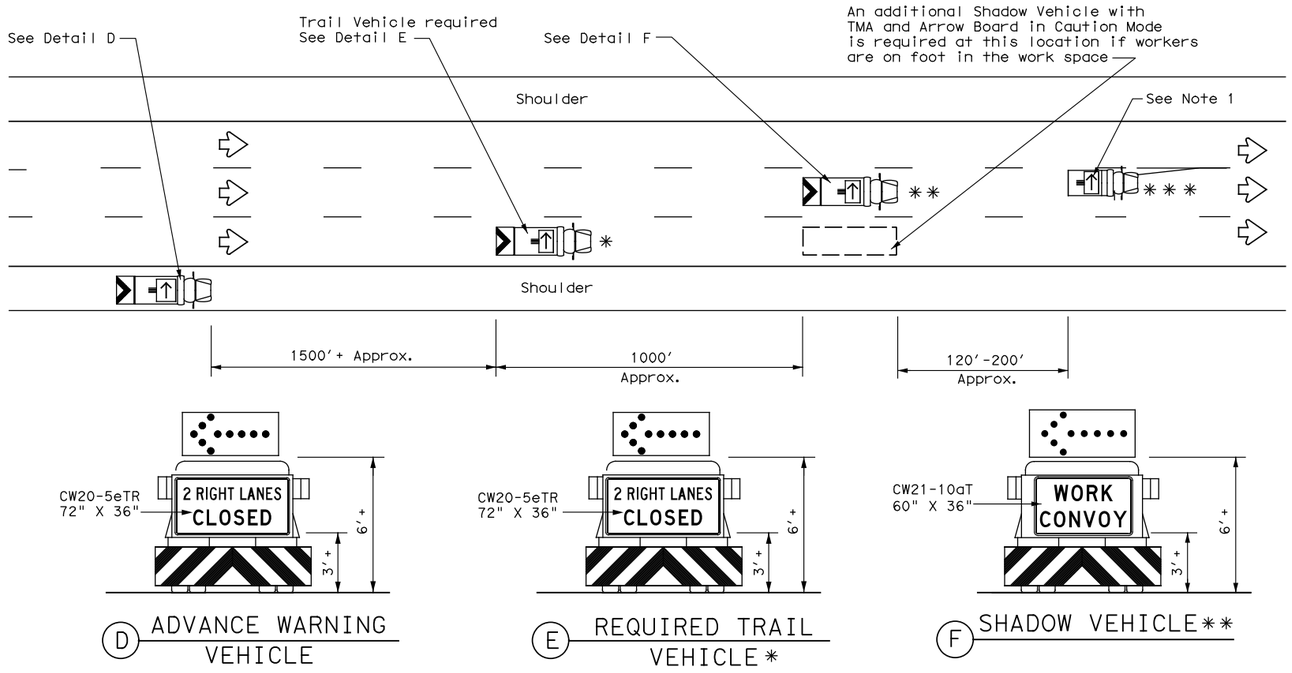
TCP (3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13				
1-97	ELP	EL PASO		042

175



RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



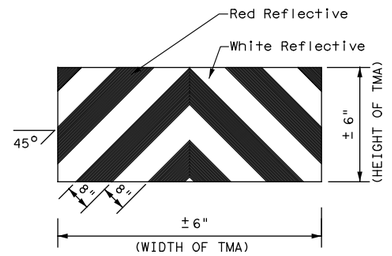
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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. ADVANCE WARNING, TRAIL and SHADOW vehicles shall be equipped with Type B or Type C flashing arrow boards as per the Barricade and Construction (BC) standards. Arrow boards on WORK vehicles will be optional based on the type of work being performed. The arrow boards shall be operated from inside the vehicle.
2. For TCP(3-2a) the Engineer will determine if the TRAIL VEHICLE is required based on prevailing roadway conditions, traffic volume, and sight distance restrictions. All other vehicles shown for both TCP(3-2a) and TCP(3-2b) are required.
3. 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.
4. The use of truck mounted attenuators (TMA) on the ADVANCE WARNING, SHADOW, and TRAIL vehicles are required.
5. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DMS 8300, Type A.
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 may vary according to terrain, work activity and other factors.
9. Standard 48" X 48" diamond shaped warning signs with the same message as those shown may be used where adequate mounting space exists.
10. The signs shown should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or a 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, must 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. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
12. The principles on this sheet may be used to close lanes from the left side of the roadway considering the number of lanes, shoulder width, sight distance, and ramp frequency.
13. Signs and flashing arrow board modes shall be appropriately altered when implementing left lane closures or interior closures which close the left lanes.
14. The Advance Warning Vehicle may straddle the edgeline when shoulder width makes it necessary.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	3451	01	035, ETC.	FM 1281, ETC.
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		043

176

3/30/2021
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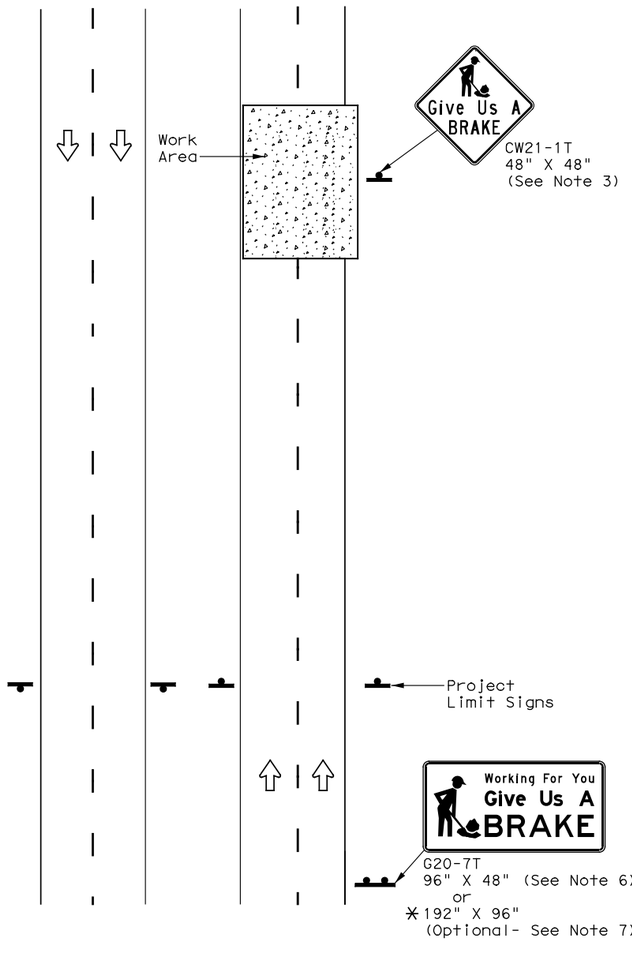
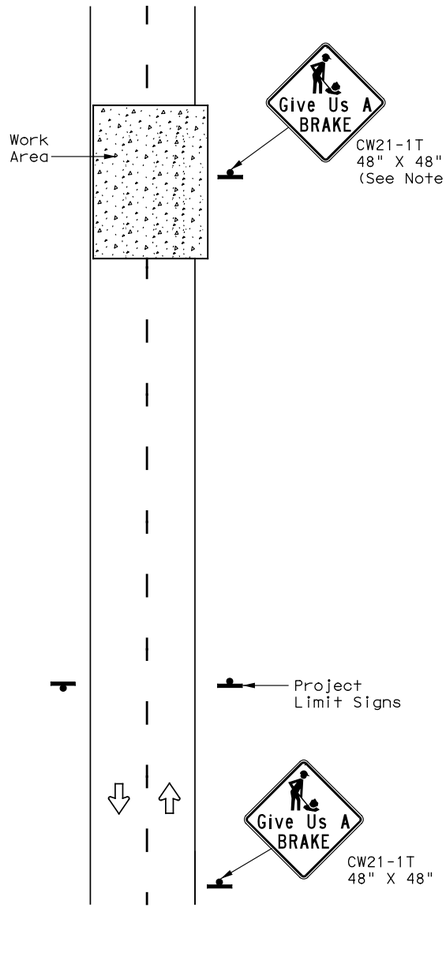


DIVIDED HIGHWAY



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

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	ELP	EL PASO		044

116

3/30/2021
37547.001 El Paso*SH20\CADD\Sheets\HALFF\STANDARDS\wzbrk-13.dgn

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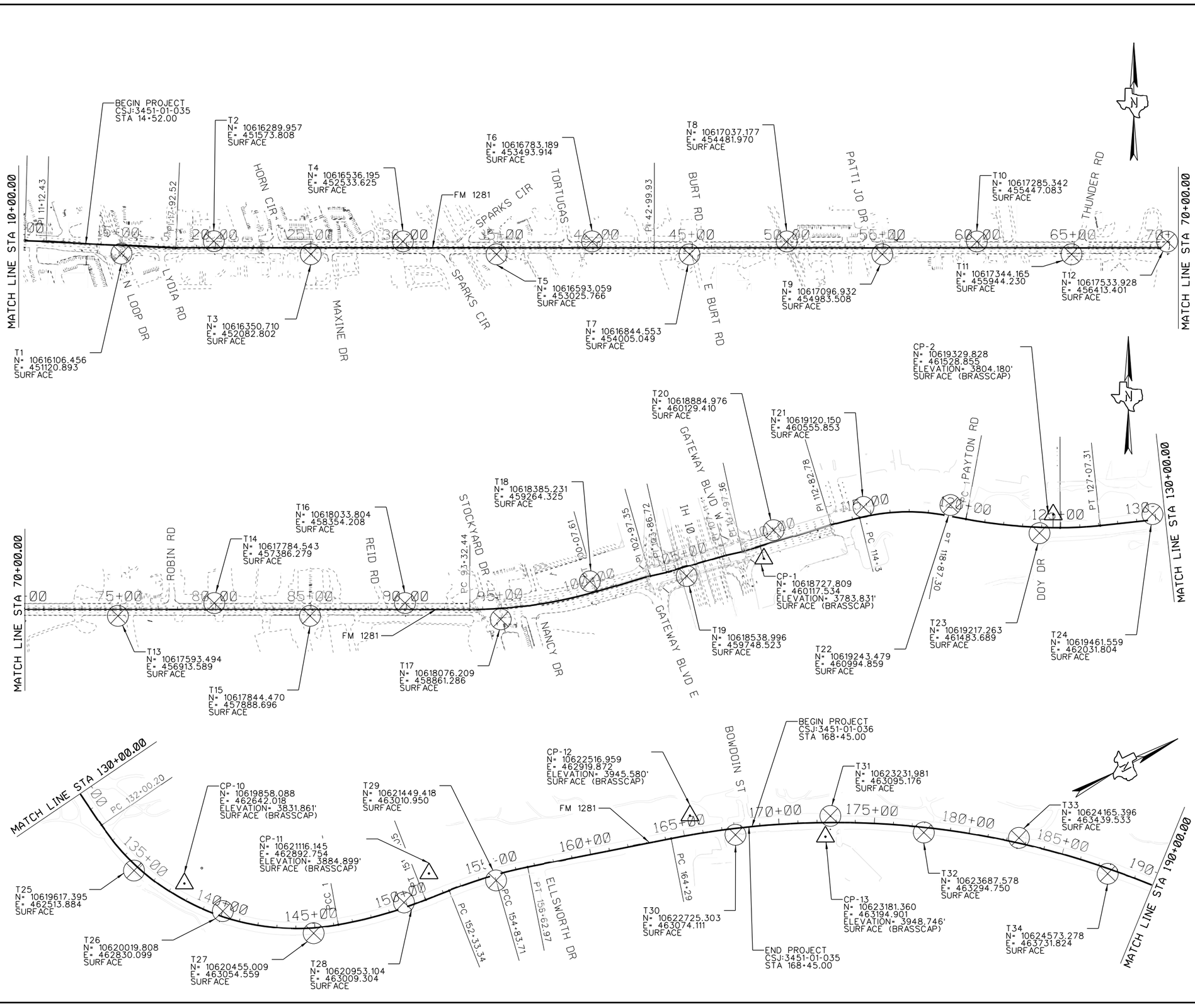

0 250 500

SCALE: 1" = 500' (H)

LEGEND

CONTROL POINTS

MOBILE LiDAR POINTS

NOTES

1. HORIZONTAL COORDINATES SHOWN ARE IN U.S. SURVEY FEET AND ARE BASED UPON THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (4203), NAD83(2011), EPOCH 2010.00 WITH A COMBINED SURFACE ADJUSTMENT FACTOR OF 1.000231. (GRID X 1.000231=SURFACE COORDIANTES).
2. ELEVATION DATA IS REFERENCED TO NAVD88 AND COMPUTED USING GEOID12A.

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NO.	REVISION	BY	DATE

STATE OF TEXAS
REGISTERED
JOSE LUIS RODARTE
3513
PROFESSIONAL
LAND SURVEYOR

3/10/21

"I HEREBY CERTIFY THAT THIS CONTROL MAP REPRESENTS A SURVEY MADE ON THE GROUND BY ME, JOSE LUIS RODARTE, R.P.L.S., No. 3513, OR UNDER MY SUPERVISION AND COMPLIES WITH THE CURRENT TEXAS BOARD OF PROFESSIONAL LAND SURVEY AND TECHNICAL STANDARDS ON MARCH 30 2021."

GRV Integrated Engineering Solutions LLC
11385 JAMES WATT DR., SUITE B-13
EL PASO, TEXAS 79936
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www.integratedengineeringsolutions.com
TBPE F#15313 TBPLS F#10194278

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9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

FM 1281 (HORIZON BLVD)

CONTROL INDEX

STA 10+00.00 - STA 190+00.00

1 OF 3

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC. / 045

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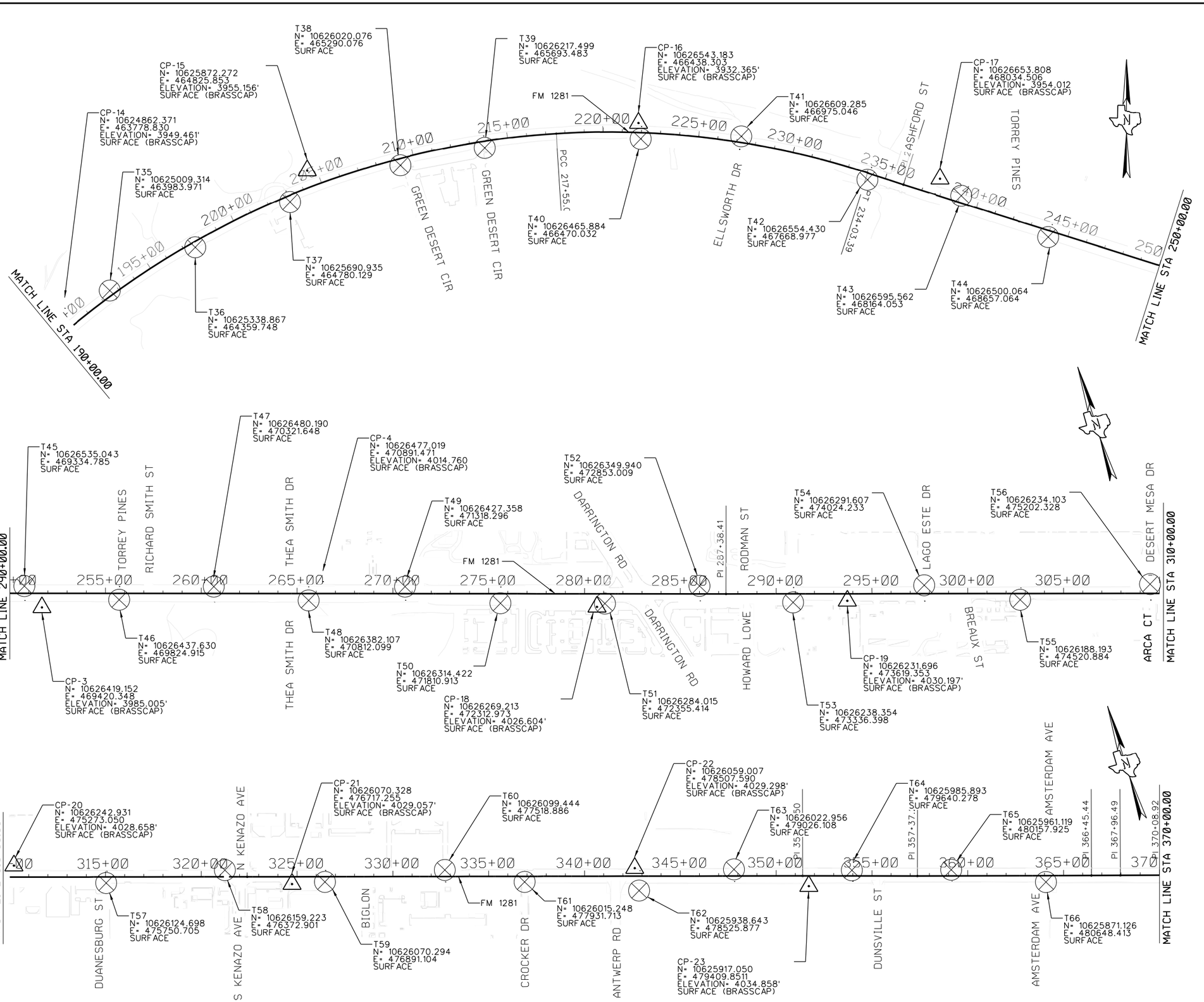

0 250 500

SCALE: 1" = 500' (H)

LEGEND

CONTROL POINTS

MOBILE LiDAR POINTS

NOTES

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FM 1281 (HORIZON BLVD)

CONTROL INDEX

STA 190+00.00 - STA 370+00.00

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
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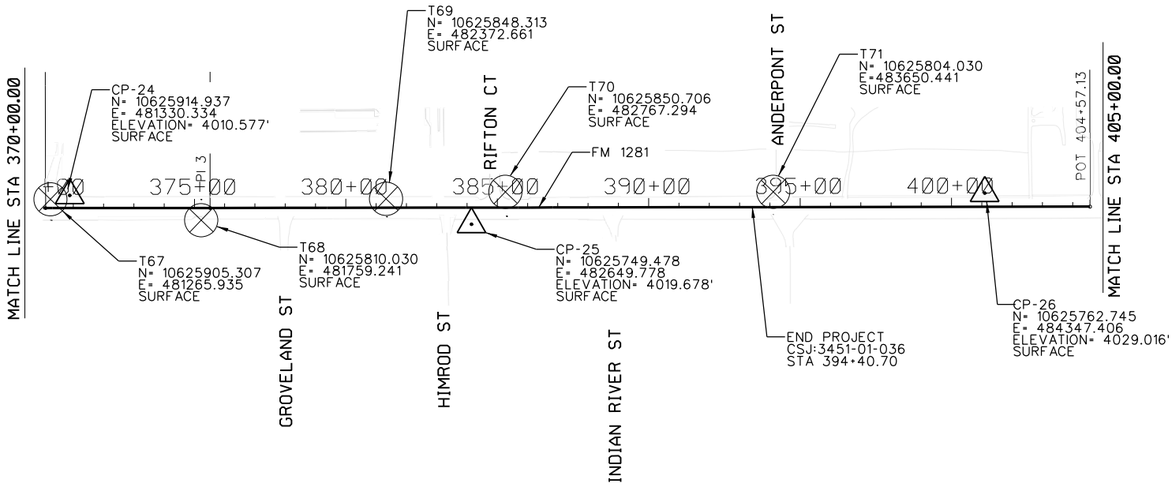

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SCALE: 1" = 500' (H)

LEGEND

CONTROL POINTS

MOBILE LiDAR POINTS

NOTES

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2. ELEVATION DATA IS REFERENCED TO NAVD88 AND COMPUTED USING GEOID12A.

Texas Department of Transportation®

NO.	REVISION	BY	DATE

STATE OF TEXAS
REGISTERED
JOSE LUIS RODARTE
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PROFESSIONAL
LAND SURVEYOR

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FM 1281 (HORIZON BLVD)

CONTROL INDEX

STA 370+00.00 - STA 405+00.00

3 OF 3

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021(624)HES			FM 1281, ETC.
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CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	047

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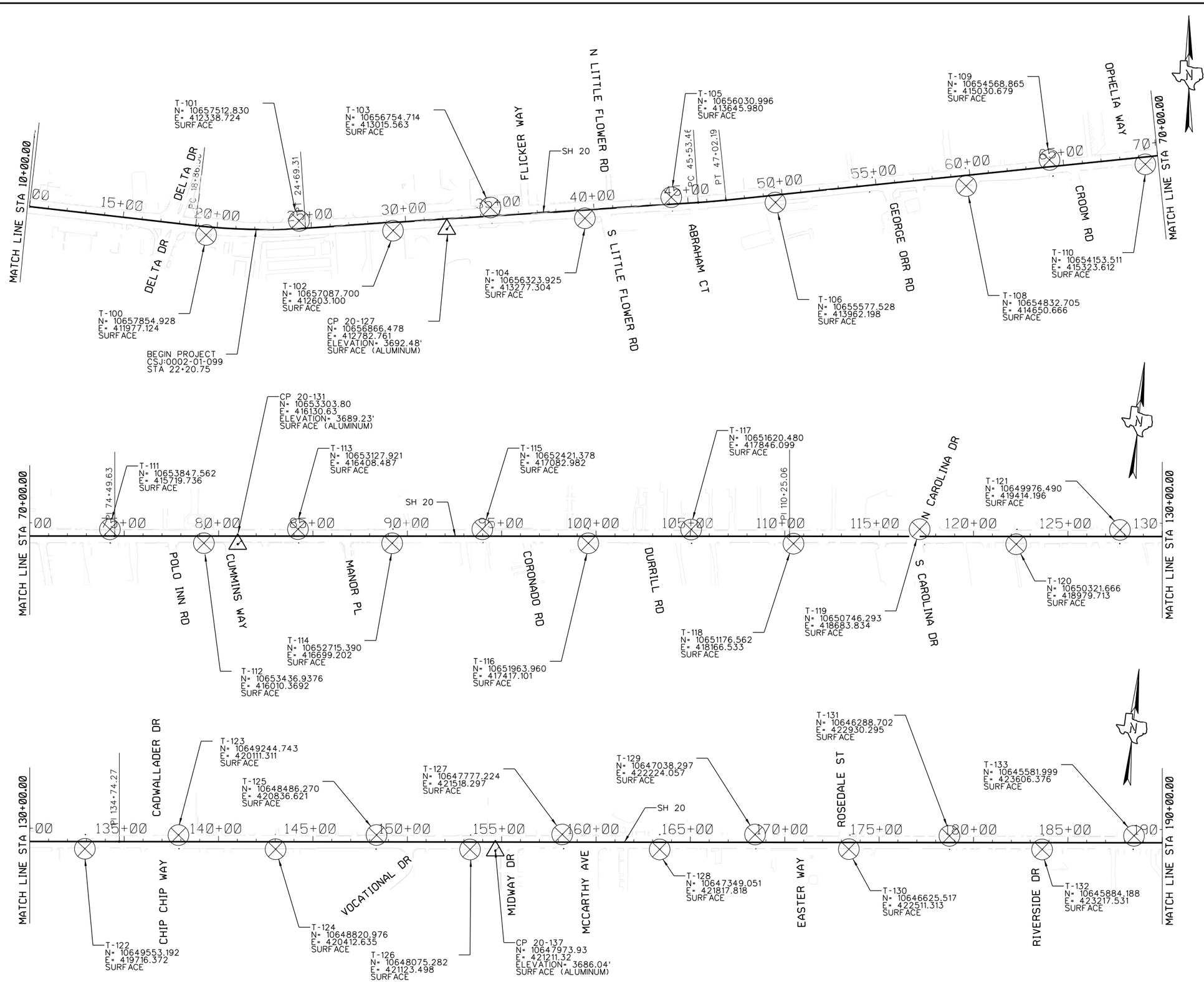

0 250 500

SCALE: 1" = 500' (H)

LEGEND

CONTROL POINTS

MOBILE LiDAR POINTS

NOTES

1. HORIZONTAL COORDINATES SHOWN ARE IN U.S. SURVEY FEET AND ARE BASED UPON THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (4203), NAD83(2011), EPOCH 2010.00 WITH A COMBINED SURFACE ADJUSTMENT FACTOR OF 1.000231. (GRID X 1.000231=SURFACE COORDIANTES).
2. ELEVATION DATA IS REFERENCED TO NAVD88 AND COMPUTED USING GEOID12A.

NO.	REVISION	BY	DATE

STATE OF TEXAS REGISTERED JOSE LUIS RODARTE 3513 PROFESSIONAL LAND SURVEYOR

3/10/21

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TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

CONTROL INDEX

STA 10+00.00 - STA 190+00.00

1 OF 2

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021(624)HES		FM 1281, ETC.
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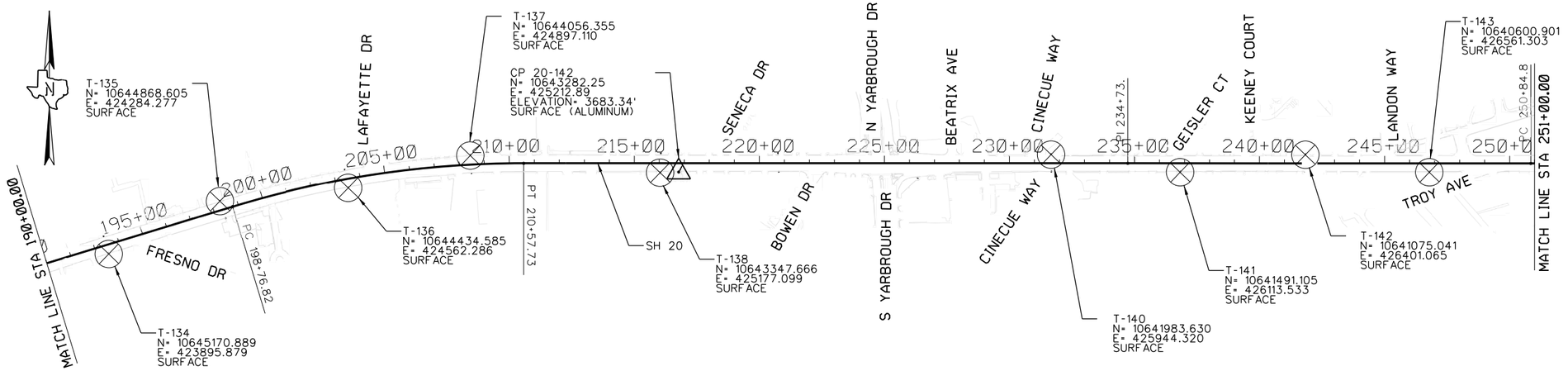
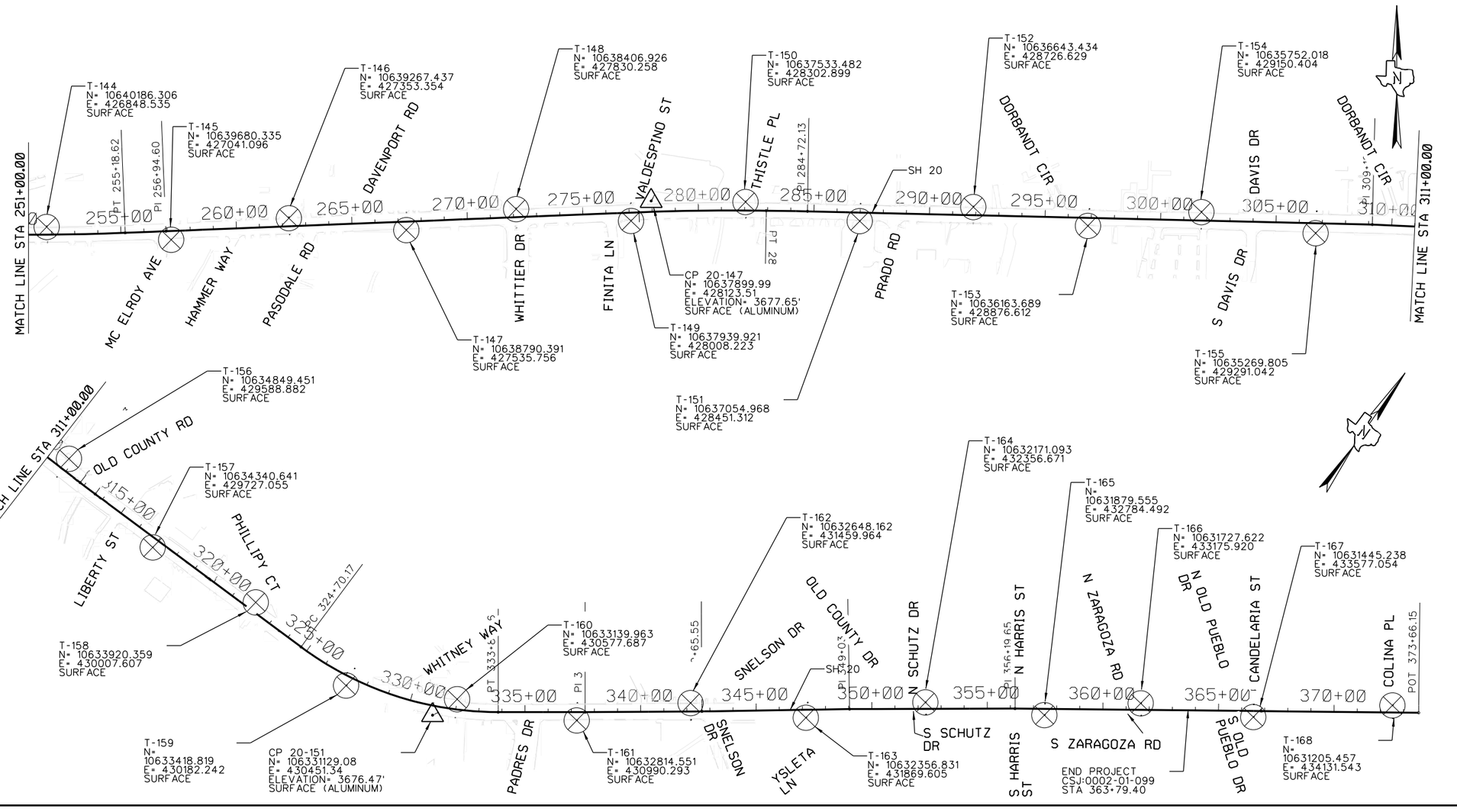
FINAL SUBMITTAL





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0 250 500
SCALE: 1" = 500' (H)

LEGEND

- CONTROL POINTS
- MOBILE LiDAR POINTS

NOTES

1. HORIZONTAL COORDINATES SHOWN ARE IN U.S. SURVEY FEET AND ARE BASED UPON THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (4203), NAD83(2011), EPOCH 2010.00 WITH A COMBINED SURFACE ADJUSTMENT FACTOR OF 1.000231. (GRID X 1.000231=SURFACE COORDIANTES).
2. ELEVATION DATA IS REFERENCED TO NAVD88 AND COMPUTED USING GEOID12A.

Texas Department of Transportation®

NO.	REVISION	BY	DATE

STATE OF TEXAS
REGISTERED
JOSE LUIS RODARTE
3513
PROFESSIONAL
LAND SURVEYOR

"I HEREBY CERTIFY THAT THIS CONTROL MAP REPRESENTS A SURVEY MADE ON THE GROUND BY ME, JOSE LUIS RODARTE, R.P.L.S., No. 3513, OR UNDER MY SUPERVISION AND COMPLIES WITH THE CURRENT TEXAS BOARD OF PROFESSIONAL LAND SURVEY AND TECHNICAL STANDARDS ON MARCH 30 2021."

3/10/21

GRV Integrated Engineering Solutions LLCC
11385 JAMES WATT DR., SUITE B-13
EL PASO, TEXAS 79936
PH: (915) 351-6701 FAX: (915) 243-6010
www.integratedengineeringsolutions.com
TBPE F#15313 TBPLS F#10194278

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9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

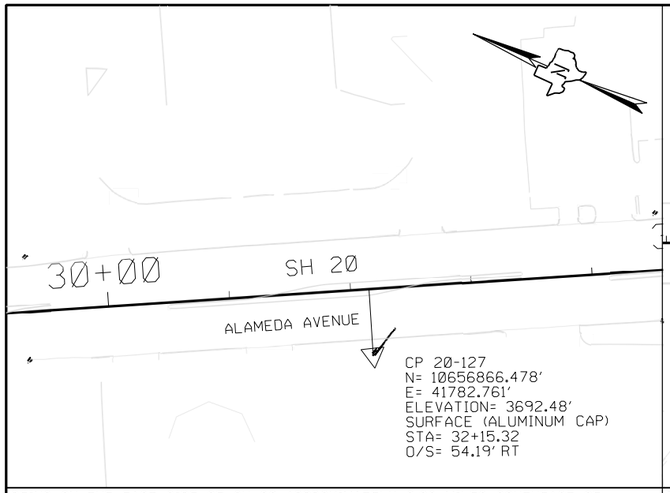
SH 20 (ALAMEDA AVE)

CONTROL INDEX

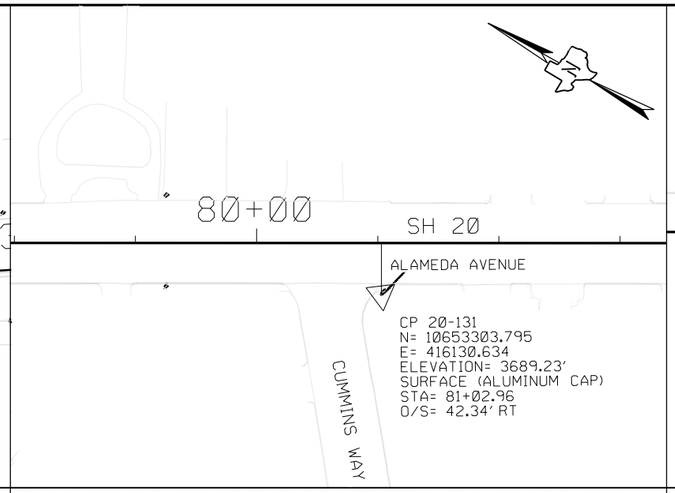
STA 190+00.00 - STA 373+66.15

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	021	ETC.	049

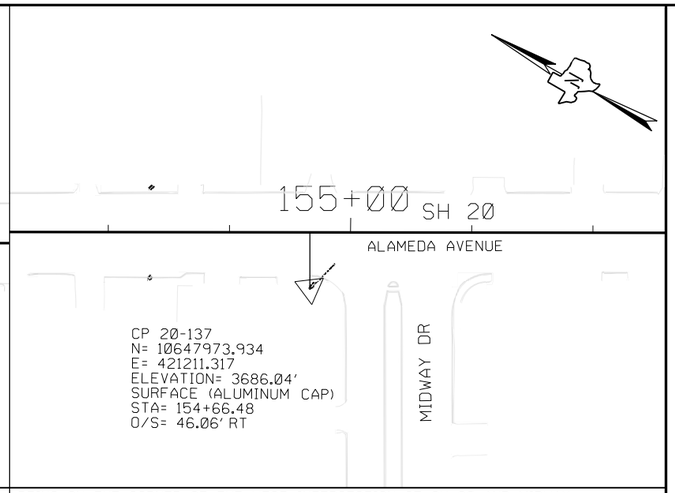
FINAL SUBMITTAL



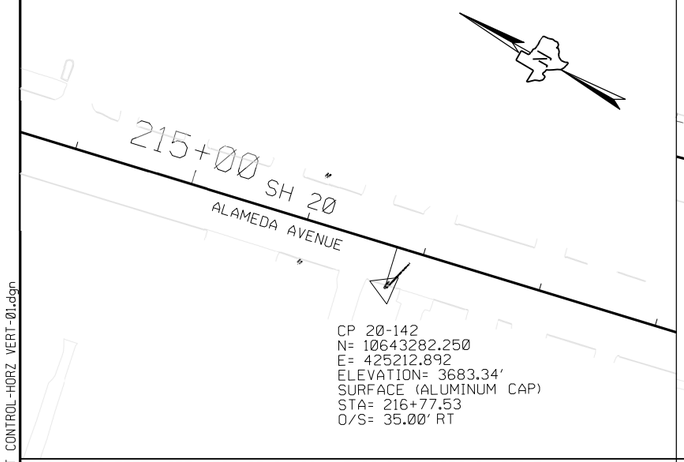
BEING ON THE EAST SIDE OF SH 20, APPROXIMATELY 0.28 MILES SOUTHEAST OF SH 20 AND EAST BOUND DELTA DRIVE INTERSECTION; AND 0.08 MILES NORTHWEST OF SH 20 AND WEST BOUND FLICKER WAY INTERSECTION.



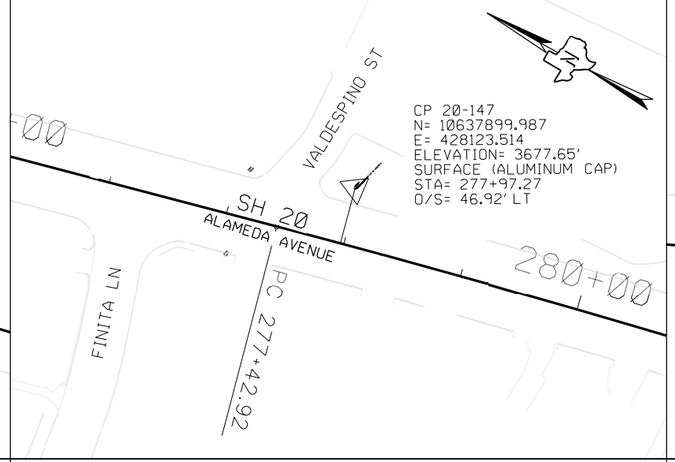
BEING ON THE SOUTHWEST CORNER OF THE INTERSECTION OF SH 20 AND CUMMINS WAY, LOCATED 24.0 FEET NORTHEAST OF A STOP SIGN, AND 8.9 FEET SOUTHWEST OF A LUMINARE STAND.



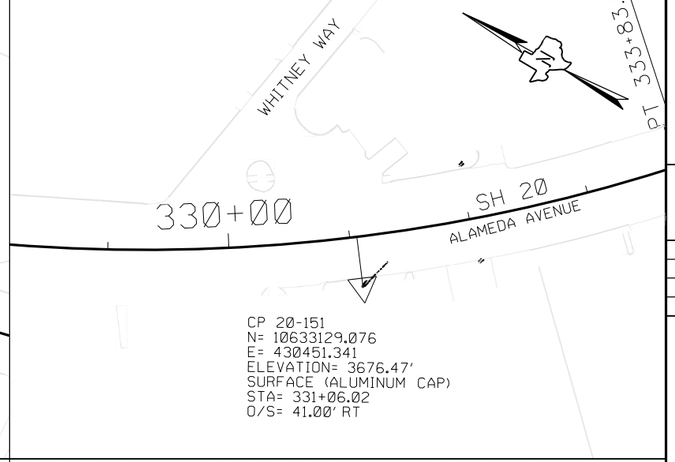
BEING ON THE CORNER OF THE WEST INTERSECTION OF SH 20 AND MIDWAY DRIVE, LOCATED 5.0 FEET SOUTHWEST OF A LUMINARE STAND, AND 5.4 FEET NORTHWEST OF THE RAISED CORNER OF A HANDICAP RAMP CONCRERTE APRON.



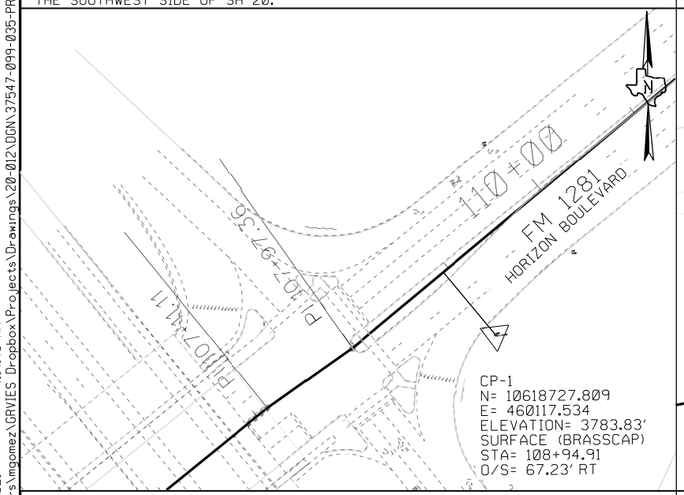
BEING 790 FEET NORTHWEST OF SH 20 AND SOUTH YARBROUGH DRIVE INTERSECTION. LOCATED 2.0 FEET SOUTHWEST OF THE BACK OF CURB ALONG THE SOUTHWEST SIDE OF SH 20.



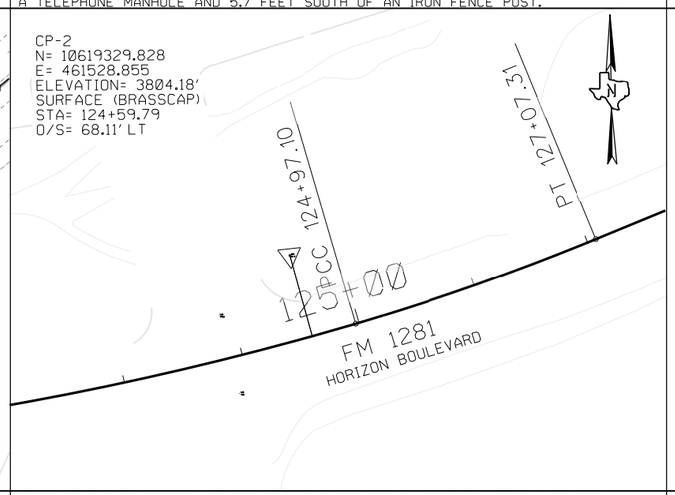
BEING ON THE NORTHEAST SIDE OF SH 20, APPROXIMATELY 182 FEET SOUTHEAST OF THE INTERSECTION OF SH 20 AND FINITA LANE. LOCATED 25.7 FEET NORTHEAST OF A TELEPHONE MANHOLE AND 5.7 FEET SOUTH OF AN IRON FENCE POST.



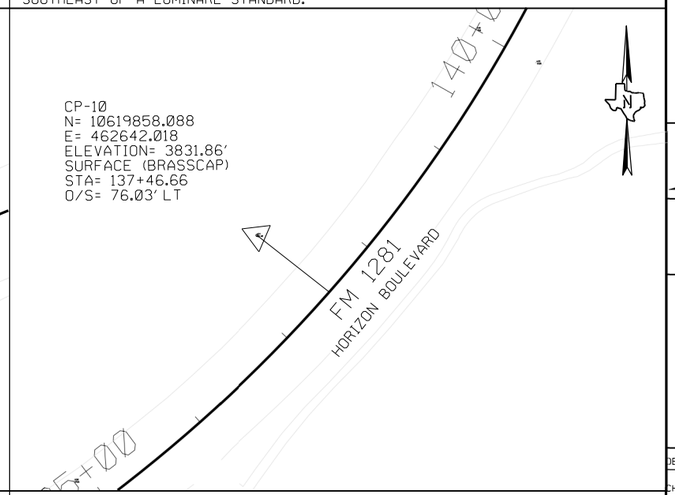
BEING ON THE SOUTHWEST SIDE OF SH 20, APPROXIMATELY 388 FEET NORTHWEST OF THE INTERSECTION SH 20 AND SOUTH PADRES DRIVE. LOCATED 11.3 FEET SOUTHEAST OF A LUMINARE STANDARD.



BEING ON THE SOUTHEAST RETURN OF IH-10 BOUND EXIT TO EAST BOUND FM 1281.



BEING AT THE ENTRANCE OF STEWART AND STEVENSON FREIGHT LINER. LOCATED ON THE NORTHEAST SIDE, APPROXIMATELY 115 FEET ACROSS FROM FM 1281 AND DOY DRIVE INTERSECTION.



LOCATED ON THE NORTHWEST SIDE OF FM 1281.

0 250 500
SCALE: 1" = 500' (H)

LEGEND

△ CONTROL POINTS

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203) NAD 83 (2011 ADJ.; EPOCH 2010.00).
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4. HORIZONTAL COORDINATE SOLUTIONS ARE BASED ON GPS OBSERVATION MEANS UTILIZING THE TXDOT VRS SYSTEM.
5. CONTROL POINTS WERE SURVEYED IN 2020.

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STATE OF TEXAS
REGISTERED
JOSE LUIS RODARTE
3513
PROFESSIONAL
LAND SURVEYOR

3/10/21

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SH 20 (ALAMEDA AVE) &
FM 1281 (HORIZON BLVD)

HORIZONTAL AND VERTICAL CONTROL

1 OF 3

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	050

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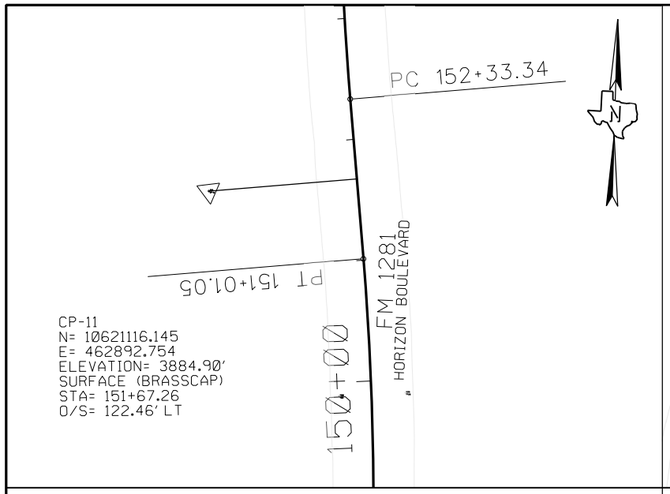
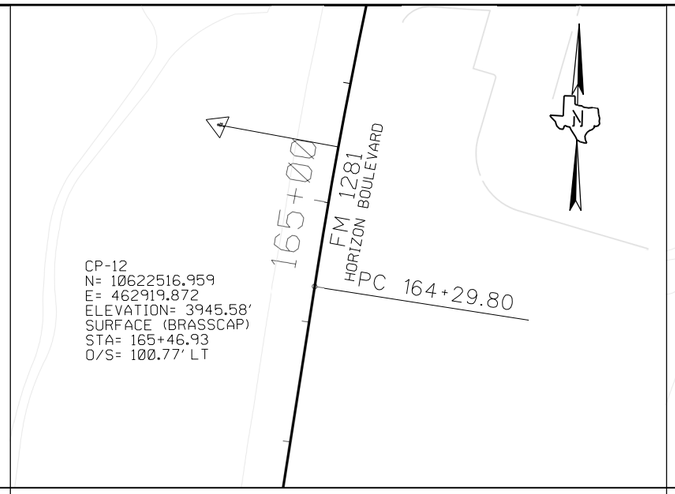
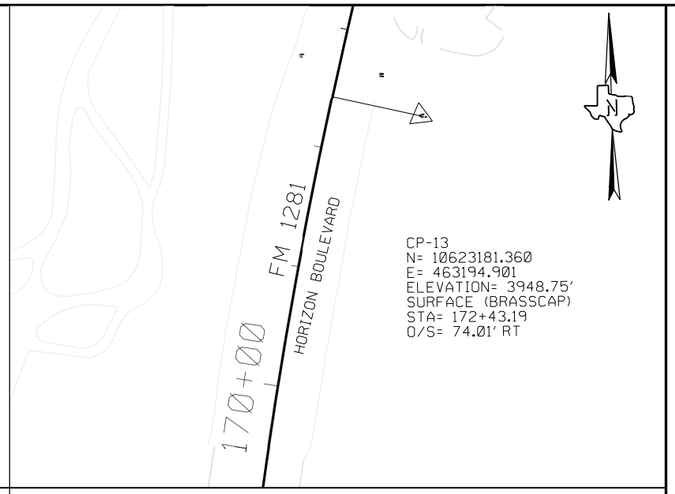
FINAL SUBMITTAL



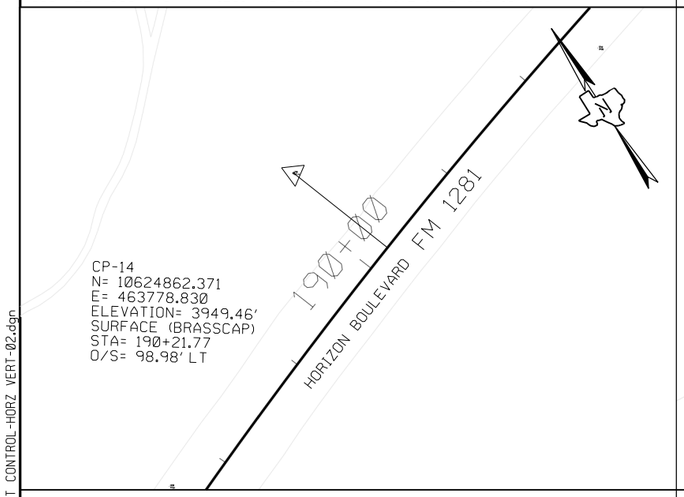
BEING ON THE SOUTHWEST SIDE, SOUTHBOUND OF FM 1281. APPROXIMATELY 560 FEET SOUTH OF FM 1281 AND ELLSWORTH DRIVE INTERSECTION.



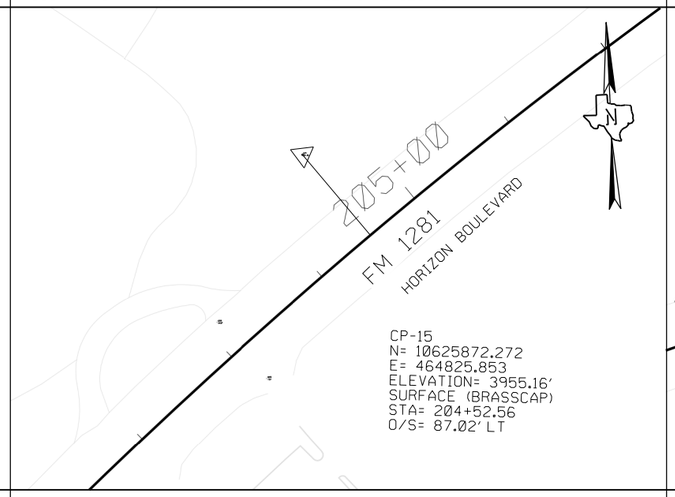
BEING ON THE WEST SIDE, SOUTHBOUND OF FM 1281. APPROXIMATELY 285 FEET SOUTH FROM FM 1281 AND BOWDOIN STREET INTERSECTION.



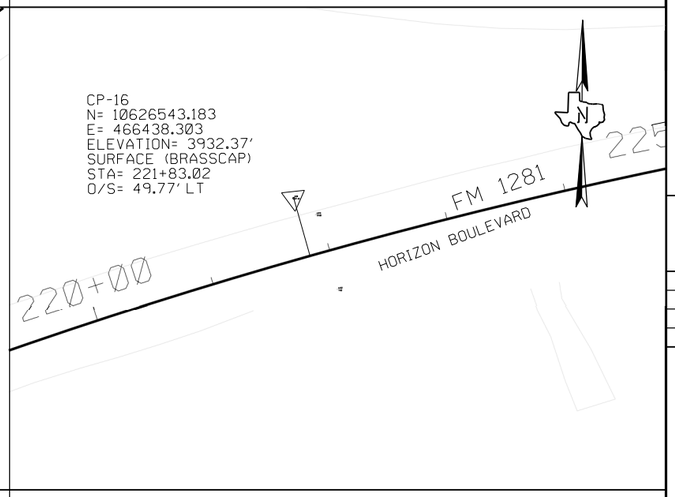
BEING ON THE EAST SIDE, NORTHBOUND OF FM 1281. LOCATED ABOUT 100 FEET SOUTH OF EL PASO MULTI USE FACILITY'S ENTRANCE DRIVEWAY.



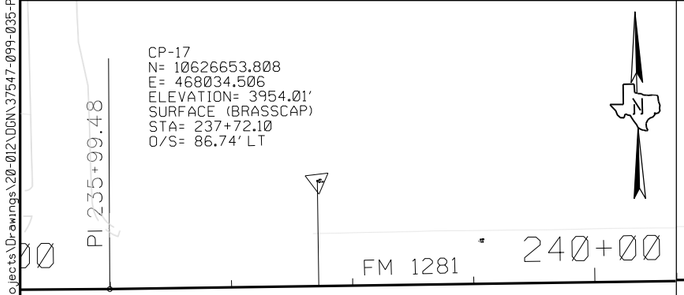
BEING ON THE SOUTHWEST SIDE, SOUTHBOUND OF FM 1281.



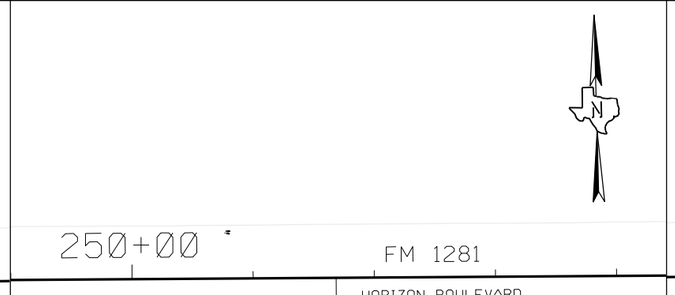
BEING ON THE SOUTHWEST SIDE, SOUTHBOUND OF FM 1281. APPROXIMATELY 480 FEET SOUTH OF FM 1281 AND GREEN DESERT CIRCLE INTERSECTION.



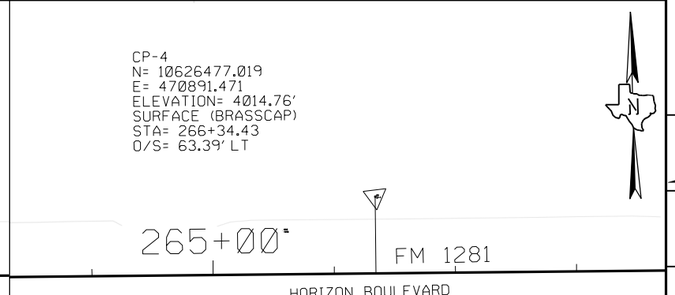
BEING ON THE NORTH SIDE, SOUTHBOUND OF FM 1281. APPROXIMATELY 518 FEET SOUTH OF FM 1281 AND ELSWORTH DRIVE INTERSECTION.



BEING ON THE NORTH SIDE, WESTBOUND OF FM 1281. APPROXIMATELY 240 FEET EAST OF FM 1282 AND ASHFORD STREET INTERSECTION, AND 392 FEET WEST OF FM 1281 AND TORREY PINES INTERSECTION.



BEING ON THE SOUTH SIDE, EASTBOUND OF FM 1281. APPROXIMATELY 73 FEET WEST OF FM 1281 AND TORREY PINES INTERSECTION.



BEING ON THE NORTH SIDE, WESTBOUND OF FM 1281. APPROXIMATELY, 200 FEET EAST OF FM 1281 THEA SMITH DRIVE INTERSECTION.

0 250 500

SCALE: 1" = 500' (H)

LEGEND

△ CONTROL POINTS

NOTES:

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5. CONTROL POINTS WERE SURVEYED IN 2020.

Texas Department of Transportation®

NO.	REVISION	BY	DATE

3/10/21

STATE OF TEXAS
REGISTERED
JOSE LUIS RODARTE
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TBPELS FIRM NO. F-312

FM 1281 (HORIZON BLVD)

HORIZONTAL AND VERTICAL CONTROL

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.
CHECKED:	EL PASO	EL PASO	3451	001	0250 ETC.

SHEET No. 051

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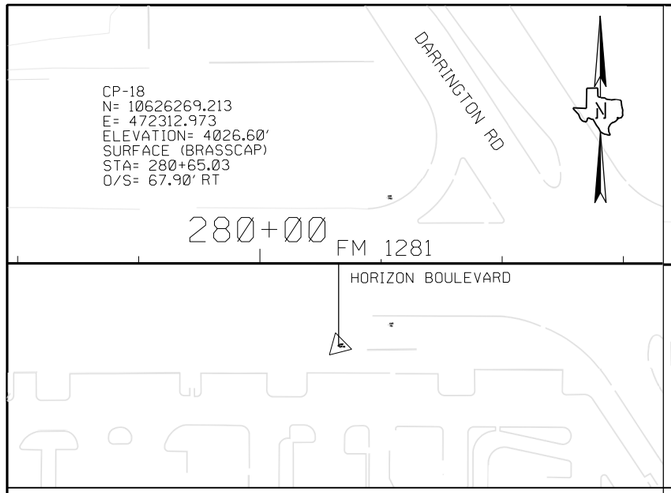
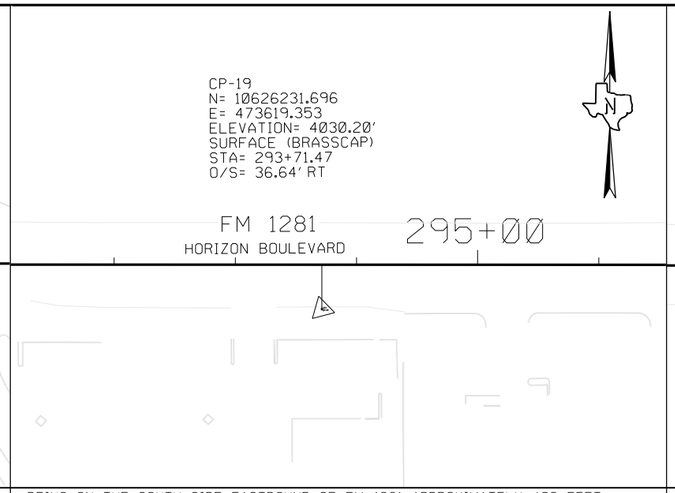
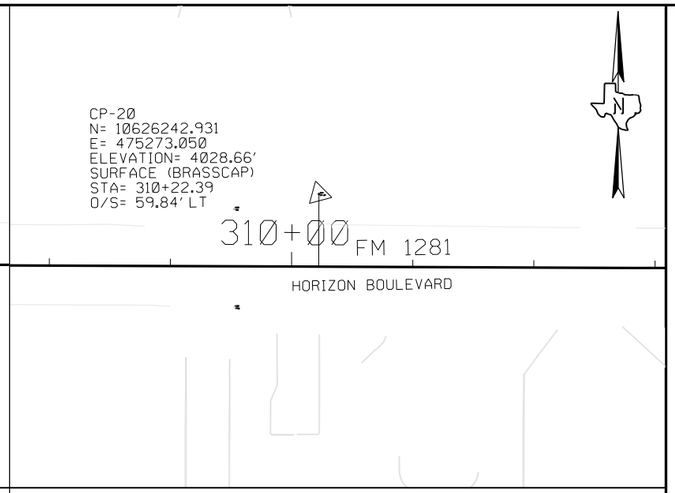
FINAL SUBMITTAL



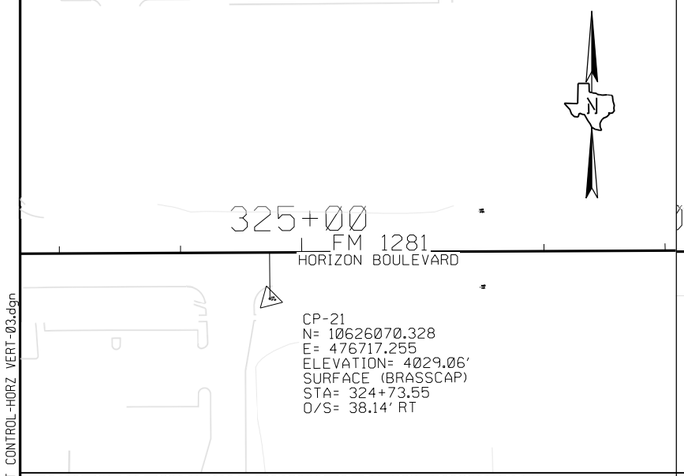
BEING ON THE SOUTH SIDE, EASTBOUND OF FM 1281. APPROXIMATELY 275 FEET WEST OF FM 1281 AND DARRINGTON ROAD INTERSECTION.



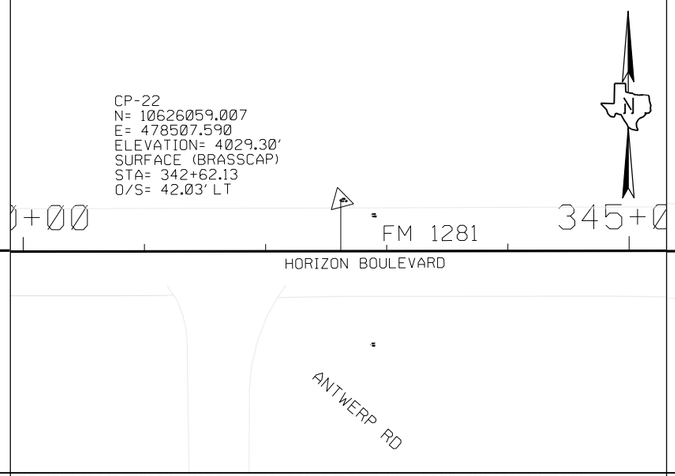
BEING ON THE SOUTH SIDE, EASTBOUND OF FM 1281. APPROXIMATELY 400 FEET WEST OF FM 1281 AND LAGO ESTE DRIVE INTERSECTION, AND 520 FEET EAST OF FM 1281 AND HOWARD LOWE INTERSECTION.



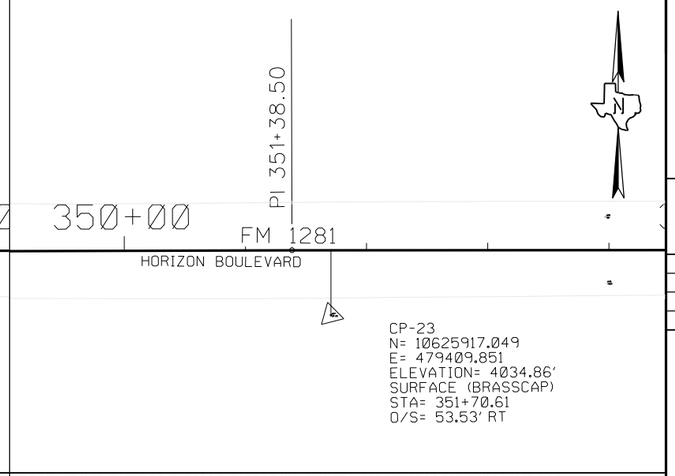
BEING ON THE NORTH SIDE, WESBOUND OF FM 1281. APPROXIMATELY, 475 FEET WEST OF FM 1281 AND DUANESBURG STREET INTERSECTION.



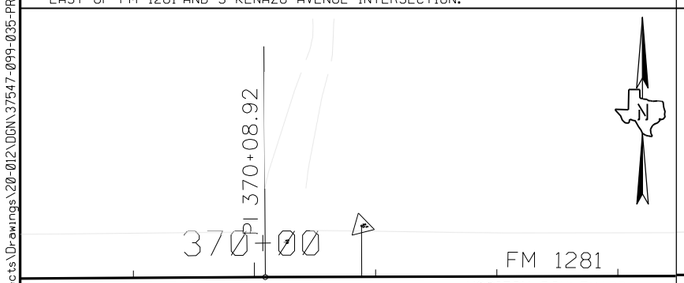
BEING ON THE SOUTH SIDE, EASTBOUND OF FM 1281. APPROXIMATELY, 385 FEET WEST OF OF FM 1281 AND BIGLON INTERSECTION, AND 270 FEET EAST OF FM 1281 AND S KENAZO AVENUE INTERSECTION.



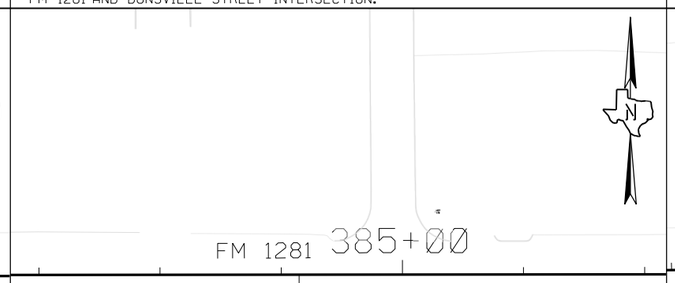
BEING ON THE NORTH SIDE, WESTBOUND OF FM 1281. APPROXIMATELY, 88 FEET EAST OF FM 1281 AND ANTWERP ROAD INTERSECTION, AND 0.24 MILES WEST OF FM 1281 AND DUNSVILLE STREET INTERSECTION.



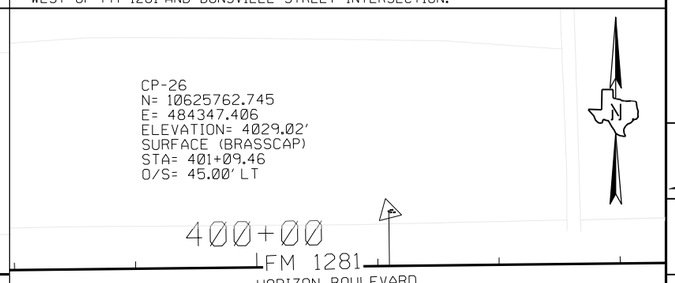
BEING ON THE NORTH SIDE, WESTBOUND OF FM 1281. APPROXIMATELY, 0.19 MILES EAST OF FM 1281 AND ANTWERP ROAD INTERSECTION, AND 362 FEET WEST OF FM 1281 AND DUNSVILLE STREET INTERSECTION.



BEING ON THE SOUTH SIDE, WESTBOUND OF FM 1281. APPROXIMATELY, 708 FEET WEST OF FM 1281 AND GROVELAND STREET INTERSECTION.



BEING ON THE SOUTH SIDE, EASTBOUND OF FM 1281. APPROXIMATELY, 78 FEET EAST OF FM 1281 AND HIMROD STREET INTERSECTION.



BEING ON THE NORTH SIDE, WESTBOUND OF FM 1281. APPROXIMATELY, 667 FEET EAST OF FM 1281 AND ANDERPOINT STREET INTERSECTION.

0 250 500
SCALE: 1" = 500' (H)

LEGEND

CONTROL POINTS

NOTES:

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TBPELS FIRM NO. F-312

FM 1281 (HORIZON BLVD)

HORIZONTAL AND VERTICAL CONTROL

3 OF 3

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	021	0035 ETC.	052

3/30/2021 9:17:43 AM
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FINAL SUBMITTAL

Beginning chain BL_SH20 description

Point SH2015 N 10,658,686.365 E 411,522.184 Sta 10+00.00

Course from SH2015 to PC BL_SH201 S 31° 17′ 42.15" E Dist 886.560

Curve Data			
Curve BL_SH201			
P.I. Station	21+78.72	N 10,657,679.145	E 412,134.464
Delta =	10° 16′ 25.13" (LT)		
Degree =	1° 45′ 46.61"		
Tangent =	292.160		
Length =	582.754		
Radius =	3,250.000		
External =	13.106		
Long Chord =	581.974		
Mid. Ord. =	13.053		
P.C. Station	18+86.56	N 10,657,928.797	E 411,982.703
P.T. Station	24+69.31	N 10,657,460.562	E 412,328.318
C.C.		N 10,659,616.994	E 414,759.840
Back = S	31° 17′ 42.15" E		
Ahead = S	41° 34′ 07.28" E		
Chord Bear = S	36° 25′ 54.71" E		

Course from PT BL_SH201 to PC BL_SH202 S 41° 34′ 07.28" E Dist 2,084.147

Curve Data			
Curve BL_SH202			
P.I. Station	46+27.84	N 10,655,845.640	E 413,760.535
Delta =	2° 07′ 49.60" (LT)		
Degree =	1° 25′ 56.62"		
Tangent =	74.375		
Length =	148.733		
Radius =	4,000.000		
External =	0.691		
Long Chord =	148.724		
Mid. Ord. =	0.691		
P.C. Station	45+53.46	N 10,655,901.284	E 413,711.186
P.T. Station	47+02.19	N 10,655,791.868	E 413,811.919
C.C.		N 10,658,555.354	E 416,703.829
Back = S	41° 34′ 07.28" E		
Ahead = S	43° 41′ 56.87" E		
Chord Bear = S	42° 38′ 02.07" E		

Course from PT BL_SH202 to SH2016 S 43° 41′ 56.87" E Dist 2,747.436

Point SH2016 N 10,653,805.534 E 415,710.044 Sta 74+49.63

Course from SH2016 to SH2017 S 43° 40′ 46.69" E Dist 3,575.430

Point SH2017 N 10,651,219.737 E 418,179.327 Sta 110+25.06

Course from SH2017 to SH2018 S 43° 39′ 17.39" E Dist 2,449.209

Point SH2018 N 10,649,447.706 E 419,870.046 Sta 134+74.27

Course from SH2018 to PC BL_SH203 S 43° 37′ 46.23" E Dist 6,402.552

Curve Data			
Curve BL_SH203			
P.I. Station	204+71.60	N 10,644,382.920	E 424,698.153
Delta =	16° 54′ 55.16" (RT)		
Degree =	1° 25′ 56.62"		
Tangent =	594.783		
Length =	1,180.912		
Radius =	4,000.000		
External =	43.979		
Long Chord =	1,176.628		
Mid. Ord. =	43.501		
P.C. Station	198+76.82	N 10,644,813.433	E 424,287.758
P.T. Station	210+57.73	N 10,643,851.624	E 424,965.532
C.C.		N 10,642,053.463	E 421,392.491
Back = S	43° 37′ 46.23" E		
Ahead = S	26° 42′ 51.07" E		
Chord Bear = S	35° 10′ 18.65" E		

Course from PT BL_SH203 to SH2019 S 26° 42′ 51.07" E Dist 2,415.534

Point SH2019 N 10,641,693.924 E 426,051.412 Sta 234+73.27

Course from SH2019 to PC BL_SH204 S 26° 41′ 26.19" E Dist 1,611.578

Curve Data			
Curve BL_SH204			
P.I. Station	253+01.76	N 10,640,060.264	E 426,872.721
Delta =	2° 15′ 33.92" (LT)		
Degree =	0° 31′ 15.13"		
Tangent =	216.917		
Length =	433.778		
Radius =	11,000.000		
External =	2.139		
Long Chord =	433.750		
Mid. Ord. =	2.138		
P.C. Station	250+84.85	N 10,640,254.068	E 426,775.288
P.T. Station	255+18.62	N 10,639,870.453	E 426,977.719
C.C.		N 10,645,194.966	E 436,603.183
Back = S	26° 41′ 26.19" E		
Ahead = S	28° 57′ 00.11" E		
Chord Bear = S	27° 49′ 13.15" E		

Course from PT BL_SH204 to SH2020 S 28° 57′ 00.11" E Dist 175.980

Point SH2020 N 10,639,716.463 E 427,062.902 Sta 256+94.60

Course from SH2020 to PC BL_SH205 S 29° 00′ 20.85" E Dist 2,048.319

Curve Data			
Curve BL_SH205			
P.I. Station	280+18.36	N 10,637,684.170	E 428,189.689
Delta =	3° 09′ 19.92" (RT)		
Degree =	0° 34′ 22.65"		
Tangent =	275.442		
Length =	550.744		
Radius =	10,000.000		
External =	3.793		
Long Chord =	550.675		
Mid. Ord. =	3.787		
P.C. Station	277+42.92	N 10,637,925.063	E 428,056.128
P.T. Station	282+93.67	N 10,637,436.289	E 428,309.787
C.C.		N 10,633,076.083	E 419,310.421
Back = S	29° 00′ 20.85" E		
Ahead = S	25° 51′ 00.93" E		
Chord Bear = S	27° 25′ 40.89" E		

Course from PT BL_SH205 to SH2021 S 25° 51′ 00.93" E Dist 178.458

Point SH2021 N 10,637,275.688 E 428,387.599 Sta 284+72.13

Course from SH2021 to SH2022 S 25° 22′ 15.46" E Dist 2,444.089

Point SH2022 N 10,635,067.325 E 429,434.835 Sta 309+16.21

Course from SH2022 to PC BL_SH206 S 24° 02′ 51.06" E Dist 363.115

Curve Data			
Curve BL_SH206			
P.I. Station	313+20.22	N 10,634,698.388	E 429,599.464
Delta =	1° 10′ 16.59" (LT)		
Degree =	1° 25′ 56.62"		
Tangent =	40.887		
Length =	81.770		
Radius =	4,000.000		
External =	0.209		
Long Chord =	81.769		
Mid. Ord. =	0.209		
P.C. Station	312+79.33	N 10,634,735.726	E 429,582.803
P.T. Station	313+61.10	N 10,634,661.398	E 429,616.884
C.C.		N 10,636,365.702	E 433,235.634
Back = S	24° 02′ 51.06" E		
Ahead = S	25° 13′ 07.65" E		
Chord Bear = S	24° 37′ 59.35" E		

Course from PT BL_SH206 to PC BL_SH207 S 25° 13′ 07.65" E Dist 1,109.074

Curve Data			
Curve BL_SH207			
P.I. Station	329+43.11	N 10,633,230.175	E 430,290.940
Delta =	36° 36′ 01.79" (LT)		
Degree =	4° 00′ 24.11"		
Tangent =	472.934		
Length =	913.483		
Radius =	1,430.000		
External =	76.176		
Long Chord =	898.030		
Mid. Ord. =	72.324		
P.C. Station	324+70.17	N 10,633,658.033	E 430,089.434
P.T. Station	333+83.66	N 10,633,006.830	E 430,707.814
C.C.		N 10,634,267.321	E 431,383.137
Back = S	25° 13′ 07.65" E		
Ahead = S	61° 49′ 09.43" E		
Chord Bear = S	43° 31′ 08.54" E		

Course from PT BL_SH207 to SH2023 S 61° 49′ 09.44" E Dist 376.226

Point SH2023 N 10,632,829.156 E 431,039.443 Sta 337+59.88

Course from SH2023 to SH2024 S 62° 10′ 47.04" E Dist 505.665

Point SH2024 N 10,632,593.162 E 431,486.662 Sta 342+65.55

Course from SH2024 to SH2025 S 62° 42′ 58.24" E Dist 638.386

Point SH2025 N 10,632,300.527 E 432,054.025 Sta 349+03.93

Course from SH2025 to SH2026 S 61° 58′ 43.11" E Dist 715.721

Point SH2026 N 10,631,964.281 E 432,685.844 Sta 356+19.65

Course from SH2026 to SH2027 S 61° 14′ 23.74" E Dist 1,065.959

Point SH2027 N 10,631,451.402 E 433,620.309 Sta 366+85.61

Course from SH2027 to SH2028 S 61° 14′ 23.74" E Dist 680.534

Point SH2028 N 10,631,123.967 E 434,216.894 Sta 373+66.15

Ending chain BL_SH20 description

0 50 100

SCALE: 1" = 100′ (H)

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
5/3/2021

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

HORIZONTAL ALIGNMENT DATA SHEET - SH 20

1 OF 3

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO	3451	01	036, ETC.	053

3/30/2021 10:59:47 AM
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FINAL SUBMITTAL

Beginning chain BL_FM1281 description

Point FM128101 N 10,616,045.094 E 450,614.072 Sta 10+00.00

Course from FM128101 to FM128102 N 77° 08′ 23.54" E Dist 112.434

Point FM128102 N 10,616,070.118 E 450,723.686 Sta 11+12.43

Course from FM128102 to FM128103 N 79° 07′ 00.19" E Dist 228.687

Point FM128103 N 10,616,113.296 E 450,948.260 Sta 13+41.12

Course from FM128103 to FM128104 N 77° 59′ 06.29" E Dist 451.400

Point FM128104 N 10,616,207.263 E 451,389.771 Sta 17+92.52

Course from FM128104 to FM128105 N 75° 35′ 07.30" E Dist 2,507.405

Point FM128105 N 10,616,831.449 E 453,818.242 Sta 42+99.93

Course from FM128105 to PC BL_FM12811 N 75° 34′ 00.38" E Dist 5,032.515

Curve Data

Curve BL_FM12811					
P.I. Station	96+72.27	N	10,618,170.515	E	459,021.029
Delta =	16° 07′ 06.71"	(LT)			
Degree =	2° 23′ 14.37"				
Tangent =	339.830				
Length =	675.171				
Radius =	2,400.000				
External =	23.940				
Long Chord =	672.947				
Mid. Ord. =	23.703				
P.C. Station	93+32.44	N	10,618,085.812	E	458,691.924
P.T. Station	100+07.61	N	10,618,343.256	E	459,313.680
C.C.		N	10,620,410.065	E	458,093.721
Back = N	75° 34′ 00.38" E				
Ahead = N	59° 26′ 53.67" E				
Chord Bear = N	67° 30′ 27.02" E				

Course from PT BL_FM12811 to FM128106 N 59° 26′ 53.67" E Dist 289.734

Point FM128106 N 10,618,490.532 E 459,563.191 Sta 102+97.35

Course from FM128106 to FM128107 N 62° 59′ 58.41" E Dist 89.378

Point FM128107 N 10,618,531.110 E 459,642.827 Sta 103+86.72

Course from FM128107 to FM128108 N 59° 27′ 21.87" E Dist 324.384

Point FM128108 N 10,618,695.961 E 459,922.199 Sta 107+11.11

Course from FM128108 to FM128109 N 63° 18′ 55.29" E Dist 86.252

Point FM128109 N 10,618,734.695 E 459,999.265 Sta 107+97.36

Course from FM128109 to FM128110 N 58° 45′ 33.51" E Dist 485.422

Point FM128110 N 10,618,986.452 E 460,414.298 Sta 112+82.78

Course from FM128110 to PC BL_FM12812 N 61° 32′ 39.67" E Dist 154.893

Curve Data

Curve BL_FM12812					
P.I. Station	116+65.99	N	10,619,169.040	E	460,751.206
Delta =	24° 32′ 05.23"	(RT)			
Degree =	5° 27′ 24.27"				
Tangent =	228.311				
Length =	449.623				
Radius =	1,050.000				
External =	24.535				
Long Chord =	446.196				
Mid. Ord. =	23.975				
P.C. Station	114+37.67	N	10,619,060.255	E	460,550.478
P.T. Station	118+87.30	N	10,619,184.652	E	460,978.983
C.C.		N	10,618,137.110	E	461,050.781
Back = N	61° 32′ 39.67" E				
Ahead = N	86° 04′ 44.90" E				
Chord Bear = N	73° 48′ 42.29" E				

Course from PT BL_FM12812 to PC BL_FM12813 N 86° 04′ 44.90" E Dist 113.234

Curve Data

Curve BL_FM12813					
P.I. Station	122+49.53	N	10,619,209.421	E	461,340.364
Delta =	10° 35′ 04.72"	(LT)			
Degree =	2° 07′ 53.54"				
Tangent =	248.995				
Length =	496.573				
Radius =	2,688.000				
External =	11.508				
Long Chord =	495.867				
Mid. Ord. =	11.459				
P.C. Station	120+00.53	N	10,619,192.395	E	461,091.952
P.T. Station	124+97.10	N	10,619,271.787	E	461,581.422
C.C.		N	10,621,874.103	E	460,908.150
Back = N	86° 04′ 44.90" E				
Ahead = N	75° 29′ 40.19" E				
Chord Bear = N	80° 47′ 12.55" E				

Curve Data

Curve BL_FM12814					
P.I. Station	126+02.30	N	10,619,298.137	E	461,683.268
Delta =	6° 02′ 56.78"	(LT)			
Degree =	2° 52′ 39.86"				
Tangent =	105.199				
Length =	210.203				
Radius =	1,991.000				
External =	2.777				
Long Chord =	210.106				
Mid. Ord. =	2.773				
P.C. Station	124+97.10	N	10,619,271.787	E	461,581.422
P.T. Station	127+07.31	N	10,619,335.072	E	461,781.770
C.C.		N	10,621,199.321	E	461,082.730
Back = N	75° 29′ 40.19" E				
Ahead = N	69° 26′ 43.41" E				
Chord Bear = N	72° 28′ 11.80" E				

Course from PT BL_FM12814 to PC BL_FM12815 N 69° 26′ 43.41" E Dist 492.896

Curve Data

Curve BL_FM12815					
P.I. Station	140+03.10	N	10,619,790.025	E	462,995.070
Delta =	66° 04′ 42.74"	(LT)			
Degree =	4° 38′ 28.37"				
Tangent =	802.897				
Length =	1,423.734				
Radius =	1,234.500				
External =	238.128				
Long Chord =	1,346.133				
Mid. Ord. =	199.622				
P.C. Station	132+00.20	N	10,619,508.128	E	462,243.287
P.T. Station	146+23.94	N	10,620,591.536	E	463,042.223
C.C.		N	10,620,664.037	E	461,809.854
Back = N	69° 26′ 43.41" E				
Ahead = N	3° 22′ 00.67" E				
Chord Bear = N	36° 24′ 22.04" E				

Curve Data

Curve BL_FM12816					
P.I. Station	148+63.27	N	10,620,830.459	E	463,056.279
Delta =	11° 18′ 45.14"	(LT)			
Degree =	2° 22′ 15.68"				
Tangent =	239.336				
Length =	477.116				
Radius =	2,416.500				
External =	11.823				
Long Chord =	476.342				
Mid. Ord. =	11.766				
P.C. Station	146+23.94	N	10,620,591.536	E	463,042.223
P.T. Station	151+01.05	N	10,621,067.498	E	463,023.195
C.C.		N	10,620,733.455	E	460,629.894
Back = N	3° 22′ 00.67" E				
Ahead = N	7° 56′ 44.47" W				
Chord Bear = N	2° 17′ 21.90" W				

Course from PT BL_FM12816 to PC BL_FM12817 N 7° 56′ 44.47" W Dist 132.290

Curve Data

Curve BL_FM12817					
P.I. Station	153+58.62	N	10,621,322.593	E	462,987.590
Delta =	5° 27′ 00.77"	(RT)			
Degree =	2° 10′ 36.81"				
Tangent =	125.278				
Length =	250.667				
Radius =	2,632.000				
External =	2.980				
Long Chord =	250.272				
Mid. Ord. =	2.976				
P.C. Station	152+33.34	N	10,621,198.518	E	463,004.908
P.T. Station	154+83.71	N	10,621,447.752	E	462,982.135
C.C.		N	10,621,562.350	E	465,611.639
Back = N	7° 56′ 44.47" W				
Ahead = N	2° 29′ 43.70" W				
Chord Bear = N	5° 13′ 14.08" W				

Curve Data

Curve BL_FM12818					
P.I. Station	155+73.39	N	10,621,537.349	E	462,978.231
Delta =	4° 53′ 10.02"	(RT)			
Degree =	2° 43′ 32.79"				
Tangent =	89.682				
Length =	179.256				
Radius =	2,102.000				
External =	1.912				
Long Chord =	179.202				
Mid. Ord. =	1.911				
P.C. Station	154+83.71	N	10,621,447.752	E	462,982.135
P.T. Station	156+62.97	N	10,621,626.954	E	462,981.971
C.C.		N	10,621,539.274	E	465,082.142
Back = N	2° 29′ 43.70" W				
Ahead = N	2° 23′ 26.32" E				
Chord Bear = N	0° 03′ 08.69" W				

Course from PT BL_FM12818 to PC BL_FM12819 N 2° 23′ 26.32" E Dist 766.829

Curve Data

Curve BL_FM12819					
P.I. Station	194+75.63	N	10,625,436.298	E	463,141.007
Delta =	69° 31′ 21.63"	(RT)			
Degree =	1° 18′ 19.91"				
Tangent =	3,045.834				
Length =	5,325.243				
Radius =	4,388.697				
External =	953.378				
Long Chord =	5,004.513				
Mid. Ord. =	783.233				
P.C. Station	164+29.80	N	10,622,393.115	E	463,013.958
P.T. Station	217+55.04	N	10,626,381.893	E	466,036.340
C.C.		N	10,622,210.051	E	467,398.835
Back = N	2° 23′ 26.32" E				
Ahead = N	71° 54′ 47.95" E				
Chord Bear = N	37° 09′ 07.13" E				

Curve Data

Curve BL_FM128110					
P.I. Station	225+89.18	N	10,626,640.859	E	466,829.269
Delta =	21° 40′ 16.93"	(RT)			
Degree =	1° 18′ 53.02"				
Tangent =	834.146				
Length =	1,648.356				
Radius =	4,358.000				
External =	79.112				
Long Chord =	1,638.548				
Mid. Ord. =	77.702				
P.C. Station	217+55.04	N	10,626,381.893	E	466,036.340
P.T. Station	234+03.39	N	10,626,588.705	E	467,661.784
C.C.		N	10,622,239.231	E	467,389.305
Back = N	71° 54′ 47.95" E				
Ahead = S	86° 24′ 55.12" E				
Chord Bear = N	82° 44′ 56.42" E				

0 50 100

SCALE: 1" = 100′ (H)

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
6/3/2021

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

HORIZONTAL ALIGNMENT DATA SHEET - FM 1281

2 OF 3

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO	3451	01	036, ETC.	054

FINAL SUBMITTAL

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Course from PT BL_FM128110 to FM128111 S 86° 24′ 55.12" E Dist 196.084
Point FM128111        N   10,626,576.445 E      467,857.484 Sta     235+99.48
Course from FM128111 to FM128112 S 86° 55′ 35.49" E Dist 5,138.929
Point FM128112        N   10,626,300.913 E      472,989.022 Sta     287+38.41
Course from FM128112 to FM128113 S 87° 02′ 42.41" E Dist 3,501.213
Point FM128113        N   10,626,120.427 E      476,485.580 Sta     322+39.62
Course from FM128113 to FM128114 S 87° 04′ 10.71" E Dist 2,898.875
Point FM128114        N   10,625,972.230 E      479,380.664 Sta     351+38.50
Course from FM128114 to FM128115 S 86° 54′ 59.04" E Dist 598.753
Point FM128115        N   10,625,940.022 E      479,978.550 Sta     357+37.25
Course from FM128115 to FM128116 S 87° 08′ 29.63" E Dist 908.190
Point FM128116        N   10,625,894.732 E      480,885.610 Sta     366+45.44
Course from FM128116 to FM128117 S 87° 17′ 45.61" E Dist 151.054
Point FM128117        N   10,625,887.605 E      481,036.496 Sta     367+96.49
Course from FM128117 to FM128118 S 87° 10′ 46.33" E Dist 212.430
Point FM128118        N   10,625,877.152 E      481,248.669 Sta     370+08.92
Course from FM128118 to FM128119 S 86° 59′ 43.37" E Dist 542.670
Point FM128119        N   10,625,848.708 E      481,790.593 Sta     375+51.59
Course from FM128119 to FM128120 S 87° 03′ 58.66" E Dist 2,905.535
Point FM128120        N   10,625,700.001 E      484,692.320 Sta     404+57.13
================================================================================
Ending chain BL_FM1281 description
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0 50 100
SCALE: 1" = 100′ (H)

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

HORIZONTAL ALIGNMENT DATA SHEET - FM 1281

3 OF 3

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO	3451	01	036, ETC.	055

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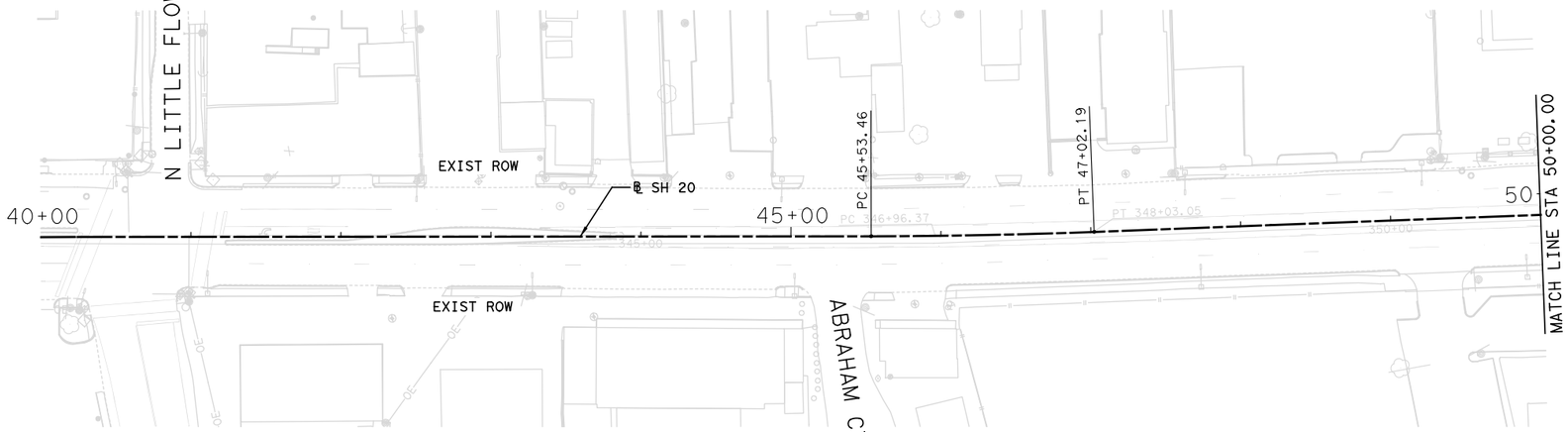
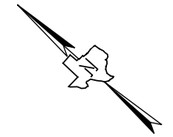
FINAL SUBMITTAL





SCALE: 1" = 100' (H)

0 50 100

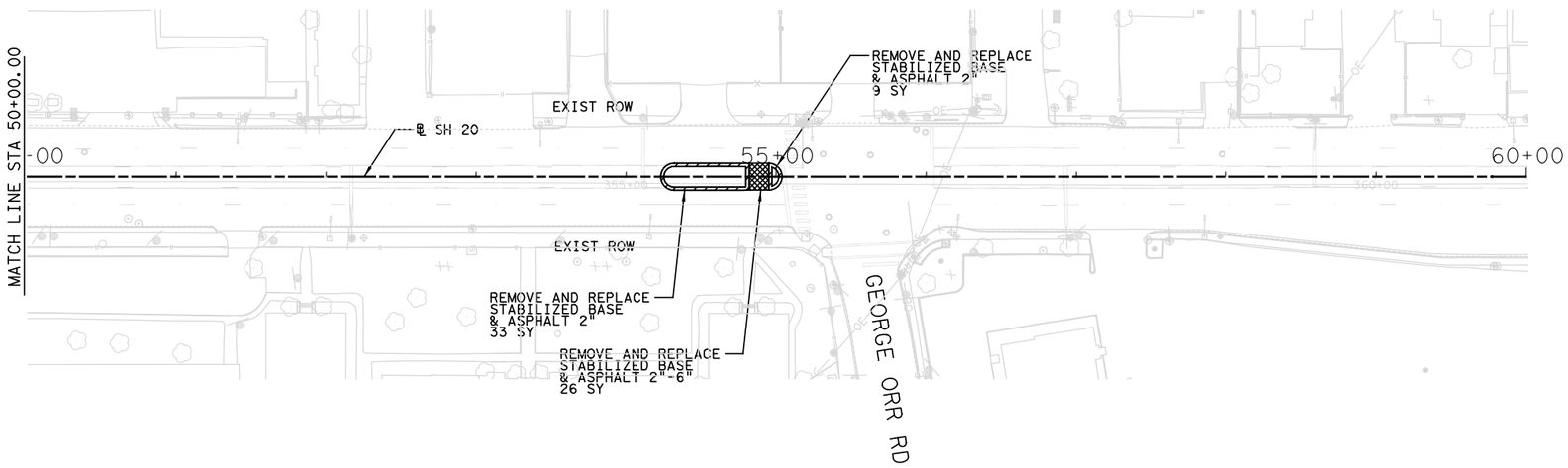
LEGEND

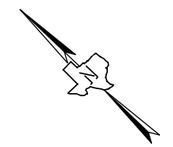
- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.

ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	42
0105 6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	26





Texas Department of Transportation

NO.	REVISION	BY	DATE

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

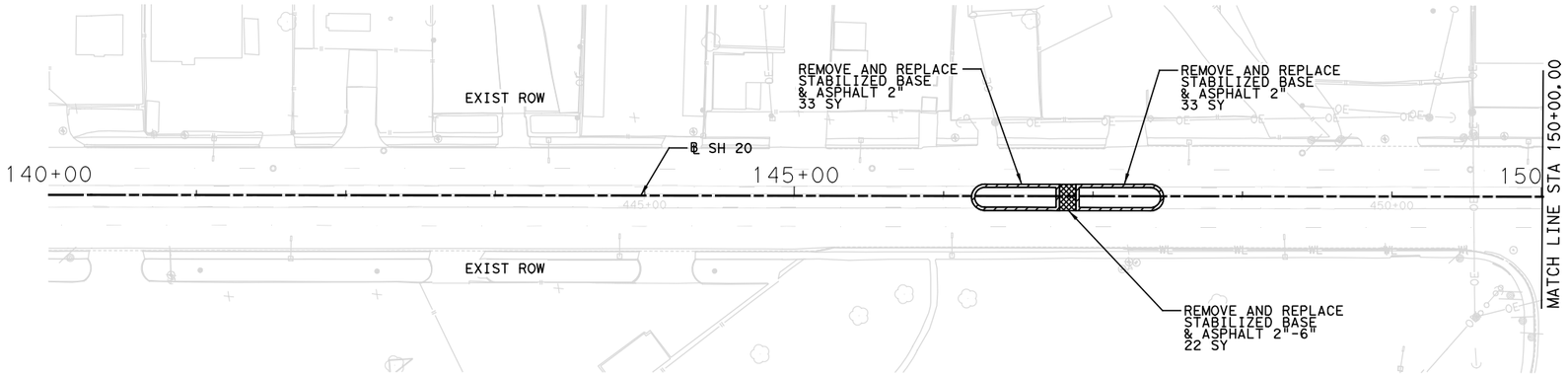
SH 20 & FM 1281

SH 20 REMOVAL
STA 40+00 - STA 60+00

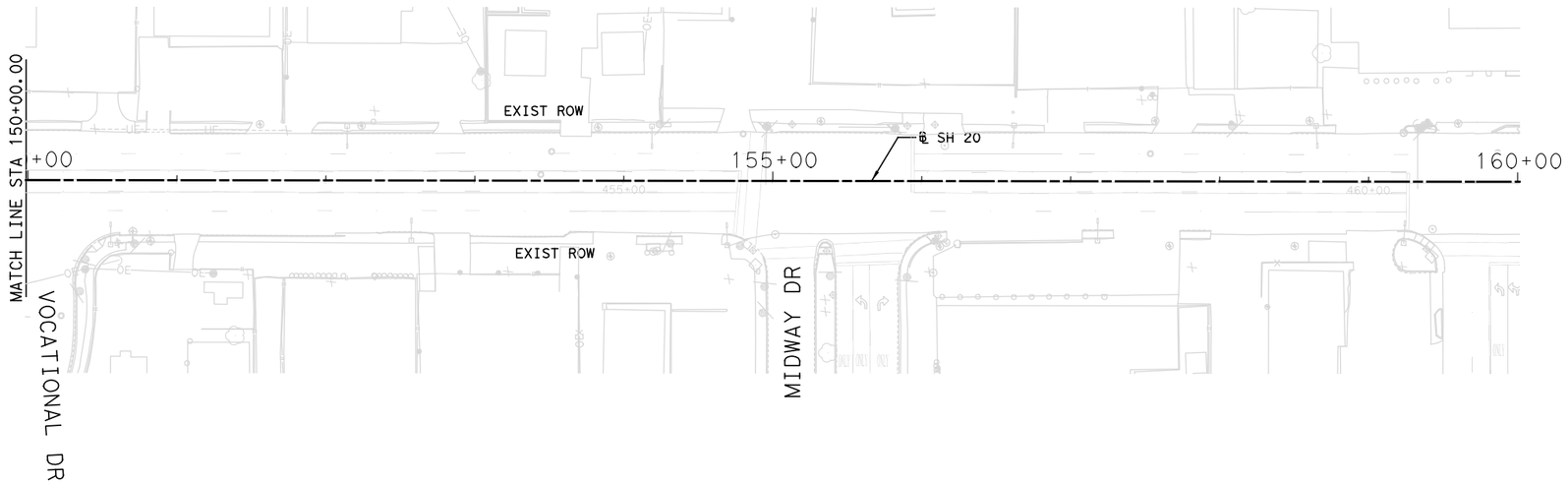
1 OF 4

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC.	056

FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	66
0105 6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	22



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
03/30/21

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9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SH 20 REMOVAL
STA 140+00 - STA 160+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	035, ETC.	057

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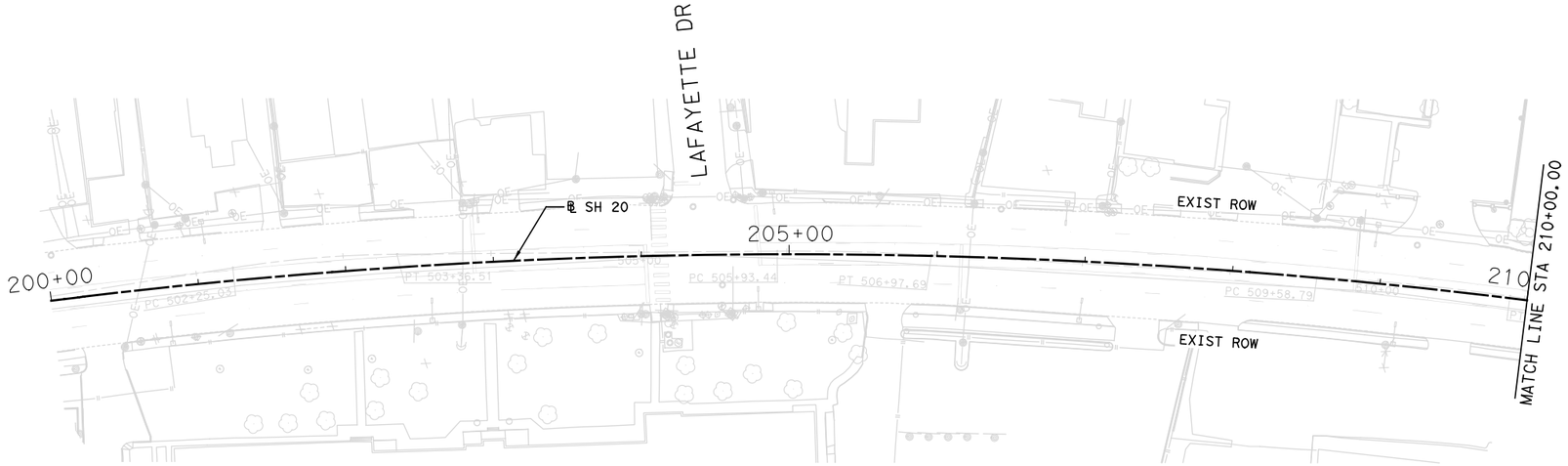
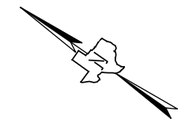
FINAL SUBMITTAL





SCALE: 1" = 100' (H)

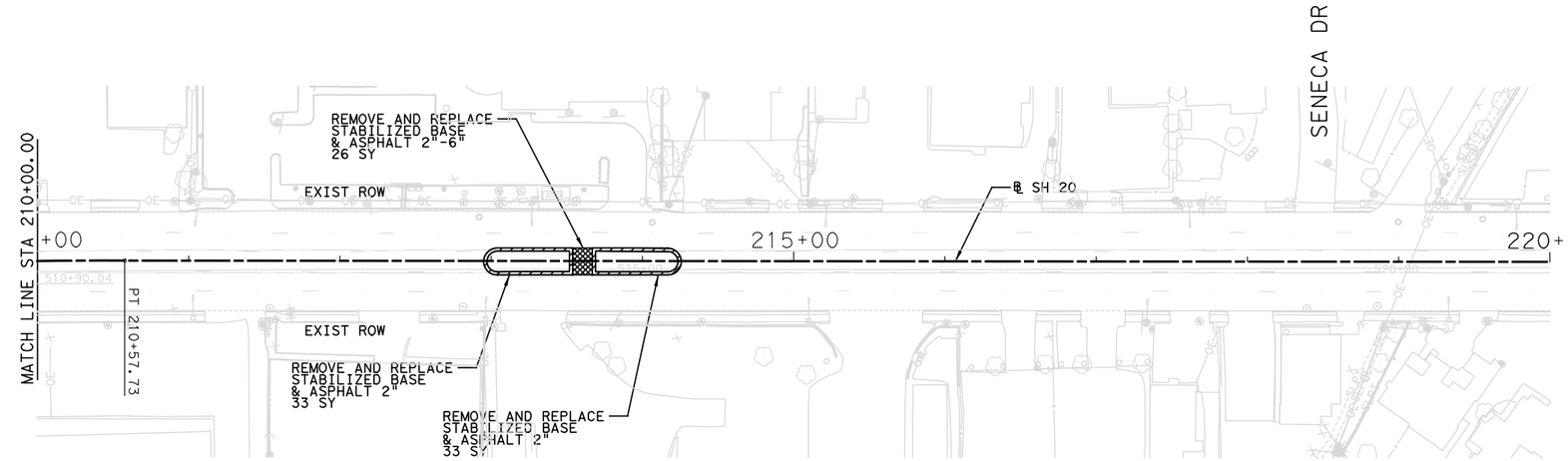
LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

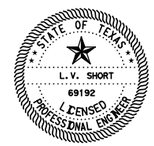
1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.

ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	66
0105 6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	26



Texas Department of Transportation

NO.	REVISION	BY	DATE



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BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SH 20 REMOVAL
STA 200+00 - STA 220+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	058

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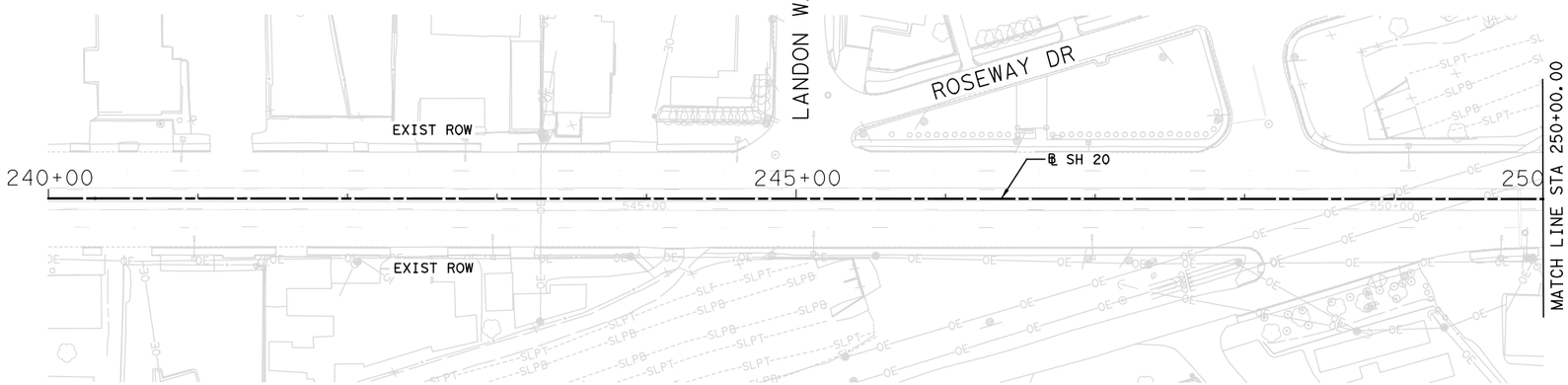
FINAL SUBMITTAL



0 50 100
SCALE: 1" = 100' (H)

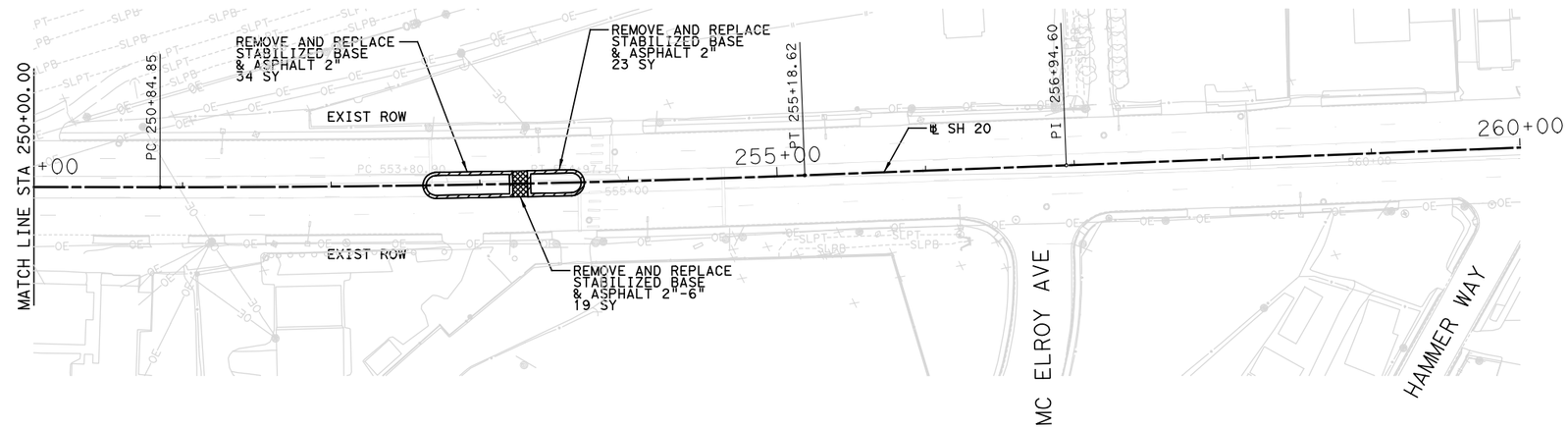
LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

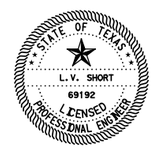
1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.

ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	57
0105 6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	19



Texas Department of Transportation

NO.	REVISION	BY	DATE



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BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

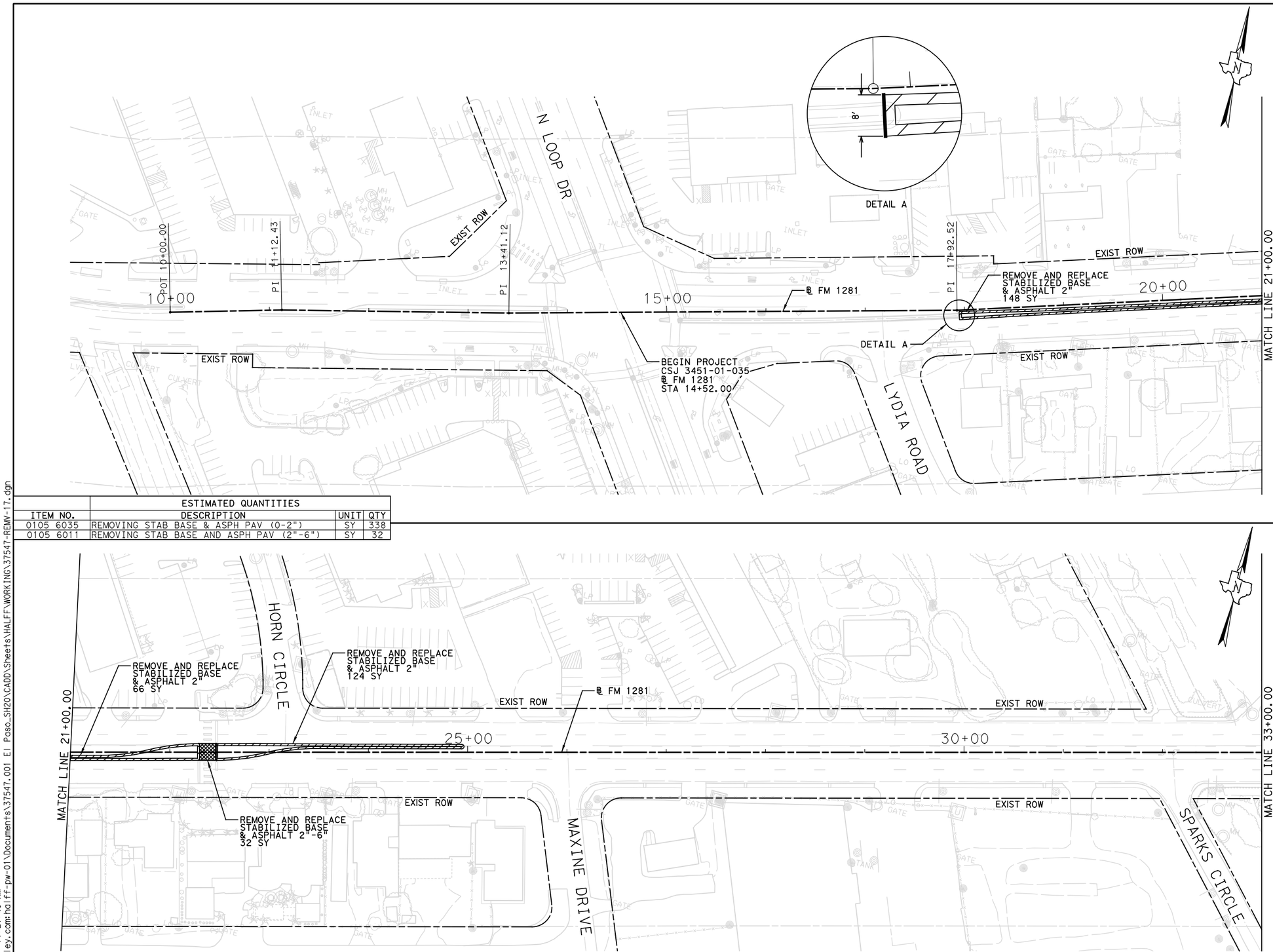
SH 20 & FM 1281

SH 20 REMOVAL
STA 240+00 - STA 260+00

4 OF 4

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	059

FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	338
0105 6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	32

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.
2. SAWCUTTING IS SUBSIDIARY TO CONCRETE CURB AND GUTTER

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
03/30/21

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9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 10+00 - STA 33+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC. / 060

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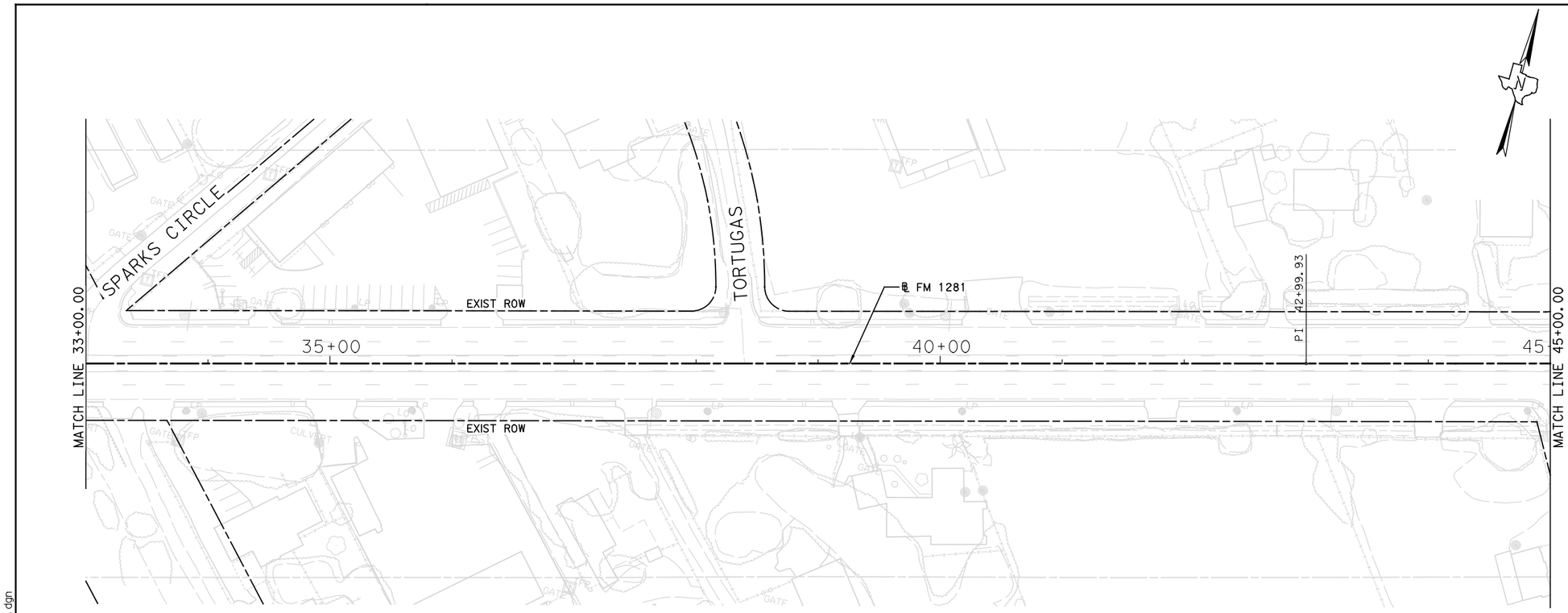
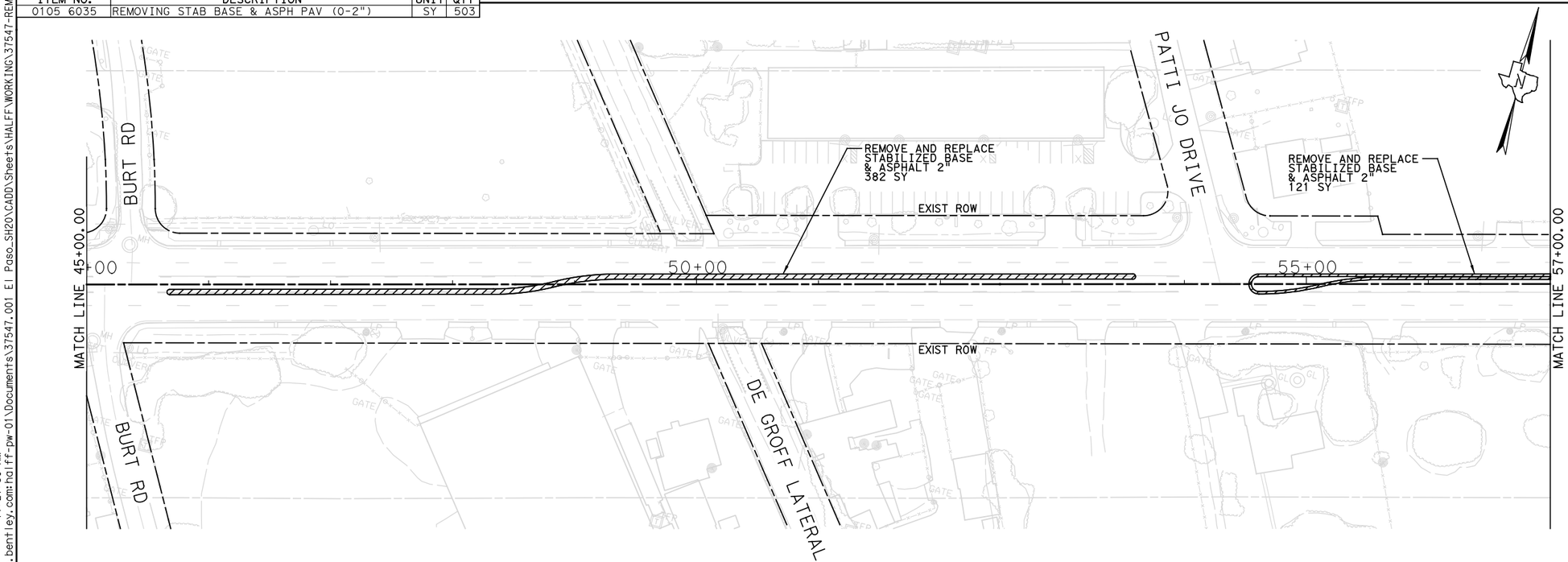
FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	503



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.
2. SAWCUTTING IS SUBSIDIARY TO CONCRETE CURB AND GUTTER

Texas Department of Transportation

NO.	REVISION	BY	DATE

L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
03/24/21

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9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 33+00 - STA 57+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	035, ETC.	061

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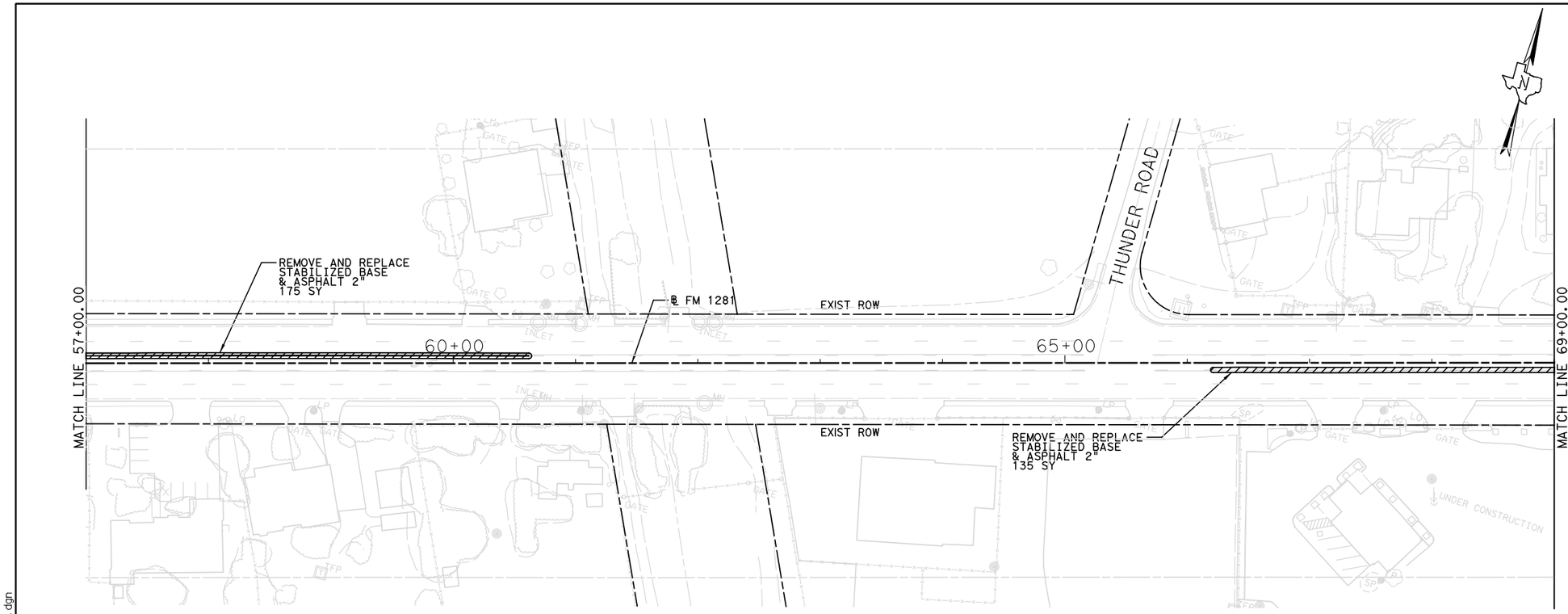
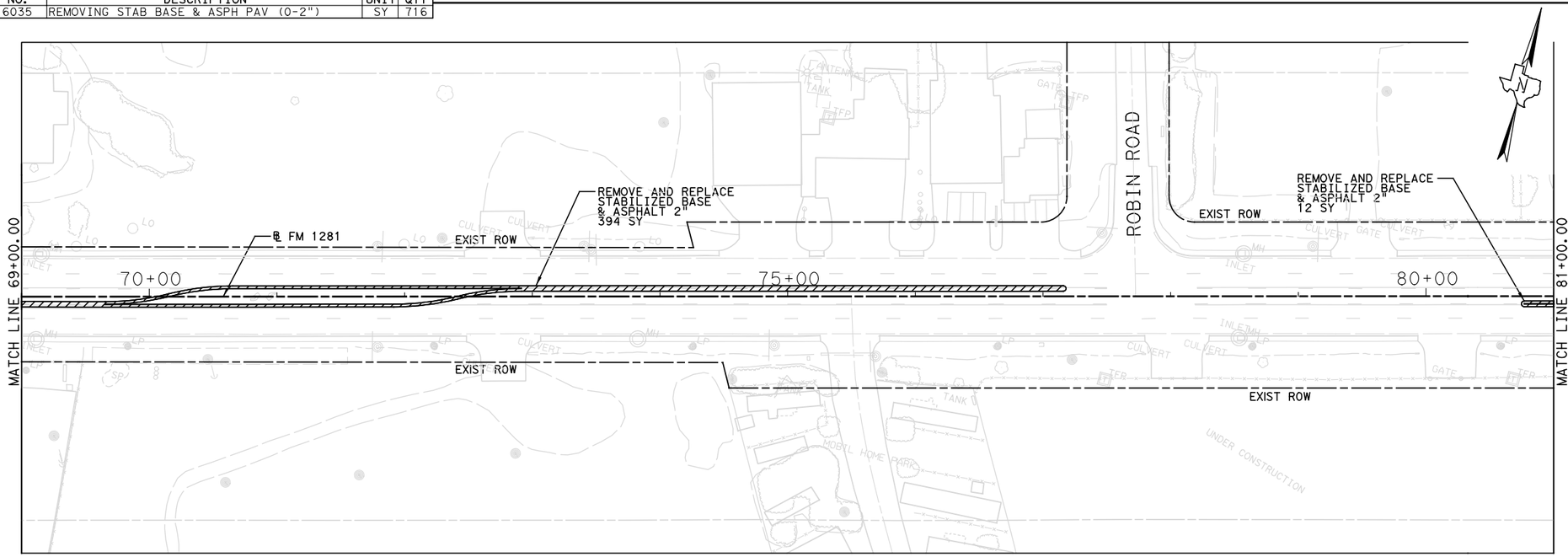
FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	716



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.
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Texas Department of Transportation

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STATE OF TEXAS
L.V. SHORT
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LICENSED
PROFESSIONAL ENGINEER
03/30/21

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9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 57+00 - STA 81+00

3 OF 16

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC.	062

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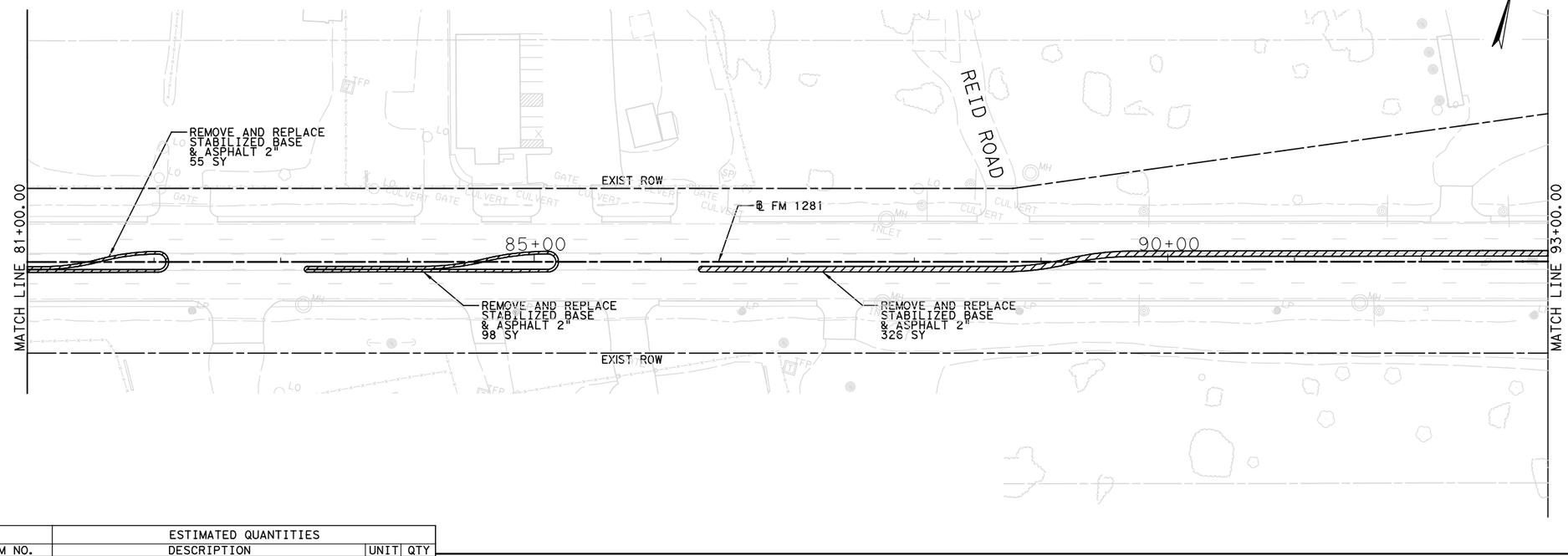
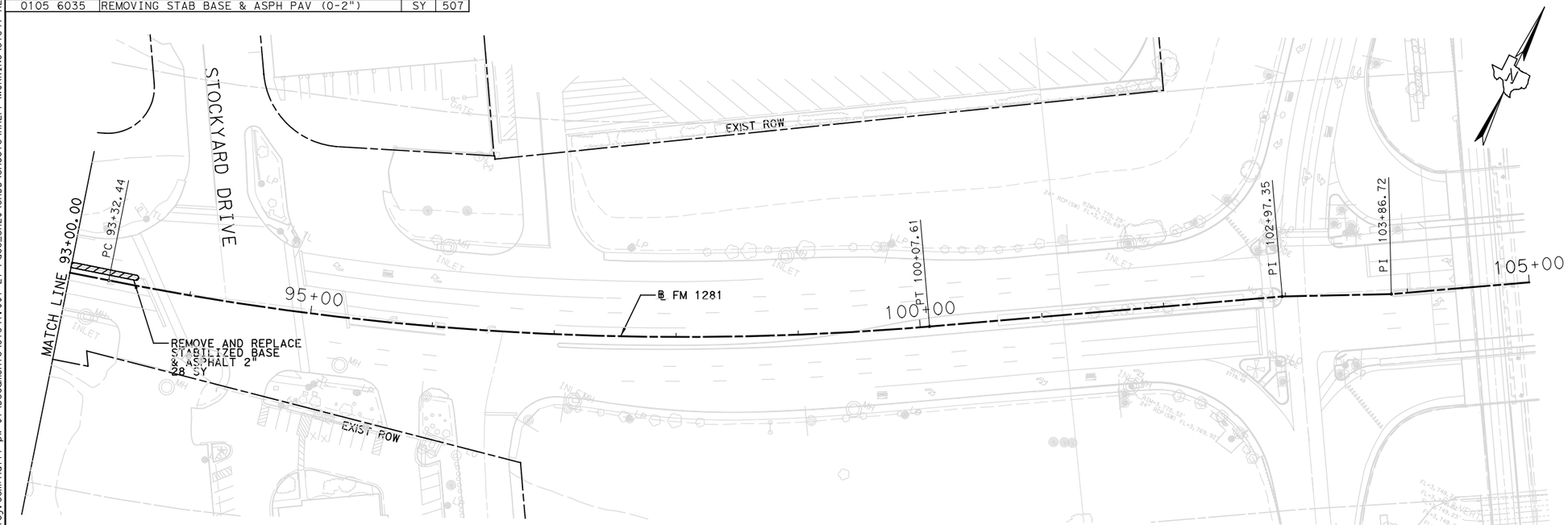


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	507



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.
2. SAWCUTTING IS SUBSIDIARY TO CONCRETE CURB AND GUTTER

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
03/24/21

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9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 81+00 - STA 105+00

4 OF 16

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC. / 063

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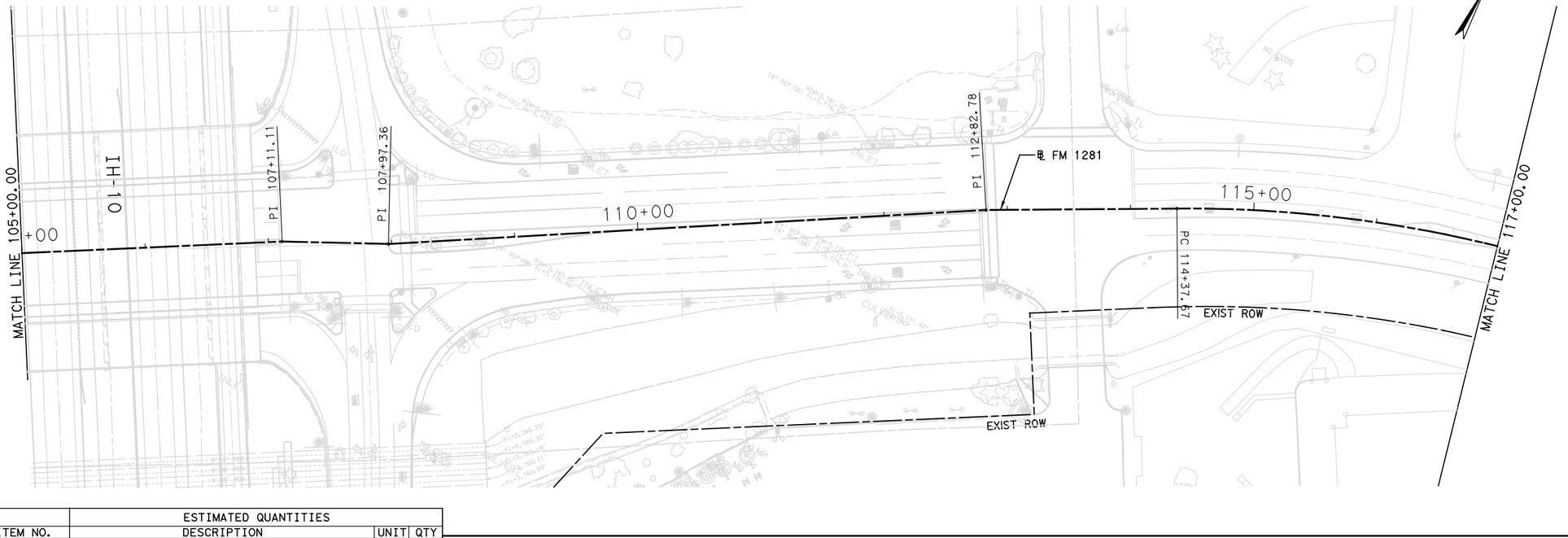
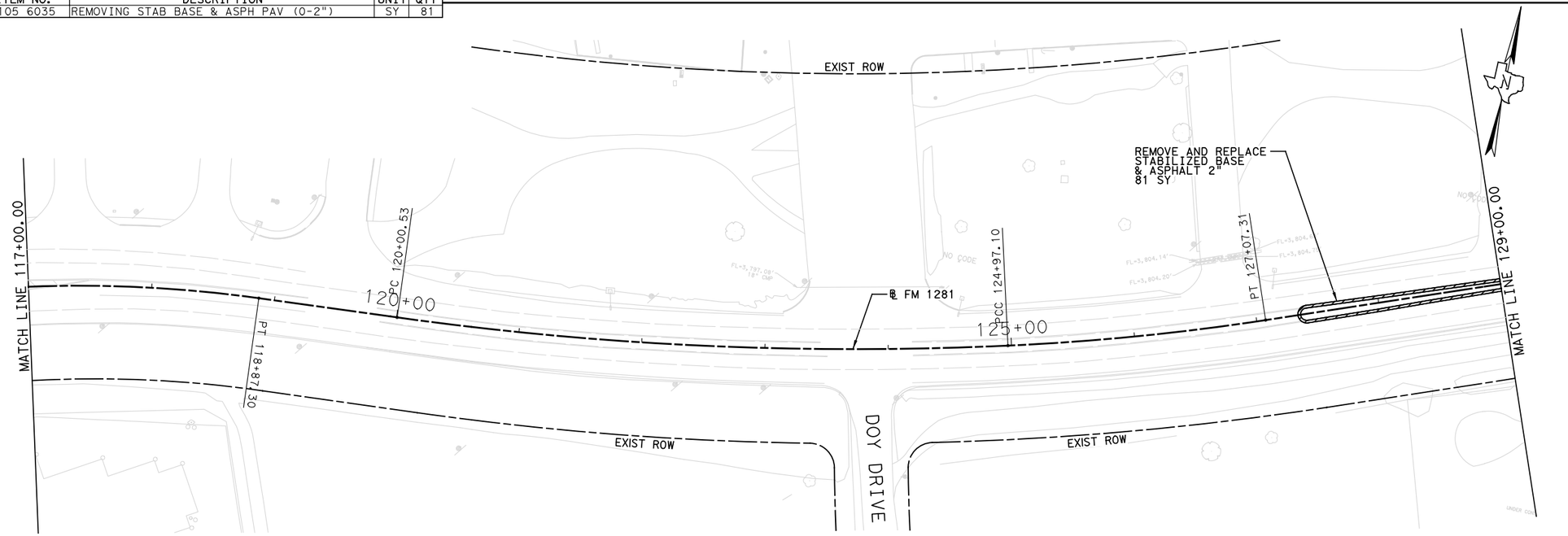
FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	81



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.
2. SAWCUTTING IS SUBSIDIARY TO CONCRETE CURB AND GUTTER

Texas Department of Transportation

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STATE OF TEXAS
L. V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
03/30/21

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BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 105+00 - STA 129+00

5 OF 16

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	025, ETC.	064

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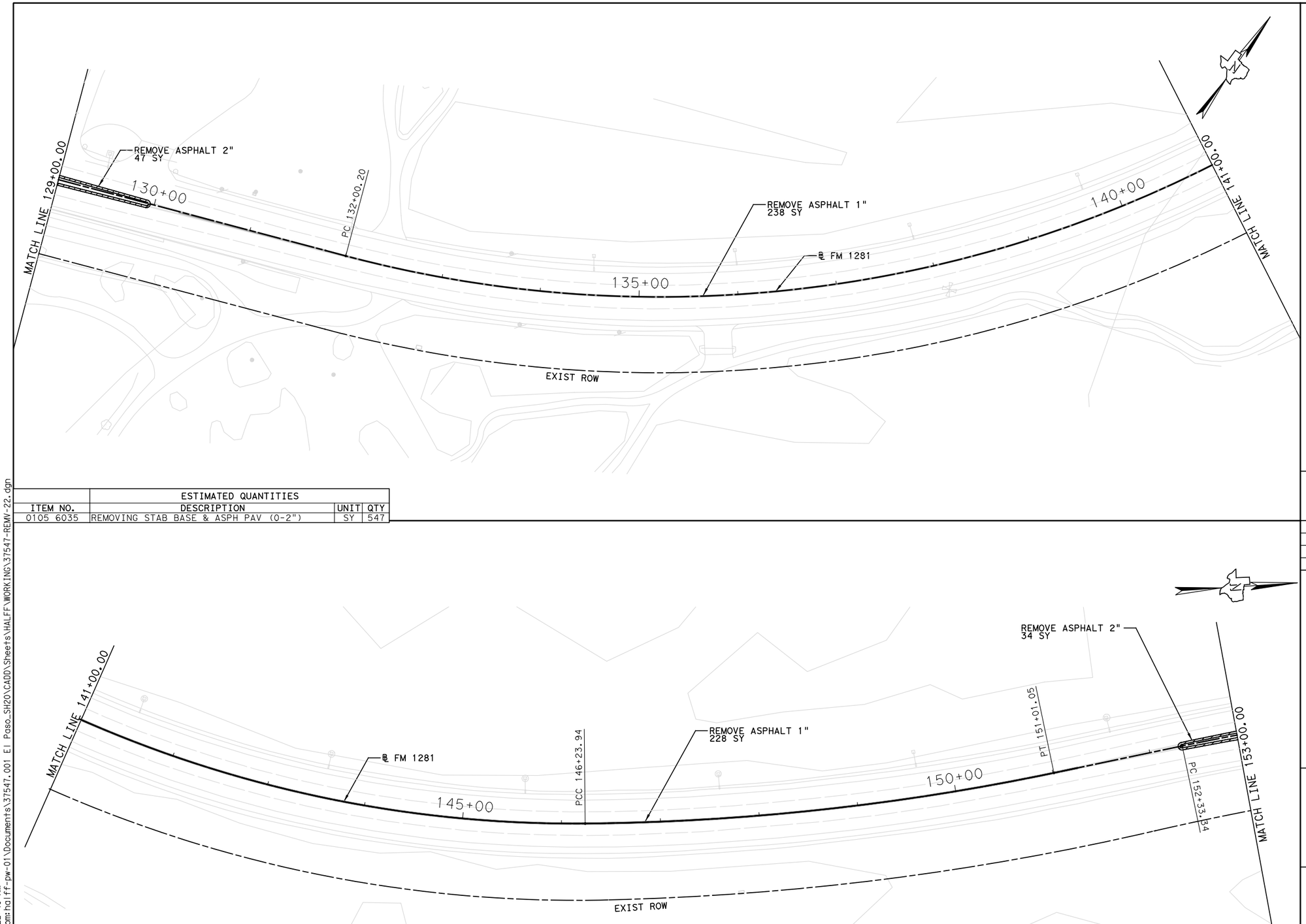
FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	547

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.
2. SAWCUTTING IS SUBSIDIARY TO CONCRETE CURB AND GUTTER

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
03/24/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 129+00 - STA 153+00

6 OF 16

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	065

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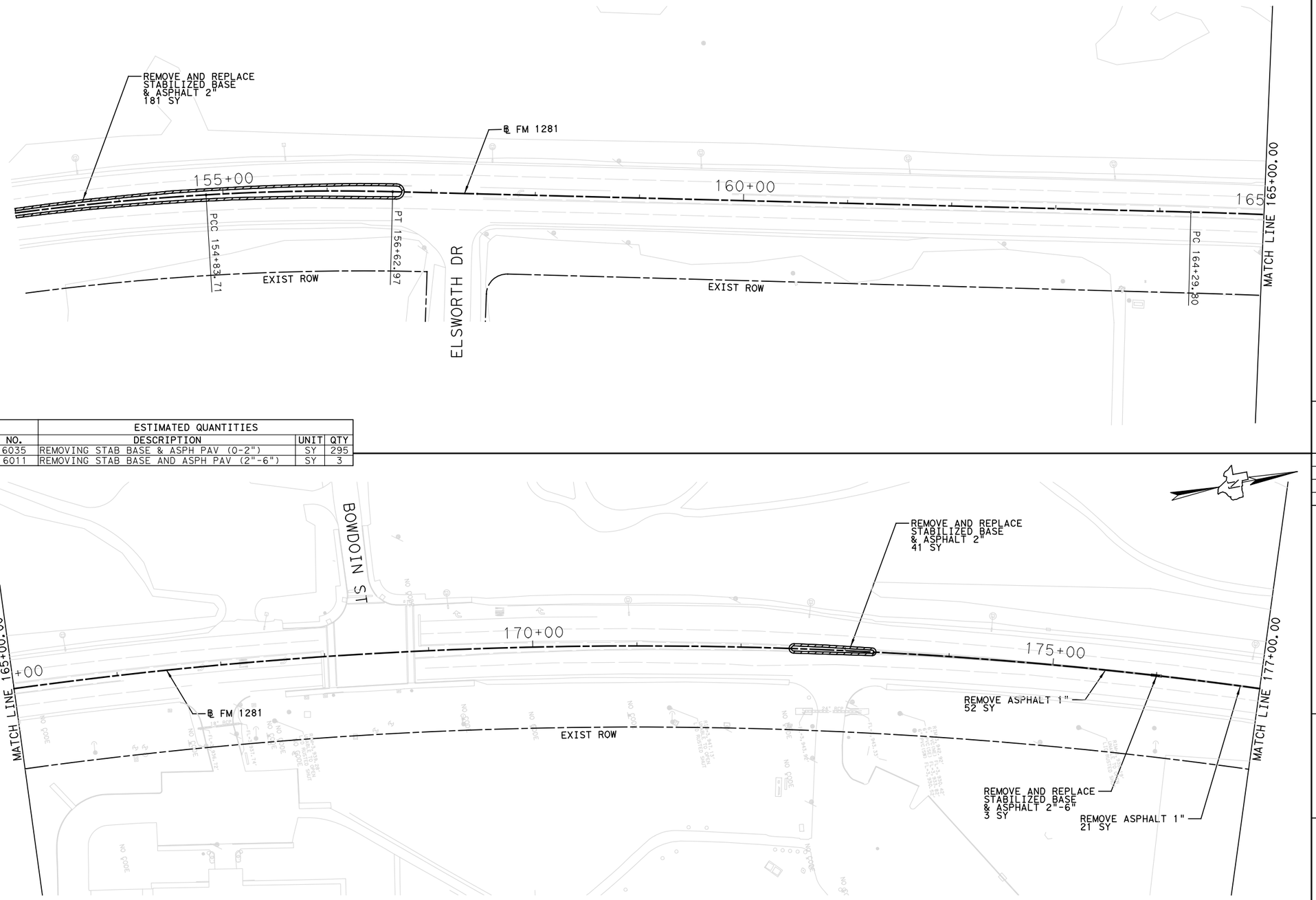
FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	295
0105 6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	3

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.
2. SAWCUTTING IS SUBSIDIARY TO CONCRETE CURB AND GUTTER

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 153+00 - STA 177+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	036, ETC.	066

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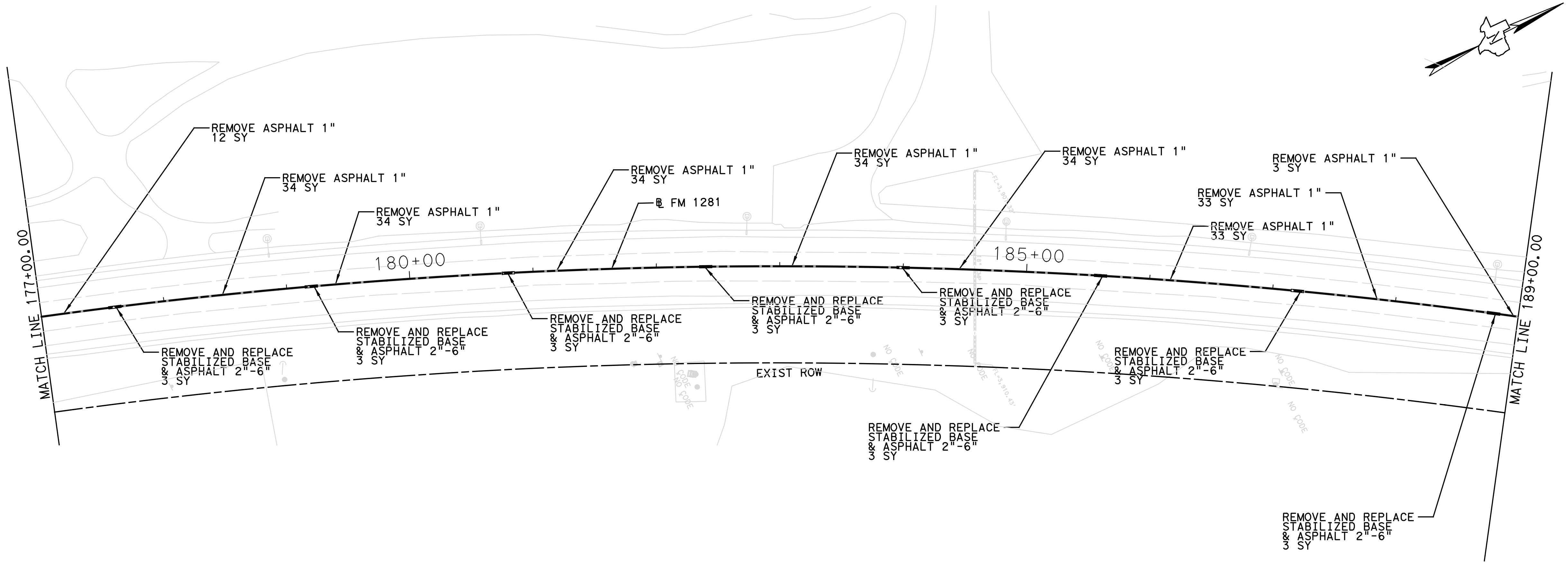
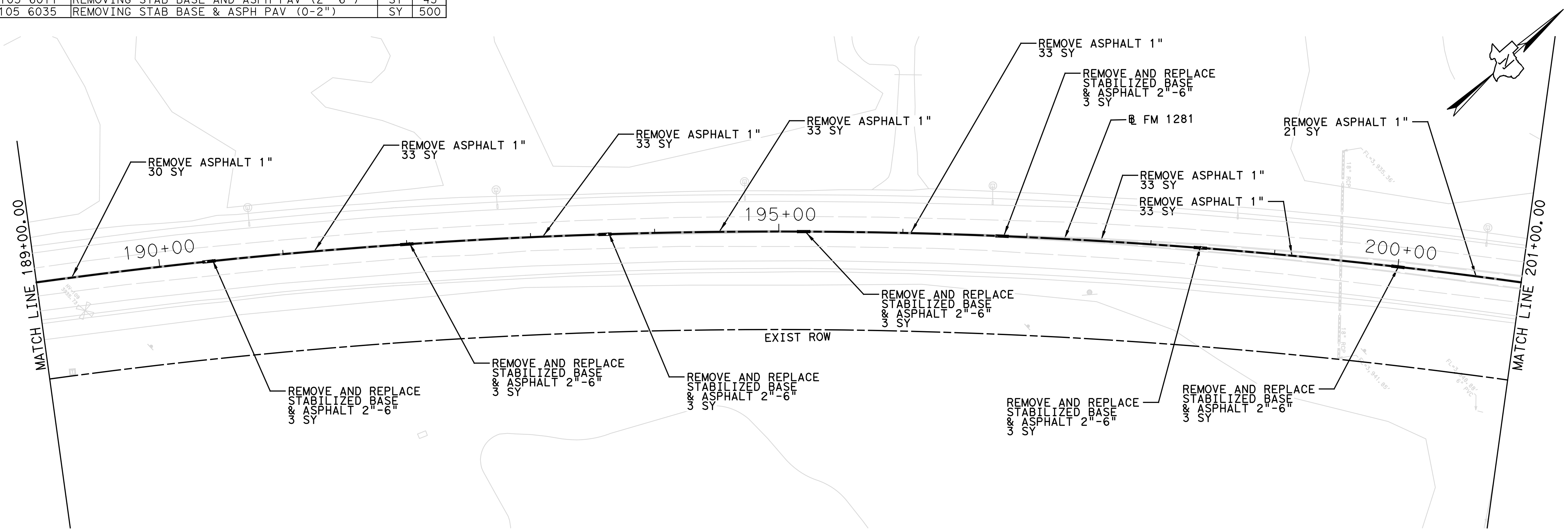
FINAL SUBMITTAL





ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	45
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	500

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.
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NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
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LICENSED PROFESSIONAL ENGINEER
03/30/21

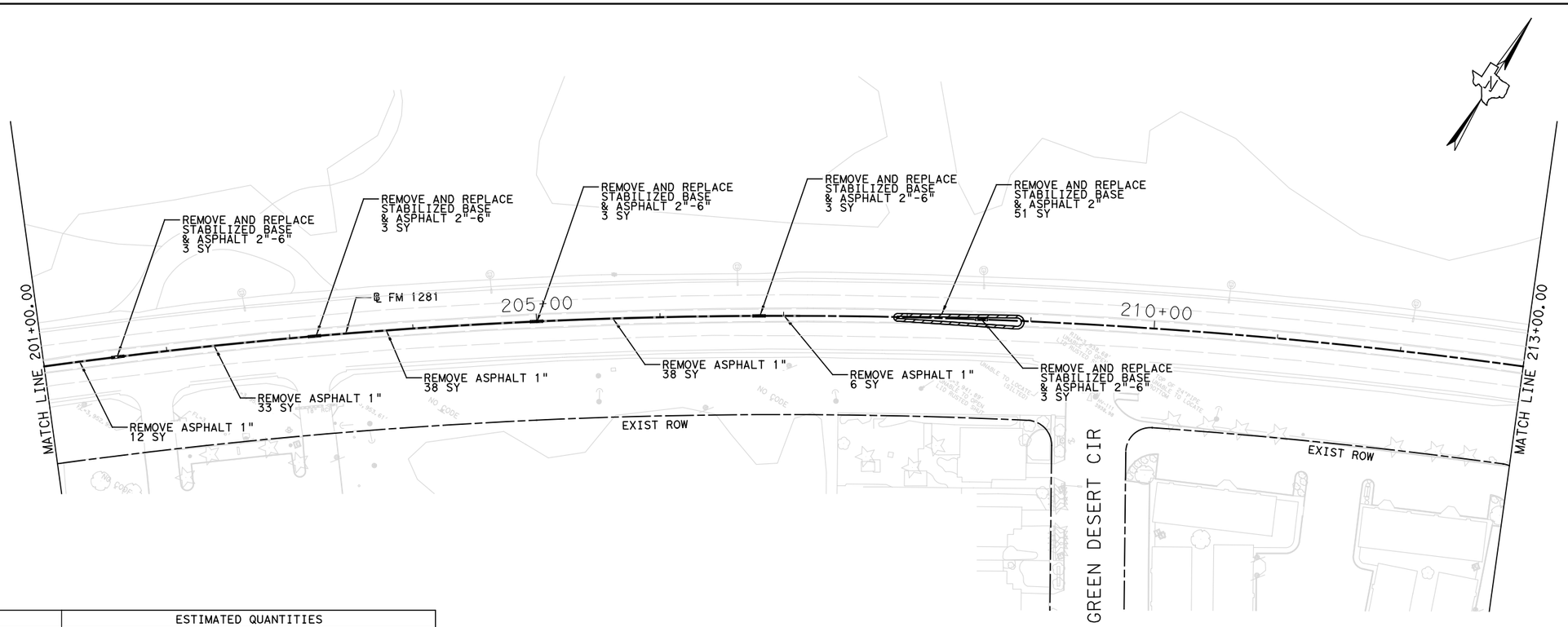
HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

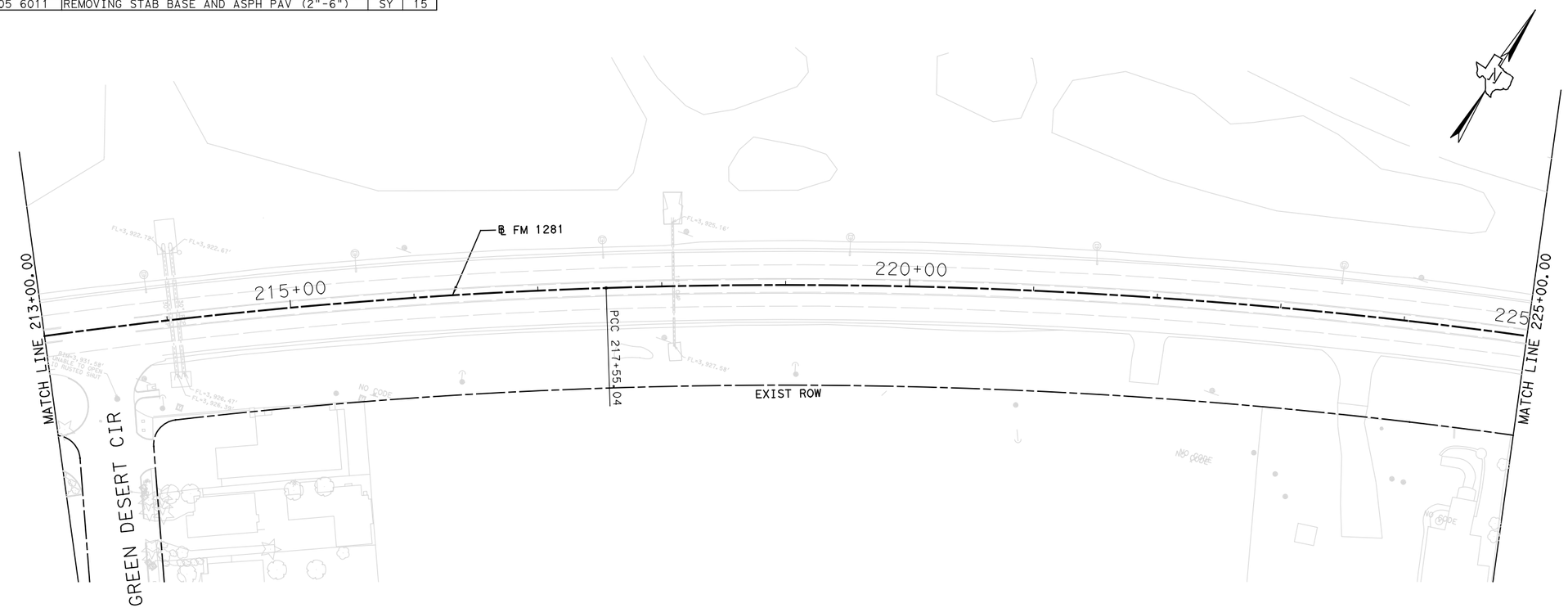
FM 1281 REMOVAL
STA 177+00 - STA 201+00

DESIGNED: GR	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT		COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED: RS	ELP		EL PASO	3451	01	035, ETC. / 067

FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	178
0105 6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	15



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.
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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
03/24/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 201+00 - STA 225+00

9 OF 16

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC.	068

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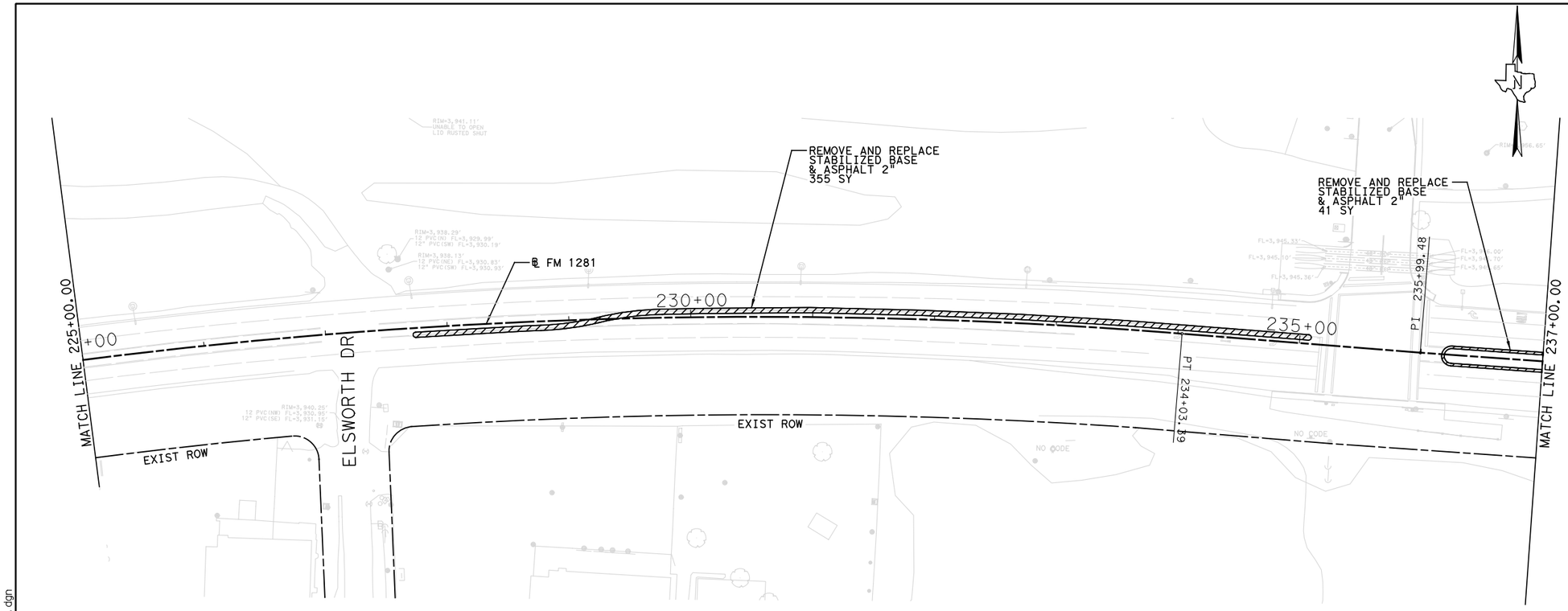
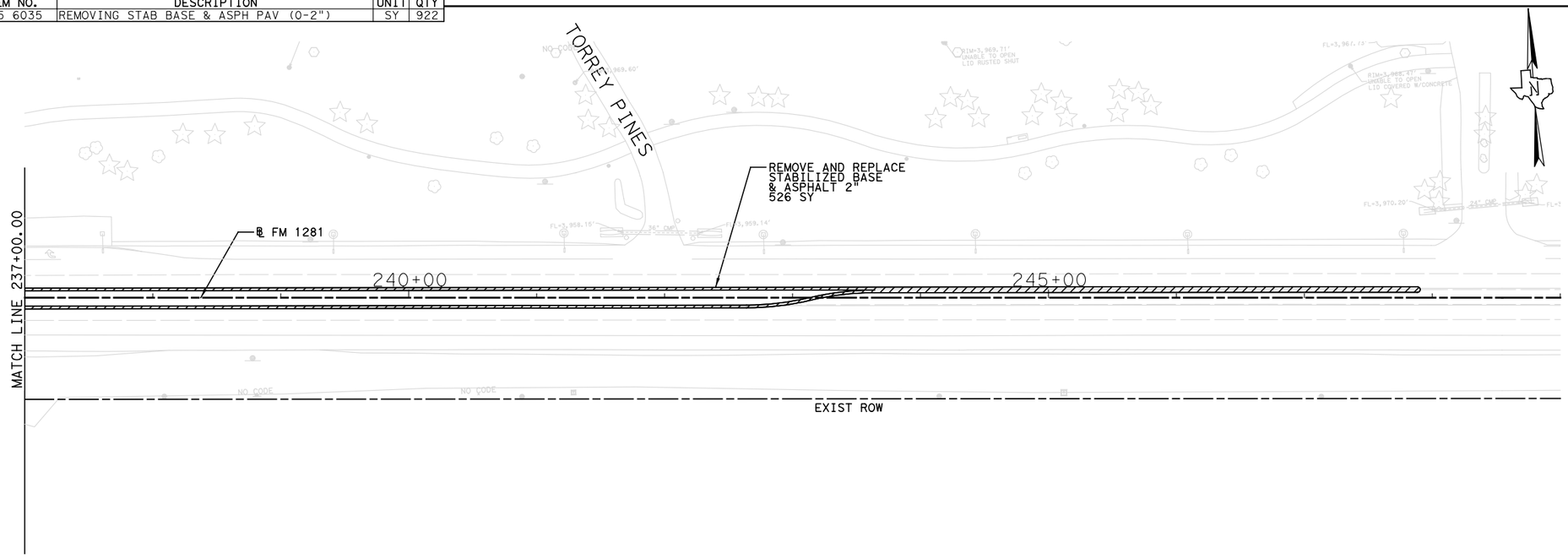
FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	922



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.
2. SAWCUTTING IS SUBSIDIARY TO CONCRETE CURB AND GUTTER

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 225+00 - STA 249+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	035, ETC.	069

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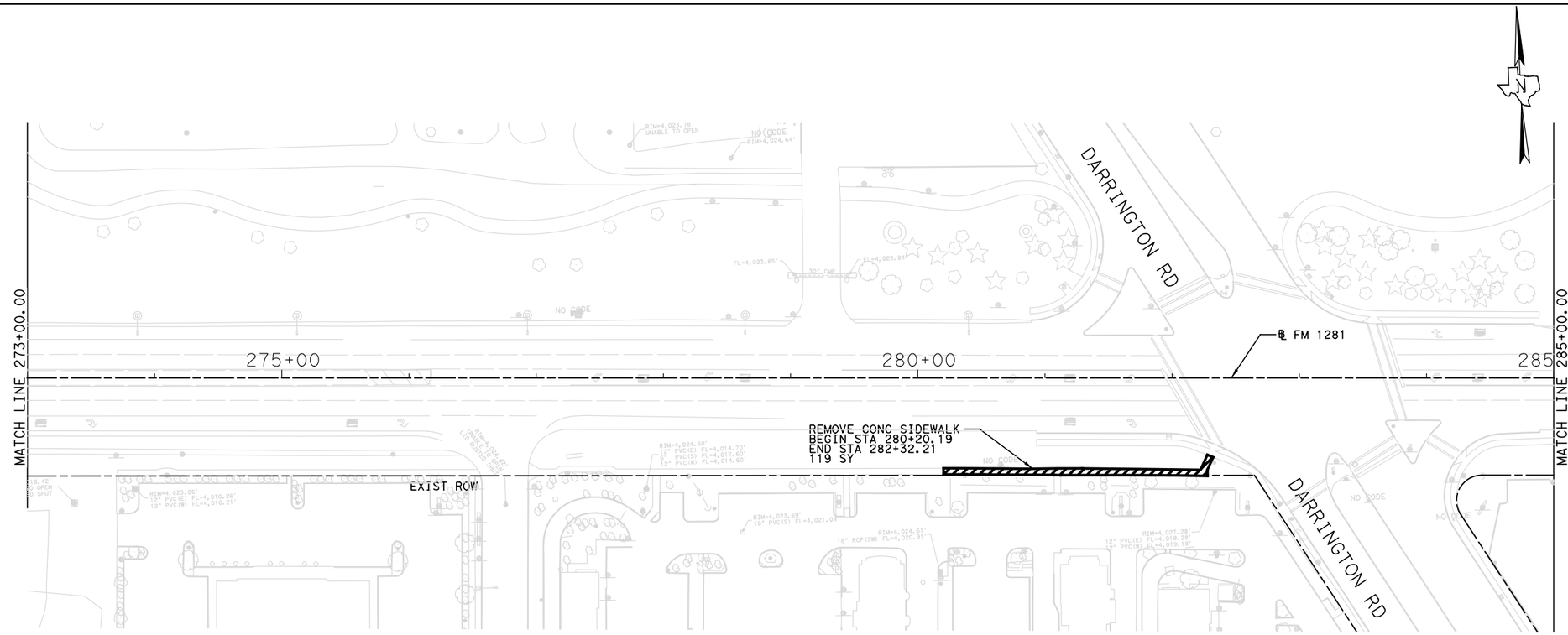
FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0104 6015	REMOVING CONC (SIDEWALKS)	SY	119
0105 6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	39

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.
2. SAWCUTTING IS SUBSIDIARY TO CONCRETE CURB AND GUTTER

Texas Department of Transportation

NO.	REVISION	BY	DATE

L. V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
03/24/21

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9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 273+00 - STA 297+00

11 OF 16

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	025, ETC.	070

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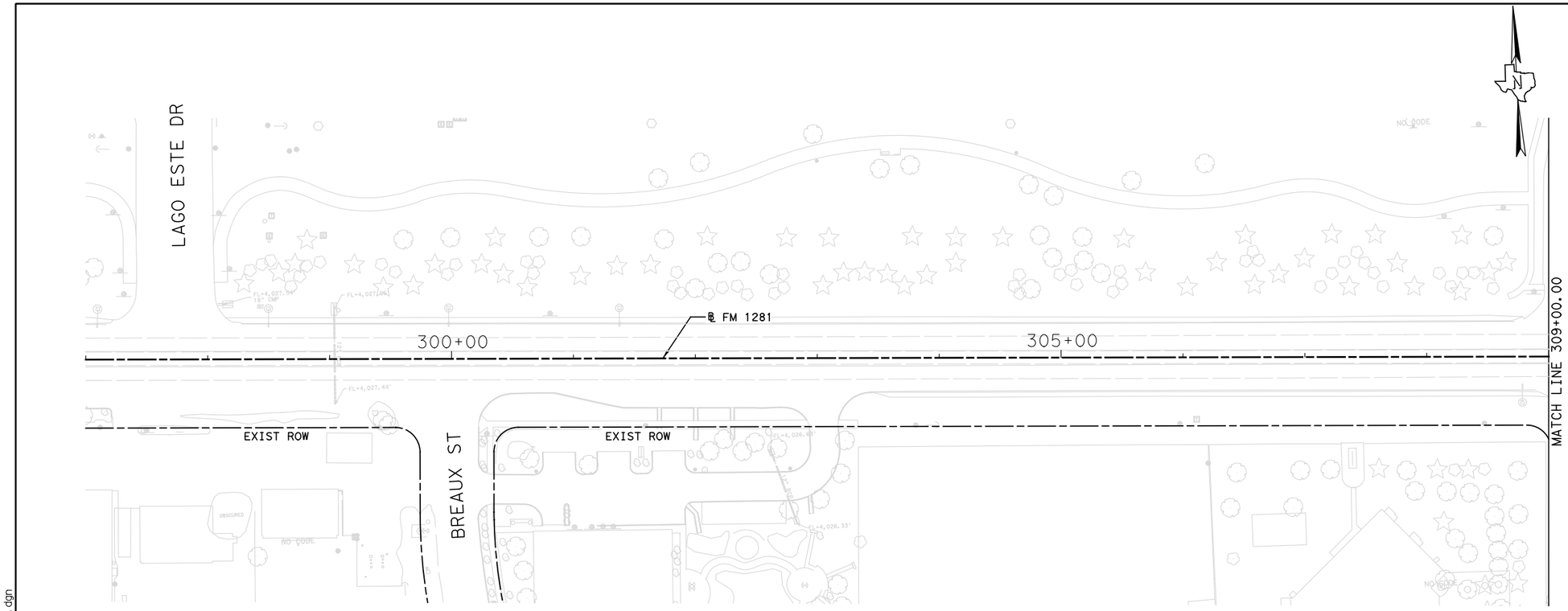
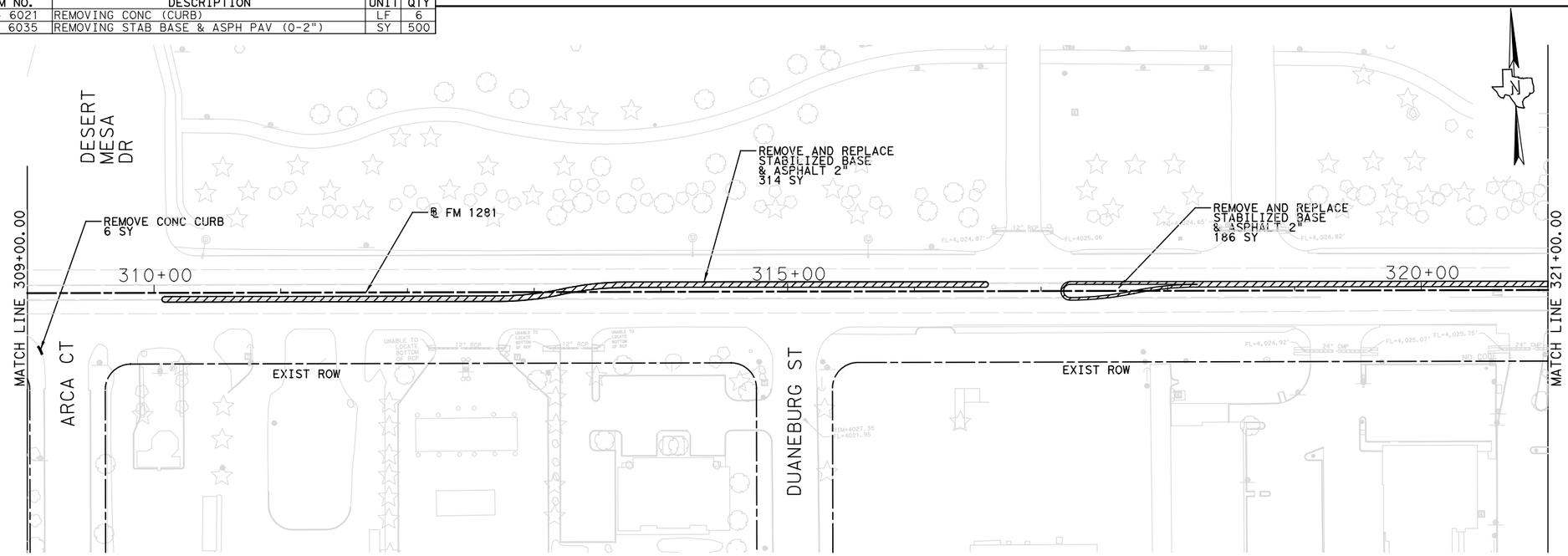


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0104 6021	REMOVING CONC (CURB)	LF	6
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	500



SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 297+00 - STA 321+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	025, ETC.	071

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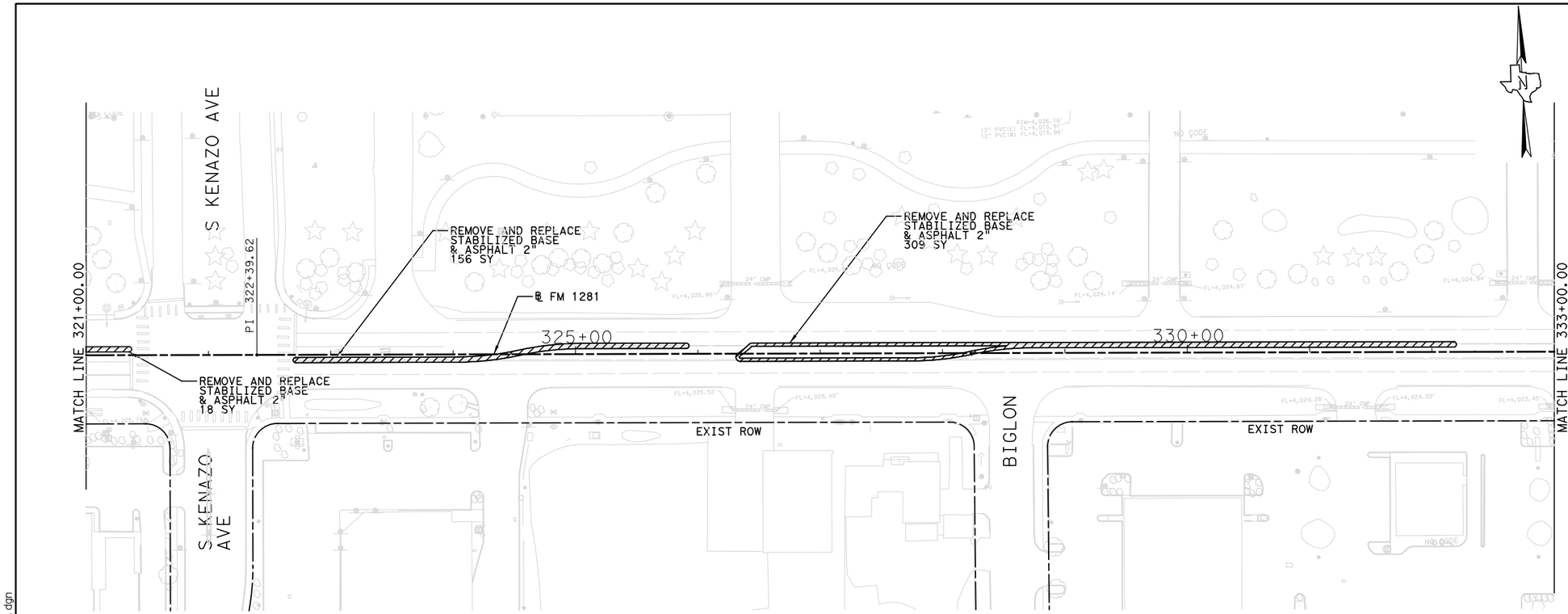
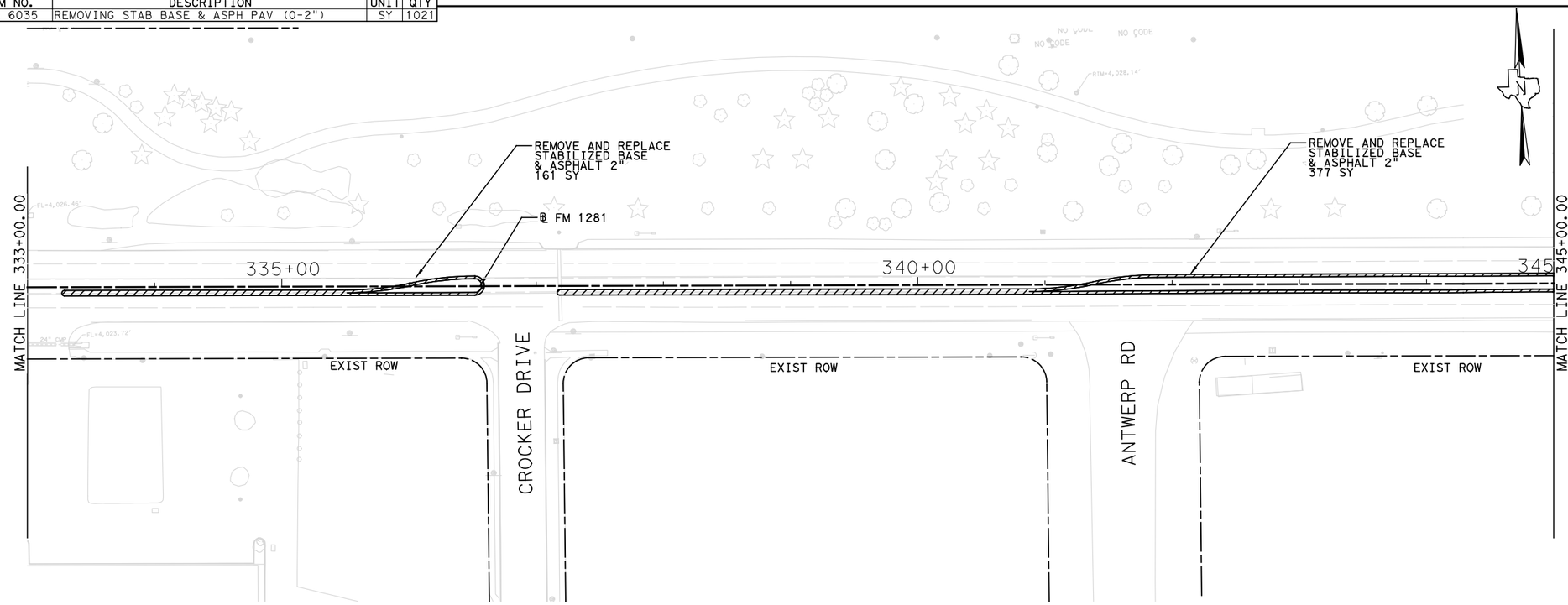
FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	1021



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.
2. SAWCUTTING IS SUBSIDIARY TO CONCRETE CURB AND GUTTER

Texas Department of Transportation

NO.	REVISION	BY	DATE

L. V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 321+00 - STA 345+00

13 OF 16

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	025, ETC.	072

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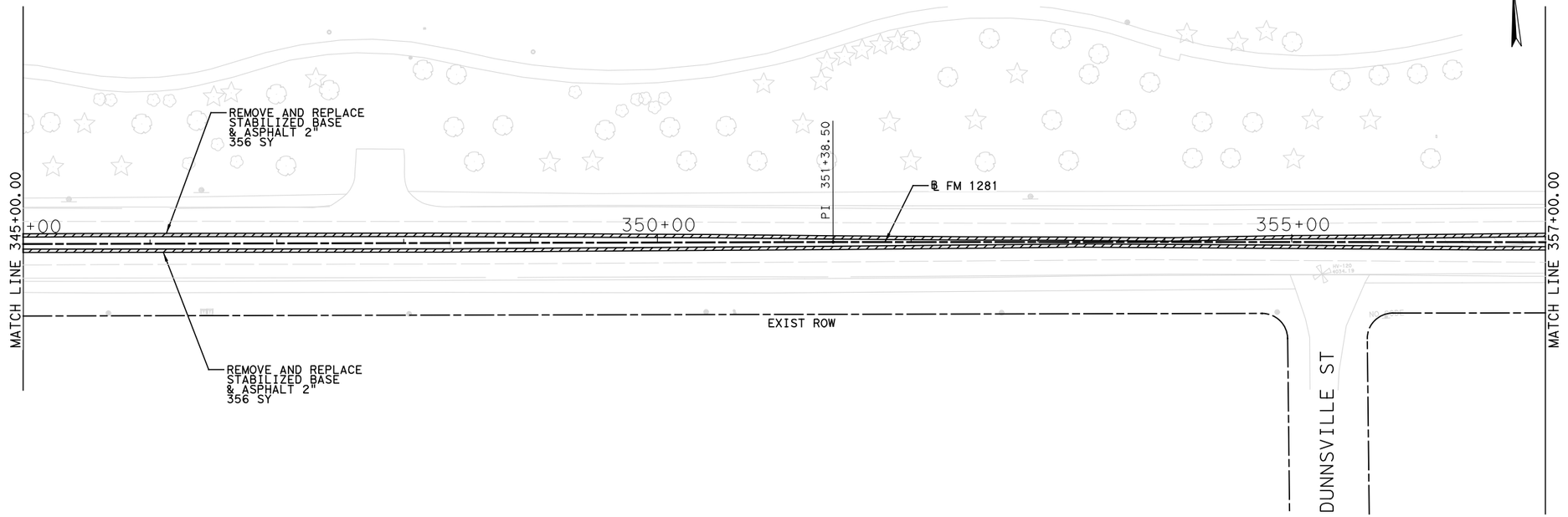
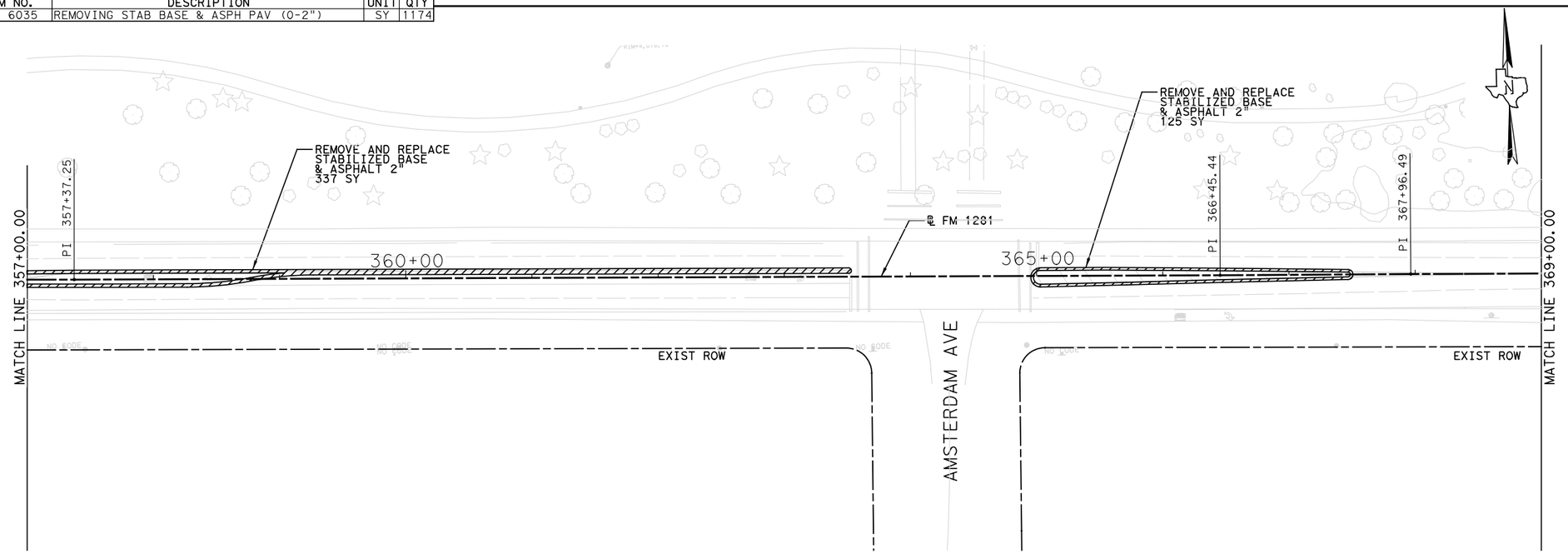


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	1174



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

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Texas Department of Transportation

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L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
03/24/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 345+00 - STA 369+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC.	073

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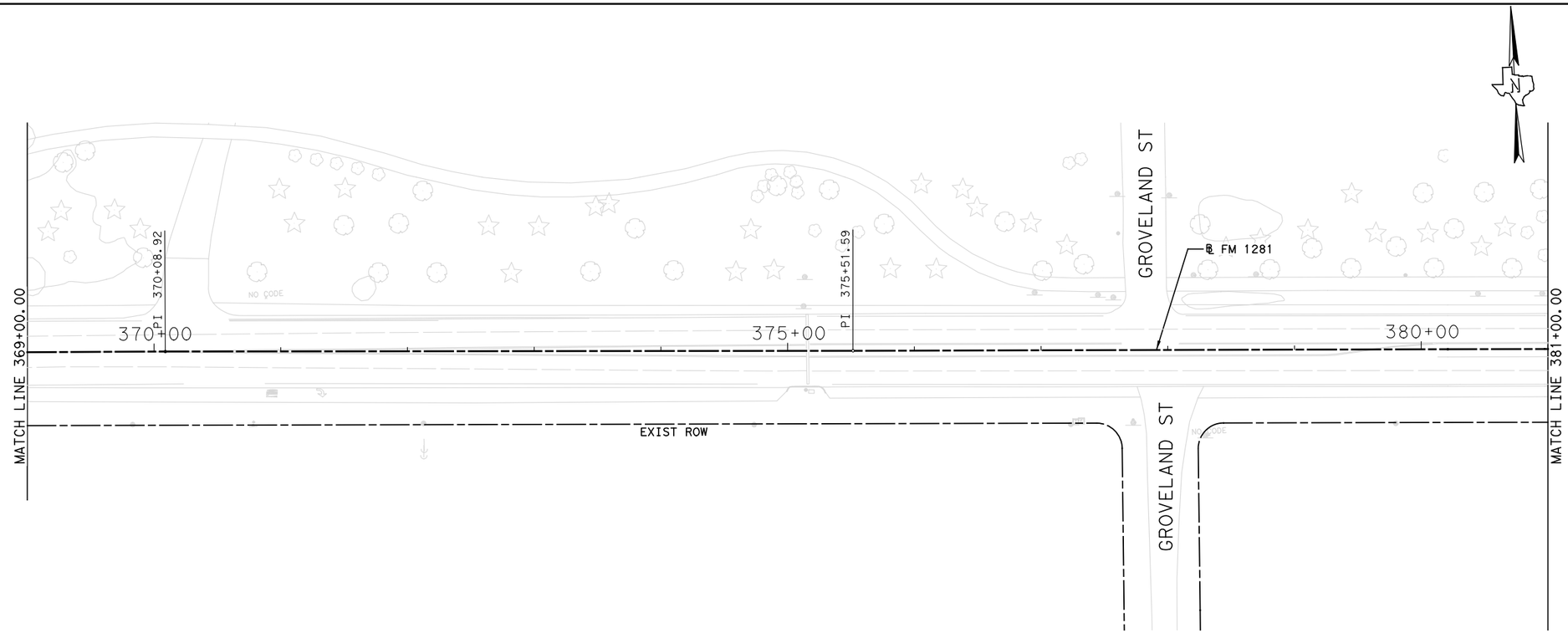
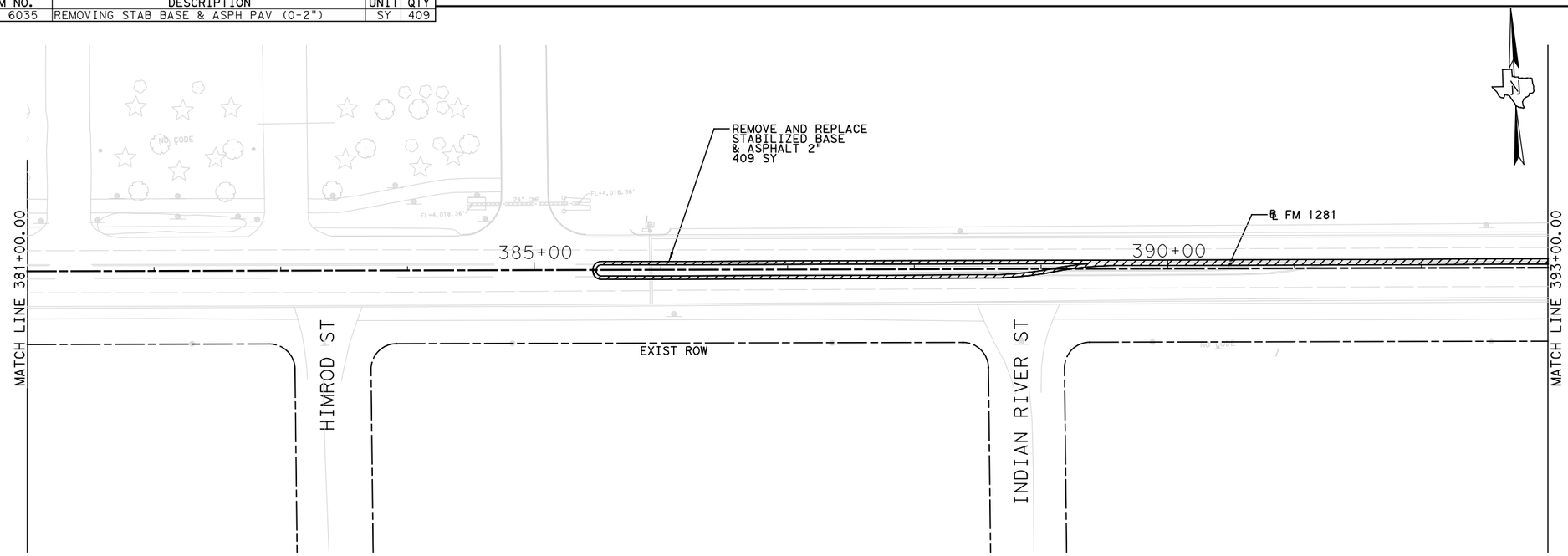


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	409



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" FOR REMOVAL LIMITIS.
2. SAWCUTTING IS SUBSIDIARY TO CONCRETE CURB AND GUTTER

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
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LICENSED
PROFESSIONAL ENGINEER
03/30/21

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9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 369+00 - STA 393+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	025, ETC.	074

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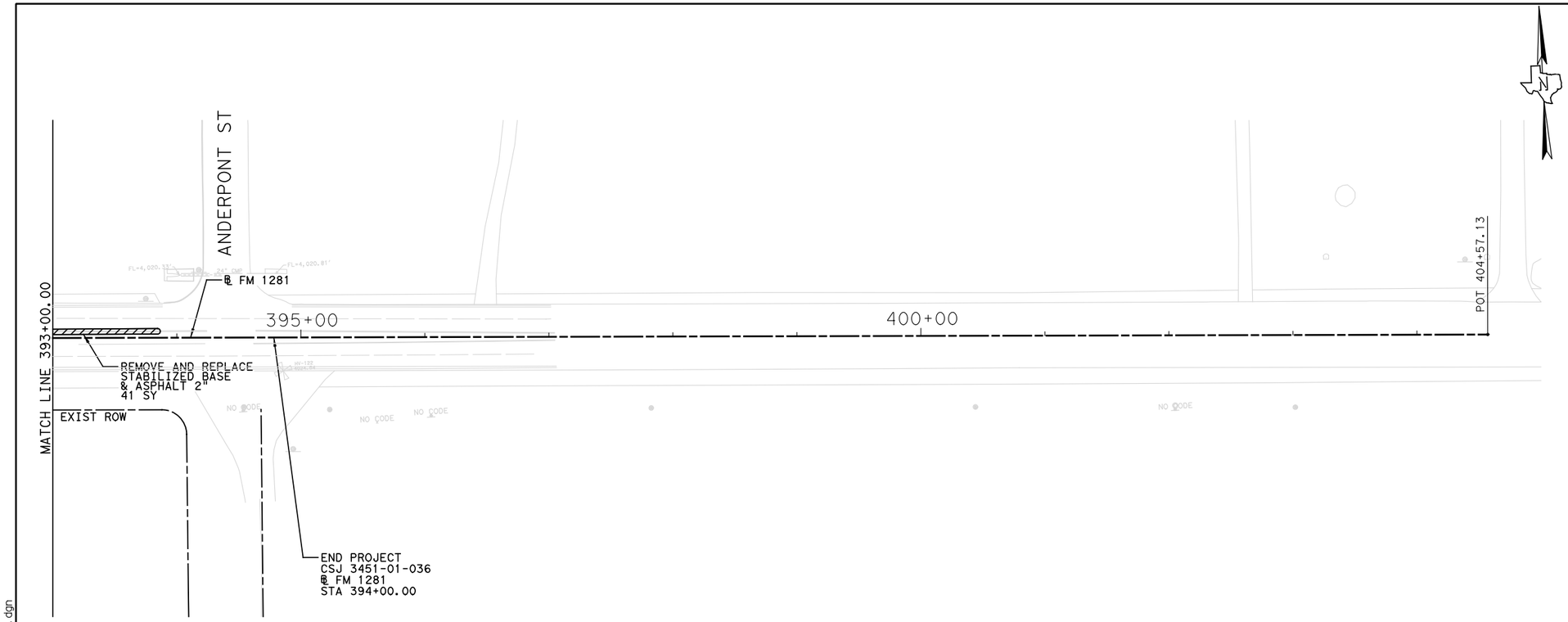

ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0105 6035	REMOVING STAB BASE & ASPH PAV (0-2")	SY	41

0 50 100

SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- 2" MILL
- FULL DEPTH REPAIR (2"-6")
- EXISTING ROW
- PLANIMETRICS

NOTES:

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(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

FM 1281 REMOVAL
STA 393+00 - STA 404+57

16 OF 16

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	035, ETC.	075

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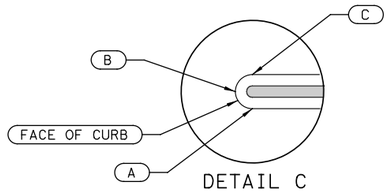

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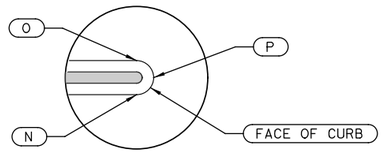
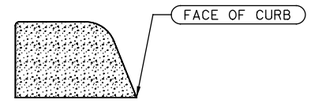
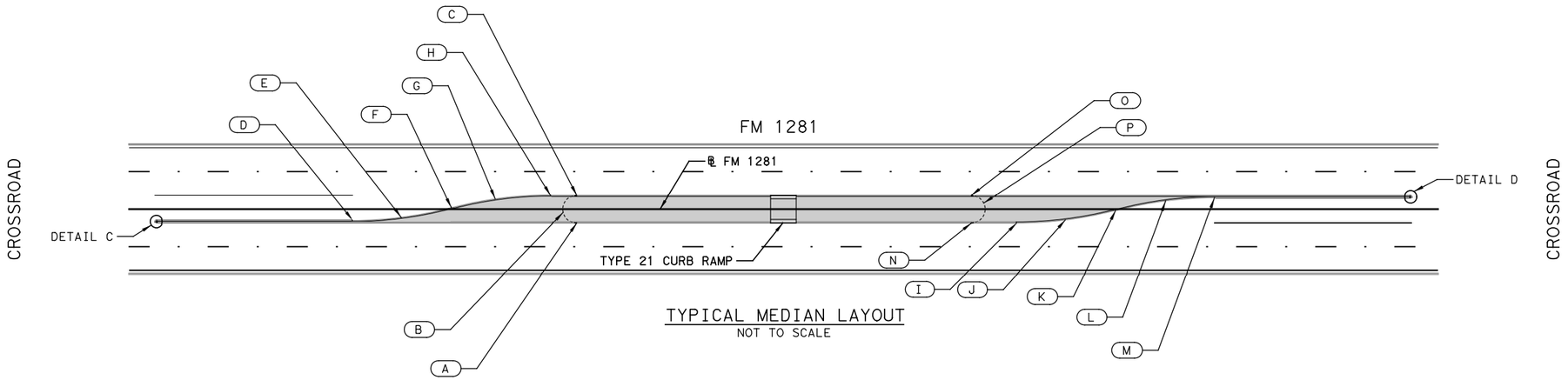


DETAIL D



CURB PROFILE



TYPICAL MEDIAN LAYOUT
NOT TO SCALE

	MEDIAN #	A		B	C		D		E	F		G	H		I		J	K		L	M		N		O		P
		STATION	OFFSET	RADIUS	STATION	OFFSET	STATION	OFFSET	RADIUS	STATION	OFFSET	RADIUS	STATION	OFFSET	STATION	OFFSET	RADIUS	STATION	OFFSET	RADIUS	STATION	OFFSET	STATION	OFFSET	STATION	OFFSET	RADIUS
CSJ#:*099	MEDIAN 001	54+32.02	7.6 RT	7.5′	54+32.02	7.5 LT																	54+95.09	7.4 RT	54+95.05	7.5 LT	7.4′
	MEDIAN 002	146+27.50	8.2 RT	7.3′	146+27.49	6.5 LT																	147+38.43	8.3 RT	147+38.41	6.5 LT	7.4′
	MEDIAN 003	213+04.01	7.8 RT	7.4′	213+03.98	7.0 LT																	214+16.84	7.7 RT	214+16.84	7.0 LT	7.4′
	MEDIAN 004	252+70.54	7.4 RT	7.3′	252+70.40	7.1 LT																	253+61.53	7.4 RT	253+61.54	7.2 LT	7.3′
CSJ#: 3451-01-035	MEDIAN 101	17+94.54	8.2 RT		17+94.54	2.9 RT	21+30.09	4.7 RT	210.6′	21+79.61	1.2 LT	210.6′	22+29.09	7.2 LT	22+47.11	6.8 RT	214.2′	22+97.42	0.8 RT	214.2′	23+47.11	5.2 LT	24+94.17	5.0 LT	24+94.18	6.5 LT	0.7′
	MEDIAN 102	45+68.00	6.9 RT	0.7′	45+68.00	5.5 RT	48+33.49	5.3 RT	206.5′	48+83.28	0.7 LT	209.2′	49+33.49	6.9 LT	48+33.49	6.7 RT	207.9′	48+83.60	0.6 RT	207.9′	49+33.49	5.6 LT	53+57.82	5.5 LT	53+57.82	6.9 LT	0.7′
	MEDIAN 103	54+61.03	6.7 RT	6.7′	54+61.06	6.7 LT									54+61.03	6.7 RT	210.7′	55+11.37	0.8 RT	210.7′	55+61.03	5.1 LT	60+61.82	5.1 LT	60+61.82	6.7 LT	0.8′
	MEDIAN 104	66+21.21	6.5 RT	0.7′	66+21.21	5.2 RT	69+65.45	5.3 RT	206.7′	70+15.42	0.8 LT	206.7′	70+65.45	6.9 LT	71+91.49	6.6 RT	208.1′	72+41.35	0.5 RT	208.1′	72+91.49	5.7 LT	77+15.83	5.5 LT	77+15.83	6.8 LT	0.7′
	MEDIAN 105	80+76.89	6.7 RT	0.7′	80+76.89	5.2 RT	81+10.07	5.2 RT	182.8′	81+56.87	0.8 LT	182.8′	82+03.31	6.9 LT									82+03.32	6.6 RT	82+03.31	6.9 LT	6.7′
	MEDIAN 106	83+20.83	6.6 RT	0.8′	83+20.83	5.1 RT	84.11.01	5.1 RT	211.6′	84+61.10	0.9 LT	211.6′	85+11.01	6.9 LT									85+11.04	6.5 RT	85+11.01	6.9 LT	6.7′
	MEDIAN 107	86+31.98	6.6 RT	0.7′	86+31.98	5.1 RT	88+70.91	5.2 RT	210.9′	89+21.01	0.9 LT	210.9′	89+70.90	6.9 LT	88+70.67	6.5 RT	214.3′	89+21.33	0.4 RT	209.6′	89+70.90	5.6 LT	93+53.99	5.7 LT	93+54.00	7.0 LT	0.7′
	MEDIAN 108	127+41.01	6.0 RT	5.7′	127+41.09	5.4 LT																	129+92.14	3.3 RT	129+92.15	1.6 LT	2.4′
	MEDIAN 109	152+33.01	2.5 RT	2.3′	152+33.03	2.2 LT																	156+66.78	5.5 RT	156+66.60	6.2 LT	5.8′
CSJ#: 3451-01-036	MEDIAN 201	172+50.82	2.9 RT	3.1′	172+50.84	3.3 LT																	173+26.09	2.0 RT	173+26.07	2.4 LT	2.2′
	MEDIAN 202	208+35.29	3.5 RT	2.6′	208+35.34	1.8 LT																	208+88.99	5.1 RT	208+88.97	3.0 LT	4.0′
	MEDIAN 203	227+73.91	6.2 RT	0.7′	227+73.92	4.9 RT	228+76.76	4.7 RT	237.4′	229+24.38	0.1 LT	240.0′	229+76.75	5.6 LT	228+76.75	6.1 RT	238.7′	229+24.66	1.2 RT	238.7′	229+76.75	4.3 LT	235+07.20	4.5 LT	235+07.19	5.9 LT	0.7′
	MEDIAN 204	236+25.23	7.6 RT	6.7′	236+25.21	5.8 LT									242+64.06	6.5 RT	217.1′	243+14.00	0.6 RT	217.1′	243+64.06	5.3 LT	247+88.39	5.7 LT	247+88.39	7.0 LT	0.7′
	MEDIAN 205	310+08.40	5.9 RT	0.7′	310+08.40	4.5 RT	312+71.73	4.5 RT	235.9′	313+21.86	0.9 LT	235.9′	313+71.73	6.3 LT	312+71.73	5.8 RT	235.9′	313+21.86	0.4 RT	235.9′	313+71.73	5.0 LT	316+56.20	4.7 LT	316+56.20	6.0 LT	0.7′
	MEDIAN 206	317+22.97	5.8 RT	5.8′	317+22.98	5.9 LT									317+28.93	5.7 RT	246.8′	317+72.88	0.7 RT	246.8′	318+22.98	4.4 LT	321+35.00	4.2 LT	321+35.00	5.5 LT	0.7′
	MEDIAN 207	322+71.29	5.0 RT	0.7′	322+71.29	3.7 RT	324+04.01	3.5 RT	234.5′	324+53.77	1.9 LT	234.5′	325+03.97	7.3 LT	324+04.02	4.9 RT	234.5′	324+53.77	0.6 LT	234.5′	325+03.97	6.0 RT	325+90.55	5.9 LT	325+90.55	7.2 LT	0.7′
	MEDIAN 208	326+34.62	4.7 RT	2.0′	326+33.49	1.1 RT	326+33.49	1.1 RT	75.0′	326+43.04	6.6 LT	2.0′	326+44.42	7.2 LT	327+73.52	4.9 RT	237.5′	328+23.55	0.4 LT	237.5′	328+73.52	5.7 LT	332+17.85	5.5 LT	332+17.85	6.8 LT	0.7′
	MEDIAN 209	333+29.16	5.4 RT	0.7′	333+29.16	4.0 RT	335+51.63	4.2 RT	233.5′	336+01.65	1.2 LT	233.5′	336+51.63	6.5 LT									336+51.62	5.7 RT	336+51.63	6.5 LT	6.1′
	MEDIAN 210	337+18.47	5.7 RT	0.7′	337+18.47	4.4 RT	340+88.04	4.7 RT	231.4′	341+38.29	0.8 LT	231.4′	341+88.04	6.3 LT	358+26.75	4.8 RT	269.2′	358+76.79	0.2 RT	269.2′	359+26.75	4.5 LT	363+51.08	4.1 LT	363+51.08	5.4 LT	0.7′
	MEDIAN 211	365+03.05	7.2 RT	6.1′	365+02.91	5.0 LT																	367+46.78	2.5 RT	367+46.78	2.5 LT	2.5′
	MEDIAN 212	385+52.82	5.9 RT	5.0′	385+52.84	5.2 LT									388+60.00	5.7 RT	264.6′	389+09.80	0.9 RT	264.6′	389+60.00	3.9 LT	393+84.51	4.5 LT	393+84.51	5.8 LT	0.7′

NOT TO SCALE

NOTES:

1. ALL STATIONS AND OFFSETS ARE LOCATED AT FACE OF CURB.
2. PATTERN AND COLOR FOR COLORED TEXTURED CONCRETE (4") IN MEDIAN TO BE DETERMINED.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

TYPICAL MEDIAN LAYOUT DETAIL

1 OF 1

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO	3451	01	035, ETC.	076

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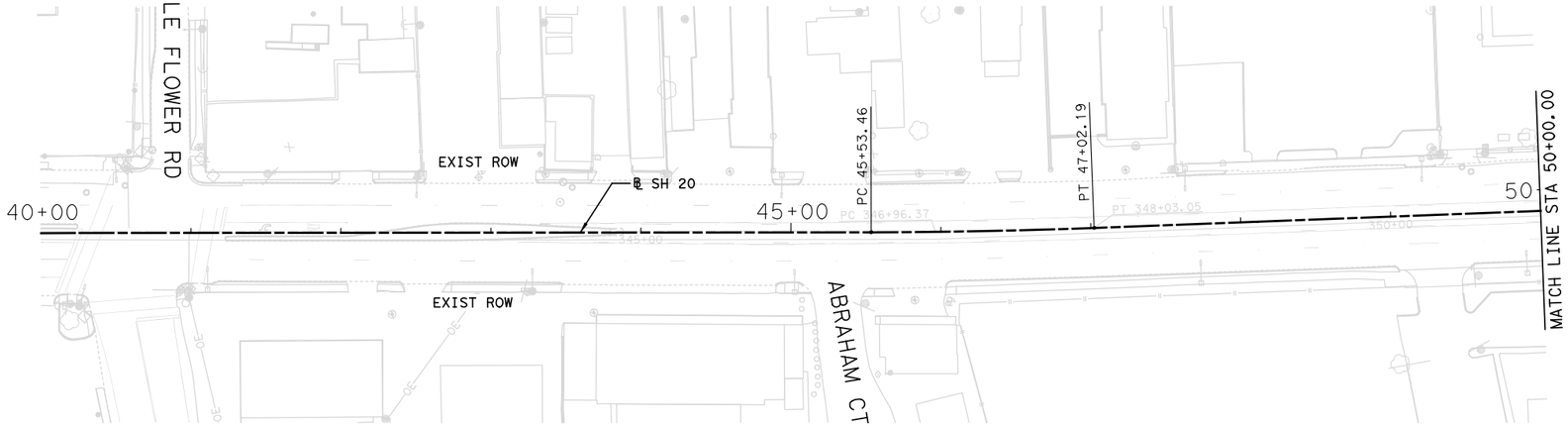
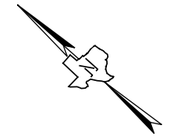
FINAL SUBMITTAL





SCALE: 1" = 100' (H)

0 50 100

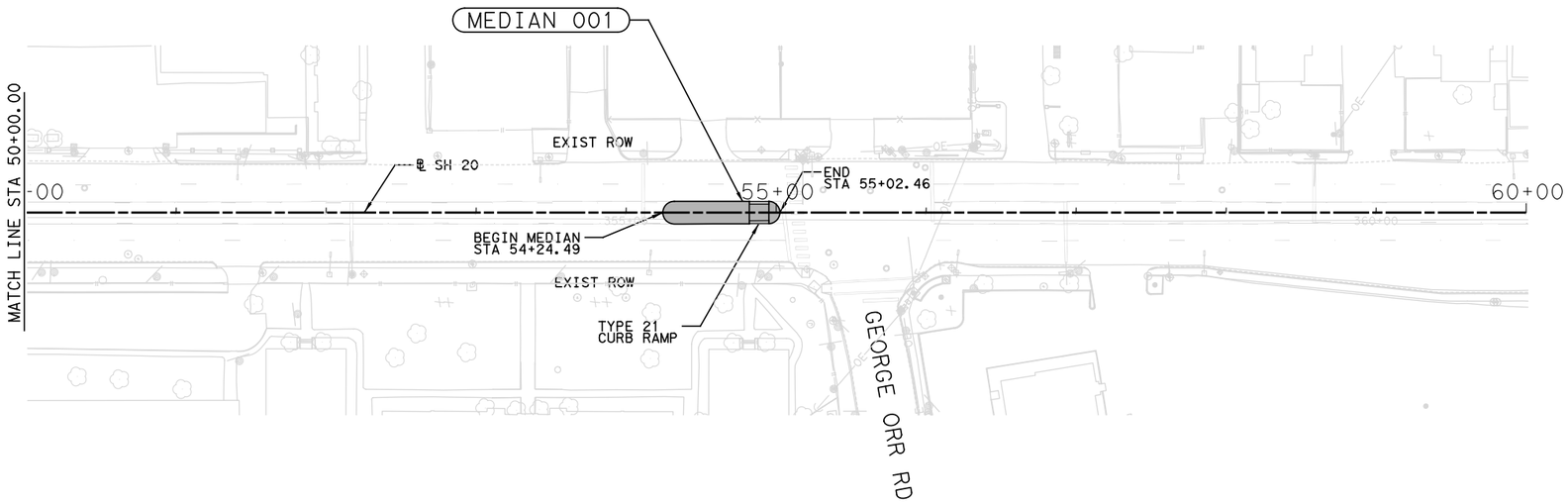
LEGEND

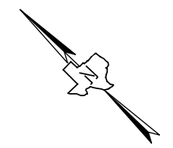
- SH 20 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "TYPICAL MEDIAN LAYOUT DETAIL" SHEET FOR MEDIAN DETAILS.
2. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" SHEET FOR MEDIAN CURB DETAILS.

ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	4
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	4
0340 6272	TACK COAT	GAL	3
0528 6001	COLORED TEXTURED CONC (4")	SY	90
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	177





Texas Department of Transportation

NO.	REVISION	BY	DATE

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

MEDIAN LAYOUT
SH 20
STA 40+00 - STA 60+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC.	077

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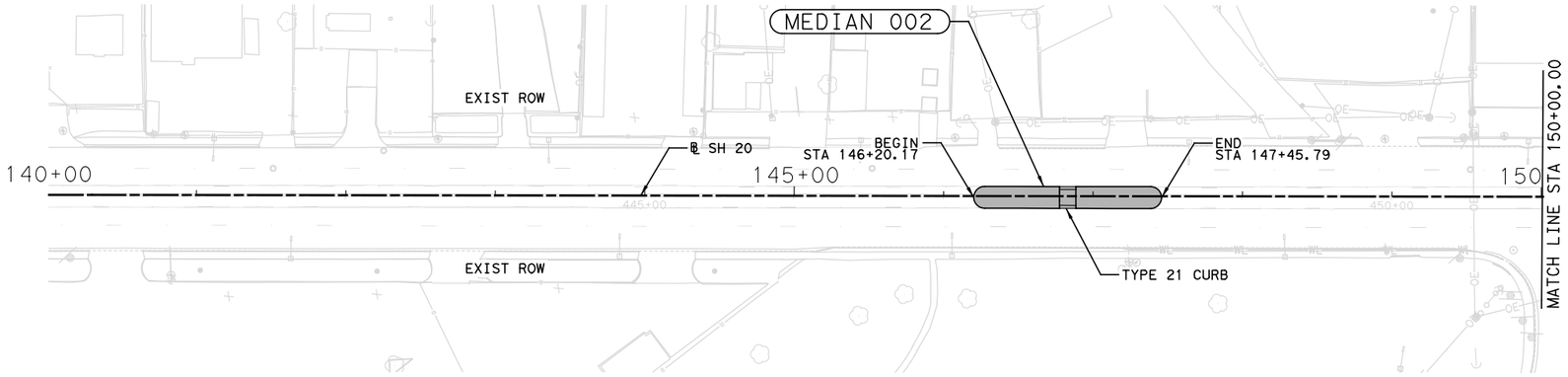
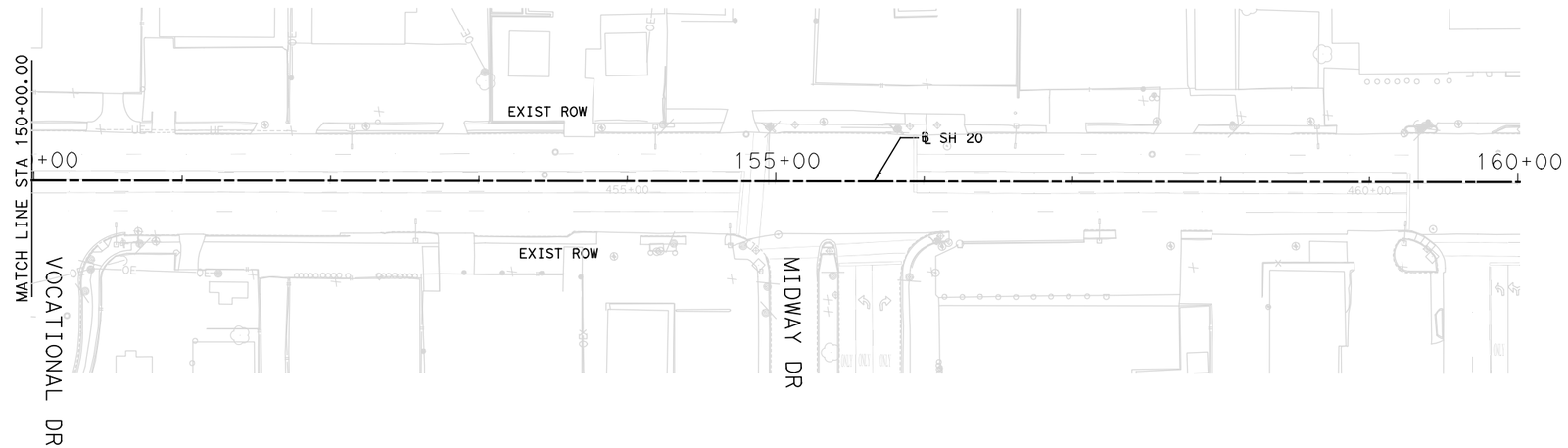
FINAL SUBMITTAL



	ESTIMATED QUANTITIES		
ITEM NO.	DESCRIPTION	UNIT	QTY
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	8
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	5
0340 6272	TACK COAT	GAL	4
0528 6001	COLORED TEXTURED CONC (4")	SY	161
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	275



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- SH 20 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "TYPICAL MEDIAN LAYOUT DETAIL" SHEET FOR MEDIAN DETAILS.
2. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" SHEET FOR MEDIAN CURB DETAILS.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
04-2021

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

MEDIAN LAYOUT
SH 20
STA 140+00 - STA 160+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	035, ETC.	078

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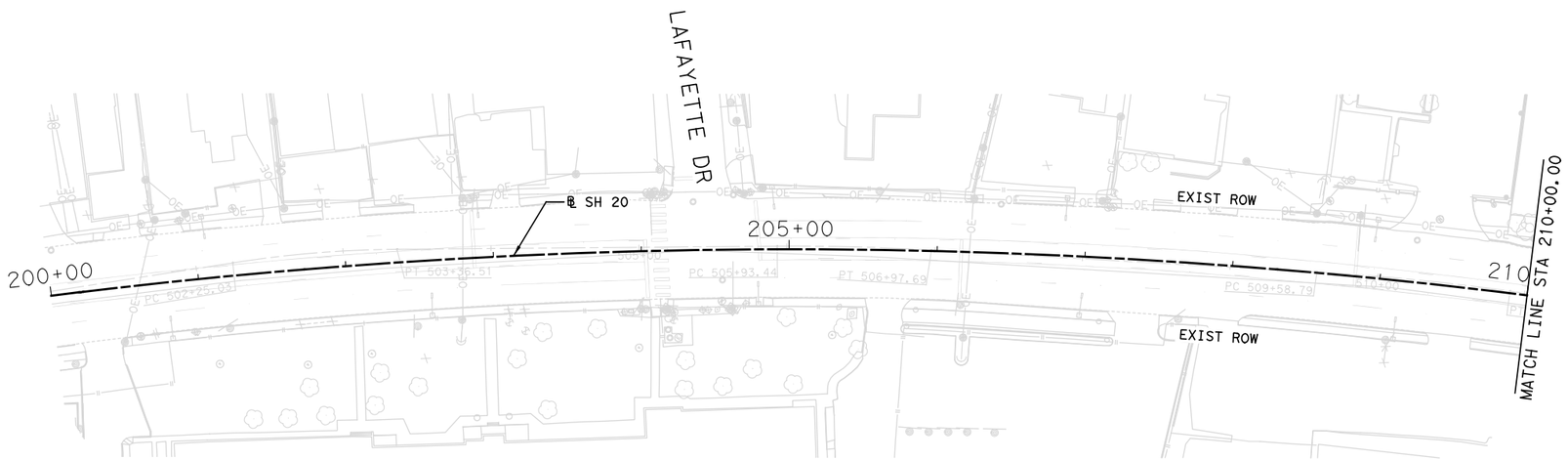
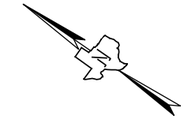




0 50 100

SCALE: 1" = 100' (H)

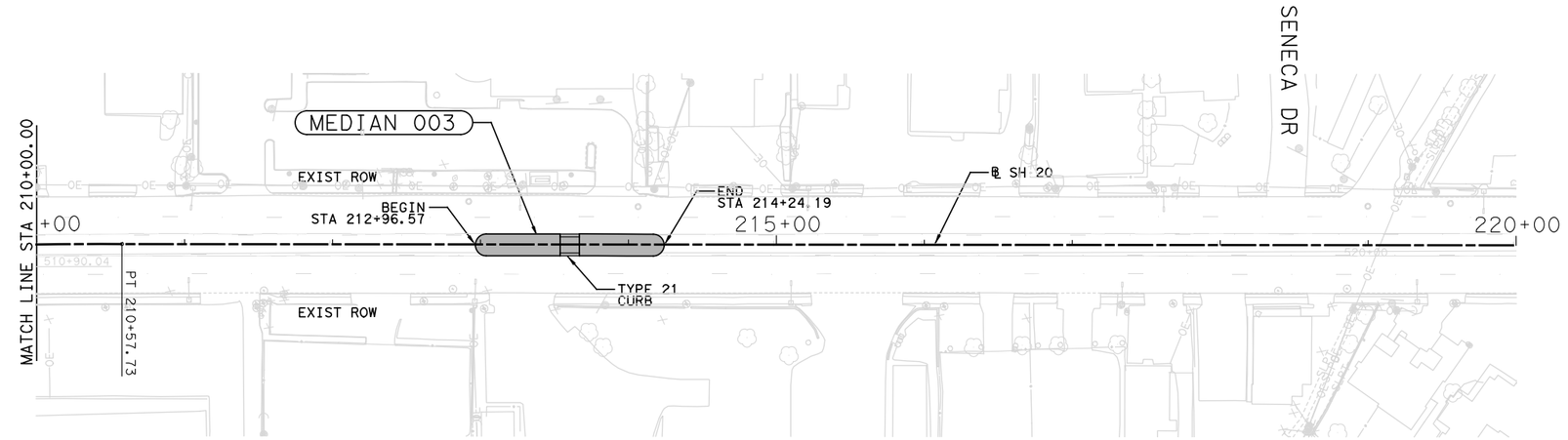
LEGEND

- SH 20 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "TYPICAL MEDIAN LAYOUT DETAIL" SHEET FOR MEDIAN DETAILS.
2. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" SHEET FOR MEDIAN CURB DETAILS.

ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	8
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	5
0340 6272	TACK COAT	GAL	4
0528 6001	COLORED TEXTURED CONC (4")	SY	163
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	276



Texas Department of Transportation

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HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

MEDIAN LAYOUT
SH 20
STA 200+00 - STA 220+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	079	

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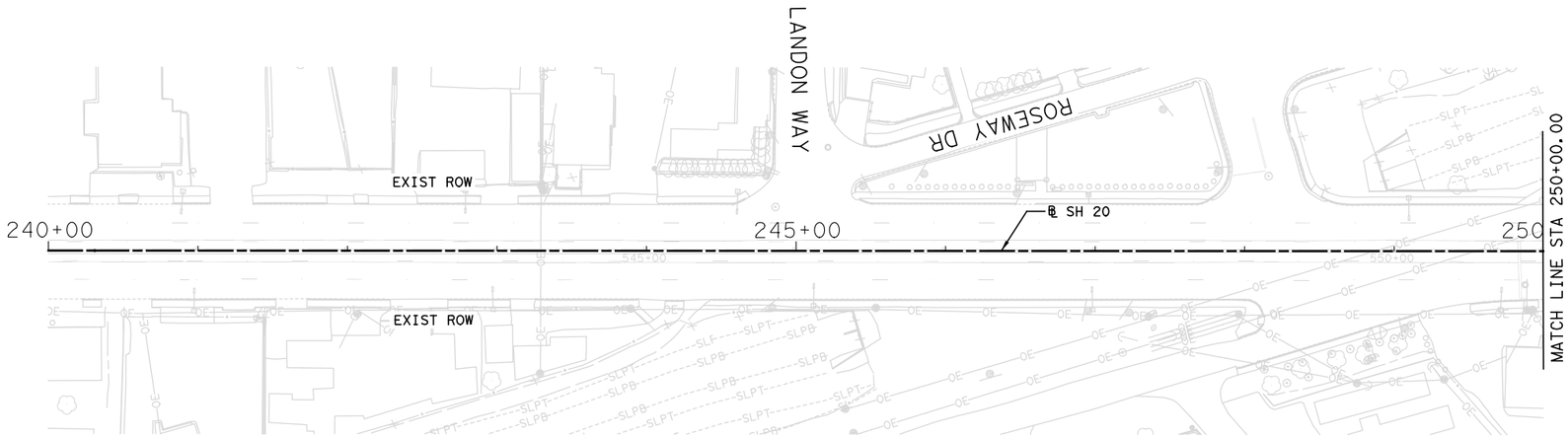
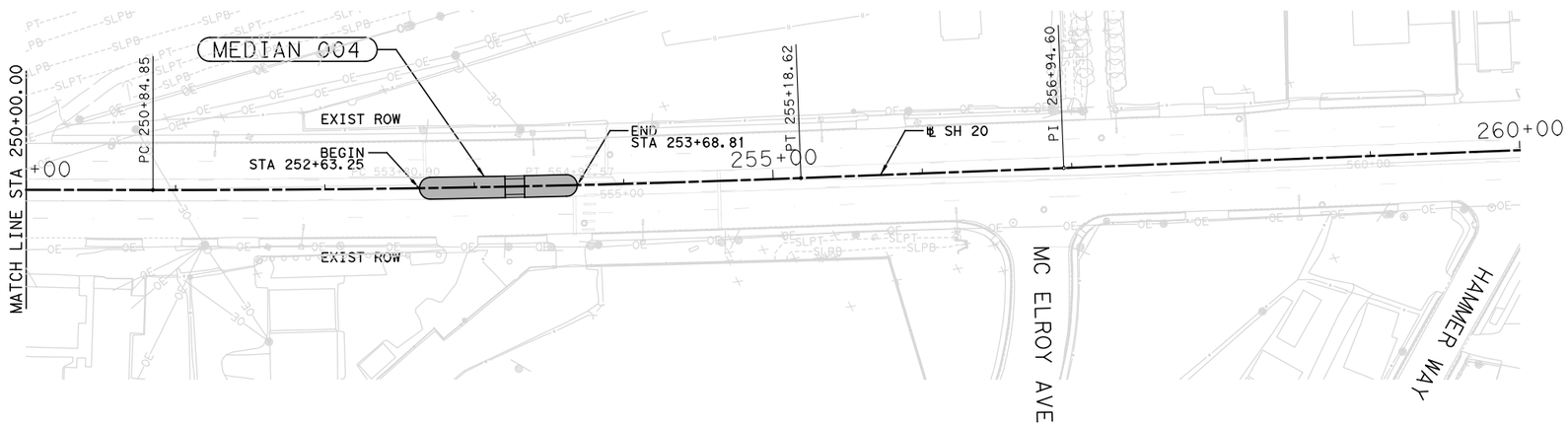


	ESTIMATED QUANTITIES		
ITEM NO.	DESCRIPTION	UNIT	QTY
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	8
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	5
0340 6272	TACK COAT	GAL	4
0528 6001	COLORED TEXTURED CONC (4")	SY	127
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	231



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- SH 20 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "TYPICAL MEDIAN LAYOUT DETAIL" SHEET FOR MEDIAN DETAILS.
2. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" SHEET FOR MEDIAN CURB DETAILS.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
04-2021

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9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

MEDIAN LAYOUT
SH 20
STA 240+00 - STA 260+00

4 OF 4

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	080

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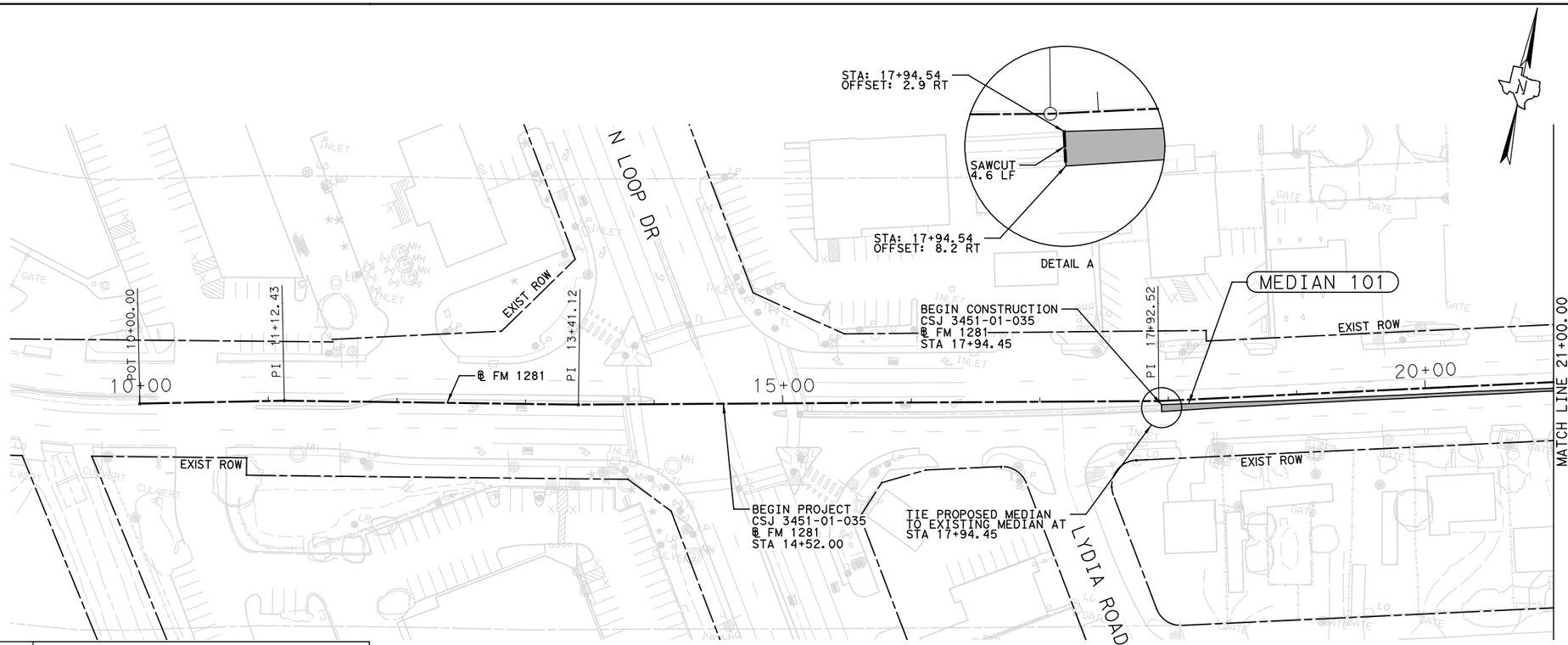

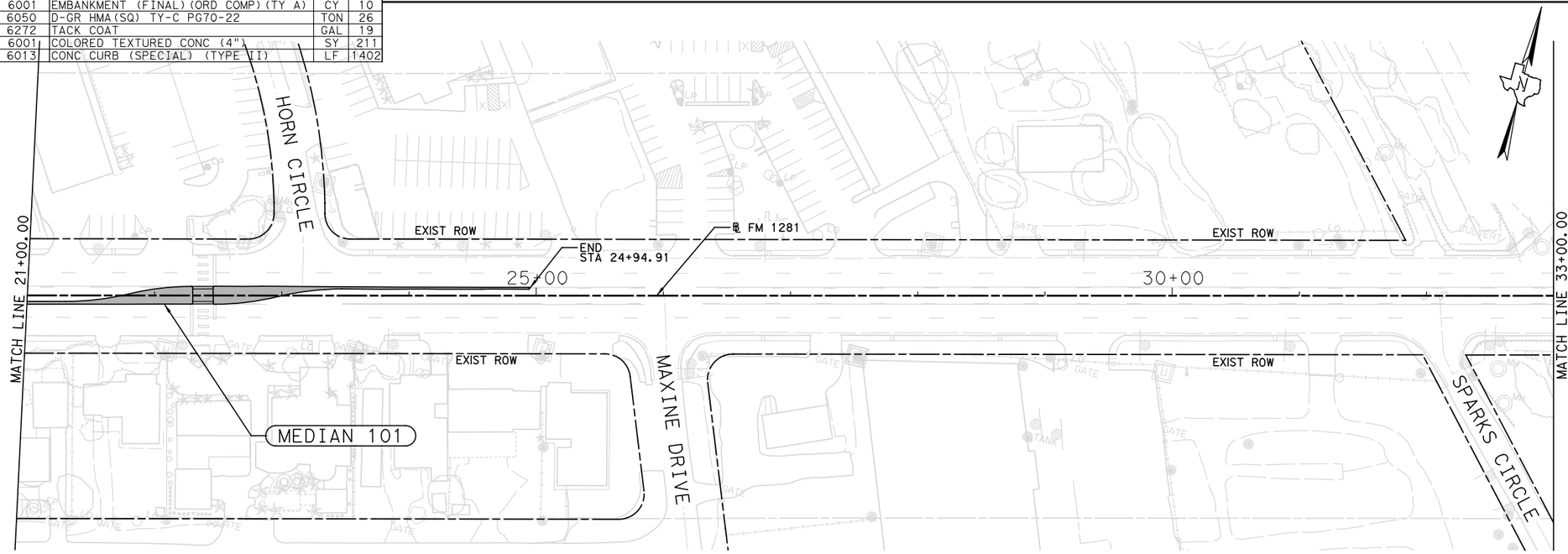

ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	10
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	26
0340 6272	TACK COAT	GAL	19
0528 6001	COLORED TEXTURED CONC (4")	SY	211
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	1402

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "TYPICAL MEDIAN LAYOUT DETAIL" SHEET FOR MEDIAN DETAILS.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
04-29-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

MEDIAN LAYOUT FM 1281

STA 10+00 - STA 33+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC.	081

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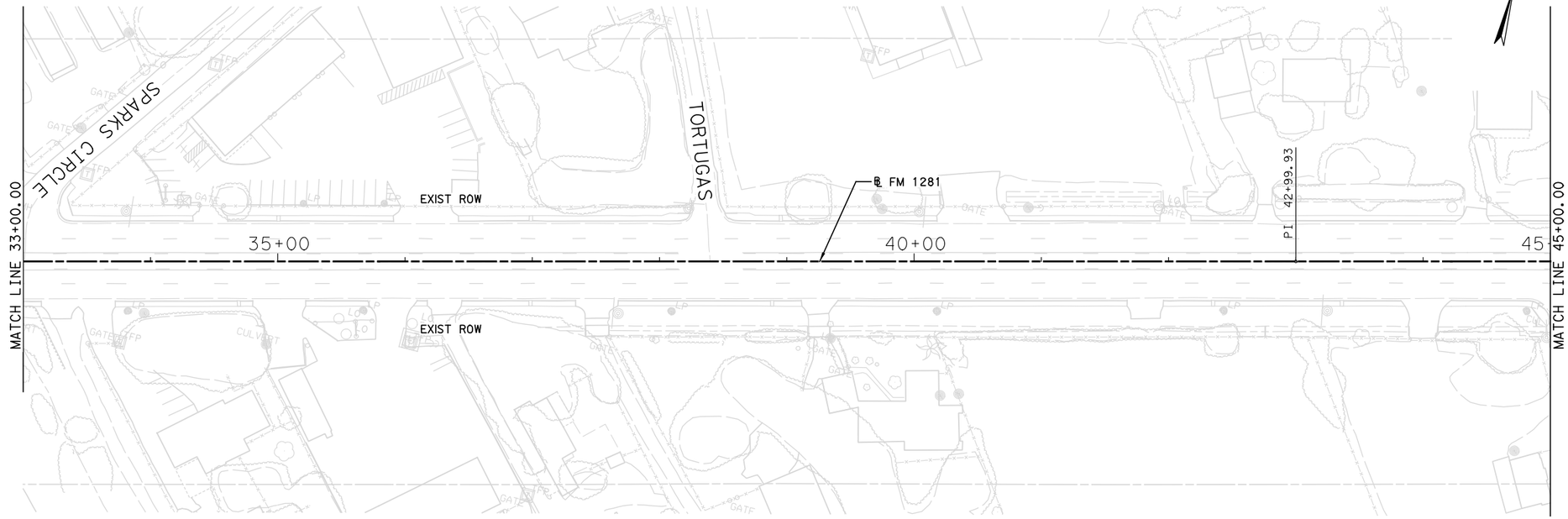
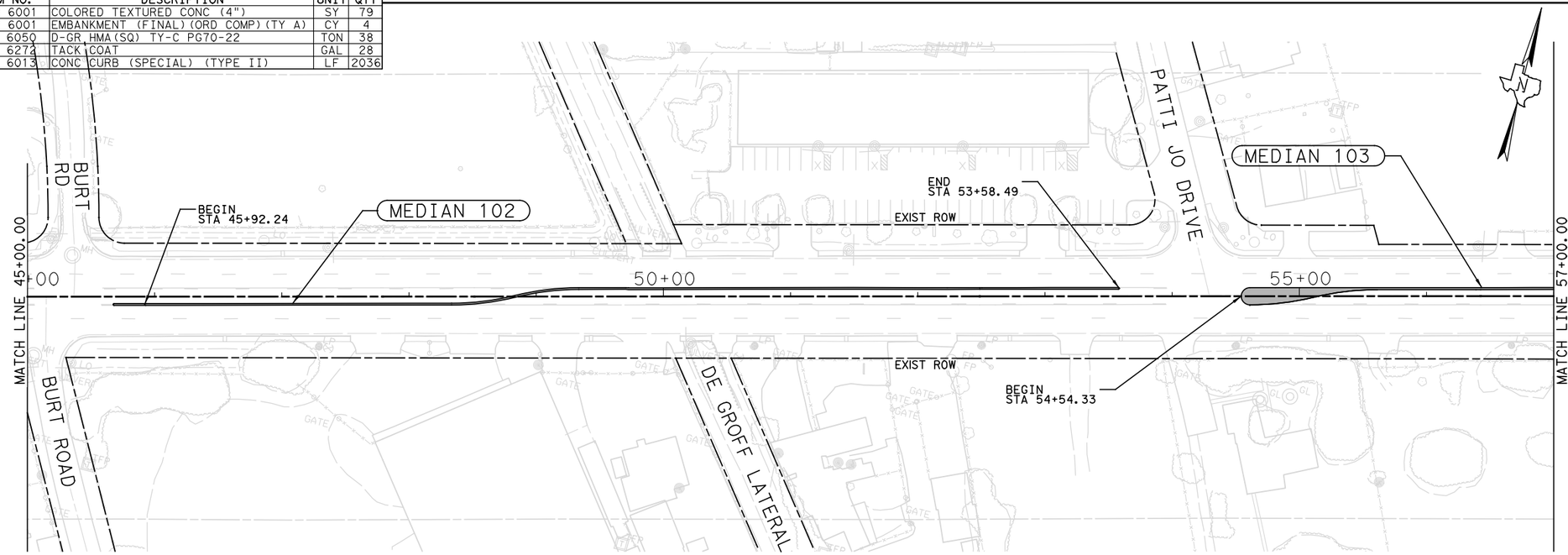


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0528 6001	COLORED TEXTURED CONC (4")	SY	79
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	4
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	38
0340 6272	TACK COAT	GAL	28
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	2036



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "TYPICAL MEDIAN LAYOUT DETAIL" SHEET FOR MEDIAN DETAILS.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER

04-2021

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

MEDIAN LAYOUT
FM 1281
STA 33+00 - STA 57+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	025, ETC.	082

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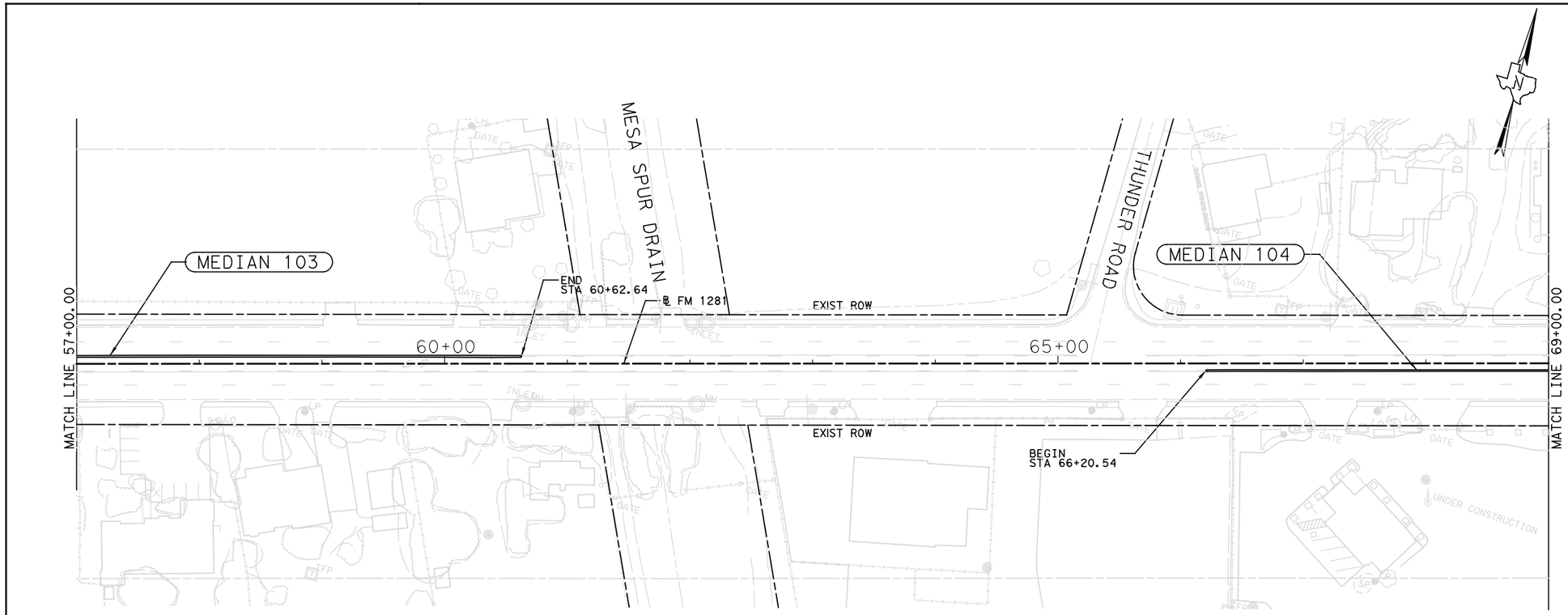
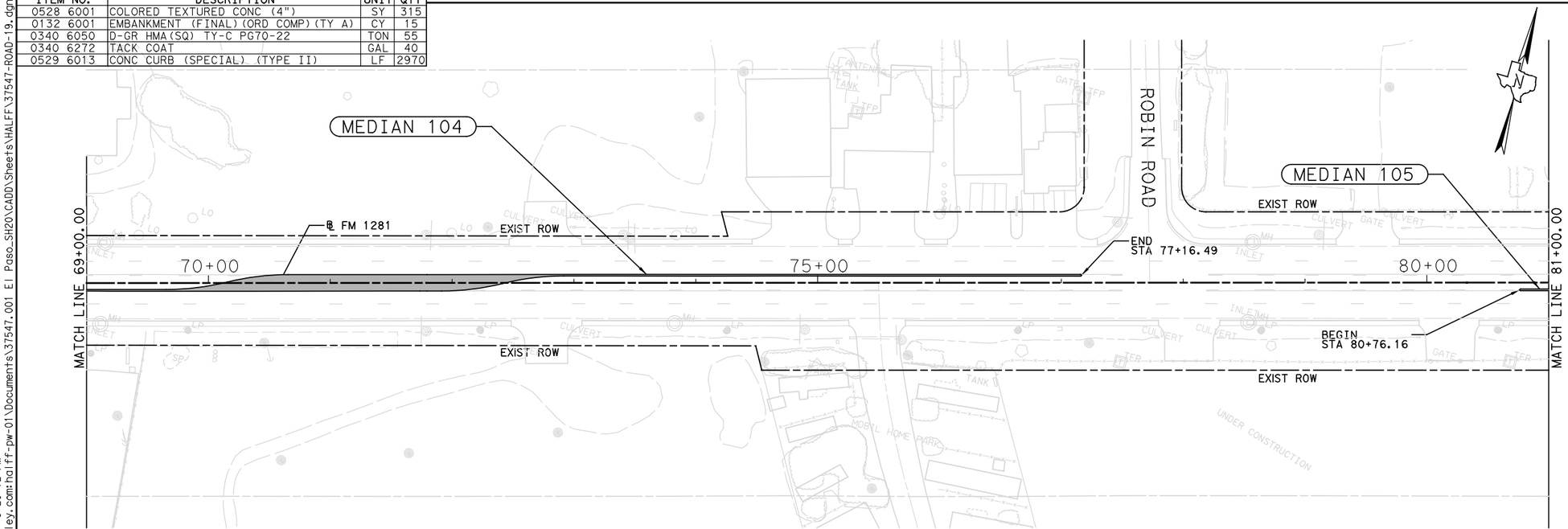


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0528 6001	COLORED TEXTURED CONC (4")	SY	315
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	15
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	55
0340 6272	TACK COAT	GAL	40
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	2970



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SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "TYPICAL MEDIAN LAYOUT DETAIL" SHEET FOR MEDIAN DETAILS.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
04-2021

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

MEDIAN LAYOUT FM 1281 STA 57+00 - STA 81+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	025, ETC.	083

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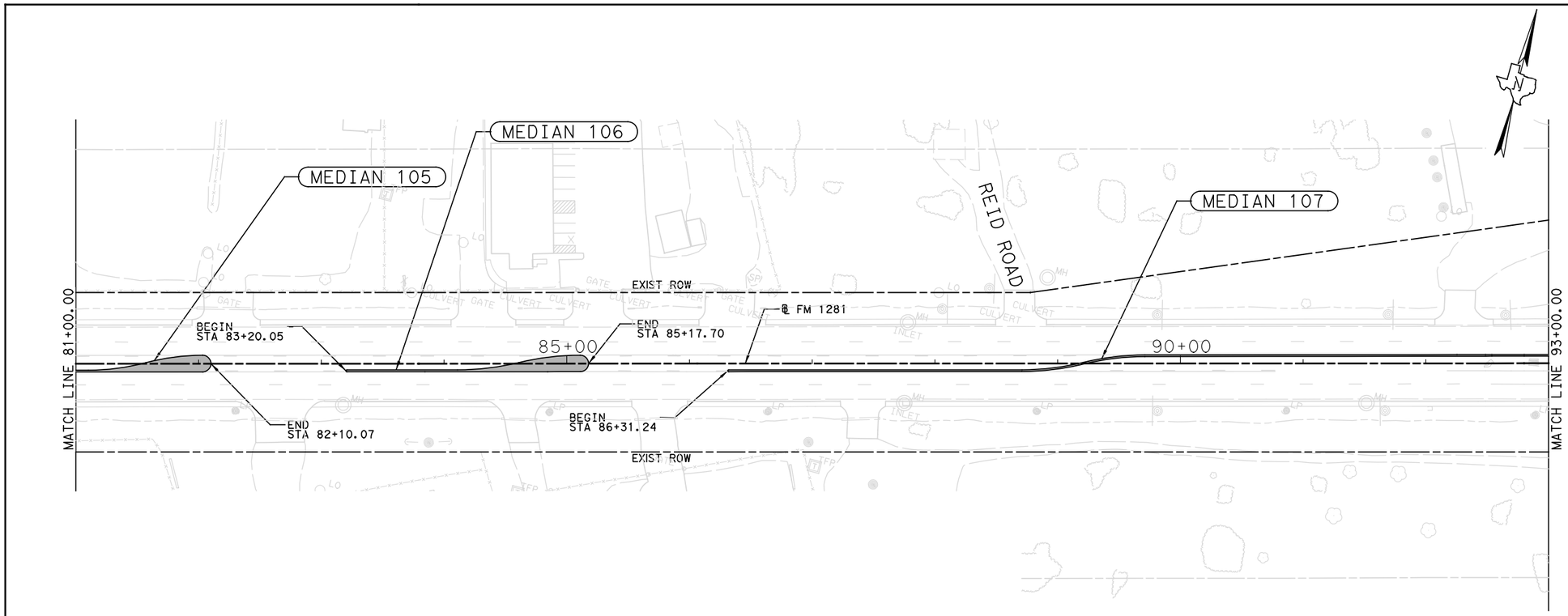
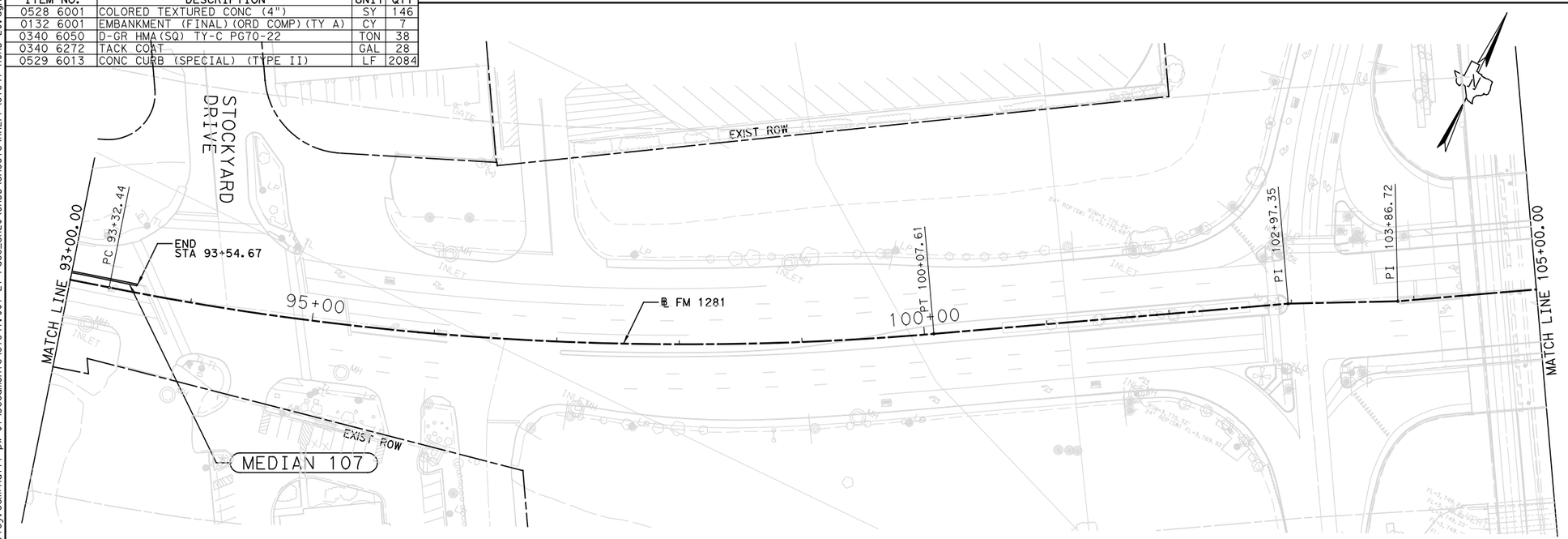
FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0528 6001	COLORED TEXTURED CONC (4")	SY	146
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	7
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	38
0340 6272	TACK COAT	GAL	28
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	2084



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

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TBPELS FIRM NO. F-312

SH 20 & FM 1281

MEDIAN LAYOUT
FM 1281
STA 81+00 - STA 105+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	035, ETC.	084

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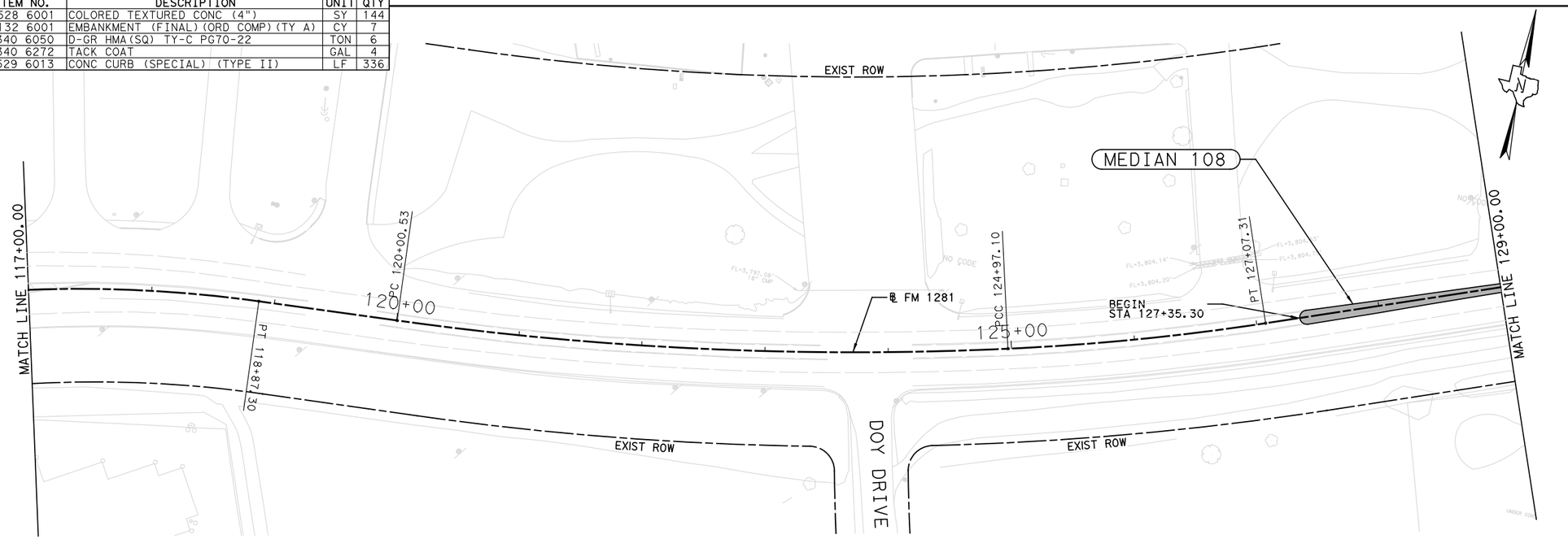

ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0528 6001	COLORED TEXTURED CONC (4")	SY	144
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	7
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	6
0340 6272	TACK COAT	GAL	4
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	336

SCALE: 1" = 100' (H)

0 50 100

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

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SH 20 & FM 1281

MEDIAN LAYOUT FM 1281 STA 105+00 - STA 129+00

5 OF 15

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED: RS	ELP	EL PASO	3451	01	025, ETC.	085	

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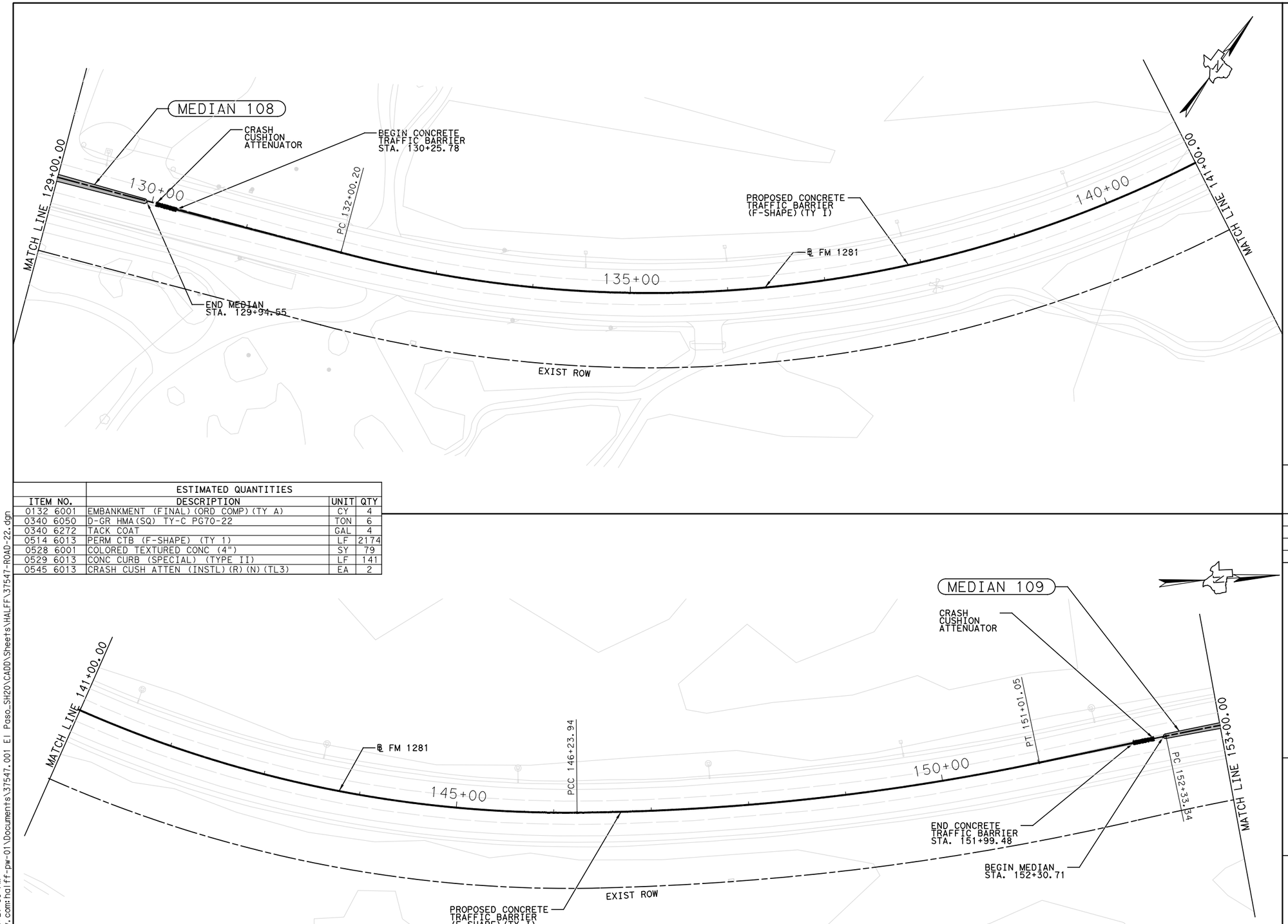

ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	4
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	6
0340 6272	TACK COAT	GAL	4
0514 6013	PERM CTB (F-SHAPE) (TY 1)	LF	2174
0528 6001	COLORED TEXTURED CONC (4")	SY	79
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	141
0545 6013	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	EA	2

SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

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SH 20 & FM 1281

MEDIAN LAYOUT FM 1281

STA 129+00 - STA 153+00

6 OF 15

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	086

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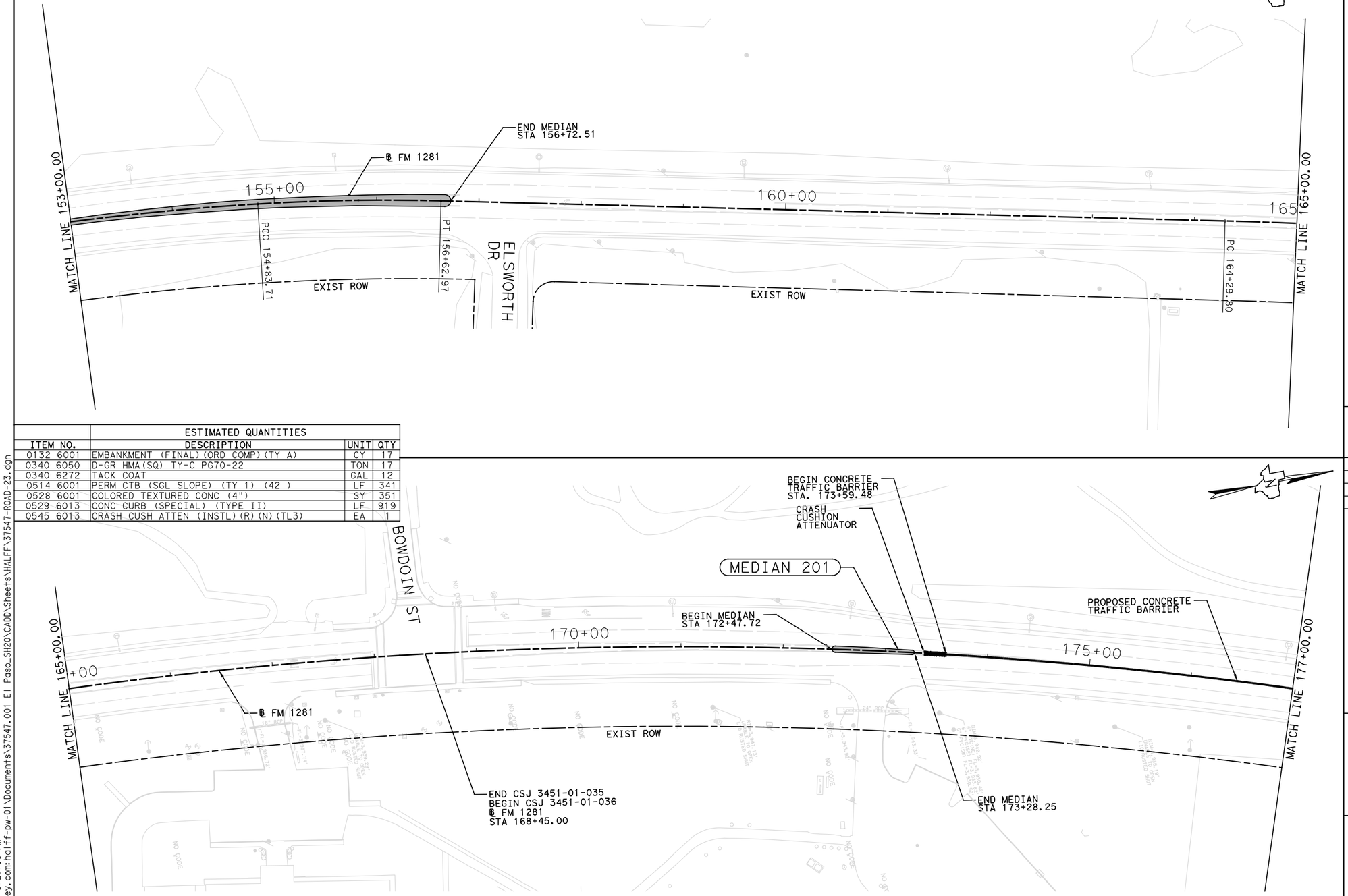

ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	17
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	17
0340 6272	TACK COAT	GAL	12
0514 6001	PERM CTB (SGL SLOPE) (TY 1) (42)	LF	341
0528 6001	COLORED TEXTURED CONC (4")	SY	351
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	919
0545 6013	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	EA	1

SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "TYPICAL MEDIAN LAYOUT DETAIL" SHEET FOR MEDIAN DETAILS.

Texas Department of Transportation

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STATE OF TEXAS
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SH 20 & FM 1281

MEDIAN LAYOUT FM 1281

STA 153+00 - STA 177+00

7 OF 15

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC.	087

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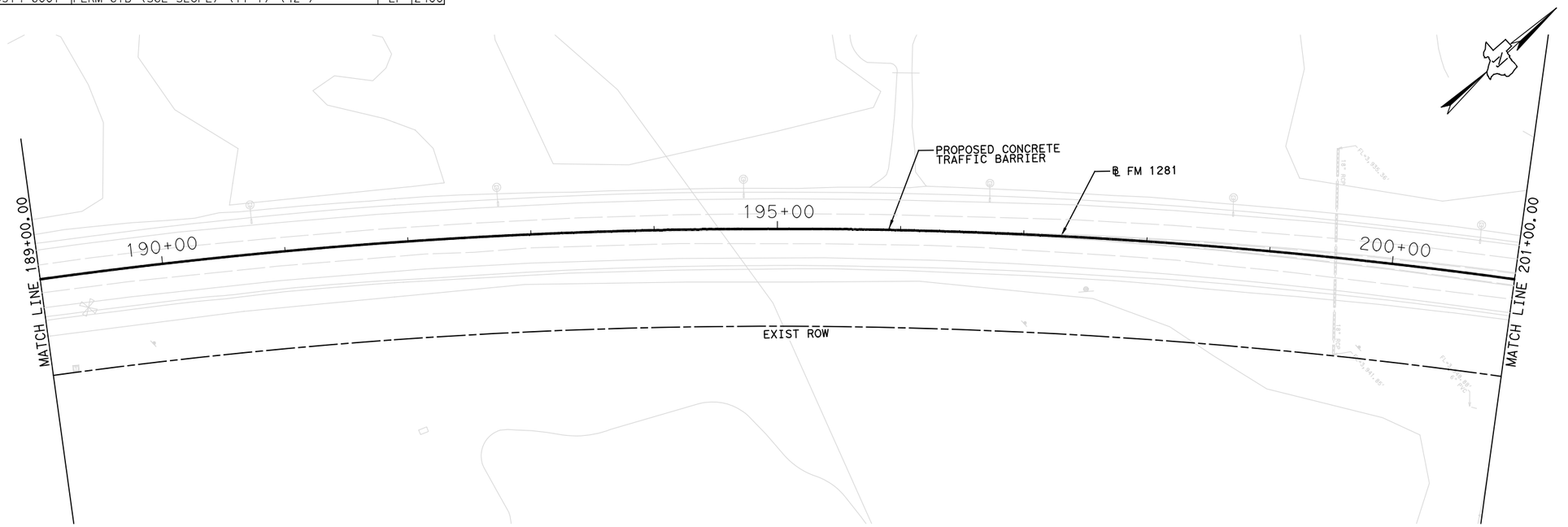

ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0514 6001	PERM CTB (SGL SLOPE) (TY 1) (42)	LF	2400

0 50 100

SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

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SH 20 & FM 1281

MEDIAN LAYOUT FM 1281 STA 177+00 - STA 201+00

8 OF 15

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC.	088

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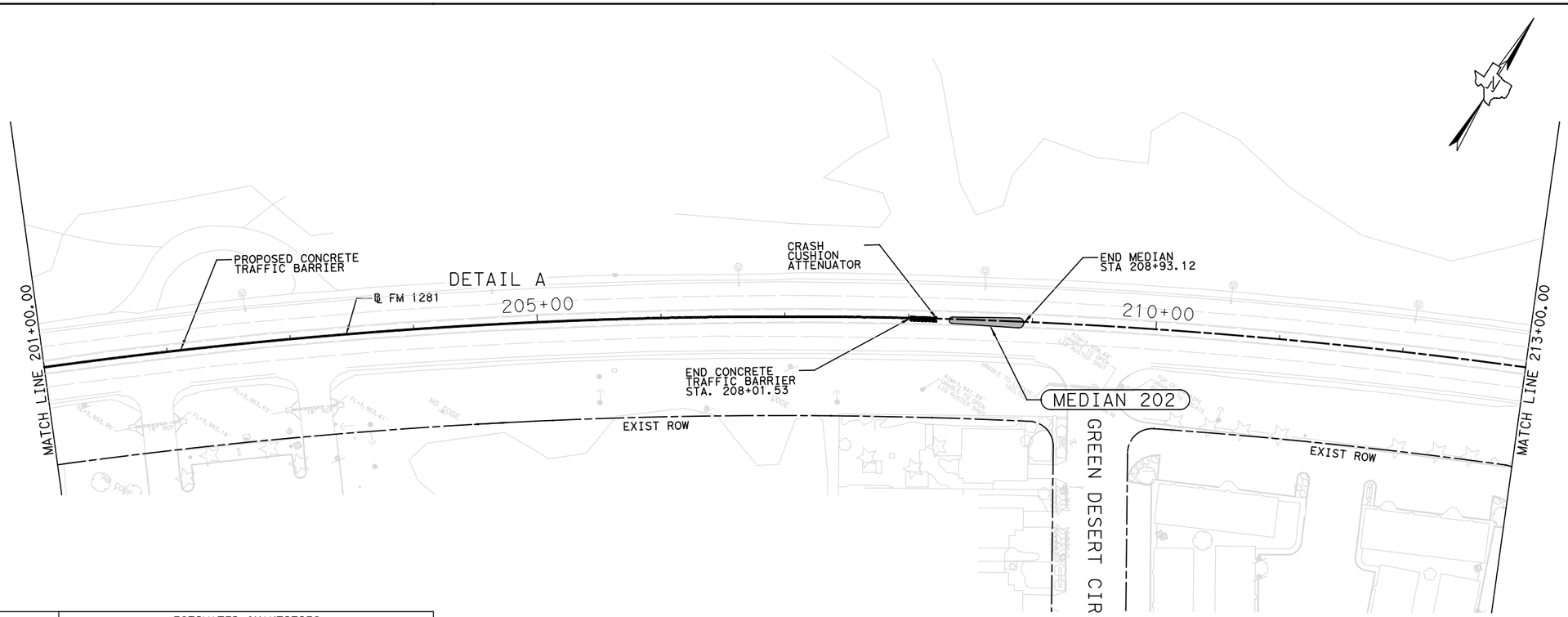
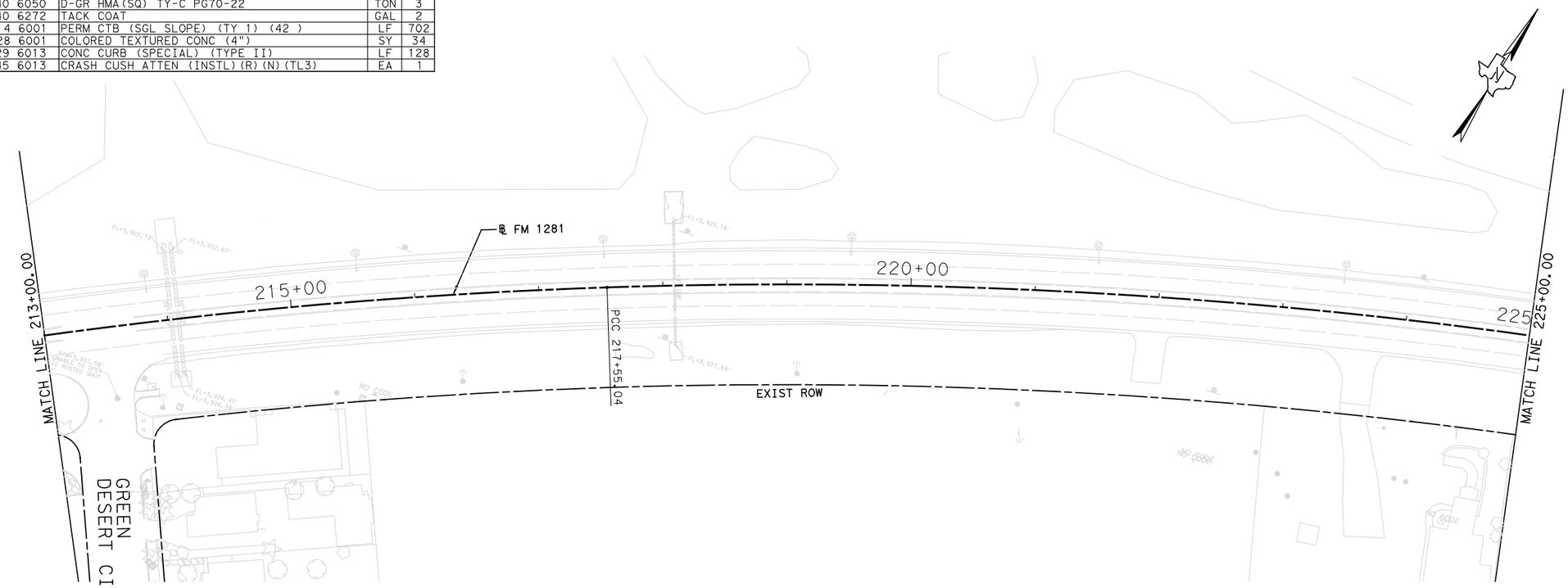


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	2
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	3
0340 6272	TACK COAT	GAL	2
0514 6001	PERM CTB (SGL SLOPE) (TY 1) (42)	LF	702
0528 6001	COLORED TEXTURED CONC (4")	SY	34
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	128
0545 6013	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	EA	1



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

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Texas Department of Transportation

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STATE OF TEXAS
L.V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
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9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
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SH 20 & FM 1281

MEDIAN LAYOUT FM 1281

STA 201+00 - STA 225+00

9 OF 15

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC.	089

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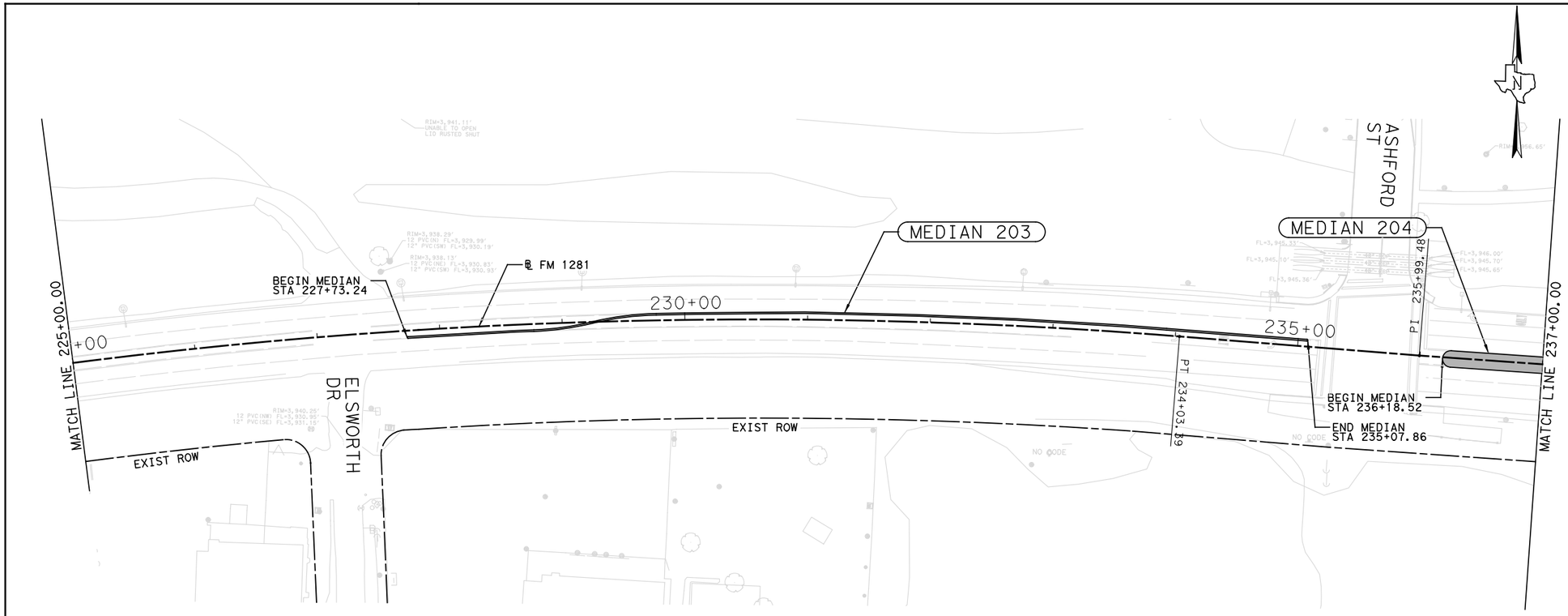
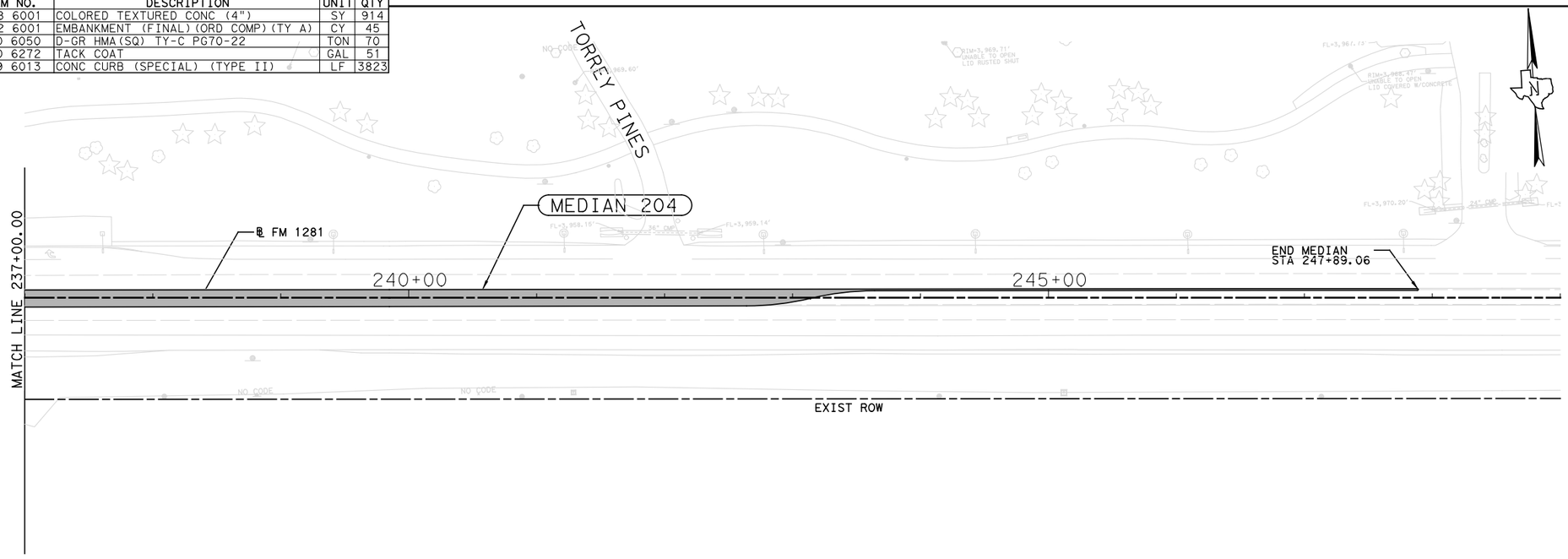


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0528 6001	COLORED TEXTURED CONC (4")	SY	914
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	45
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	70
0340 6272	TACK COAT	GAL	51
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	3823



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

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Texas Department of Transportation

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STATE OF TEXAS
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BLDG F, STE 125
AUSTIN, TX 78729
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SH 20 & FM 1281

MEDIAN LAYOUT
FM 1281
STA 225+00 - STA 249+00

10 OF 15

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	035, ETC.	090

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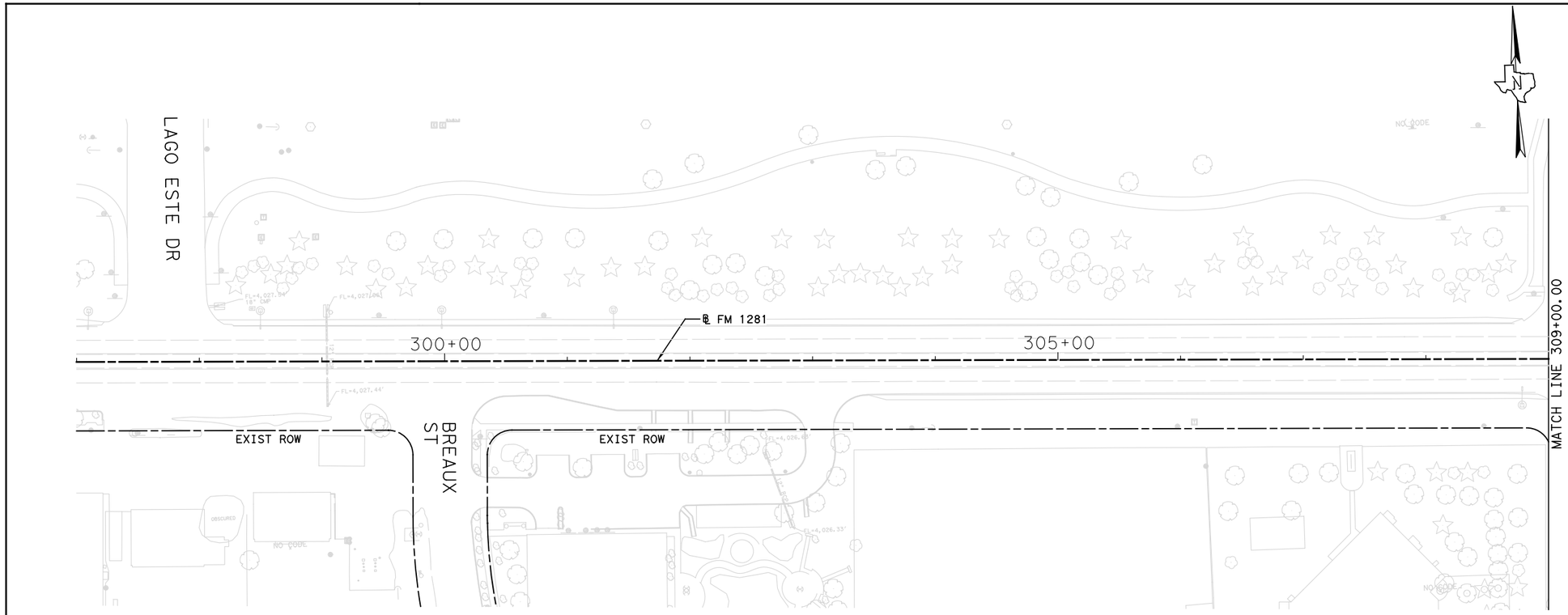
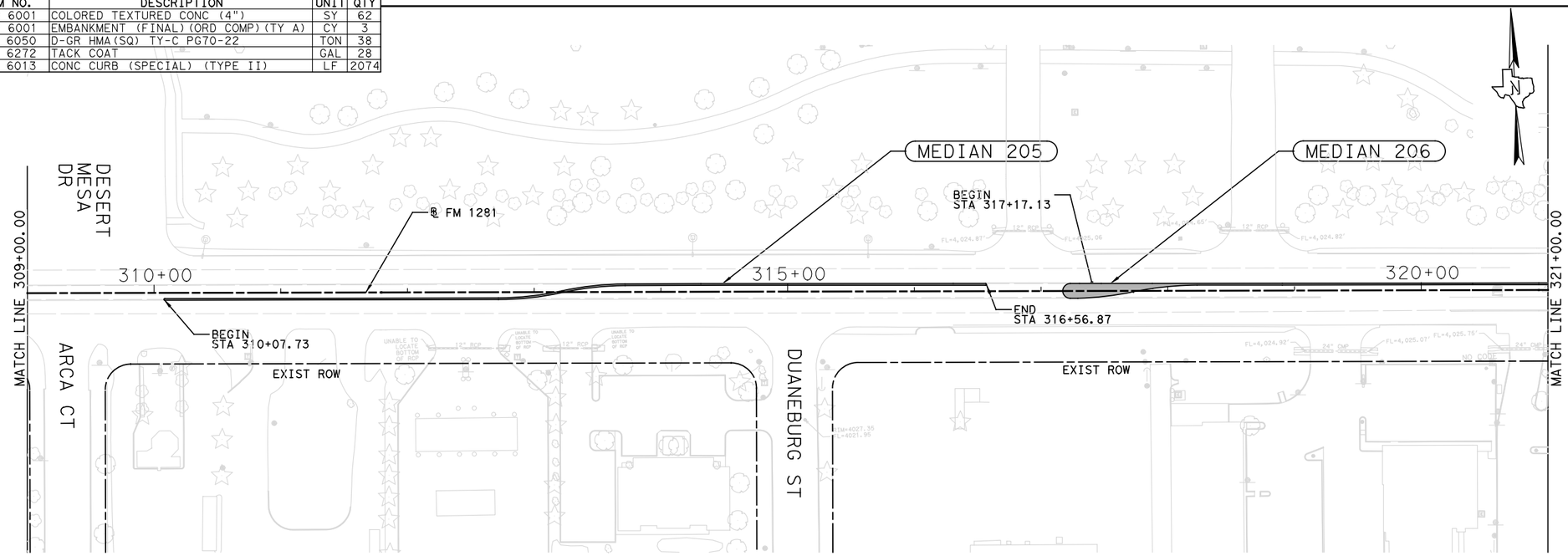


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0528 6001	COLORED TEXTURED CONC (4")	SY	62
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	3
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	38
0340 6272	TACK COAT	GAL	28
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	2074



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

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STATE OF TEXAS
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SH 20 & FM 1281

MEDIAN LAYOUT FM 1281

STA 297+00 - STA 321+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	025, ETC.	091

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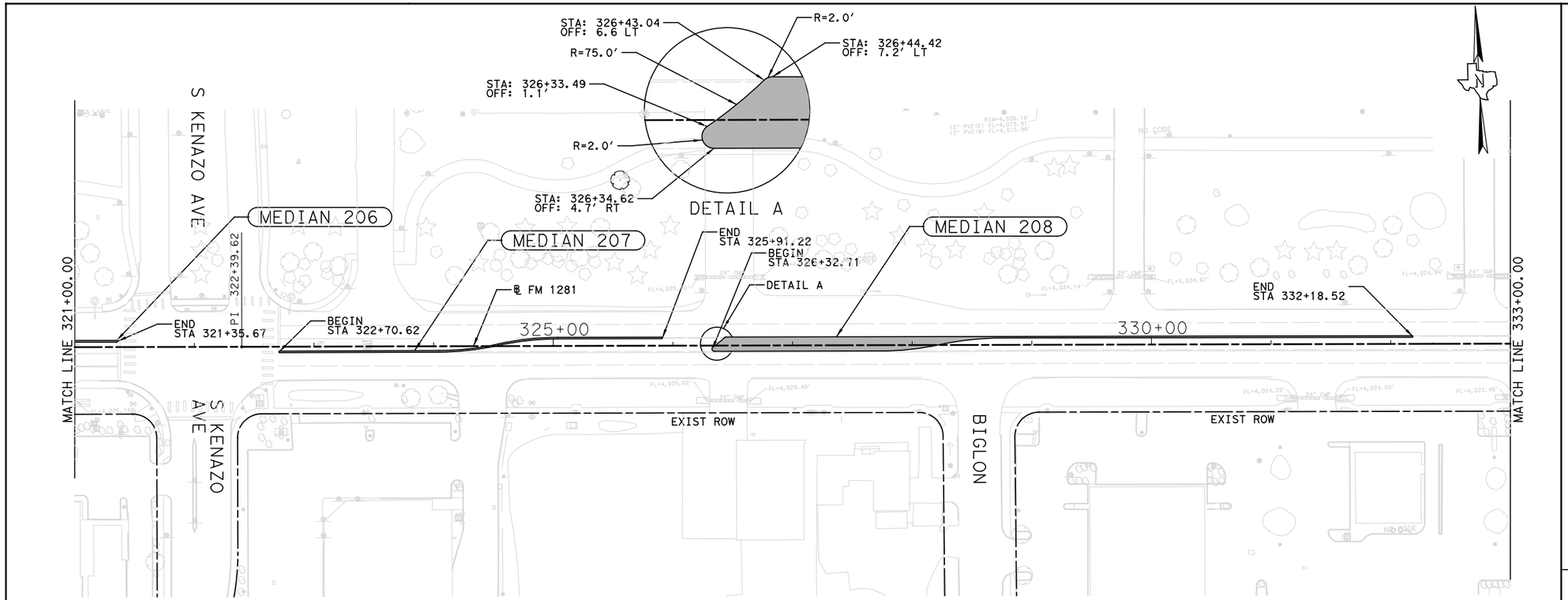
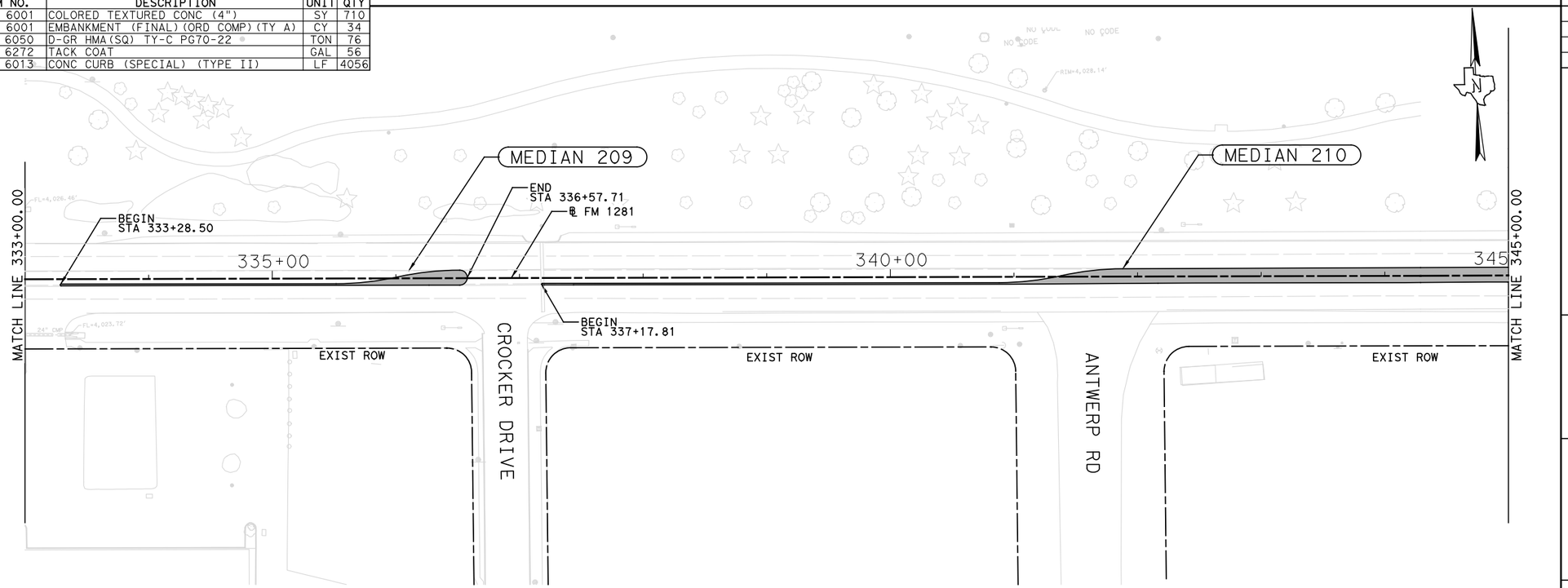


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0528 6001	COLORED TEXTURED CONC (4")	SY	710
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	34
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	76
0340 6272	TACK COAT	GAL	56
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	4056



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

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SH 20 & FM 1281

MEDIAN LAYOUT
FM 1281
STA 321+00 - STA 345+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	025, ETC.	092

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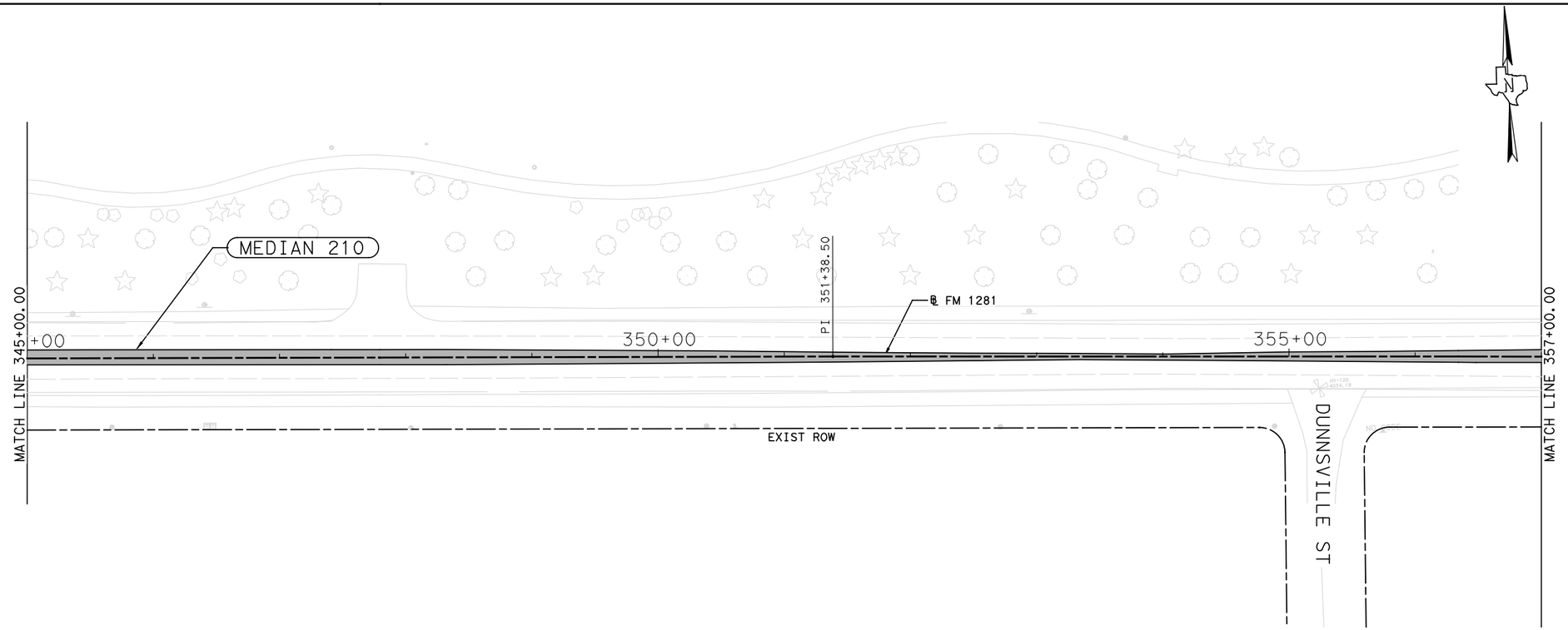
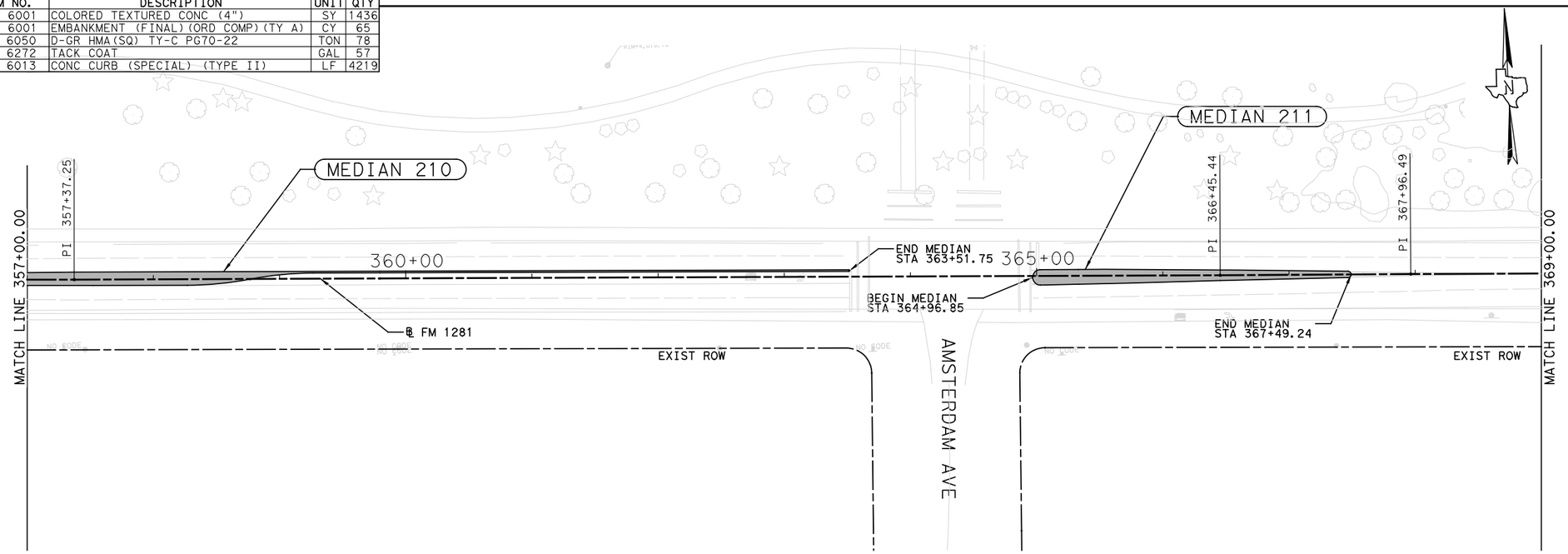


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0528 6001	COLORED TEXTURED CONC (4")	SY	1436
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	65
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	78
0340 6272	TACK COAT	GAL	57
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	4219



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SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "TYPICAL MEDIAN LAYOUT DETAIL" SHEET FOR MEDIAN DETAILS.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
04-2021

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

MEDIAN LAYOUT FM 1281 STA 345+00 - STA 369+00

13 OF 15

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC. / 093

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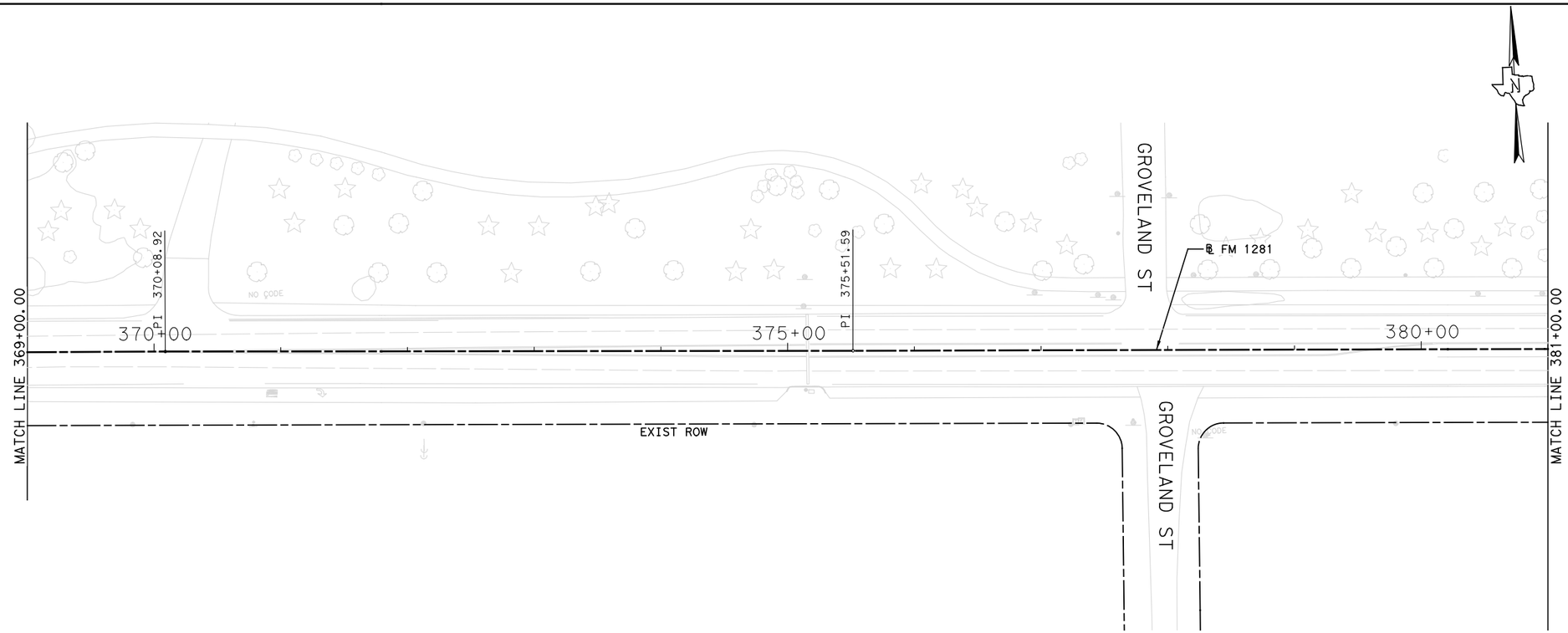
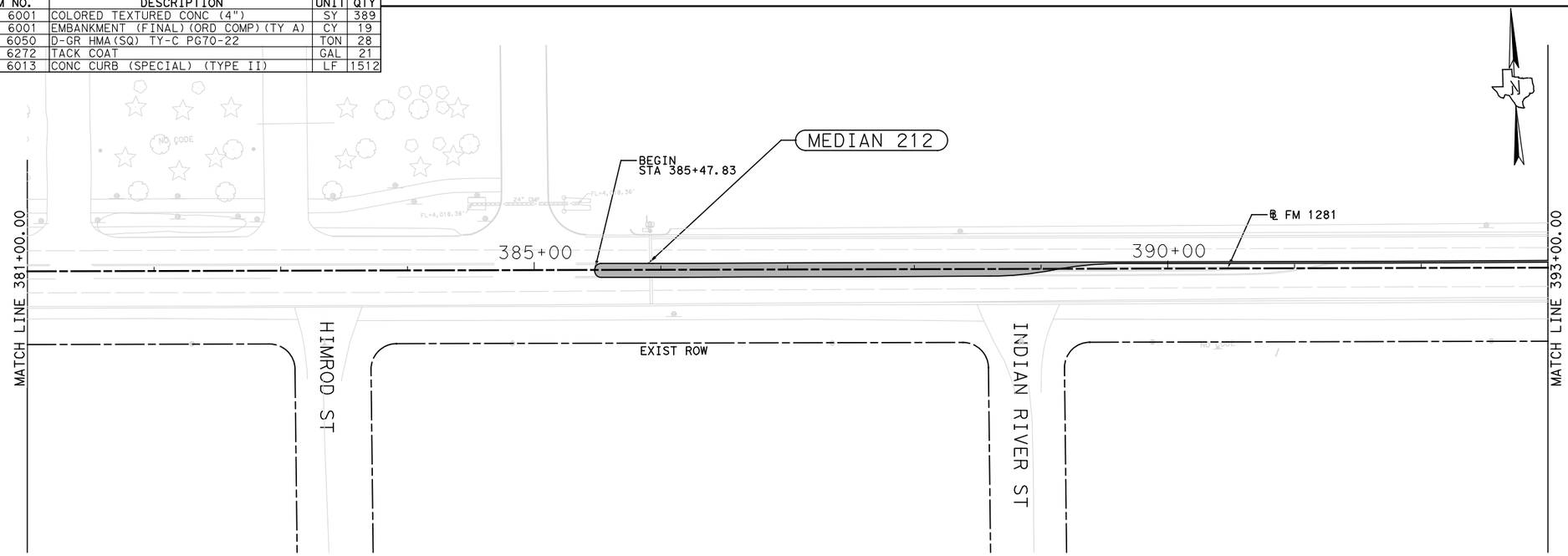
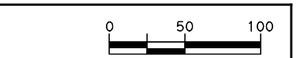


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0528 6001	COLORED TEXTURED CONC (4")	SY	389
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	19
0340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	28
0340 6272	TACK COAT	GAL	21
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	1512





LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "TYPICAL MEDIAN LAYOUT DETAIL" SHEET FOR MEDIAN DETAILS.

Texas Department of Transportation

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TBPELS FIRM NO. F-312

SH 20 & FM 1281

MEDIAN LAYOUT FM 1281 STA 369+00 - STA 393+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	025, ETC. / 094

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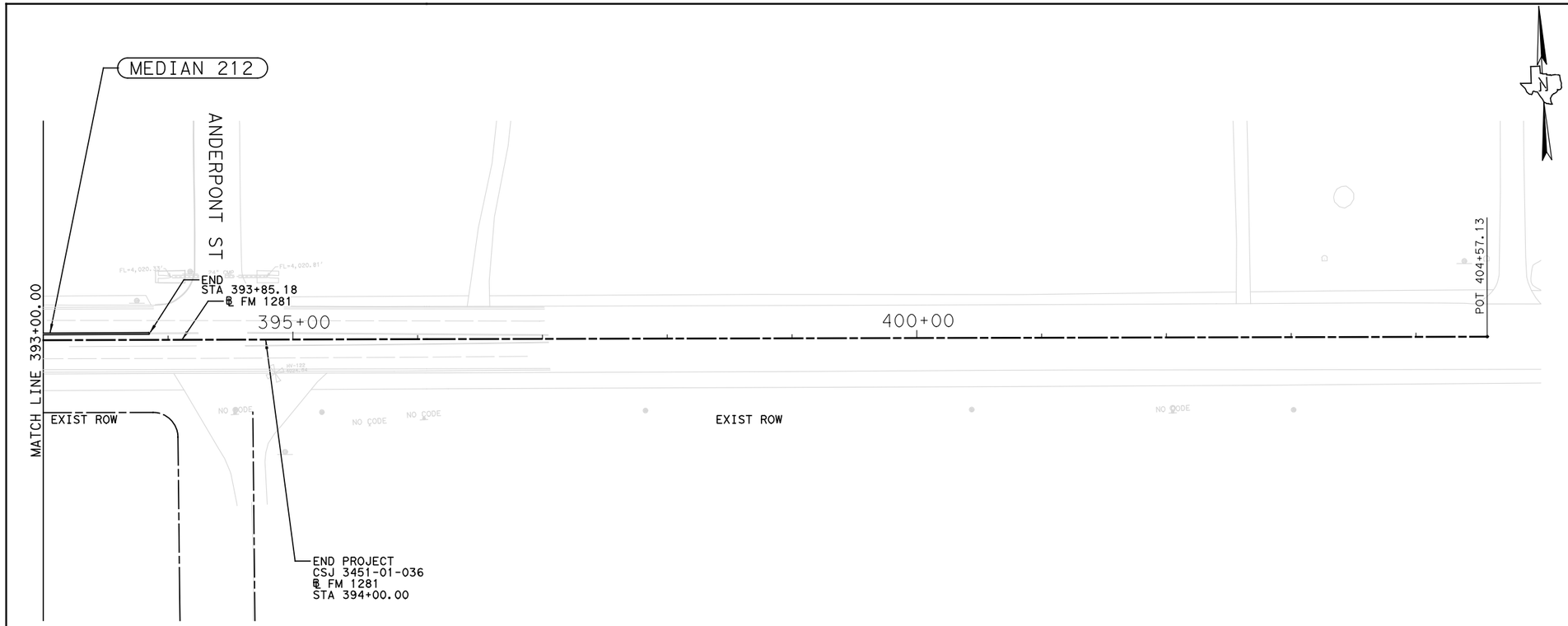
FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	171
0340 6272	TACK COAT	GAL	125

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- FM 1281 BASELINE
- PROPOSED RAISED MEDIAN
- EXISTING ROW
- PLANIMETRICS

NOTES:

1. SEE "TYPICAL MEDIAN LAYOUT DETAIL" SHEET FOR MEDIAN DETAILS.

Texas Department of Transportation

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STATE OF TEXAS
L. V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
04-2021

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AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

MEDIAN LAYOUT
FM 1281
STA 393+00 - STA 404+57.13

15 OF 15

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO		3451	01	036, ETC.	095

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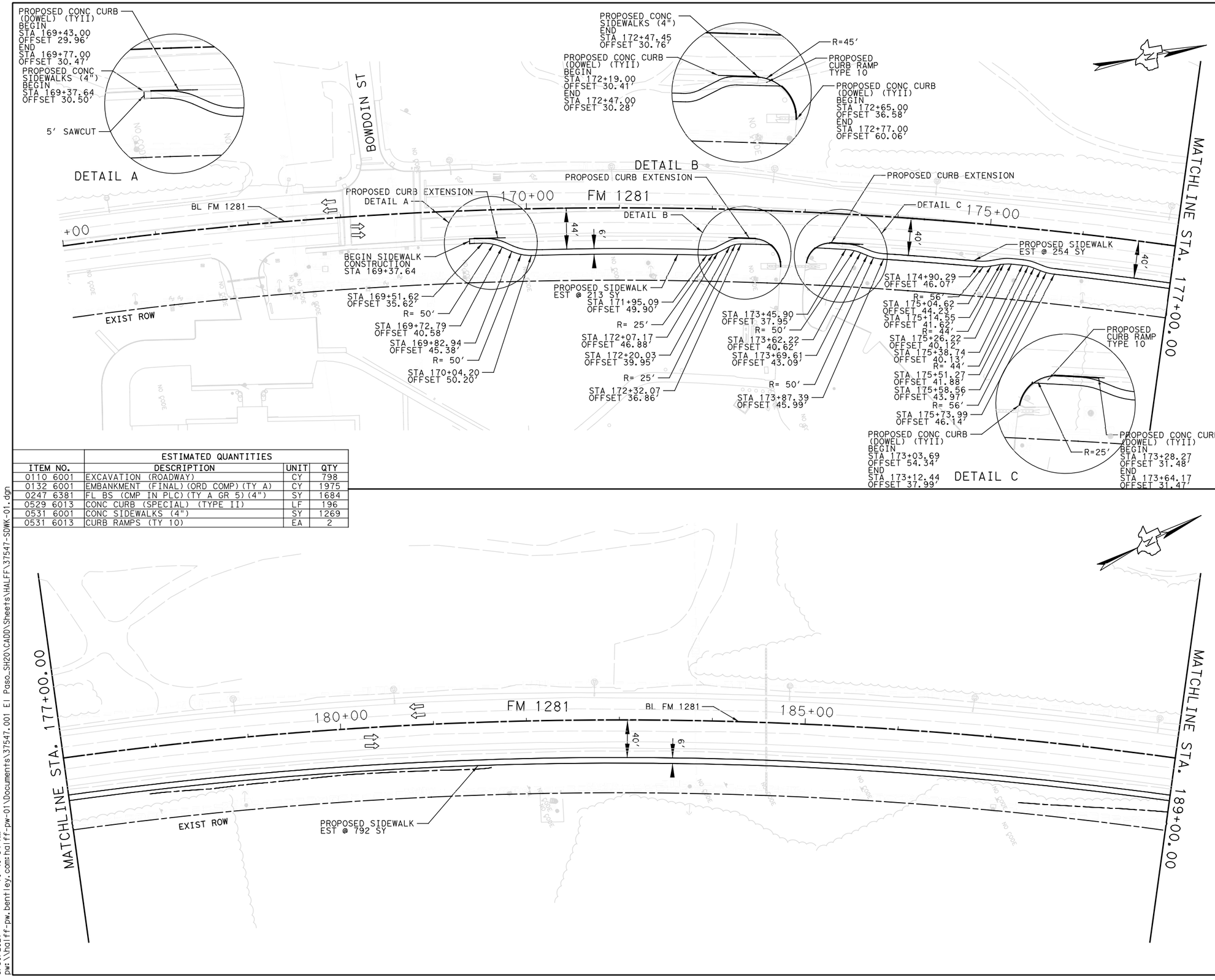
FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0110 6001	EXCAVATION (ROADWAY)	CY	798
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	1975
0247 6381	FL BS (CMP IN PLC)(TY A GR 5)(4")	SY	1684
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	196
0531 6001	CONC SIDEWALKS (4")	SY	1269
0531 6013	CURB RAMPS (TY 10)	EA	2

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- EDGE OF SIDEWALK
- EXISTING ROW
- TRAFFIC ARROW
- FM 1281 BASELINE

NOTES:

1. SAWCUTTING AND REMOVAL IS SUBSIDIARY TO SIDEWALK.
2. SEE SIDEWALK TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
03/24/21

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BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIDEWALK LAYOUT
STA 165+00 - STA 189+00

DESIGNED: BC	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: BC	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	096

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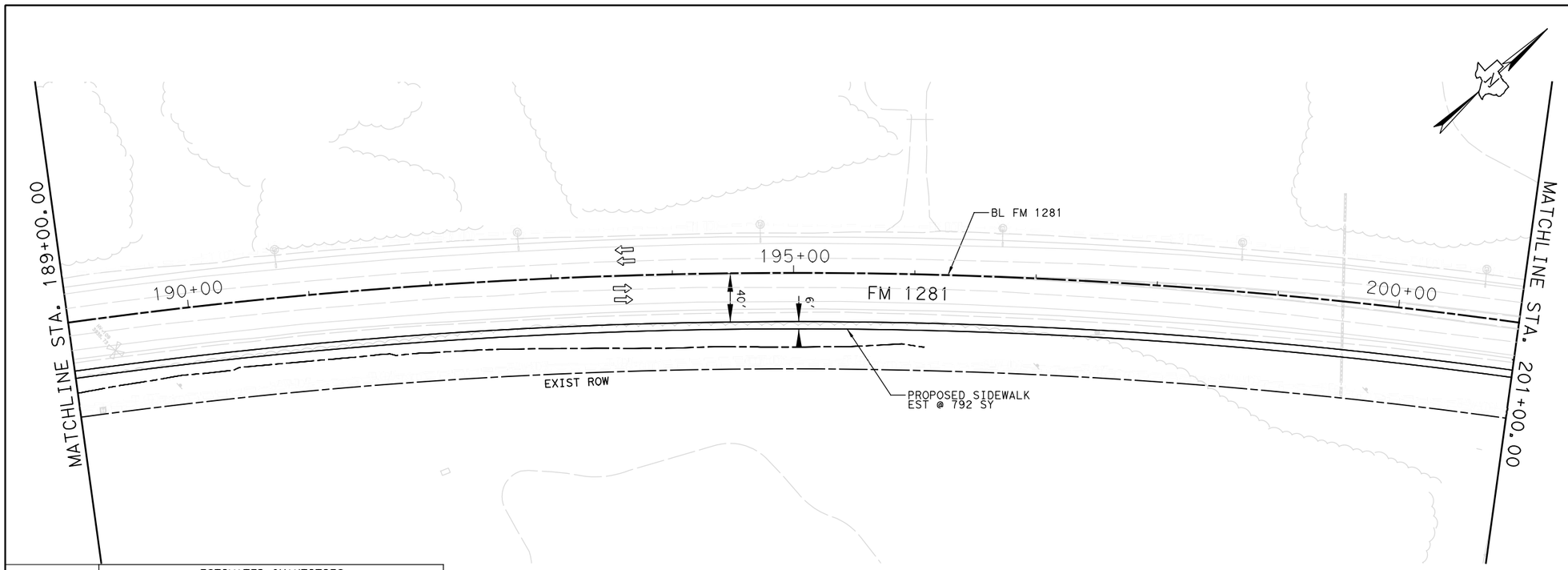
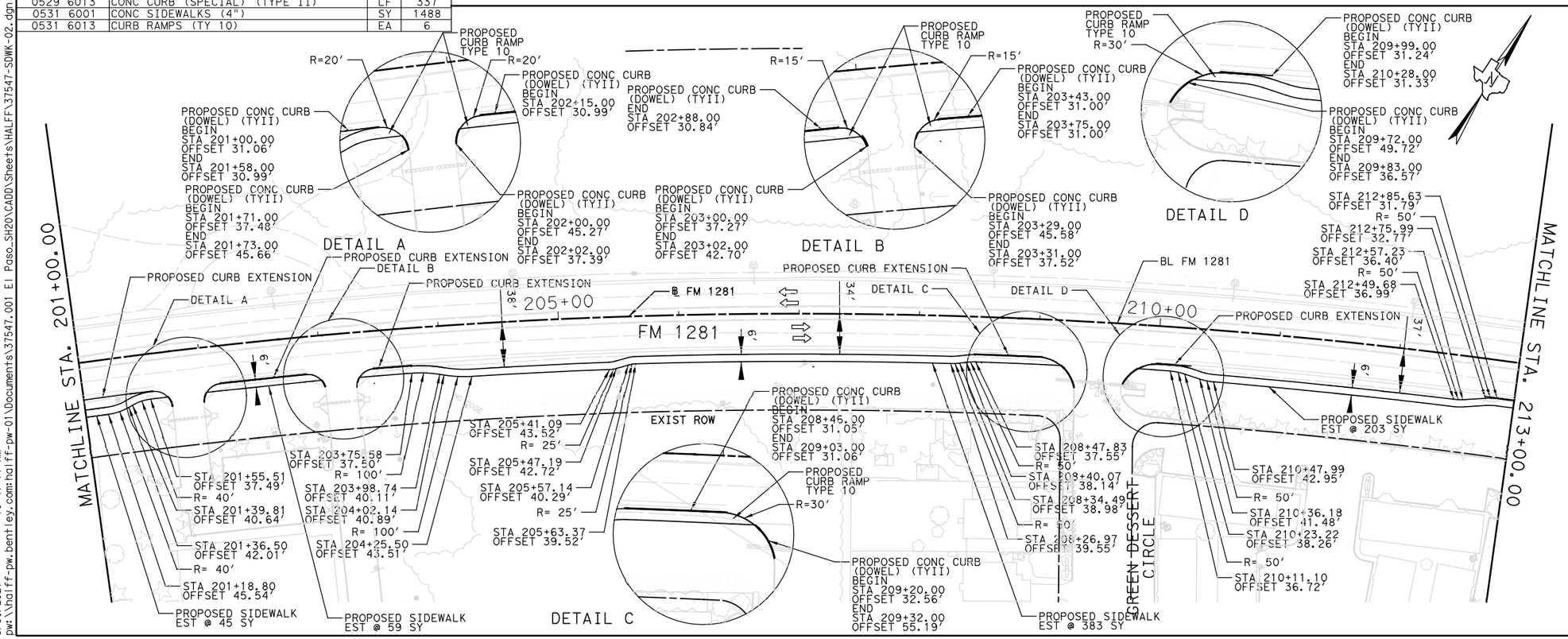
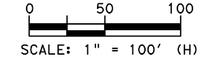


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0110 6001	EXCAVATION (ROADWAY)	CY	248
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	2439
0247 6381	FL BS (CMP IN PLC)(TY A GR 5)(4")	SY	1983
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	337
0531 6001	CONC SIDEWALKS (4")	SY	1488
0531 6013	CURB RAMPS (TY 10)	EA	6





LEGEND

- EDGE OF SIDEWALK
- EXISTING ROW
- TRAFFIC ARROW
- FM 1281 BASELINE

NOTES:

1. SAWCUTTING AND REMOVAL IS SUBSIDIARY TO SIDEWALK.
2. SEE SIDEWALK TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.

Texas Department of Transportation

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AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIDEWALK LAYOUT
STA 189+00 - STA 213+00

2 OF 8

DESIGNED: BC	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN: BC	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	097

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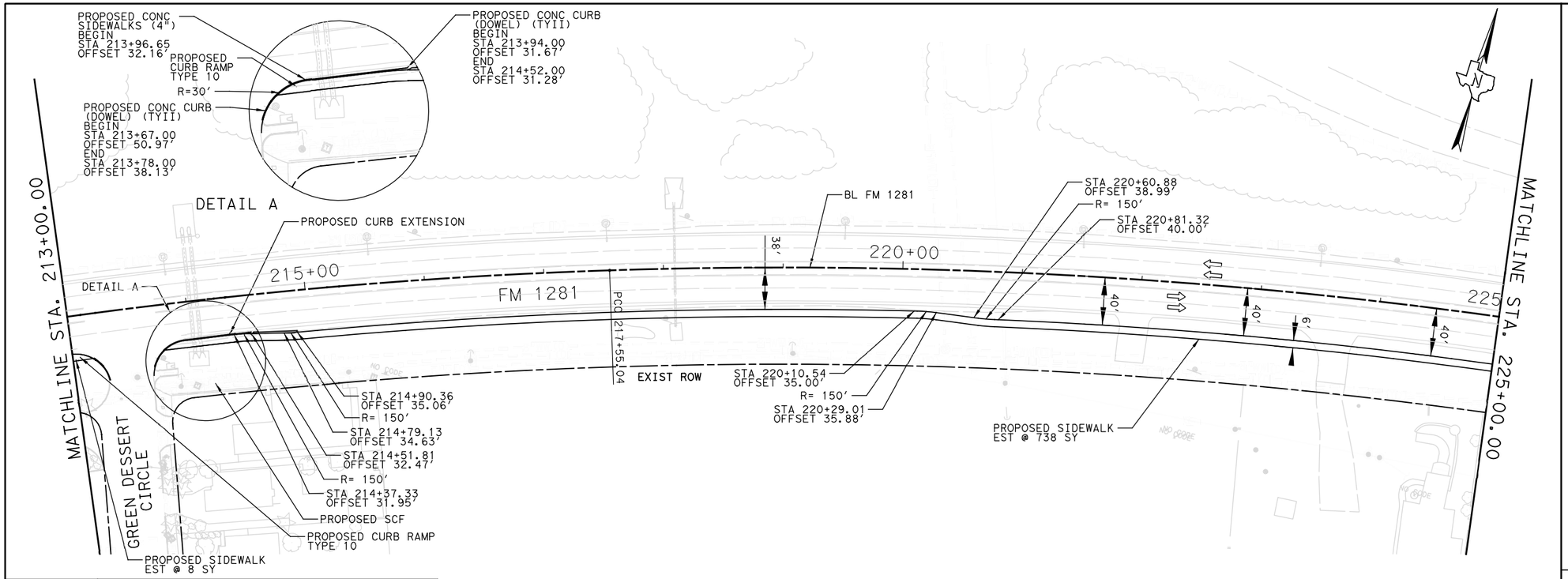
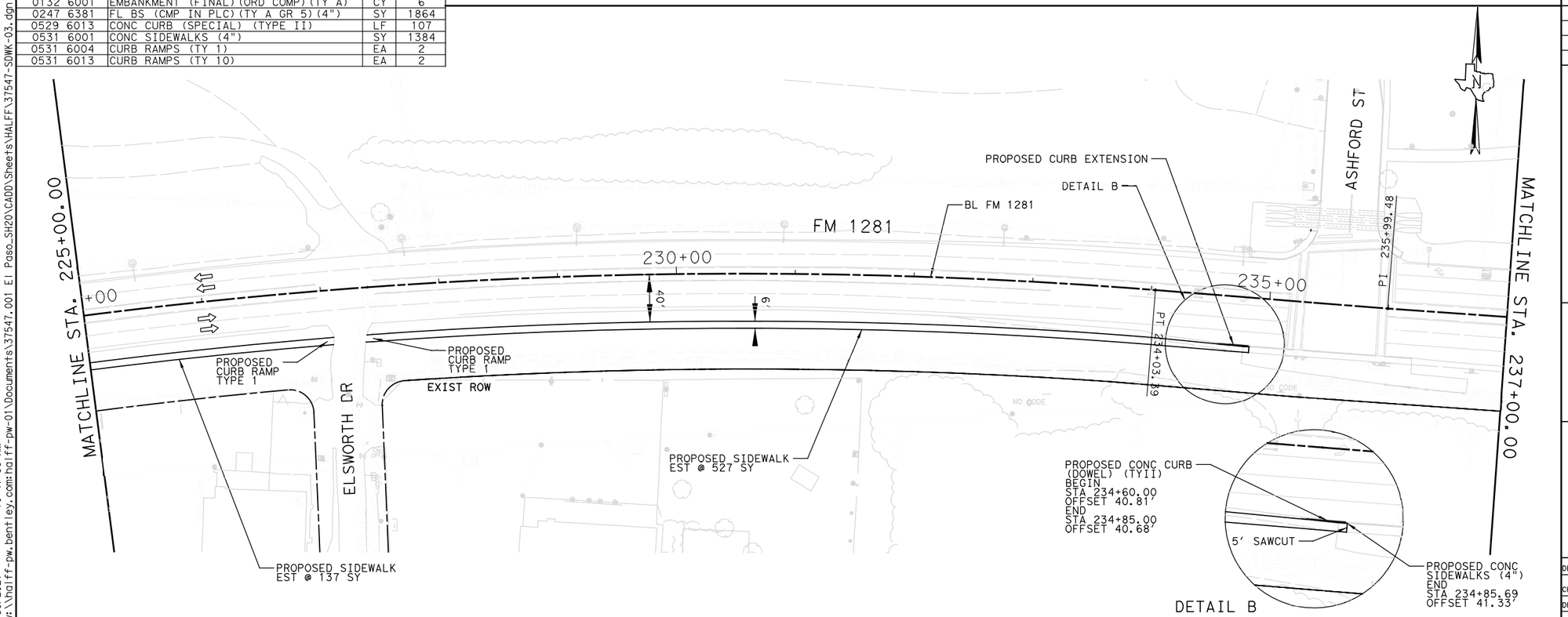
FINAL SUBMITTAL



	ESTIMATED QUANTITIES		
ITEM NO.	DESCRIPTION	UNIT	QTY
0110 6001	EXCAVATION (ROADWAY)	CY	1254
0132 6001	EMBANKMENT (FINAL) (ORD COMP) (TY A)	CY	6
0247 6381	FL BS (CMP IN PLC) (TY A GR 5) (4")	SY	1864
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	107
0531 6001	CONC SIDEWALKS (4")	SY	1384
0531 6004	CURB RAMPS (TY 1)	EA	2
0531 6013	CURB RAMPS (TY 10)	EA	2



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SCALE: 1" = 100' (H)

LEGEND

- EDGE OF SIDEWALK
- EXISTING ROW
- TRAFFIC ARROW
- FM 1281 BASELINE

NOTES:

1. SAWCUTTING AND REMOVAL IS SUBSIDIARY TO SIDEWALK.
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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
03/24/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIDEWALK LAYOUT
STA 213+00 - STA 237+00

3 OF 8

DESIGNED: BC	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN: BC	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.

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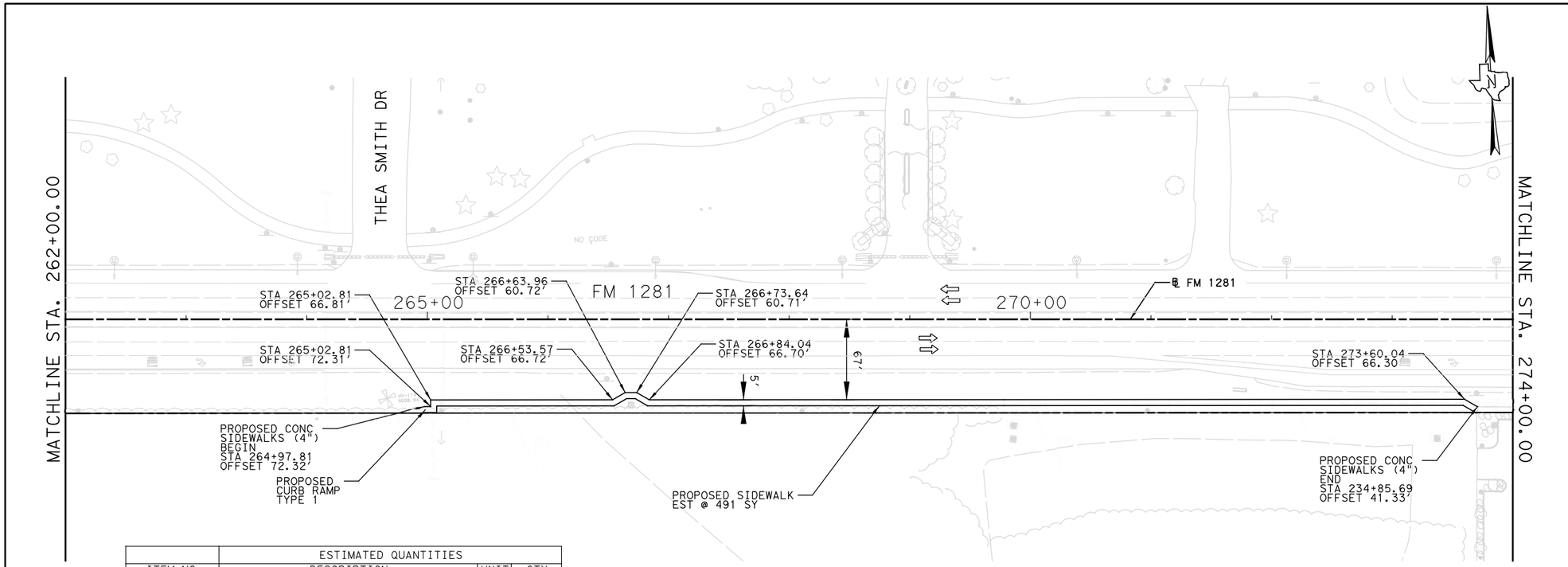
FINAL SUBMITTAL



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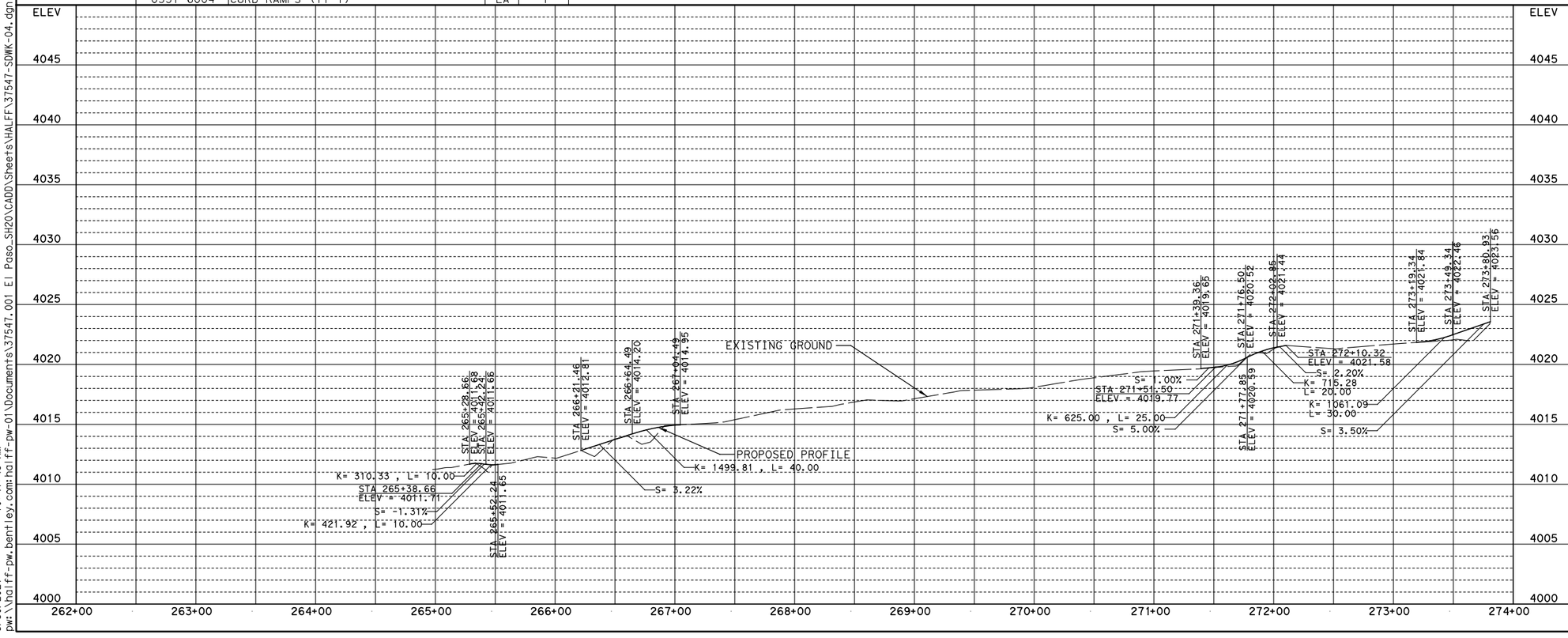
ITEM NO.	DESCRIPTION	UNIT	QTY
0110 6001	EXCAVATION (ROADWAY)	CY	31
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	52
0247 6381	FL BS (CMP IN PLC)(TY A GR 5)(4")	SY	688
0531 6001	CONC SIDEWALKS (4")	SY	491
0531 6004	CURB RAMPS (TY 1)	EA	1



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SCALE: 1" = 100' (H)

LEGEND

- EDGE OF SIDEWALK
- EXISTING ROW
- TRAFFIC ARROW
- FM 1281 BASELINE

NOTES:

1. SAWCUTTING AND REMOVAL IS SUBSIDIARY TO SIDEWALK.
2. SEE SIDEWALK TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

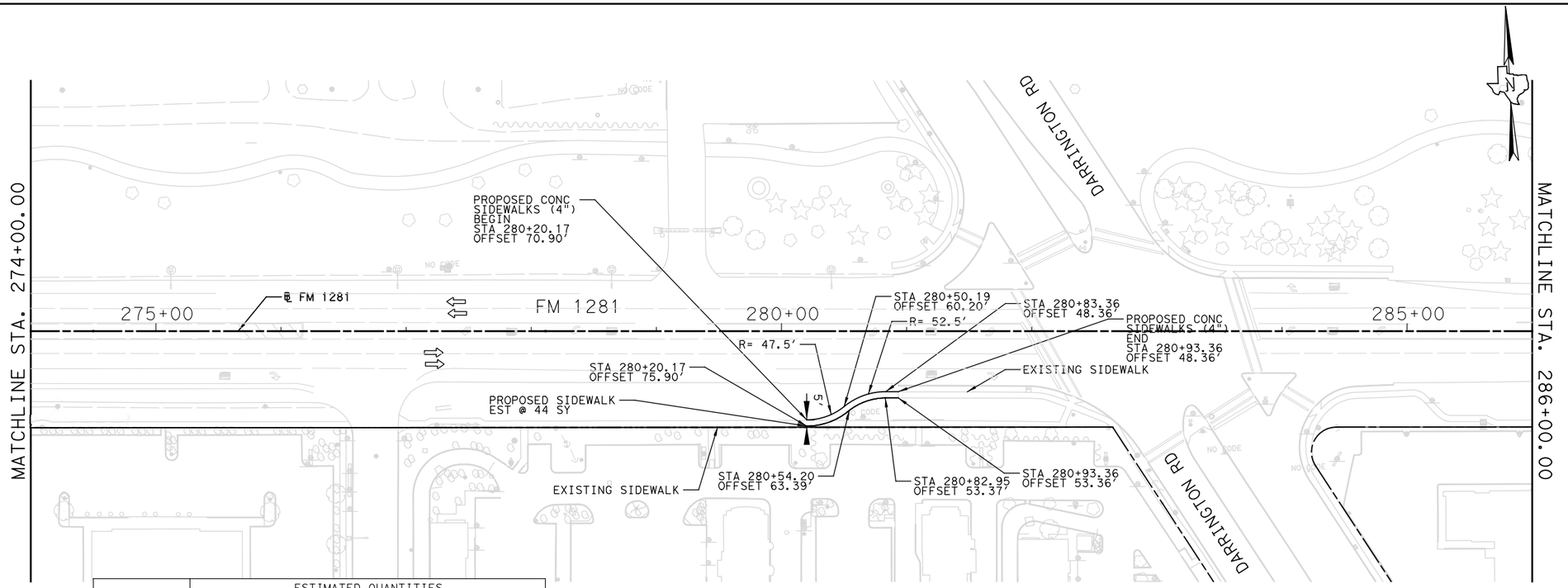
SIDEWALK LAYOUT
STA 262+00 - STA 274+00

4 OF 8

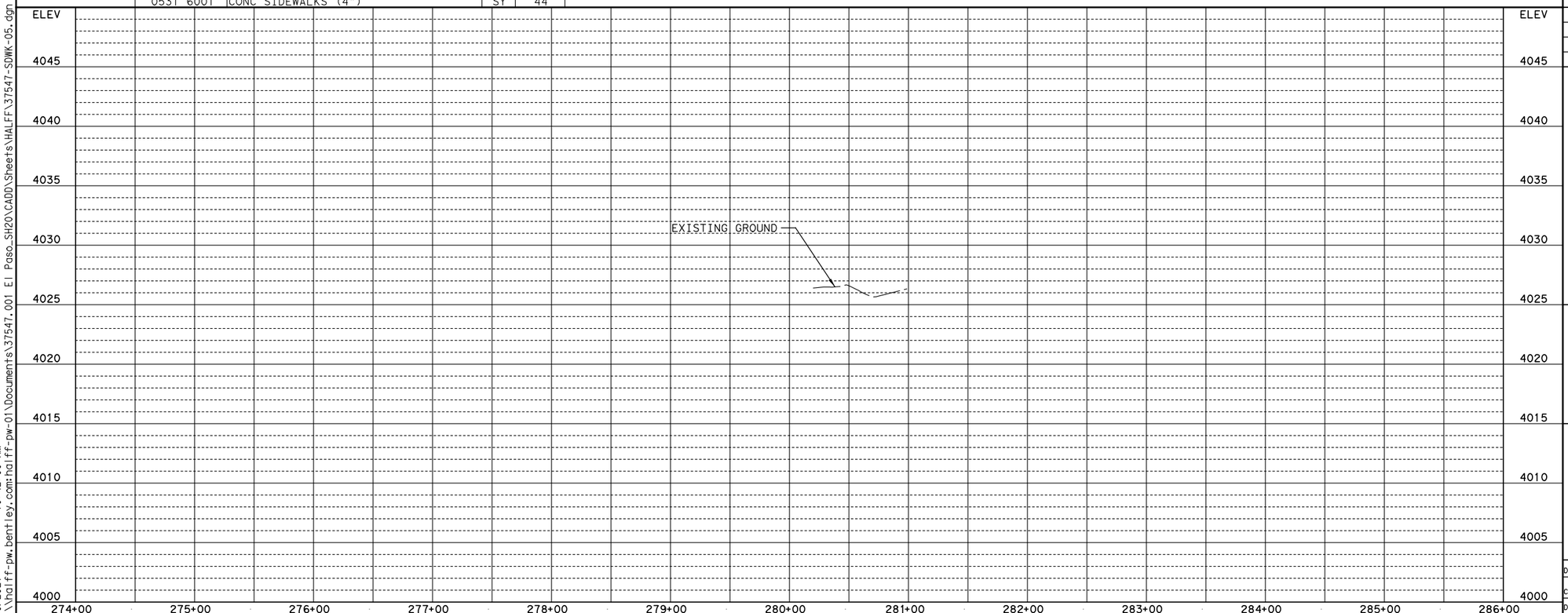
DESIGNED: BC	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: BC	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	032, ETC.	099

FINAL SUBMITTAL



	ESTIMATED QUANTITIES		
ITEM NO.	DESCRIPTION	UNIT	QTY
0110 6001	EXCAVATION (ROADWAY)	CY	5
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	1
0247 6381	FL BS (CMP IN PLC)(TY A GR 5)(4")	SY	63
0531 6001	CONC SIDEWALKS (4")	SY	44



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SCALE: 1" = 100' (H)

LEGEND

- EDGE OF SIDEWALK
- EXISTING ROW
- TRAFFIC ARROW
- FM 1281 BASELINE

NOTES:

1. SAWCUTTING AND REMOVAL IS SUBSIDIARY TO SIDEWALK.
2. SEE SIDEWALK TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIDEWALK LAYOUT
STA 274+00 - STA 286+00

5 OF 8

DESIGNED: BC	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: BC	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	032, ETC.	100

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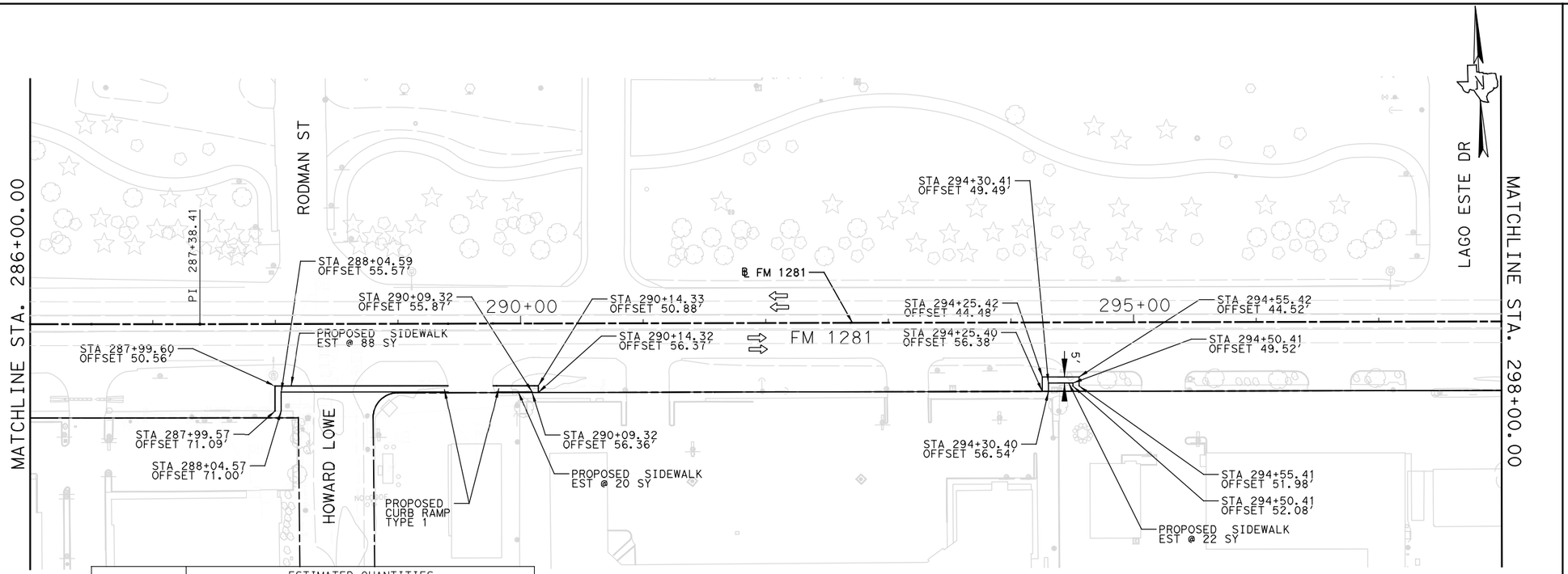
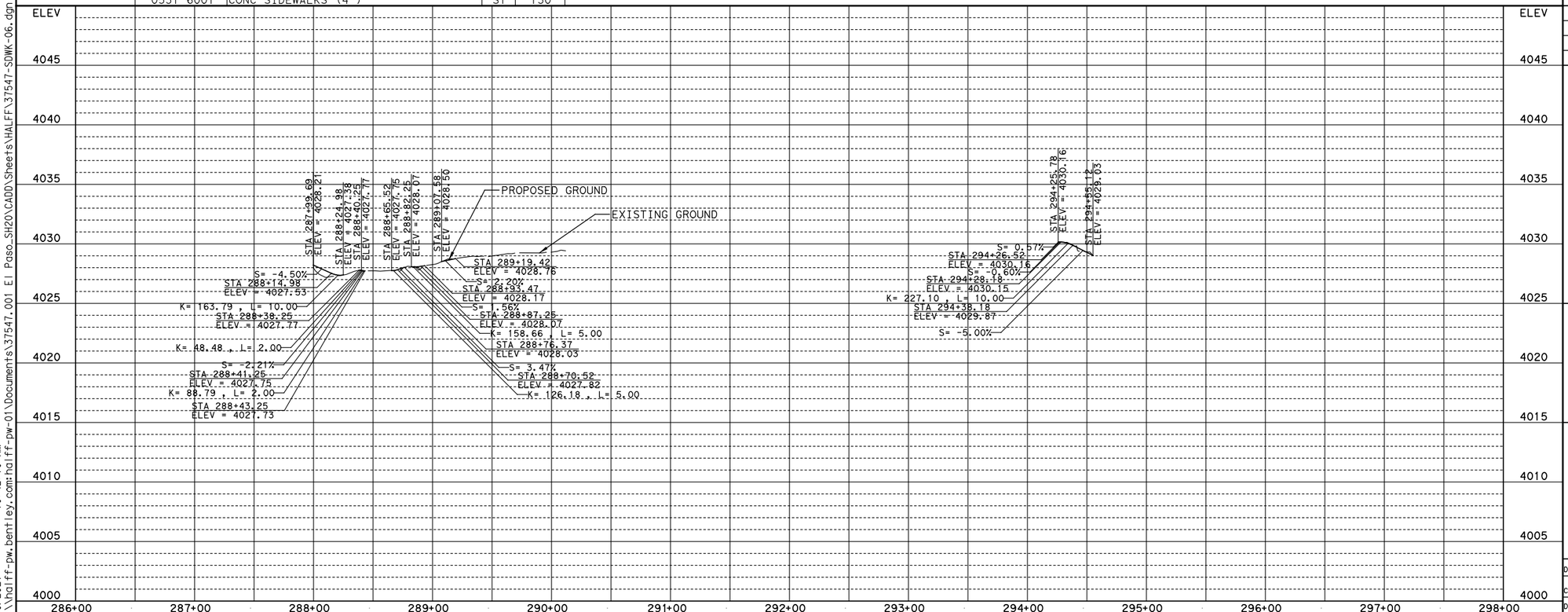
FINAL SUBMITTAL



	ESTIMATED QUANTITIES		
ITEM NO.	DESCRIPTION	UNIT	QTY
0110 6001	EXCAVATION (ROADWAY)	CY	16
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	1
0247 6381	FL BS (CMP IN PLC)(TY A GR 5)(4")	SY	190
0531 6001	CONC SIDEWALKS (4")	SY	130



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SCALE: 1" = 100' (H)

LEGEND

- EDGE OF SIDEWALK
- EXISTING ROW
- TRAFFIC ARROW
- FM 1281 BASELINE

NOTES:

1. SAWCUTTING AND REMOVAL IS SUBSIDIARY TO SIDEWALK.
2. SEE SIDEWALK TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIDEWALK LAYOUT
STA 286+00 - STA 298+00

6 OF 8

DESIGNED: BC	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: BC	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	030 ETC.	101

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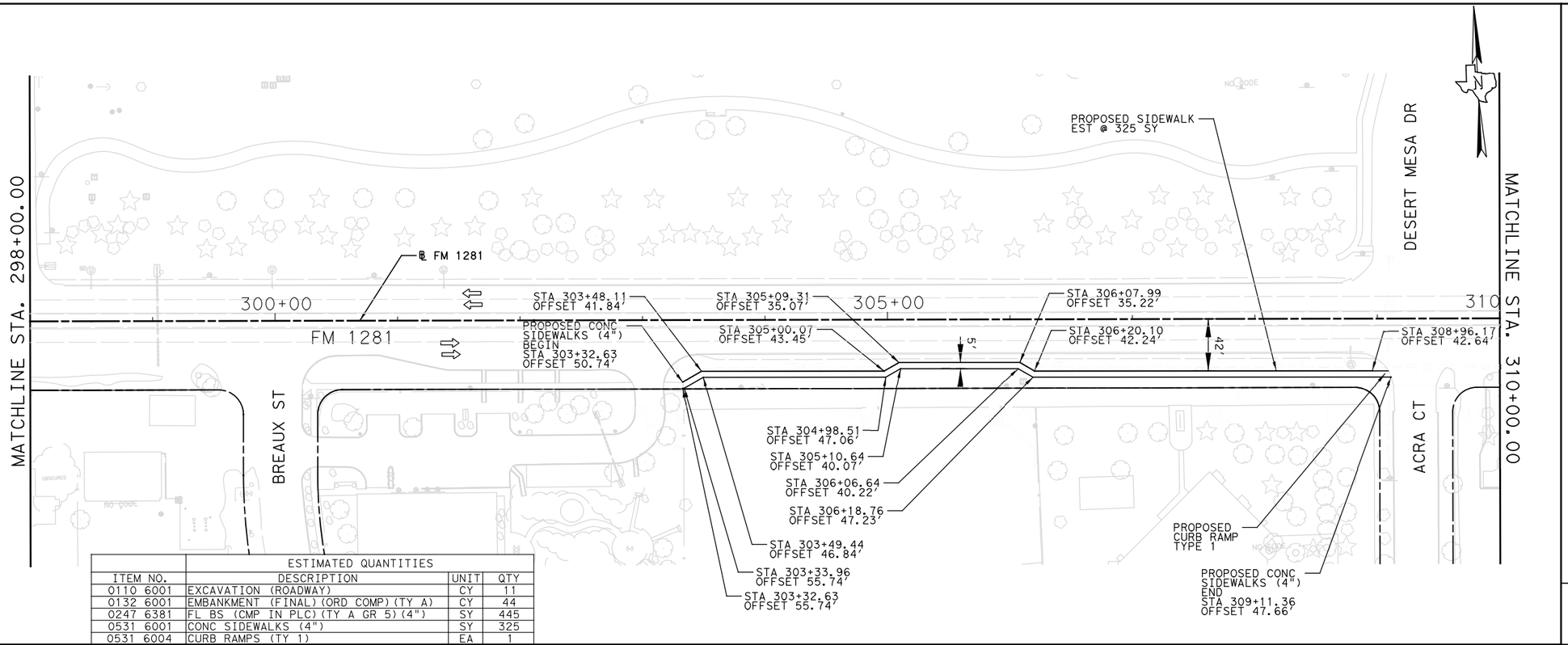
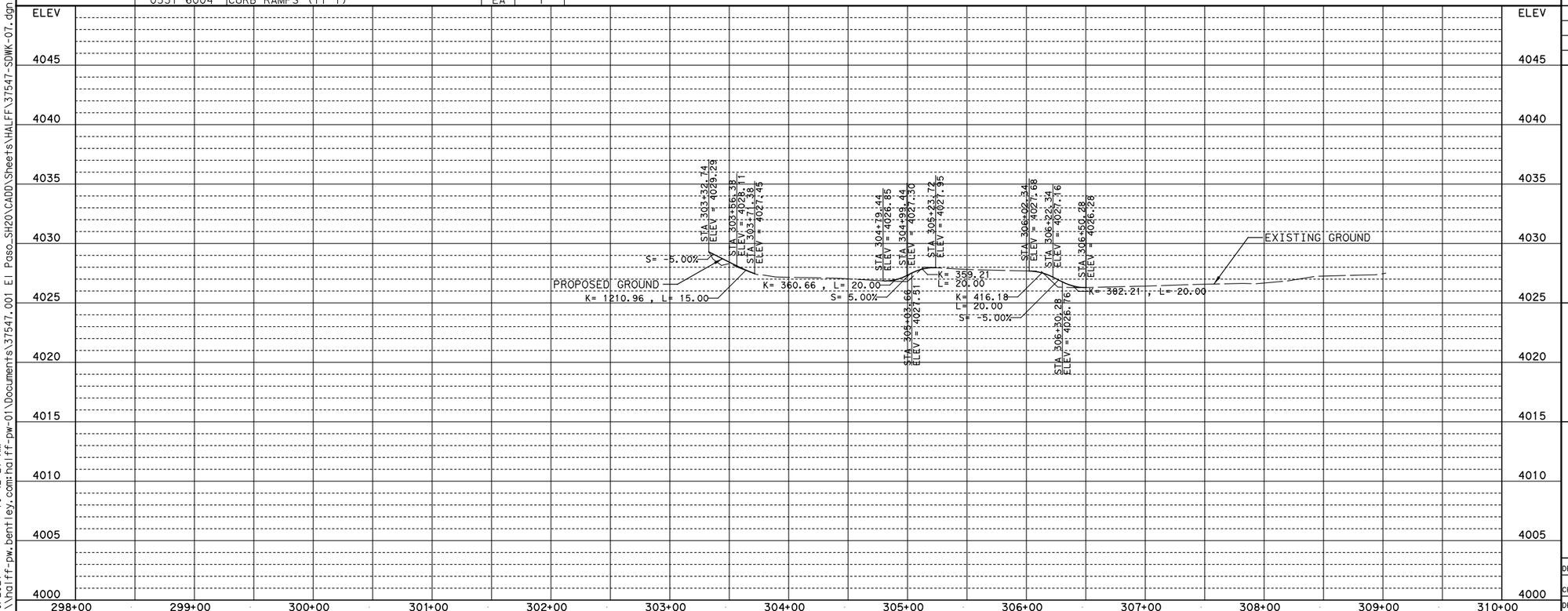
FINAL SUBMITTAL



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0110 6001	EXCAVATION (ROADWAY)	CY	11
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	44
0247 6381	FL BS (CMP IN PLC)(TY A GR 5)(4")	SY	445
0531 6001	CONC SIDEWALKS (4")	SY	325
0531 6004	CURB RAMPS (TY 1)	EA	1



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- EDGE OF SIDEWALK
- EXISTING ROW
- TRAFFIC ARROW
- FM 1281 BASELINE

NOTES:

1. SAWCUTTING AND REMOVAL IS SUBSIDIARY TO SIDEWALK.
2. SEE SIDEWALK TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
68192
LICENSED
PROFESSIONAL ENGINEER
03/30/21

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9500 AMBERGLEN BLVD
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AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIDEWALK LAYOUT
STA 298+00 - STA 310+00

7 OF 8

DESIGNED: BC	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: BC	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	032, ETC.	102

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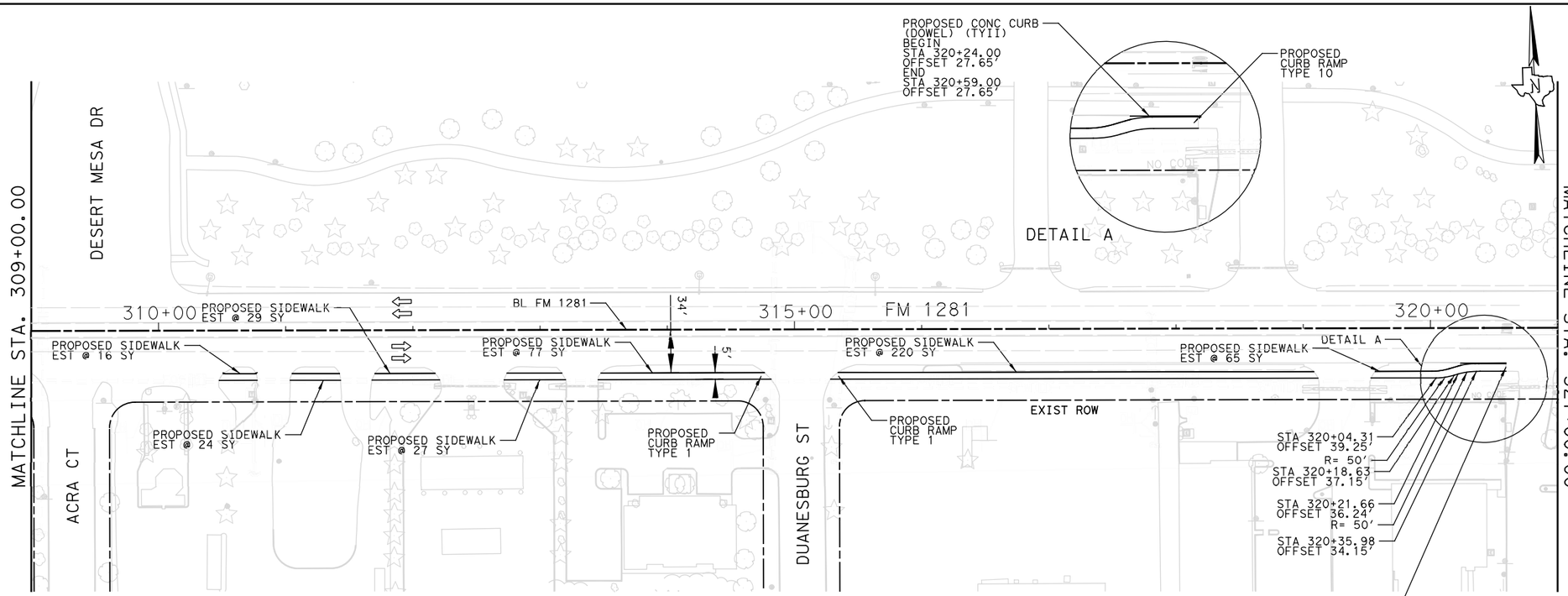
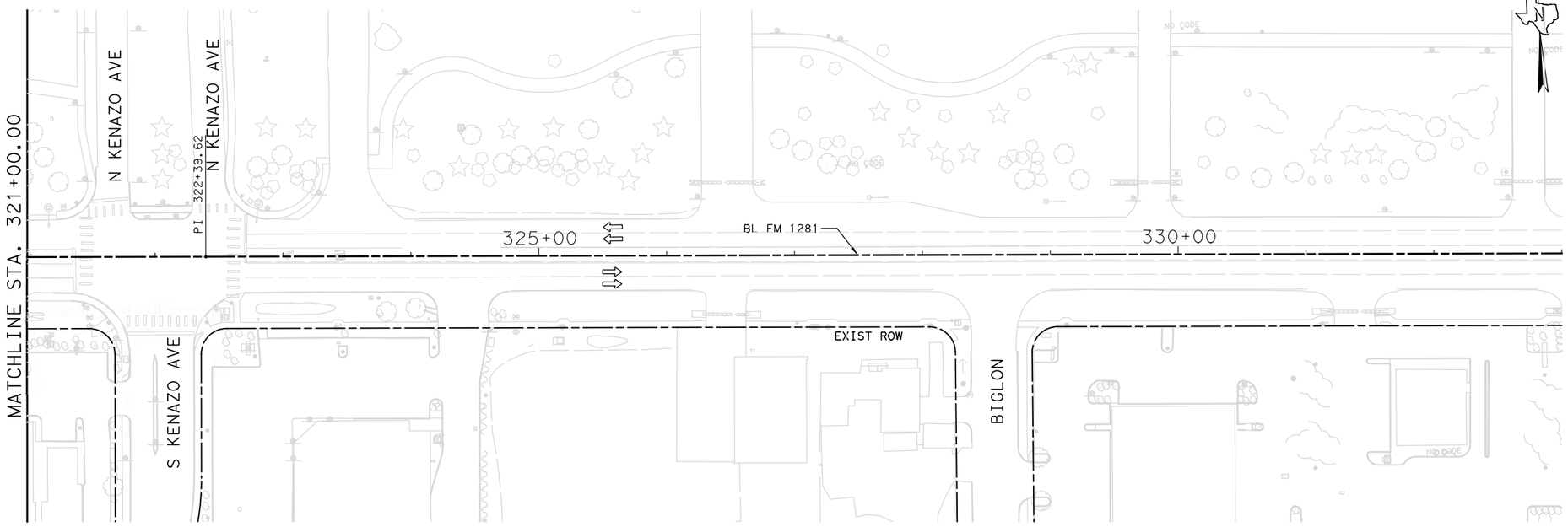


ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY
0110 6001	EXCAVATION (ROADWAY)	CY	36
0132 6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	881
0247 6381	FL BS (CMP IN PLC)(TY A GR 5)(4")	SY	643
0529 6013	CONC CURB (SPECIAL) (TYPE II)	LF	36
0531 6001	CONC SIDEWALKS (4")	SY	458
0531 6004	CURB RAMPS (TY 1)	EA	2
0531 6013	CURB RAMPS (TY 10)	EA	1



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- EDGE OF SIDEWALK
- EXISTING ROW
- TRAFFIC ARROW
- FM 1281 BASELINE

NOTES:

1. SAWCUTTING AND REMOVAL IS SUBSIDIARY TO SIDEWALK.
2. SEE SIDEWALK TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
03/30/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIDEWALK LAYOUT
STA 309+00 - STA 333+00

8 OF 8

DESIGNED: BC	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: BC	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	103

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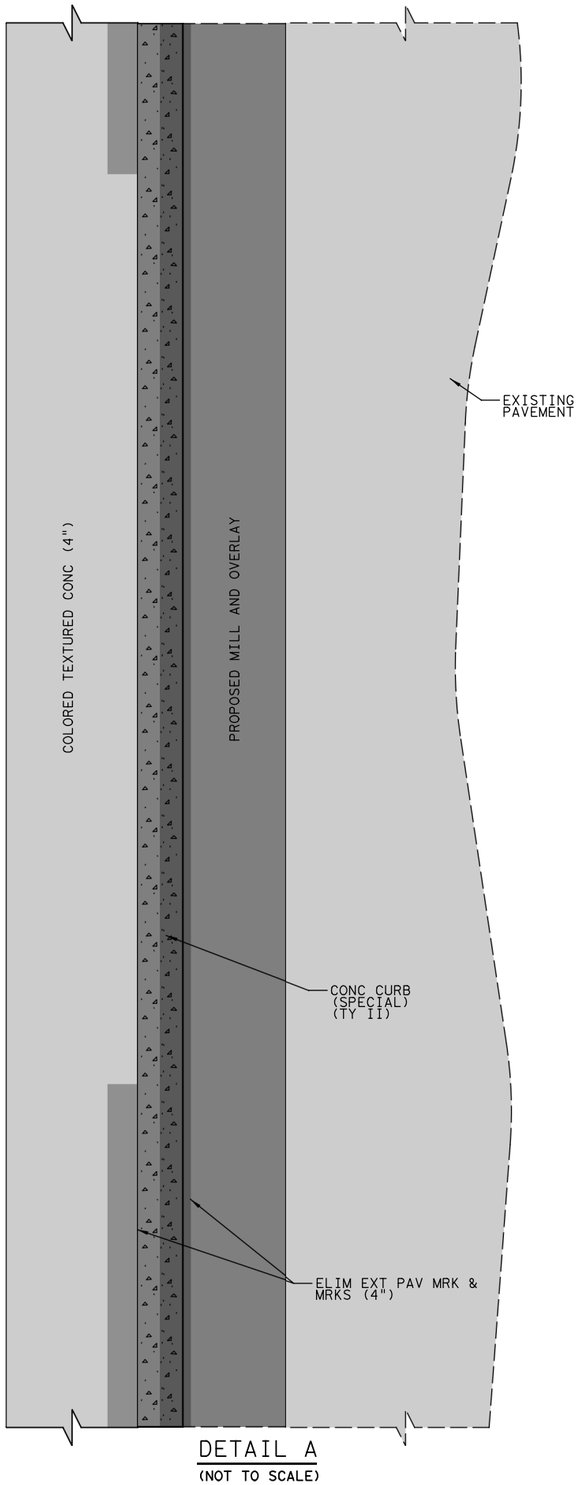
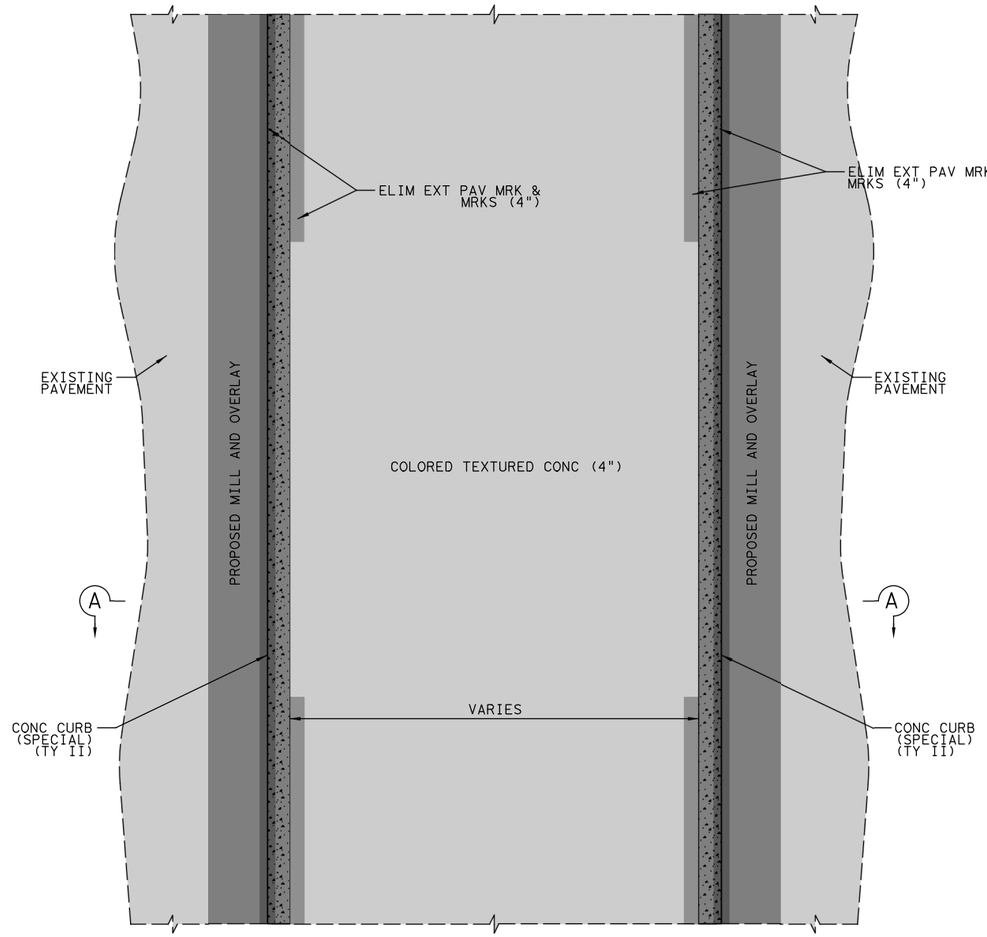
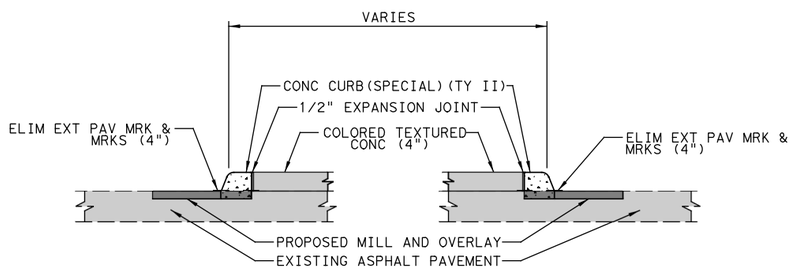
FINAL SUBMITTAL



DETAIL A
(NOT TO SCALE)



PLAN VIEW OF TYPICAL MEDIAN SECTION
(NOT TO SCALE)



SECTION A-A
(NOT TO SCALE)

NOT TO SCALE

NOTES:

1. SEE "COLORED CONCRETE AND MISCELLANEOUS DETAILS" SHEET FOR ADDITIONAL INFORMATION
2. ONE-HALF INCH EXPANSION JOINT MATERIAL SHALL BE PROVIDED BETWEEN CURB AND COLORED TEXTURED CONCRETE.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
03/24/21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

CURB & MEDIAN DETAIL

1 OF 1

	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
DESIGNED:							
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY		CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO		3451	01	035, ETC.	104

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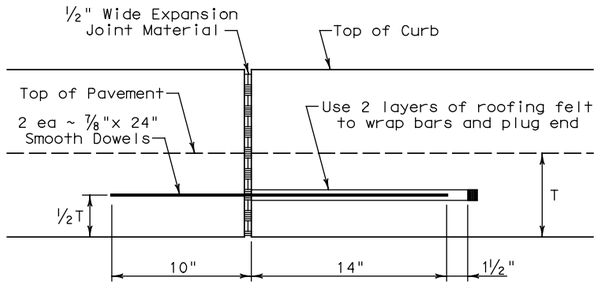
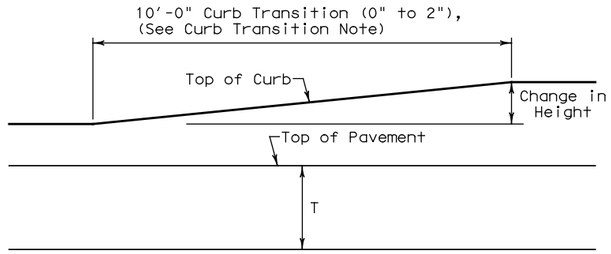
DATE:
FILE:



EXPANSION JOINT DETAIL



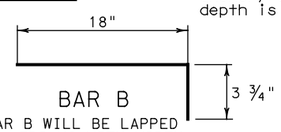
CURB TRANSITION

Note: To be paid for as Highest Curb

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

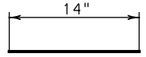
Type Mono Curb II Note:
Hole size, hole cleaning and other installation requirements shall conform to manufacturer's recomendation.

*4 deformed bar (½") with adhesive anchor (ty iii cl 9 epoxy). min pullout tensile strength of 12, 000 lbs each anchor, estimated required embankment depth is 6".

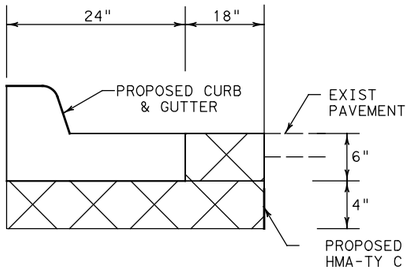


BAR B

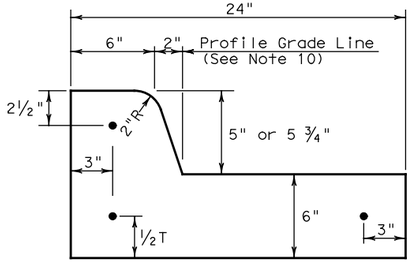
BAR B WILL BE LAPPED ON MEDIANS WITH WIDTH BETWEEN 4' TO 2'



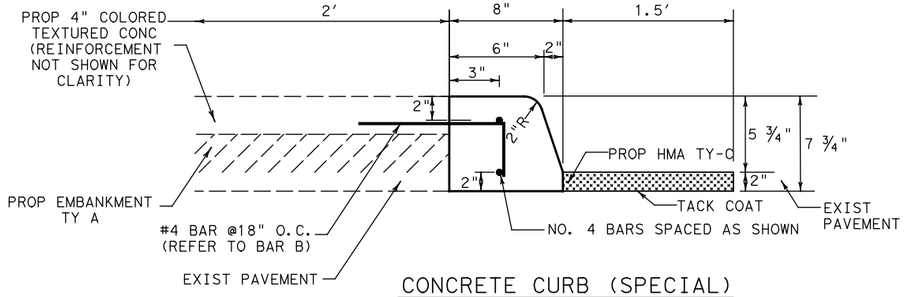
BAR C



TYPICAL CURB AND GUTTER INSTALLATION



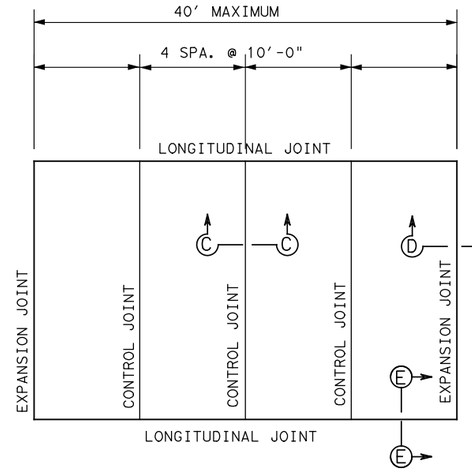
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



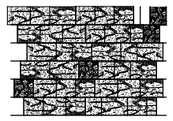
CONCRETE CURB (SPECIAL)

General Notes

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



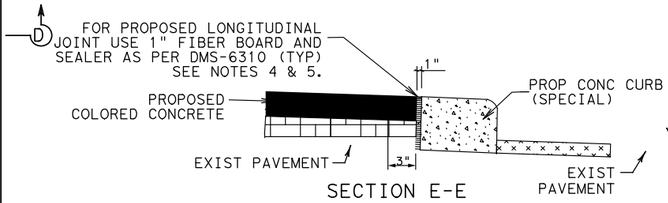
4" COLORED TEXTURED CONCRETE JOINT DIAGRAM



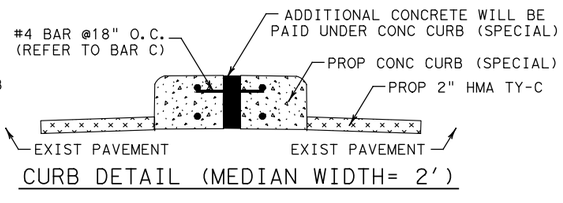
COLORED TEXTURED CONCRETE
PATTERN: LONDON COBBLE STONE

COLORS: "SLATE GREEN AND DESERT TAN"

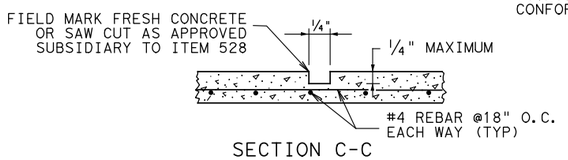
CURB DETAIL (MEDIAN WIDTH 4' TO 2')



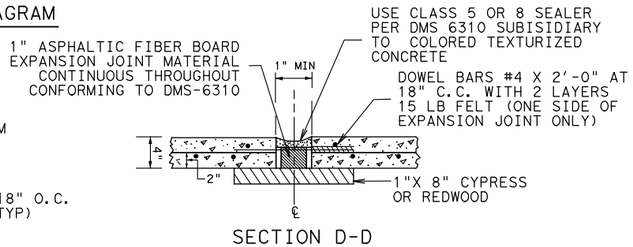
SECTION E-E
LONGITUDINAL JOINT DETAIL



CURB DETAIL (MEDIAN WIDTH= 2')



SECTION C-C
CONTROL JOINT

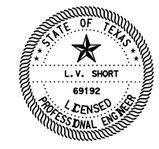


SECTION D-D
EXPANSION JOINT

Colored Textured Concrete Notes:

1. Prepare existing subgrade and embankment material 4" below top of curb.
2. Use class "A" concrete for colored textured concrete.
3. Install patterns per manufacturer's specifications. Orient patter to median center line. Use colored textured concrete pattern shown or as directed.
4. Place control, longitudinal & expansion joints as shown or directed. Materials and labor are subsidiary to item 528.
5. See general notes for colored concrete pattern and color dedicated for the project area. Refer to "Median Layout" sheets for colored concrete location, quantity and pay items.
6. See "Median Layout" sheets for colored concrete layout, pay items and quantities. Refer to general notes for additional information.

SCALE: N.T.S.



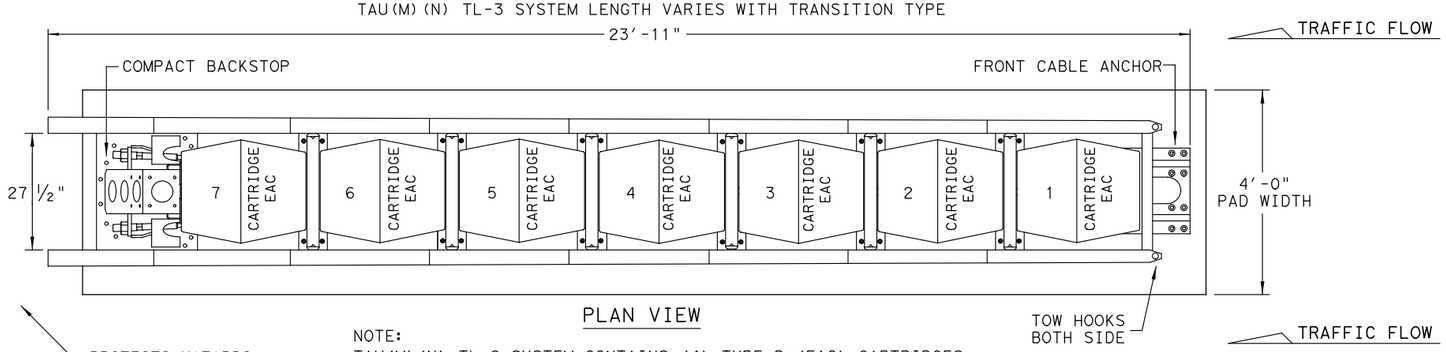
SHEET 1 OF 1

Texas Department of Transportation

COLORED CONCRETE AND MISCELLANEOUS DETAILS

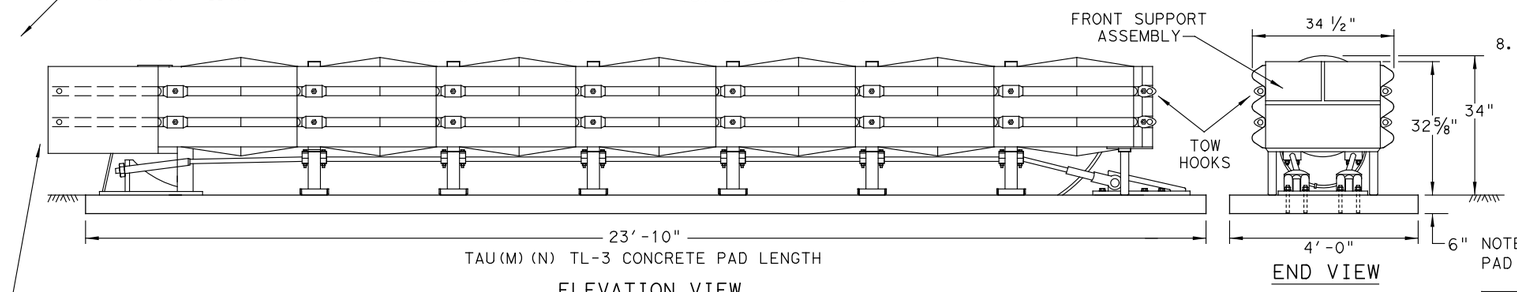
	DN: TxDOT	CK: AM	DW: VP	CK: VP
	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		105

TAU(M)(N) TL-3 SYSTEM LENGTH VARIES WITH TRANSITION TYPE



PLAN VIEW

NOTE:
TAU(M)(N) TL-2 SYSTEM CONTAINS (4) TYPE B (EAC) CARTRIDGES. INSTALLED ON ROADWAYS WITH MAXIMUM SPEEDS OF 45 MPH.



ELEVATION VIEW

END VIEW

NOTE:
PAD THICKNESS VARIES - SEE FOUNDATION OPTIONS

NOTES:
TRANSITIONS AND ATTACHMENTS TO VARIOUS BARRIER SHAPES, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS MANUAL FOR ADDITIONAL TRANSITION DETAILS.

NOTE:
CONCRETE FOUNDATION PAD LENGTH VARIES WITH TL-3 AND TL-2 SYSTEMS, SEE SYSTEM & FOUNDATION LENGTH TABLE.

FOUNDATION OPTIONS	
6" REINFORCED CONCRETE	
8" UNREINFORCED CONCRETE	
ASPHALT OVER CONCRETE WITH MINIMUM 6" EMBEDMENT IN CONCRETE	
⚹ 6" ASPHALT OVER 6" COMPACT SUBBASE	
8" MINIMUM ASPHALT	

SYSTEM & FOUNDATION LENGTH TABLE	
SYSTEM LENGTH	FOUNDATION LENGTH
TL-2 = 15′-5"	TL-2 = 15′-4"
TL-3 = 23′-11"	TL-3 = 23′-10"

⚹ NOTE:
REQUIRES AN ASPHALT ANCHORAGE PACKAGE: INCLUDES ADDITIONAL BRACES FOR THE FRONT CABLE ANCHOR AND THE COMPACT BACKSTOP, AND ASPHALT HARDWARE KIT. THE TL-3 ASPHALT CONFIGURATION ALSO REQUIRES NESTED SLIDER PANELS AND SHIMS AT THE LAST TWO BAYS. SEE MANUFACTURER'S INSTALLATION INSTRUCTION MANUAL FOR DETAILS.

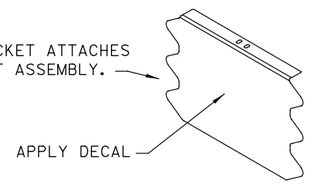
NOTE:
SEE MANUFACTURER'S INSTALLATION INSTRUCTION MANUAL FOR FOUNDATION SPECIFICATIONS THAT INCLUDE, STONE AGGREGATE MIX, COMPRESSION STRENGTH, STEEL SIZE, ANCHOR SIZE, AND EMBEDMENT DEPTH.

TRANSITION OPTIONS	
USE THE COMPACT BACKSTOP	VERTICAL WALL
	CONCRETE TRAFFIC BARRIERS
	W-BEAM GUARDRAIL
	THRIE BEAM GUARDRAIL

NOTE:
FOR BI-DIRECTIONAL TRANSITION PANELS AND BRIDGE RAIL END SHOE DETAILS. SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS MANUAL.

⚹⚹ NOTE:
ENGINEER OR CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURER FOR THE CORRECT DECAL PER TRAFFIC FLOW, LEFT, RIGHT OR BOTH-SIDES.

NOTE:
DELINEATION BRACKET ATTACHES TO FRONT SUPPORT ASSEMBLY.



DELINEATION BRACKET

NOTE:
APPLY A HIGH REFLECTIVE DECAL TO THE DELINEATION BRACKET. DELINEATION DECAL ORIENTATION IS SHOWN ON THE CONSTRUCTION PLAN SET AND SHALL BE IN ACCORDANCE WITH THE TEXAS MUTCD FOR (TRAFFIC CONTROL DEVICES). DECALs ARE AVAILABLE FOR TRAFFIC FLOW ON THE LEFT-SIDE, BOTH -SIDES AND RIGHT-SIDE.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. REFER TO THE LATEST (LTS) INSTALLATION INSTRUCTION MANUAL FOR IMPORATANT SAFETY MESSAGES, COMPLETE SYSTEM ASSEMBLY, AND ANCHOR INSTALLATION REQUIREMENTS FOR THE NINE (9) DIFFERENT SITE TRANSITIONS.
3. INSTALLATION DETAILS FOR THE COMPACT BACKSTOP, FRONT CABLE ANCHOR AND FOUNDATION OPTIONS ARE SHOWN ON THE INSTALLATION INSTRUCTION MANUAL FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 P.S.I.
5. IF THE CROSS-SLOPES VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE TAU(M)(N) SYSTEM SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTER LINE OF MERGING BARRIERS.
8. THIS DRAWING REPRESENTS THE UNIVERSAL TAU(M)(N) TL-3 SYSTEM, A RE-DIRECTIVE NON-GATING CRASH CUSHION THAT CAN PROTECT HAZARDS UP TO 30-INCHES IN WIDTH. ALSO AVAILABLE IN TL-2 CONFIGURATION.

BILL OF MATERIALS FOR TAU(M)(N) TL-3 & TL-2 SYSTEMS		QUANTITIES	
	PART NUMBER	PART DESCRIPTION	TL-3 SYSTEM	TL-2 SYSTEM
	BSI-1708019-00	SLIDING PANEL GALVANIZED TAU(M)(N)	14	8
	BSI-1708030-00	END PANEL, THRIE BEAM, GALV, TAU(M)(N)	2	2
	BSI-1706001-00	CABLE ASSEMBLY, 7 BAY, TAU(M)(N)	2	-
	BSI-1805036-00	CABLE ASSEMBLY, 4 BAY, TAU(M)(N)	-	2
	BSI-1708018-00	FRONT CABLE ANCHOR	1	1
	BSI-1707034-00	COMPACT BACKSTOP	1	1
	B030703	MIDDLE SUPPORT ASSEMBLY	6	3
	B030704	FRONT SUPPORT	1	1
	B010722	ENERGY ABSORBING CARTRIDGE, TYPE B	7	4
	K001005	TAU-II FRONT SUPPORT LEG KIT	1	1
	BSI-1709083-KT	TETHER KIT (INCLUDES ALL HARDWARE)	1	1
	BSI-1809041-KT	SLIDER KIT (INCLUDES ALL HARDWARE)	7	4
	BSI-1808033-KT	CABLE GUIDE KIT (INCLUDES ALL HARDWARE)	6	3
	BSI-1809040-KT	TOW HOOK KIT (INCLUDES ALL HARDWARE)	1	1
	BSI-1808034-KT	DELINEATION BRACKET KIT(INCLUDES ALL HARDWARE)	1	1
	BSI-1808035-KT	END PANEL MOUNT KIT (INCLUDES ALL HARDWARE)	1	1
	BSI-1808036-KT	CONCRETE ANCHORING KIT	1	1
⚹⚹	SEE NOTE	HIGH REFLECTIVE DECAL	1	1
	ECN 3883	INSTALLATION AND INSTRUCTIONS MANUAL	1	1

NOTES:
UPGRADE KITS ARE AVAILABLE TO RETROFIT EXISTING NCHRP 350 TAU-II SYSTEMS TO MASH COMPLIANT SYSTEMS. SEE MANUFACTURER'S PRODUCT INFORMATION.

THE TAU(M)(N) UNIDIRECTIONAL SYSTEM IS FREE STANDING AND IS NOT REQUIRED TO BE CONNECTED TO THE HAZARD.

TRANSITIONS TO GUARD FENCE, BRIDGE RAILS AND ROADSIDE BARRIERS SHALL BE IN ACCORDANCE WITH TxDOT'S POLICY.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE UNIVERSAL TAU(M)(N) SYSTEM, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTION MANUAL.

REUSABLE

Texas Department of Transportation — Design Division Standard

LINDSAY TRANSPORTATION SOLUTIONS

UNIVERSAL CRASH CUSHION (MASH TL-3 & TL-2)

TAU(M)(N)-19

FILE: taumn19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
©TxDOT: APRIL 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		106

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DATE: 3/30/2021
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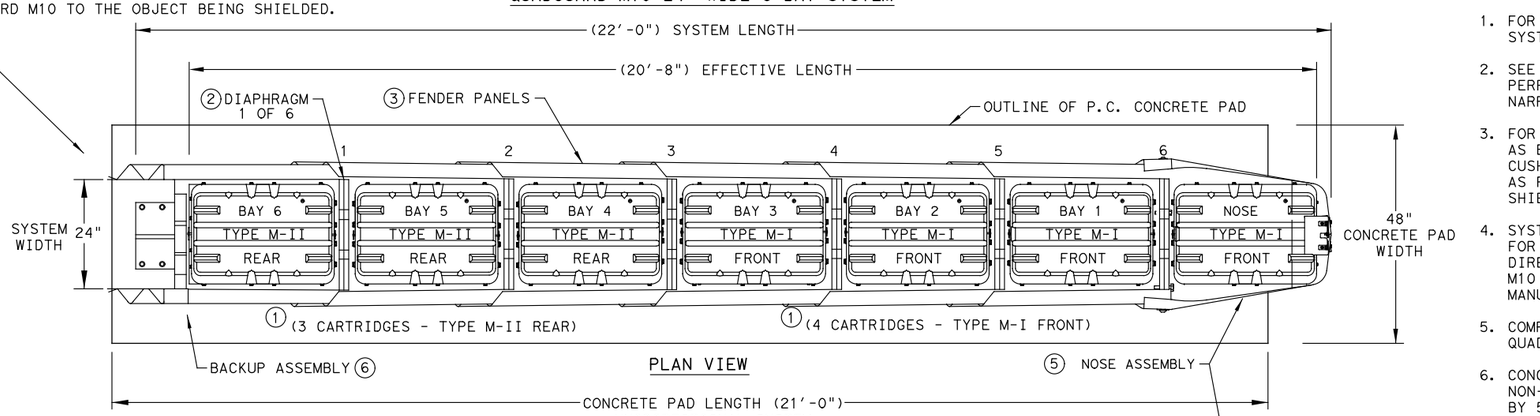
NOTE:
A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD M10 TO THE OBJECT BEING SHIELDED.

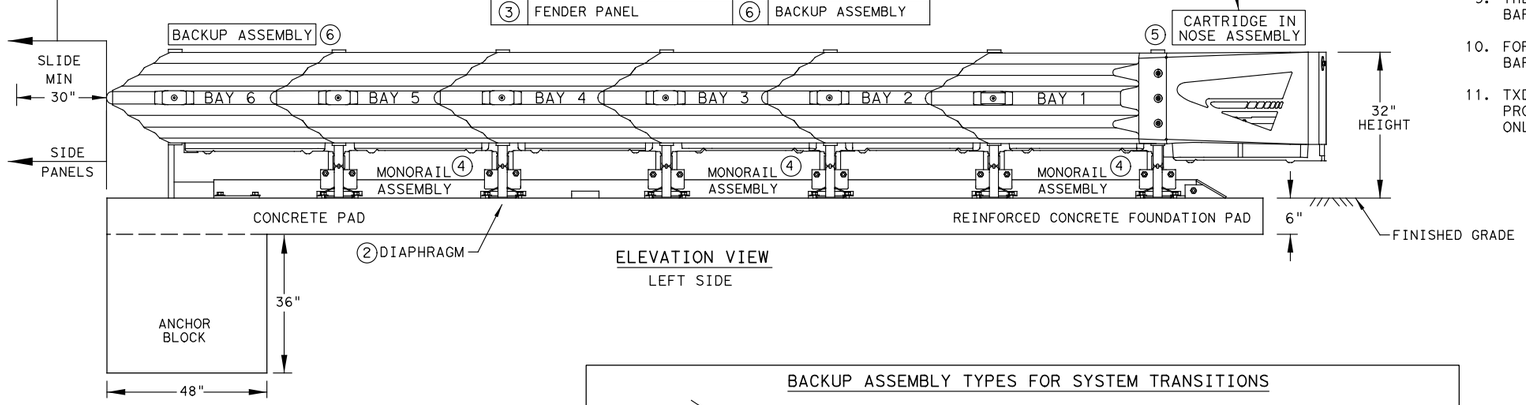
QUADGUARD M10 24" WIDE 6-BAY SYSTEM



PLAN VIEW

KEY		KEY	
①	QUADGUARD CARTRIDGE	④	MONORAILS
②	DIAPHRAGM	⑤	NOSE ASSEMBLY
③	FENDER PANEL	⑥	BACKUP ASSEMBLY

NOTE:
PROVISION SHALL BE MADE FOR REAR FENDER SIDE PANELS TO SLIDE REARWARD UPON IMPACT, 30" 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 M10 (N) INSTALATION AND DETAILED INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY FOR THE REQUIRED TRANSITION WILL BE PROVIDED 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.

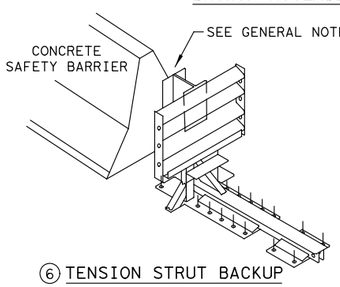
CONCRETE PAD AND ANCHOR BLOCK COMBINATIONS SHALL BE CONFIRMED WITH THE MANUFACTURER BASED UPON SITE SPECIFIC DATA (SSD).

NOTE:
THE QUADGUARD M10 24" WIDE 6-BAY - NARROW SYSTEM HAS BEEN TESTED TO MASH TEST LEVEL 3.

TL-3 MODEL #	QM10024	CARTRIDGE TYPES IN BAYS		
BAYS	6	TYPE-MII	TYPE-MI	TYPE-MI
DIAPHRAGMS	6	3	3	1
WIDTH	24"	REAR	FRONT	NOSE

TL-2 MODEL #	QM7024	CARTRIDGE TYPES IN BAYS		
BAYS	3	TYPE-MII	TYPE-MI	TYPE-MI
DIAPHRAGMS	3	1	2	1
WIDTH	24"	REAR	FRONT	NOSE

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS



⑥ 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 M10 TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:

ALL POSTS W6X8.5/9 I-BEAMS (78" LONG).

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.

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 M10 PRODUCT DESCRIPTION ASSEMBLY MANAUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITIONS AND THE DRAWING PACKAGE FOR THE NARROW 24" SYSTEM BEFORE INSTALLING THE QUADGUARD M10 SYSTEM AT ANY GIVEN LOCATION.
3. FOR BI-DIRECTIONAL TRAFFIC: THE PLACEMENT OF THE QUADGUARD M10 IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD M10 THE CRASH CUSHION MUST BE PLACED SUCH THAT THE TRAFFIC SIDE OF CRASH CUSHION IS AT LEAST AS FAR FROM ADJACENT TRAVEL LANE LINE AS THE TRAFFIC SIDE OF BARRIER/OBJECT BEING SHIELDED.
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 M10 SYSTEM IS SHIELDING. SEE THE QUADGUARD M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
5. COMPONENTS FOR THE QUADGUARD M10 BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD 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 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 M10 SYSTEM. THE QUADGUARD M10 PRODUCT DESCRIPTION AND ASSEMBLEY 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.

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

REUSABLE

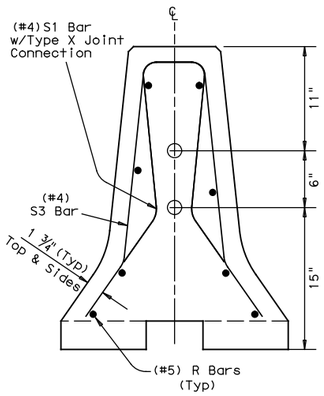
Texas Department of Transportation — Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD M10 (MASH TL-3 & TL-2 NARROW-24"ONLY)

QGUARD(M10)(N)-20

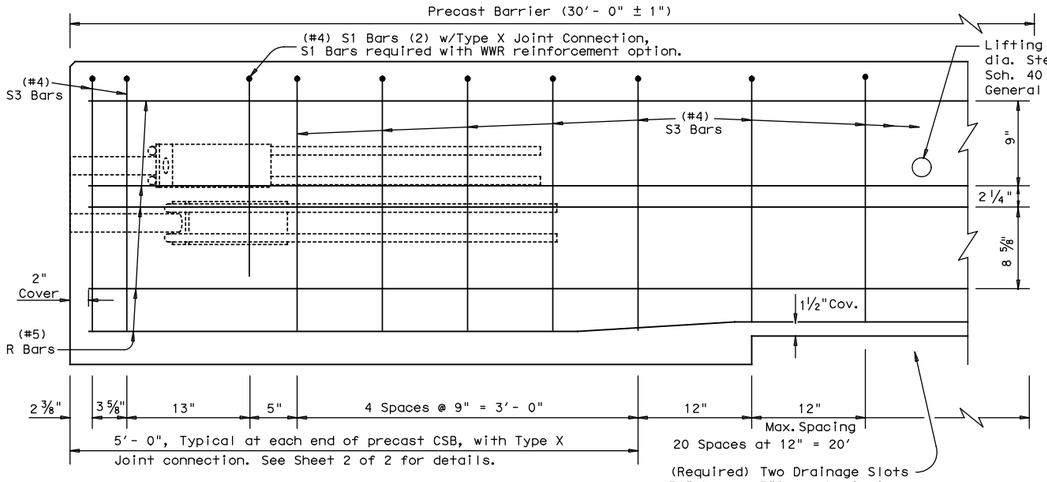
FILE: qguardm10n20.dgn	DN:TxDOT	CK:KM	DW:VP	CK:AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		107

DATE:
FILE:



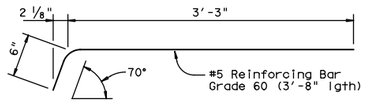
End View Precast Barrier

See sheet 2 of 3 for Joint connection Type X



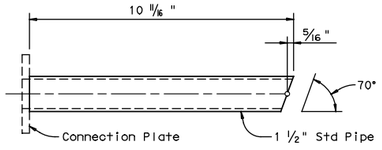
Reinforcement for Precast (CSB) Concrete Safety Barrier (Type 1)

Showing reinforcement for Joint Type X



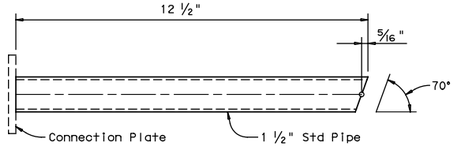
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly.
Eight (8) required per Joint.



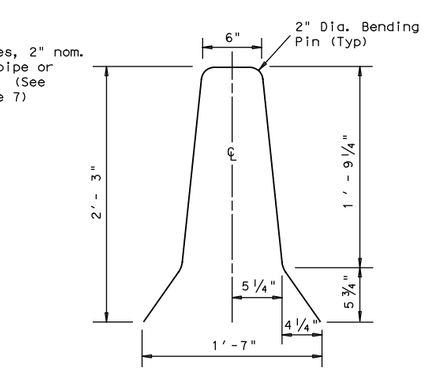
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly.
Two (2) required per Joint.



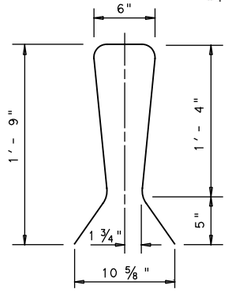
LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly.
Two (2) required per Joint.



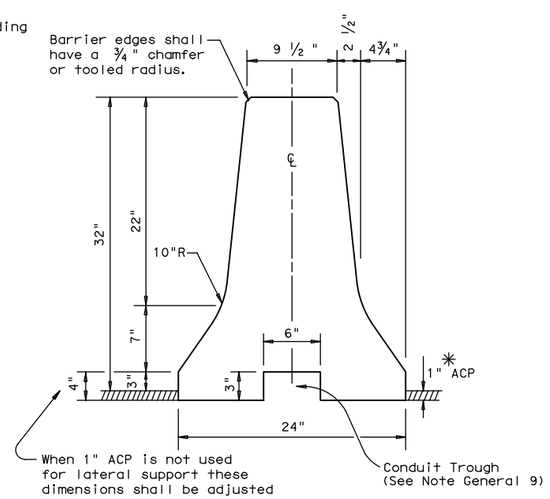
S3 Bar

#4 Bar



S1 Bar

#4 Bar (2)
(Joint Type X)

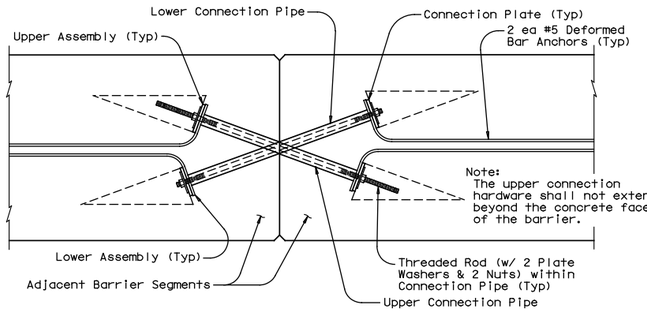


Concrete Safety Barrier

✳ When 1" ACP is "not" used as lateral support for permanent barrier placement. A permissible method of attaining the equivalent lateral support may be used, See CSB(6) sheet.

GENERAL NOTES

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a 3/4" chamfer or tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. All steel assemblies for joint shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items involved.
9. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

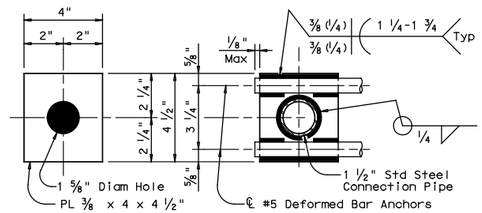
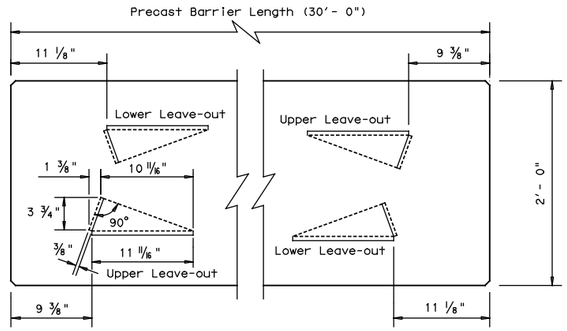


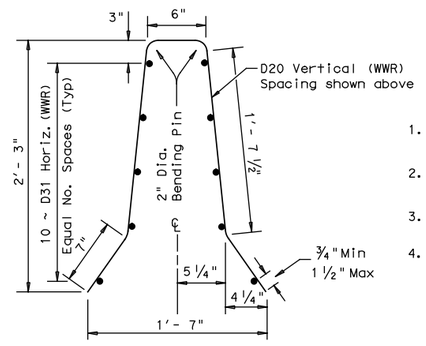
PLATE DIMENSIONS WELDING DETAILS

CONNECTION PLATE DETAILS

One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.



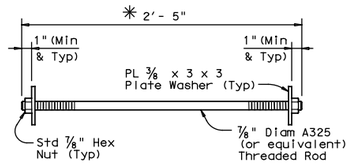
BARRIER PLAN AT END JOINTS



Welded Wire Reinforcement (WWR) Option for Bars R and S3

(WWR) General Notes

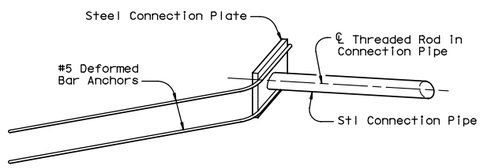
1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



CONNECTION BOLT OR THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts) (w/ Two (2) PL 3/8 x 3 x 3 Plate Washers & Two (2) Std Hex Nuts) required per Joint.

✳ The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.



ISOMETRIC OF TYPICAL WELDED ASSEMBLY

Four (4) [2 Upper & 2 Lower] Assemblies required per Joint.

Weight of one Precast 30 ft. (CSB) segment = Approx. 6.5 Tons or 440 lbs per ft.

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

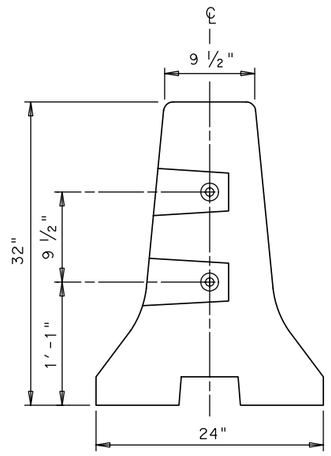
CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER (TYPE 1)

CSB(1)-10

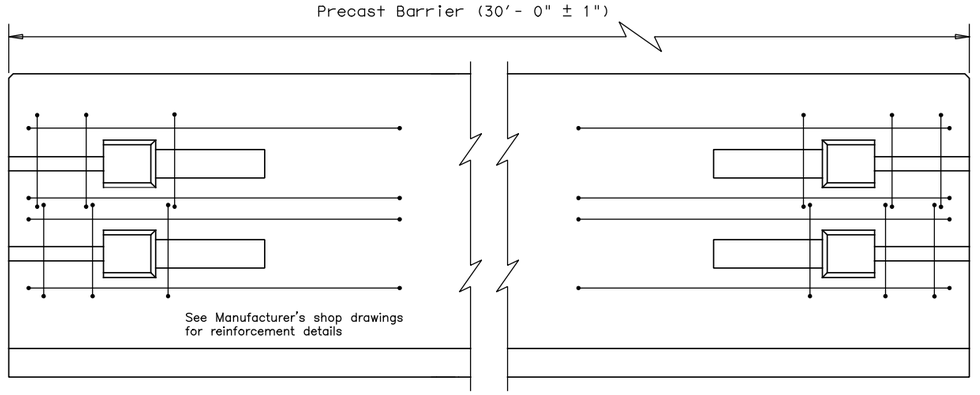
FILE: csb110.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		108

DATE:
FILE:



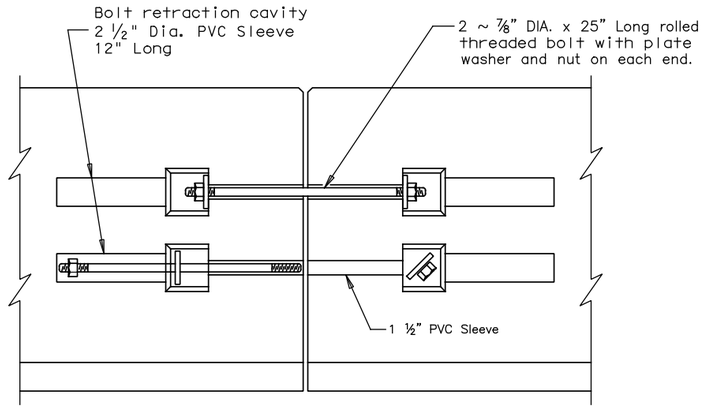
END VIEW (CSB) QUICK-BOLT

QUICK-BOLT POCKET LOCATIONS



ELEVATION (CSB) QUICK-BOLT

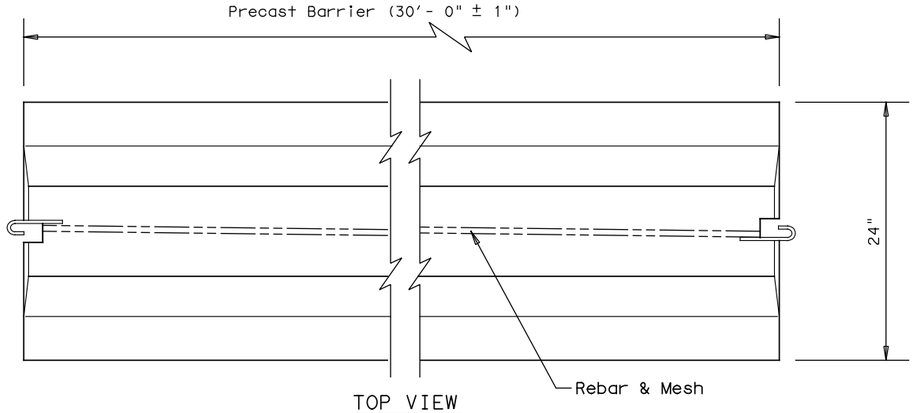
See Manufacturer's shop drawing for additional details



ELEVATION VIEW SHOWING JOINT CONNECTION

"QUICK-BOLT"

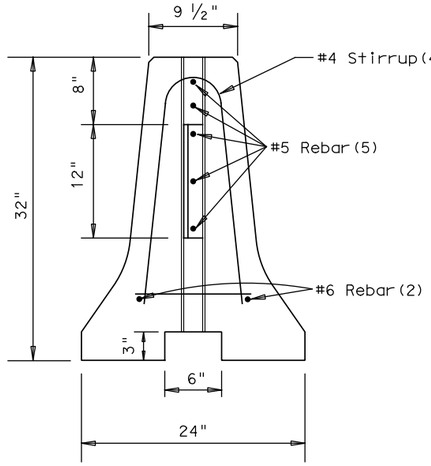
Joint Connection (Type Q)



TOP VIEW

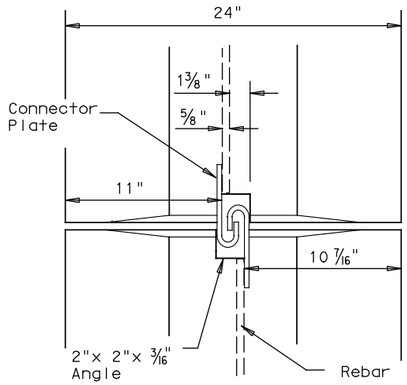
PRECAST (CSB) WITH J-J HOOKS

See Manufacturer's shop drawing for additional details



END VIEW
J-J HOOK CONNECTION

Joint Connection (Type J)



VIEW FROM ABOVE
J-J HOOK CONNECTION

Proprietary Joint Connections (CSB)

Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

J-J Hooks by Easi-Set Industries, (800)547-4045
Quick-Bolt by Bexar Concrete, (210)497-3773

If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.

Texas Department of Transportation

Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)

CSB(1)-10

FILE: csb110.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP		
©TxDOT December 2010	CONT	SECT	JOB		HIGHWAY	
REVISIONS	3451	01	035, ETC.		FM 1281, ETC.	
	DIST	COUNTY			SHEET NO.	
	ELP	EL PASO			109	

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	PERMANENT	FM 1281 6 OF 15	FM 1281	130+05	TL3	BI	N/A	N/A	F-SHAPE CTB PRECAST BARRIER (TY 1): CSB (1)-10	2′-0"	3′-6"	62′-6"	1						1			
2	PERMANENT	FM 1281 6 OF 15	FM 1281	151+99	TL3	BI	N/A	N/A	F-SHAPE CTB PRECAST BARRIER (TY 1): CSB (1)-10	2′-0"	3′-6"	62′-6"	1						1			
3	PERMANENT	FM 1281 5 OF 15	FM 1281	173+38	TL3	BI	N/A	N/A	SINGLE SLOPE CTB PRECAST BARRIER (TY 1): SSCB(2)-10	2′-0"	3′-6"	62′-6"	1						1			
4	PERMANENT	FM 1281 7 OF 15	FM 1281	208+02	TL3	BI	N/A	N/A	SINGLE SLOPE CTB PRECAST BARRIER (TY 1): SSCB(2)-10	2′-0"	3′-6"	62′-6"	1						1			
												TOTALS	4			4						

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	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC	FM 1281, ETC.
	DIST	COUNTY		
	ELP	EL PASO		
	FEDERAL AID PROJECT			SHEET NO.
	STP 2021 (624) HES			110

DATE:
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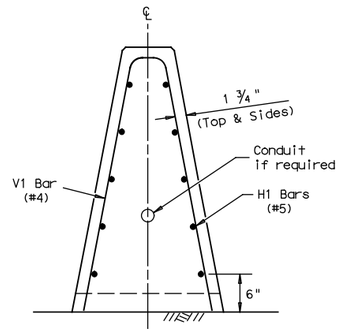
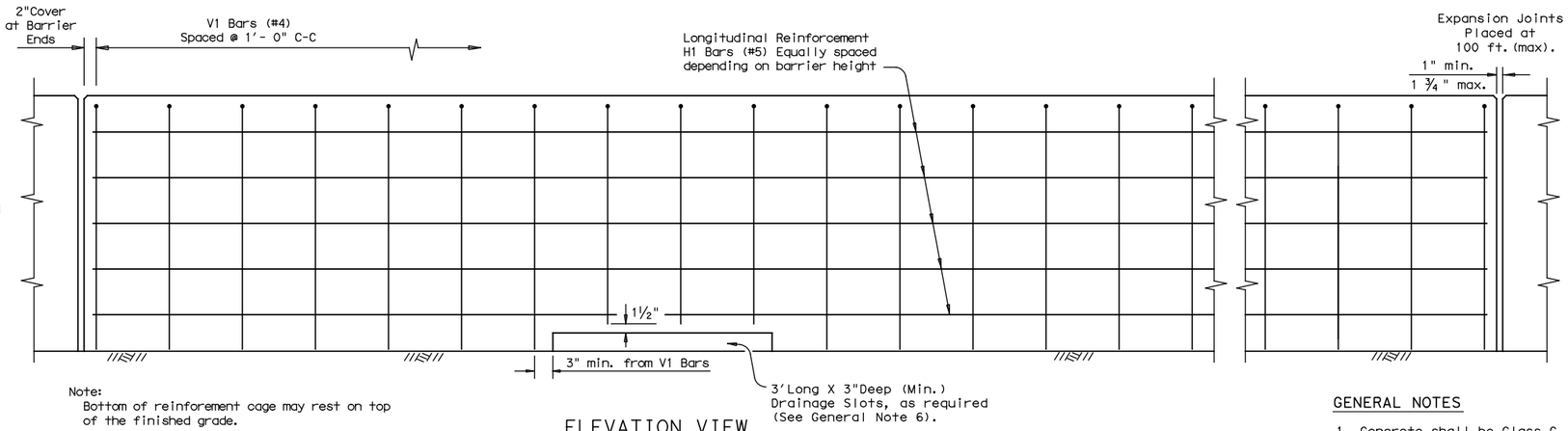


END VIEW

CAST-IN-PLACE (CIP) BARRIER

Barrier is Symmetrical About the Center Line

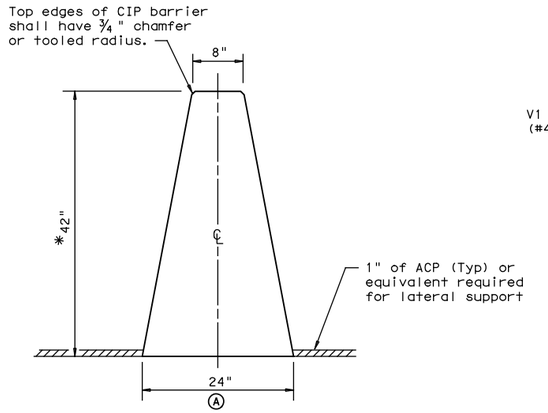


Note:
Bottom of reinforcement cage may rest on top of the finished grade.

Reinforcement around the drainage slots may be cut or bent to accommodate the edge and top clearances.

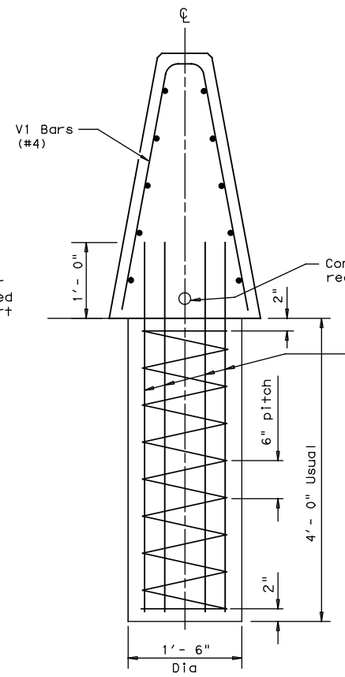
ELEVATION VIEW

Cast-in-Place (SSCB)(Type 2)on Roadway



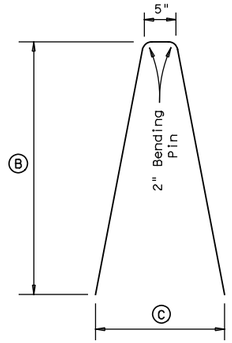
SINGLE SLOPE CONCRETE BARRIER

(SSCB)(42")



SECTION D-D

ANCHOR DETAIL



V1 Bar

#4 Rebar

BARRIER HEIGHT (IN.)	* DIMENSIONS (IN.)		
	Ⓐ	Ⓑ	Ⓒ
42	24	40 ¼	20 ½
48	26 ¼	46 ¼	22 ¾
54	28 ½	52 ¼	25 ⁵⁄₁₆

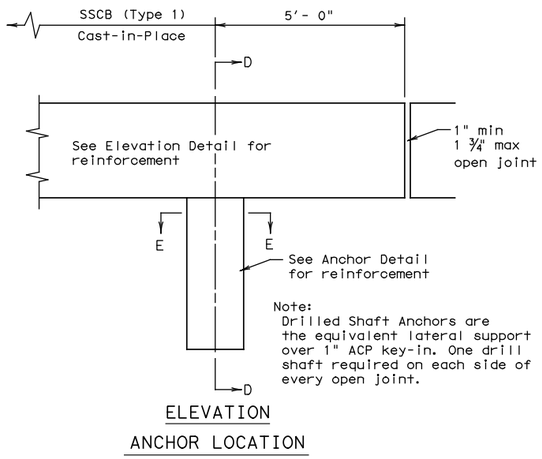
*(SSCB)(42") Barrier height may be increased to 48" or 54". This would increase the barrier and reinforcement dimensions accordingly.

GENERAL NOTES

1. Concrete shall be Class C. Unless otherwise specified in the plans.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. These details cover barrier per Item 514,"Permanent Concrete Traffic Barrier".
4. The Anchorage shown is considered subsidiary to the bid item.
5. Top edges of CIP barrier shall have a ¾ " chamfer or tooled radius.
6. Drainage slot locations (12'- 0", C-C Min. Spacing) are shown elsewhere, or as directed by the Engineer. Drainage slot heights on the SSCB may be increased to a maximum of 5 inches, without geometric changes to the barrier face.
7. Cast-in-place barrier may be slip formed. Bracing may be tied or tack welded to the reinforcement cage to provide cage stability. Do not weld to anchorage.
8. For locations where lighting is required, see the SSCB(4) sheet for the proper reinforcement and anchorage.

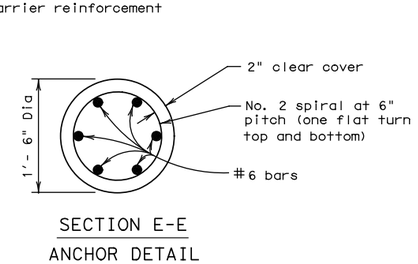
Cast-In-Place (CIP) or Slip-Formed (SSCB)
Cast-in-Place barrier may be connected to precast SSCB. Joint connection "Types" may be used in Cast-in-Place barrier, to match the precast barrier connection. (See required connection "Type" elsewhere in the plans)

The weight of Cast-in-Place (SSCB)42" is approx. 717 lbs per ft.



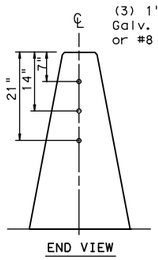
ELEVATION

ANCHOR LOCATION



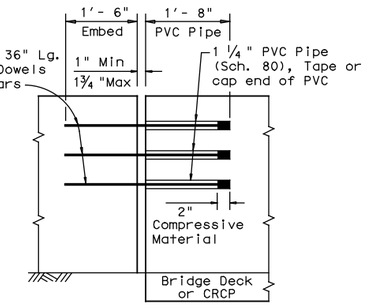
SECTION E-E

ANCHOR DETAIL



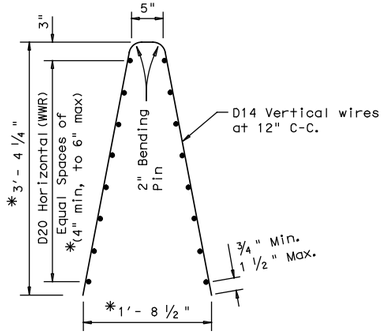
END VIEW

Dowel locations



EXPANSION JOINT (Dowel Connection)

Dowels may be used, as directed by the Engineer, in locations where the barrier could be laterally displaced.



Welded Wire Reinforcement (WWR) Option for Bars V1 and H1

(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut and bent to accommodate the drainage slots, as directed by the Engineer.
3. Weled wire spilce locations shall have a "minimum" splice lap length of 12".
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".

Texas Department of Transportation

Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

CAST-IN-PLACE

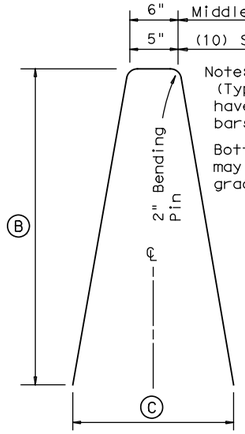
(TYPE 1)

(FLEXIBLE PAVEMENT)

SSCB(1F)-10

FILE: sscb1f10.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		111

DATE:
FILE:



Note:
(Type 4) barrier first (5) S3 bars have 5" top dimension, middle (10) bars require 6" top dimension.

Bottom of reinforcement cage may rest on top of the finished grade.

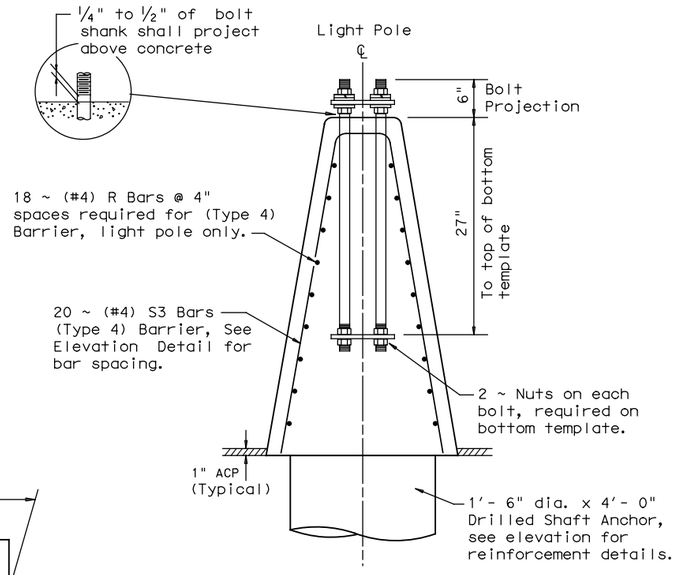
✱ Barrier height (IN.)	Dimensions (IN.) Ⓑ	Ⓒ
42	40 1/4	20 1/2
48	46 1/4	22 3/4
54	52 1/4	25 1/16

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

BAR	SIZE	QUANTITY
S3	#4	20
R	#4	18

Welded Wire Reinforcement (WWR):
IS NOT APPROVED FOR USE WITH (TYPE 4) BARRIER.

✱ (SSCB)(42")(Type 4) Barrier height may be increased to 48" or 54". This would increase the barrier and reinforcement dimensions accordingly.

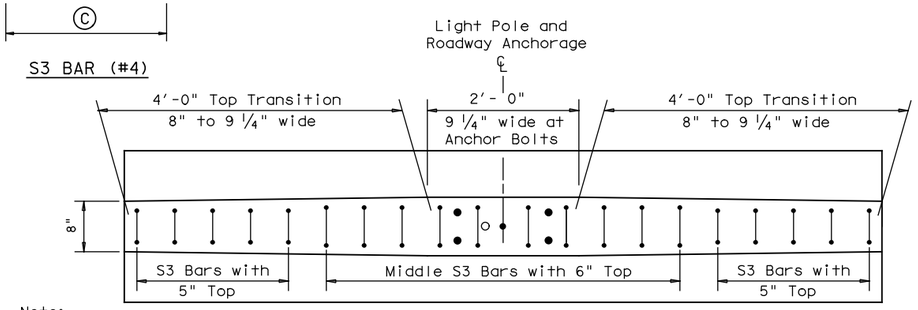


(ROADWAY) SECTION AT LIGHT POLE
Symmetrical about center line

GENERAL NOTES

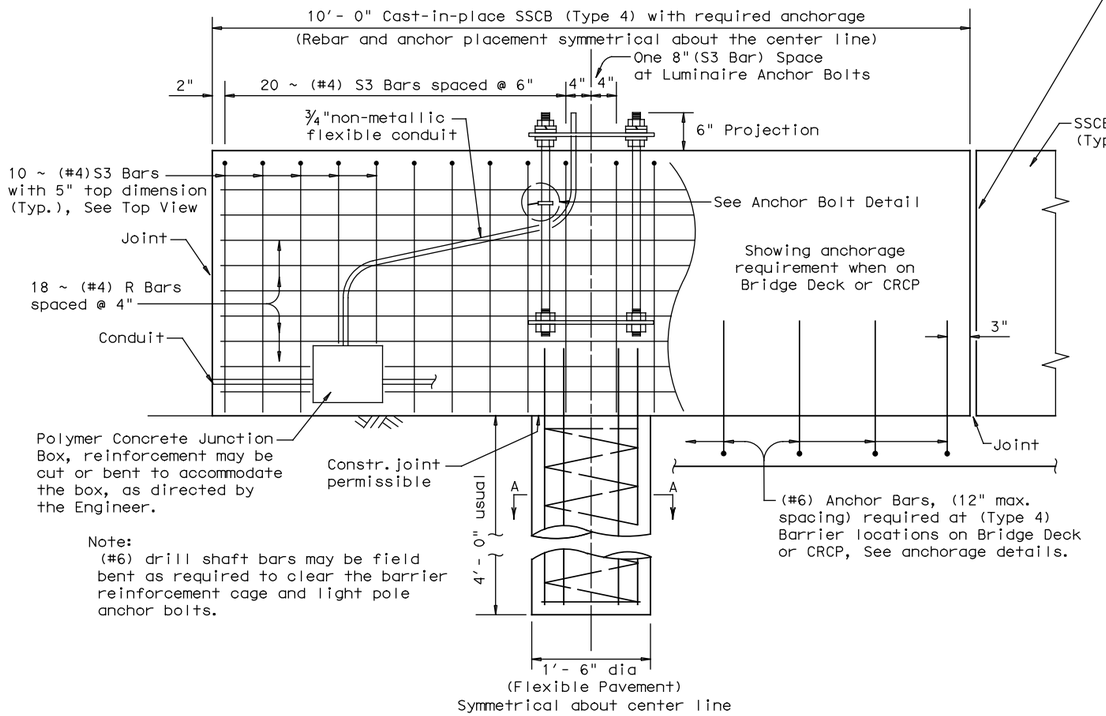
1. All concrete shall be Class C.
2. Anchor bolts, junction box, non-metallic flexible conduit, and bonding to steel shall not be paid for directly, but will be considered subsidiary to the various bid items.
3. For proper installation and material requirements for the anchor bolts and light pole, see 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 4 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.

S3 BAR (#4)



Note:
Top of barrier transitions from 8" to 9 1/4" to clear anchor bolts.

BARRIER (TYPE 4)
TOP VIEW
Showing S3 Bars and top dimension.



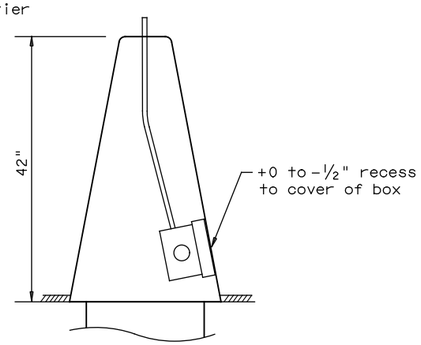
Symmetrical about center line

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

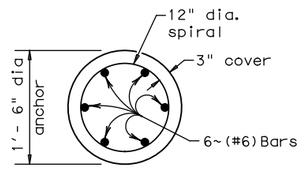
ELEVATION SHOWING THE REQUIRED REINFORCEMENT AND ANCHORAGE FOR (TYPE 4) BARRIER

The "Drilled Shaft Anchor" is the required anchorage for (Type 4) barrier on roadways with Flexible Pavement.
The #6 Anchor Bars (Shown) is the required anchorage for (Type 4) barrier on Bridge Decks and CRCP.

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.

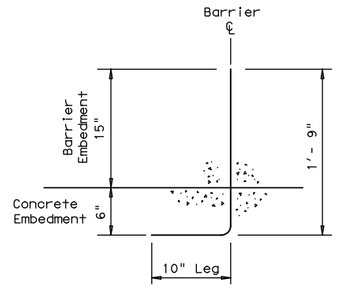


SECTION SHOWING JUNCTION BOX
CONCRETE SAFETY BARRIER (TYPE 4)



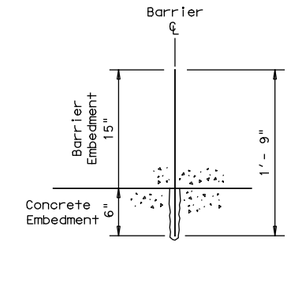
No.3 spiral at 6" pitch
(one flat turn top and bottom)

SECTION A-A



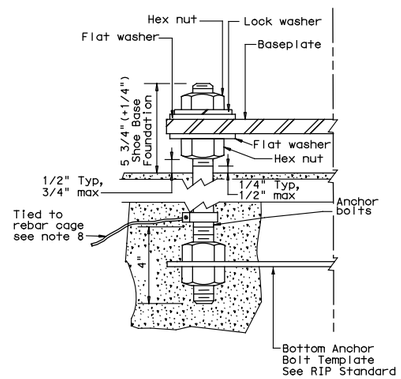
STANDARD "CONCRETE" ANCHORAGE
(#6) Bar
Concrete Pavement / Bridge Deck Anchorage:
Cast-in-Place or Slip-Formed Barrier

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. Follow the manufacturer's directions for installing the epoxied anchor bars.



ANCHOR BOLT DETAIL

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER
CAST-IN-PLACE
(TYPE 4) AT LIGHT POLE
TL-4 MASH COMPLIANT

SSCB(4)-19

FILE: sscb419.dgn	DN: TxDOT	CK: KM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
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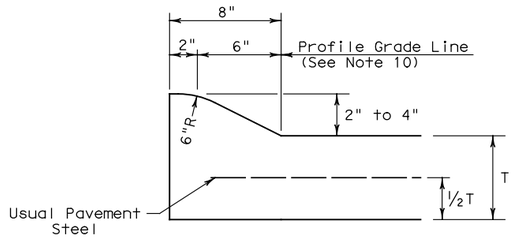
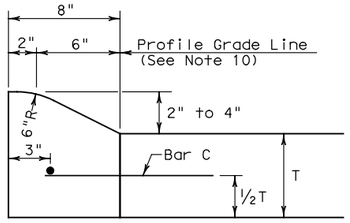
	ELP	EL PASO		112



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



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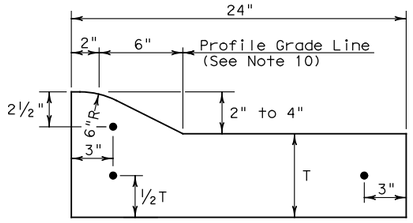
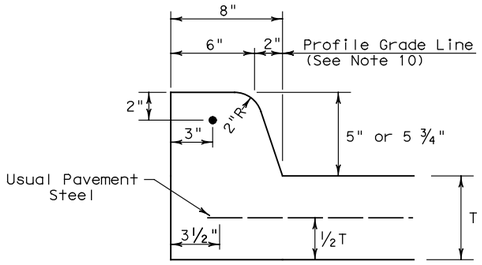
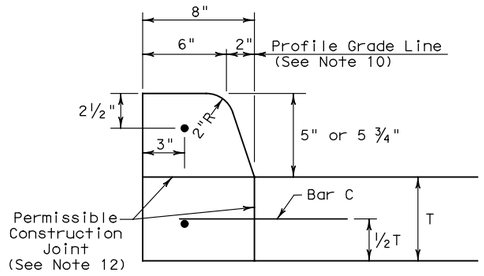


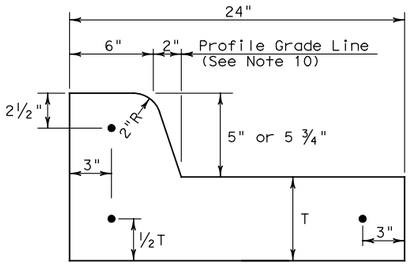
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



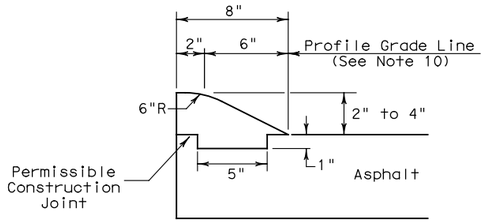
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



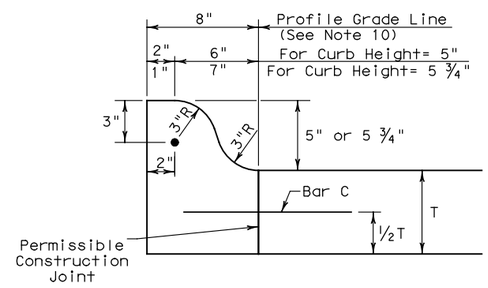
TYPE II CURB
5" - 5 ¾" HEIGHT



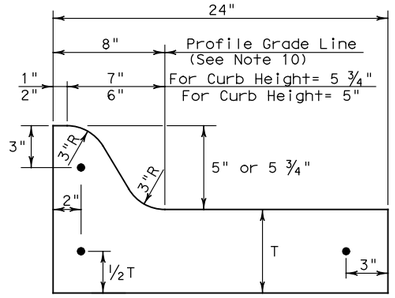
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



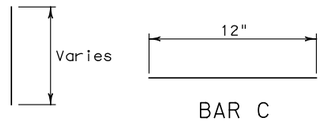
TYPE III CURB (KEYED)
2" - 4" HEIGHT



TYPE IIa CURB
5" - 5 ¾" HEIGHT

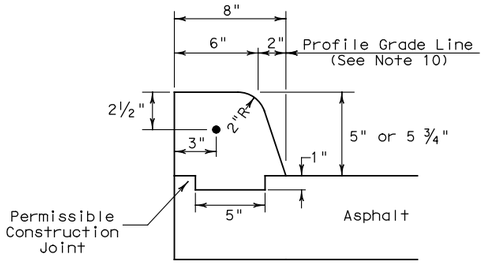


TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT

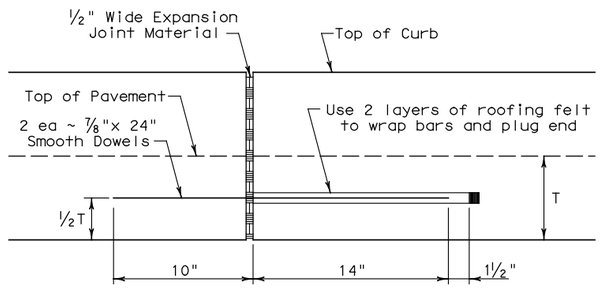


BAR B

BAR C

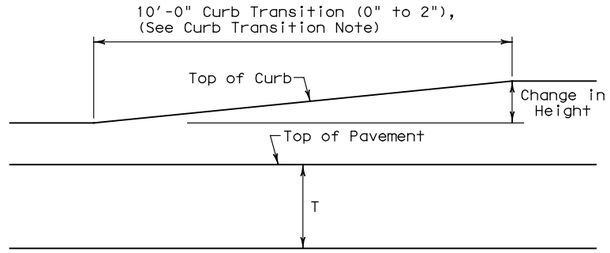


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

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



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-21

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: SS	CK: KM	
©TxDOT: FEBRUARY 2021 REVISIONS	CONT	SECT	JOB	HIGHWAY	
	3451	01	035, ETC.	FM 1281, ETC.	
	DIST	COUNTY		SHEET NO.	
	ELP	EL PASO		113	

3/30/2021
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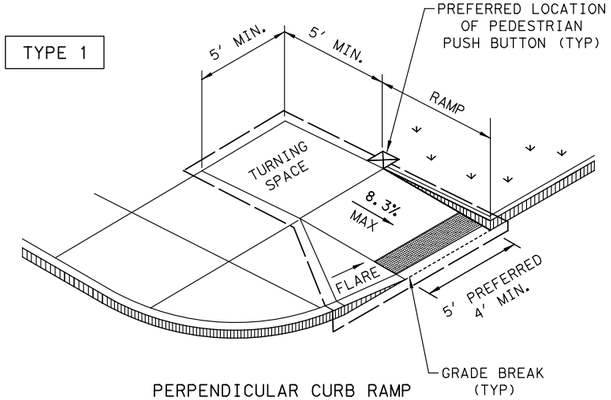
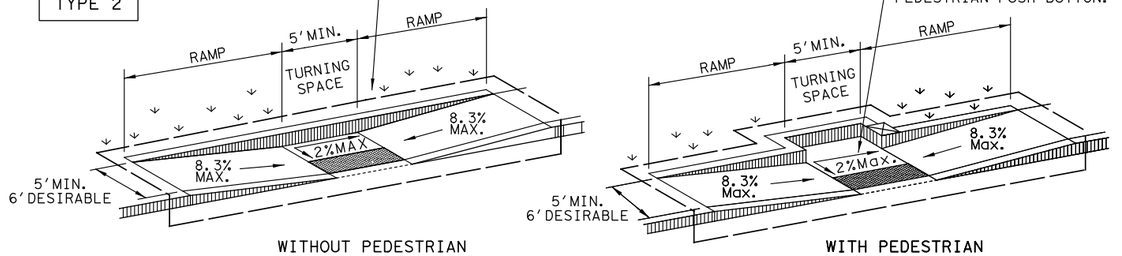
TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

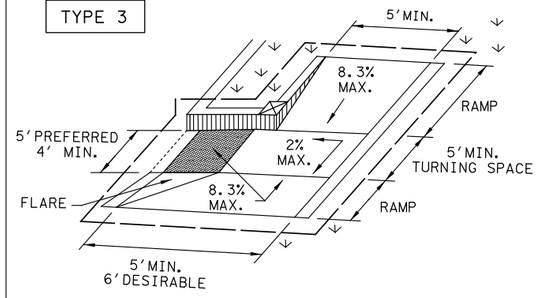


WITHOUT PEDESTRIAN PUSH BUTTON

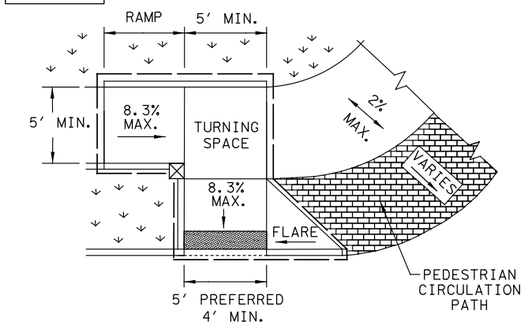
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

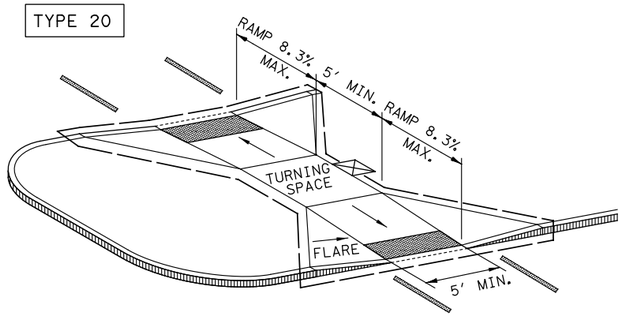


TYPE 6



COMBINATION CURB RAMPS

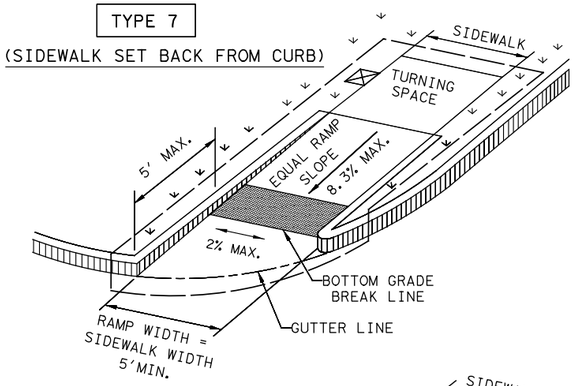
TYPE 20



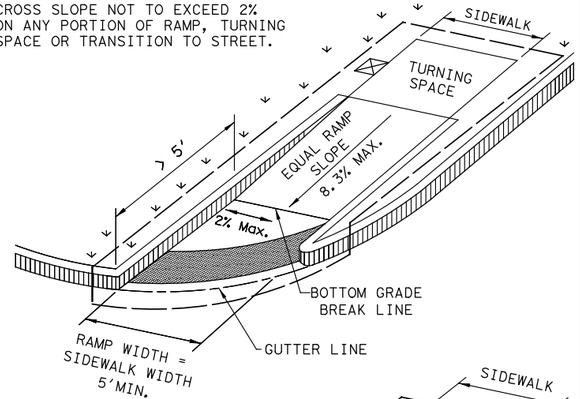
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

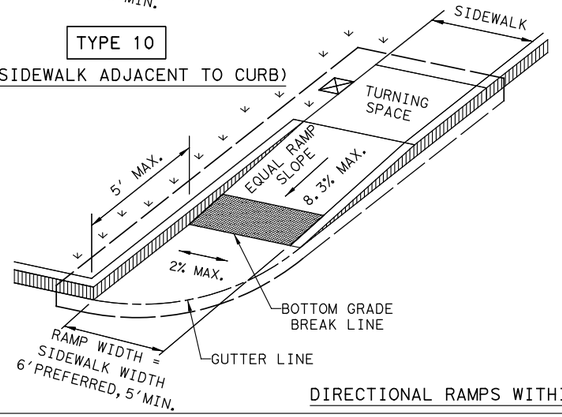


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

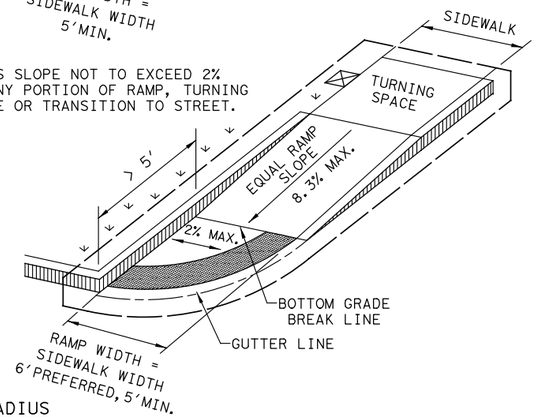


TYPE 10

(SIDEWALK ADJACENT TO CURB)

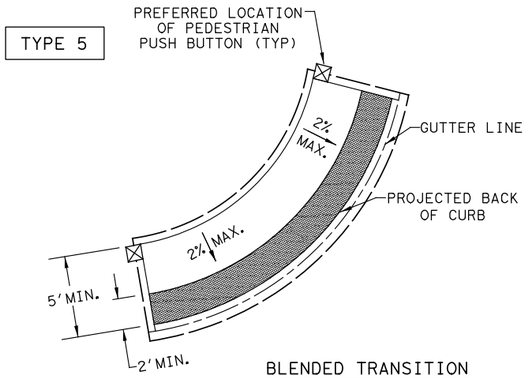


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

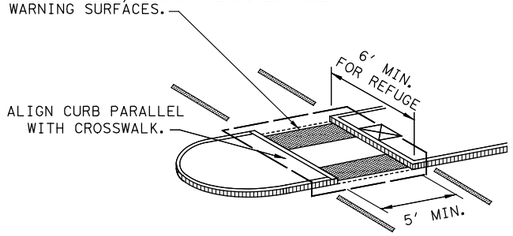
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

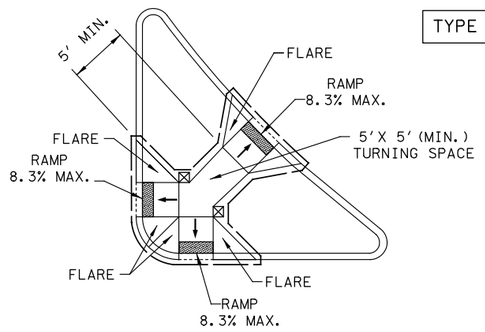
TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.



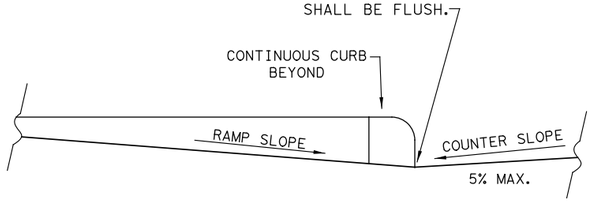
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
	CONT	SECT	JOB		HIGHWAY
REVISIONS	3451	01	035, ETC.		FM 1281, ETC.
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	ELP	EL PASO			114

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5′. Where the sidewalk is adjacent to the back of curb, a 6′ sidewalk width is desirable. Where a 5′ sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4′ for short distances. 5′x 5′ passing areas at intervals not to exceed 200′ are required.
5. Turning Spaces shall be 5′x 5′ minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4′x 4′ wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6′ wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5′x 5′ landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicable standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

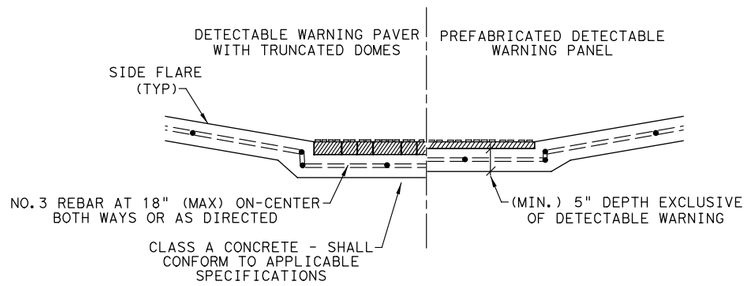
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

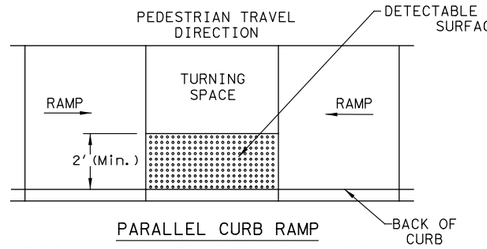
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.

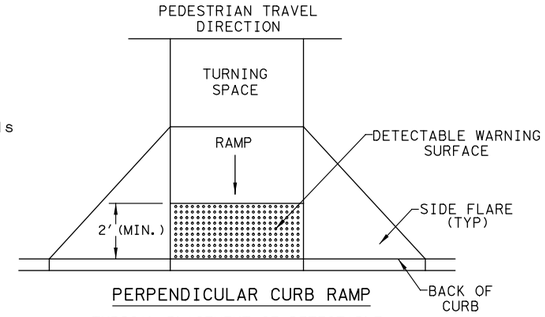


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

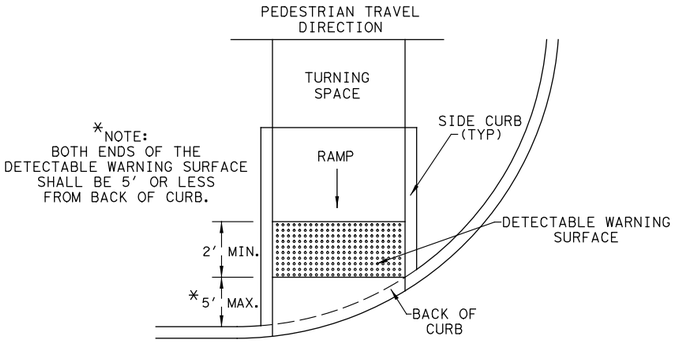
DETECTABLE WARNING SURFACE DETAILS



PARALLEL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	3451	01	035, ETC.		FM 1281, ETC.
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	ELP	EL PASO			115

3/30/2021
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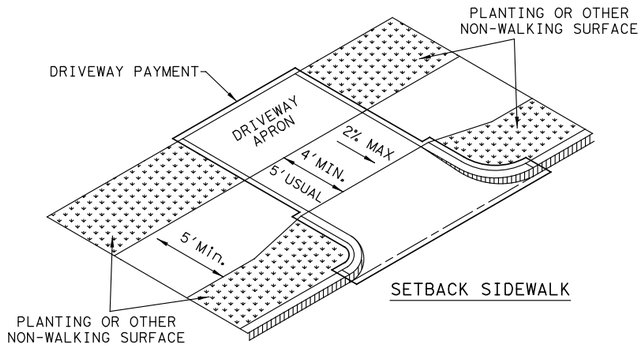
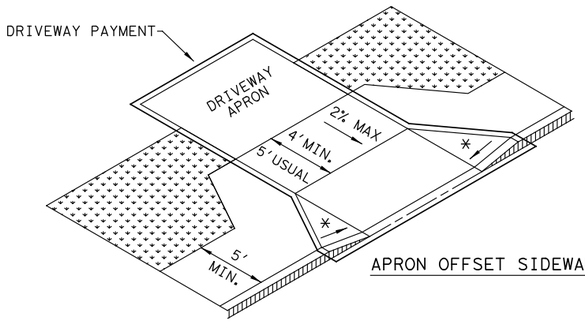
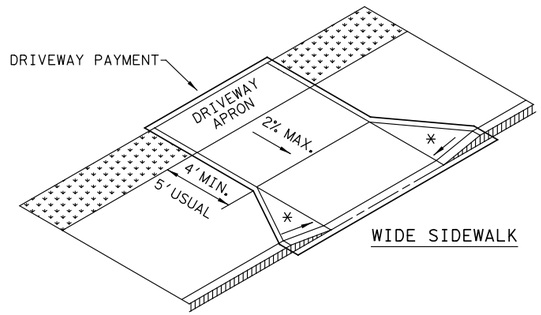
SIDEWALK TREATMENT AT DRIVEWAYS



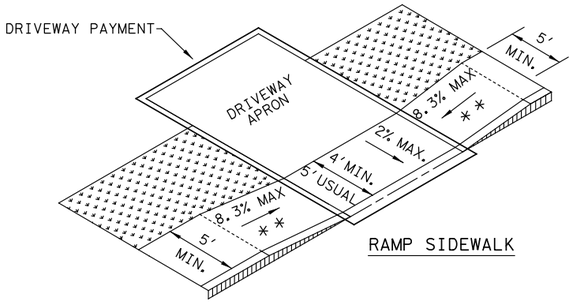
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

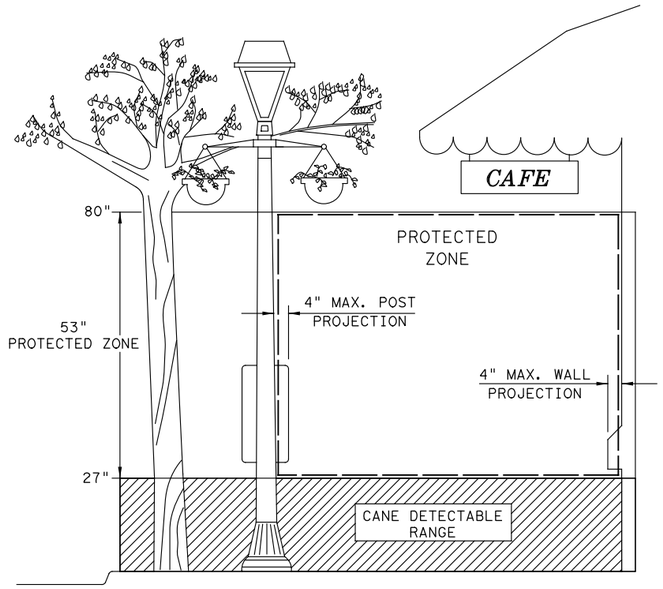


RAMP SIDEWALK

NOTES:

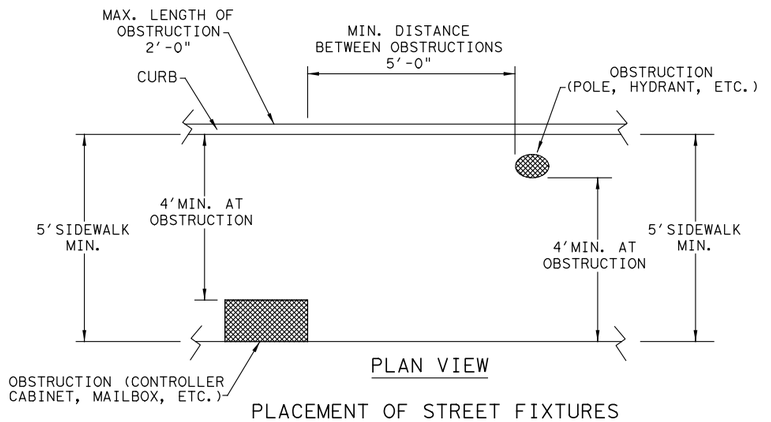
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.



PROTECTED ZONE

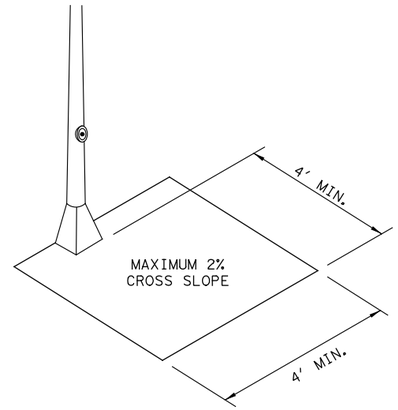
NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



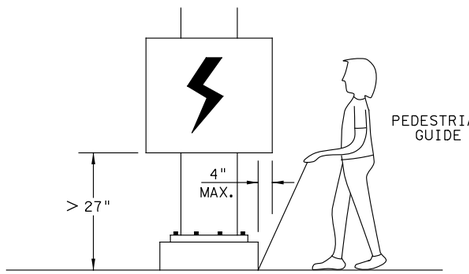
PLAN VIEW

PLACEMENT OF STREET FIXTURES

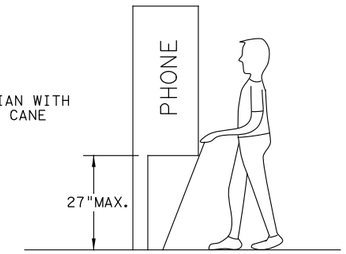
NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.



PROTRUDING OBJECTS OF A HEIGHT ≤ 27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

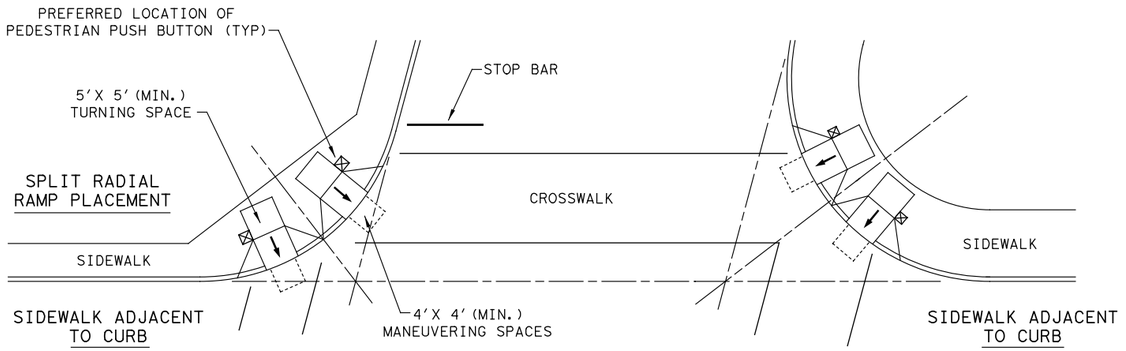
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	3451	01	035, ETC.		FM 1281, ETC.
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST		COUNTY		SHEET NO.
	ELP		EL PASO		116

3/30/2021
...3547.001 El Paso\SH20\CADD\Sheets\HALFF\STANDARDS\ped18.dgn

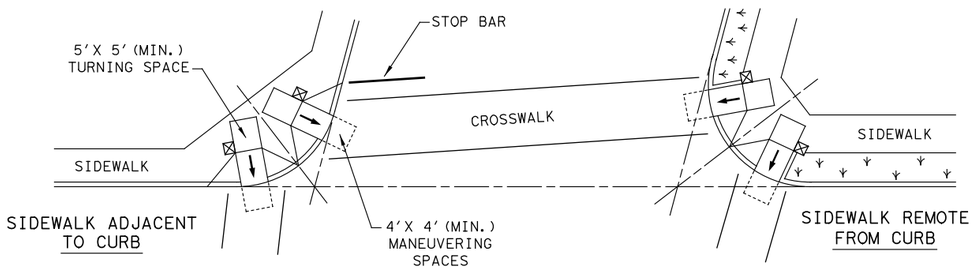
3/30/2021
...s\3754.001 El Paso*SH20\CADD\Sheets\HALFF\STANDARDS\ped18.dgn

TYPICAL CROSSING LAYOUTS

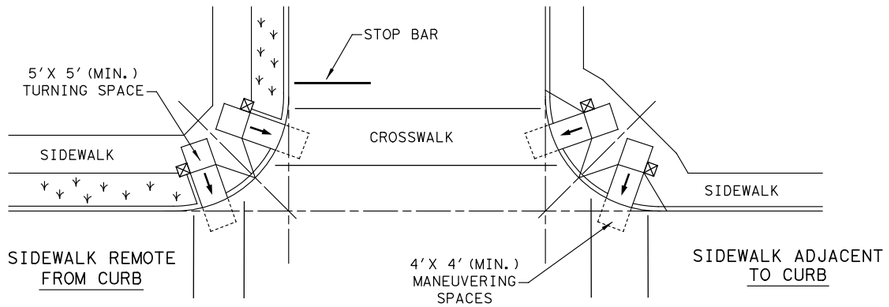
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



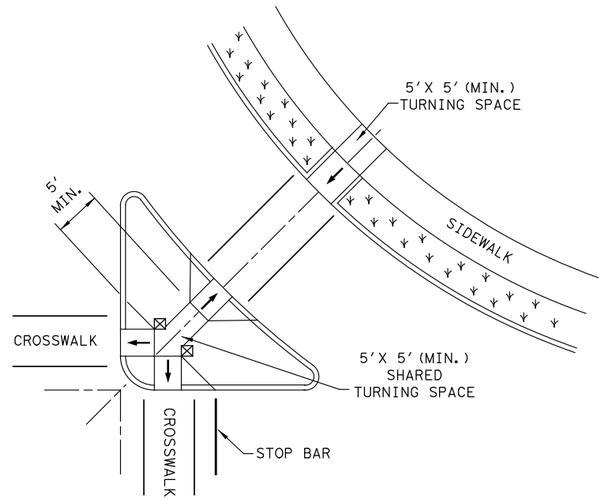
SKEWED INTERSECTION WITH "LARGE" RADIUS



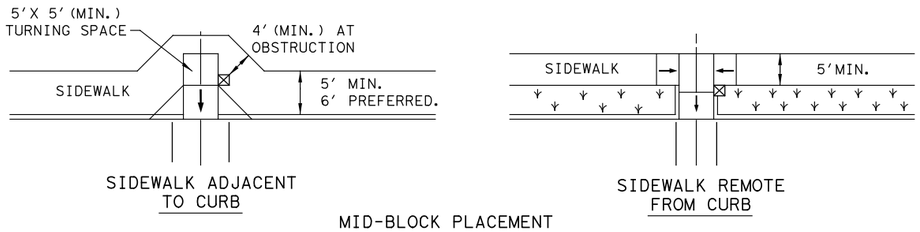
SKEWED INTERSECTION WITH "SMALL" RADIUS



NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ⊠

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

SHEET 4 OF 4

Texas Department of Transportation

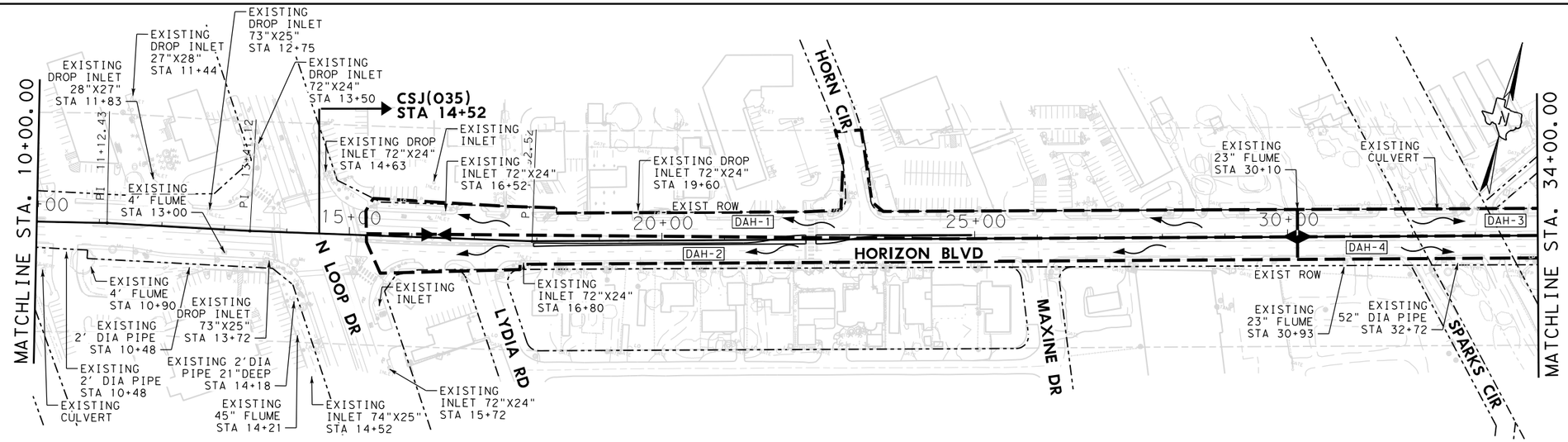
Design Division Standard

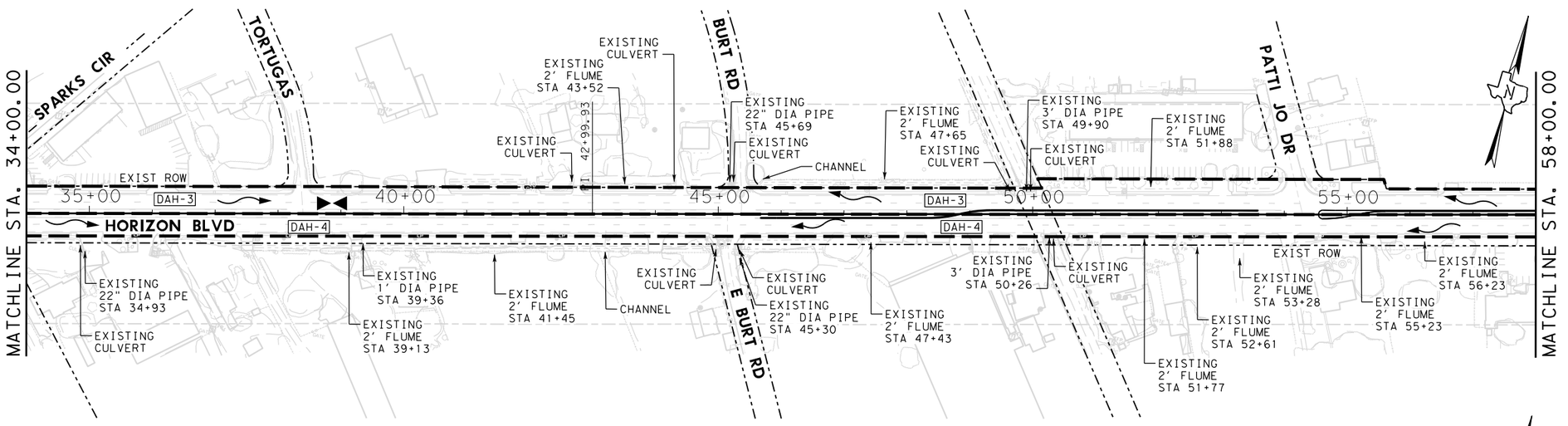
PEDESTRIAN FACILITIES CURB RAMPS

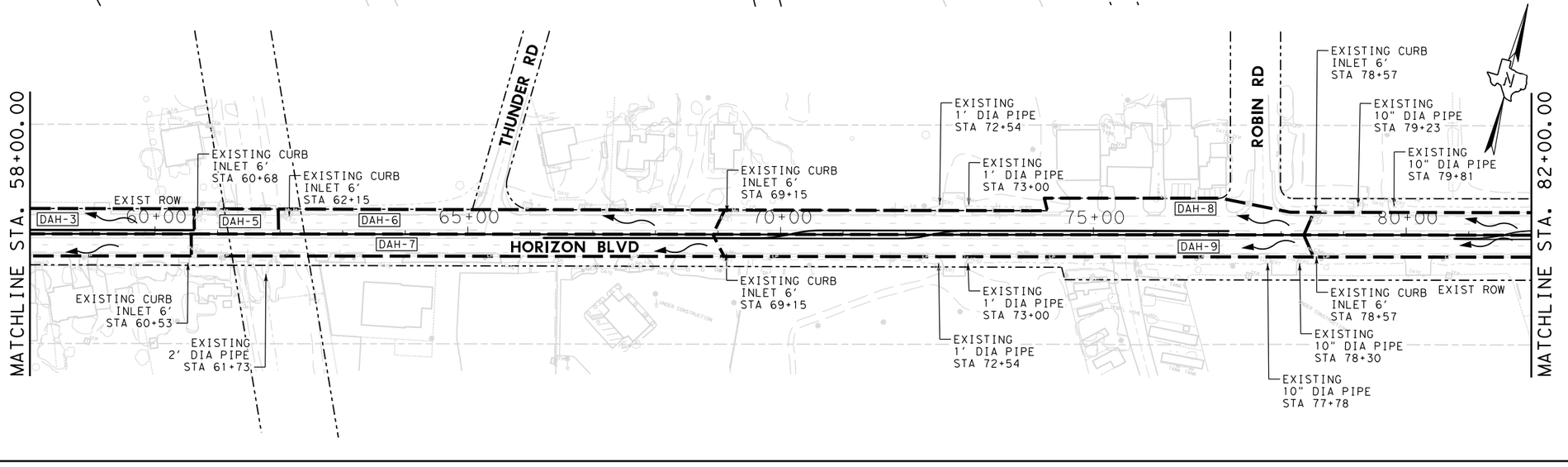
PED-18

FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	3451	01	035, ETC.		FM 1281, ETC.
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	ELP	EL PASO			117

FINAL SUBMITTAL







0 100 200

SCALE: 1" = 200'

LEGEND

- DA XX-XX — DRAINAGE AREA ID
- DRAINAGE AREA
- DIRECTION OF FLOW
- PROPOSED DITCH
- EXISTING ROW
- HIGH POINT
- LOW POINT

NOTES:

1. FOR PROPOSED FLUME DETAILS, SEE "MISCELLANEOUS DETAILS" SHEET.

Texas Department of Transportation®

NO.	REVISION	BY	DATE

STATE OF TEXAS
OSWALD F. GARCIA
109889
LICENSED PROFESSIONAL ENGINEER

MARCH 29, 2021

PLANNING ENGINEERING PROJECT MANAGEMENT
MCi Moreno Cardenas Inc.
EL PASO · SAN ANTONIO
TBPE Firm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281 INTERIOR DRAINAGE AREA LAYOUTS STA 10+00.00 TO STA 82+00.00

01 OF 07

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	032 ETC.	118

3/29/2021 9:16:07 AM
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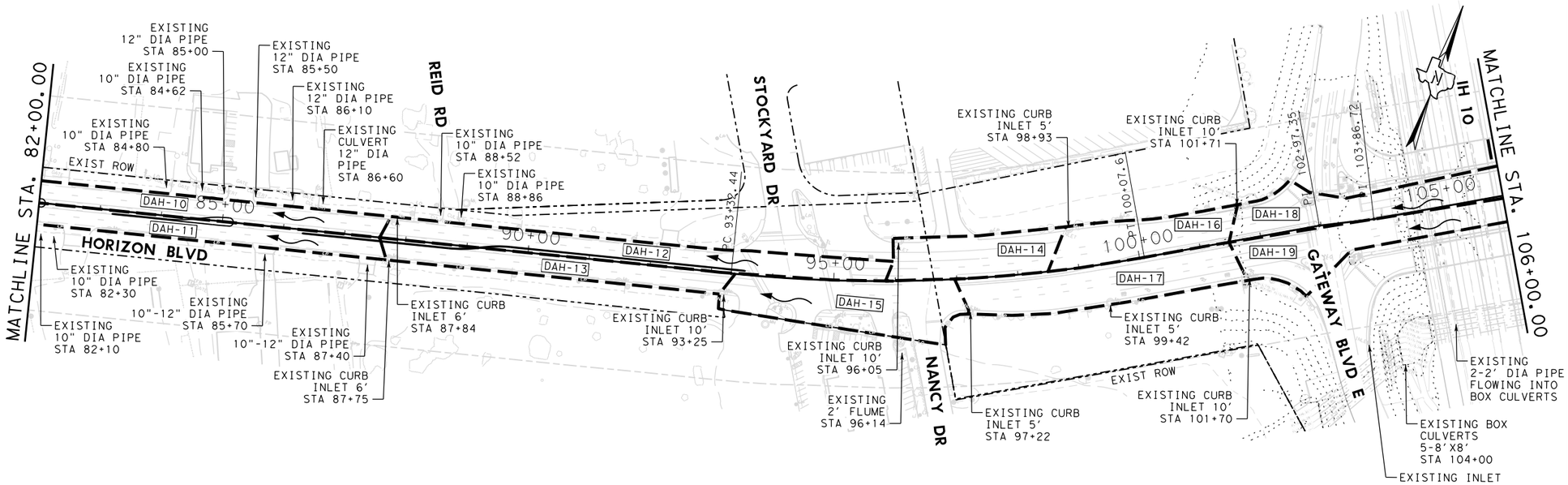
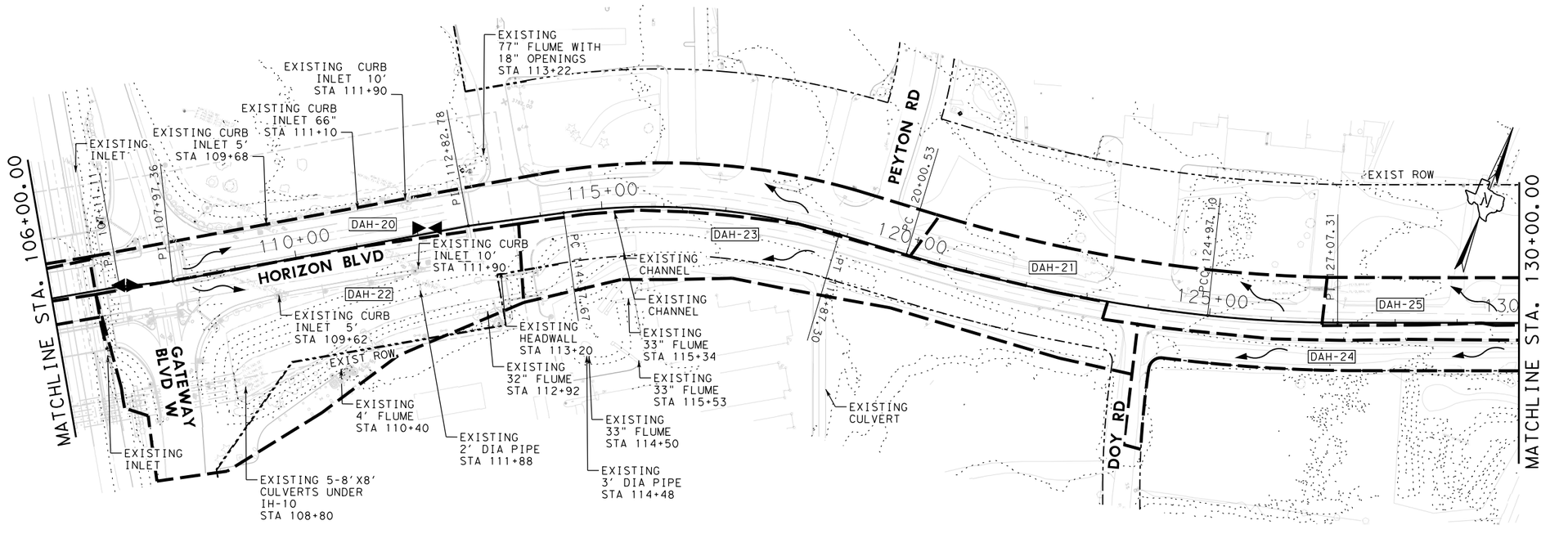
FINAL SUBMITTAL





0 100 200

SCALE: 1" = 200'

LEGEND

- DA XX-XX — DRAINAGE AREA ID
- DRAINAGE AREA
- DIRECTION OF FLOW
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NOTES:

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SH 20 & FM 1281 INTERIOR DRAINAGE AREA LAYOUTS STA 82+00.00 TO STA 130+00.00

02 OF 07

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	119

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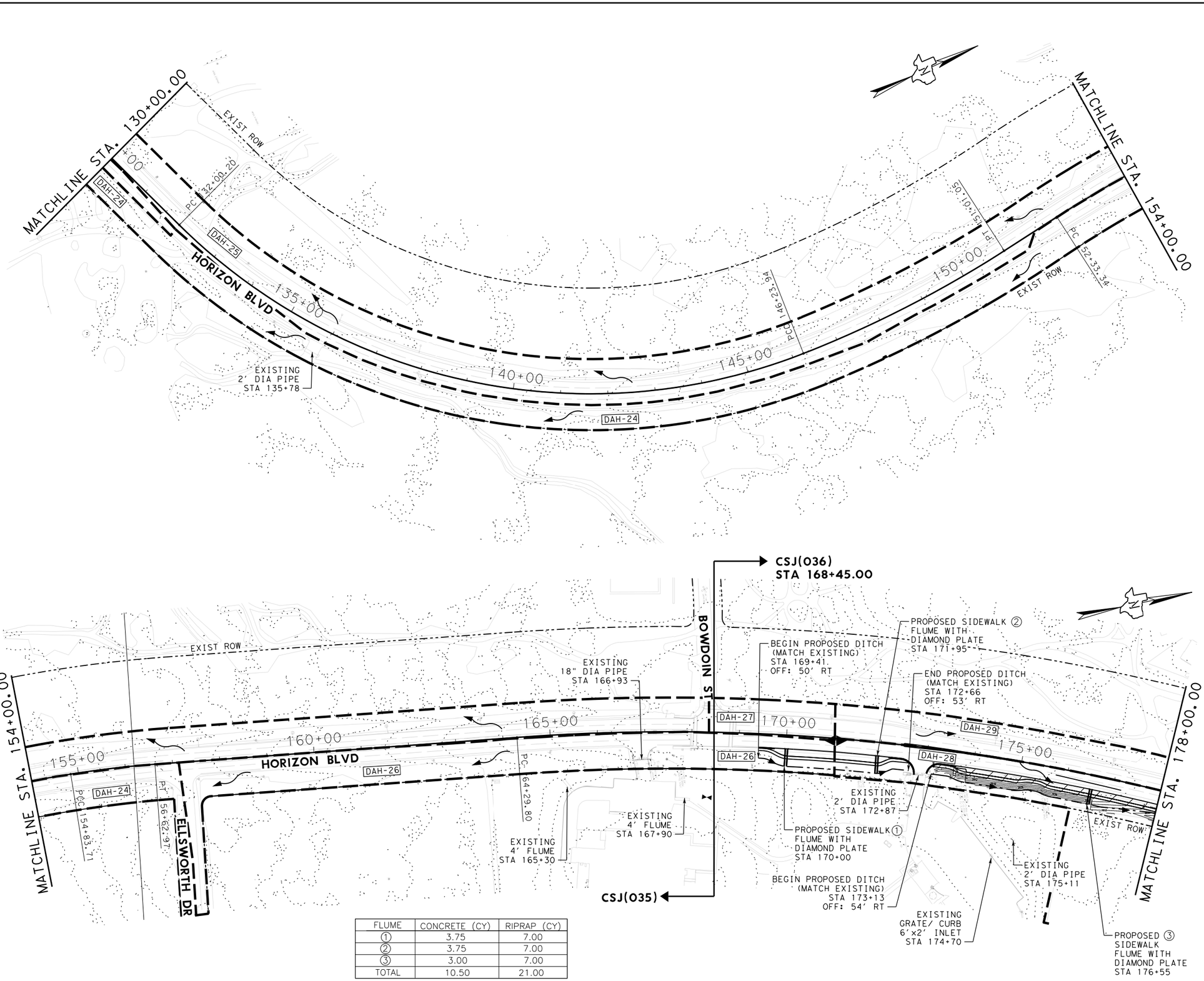

FLUME	CONCRETE (CY)	RIPRAP (CY)
①	3.75	7.00
②	3.75	7.00
③	3.00	7.00
TOTAL	10.50	21.00

0 100 200
SCALE: 1" = 200'

LEGEND

- DA XX-XX — DRAINAGE AREA ID
- DRAINAGE AREA
- DIRECTION OF FLOW
- PROPOSED DITCH
- EXISTING ROW
- HIGH POINT
- LOW POINT

NOTES:

1. FOR PROPOSED FLUME DETAILS, SEE "MISCELLANEOUS DETAILS" SHEET.
2. FOR DITCH FLOW LINE ELEVATIONS SEE DITCH HYDRAULIC CALCULATIONS SHEET

NO.	REVISION	BY	DATE

STATE OF TEXAS
OSWALD F. GARCIA
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LICENSED PROFESSIONAL ENGINEER

MARCH 29, 2021

PLANNING ENGINEERING PROJECT MANAGEMENT
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EL PASO · SAN ANTONIO
TBPE Firm Registration No. F-000554

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SH 20 & FM 1281 INTERIOR DRAINAGE AREA LAYOUTS STA 130+00.00 TO STA 178+00.00

03 OF 07

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	120

3/29/2021 9:11:33 AM
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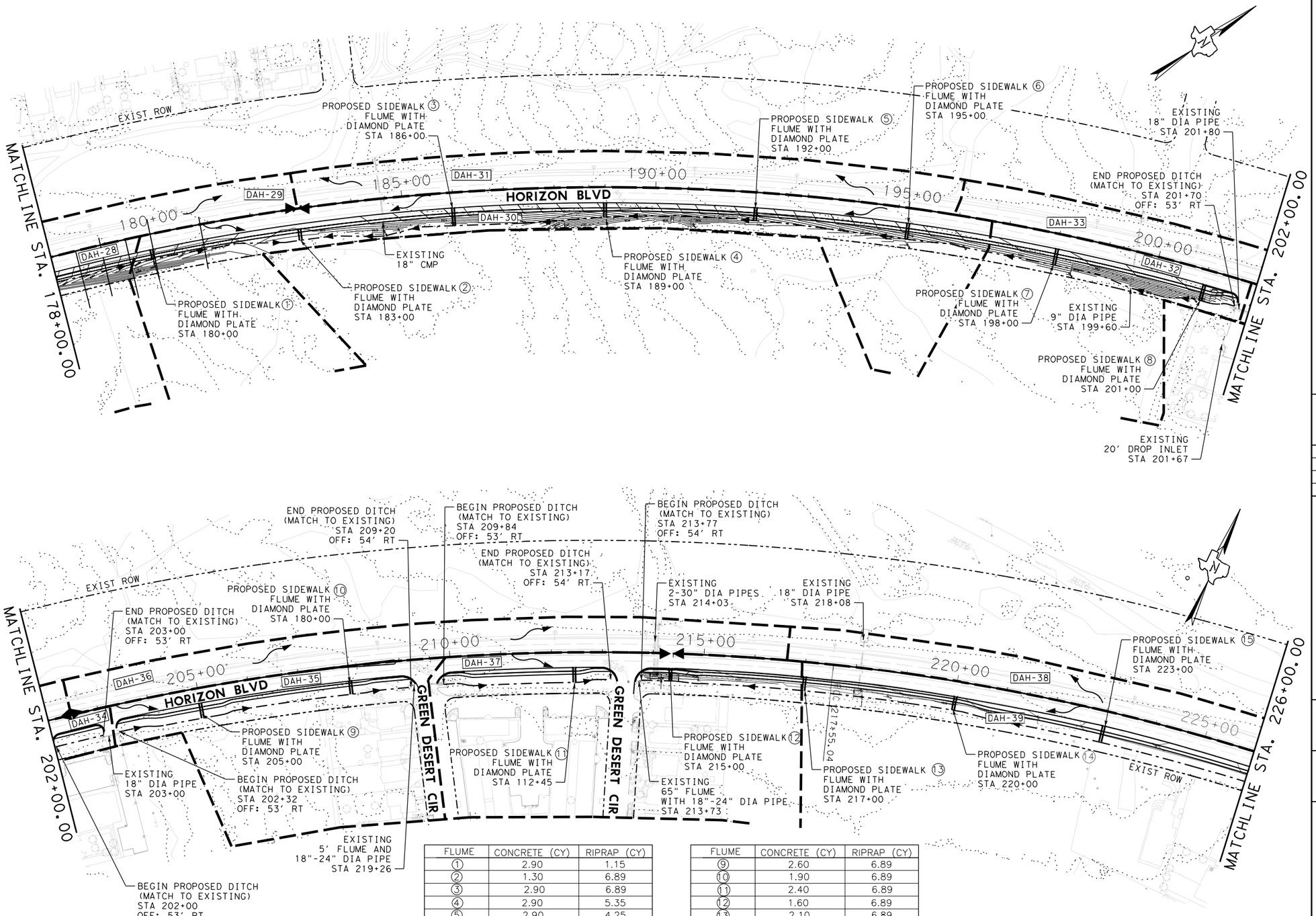
FINAL SUBMITTAL



FLUME	CONCRETE (CY)	RIPRAP (CY)
①	2.90	1.15
②	1.30	6.89
③	2.90	6.89
④	2.90	5.35
⑤	2.90	4.25
⑥	2.90	6.50
⑦	2.90	6.89
⑧	2.90	6.89

FLUME	CONCRETE (CY)	RIPRAP (CY)
⑨	2.60	6.89
⑩	1.90	6.89
⑪	2.40	6.89
⑫	1.60	6.89
⑬	2.10	6.89
⑭	2.10	6.89
⑮	3.10	6.89
TOTAL	37.50	93.00

0 100 200
SCALE: 1" = 200'

LEGEND

- DA XX-XX — DRAINAGE AREA ID
- DRAINAGE AREA
- DIRECTION OF FLOW
- PROPOSED DITCH
- EXISTING ROW
- HIGH POINT
- LOW POINT

NOTES:

1. FOR PROPOSED FLUME DETAILS, SEE "MISCELLANEOUS DETAILS" SHEET.
2. FOR DITCH FLOW LINE ELEVATIONS SEE DITCH HYDRAULIC CALCULATIONS SHEET

Texas Department of Transportation®

NO.	REVISION	BY	DATE

OSWALD F. GARCIA
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LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
MARCH 29, 2021

PLANNING ENGINEERING PROJECT MANAGEMENT
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(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281 INTERIOR DRAINAGE AREA LAYOUTS STA 178+00.00 TO STA 226+00.00

04 OF 07

DESIGNED:	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	121

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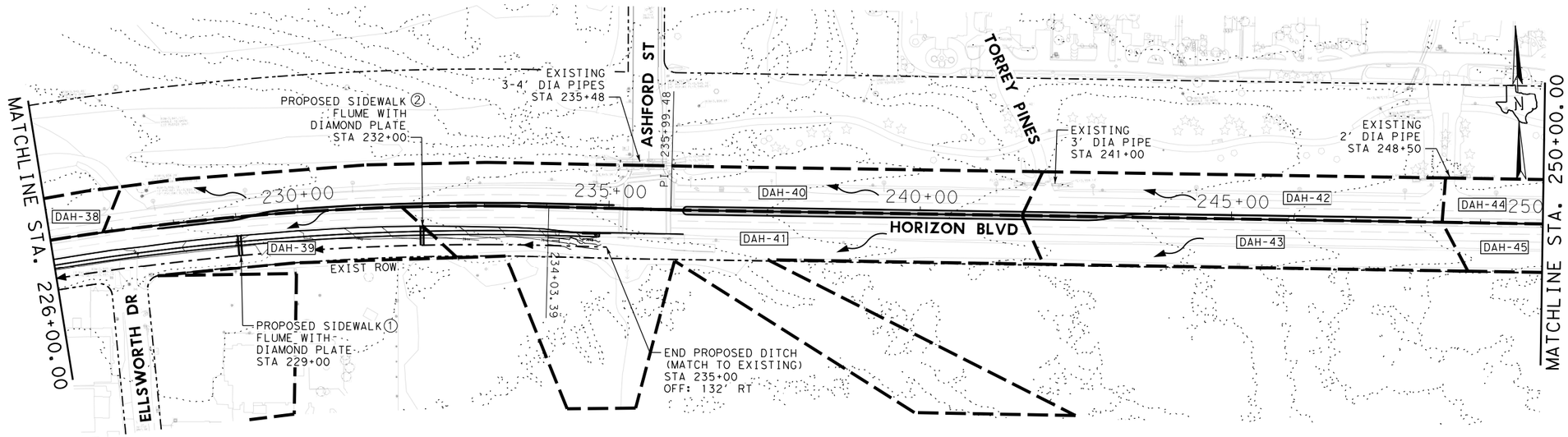
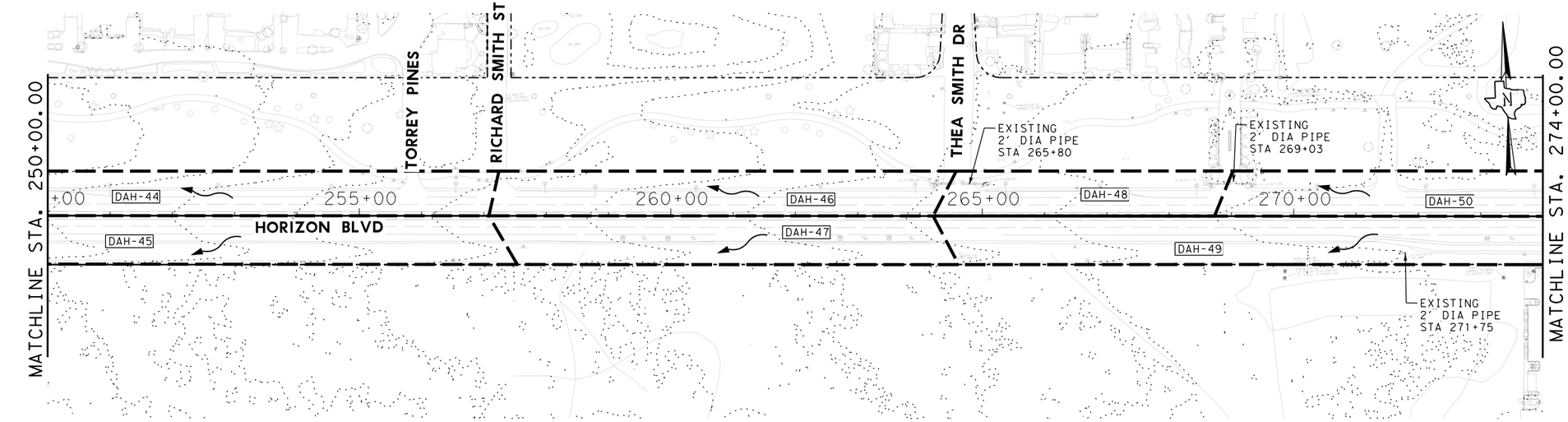
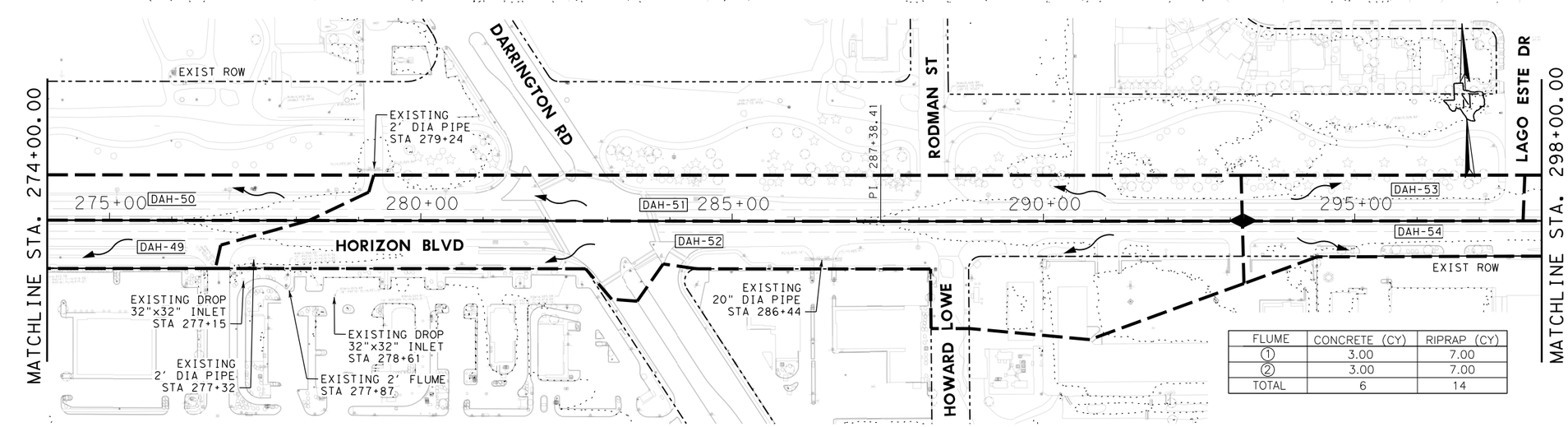
FINAL SUBMITTAL







FLUME	CONCRETE (CY)	RIPRAP (CY)
①	3.00	7.00
②	3.00	7.00
TOTAL	6	14

0 100 200
SCALE: 1" = 200'

LEGEND

- DA XX-XX — DRAINAGE AREA ID
- DRAINAGE AREA
- DIRECTION OF FLOW
- PROPOSED DITCH
- EXISTING ROW
- HIGH POINT
- LOW POINT

NOTES:

1. FOR PROPOSED FLUME DETAILS, SEE "MISCELLANEOUS DETAILS" SHEET.

NO.	REVISION	BY	DATE

STATE OF TEXAS
OSWALD F. GARCIA
109889
LICENSED PROFESSIONAL ENGINEER

MARCH 29, 2021

PLANNING ENGINEERING PROJECT MANAGEMENT
MCi Moreno Cardenas Inc.
EL PASO • SAN ANTONIO
TBPE Firm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281 INTERIOR DRAINAGE AREA LAYOUTS STA 226+00.00 TO STA 298+00.00

05 OF 07

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	122

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FINAL SUBMITTAL

0 100 200

SCALE: 1" = 200'

LEGEND

- DA XX-XX — DRAINAGE AREA ID
- DRAINAGE AREA
- DIRECTION OF FLOW
- PROPOSED DITCH
- EXISTING ROW
- HIGH POINT
- LOW POINT

NOTES:

1. FOR PROPOSED FLUME DETAILS, SEE "MISCELLANEOUS DETAILS" SHEET.

Texas Department of Transportation®
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NO.	REVISION	BY	DATE

STATE OF TEXAS
OSWALD F. GARCIA
109889
LICENSED PROFESSIONAL ENGINEER

MARCH 29, 2021

PLANNING ENGINEERING PROJECT MANAGEMENT
MCi Moreno Cardenas Inc.
EL PASO · SAN ANTONIO
TBPE Firm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281 INTERIOR DRAINAGE AREA LAYOUTS STA 298+00.00 TO STA 370+00.00

06 OF 07

	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
DESIGNED:					
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035 ETC.	123

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FINAL SUBMITTAL

0 100 200

SCALE: 1" = 200'

LEGEND

- DA XX-XX — DRAINAGE AREA ID
- DRAINAGE AREA
- DIRECTION OF FLOW
- PROPOSED DITCH
- EXISTING ROW
- HIGH POINT
- LOW POINT

NOTES:

1. FOR PROPOSED FLUME DETAILS, SEE "MISCELLANEOUS DETAILS" SHEET.

Texas Department of Transportation®

NO.	REVISION	BY	DATE

STATE OF TEXAS
OSWALD F. GARCIA
109889
LICENSED
PROFESSIONAL ENGINEER
MARCH 29, 2021

PLANNING ENGINEERING PROJECT MANAGEMENT
MCi Moreno Cardenas Inc.
EL PASO • SAN ANTONIO
TBPE Firm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281 INTERIOR DRAINAGE AREA LAYOUTS STA 370+00.00 TO STA 404+57.13

07 OF 07

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	124

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FINAL SUBMITTAL

HORIZON BLVD. FROM NORTH LOOP DR. TO I-10							
AREA ID	AREA C-VALUE	AREA (ac)	AREA TIME OF CONC. (min)	AREA 25YR INTENSITY (in/hr)	AREA 25YR DISCHARGE (cfs)	AREA 100YR INTENSITY (in/hr)	AREA 100YR DISCHARGE (cfs)
DAH-1	0.95	2.35	10.00	6.21	13.86	8.30	18.53
DAH-2	0.95	2.30	10.00	6.21	13.58	8.30	18.15
DAH-3	0.95	2.26	10.00	6.21	13.35	8.30	17.84
DAH-4	0.95	1.76	10.00	6.21	10.38	8.30	13.88
DAH-5	0.95	0.12	10.00	6.21	0.73	8.30	0.98
DAH-6	0.95	0.65	10.00	6.21	3.81	8.30	5.10
DAH-7	0.95	0.69	10.00	6.21	4.05	8.30	5.42
DAH-8	0.95	0.98	10.00	6.21	5.80	8.30	7.76
DAH-9	0.95	0.76	10.00	6.21	4.48	8.30	5.99
DAH-10	0.95	0.76	10.00	6.21	4.51	8.30	6.03
DAH-11	0.95	0.74	10.00	6.21	4.37	8.30	5.85
DAH-12	0.95	0.69	10.00	6.21	4.08	8.30	5.45
DAH-13	0.95	0.44	10.00	6.21	2.59	8.30	3.47
DAH-14	0.95	0.45	10.00	6.21	2.67	8.30	3.57
DAH-15	0.95	0.72	10.00	6.21	4.25	8.30	5.69
DAH-16	0.95	0.39	10.00	6.21	2.28	8.30	3.05
DAH-17	0.95	0.69	10.00	6.21	4.06	8.30	5.43
DAH-18	0.95	0.62	10.00	6.21	3.63	8.30	4.85
DAH-19	0.95	0.61	10.00	6.21	3.62	8.30	4.84

HORIZON BLVD. FROM I-10 TO ANDERPOINT RD.							
AREA ID	AREA C-VALUE	AREA (ac)	AREA TIME OF CONC. (min)	AREA 25YR INTENSITY (in/hr)	AREA 25YR DISCHARGE (cfs)	AREA 100YR INTENSITY (in/hr)	AREA 100YR DISCHARGE (cfs)
DAH-20	0.95	2.22	10.00	6.21	13.07	8.30	17.47
DAH-21	0.95	1.62	10.00	6.21	9.55	8.30	12.76
DAH-22	0.95	3.55	10.00	6.21	20.94	8.30	27.99
DAH-23	0.95	2.36	10.00	6.21	13.95	8.30	18.64
DAH-24	0.95	4.70	10.00	6.21	27.70	8.30	37.02
DAH-25	0.95	7.98	10.00	6.21	47.07	8.30	62.92
DAH-26	0.95	2.58	10.00	6.21	15.19	8.30	20.31
DAH-27	0.95	0.46	10.00	6.21	2.71	8.30	3.62
DAH-28	0.95	3.38	10.00	6.21	19.93	8.30	26.63
DAH-29	0.95	1.97	10.00	6.21	11.64	8.30	15.56
DAH-30	0.95	6.18	10.00	6.21	36.43	8.30	48.69
DAH-31	0.95	2.14	10.00	6.21	12.63	8.30	16.88
DAH-32	0.95	3.41	10.00	6.21	20.14	8.30	26.92
DAH-33	0.95	1.06	10.00	6.21	6.24	8.30	8.34
DAH-34	0.95	0.24	10.00	6.21	1.44	8.30	1.93
DAH-35	0.95	3.65	10.00	6.21	21.55	8.30	28.80
DAH-36	0.95	2.26	10.00	6.21	13.34	8.30	17.82
DAH-37	0.95	5.32	10.00	6.21	31.36	8.30	41.91
DAH-38	0.95	1.64	10.00	6.21	9.65	8.30	12.90
DAH-39	0.95	9.67	10.00	6.21	57.02	8.30	76.21
DAH-40	0.95	2.36	10.00	6.21	13.95	8.30	18.65
DAH-41	0.95	3.96	10.00	6.21	23.39	8.30	31.26
DAH-42	0.95	1.08	10.00	6.21	6.35	8.30	8.49
DAH-43	0.95	1.21	10.00	6.21	7.15	8.30	9.55
DAH-44	0.95	1.44	10.00	6.21	8.47	8.30	11.33
DAH-45	0.95	1.56	10.00	6.21	9.20	8.30	12.30
DAH-46	0.95	1.20	10.00	6.21	7.05	8.30	9.42
DAH-47	0.95	1.27	10.00	6.21	7.51	8.30	10.04
DAH-48	0.95	0.74	10.00	6.21	4.38	8.30	5.86
DAH-49	0.95	2.26	10.00	6.21	13.35	8.30	17.84
DAH-50	0.95	1.67	10.00	6.21	9.85	8.30	13.17
DAH-51	0.95	2.41	10.00	6.21	14.24	8.30	19.03
DAH-52	0.95	3.91	10.00	6.21	23.04	8.30	30.80
DAH-53	0.95	0.76	10.00	6.21	4.51	8.30	6.02
DAH-54	0.95	1.27	10.00	6.21	7.48	8.30	10.00
DAH-55	0.95	2.01	10.00	6.21	11.83	8.30	15.82
DAH-56	0.95	0.77	10.00	6.21	4.56	8.30	6.10
DAH-57	0.95	1.23	10.00	6.21	7.26	8.30	9.70
DAH-58	0.95	0.05	10.00	6.21	0.32	8.30	0.42
DAH-59	0.95	0.50	10.00	6.21	2.93	8.30	3.92
DAH-60	0.95	0.31	10.00	6.21	1.82	8.30	2.43
DAH-61	0.95	1.33	10.00	6.21	7.85	8.30	10.49
DAH-62	0.95	0.09	10.00	6.21	0.54	8.30	0.72
DAH-63	0.95	0.38	10.00	6.21	2.23	8.30	2.99
DAH-64	0.95	0.72	10.00	6.21	4.25	8.30	5.68
DAH-65	0.95	0.55	10.00	6.21	3.26	8.30	4.36
DAH-66	0.95	0.50	10.00	6.21	2.93	8.30	3.92
DAH-67	0.95	0.23	10.00	6.21	1.37	8.30	1.83
DAH-68	0.95	2.86	10.00	6.21	16.89	8.30	22.58
DAH-69	0.95	1.87	10.00	6.21	11.05	8.30	14.77
DAH-70	0.95	5.88	10.00	6.21	34.67	8.30	46.34
DAH-71	0.95	5.25	10.00	6.21	30.98	8.30	41.40
DAH-72	0.95	1.57	10.00	6.21	9.28	8.30	12.41
DAH-73	0.95	1.33	10.00	6.21	7.86	8.30	10.51
DAH-74	0.95	1.67	10.00	6.21	9.88	8.30	13.21
DAH-75	0.95	1.39	10.00	6.21	8.21	8.30	10.97

NOTES:

1. INTENSITY OBTAINED FROM NOAA ATLAS 14 POINT PRECIPITATION FREQUENTLY ESTIMATES

Texas Department of Transportation®

NO.	REVISION	BY	DATE

STATE OF TEXAS
OSWALD F. GARCIA
109889
LICENSED PROFESSIONAL ENGINEER

MARCH 29, 2021

PLANNING ENGINEERING PROJECT MANAGEMENT
MCi Moreno Cardenas Inc.
EL PASO • SAN ANTONIO
TBPE Firm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281 INTERIOR DRAINAGE AREA HYDRAULIC CALCULATIONS

01 OF 01

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	125

FINAL SUBMITTAL

BACK				AHEAD				BOTTOM WIDTH	FORESLOPE GRADE	BACKSLOPE GRADE	SEGMENT LEGNTH	CHANNEL DEPTH	MANNING'S "n"	DESIGN FLOW 20% AEP	SLOPE	NORMAL DEPTH	FREEBOARD
STATION	FORESLOPE TOP ELEVATION	BACKSLOPE TOP ELEVATION	FLOWLINE ELEVATION	STATION	FORESLOPE TOP ELEVATION	BACKSLOPE TOP ELEVATION	FLOWLINE ELEVATION										
(ft)	(ft)		(ft)	(ft)	(ft)		(ft)	(ft)	X:1	X:1	(ft)	(ft)		(cfs)	(ft/ft)	(ft)	(ft)
169+50	3947.36	3947.39	3944.18	170+00	3947.19	3948.00	3945.81	0.0	6.0	6.0	50.00	1.38	0.035	0.9	0.033	0.270	1.11
170+00	3947.19	3948.00	3945.81	170+50	3947.46	3947.99	3946.44	0.0	6.0	6.0	50.00	1.02	0.035	0.9	0.013	0.320	0.70
170+50	3947.46	3947.99	3946.44	171+00	3947.57	3948.60	3946.51	0.0	6.0	6.0	50.00	1.06	0.035	0.1	0.001	0.230	0.83
171+00	3947.57	3948.60	3946.51	171+50	3947.44	3948.00	3946.78	0.0	6.0	6.0	50.00	0.66	0.035	0.9	0.005	0.250	0.41
171+50	3947.44	3948.00	3946.78	172+00	3947.25	3948.00	3946.10	1.6	6.0	6.0	50.00	1.15	0.035	5.8	0.014	0.530	0.62
172+00	3947.25	3948.00	3946.10	172+50	3947.21	3948.00	3945.64	15.0	6.0	6.0	50.00	1.57	0.035	6.2	0.009	0.250	1.32
172+50	3947.21	3948.00	3945.64	173+00	3945.63	3646.00	3941.00	15.0	6.0	6.0	50.00	4.63	0.035	6.6	0.093	0.130	4.50
173+00	CULVERT			173+50	3945.63	3946.00	3942.31	5.0	3.0	3.0	50.00	3.32	0.035	7.4	0.067	0.290	3.03
173+50	3945.63	3946.00	3942.31	174+00	3943.83	3943.83	3938.47	0.0	3.0	3.0	50.00	5.36	0.035	7.8	0.077	0.680	4.68
174+00	3943.83	3943.83	3938.47	174+50	3942.52	3942.52	3936.93	13.8	3.0	3.0	50.00	5.59	0.035	8.2	0.031	0.220	5.37
174+50	3942.52	3942.52	3936.93	175+00	3940.89	3940.89	3935.47	22.5	3.0	3.0	50.00	5.42	0.035	8.6	0.029	0.170	5.25
175+00	3940.89	3940.89	3935.47	175+50	3939.27	3940.00	3934.07	28.0	3.0	3.0	50.00	5.20	0.035	9.0	0.028	0.160	5.04
177+00	3934.97	3930.00	3930.79	177+50	3933.60	3934.00	3932.34	0.0	6.0	6.0	50.00	1.26	0.035	9.7	0.031	OPEN SPACE	
177+50	3933.60	3934.00	3932.34	178+00	3932.10	3935.00	3930.50	0.0	4.0	2.0	50.00	1.60	0.035	2.5	0.037	0.520	1.08
178+00	3932.10	3935.00	3930.50	178+50	3930.40	3935.00	3928.50	0.0	4.0	2.0	50.00	1.90	0.035	2.9	0.040	0.530	1.37
178+50	3930.40	3935.00	3928.50	179+00	3928.80	3935.00	3927.80	0.0	4.0	2.0	50.00	1.00	0.035	3.2	0.014	0.670	0.33
179+00	3928.80	3935.00	3927.80	179+50	3927.50	3935.00	3925.65	0.0	4.0	2.0	50.00	1.85	0.035	3.5	0.043	0.570	1.28
179+50	3927.50	3935.00	3925.65	180+00	3925.90	3933.00	3924.10	0.0	4.0	2.0	50.00	1.80	0.035	3.8	0.031	0.620	1.18
180+00	3925.90	3933.00	3924.10	180+50	3924.70	3934.00	3922.90	0.0	4.0	2.0	50.00	1.80	0.035	4.1	0.024	0.670	1.13
180+50	3924.70	3934.00	3922.90	181+00	3923.95	3927.00	3922.80	0.0	4.0	2.0	50.00	1.15	0.035	4.5	0.002	0.550	0.6
181+00	3923.95	3922.80	3927.00	181+50	3923.20	3924.00	3921.50	0.0	4.0	2.0	50.00	1.70	0.035	4.8	0.110	0.550	1.15
181+50	3923.20	3924.00	3921.50	182+00	3922.24	3923.00	3920.19	0.0	6.0	6.0	50.00	2.05	0.035	5.1	0.026	0.550	1.5
182+00	3922.24	3923.00	3920.19	182+50	3921.86	3920.00	3920.28	OPEN SPACE									
187+00	3928.95	3925.00	3925.14	187+50	3930.29	3931.00	3925.62	0.0	4.0	4.0	50.00	4.67	0.035	14.9	0.023	0.980	3.69
187+50	3930.29	3931.00	3925.62	188+00	3931.59	3932.00	3924.48	0.0	4.0	4.0	50.00	7.11	0.035	17.4	0.023	1.030	6.08
188+00	3931.59	3932.00	3924.48	188+50	3932.79	3934.30	3929.49	0.0	4.0	3.0	50.00	3.30	0.035	19.8	0.100	0.870	2.43
188+50	3932.79	3934.30	3929.49	189+00	3934.09	3936.15	3931.52	0.0	4.0	3.0	50.00	2.57	0.035	22.3	0.041	1.070	1.50
189+00	3934.09	3936.15	3931.52	189+50	3935.43	3936.24	3933.35	0.0	4.0	3.0	50.00	2.08	0.035	24.8	0.037	1.140	0.94
189+50	3935.43	3936.24	3933.35	190+00	3936.63	3937.64	3934.41	0.0	1.0	3.0	50.00	2.22	0.035	27.3	0.021	1.660	0.56
190+00	3936.63	3937.64	3934.41	190+50	3937.89	3941.25	3936.02	0.0	3.0	3.0	50.00	1.87	0.035	29.7	0.032	1.330	0.54
190+50	3937.89	3941.25	3936.02	191+00	3939.28	3947.54	3937.27	0.0	3.0	2.3	50.00	2.01	0.035	12.5	0.025	1.000	1.01
191+00	3939.28	3947.54	3937.27	191+50	3940.56	3942.71	3938.66	0.0	3.0	3.0	50.00	1.90	0.035	13.7	0.028	1.020	0.88
191+50	3940.56	3942.71	3938.66	192+00	3941.83	3942.20	3940.01	0.0	4.0	4.0	50.00	1.82	0.035	15.0	0.027	0.950	0.87
192+00	3941.83	3942.20	3940.01	192+50	3943.07	3942.60	3941.12	0.0	4.0	6.0	50.00	1.95	0.035	16.2	0.022	0.930	1.02
192+50	3943.07	3942.60	3941.12	193+00	3944.41	3944.41	3942.00	0.0	4.0	6.0	50.00	2.41	0.035	17.5	0.018	0.990	1.42
193+00	3944.41	3944.41	3942.00	193+50	3945.75	3946.00	3942.91	0.0	4.0	6.0	50.00	2.84	0.035	18.7	0.018	1.020	1.82
193+50	3945.75	3946.00	3942.91	194+00	3947.02	3947.00	3943.86	0.0	4.0	6.0	50.00	3.16	0.035	20.0	0.019	1.040	2.12
194+00	3947.02	3947.00	3943.86	194+50	3948.15	3949.00	3945.05	0.0	4.0	6.0	50.00	3.10	0.035	21.2	0.024	1.010	2.09
194+50	3948.15	3949.00	3945.05	195+00	3949.14	3947.45	3945.88	0.0	4.0	4.0	50.00	3.26	0.035	22.5	0.017	1.200	2.06
195+00	3949.14	3947.45	3945.88	195+50	3950.01	3950.01	3946.95	0.0	4.0	6.0	50.00	3.06	0.035	23.7	0.021	1.080	1.98
195+50	3950.01	3950.01	3946.95	196+00	3950.74	3951.00	3948.07	0.0	4.0	6.0	50.00	2.67	0.035	25.0	0.022	1.100	1.57
196+00	3950.74	3951.00	3948.07	196+50	3951.38	3948.00	3948.83	OPEN DITCH									

NO.	REVISION	BY	DATE

STATE OF TEXAS
OSWALD F. GARCIA
109889
LICENSED
PROFESSIONAL ENGINEER

MARCH 29, 2021

PLANNING ENGINEERING PROJECT MANAGEMENT
MCi Moreno Cardenas Inc.
EL PASO · SAN ANTONIO
TBPE Firm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281 DITCH HYDRAULIC CALCULATIONS

01 OF 02

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	126

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FINAL SUBMITTAL

BACK				AHEAD				BOTTOM WIDTH	FORESLOPE GRADE	BACKSLOPE GRADE	SEGMENT LEGNTH	CHANNEL DEPTH	MANNING'S "n"	DESIGN FLOW 20% AEP	SLOPE	NORMAL DEPTH	FREEBOARD
STATION	FORESLOPE TOP ELEVATION	BACKSLOPE TOP ELEVATION	FLOWLINE ELEVATION	STATION	FORESLOPE TOP ELEVATION	BACKSLOPE TOP ELEVATION	FLOWLINE ELEVATION										
(ft)	(ft)		(ft)	(ft)	(ft)		(ft)	(ft)	X:1	X:1	(ft)	(ft)		(cfs)	(ft/ft)	(ft)	(ft)
202+50	3956.73	3956.00	3954.50	202+90	3958.64	3956.00	3955.43	0.0	3.0	3.0	40.00	3.21	0.035	0.3	0.023	0.262	3.19
202+90		culvert		203+50	3958.64	3956.00	3953.61	0.0	3.0	3.0	9.16	5.03	0.035	0.2	0.097	0.159	4.93
203+50	3956.32	3956.00	3953.95	204+10	3954.99	3955.00	3953.45	0.0	6.0	6.0	60.00	1.54	0.035	0.4	0.008	0.267	1.53
204+10	3954.99	3955.00	3953.45	204+50	3954.32	3954.00	3952.81	0.0	4.0	4.0	40.00	1.51	0.035	1.1	0.016	0.390	1.49
204+50	3954.32	3954.00	3952.81	205+00	3953.49	3953.30	3951.87	0.0	4.0	4.0	50.00	1.62	0.035	2.2	0.019	0.490	1.60
205+00	3953.49	3953.30	3951.87	205+50	3952.39	3952.18	3950.38	0.0	4.0	4.0	50.00	2.01	0.035	3.2	0.030	0.524	1.98
205+50	3952.39	3952.18	3950.38	206+00	3951.12	3950.33	3948.22	0.0	4.0	4.0	50.00	2.90	0.035	4.3	0.043	0.545	2.86
206+00	3951.12	3950.33	3948.22	206+50	3949.70	3948.84	3946.23	0.0	4.0	4.0	50.00	3.47	0.035	5.4	0.040	0.601	3.43
206+50	3949.70	3948.84	3946.23	207+00	3948.15	3947.24	3944.67	0.0	4.0	4.0	50.00	3.48	0.035	6.5	0.031	0.675	3.45
207+00	3948.15	3947.24	3944.67	207+50	3946.46	3946.18	3943.31	0.0	4.0	4.0	50.00	3.15	0.035	7.6	0.027	0.715	3.12
207+50	3946.46	3946.18	3943.31	208+00	3944.62	3944.70	3941.92	0.0	4.0	4.0	50.00	2.70	0.035	8.6	0.028	0.766	2.67
208+00	3944.62	3944.70	3941.92	208+50	3943.21	3943.38	3940.98	0.0	4.0	4.0	50.00	2.23	0.035	9.7	0.019	0.861	2.21
208+50	3943.21	3943.38	3940.98	209+00	3941.17	3941.77	3939.80	10.3	6.0	6.0	50.00	1.37	0.035	10.8	0.024	0.341	1.35
209+00	3941.17	3941.77	3939.80	210+00	3937.69	3940.05	3934.65	18.5	6.0	6.0	50.00	3.04	0.035	13.0	0.103	0.169	2.94
210+00	3937.69	3940.05	3934.65	210+50	3935.49	3935.23	3933.30	0.0	4.0	4.0	50.00	2.19	0.035	1.5	0.027	0.396	2.16
210+50	3935.49	3935.23	3933.30	211+00	3934.06	3935.33	3932.30	0.0	3.0	3.0	50.00	1.76	0.035	2.9	0.020	0.609	1.74
211+00	3934.06	3935.33	3932.30	211+50	3932.93	3933.59	3931.78	0.0	3.0	3.0	50.00	1.15	0.035	4.4	0.010	0.807	1.14
211+50	3932.93	3933.59	3931.78	212+00	3931.94	3933.09	3931.12	0.0	3.0	3.0	50.00	0.82	0.035	5.8	0.013	0.856	0.81
212+00	3931.94	3933.09	3931.12	212+50	3931.32	3932.25	3930.37	6.6	3.0	3.0	50.00	0.95	0.035	7.3	0.015	0.415	0.94
212+50	3931.32	3932.25	3930.37	213+00	3931.43	3931.98	3929.34	6.9	3.0	3.0	50.00	2.09	0.035	8.8	0.021	0.406	2.07
213+00	3931.43	3931.98	3929.34	214+00	3931.24	3930.97	3927.39	0.0	3.0	3.0	50.00	3.85	0.035	10.2	0.039	0.859	3.81
214+00	3931.24	3930.97	3927.39	214+50	3931.12	3930.44	3927.80	0.0	3.0	3.0	50.00	3.32	0.035	11.7	0.008	1.215	3.31
214+50	3931.12	3930.44	3927.80	215+00	3930.70	3931.70	3928.45	0.0	3.0	3.0	50.00	2.25	0.035	20.4	0.013	1.368	2.24
215+00	3930.70	3931.70	3928.45	215+50	3930.92	3932.25	3929.00	0.0	3.0	3.0	50.00	1.92	0.035	5.8	0.011	0.883	1.91
215+50	3930.92	3932.25	3929.00	216+00	3931.11	3930.57	3929.05	0.0	3.0	3.0	50.00	2.06	0.035	4.4	0.001	1.234	2.06
216+00	3931.11	3930.57	3929.05	216+50	3931.40	3931.52	3929.98	0.0	3.0	3.0	50.00	1.42	0.035	2.9	0.019	0.614	1.40
216+50	3931.40	3931.52	3929.98	217+00	3931.53	3933.05	3930.35	0.0	4.0	4.0	50.00	1.18	0.035	1.5	0.007	0.510	1.17
217+00	3931.53	3933.05	3930.35	217+50	3931.65	3932.35	3930.61	0.0	4.0	4.0	50.00	1.04	0.035	37.1	0.005	1.827	1.03
217+50	3931.65	3932.35	3930.61	218+00	3931.76	3932.24	3930.72	0.0	4.0	4.0	50.00	1.04	0.035	35.7	0.002	2.138	1.04
218+00	3931.76	3932.24	3930.72	218+50	3931.82	3936.38	3930.28	0.0	4.0	4.0	50.00	1.54	0.035	34.3	0.009	1.588	1.53
218+50	3931.82	3936.38	3930.28	219+00	3931.99	3931.31	3930.84	0.0	4.0	4.0	50.00	1.15	0.035	32.8	0.011	1.505	1.14
219+00	3931.99	3931.31	3930.84	219+50	3932.31	3936.60	3931.51	0.0	4.0	4.0	50.00	0.80	0.035	31.4	0.013	1.435	0.79
219+50	3932.31	3936.60	3931.51	220+00	3932.61	3932.61	3931.94	8.1	6.0	6.0	50.00	0.67	0.035	30.0	0.009	0.816	0.66
220+00	3932.61	3932.61	3931.94	220+50	3932.99	3936.63	3932.73	13.5	6.0	6.0	50.00	0.26	0.035	28.5	0.016	0.539	0.24
220+50	3932.99	3936.63	3932.73	221+00	3933.34	3937.64	3933.22	22.4	6.0	6.0	50.00	0.12	0.035	27.1	0.010	0.458	0.11
221+00	3933.34	3937.64	3933.22	221+50	3933.66	3933.39	3932.90	22.5	6.0	6.0	50.00	0.76	0.035	25.7	0.006	0.513	0.75
221+50	3933.66	3933.39	3932.90	222+00	3935.48	3936.35	3934.89	0.0	4.0	4.0	50.00	0.59	0.035	24.2	0.040	1.055	0.55
222+00	3935.19	3935.88	3934.46	222+50	3935.77	3937.72	3935.20	19.7	6.0	6.0	50.00	0.57	0.035	22.8	0.015	0.395	0.56
222+50	3935.48	3936.35	3934.89	223+00	3935.77	3937.72	3935.20	19.8	6.0	6.0	50.00	0.57	0.035	21.4	0.006	0.495	0.56
223+00	3935.77	3937.72	3935.20	223+50	3936.05	3937.08	3935.43	21.5	6.0	6.0	50.00	0.62	0.035	20.0	0.005	0.479	0.62
223+50	3936.05	3937.08	3935.43	224+00	3936.42	3936.76	3935.76	17.0	6.0	6.0	50.00	0.66	0.035	18.5	0.007	0.473	0.65
224+00	3936.42	3936.76	3935.76	224+50	3936.80	3936.47	3936.10	17.5	6.0	0.0	50.00	0.70	0.035	17.1	0.007	0.454	0.69
224+50	3936.80	3936.47	3936.10	225+00	3937.10	3936.90	3936.34	15.8	6.0	0.0	50.00	0.76	0.035	15.7	0.005	0.504	0.76
225+00	3937.10	3936.90	3936.34	225+50	3937.59	3936.95	3936.81	19.5	6.0	0.0	50.00	0.78	0.035	14.2	0.009	0.355	0.77
225+50	3937.59	3936.95	3936.81	226+00	3937.93	3937.48	3937.10	16.0	20.0	4.0	50.00	0.83	0.035	12.8	0.006	0.398	0.82
226+00	3937.93	3937.48	3937.10	226+50	3938.28	3938.12	3937.52	15.5	20.0	4.0	50.00	0.76	0.035	11.4	0.008	0.349	0.75
226+50	3938.28	3938.12	3937.52	227+00	3938.64	3939.50	3937.71	15.2	20.0	4.0	50.00	0.93	0.035	9.9	0.004	0.396	0.93
227+00	3938.64	3939.50	3937.71	227+50	3939.07	3938.77	3938.19	15.5	20.0	20.0	50.00	0.88	0.035	8.5	0.010	0.268	0.87
227+50	3939.07	3938.77	3938.19	228+00	3939.58	3939.57	3938.81	14.9	20.0	20.0	50.00	0.77	0.035	7.1	0.012	0.239	0.76
228+00	3939.58	3939.57	3938.81	228+50	3939.94	3940.40	3939.35	15.5	20.0	4.0	50.00	0.59	0.035	5.7	0.011	0.214	0.58
228+50	3939.94	3940.40	3939.35	229+00	3940.52	3941.40	3939.78	0.0	20.0	2.0	50.00	0.74	0.035	4.2	0.009	0.492	0.73
229+00	3940.52	3941.40	3939.78	229+50	3940.56	3940.13	3940.34	0.0	20.0	2.0	50.00	0.22	0.035	2.8	0.011	0.406	0.21
229+50	3940.56	3940.13	3940.34	230+00	3940.77	3942.46	3940.63	0.0	20.0	4.0	50.00	0.14	0.035	1.4	0.006	0.336	0.13
230+00	3940.77	3942.46	3940.63	230+50	3941.33	3943.43	3941.28	28.2	20.0	4.0	50.00	0.05	0.035	0.7	0.013	0.410	0.04
230+50	3941.33	3943.43	3941.28	231+00	3942.11	3943.47	3941.86	28.7	20.0	2.0	50.00	0.25	0.035	0.3	0.012	0.028	0.24
231+00	3942.11	3943.47	3941.86	231+50	3942.99	3943.65	3942.33	26.7	20.0	3.0	50.00	0.66	0.035	15.2	0.009	0.300	0.65
231+50	3942.99	3943.65	3942.33	232+00	3943.79	3944.66	3943.05	19.5	20.0	3.0	50.00	0.74	0.035	14.4	0.014	0.304	0.73
232+00	3943.79	3944.66	3943.05	232+50	3944.62	3945.43	3943.57	0.0	6.0	6.0	50.00	1.05	0.035	13.7	0.010	0.944	1.04
232+50	3944.62	3945.43	3943.57	233+00	3945.35	3945.48	3944.18	11.4	6.0	6.0	50.00	1.17	0.035	12.9	0.012	0.407	1.16
233+00	3945.35	3945.48	3944.18	223+50	3946.27	3946.01	3945.20	13.3	6.0	6.0	50.00	1.07	0.035	12.2	0.020	0.313	1.05
223+50	3946.27	3946.01	3945.20	234+00	3947.01	3947.35	3945.62	10.8	6.0	6.0	50.00	1.39	0.035	11.4	0.008	0.437	1.38

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NO.	REVISION	BY	DATE

STATE OF TEXAS
OSWALD F. GARCIA
109889
LICENSED PROFESSIONAL ENGINEER
MARCH 29, 2021

PLANNING ENGINEERING PROJECT MANAGEMENT
MCi Moreno Cardenas Inc.
EL PASO • SAN ANTONIO
TBPE Firm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281 DITCH HYDRAULIC CALCULATIONS

02 OF 02

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	127

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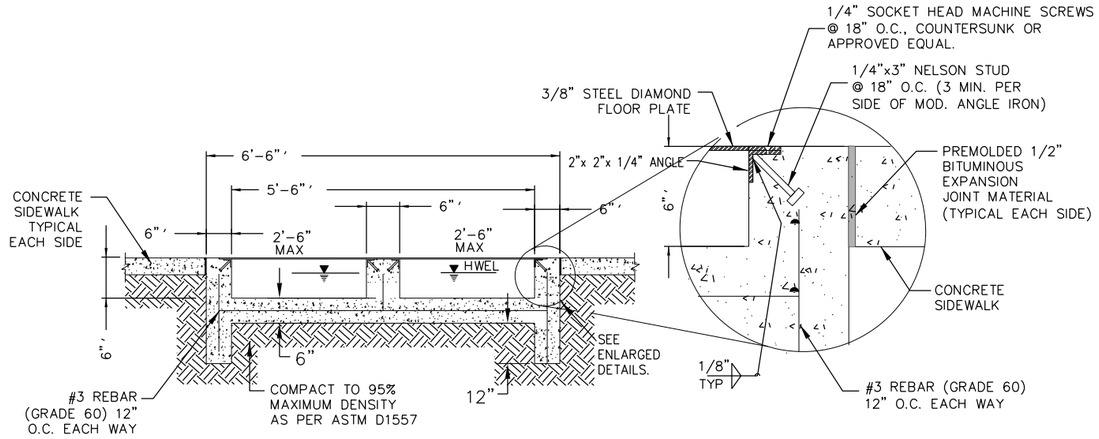
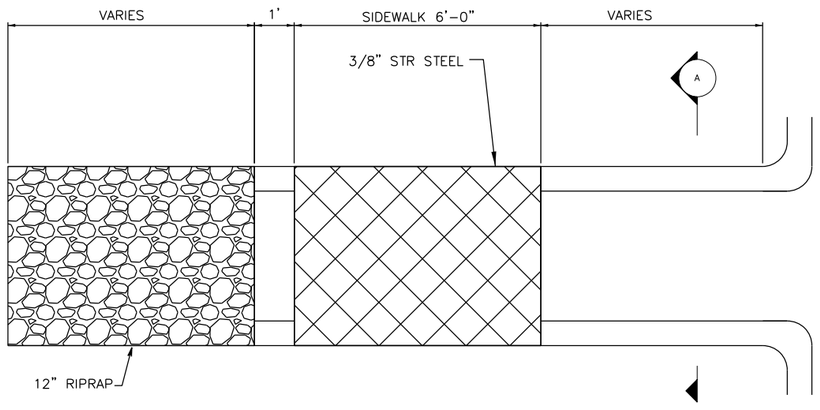
FINAL SUBMITTAL



SECTION A CONCRETE FLUME WITH STEEL PLATE COVER

NTS



SWALE & FLUME DETAIL

NTS

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NO.	REVISION	BY	DATE

STATE OF TEXAS
OSWALD F. GARCIA
109889
LICENSED
PROFESSIONAL ENGINEER

MARCH 29, 2021

PLANNING ENGINEERING PROJECT MANAGEMENT
MCi Moreno Cardenas Inc.
EL PASO • SAN ANTONIO
TBPE Firm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281 (ALAMEDA AVE. & HORIZON BLVD.) SIDEWALK FLUME DETAIL

01 OF 01

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	128

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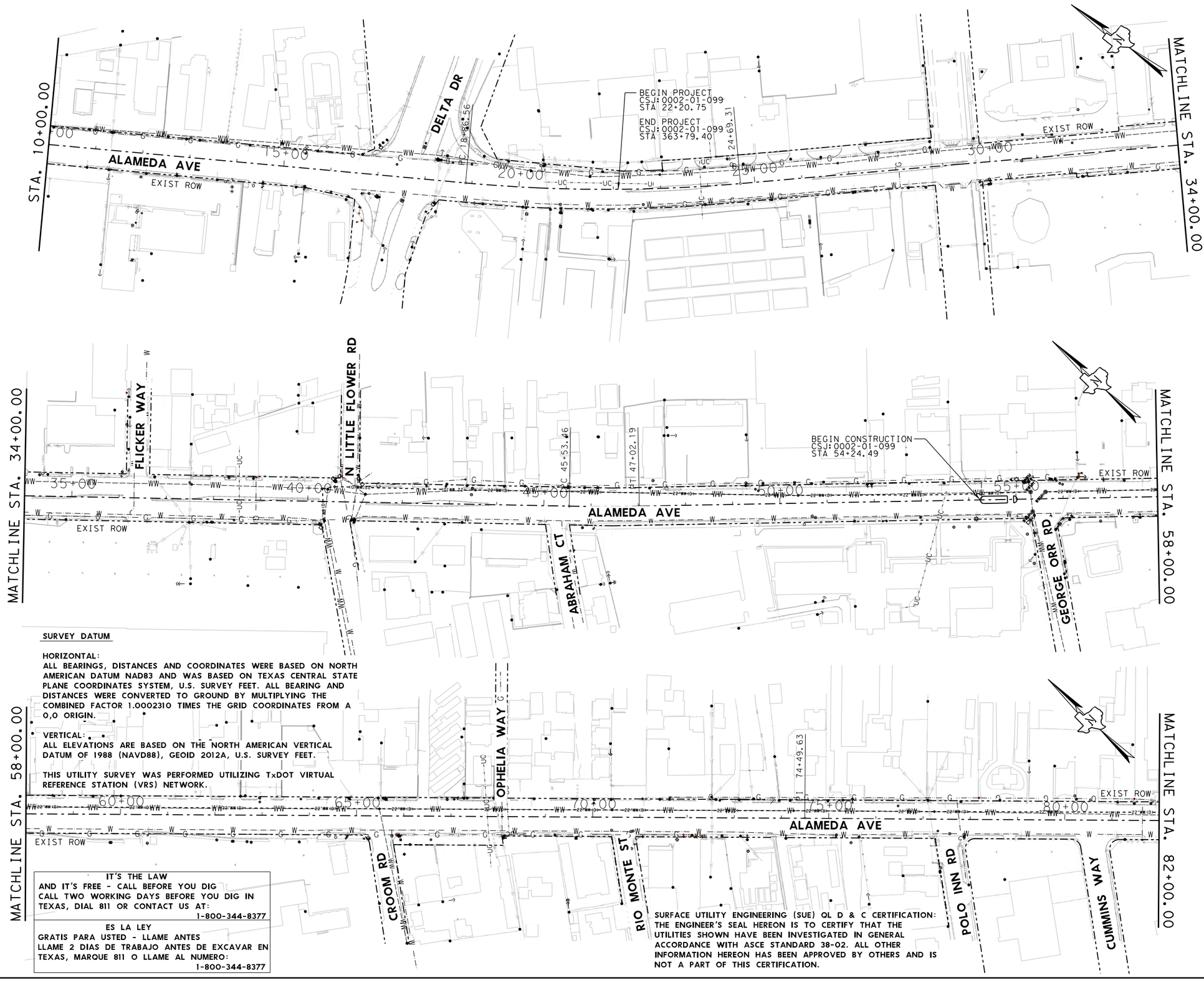

SURVEY DATUM

HORIZONTAL:
ALL BEARINGS, DISTANCES AND COORDINATES WERE BASED ON NORTH AMERICAN DATUM NAD83 AND WAS BASED ON TEXAS CENTRAL STATE PLANE COORDINATES SYSTEM, U.S. SURVEY FEET. ALL BEARING AND DISTANCES WERE CONVERTED TO GROUND BY MULTIPLYING THE COMBINED FACTOR 1.0002310 TIMES THE GRID COORDINATES FROM A 0,0 ORIGIN.

VERTICAL:
ALL ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), GEOID 2012A, U.S. SURVEY FEET.

THIS UTILITY SURVEY WAS PERFORMED UTILIZING TxDOT VIRTUAL REFERENCE STATION (VRS) NETWORK.

IT'S THE LAW
AND IT'S FREE - CALL BEFORE YOU DIG
CALL TWO WORKING DAYS BEFORE YOU DIG IN TEXAS, DIAL 811 OR CONTACT US AT:
1-800-344-8377

ES LA LEY
GRATIS PARA USTED - LLAME ANTES
LLAME 2 DIAS DE TRABAJO ANTES DE EXCAVAR EN TEXAS, MARQUE 811 O LLAME AL NUMERO:
1-800-344-8377

SURFACE UTILITY ENGINEERING (SUE) QL D & C CERTIFICATION: THE ENGINEER'S SEAL HEREON IS TO CERTIFY THAT THE UTILITIES SHOWN HAVE BEEN INVESTIGATED IN GENERAL ACCORDANCE WITH ASCE STANDARD 38-02. ALL OTHER INFORMATION HEREON HAS BEEN APPROVED BY OTHERS AND IS NOT A PART OF THIS CERTIFICATION.

0 100 200
SCALE: 1" = 200' (H)

LEGEND

- UG - UNDERGROUND
- E - ELECTRIC UG LINE
- FOC - FIBER OPTIC CONDUIT
- T - TELECOMMUNICATION UG LINE
- WW - EXISTING WASTEWATER LINE
- W - EXISTING WATER LINE
- G - EXISTING GAS LINE
- UC - EXISTING UNDERGROUND ELECTRICAL/COMMUNICATION LINE
- ℄ ROADWAY ALIGNMENT
- ROW

NOTES:

1. THE LOCATIONS OF THE EXISTING UTILITIES SHOWN ARE TAKEN FROM THE BEST INFORMATION AVAILABLE. THEY ARE NOT GUARANTEED TO BE ACCURATE OR COMPLETE AND MUST BE VERIFIED BY THE CONTRACTOR BEFORE THE START OF CONSTRUCTION.
2. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY DAMAGE TO UTILITIES AND COORDINATION WITH EACH RESPECTIVE UTILITY PROVIDER PRIOR TO CONSTRUCTION AS UTILITY LINES ARE SHALLOW AND UTILITY PROVIDERS' STAND BY MAY BE REQUIRED DURING CONSTRUCTION.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UTILITIES WHETHER PUBLIC OR PRIVATE, PRIOR TO CONSTRUCTION.
4. CONTRACTOR IS TO ADJUST TO PROPOSED GRADE ALL EXISTING CONFLICTING SURFACE UTILITIES WITHIN CONSTRUCTION LIMITS EXCEPT FOR DRAINAGE INFRASTRUCTURE. CONTRACTOR IS TO BE CAUTIOUS NOT TO BURY ANY SURFACE UTILITY FACILITY.
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Texas Department of Transportation

NO.	REVISION	BY	DATE

OSWALD F. GARCIA
109889
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
MARCH 29, 2021

PLANNING ENGINEERING PROJECT MANAGEMENT
MCi Moreno Cardenas Inc.
EL PASO · SAN ANTONIO
TBPE Firm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

UTILITY LAYOUT

STA 22+20.75 TO STA 82+00.00

01 OF 12

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	129	

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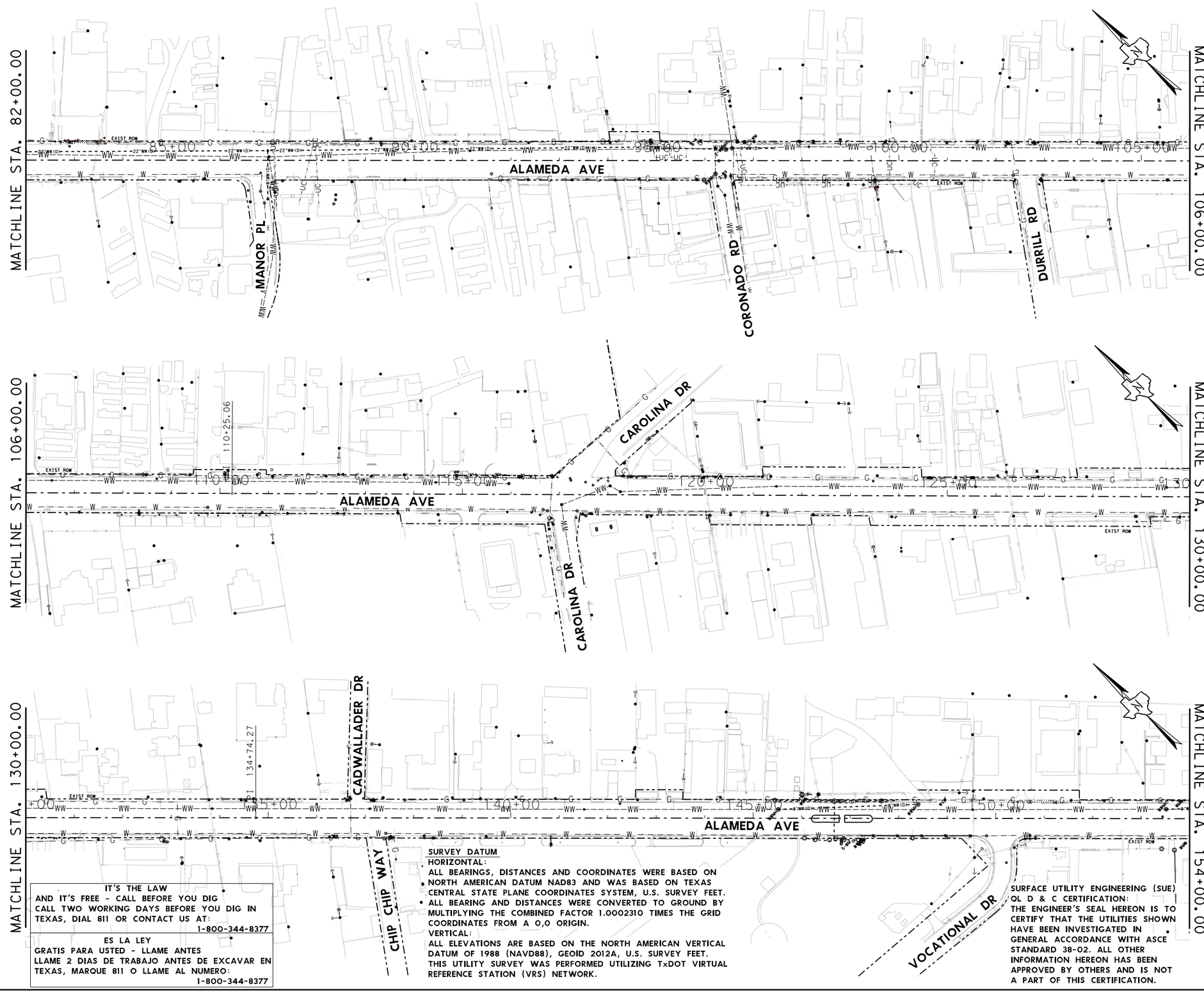

0 100 200

SCALE: 1" = 200' (H)

LEGEND

UG -	UNDERGROUND
E -	ELECTRIC UG LINE
FOC -	FIBER OPTIC CONDUIT
T -	TELECOMMUNICATION UG LINE
WW	EXISTING WASTEWATER LINE
W	EXISTING WATER LINE
G	EXISTING GAS LINE
UC	EXISTING UNDERGROUND ELECTRICAL/COMMUNICATION LINE
	℄ ROADWAY ALIGNMENT
	ROW

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AUSTIN, TX 78729
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TBPELS FIRM NO. F-312

SH 20 & FM 1281

UTILITY LAYOUT

STA 82+00.00 TO STA 154+00.00

02 OF 12

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	EL PASO	EL PASO	3451	01	035 ETC.	130	

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SURVEY DATUM
HORIZONTAL:
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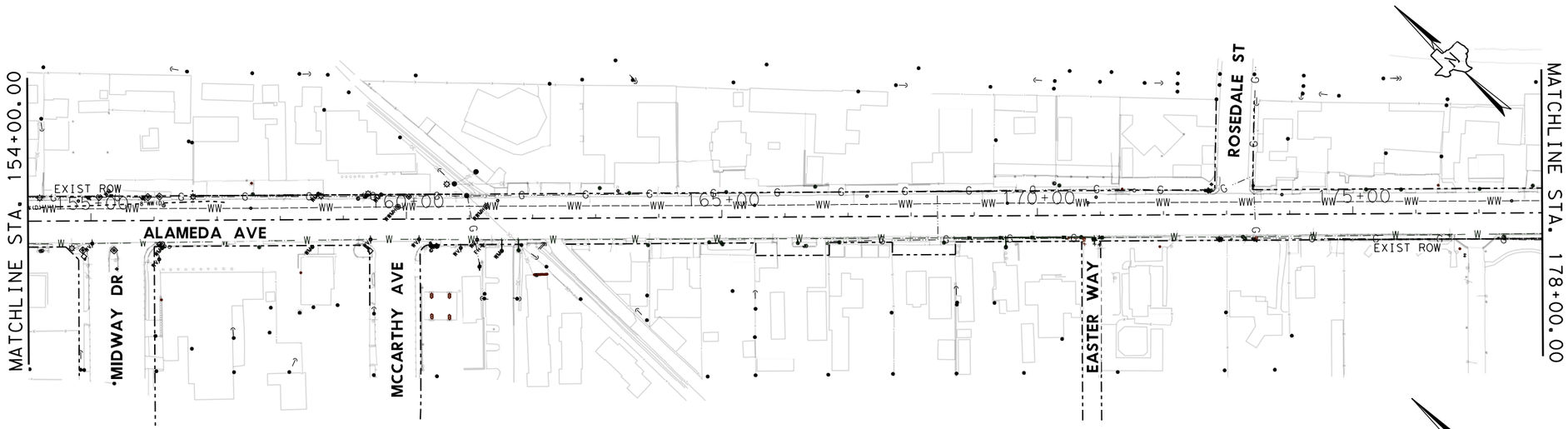

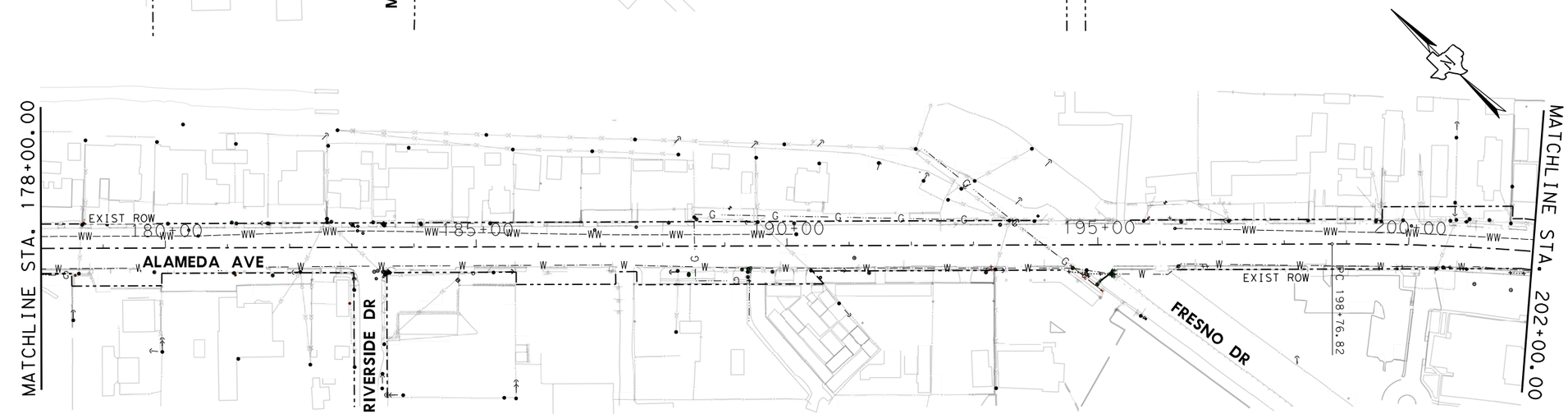

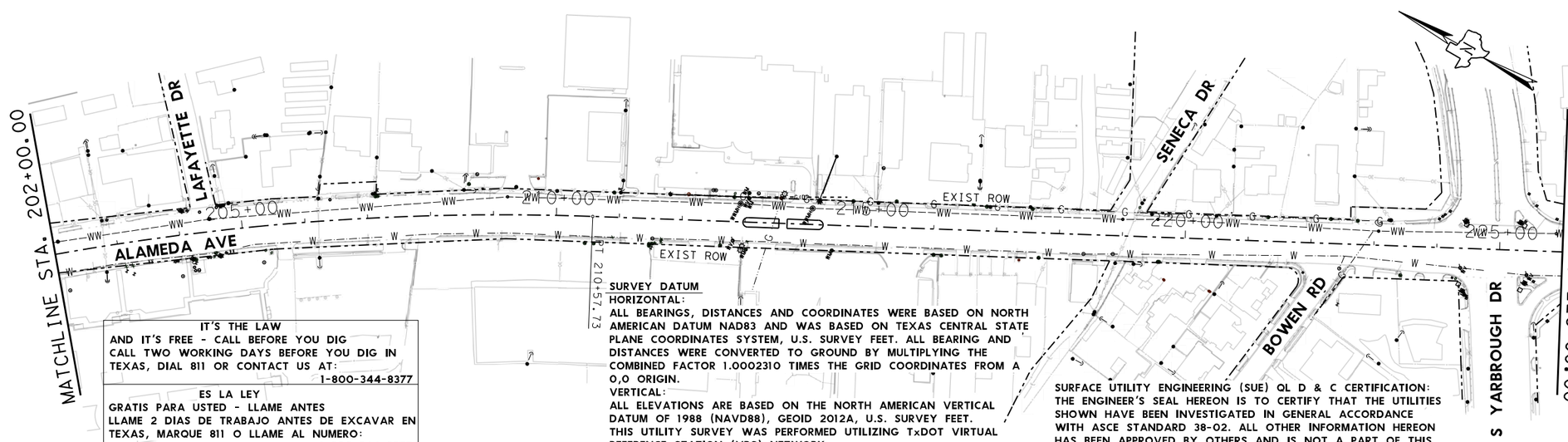

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0 100 200
SCALE: 1" = 200' (H)

LEGEND

- UG - UNDERGROUND
- E - ELECTRIC UG LINE
- FOC - FIBER OPTIC CONDUIT
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OSWALD F. GARCIA
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LICENSED PROFESSIONAL ENGINEER
MARCH 29, 2021

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TBPE Firm Registration No. F-000554

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9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

UTILITY LAYOUT

STA 154+00.00 TO STA 226+00.00

03 OF 12

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	131

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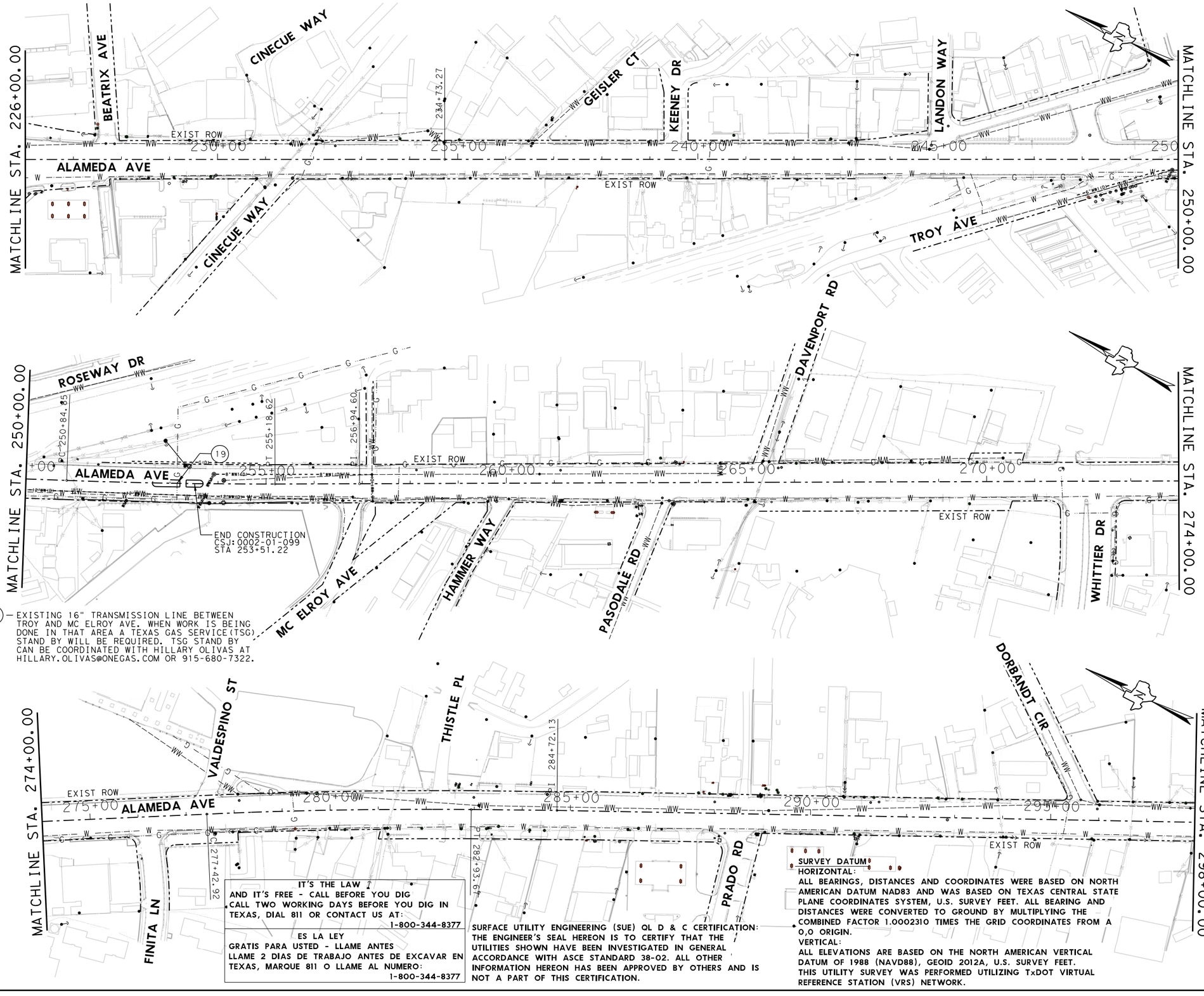

19 – EXISTING 16" TRANSMISSION LINE BETWEEN TROY AND MC ELROY AVE. WHEN WORK IS BEING DONE IN THAT AREA A TEXAS GAS SERVICE(TSG) STAND BY WILL BE REQUIRED. TSG STAND BY CAN BE COORDINATED WITH HILLARY OLIVAS AT HILLARY.OLIVAS@ONEGAS.COM OR 915-680-7322.

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0 100 200
SCALE: 1" = 200' (H)

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STATE OF TEXAS
OSWALD F. GARCIA
109889
LICENSED PROFESSIONAL ENGINEER
MARCH 29, 2021

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MCi Moreno Cardenas Inc.
EL PASO · SAN ANTONIO
TBPE Firm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

UTILITY LAYOUT

STA 226+00.00 TO STA 298+00.00

04 OF 12

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	132

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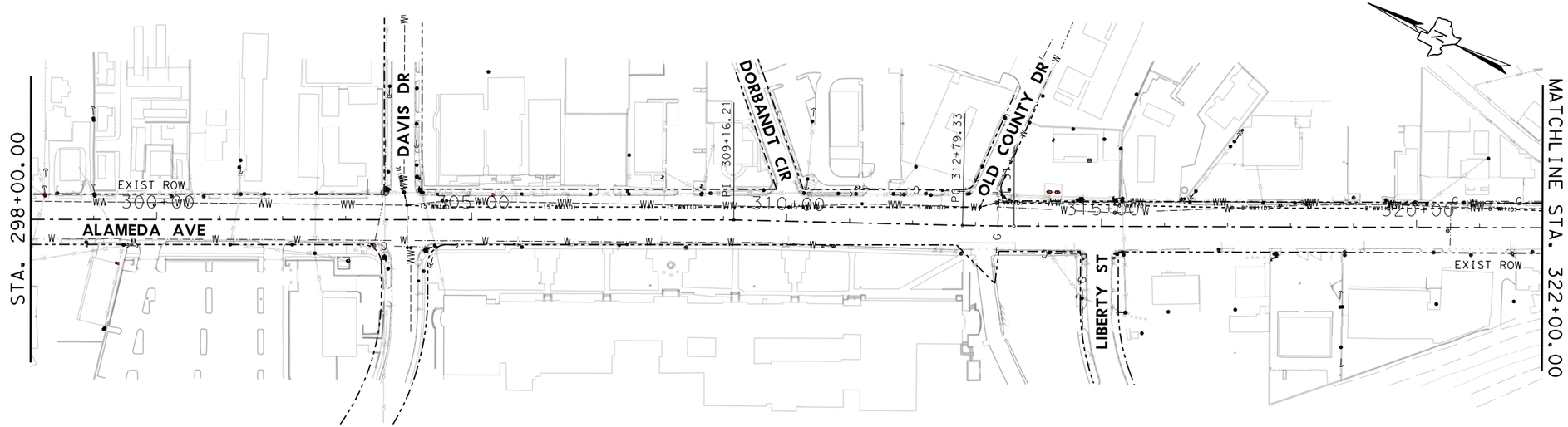

0 100 200

SCALE: 1" = 200' (H)

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(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

UTILITY LAYOUT

STA 298+00.00 TO STA 346+00.00

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
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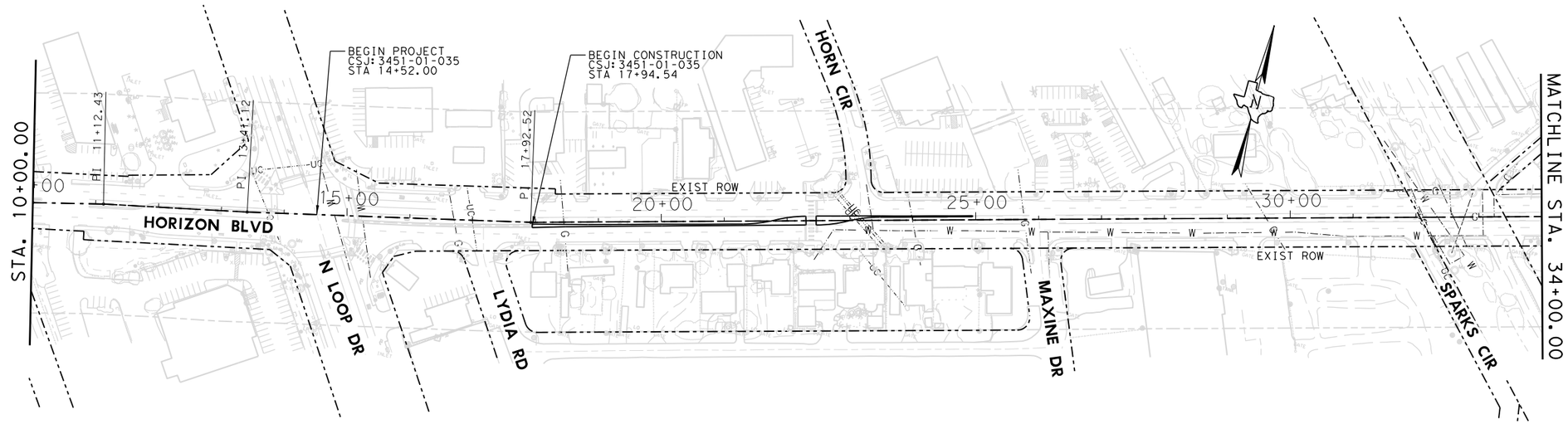

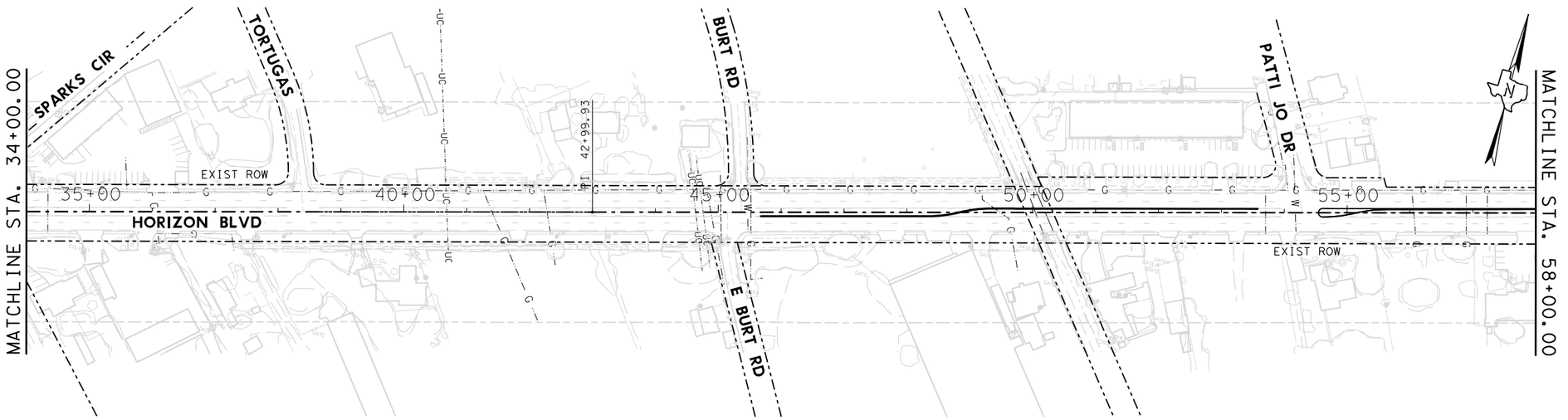

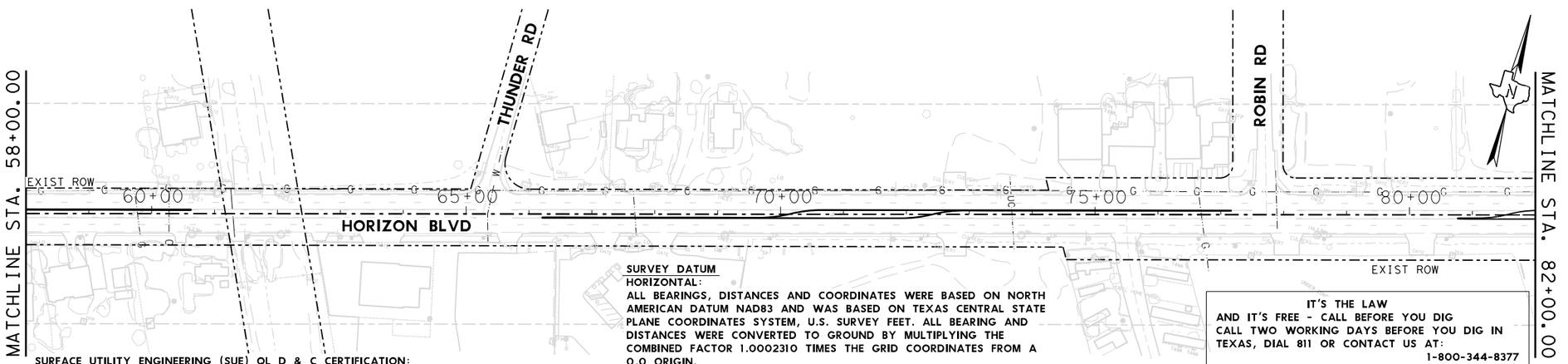

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SH 20 & FM 1281

UTILITY LAYOUT

STA 14+52.00
TO STA 82+00.00

06 OF 12

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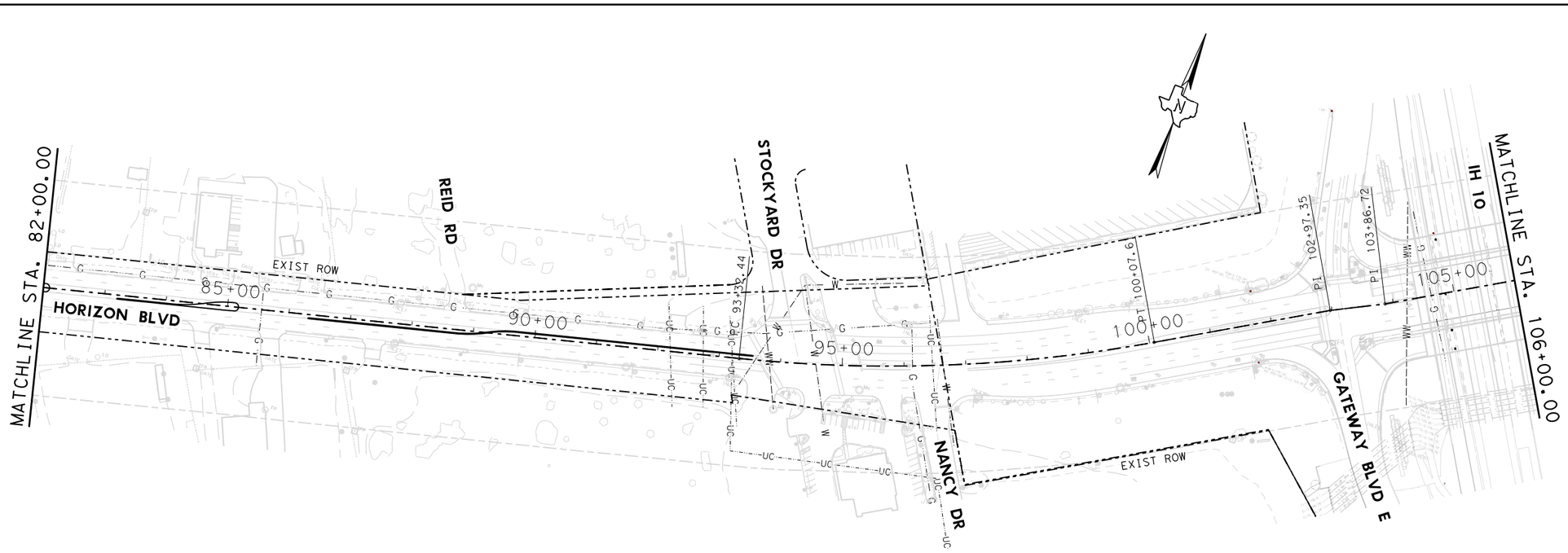

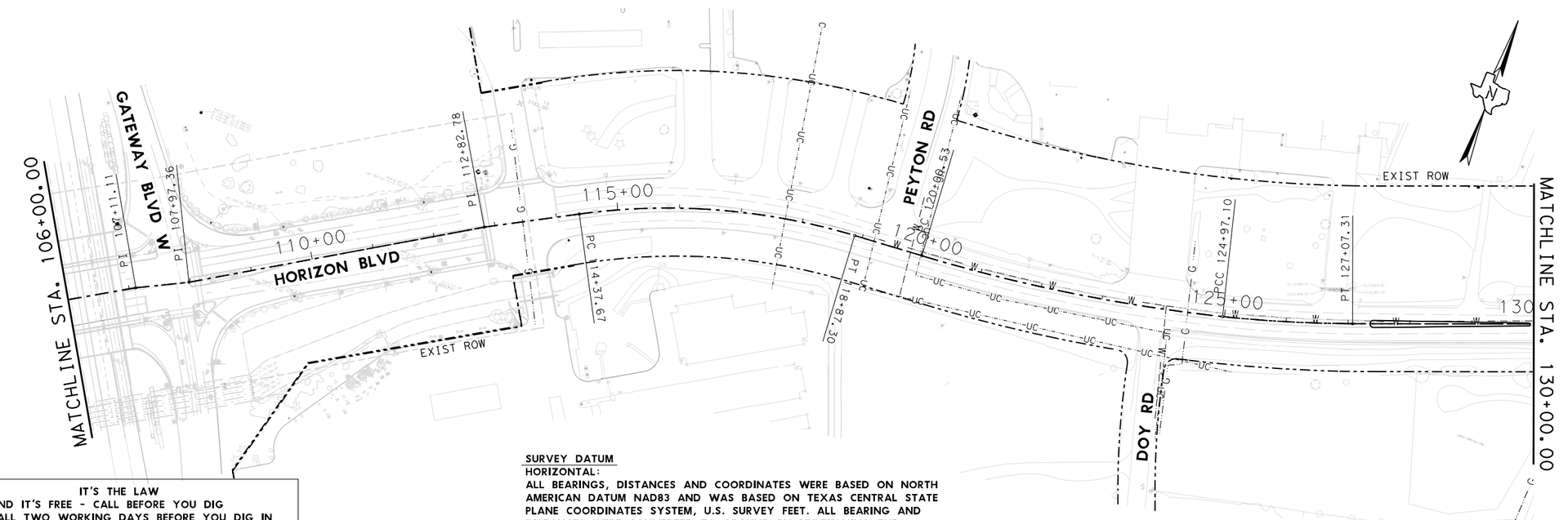

0 100 200

SCALE: 1" = 200' (H)

LEGEND

- UG - UNDERGROUND
- E - ELECTRIC UG LINE
- FOC - FIBER OPTIC CONDUIT
- T - TELECOMMUNICATION UG LINE
- WW - EXISTING WASTEWATER LINE
- W - EXISTING WATER LINE
- G - EXISTING GAS LINE
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- ℄ ROADWAY ALIGNMENT
- ROW

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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
OSWALD F. GARCIA
109889
LICENSED PROFESSIONAL ENGINEER

MARCH 29, 2021

PLANNING ENGINEERING PROJECT MANAGEMENT
MCi Moreno Cardenas Inc.
EL PASO · SAN ANTONIO
TBPE Firm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

UTILITY LAYOUT

STA 82+00.00 TO STA 130+00.00

07 OF 12

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	135

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LLAME 2 DIAS DE TRABAJO ANTES DE EXCAVAR EN TEXAS, MARQUE 811 O LLAME AL NUMERO:
1-800-344-8377

SURVEY DATUM
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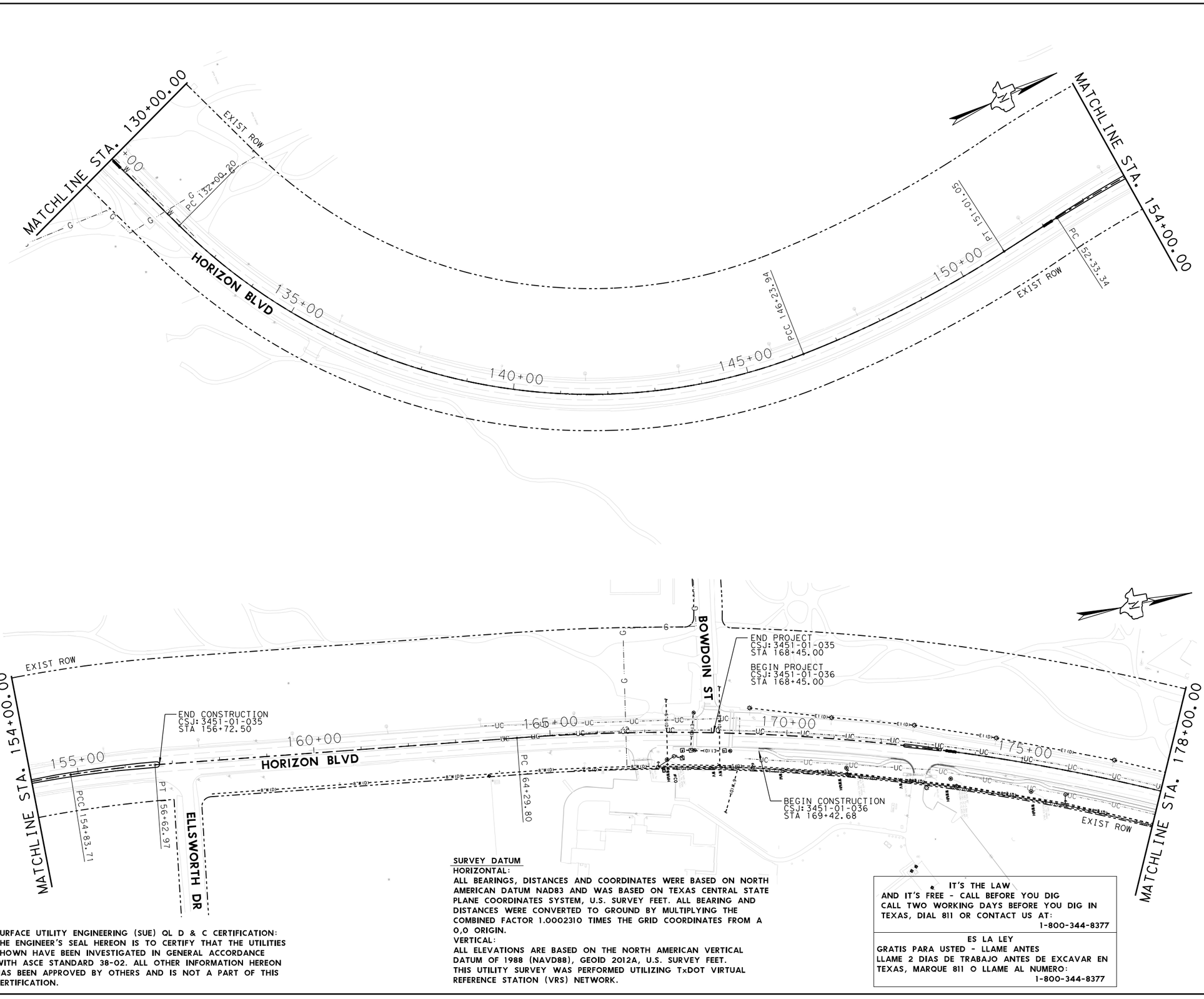

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SCALE: 1" = 200' (H)

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STATE OF TEXAS
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PLANNING ENGINEERING PROJECT MANAGEMENT
MCi Moreno Cardenas Inc.
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TBPE FIrm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

UTILITY LAYOUT

STA 130+00.00 TO STA 178+00.00

08 OF 12

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
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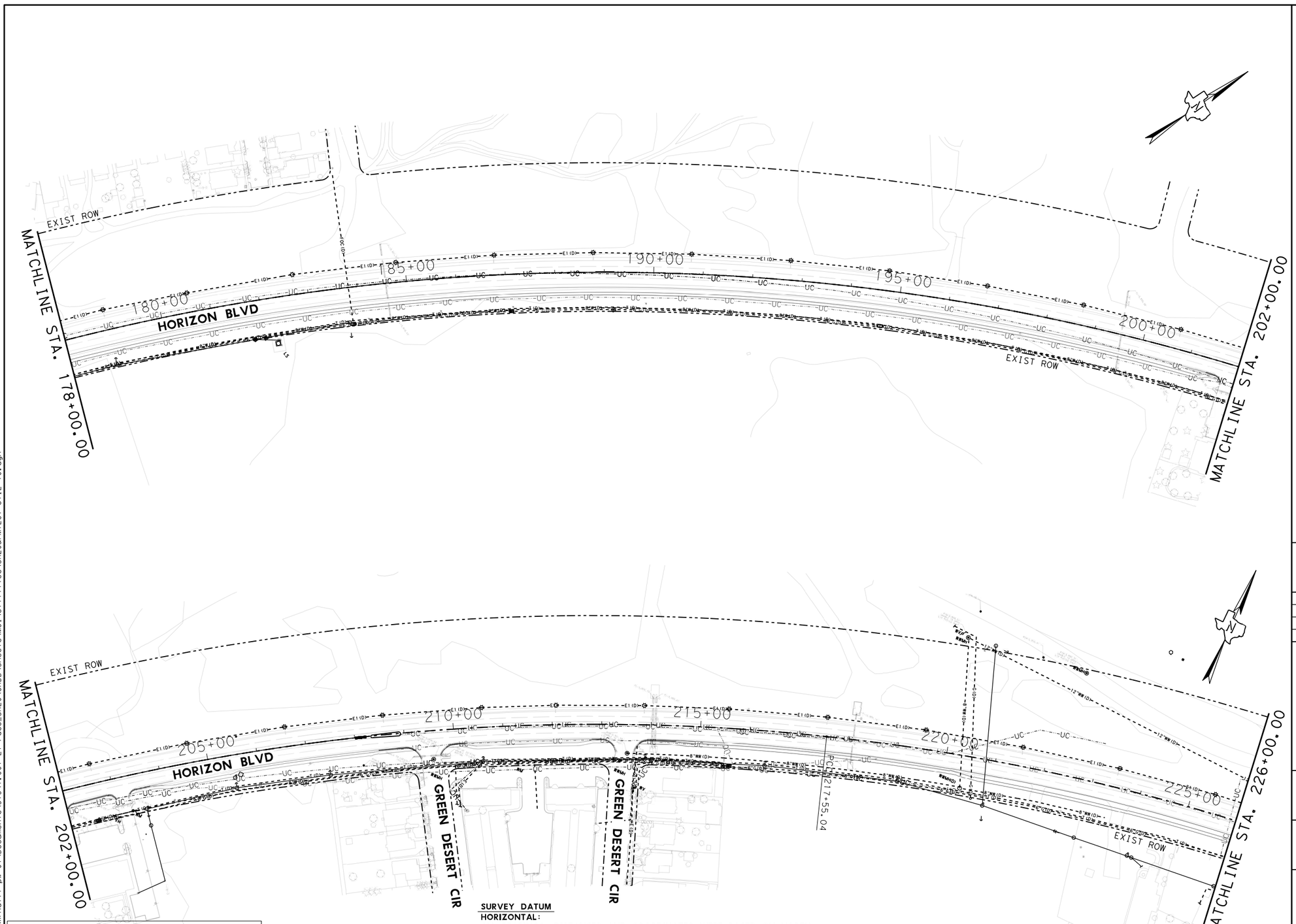

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MARCH 29, 2021

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TBPE Firm Registration No. F-000554

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TBPELS FIRM NO. F-312

SH 20 & FM 1281

UTILITY LAYOUT

STA 178+00.00 TO STA 226+00.00

09 OF 12

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
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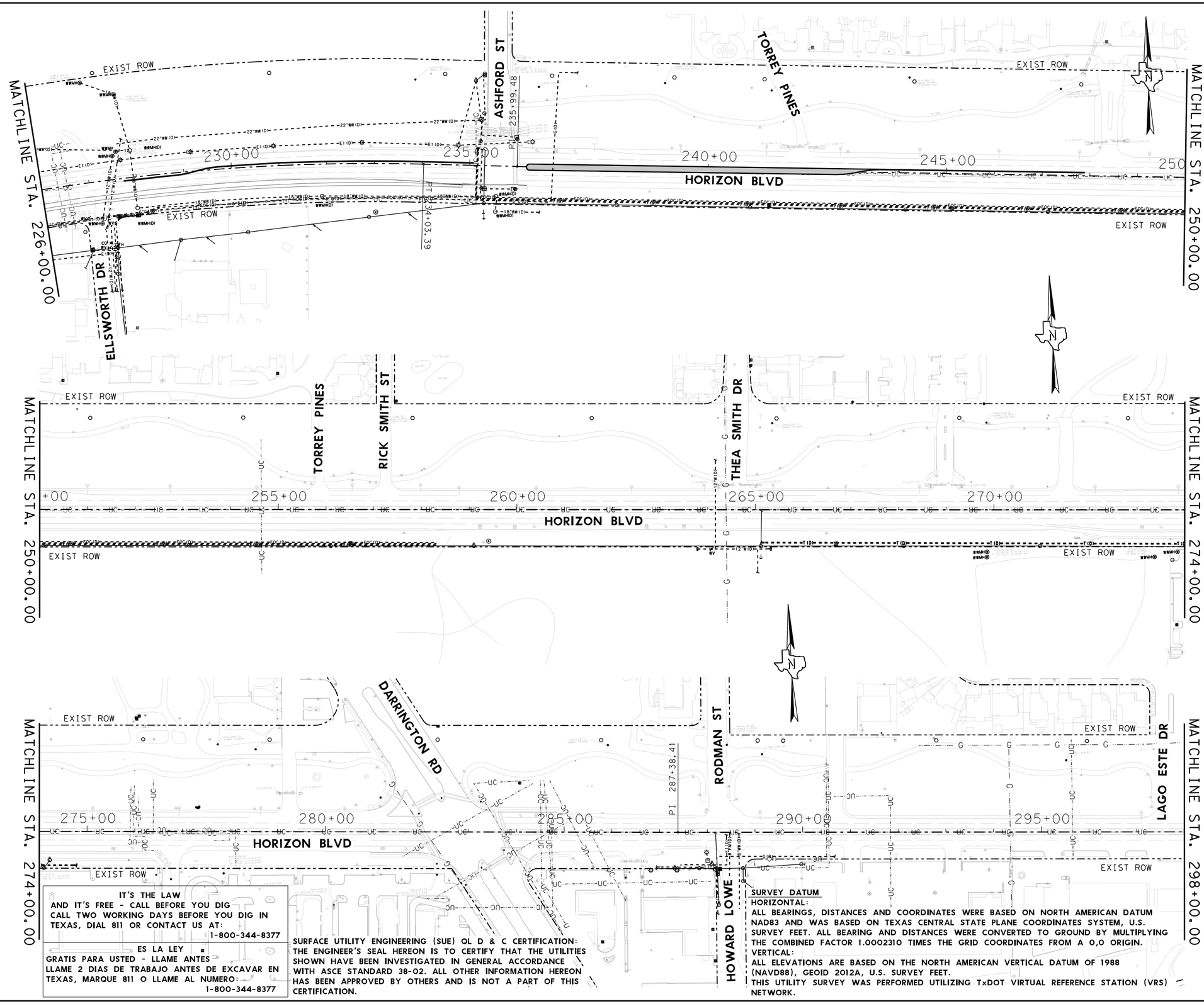

0 100 200

SCALE: 1" = 200' (H)

LEGEND

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OSWALD F. GARCIA
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MARCH 29, 2021

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TBPE Firm Registration No. F-000554

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(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

UTILITY LAYOUT

STA 226+00.00 TO STA 298+00.00

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
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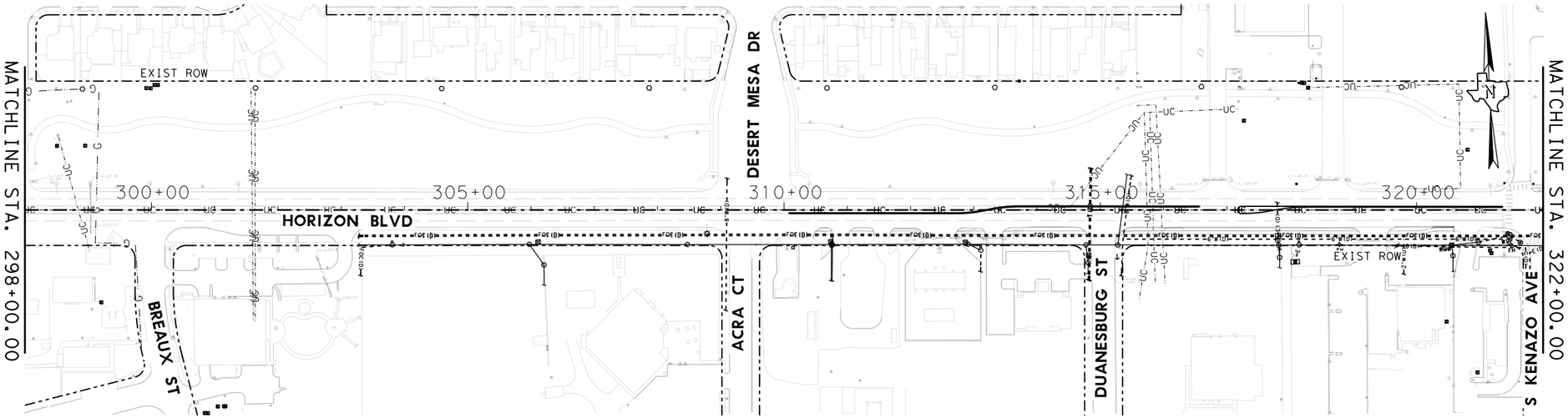

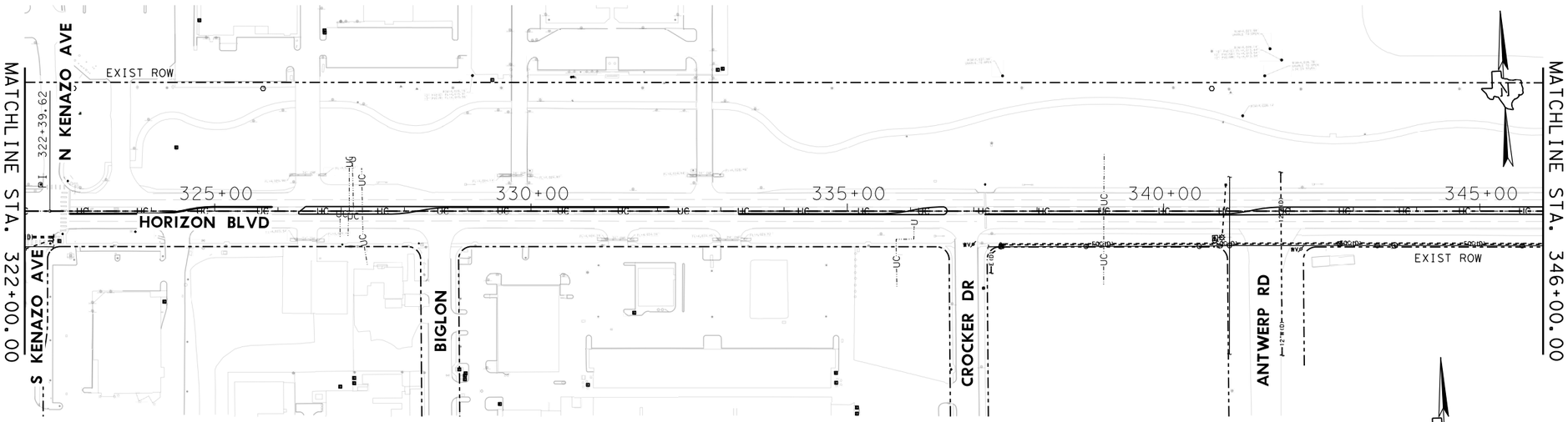

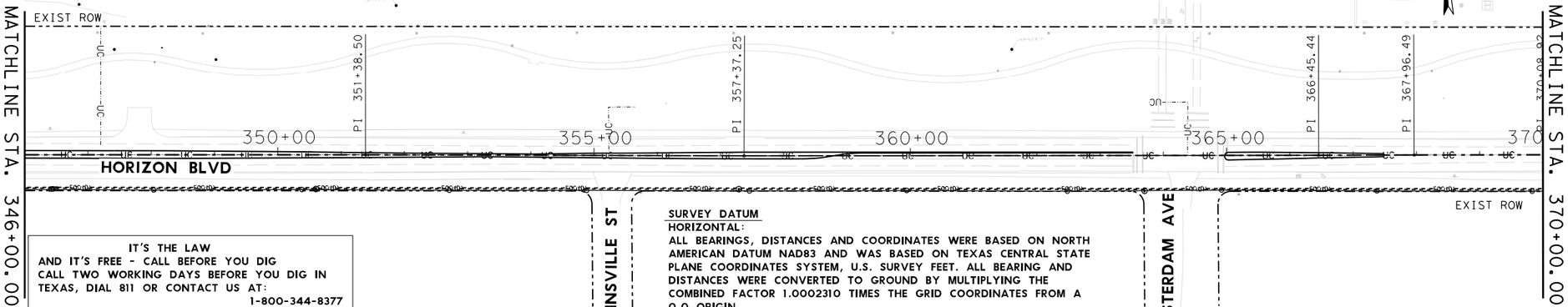

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STA 298+00.00 TO STA 370+00.00

11 OF 12

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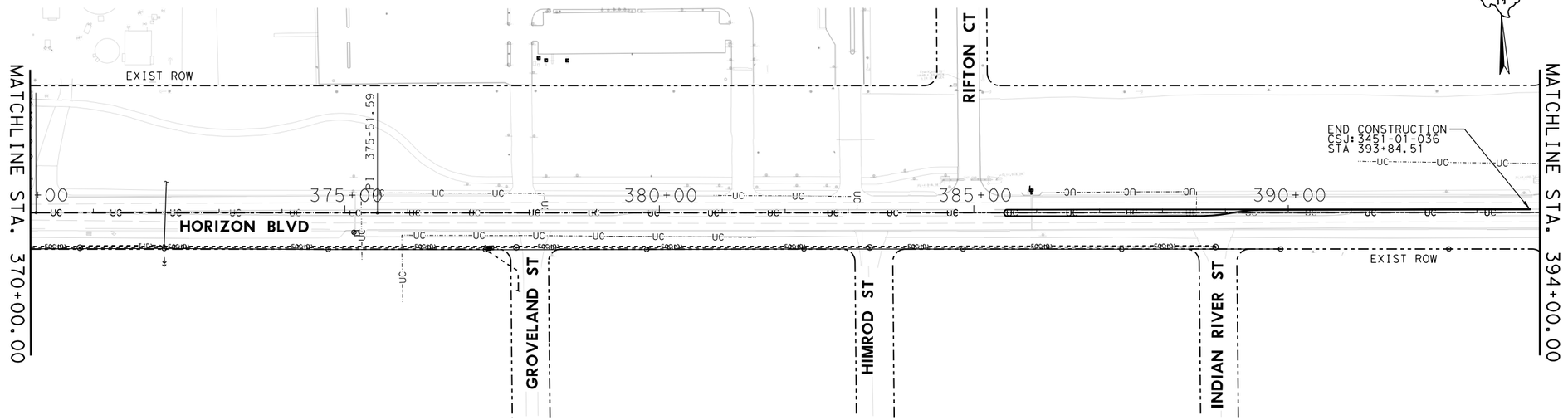

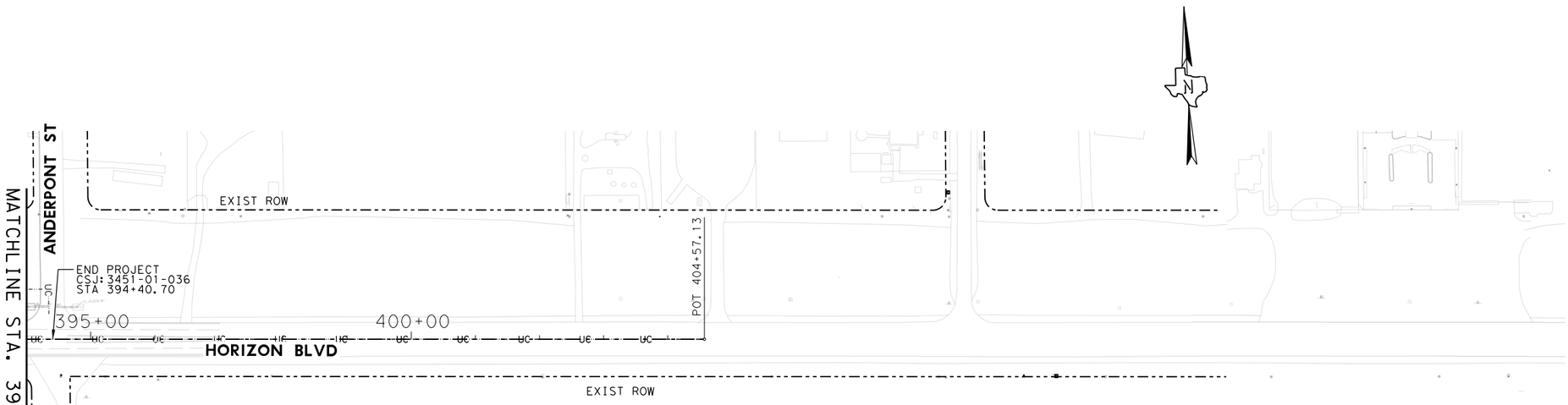

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1-800-344-8377

SURVEY DATUM

HORIZONTAL:
ALL BEARINGS, DISTANCES AND COORDINATES WERE BASED ON NORTH AMERICAN DATUM NAD83 AND WAS BASED ON TEXAS CENTRAL STATE PLANE COORDINATES SYSTEM, U.S. SURVEY FEET. ALL BEARING AND DISTANCES WERE CONVERTED TO GROUND BY MULTIPLYING THE COMBINED FACTOR 1.0002310 TIMES THE GRID COORDINATES FROM A 0,0 ORIGIN.

VERTICAL:
ALL ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), GEOID 2012A, U.S. SURVEY FEET. THIS UTILITY SURVEY WAS PERFORMED UTILIZING TxDOT VIRTUAL REFERENCE STATION (VRS) NETWORK.

SURFACE UTILITY ENGINEERING (SUE) QL D & C CERTIFICATION: THE ENGINEER'S SEAL HEREON IS TO CERTIFY THAT THE UTILITIES SHOWN HAVE BEEN INVESTIGATED IN GENERAL ACCORDANCE WITH ASCE STANDARD 38-02. ALL OTHER INFORMATION HEREON HAS BEEN APPROVED BY OTHERS AND IS NOT A PART OF THIS CERTIFICATION.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
OSWALD F. GARCIA
109889
LICENSED PROFESSIONAL ENGINEER

MARCH 29, 2021

PLANNING ENGINEERING PROJECT MANAGEMENT
MCi Moreno Cardenas Inc.
EL PASO · SAN ANTONIO
TBPE Firm Registration No. F-000554

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

UTILITY LAYOUT

STA 370+00.00 TO STA 394+40.70

12 OF 12

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	140

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FINAL SUBMITTAL

ILLUMINATION NOTES:

1. EXISTING COMPONENTS SUCH AS UTILITIES, SIGNS & DRAINAGE STRUCTURES SHOWN ARE APPROXIMATE AND SHALL BE VERIFIED BY THE CONTRACTOR BEFORE CONSTRUCTION. CONTRACTOR SHALL CALL FOR LOCATES PRIOR TO COMMENCING EXCAVATION.

2. CONTRACTOR SHALL INFORM THE ENGINEER OF ANY EXISTING ILLUMINATION EQUIPMENT, GROUND BOXES AND CABLES THAT REQUIRE RELOCATION PRIOR TO ANY WORK. CONTRACTOR SHALL PROTECT AND KEEP EXISTING ILLUMINATION FACILITIES IN OPERATION AND SHALL ONLY REMOVE EXISTING ILLUMINATION POLES, ELECTRICAL SERVICE METERS, GROUND BOXES AND OTHER COMPONENTS CALL TO BE REMOVED ONLY AFTER PROPOSED ILLUMINATION IS OPERATIONAL. DAMAGE TO EXISTING ILLUMINATION FACILITIES CAUSED BY THE CONTRACTOR SHALL BE REPLACED AT NO COST TO TxDOT WITH EQUIPMENT AS APPROVED BY THE ENGINEER.

3. LOCATION OF ILLUMINATION POLES AND ELECTRICAL SERVICE SHALL BE VERIFIED AND APPROVED BY TxDOT PRIOR TO CONSTRUCTION.

4. CONTRACTOR SHALL POTHOLE ILLUMINATION POLE AND ELECTRICAL SERVICE METER POLE FOUNDATION LOCATIONS NEAR UTILITIES PRIOR TO INSTALLING POLE FOUNDATIONS.

5. CONTRACTOR SHALL NOT DAMAGE EXISTING VEGETATION.

6. CONTRACTOR SHALL REMOVE EXISTING CONDUCTORS AND GROUND BOXES FOR THE EXISTING ILLUMINATION POLES LABELED AS TO BE REMOVED AND IS SUBSIDIARY TO ITEMS 620 & 624. EXISTING CONDUITS CAN BE ABANDONED.

7. CONDUCTOR RUNS IN ILLUMINATION LAYOUTS CONTAIN 5 FT. OF SLACK. ALL SLACKS ARE QUANTIFIED.

8. USE INSTALLED CONDUCTORS FOR BARE AS SHOWN ON PLANS.

9. CONTRACTOR SHALL DELIVER REMOVED ILLUMINATION POLES TO TEXAS DEPARTMENT OF TRANSPORTATION AT 13301 GATEWAY WEST BLVD. EL PASO, TX 79928.(PHONE: 915-790-4245). THIS WORK SHALL NOT BE MEASURED OR PAID SEPARATELY, BUT SHALL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS. CONTACT THE TRAFFIC SIGNAL SHOP SUPERVISOR AT LEAST 24 HOURS IN ADVANCE OF RETURNING MATERIALS.

10. CONTRACTOR TO VERIFY EXISTING LUMINAIRE VOLTAGES PRIOR TO PURCHASE OF PROPOSED LED LUMINAIRES. THIS APPLIES TO ALL POLES THAT REQUIRE REPLACEMENT OF LUMINAIRES.

11. THE LOCATION OF CONDUIT IS DIAGRAMMATIC AND MAY BE VARIED TO MEET LOCAL CONDITIONS UPON APPROVAL OF THE ENGINEER.

12. ADD JUNCTION BOXES AS SHOWN ON PLANS AND AT CONCRETE BARRIER MOUNTED ILLUMINATION POLES. SUBSIDIARY TO ITEM 618.

13. MAINTIAN 10 FT. MINIMUM VERTICAL AND HORIZONTAL CLEARANCE FROM ALL OVERHEAD ELECTRICAL LINES.

14. CONTRACTOR TO COMPLETE ELECTRIC SERVICE COORDINATION AND IDENTIFY SERVICE LOCATIONS WITH UTILITY PROVIDER PRIOR TO STARTING ANY WORK ON THE PROJECT. CONTRACTOR TO COMPLETE THE CONSTRUCTION OF ALL ELECTRICAL SERVICES AT THE EARLIEST POSSIBLE TIME TO ESTABLISH POWER FOR THE PROPOSED LUMINAIRES.

NO.	REVISION	BY	DATE

STATE OF TEXAS
BHARATH DONAVALLI
138746
LICENSED
PROFESSIONAL ENGINEER

3/28/2021

WSP USA Inc
9311 San Pedro St., Suite 700
San Antonio, TX 78216
TEL: 210-247-4360
TBPE F-2263

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

ILLUMINATION GENERAL NOTES

DESIGNED: BD	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	030, ETC.	141

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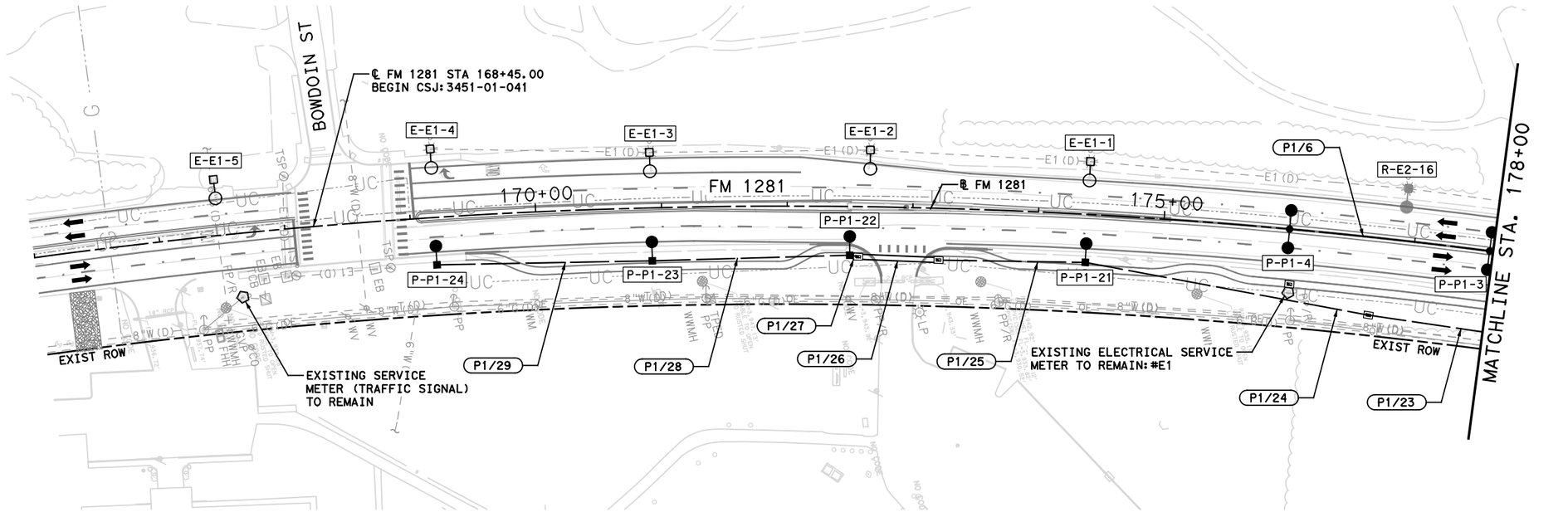
FINAL SUBMITTAL



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- (XX/X) CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X
  - POLE NO.
  - SERVICE METER NO.
  - E - EXISTING TO REMAIN
    P - PROPOSED
    R - REMOVE EXISTING

SHEET NOTES:

1. REPLACE EXISTING LUMINAIRES WITH 250W EQ LED FOR POLES E-E1-1 TO E-E1-4.
2. REMOVE EXISTING LIGHT POLE R-E2-16.
3. EXISTING HPS LUMINAIRE ON POLE E-E1-5 SHALL REMAIN.

WARNING!!!
BEFORE YOU DIG

CONTRACTOR SHALL FIELD LOCATE ALL EXISTING UNERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION WITH ALL UTILITY COMPANIES.

TxDOT: (915) 790-4245
DIG TESS: 811

EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND ARE INTENDED TO ILLUSTRATE THAT THEY ARE PRESENT. CONTRACTOR SHALL POTHOLE APPARENT UTILITY CONFLICTS AT LOCATIONS NO MORE THAN 300 FT. TO VERIFY LOCATION AND DEPTH.

CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") CONDUIT LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) CONDUIT LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
P1/6	A	160	1	160			2	1	495
P1/23	C	500	1	500			2	1	1515
P1/24	C	230	1	230			2	1	705
P1/25	C	120	1	120			2	1	375
P1/26	C	65			1	65	2	1	210
P1/27	C	10	1	10			2	1	45
P1/28	C	160	1	160			2	1	495
P1/29	C	175	1	175			2	1	540
TOTAL				1355		65			4380

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-P1-3	177+60.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-4	176+00.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-21	174+40.00	38.2 RT	(TY SA) 40T-10 (250W EQ) LED	30 IN	8
P-P1-22	172+50.00	38.7 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P1-23	170+92.00	42.1 RT	(TY SA) 40T-10 (250W EQ) LED	30 IN	8
P-P1-24	169+19.00	38.0 RT	(TY SA) 40T-10 (250W EQ) LED	30 IN	8

* SUBSIDIARY TO ITEM 514. REFER TO ROADWAY SHEETS FOR ITEM 514 QUANTITIES

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
110	6003	EXCAVATION (SPECIAL)	CY	3
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	32
432	6006	RIPRAP (CONC)(CL B)	CY	2
610	6007	REMOVE RD IL ASM (SHOE-BASE)	EA	1
610	6102	REPLACE LUMINAIRE W/LED (250W EQ)	EA	4
610	6191	IN RD IL (TY SP) 38S-8-8 (250W EQ) LED	EA	2
610	6216	IN RD IL (TY SA) 40T-10 (250W EQ) LED	EA	3
610	6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA	1
618	6023	CONDT (PVC) (SCH 40) (2")	LF	1355
618	6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	65
620	6010	ELEC CONDR (NO.6) INSULATED	LF	4380
624	6002	GROUND BOX TY A (122311)W/APRON	EA	3

Texas Department of Transportation®

NO.	REVISION	BY	DATE

STATE OF TEXAS
BHARATH DONAVALLI
138746
LICENSED
PROFESSIONAL ENGINEER
3/28/2021

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9311 San Pedro St., Suite 700
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AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 166+00 TO STA 178+00

DESIGNED: BD	FED. RD DIV. NO. 6	STATE TEXAS	FEDERAL AID PROJECT No. STP 2021 (624) HES	HIGHWAY No. FM 1281, ETC.
CHECKED: PMP				

DRAWN: BD	STATE DISTRICT EL PASO	COUNTY EL PASO	CONTROL No. 3451	SECTION No. 01	JOB No. 030, ETC.	SHEET No. 142
CHECKED: PMP						

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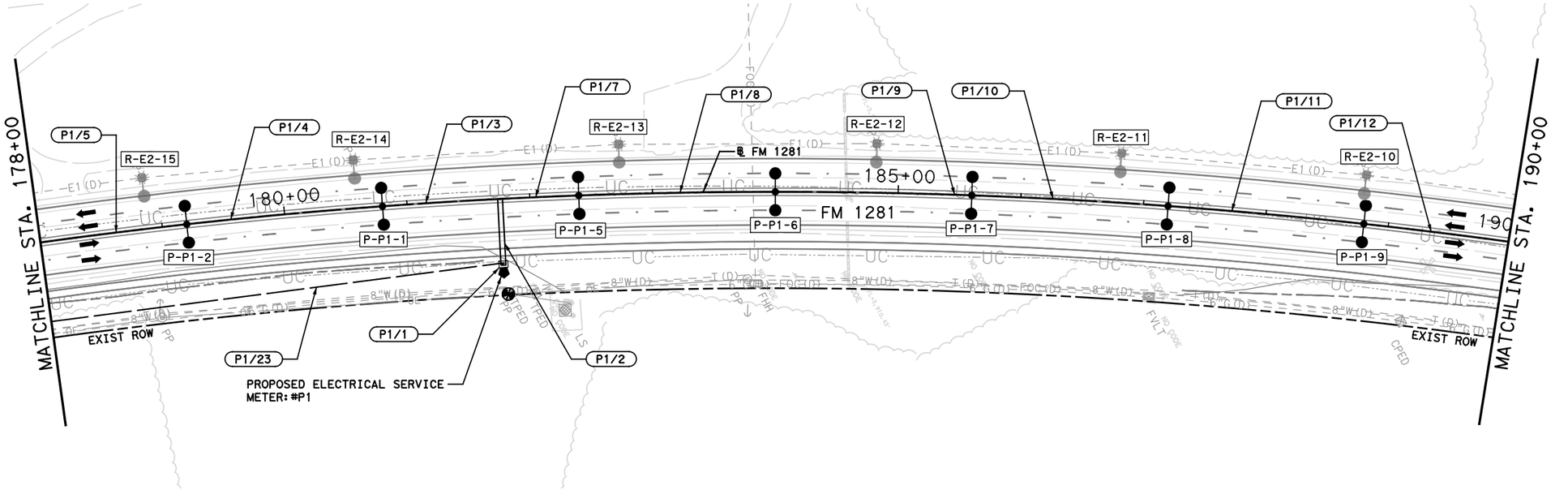

SHEET NOTES:

1. REMOVE EXISTING LIGHT POLES R-E2-10 TO R-E2-15.

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- (XX/X) CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X
  - POLE NO.
  - SERVICE METER NO.
  - E - EXISTING TO REMAIN
    P - PROPOSED
    R - REMOVE EXISTING

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NO.	REVISION	BY	DATE

ELECTRICAL SERVICE DATA

ELEC. SERVICE NO.	ELECTRICAL SERVICE DESCRIPTION (SEE ED (5) - 14)	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	CIRCUIT NO.	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
#P1	ELC SRV TY A 240/480 060(NS)SS(E)GC(O)	1 1/4"	3/#4	N/A	2P/60	60	N/A	A	2P/20	2.8	12.19
								B	2P/20	11.2	
								C	2P/20	1.4	
								D(SPARE)	2P/20	10	

CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") CONDUIT LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) CONDUIT LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
P1/1	A,B,C	10	1	10			6	1	105
P1/2	A,B	55			1	55	4	1	300
P1/3	A	95	1	95			2	1	300
P1/4	A	160	1	160			2	1	495
P1/5	A	160	1	160			2	1	495
P1/7	B	65	1	65			2	1	210
P1/8	B	160	1	160			2	1	495
P1/9	B	160	1	160			2	1	495
P1/10	B	160	1	160			2	1	495
P1/11	B	160	1	160			2	1	495
P1/12	B	160	1	160			2	1	495
P1/23	SEE PREVIOUS SHEET								
TOTAL				1290		55			4380

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-P1-1	180+80.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-2	179+20.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-5	182+40.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-6	184+00.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-7	185+60.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-8	187+20.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-9	188+80.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*

* SUBSIDIARY TO ITEM 514. REFER TO ROADWAY SHEETS FOR ITEM 514 QUANTITIES

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
610	6007	REMOVE RD IL ASM (SHOE-BASE)	EA	6
610	6191	IN RD IL (TY SP) 38S-8-8 (250W EQ) LED	EA	7
618	6023	CONDT (PVC) (SCH 40) (2")	LF	1290
618	6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	55
620	6010	ELEC CONDR (NO.6) INSULATED	LF	4380
624	6002	GROUND BOX TY A (122311)W/APRON	EA	1
628	6041	ELC SRV TY A 240/480 060(NS)SS(E)GC(O)	EA	1

WARNING!!!
BEFORE YOU DIG

CONTRACTOR SHALL FIELD LOCATE ALL EXISTING UNERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION WITH ALL UTILITY COMPANIES.

TxDOT: (915) 790-4245
DIG TESS: 811

EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND ARE INTENDED TO ILLUSTRATE THAT THEY ARE PRESENT. CONTRACTOR SHALL POTHOLE APPARENT UTILITY CONFLICTS AT LOCATIONS NO MORE THAN 300 FT. TO VERIFY LOCATION AND DEPTH.

STATE OF TEXAS
BHARATH DONAVALLI
138746
LICENSED
PROFESSIONAL ENGINEER
3/28/2021

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TBPELS FIRM NO. F-312

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 178+00 TO STA 190+00

DESIGNED: BD	FED. RD DIV. NO. 6	STATE TEXAS	FEDERAL AID PROJECT No. STP 2021 (624) HES	HIGHWAY No. FM 1281, ETC.
CHECKED: PMP				

DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	030, ETC.	143

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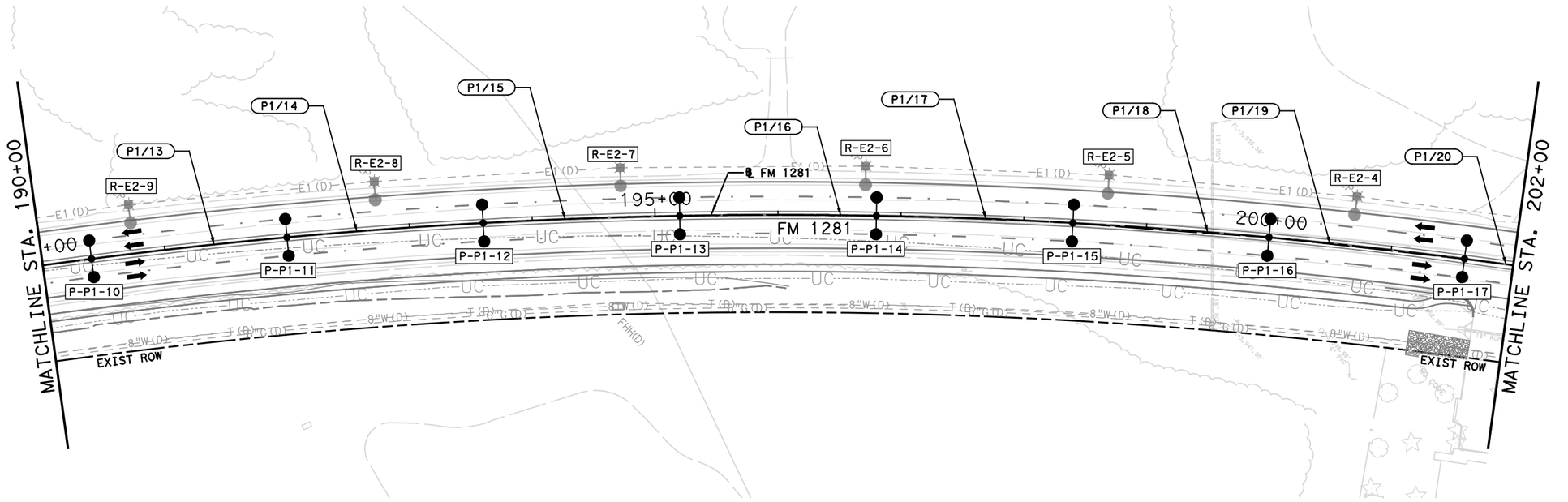

SHEET NOTES:

1. REMOVE EXISTING LIGHT POLES R-E2-4 TO R-E2-9.

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- (XX/X) CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X
  - POLE NO.
  - SERVICE METER NO.
  - E - EXISTING TO REMAIN
    P - PROPOSED
    R - REMOVE EXISTING

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CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") CONDUIT LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) CONDUIT LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
P1/13	B	160	1	160			2	1	495
P1/14	B	160	1	160			2	1	495
P1/15	B	160	1	160			2	1	495
P1/16	B	160	1	160			2	1	495
P1/17	B	160	1	160			2	1	495
P1/18	B	160	1	160			2	1	495
P1/19	B	160	1	160			2	1	495
P1/20	B	160	1	160			2	1	495
TOTAL				1280		0			3960

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-P1-10	190+40.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-11	192+00.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-12	193+60.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-13	195+20.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-14	196+80.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-15	198+40.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-16	200+00.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-17	201+60.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*

* SUBSIDIARY TO ITEM 514. REFER TO ROADWAY SHEETS FOR ITEM 514 QUANTITIES

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
610	6007	REMOVE RD IL ASM (SHOE-BASE)	EA	6
610	6191	IN RD IL (TY SP) 38S-8-8 (250W EQ) LED	EA	8
618	6023	CONDT (PVC) (SCH 40) (2")	LF	1280
620	6010	ELEC CONDR (NO.6) INSULATED	LF	3960

STATE OF TEXAS
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TBPELS FIRM NO. F-312

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 190+00 TO STA 202+00

DESIGNED: BD	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	030, ETC.	144

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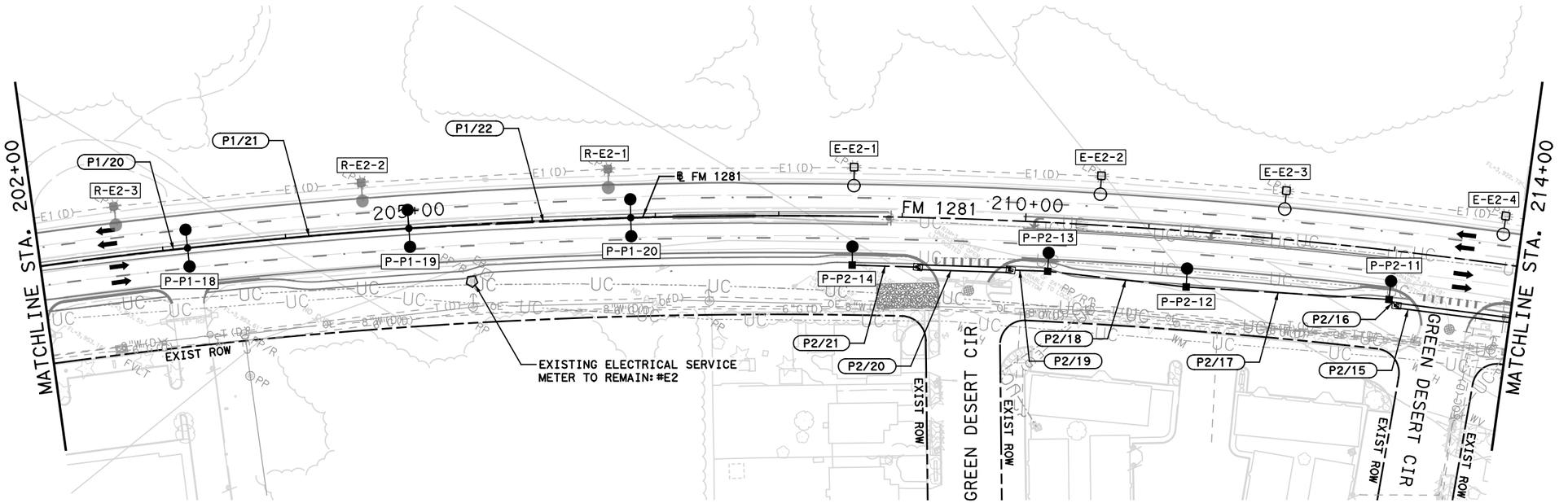

SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- XX/X — CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X — POLE NO. / SERVICE METER NO. / E - EXISTING TO REMAIN, P - PROPOSED, R - REMOVE EXISTING

SHEET NOTES:

1. REPLACE EXISTING LUMINAIRES WITH 250W EQ LED FOR POLES E-E2-1 TO E-E2-4.
2. REMOVE EXISTING LIGHT POLES R-E2-1 TO R-E2-3.

CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") CONDUIT LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) CONDUIT LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
P1/20	SEE PREVIOUS SHEET								
P1/21	B	180	1	180			2	1	555
P1/22	B	180	1	180			2	1	555
P2/15	A	120			1	120	2	1	375
P2/16	A	10	1	10			2	1	45
P2/17	A	165	1	165			2	1	510
P2/18	A	115	1	115			2	1	360
P2/19	A	30	1	30			2	1	105
P2/20	A	75			1	75	2	1	240
P2/21	A	55	1	55			2	1	180
TOTAL				735		195			2925

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-P1-18	203+20.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-19	205+00.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P1-20	206+80.00	0.0	(TY SA) 38S-8-8 (250W EQ) LED	18 IN*	4*
P-P2-11	213+00.00	39.7 RT	(TY SA) 40T-10 (250W EQ) LED	30 IN	8
P-P2-12	211+33.85	45.2 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-13	210+20.00	39.6 RT	(TY SA) 40T-10 (250W EQ) LED	30 IN	8
P-P2-14	208+60.00	39.6 RT	(TY SA) 40T-10 (250W EQ) LED	30 IN	8

* SUBSIDIARY TO ITEM 514. REFER TO ROADWAY SHEETS FOR ITEM 514 QUANTITIES

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
110	6003	EXCAVATION (SPECIAL)	CY	6
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	32
432	6006	RIPRAP (CONC)(CL B)	CY	2
610	6007	REMOVE RD IL ASM (SHOE-BASE)	EA	3
610	6102	REPLACE LUMINAIRE W/LED (250W EQ)	EA	4
610	6191	IN RD IL (TY SP) 38S-8-8 (250W EQ) LED	EA	3
610	6216	IN RD IL (TY SA) 40T-10 (250W EQ) LED	EA	3
610	6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA	1
618	6023	CONDT (PVC) (SCH 40) (2")	LF	735
618	6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	195
620	6010	ELEC CONDR (NO.6) INSULATED	LF	2925
624	6002	GROUND BOX TY A (122311)W/APRON	EA	3

WARNING!!!
BEFORE YOU DIG

CONTRACTOR SHALL FIELD LOCATE ALL EXISTING UNERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION WITH ALL UTILITY COMPANIES.

TxDOT: (915) 790-4245
DIG TESS: 811

EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND ARE INTENDED TO ILLUSTRATE THAT THEY ARE PRESENT. CONTRACTOR SHALL POTHOLE APPARENT UTILITY CONFLICTS AT LOCATIONS NO MORE THAN 300 FT. TO VERIFY LOCATION AND DEPTH.

Texas Department of Transportation®

NO.	REVISION	BY	DATE

STATE OF TEXAS
BHARATH DONAVALLI
138746
LICENSED
PROFESSIONAL ENGINEER
3/28/2021

WSP USA Inc
9311 San Pedro St., Suite 700
San Antonio, TX 78216
TEL: 210-247-4360
TBPE F-2263

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 202+00 TO STA 214+00

DESIGNED: BD	FED. RD DIV. NO. 6	STATE TEXAS	FEDERAL AID PROJECT No. STP 2021 (624) HES	HIGHWAY No. FM 1281, ETC.
CHECKED: PMP				

DRAWN: BD	STATE DISTRICT EL PASO	COUNTY EL PASO	CONTROL No. 3451	SECTION No. 01	JOB No. 030, ETC.	SHEET No. 145
CHECKED: PMP						

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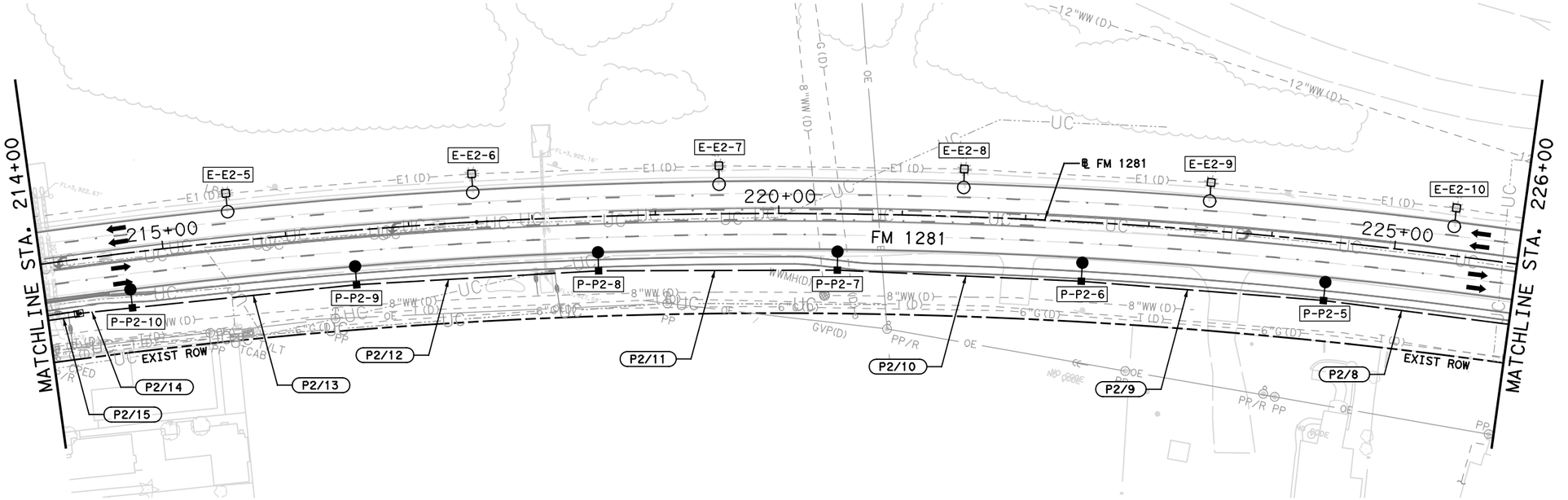

SHEET NOTES:

1. REPLACE EXISTING LUMINAIRES WITH 250W EQ LED FOR POLES E-E2-5 TO E-E2-10.

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- XX/X — CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X
  - POLE NO.
  - SERVICE METER NO.
  - E - EXISTING TO REMAIN
    P - PROPOSED
    R - REMOVE EXISTING

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NO.	REVISION	BY	DATE

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DIG TESS: 811

EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND ARE INTENDED TO ILLUSTRATE THAT THEY ARE PRESENT. CONTRACTOR SHALL POTHOLE APPARENT UTILITY CONFLICTS AT LOCATIONS NO MORE THAN 300 FT. TO VERIFY LOCATION AND DEPTH.

CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO. 6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO. 6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO. 6) INSULATED CONDUCTOR LENGTH (FT)
P2/8	A	220	1	220			2	1	675
P2/9	A	200	1	200			2	1	615
P2/10	A	200	1	200			2	1	615
P2/11	A	195	1	195			2	1	600
P2/12	A	200	1	200			2	1	615
P2/13	A	185	1	185			2	1	570
P2/14	A	45	1	45			2	1	150
P2/15	SEE PREVIOUS SHEET								
TOTAL				1245		0			3840

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-P2-5	224+47.00	48.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-6	222+48.00	48.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-7	220+47.94	45.7 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-8	218+52.50	44.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-9	216+54.11	44.2 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-10	214+70.00	44.6 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
110	6003	EXCAVATION (SPECIAL)	CY	9
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	48
432	6006	RIPRAP (CONC)(CL B)	CY	3
610	6102	REPLACE LUMINAIRE W/LED (250W EQ)	EA	6
610	6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA	6
618	6023	CONDT (PVC) (SCH 40) (2")	LF	1245
620	6010	ELEC CONDR (NO.6) INSULATED	LF	3840
624	6002	GROUND BOX TY A (122311)W/APRON	EA	1

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 214+00 TO STA 226+00

05 OF 16

DESIGNED: BD	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	030, ETC.	146

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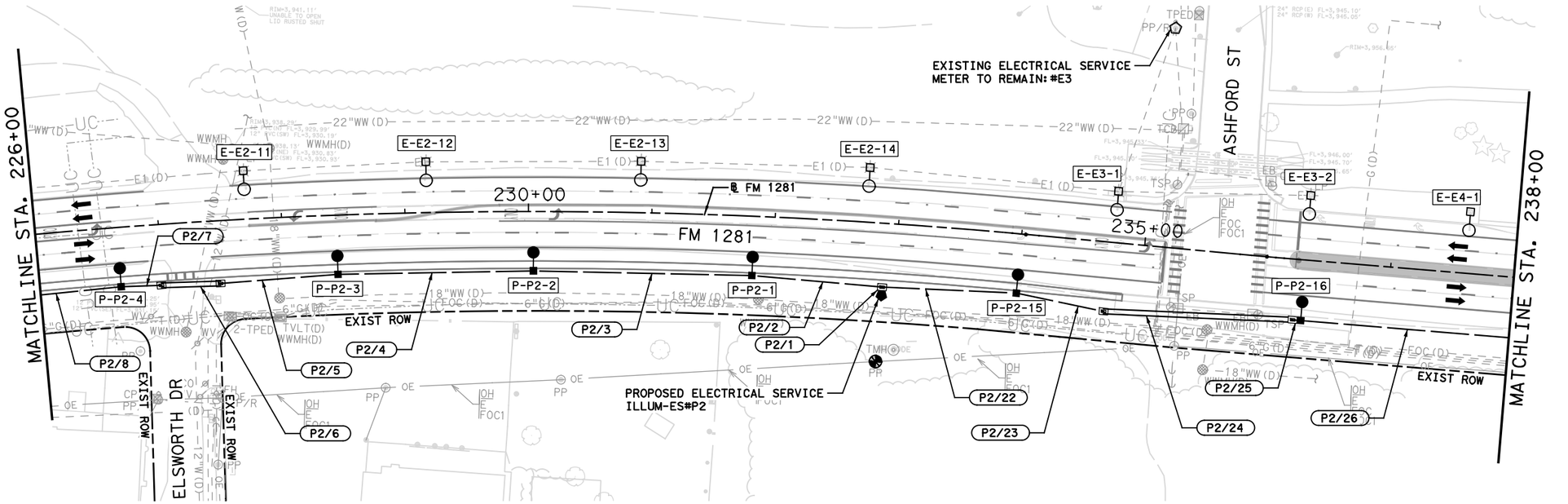

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- XX/X — CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X — POLE NO. / SERVICE METER NO. / E - EXISTING TO REMAIN, P - PROPOSED, R - REMOVE EXISTING

SHEET NOTES:

1. REPLACE EXISTING LUMINAIRES WITH 250W EQ LED FOR POLES E-E2-11 TO E-E2-14, E-E3-1, E-E3-2 AND E-E4-1.
2. CONTRACTOR MAY TRENCH RUN P2/24 BUT SHALL RESURFACE THE SLOPE MATCHING THE EXISTING MATERIAL AND GROUND SURFACE. WORK SHALL BE SUBSIDIARY TO ITEM 618

ELECTRICAL SERVICE DATA

ELEC. SERVICE NO.	ELECTRICAL SERVICE DESCRIPTION (SEE ED (5) - 14)	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	CIRCUIT NO.	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
#P2	ELC SRV TY A 240/480 060(NS)SS(E)GC(O)	1 1/4"	3/#4	N/A	2P/60	60	N/A	A	2P/20	5.25	8.50
								B	2P/20	2.45	
								C(SPARE)	2P/20	10	

CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") CONDUIT LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) CONDUIT LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
P2/1	A,B	10	1	10			4	1	75
P2/2	A	110	1	110			2	1	345
P2/3	A	180	1	180			2	1	555
P2/4	A	160	1	160			2	1	495
P2/5	A	95	1	95			2	1	300
P2/6	A	50			1	50	2	1	165
P2/7	A	35	1	35			2	1	120
P2/8	SEE PREVIOUS SHEET								
P2/22	B	110	1	110			2	1	345
P2/23	B	75	1	75			2	1	240
P2/24	B	155			1	155	2	1	480
P2/25	B	5	1	5			2	1	30
P2/26	B	220	1	220			2	1	675
TOTAL				1000		205			3825

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-P2-1	231+83.00	48.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-2	230+04.00	48.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-3	228+44.02	48.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-4	226+66.19	48.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-15	234+00.00	48.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-16	236+31.00	49.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
110	6003	EXCAVATION (SPECIAL)	CY	9
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	48
432	6006	RIPRAP (CONC)(CL B)	CY	3
610	6102	REPLACE LUMINAIRE W/LED (250W EQ)	EA	7
610	6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA	6
618	6023	CONDT (PVC) (SCH 40) (2")	LF	1000
618	6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	205
620	6010	ELEC CONDR (NO.6) INSULATED	LF	3825
624	6002	GROUND BOX TY A (122311)W/APRON	EA	5
628	6041	ELC SRV TY A 240/480 060(NS)SS(E)GC(O)	EA	1

WARNING!!!
BEFORE YOU DIG

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TxDOT: (915) 790-4245
DIG TESS: 811

EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND ARE INTENDED TO ILLUSTRATE THAT THEY ARE PRESENT. CONTRACTOR SHALL POTHOLE APPARENT UTILITY CONFLICTS AT LOCATIONS NO MORE THAN 300 FT. TO VERIFY LOCATION AND DEPTH.

Texas Department of Transportation®

NO.	REVISION	BY	DATE

STATE OF TEXAS
BHARATH DONAVALLI
138746
LICENSED
PROFESSIONAL ENGINEER
3/28/2021

WSP USA Inc
9311 San Pedro St., Suite 700
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HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 226+00 TO STA 238+00

DESIGNED: BD	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	030, ETC.	147

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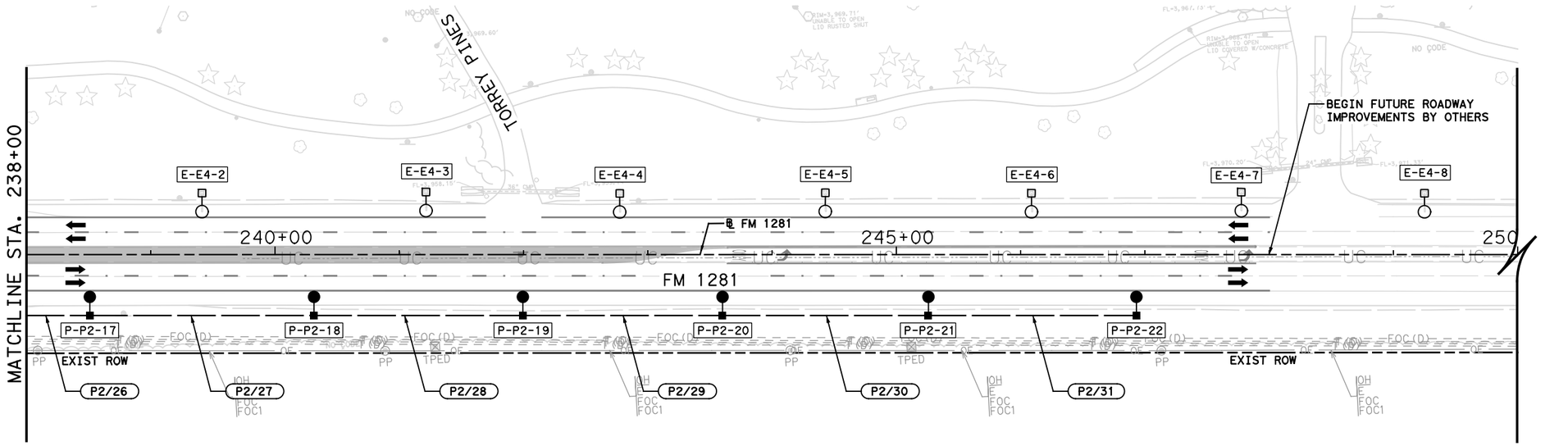

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- XX/X — CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X
  - POLE NO.
  - SERVICE METER NO.
  - E - EXISTING TO REMAIN
    P - PROPOSED
    R - REMOVE EXISTING

SHEET NOTES:

1. REPLACE EXISTING LUMINAIRES WITH 250W EQ LED FOR POLES E-E4-2 TO E-E4-7.
2. EXISTING HPS LUMINAIRE ON POLE E-E4-8 SHALL REMAIN.
3. CONTRACTOR TO IDENTIFY EXISTING ELECTRICAL SERVICE METER #E4 IF REQUIRED.
4. ALL EXISTING LIGHT POLES, LUMINAIRES, CONDUITS AND GROUND BOXES FROM STA 249+00 TO STA 310+00 SHALL REMAIN.

WARNING!!!
BEFORE YOU DIG

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TxDOT: (915) 790-4245
DIG TESS: 811

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CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") CONDUIT LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) CONDUIT LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
P2/26	SEE PREVIOUS SHEET								
P2/27	B	180	1	180			2	1	555
P2/28	B	170	1	170			2	1	525
P2/29	B	160	1	160			2	1	495
P2/30	B	165	1	165			2	1	510
P2/31	B	170	1	95			2	1	525
TOTAL				770		0			2610

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-P2-17	238+51.00	49.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-18	240+31.50	49.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-19	241+99.50	49.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-20	243+60.00	49.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-21	245+26.00	49.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P2-22	246+93.00	49.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
110	6003	EXCAVATION (SPECIAL)	CY	9
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	48
432	6006	RIPRAP (CONC)(CL B)	CY	3
610	6102	REPLACE LUMINAIRE W/LED (250W EQ)	EA	6
610	6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA	6
618	6023	CONDT (PVC) (SCH 40) (2")	LF	770
620	6010	ELEC CONDR (NO.6) INSULATED	LF	2610

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NO.	REVISION	BY	DATE

STATE OF TEXAS
BHARATH DONAVALLI
138746
LICENSED
PROFESSIONAL ENGINEER
3/28/2021

WSP USA Inc
9311 San Pedro St., Suite 700
San Antonio, TX 78216
TEL: 210-247-4360
TBPE F-2263

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 238+00 TO STA 250+00

07 OF 16

DESIGNED: BD	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	030, ETC.	148

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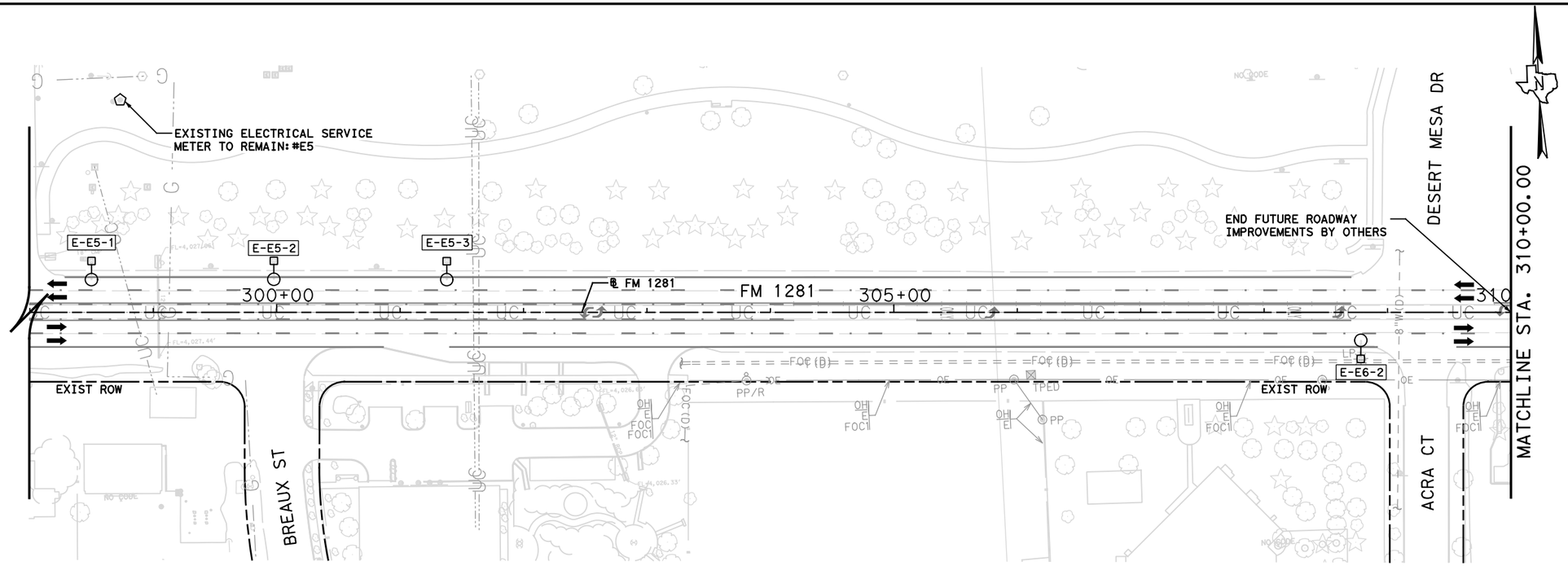

SHEET NOTES:

1. EXISTING HPS LUMINAIRE ON POLE E-E6-2 SHALL REMAIN.

2. CONTRACTOR TO IDENTIFY EXISTING CODUIT RUNS CONNECTING E-E6-2 POLE AND SERVICE METER #E6. IF POLES E-E6-2 AND E-E6-1 ARE NOT CONNECTED IN SERIES, CONTRACOR TO INSTALL ADDITIONAL CONDUIT TO CONNECT E-E6-2 IN SERIES WITH E-E6-1. CONDUIT, CONDUCTORS AND GROUND BOXES ARE SUBSIDIARY TO ITMES 618,620 & 624.

3. ALL EXISTING LIGHT POLES, LUMINAIRES, CONDUITS AND GROUND BOXES FROM STA 249+00 TO STA 310+00 SHALL REMAIN.

WARNING!!!
BEFORE YOU DIG

CONTRACTOR SHALL FIELD LOCATE ALL EXISTING UNERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION WITH ALL UTILITY COMPANIES.

TxDOT: (915) 790-4245
DIG TESS: 811

EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND ARE INTENDED TO ILLUSTRATE THAT THEY ARE PRESENT. CONTRACTOR SHALL POTHOLE APPARENT UTILITY CONFLICTS AT LOCATIONS NO MORE THAN 300 FT. TO VERIFY LOCATION AND DEPTH.

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- XX/X — CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X
  - POLE NO.
  - SERVICE METER NO.
  - E - EXISTING TO REMAIN
    P - PROPOSED
    R - REMOVE EXISTING

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TBPELS FIRM NO. F-312

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 298+00 TO STA 310+00

08 OF 16

DESIGNED: BD	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED: PMP	EL PASO	EL PASO	3451	01	030, ETC.	149	

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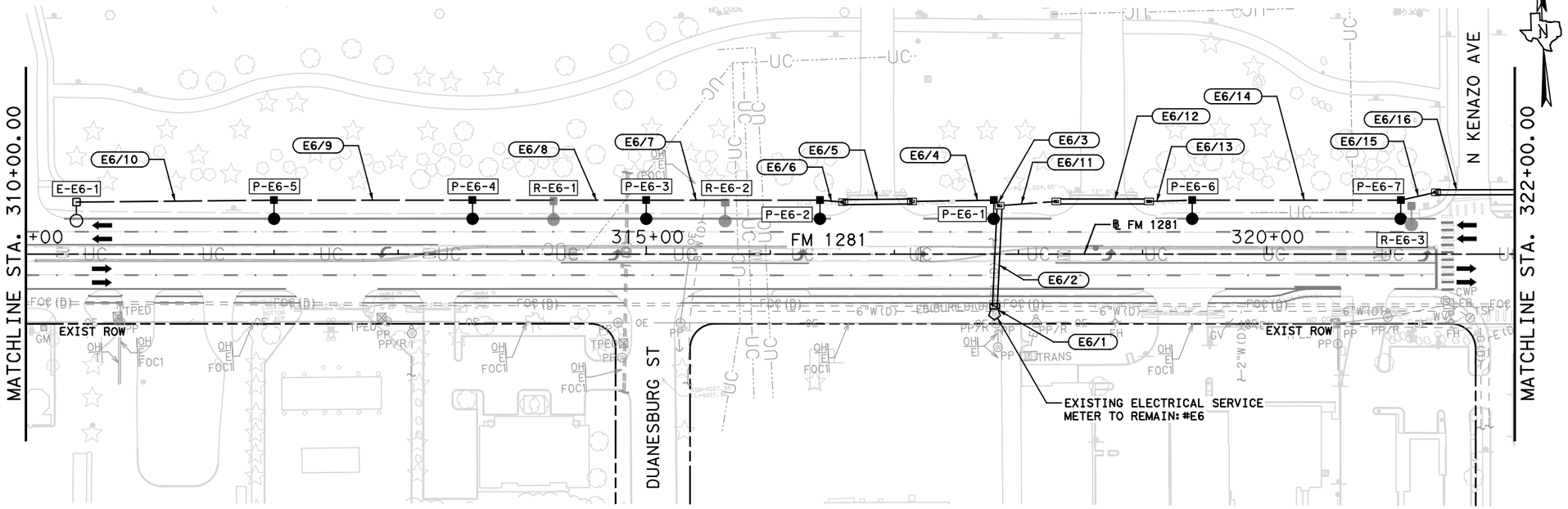

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- XX/X — CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X
  - POLE NO.
  - SERVICE METER NO.
  - E - EXISTING TO REMAIN
    P - PROPOSED
    R - REMOVE EXISTING

SHEET NOTES:

1. REPLACE EXISTING LUMINAIRES WITH 250W EQ LED FOR POLES E-E6-1.
2. REMOVE EXISTING LIGHT POLES R-E6-1 TO R-E6-3.
3. CONTRACTOR TO IDENTIFY EXISTING CONDUITS AND GROUND BOXES AND SHALL REMOVE CONDUCTORS AND GROUND BOXES THAT DO NOT SERVE PURPOSE AFTER PROPOSED LUMINAIRES ARE OPERATIONAL.

WARNING!!!
BEFORE YOU DIG

CONTRACTOR SHALL FIELD LOCATE ALL EXISTING UNERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION WITH ALL UTILITY COMPANIES.

TxDOT: (915) 790-4245
DIG TESS: 811

EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND ARE INTENDED TO ILLUSTRATE THAT THEY ARE PRESENT. CONTRACTOR SHALL POTHOLE APPARENT UTILITY CONFLICTS AT LOCATIONS NO MORE THAN 300 FT. TO VERIFY LOCATION AND DEPTH.

ELECTRICAL SERVICE DATA

ELEC. SERVICE NO.	ELECTRICAL SERVICE DESCRIPTION (SEE ED (5) - 14)	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	CIRCUIT NO.	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
#E6	EXISTING							A	2P/20	4.2	2.86
								B	2P/20	1.75	

CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") CONDUIT LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) CONDUIT LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
E6/1	A,B	10	1	10			4	1	75
E6/2	A,B	80			1	80	4	1	425
E6/3	A	10	1	10			2	1	45
E6/4	A	65	1	65			2	1	210
E6/5	A	55			1	55	2	1	180
E6/6	A	20	1	20			2	1	75
E6/7	A	140	1	140			2	1	435
E6/8	A	140	1	140			2	1	435
E6/9	A	160	1	160			2	1	495
E6/10	A	160	1	160			2	1	495
E6/11	A,B	45	1	45			4	1	250
E6/12	A,B	75			1	75	4	1	400
E6/13	A,B	35	1	35			4	1	200
E6/14	A,B	170	1	170			4	1	875
E6/15	A,B	30	1	30			4	1	175
E6/16	A,B	165			1	165	4	1	850
TOTAL				985		375			5620

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-E6-1	317+80.00	43.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-2	316+40.00	43.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-3	315+00.00	43.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-4	313+60.00	43.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-5	312+00.00	43.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-6	319+40.00	43.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-7	321+08.00	43.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
110	6003	EXCAVATION (SPECIAL)	CY	5
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	56
432	6006	RIPRAP (CONC)(CL B)	CY	3
610	6007	REMOVE RD IL ASM (SHOE-BASE)	EA	3
610	6102	REPLACE LUMINAIRE W/LED (250W EQ)	EA	1
610	6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA	7
618	6023	CONDT (PVC) (SCH 40) (2")	LF	985
618	6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	375
620	6010	ELEC CONDR (NO.6) INSULATED	LF	5620
624	6002	GROUND BOX TY A (122311)W/APRON	EA	7
624	6028	REMOVE GROUND BOX	EA	1
6084	6001	MODIFY EXISTING ELECTRICAL SERVICE	EA	1

NO.	REVISION	BY	DATE

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SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 310+00 TO STA 322+00

09 OF 16

DESIGNED: BD	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	030, ETC.	150

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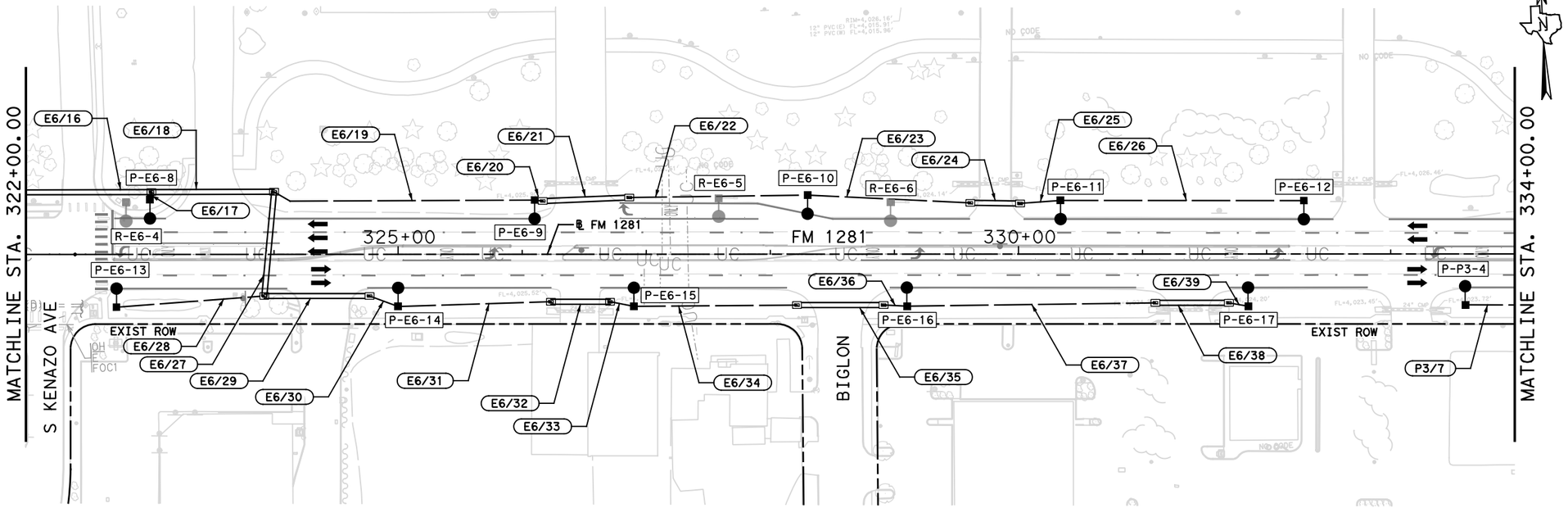

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- (XX/X) CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X
  - POLE NO.
  - SERVICE METER NO.
  - E - EXISTING TO REMAIN
    P - PROPOSED
    R - REMOVE EXISTING

SHEET NOTES:

1. REMOVE EXISTING LIGHT POLES R-E6-4 TO R-E6-6.
2. CONTRACTOR TO IDENTIFY EXISTING CONDUITS AND GROUND BOXES AND SHALL REMOVE CONDUCTORS AND GROUND BOXES THAT DO NOT SERVE PURPOSE AFTER PROPOSED LUMINAIRES ARE OPERATIONAL.

CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") CONDUIT LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) CONDUIT LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
E6/16	SEE PREVIOUS SHEET								
E6/17	A	10	1	10			2	1	45
E6/18	A,B	100			1	100	4	1	525
E6/19	A	215	1	215			2	1	660
E6/20	A	10	1	10			2	1	45
E6/21	A	70			1	70	2	1	225
E6/22	A	145	1	145			2	1	450
E6/23	A	135	1	135			2	1	420
E6/24	A	40			1	40	2	1	135
E6/25	A	35	1	35			2	1	120
E6/26	A	200	1	200			2	1	615
E6/27	B	85			1	85	2	1	270
E6/28	B	120	1	120			2	1	375
E6/29	B	85			1	85	2	1	270
E6/30	B	25	1	25			2	1	90
E6/31	B	125	1	125			2	1	390
E6/32	B	50			1	50	2	1	165
E6/33	B	20	1	20			2	1	75
E6/34	B	135	1	135			2	1	420
E6/35	B	70			1	70	2	1	225
E6/36	B	20	1	20			2	1	75
E6/37	B	200	1	200			2	1	615
E6/38	B	60			1	60	2	1	195
E6/39	B	15	1	15			2	1	60
P3/7	A	220	1	220			2	1	675
TOTAL				1630		560			7140

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-E6-8	323+00.00	44.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-9	326+10.00	43.6 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-10	328+30.00	47.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-11	330+34.00	43.2 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-12	332+30.00	43.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-13	322+73.00	42.5 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-14	325+00.00	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-15	326+90.00	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-16	329+10.00	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-E6-17	331+85.00	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-4	333+60.00	41.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
110	6003	EXCAVATION (SPECIAL)	CY	9
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	88
432	6006	RIPRAP (CONC)(CL B)	CY	4
610	6007	REMOVE RD IL ASM (SHOE-BASE)	EA	3
610	6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA	11
618	6023	CONDT (PVC) (SCH 40) (2")	LF	1630
618	6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	560
620	6010	ELEC CONDR (NO.6) INSULATED	LF	7140
624	6002	GROUND BOX TY A (122311)W/APRON	EA	13

WARNING!!!
BEFORE YOU DIG

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TxDOT: (915) 790-4245
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NO.	REVISION	BY	DATE

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TBPELS FIRM NO. F-312

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 322+00 TO STA 334+00

DESIGNED: BD	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	035, ETC. / 151

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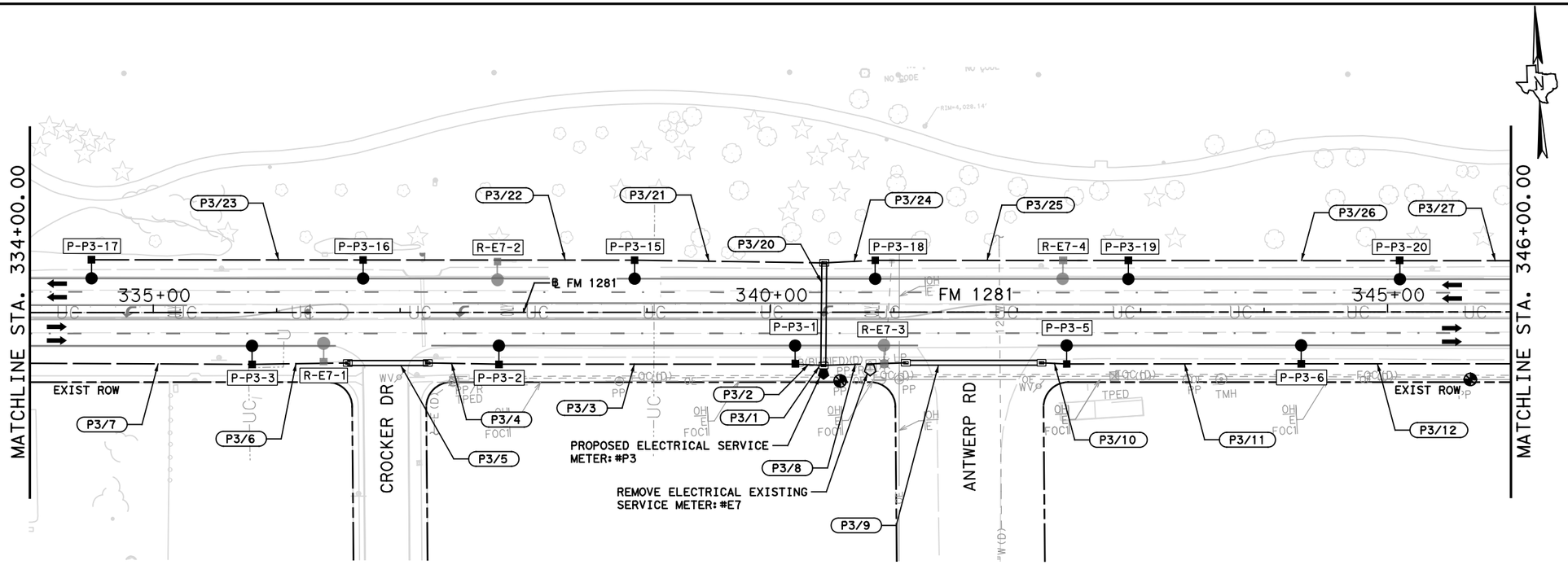

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- XX/X — CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X
  - POLE NO.
  - SERVICE METER NO.
  - E - EXISTING TO REMAIN
    P - PROPOSED
    R - REMOVE EXISTING

SHEET NOTES:

1. REMOVE EXISTING LIGHT POLES R-E7-1 TO R-E7-4.
2. CONTRACTOR TO IDENTIFY EXISTING CONDUITS AND GROUND BOXES AND SHALL REMOVE CONDUCTORS AND GROUND BOXES THAT DO NOT SERVE PURPOSE AFTER PROPOSED LUMINAIRES ARE OPERATIONAL.

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ELECTRICAL SERVICE DATA

ELEC. SERVICE NO.	ELECTRICAL SERVICE DESCRIPTION (SEE ED (5) - 14)	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	CIRCUIT NO.	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
#P3	ELC SRV TY A 240/480 060(NS)SS(E)GC(O)	1 1/4"	3/#4	N/A	2P/60	60	N/A	A	2P/20	1.4	4.70
								B	2P/20	3.5	
								C	2P/20	1.05	
								D	2P/20	3.85	

CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") CONDUIT LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) CONDUIT LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
P3/1	A, B, C, D	10	1	10			8	1	135
P3/2	A	25	1	25			2	1	90
P3/3	A	240	1	240			2	1	735
P3/4	A	60	1	60			2	1	195
P3/5	A	65			1	65	2	1	210
P3/6	A	80	1	80			2	1	255
P3/7	SEE PREVIOUS SHEET								
P3/8	B	70	1	70			2	1	225
P3/9	B	110			1	110	2	1	345
P3/10	B	20	1	20			2	1	75
P3/11	B	190	1	190			2	1	585
P3/12	B	200	1	200			2	1	615
P3/20	C, D	85			1	85	4	1	450
P3/21	C	155	1	155			2	1	480
P3/22	C	220	1	220			2	1	675
P3/23	C	220	1	220			2	1	675
P3/24	D	45	1	45			2	1	150
P3/25	D	205	1	205			2	1	630
P3/26	D	220	1	220			2	1	675
P3/27	D	220	1	220			2	1	675
TOTAL				2180		260			7875

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-P3-1	340+20.00	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-2	337+80.00	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-3	335+80.00	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-5	342+40.00	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-6	344+30.00	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-15	338+90.00	42.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-16	336+70.00	42.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-17	334+50.00	42.7 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-18	340+85.00	42.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-19	342+90.00	42.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-20	345+10.00	42.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
110	6003	EXCAVATION (SPECIAL)	CY	8
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	88
432	6006	RIPRAP (CONC)(CL B)	CY	4
610	6007	REMOVE RD IL ASM (SHOE-BASE)	EA	4
610	6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA	11
618	6023	CONDT (PVC) (SCH 40) (2")	LF	2180
618	6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	260
620	6010	ELEC CONDR (NO.6) INSULATED	LF	7875
624	6002	GROUND BOX TY A (122311)W/APRON	EA	6
624	6028	REMOVE GROUND BOX	EA	2
628	6002	REMOVE ELECTRICAL SERVICES	EA	1
628	6041	ELC SRV TY A 240/480 060(NS)SS(E)GC(O)	EA	1

Texas Department of Transportation®

NO.	REVISION	BY	DATE

STATE OF TEXAS
BHARATH DONAVALLI
138746
LICENSED
PROFESSIONAL ENGINEER
3/28/2021

WSP USA Inc
9311 San Pedro St., Suite 700
San Antonio, TX 78216
TEL: 210-247-4360
TBPE F-2263

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 334+00 TO STA 346+00

DESIGNED: BD	FED. RD DIV. NO. 6	STATE TEXAS	FEDERAL AID PROJECT No. STP 2021 (624) HES	HIGHWAY No. FM 1281, ETC.
CHECKED: PMP				

DRAWN: BD	STATE DISTRICT EL PASO	COUNTY EL PASO	CONTROL No. 3451	SECTION No. 01	JOB No. 030, ETC.	SHEET No. 152
CHECKED: PMP						

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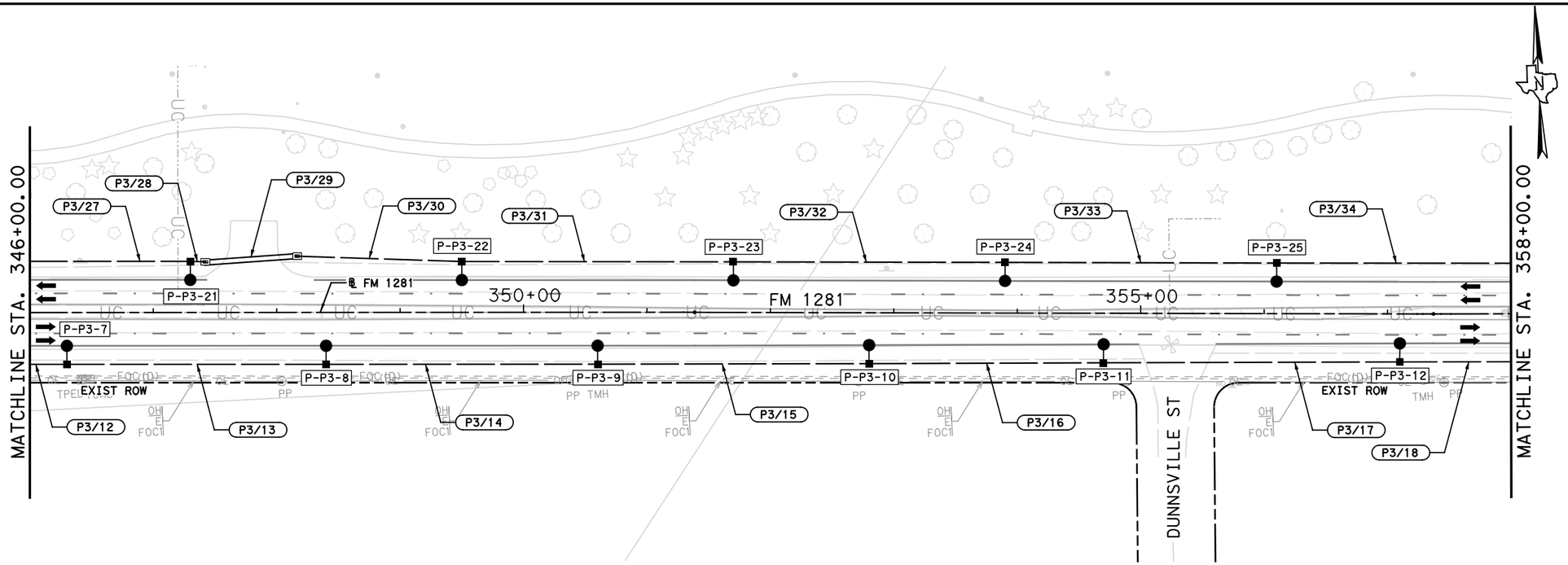

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SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- XX/X — CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X
  - POLE NO.
  - SERVICE METER NO.
  - E - EXISTING TO REMAIN
    P - PROPOSED
    R - REMOVE EXISTING

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NO.	REVISION	BY	DATE

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WARNING!!!
BEFORE YOU DIG
CONTRACTOR SHALL FIELD LOCATE ALL EXISTING UNERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION WITH ALL UTILITY COMPANIES.

TxDOT: (915) 790-4245
DIG TESS: 811

EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND ARE INTENDED TO ILLUSTRATE THAT THEY ARE PRESENT. CONTRACTOR SHALL POTHOLE APPARENT UTILITY CONFLICTS AT LOCATIONS NO MORE THAN 300 FT. TO VERIFY LOCATION AND DEPTH.

CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") CONDUIT LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) CONDUIT LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
P3/12	SEE PREVIOUS SHEET								
P3/13	B	210	1	210			2	1	645
P3/14	B	220	1	220			2	1	675
P3/15	B	220	1	220			2	1	675
P3/16	B	190	1	190			2	1	585
P3/17	B	240	1	240			2	1	735
P3/18	B	230	1	230			2	1	705
P3/27	SEE PREVIOUS SHEET								
P3/28	D	15	1	15			2	1	60
P3/29	D	75			1	75	2	1	240
P3/30	D	135	1	135			2	1	420
P3/31	D	220	1	220			2	1	675
P3/32	D	220	1	220			2	1	675
P3/33	D	220	1	220			2	1	675
P3/34	D	220	1	220			2	1	675
TOTAL				2340		75			7440

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-P3-7	346+.30.00	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-8	348+40.00	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	9
P-P3-9	350+60.00	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	10
P-P3-10	352+80.00	41.2 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	11
P-P3-11	354+70.00	40.2 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	12
P-P3-12	357+10.00	39.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	13
P-P3-21	347+30.00	41.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-22	349+50.00	41.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-23	351+70.00	41.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-24	353+90.00	41.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-25	356+10.00	41.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
110	6003	EXCAVATION (SPECIAL)	CY	9
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	88
432	6006	RIPRAP (CONC)(CL B)	CY	4
610	6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA	11
618	6023	CONDT (PVC) (SCH 40) (2")	LF	2340
618	6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	75
620	6010	ELEC CONDR (NO.6) INSULATED	LF	7440
624	6002	GROUND BOX TY A (122311)W/APRON	EA	2

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 346+00 TO STA 358+00

12 OF 16

DESIGNED: BD	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	030, ETC.	153

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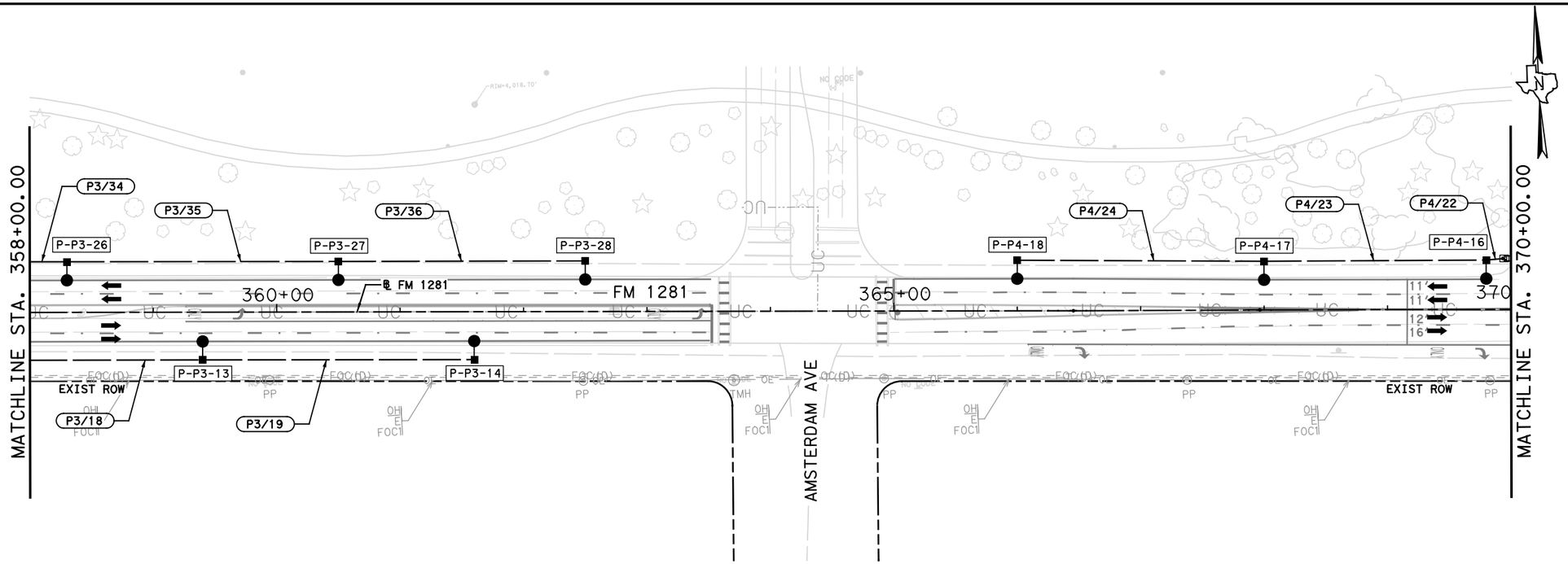

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- XX/X — CONDUIT RUN NO. IDENTIFICATION / METER NO./RUN NO.
- X-XX-X — POLE NO. / SERVICE METER NO. / E - EXISTING TO REMAIN, P - PROPOSED, R - REMOVE EXISTING

NO.	REVISION	BY	DATE

STATE OF TEXAS
BHARATH DONAVALLI
138746
LICENSED
PROFESSIONAL ENGINEER
3/30/2021

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CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
P3/18	SEE PREVIOUS SHEET								
P3/19	B	220	1	220			2	1	675
P3/34	SEE PREVIOUS SHEET								
P3/35	D	220	1	220			2	1	675
P3/36	D	200	1	200			2	1	615
P4/22	B	15	1	15			2	1	60
P4/23	B	180	1	180			2	1	555
P4/24	B	200	1	200			2	1	615
TOTAL				1035		0			3195

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-P3-13	359+40.00	39.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-14	361+60.00	39.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-26	358+30.00	41.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-27	360+50.00	41.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P3-28	362+50.00	41.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-16	369+80.00	40.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	10
P-P4-17	368+00.00	40.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	11
P-P4-18	366+00.00	41.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
110	6003	EXCAVATION (SPECIAL)	CY	5
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	80
432	6006	RIPRAP (CONC)(CL B)	CY	4
610	6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA	10
618	6023	CONDT (PVC) (SCH 40) (2")	LF	1035
620	6010	ELEC CONDR (NO.6) INSULATED	LF	3195
624	6002	GROUND BOX TY A (122311)W/APRON	EA	1

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 358+00 TO STA 370+00

13 OF 16

DESIGNED: BD	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	030, ETC.	154

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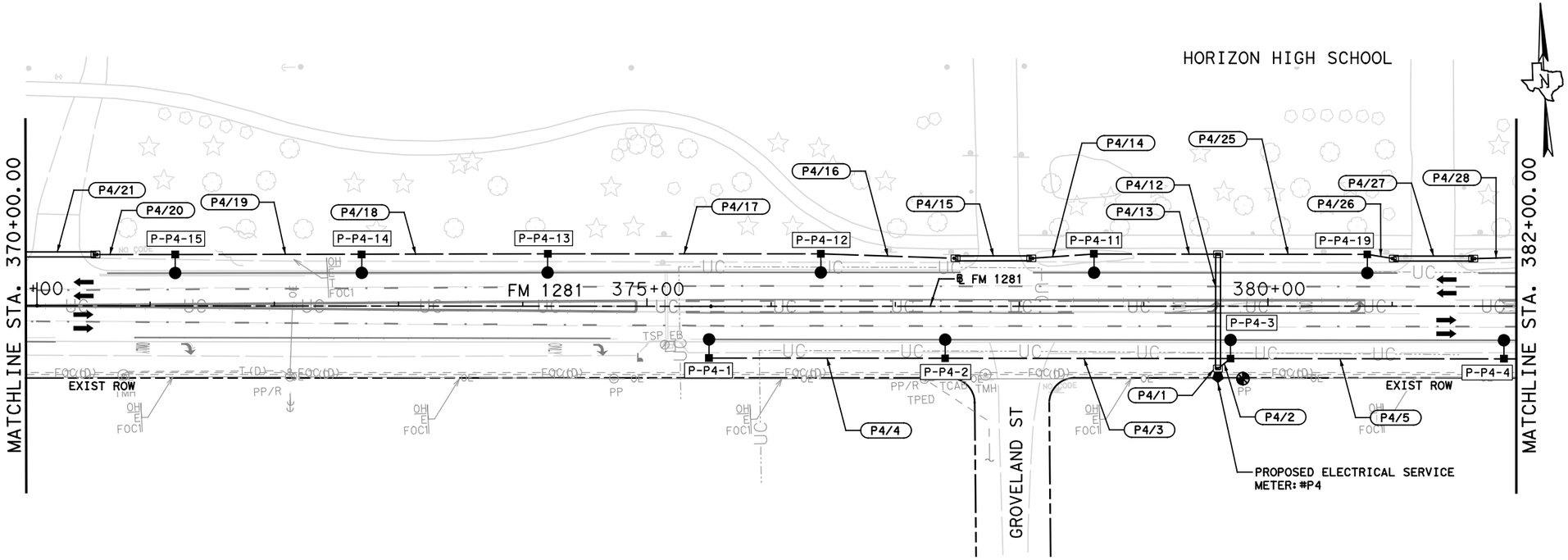

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- XX/X — CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X
  - POLE NO.
  - SERVICE METER NO.
  - E - EXISTING TO REMAIN
    P - PROPOSED
    R - REMOVE EXISTING

ELECTRICAL SERVICE DATA

ELEC. SERVICE NO.	ELECTRICAL SERVICE DESCRIPTION (SEE ED (5) - 14)	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	CIRCUIT NO.	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
#P4	ELC SRV TY A 240/480 060(NS)SS(E)GC(O)	1 1/4"	3/#4	N/A	2P/60	60	N/A	A	2P/20	3.5	9.17
								B	2P/20	2.8	
								C	2P/20	2.8	
								D(SPARE)	2P/20	10	

CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") CONDUIT LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) CONDUIT LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
P4/1	A,B,C	10	1	10			6	1	105
P4/2	A	15	1	15			2	1	60
P4/3	A	230	1	230			2	1	705
P4/4	A	190	1	190			2	1	585
P4/5	A	220	1	220			2	1	675
P4/12	B,C	95			1	95	4	1	500
P4/13	B	100	1	100			2	1	315
P4/14	B	50	1	50			2	1	165
P4/15	B	60			1	60	2	1	195
P4/16	B	110	1	110			2	1	345
P4/17	B	220	1	220			2	1	675
P4/18	B	150	1	150			2	1	465
P4/19	B	150	1	150			2	1	465
P4/20	B	65	1	65			2	1	210
P4/21	B	65			1	65	2	1	210
P4/25	C	120	1	120			2	1	375
P4/26	C	25	1	25			2	1	90
P4/27	C	65			1	65	2	1	210
P4/28	C	105	1	105			2	1	330
TOTAL				1760		285			6680

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-P4-1	375+50.00	41.6 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-2	377+40.10	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-3	379+70.00	42.2 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-4	381+90.00	42.5 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-11	378+60.00	42.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-12	376+40.00	42.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-13	374+20.00	42.1 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-14	372+70.00	42.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-15	371+20.00	41.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-19	380+80.00	41.7 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
110	6003	EXCAVATION (SPECIAL)	CY	6
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	88
432	6006	RIPRAP (CONC)(CL B)	CY	4
610	6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA	11
618	6023	CONDT (PVC) (SCH 40) (2")	LF	1760
618	6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	285
620	6010	ELEC CONDR (NO.6) INSULATED	LF	6680
624	6002	GROUND BOX TY A (122311)W/APRON	EA	7
628	6041	ELC SRV TY A 240/480 060(NS)SS(E)GC(O)	EA	1

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DIG TESS: 811

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NO.	REVISION	BY	DATE

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LICENSED
PROFESSIONAL ENGINEER
3/28/2021

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TBPELS FIRM NO. F-312

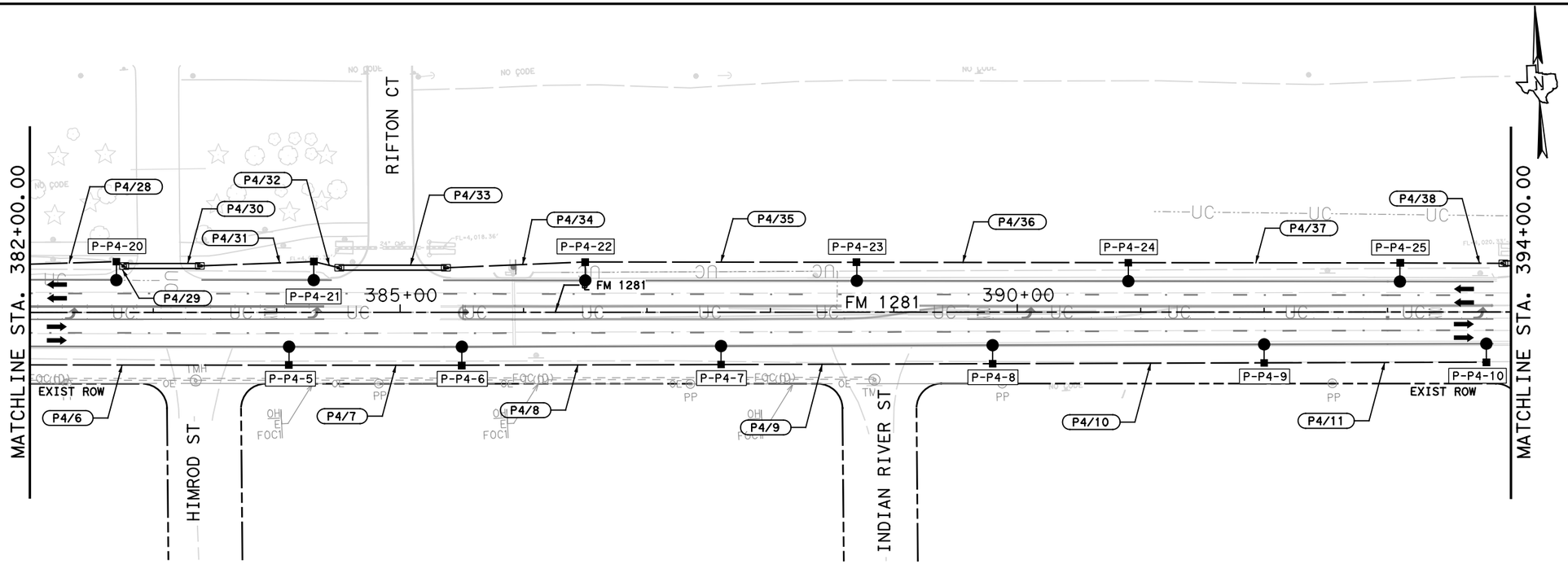
SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 370+00 TO STA 382+00

DESIGNED: BD	FED. RD DIV. No. 6	STATE TEXAS	FEDERAL AID PROJECT No. STP 2021 (624) HES				HIGHWAY No. FM 1281, ETC.
CHECKED: PMP	STATE DISTRICT EL PASO	COUNTY EL PASO	CONTROL No. 3451	SECTION No. 01	JOB No. 036, ETC.	SHEET No. 155	
DRAWN: BD							
CHECKED: PMP							

FINAL SUBMITTAL



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- REMOVE EXISTING 40' ROADWAY ILLUM.
- EXISTING 40' ROADWAY ILLUM. ASSEMBLY TO REMAIN
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SA 40 T-X)(250W EQ)LED
- PROPOSED ROADWAY ILLUM. ASSEMBLY (TY SP 38S-8-8)(250W EQ)LED
- PROP CONDUIT (SCH 40 PVC)
- PROP BORED CONDUIT (SCH 40 PVC)
- EXISTING GROUND BOX
- PROP GROUND BOX (TY A) W/ APRON
- EXISTING ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- XX/X — CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X
  - POLE NO.
  - SERVICE METER NO.
  - E - EXISTING TO REMAIN
    P - PROPOSED
    R - REMOVE EXISTING

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NO.	REVISION	BY	DATE

STATE OF TEXAS
BHARATH DONAVALLI
138746
LICENSED
PROFESSIONAL ENGINEER
3/28/2021

WSP USA Inc
9311 San Pedro St., Suite 700
San Antonio, TX 78216
TEL: 210-247-4360
TBPE F-2263

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") CONDUIT LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) CONDUIT LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
P4/6	A	220	1	220			2	1	675
P4/7	A	140	1	140			2	1	435
P4/8	A	210	1	210			2	1	645
P4/9	A	220	1	220			2	1	675
P4/10	A	220	1	220			2	1	675
P4/11	A	180	1	180			2	1	555
P4/28	SEE PREVIOUS SHEET								
P4/29	C	10	1	10			2	1	45
P4/30	C	60			1	60	2	1	195
P4/31	C	95	1	95			2	1	300
P4/32	C	20	1	20			2	1	75
P4/33	C	85			1	85	2	1	270
P4/34	C	115	1	115			2	1	360
P4/35	C	220	1	220			2	1	675
P4/36	C	220	1	220			2	1	675
P4/37	C	220	1	220			2	1	675
P4/38	C	85	1	85			2	1	270
TOTAL				2175		145			7200

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-P4-5	384+10.00	43.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-6	385+50.00	43.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-7	387+60.00	42.5 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-8	389+80.00	42.0 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-9	392+00.00	41.2 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-10	393+80.00	40.7 RT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-20	382+70.00	41.2 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-21	384+30.00	41.2 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-22	386+50.00	41.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-23	388+70.00	40.5 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-24	390+90.00	40.1 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8
P-P4-25	393+10.00	40.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
110	6003	EXCAVATION (SPECIAL)	CY	9
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	96
432	6006	RIPRAP (CONC)(CL B)	CY	5
610	6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA	12
618	6023	CONDT (PVC) (SCH 40) (2")	LF	2175
618	6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	145
620	6010	ELEC CONDR (NO.6) INSULATED	LF	7200
624	6002	GROUND BOX TY A (122311)W/APRON	EA	5

WARNING!!!
BEFORE YOU DIG
CONTRACTOR SHALL FIELD LOCATE ALL EXISTING UNERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION WITH ALL UTILITY COMPANIES.

TxDOT: (915) 790-4245
DIG TESS: 811

EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND ARE INTENDED TO ILLUSTRATE THAT THEY ARE PRESENT. CONTRACTOR SHALL POTHOLE APPARENT UTILITY CONFLICTS AT LOCATIONS NO MORE THAN 300 FT. TO VERIFY LOCATION AND DEPTH.

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 382+00 TO STA 394+00

DESIGNED: BD	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	030, ETC.	156

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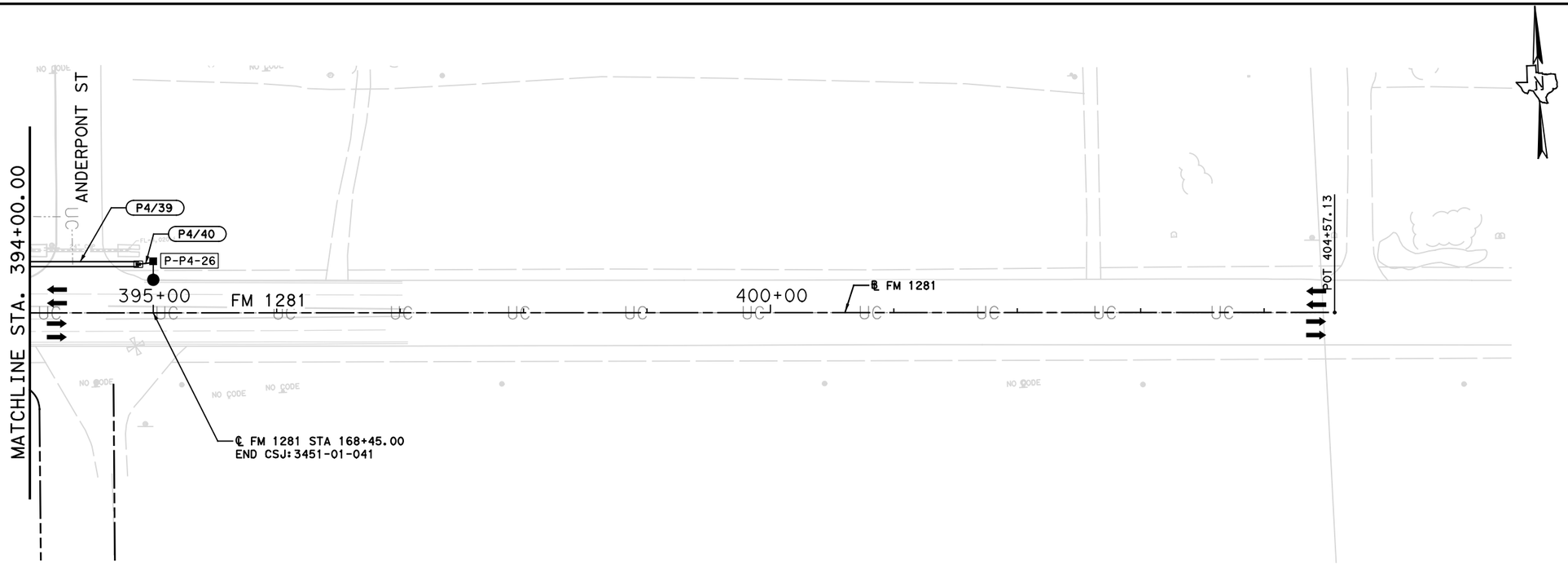

0 50 100
SCALE: 1" = 100' (H)

LEGEND

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- PROP JUNCTION BOX
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- [X-XX-X]
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  - SERVICE METER NO.
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CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	CIRCUIT	RUN LENGTH (FT)	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") PROPOSED CONDUITS	CONDUIT 618 6023 CONDT (PVC) (SCH 40) (2") CONDUIT LENGTH (FT)	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) PROPOSED CONDUITS	CONDUIT 618 6024 CONDT (PVC) (SCH 40) (2") (BORE) CONDUIT LENGTH (FT)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (POWER)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED PROPOSED CONDUCTOR (GROUND)	CONDUCTOR 620 6010 ELEC CONDR (NO.6) INSULATED CONDUCTOR LENGTH (FT)
P4/39	D	95			1	95	2	1	300
P4/40	D	15	1	15			2	1	60
TOTAL				15		95			360

* 5 FT. SLACK IN ALL CONDUCTOR RUNS.

ILLUMINATION ASSEMBLY SCHEDULE

POLE NO.	B.L. FM1281 STATION	OFFSET (FT)	STANDARD TYPE (ITEM)	FOUNDATION SIZE	FOUNDATION LENGTH (LF)
P-P4-26	395+00.00	42.0 LT	(TY SA) 40T-12 (250W EQ) LED	30 IN	8

SHEET QUANTITIES

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	8
432	6006	RIPRAP (CONC)(CL B)	CY	1
610	6218	IN RD IL (TY SA) 40T-12 (250W EQ) LED	EA	1
618	6023	CONDT (PVC) (SCH 40) (2")	LF	15
618	6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	95
620	6010	ELEC CONDR (NO.6) INSULATED	LF	360
624	6002	GROUND BOX TY A (122311)W/APRON	EA	1

SH 20 & FM 1281

ILLUMINATION LAYOUTS

STA 394+00 TO END

16 OF 16

DESIGNED: BD	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	030, ETC.	157

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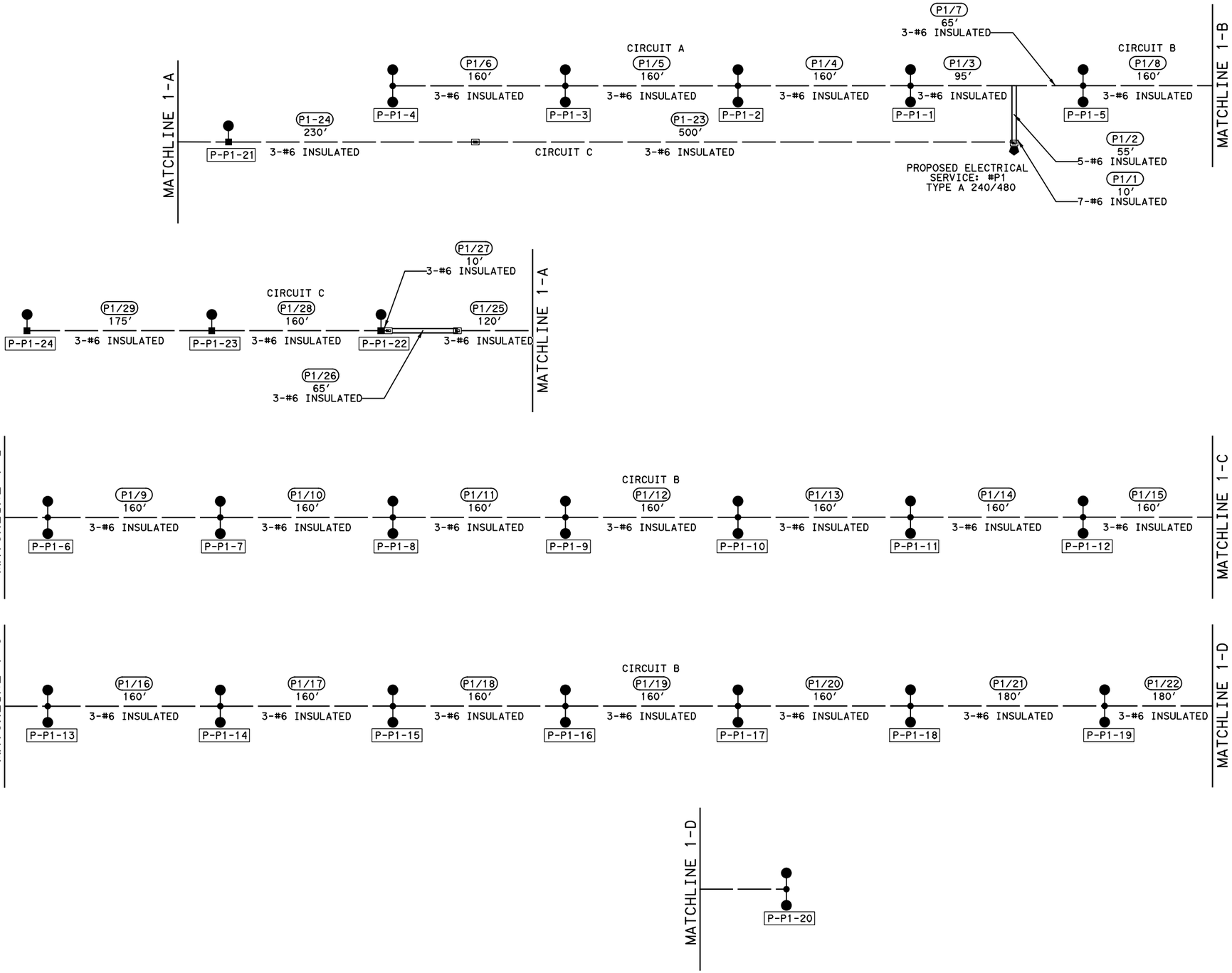

NOT TO SCALE

LEGEND

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Texas Department of Transportation®

NO.	REVISION	BY	DATE

STATE OF TEXAS
BHARATH DONAVALLI
138746
LICENSED PROFESSIONAL ENGINEER
3/30/2021

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9311 San Pedro St., Suite 700
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TBPE F-2263

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TBPELS FIRM NO. F-312

SH 20 & FM 1281

ILLUMINATION CIRCUIT DIAGRAM

01 OF 05

DESIGNED: BD	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	036, ETC. / 158

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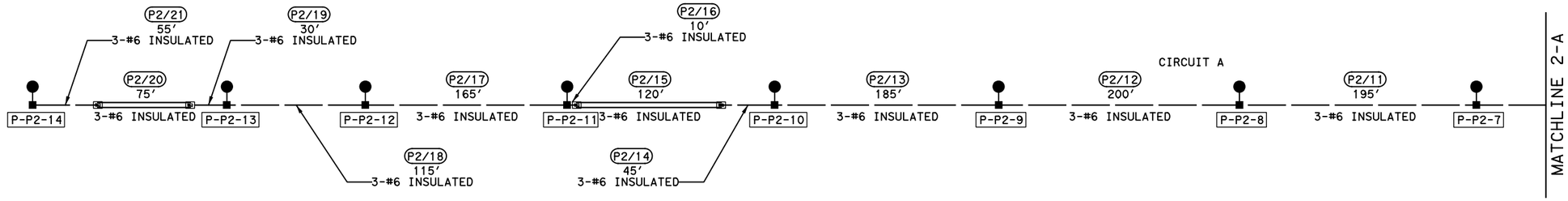

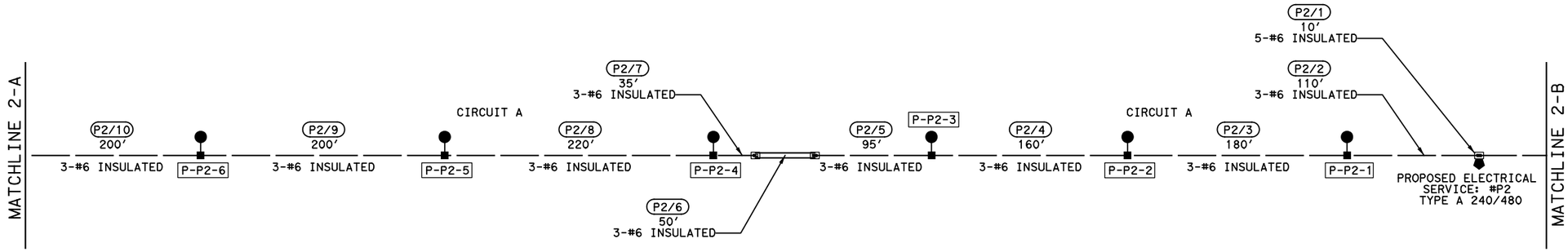

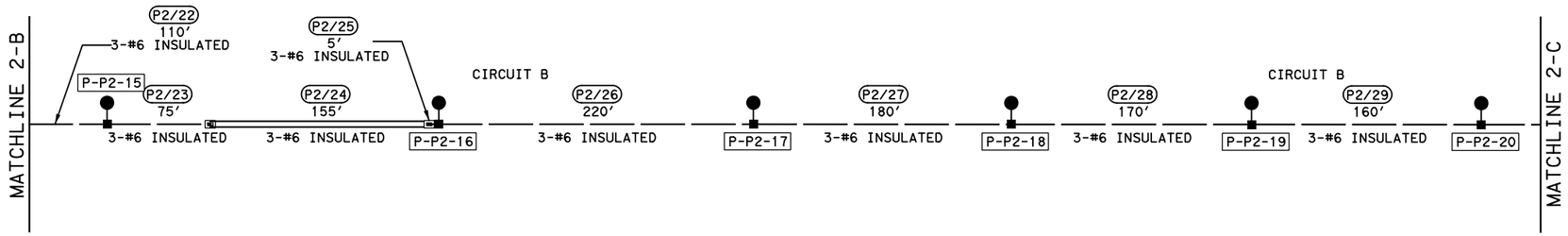

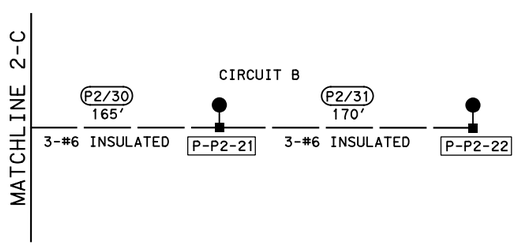

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SH 20 & FM 1281

ILLUMINATION CIRCUIT DIAGRAM

02 OF 05

DESIGNED: BD	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	036, ETC.	159

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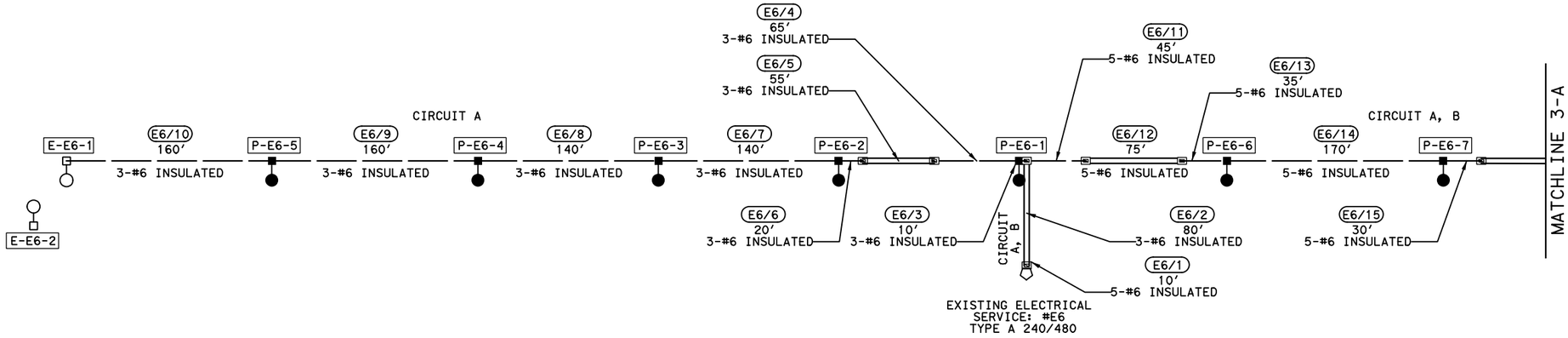

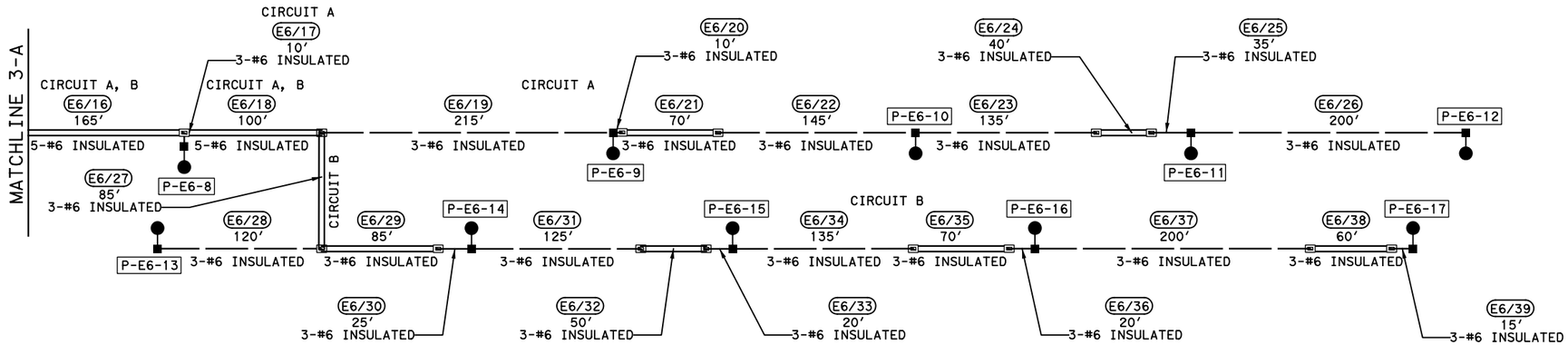

NOT TO SCALE

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SH 20 & FM 1281

ILLUMINATION CIRCUIT DIAGRAM

03 OF 05

DESIGNED: BD	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	036, ETC. / 160

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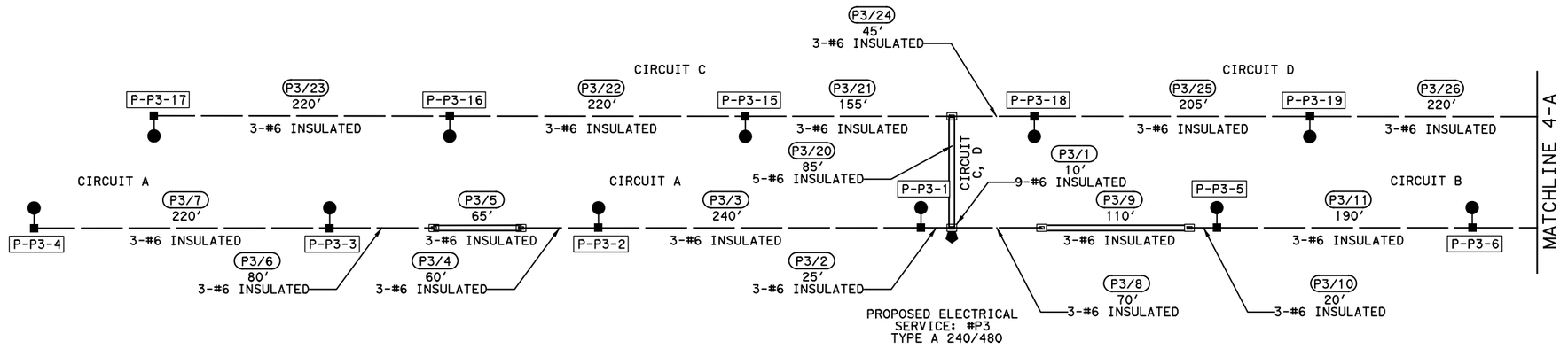

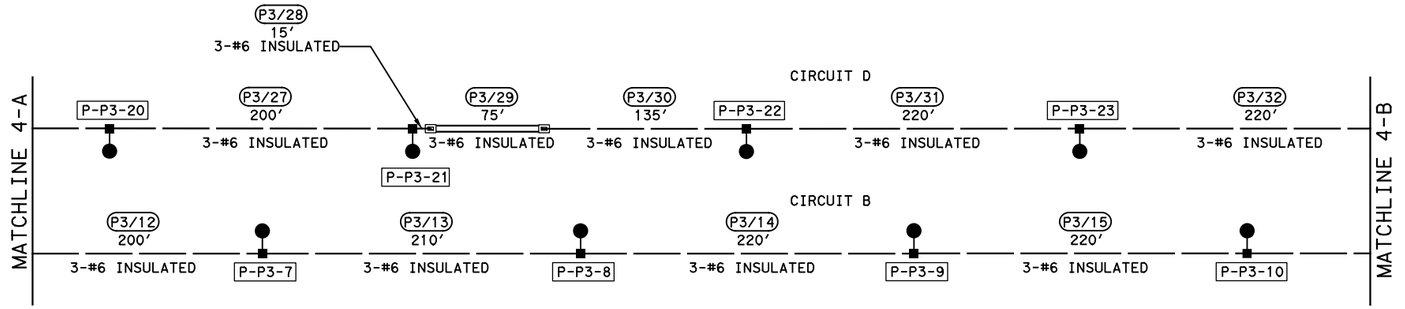

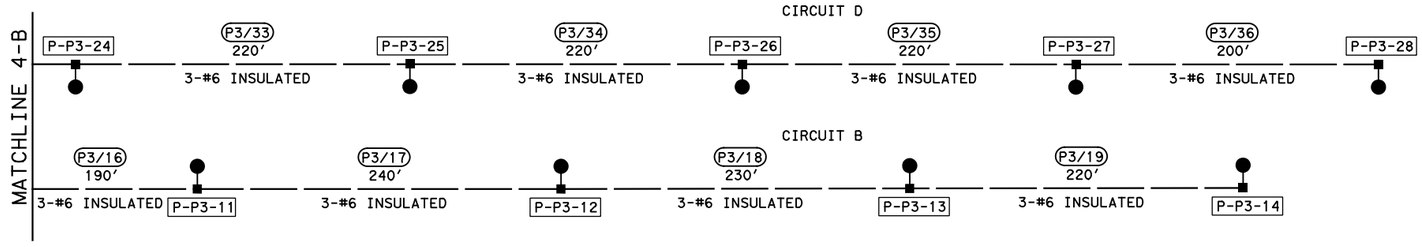

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ILLUMINATION CIRCUIT DIAGRAM

04 OF 05

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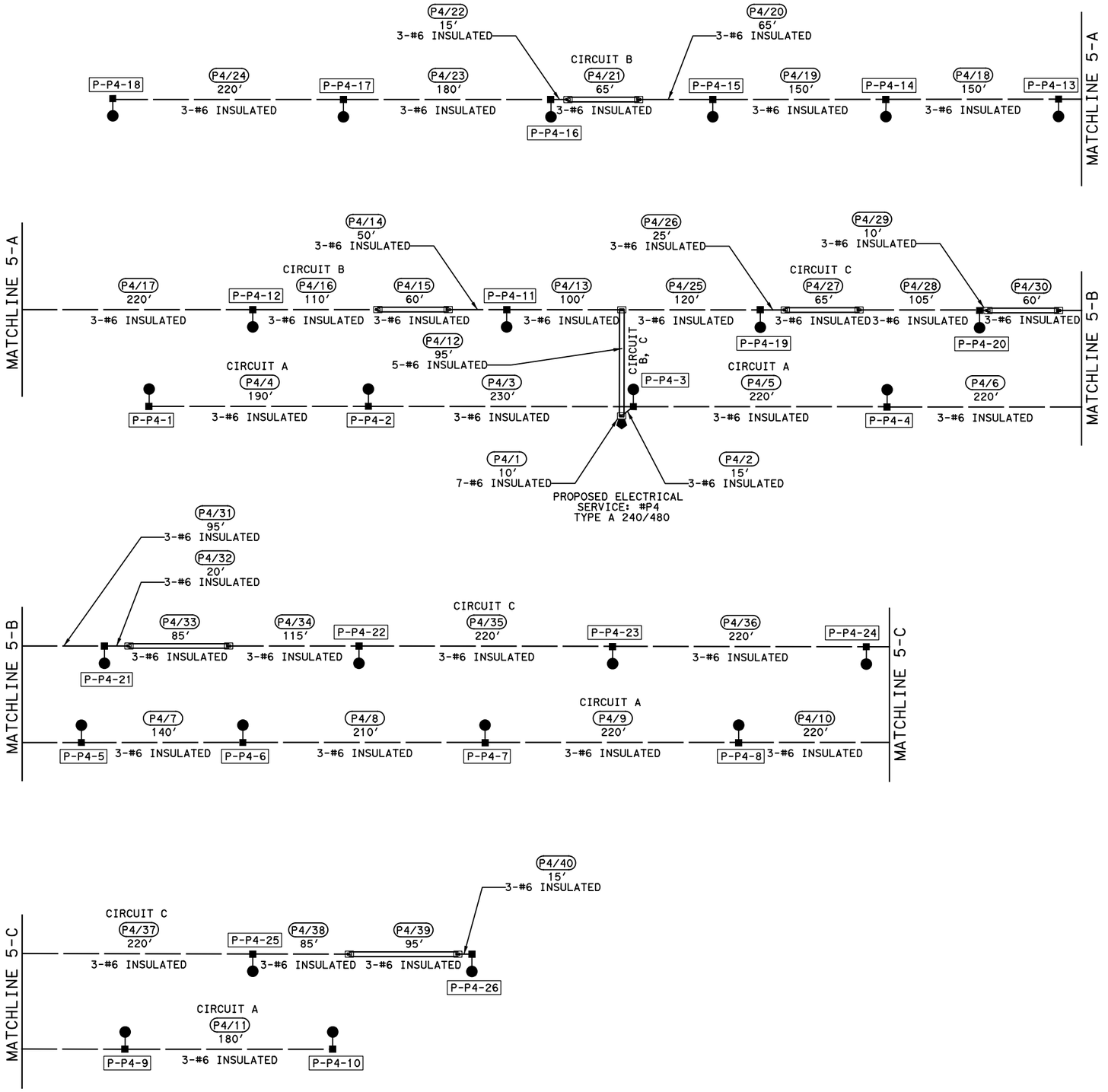
DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	032, ETC. / 161

FINAL SUBMITTAL



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- PROP ELECTRICAL SERVICE TYPE "A"
- POWER SOURCE
- PROP JUNCTION BOX
- (XX/X) CONDUIT RUN NO. IDENTIFICATION METER NO./RUN NO.
- X-XX-X
  - POLE NO.
  - SERVICE METER NO.
  - E - EXISTING TO REMAIN
    P - PROPOSED
    R - REMOVE EXISTING

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STATE OF TEXAS
BHARATH DONAVALLI
138746
LICENSED
PROFESSIONAL ENGINEER
3/30/2021

WSP USA Inc
9311 San Pedro St., Suite 700
San Antonio, TX 78216
TEL: 210-247-4360
TBPE F-2263

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512)777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

ILLUMINATION CIRCUIT DIAGRAM

05 OF 05

DESIGNED: BD	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED: PMP	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN: BD	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED: PMP	EL PASO	EL PASO	3451	01	036, ETC: 162

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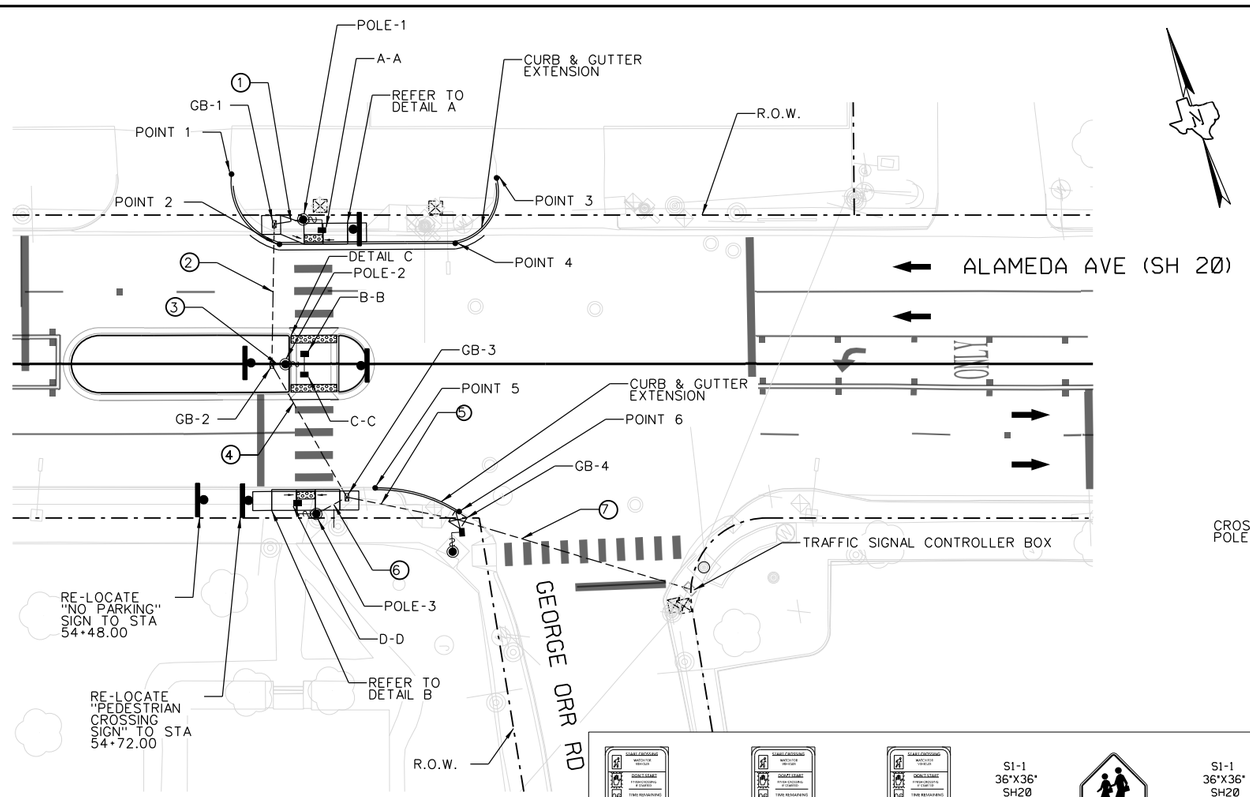
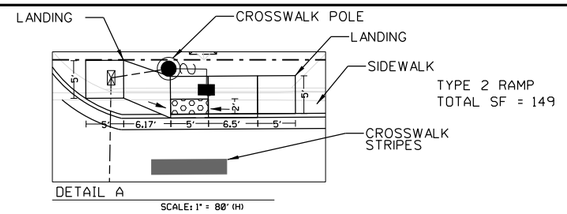
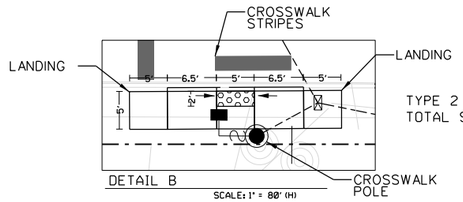
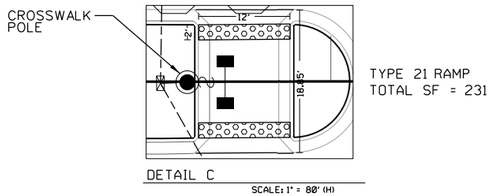
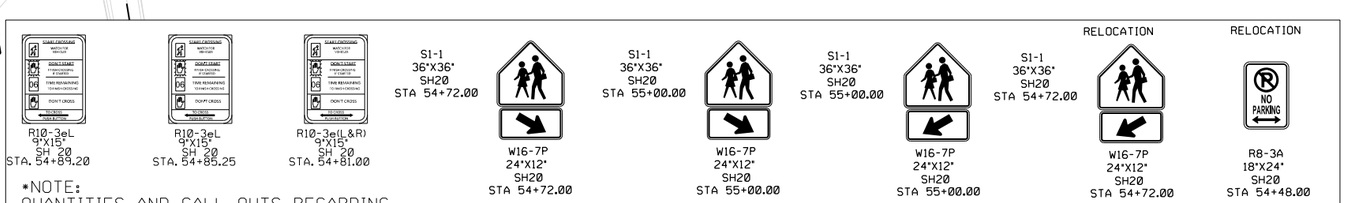
FINAL SUBMITTAL











*NOTE:
QUANTITIES AND CALL OUTS REGARDING SIGNAGE ARE INCLUDED ON PAVEMENT MARKINGS FOR ALAMEDA AVENUE (SH 20).

FOR CONTRACTOR INFORMATION ONLY

CONDUIT & CONDUCTOR RUNS

CONDUIT RUN *	LENGTH OF RUN (FT)	CONDUIT * (BORED)	CONDUIT SIZE (INCHES) (BORED)	CONDUIT * (TRENCHED)	CONDUIT SIZE (INCHES) (TRENCHED)	ELEC CONDUCTOR (NO. 6) INSULATED GROUND	TRAF SIG CBL (TY C) (2 CONDR) (18 AWG) (PED BTN)	TRAF SIG CBL (TY A) (9 CONDR) (12 AWG)	TRAF SIG CBL (TY A) (5 CONDR) (12 AWG)
1	8			1		1	1		1
2	38	1	3			1	1		1
3	4			1	3	1	1	1	
4	41	1	3			1	2	1	1
5	30	1	3			1	3	1	2
6	10			1	3	1	1		1
7	64	1	3			1	3	1	2
TOTAL	195	173		22		195	424	139	285

NUMBER OF CONDUCTORS FROM POLE BASE TO PEDESTRIAN HEAD

POLE ID.	PEDESTRIAN SIGNAL HEAD NO. A-A	B-B	C-C	D-D	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-1	16				16	(TY-A) (5 CONDR) (12 AWG)
POLE-2		16			16	(TY-A) (9 CONDR) (12 AWG)
POLE-3			16		16	(TY-A) (5 CONDR) (12 AWG)
TOTAL					48	

NUMBER OF CONDUCTORS FROM POLE BASE ACCESSIBLE PEDESTRIAN SIGNALS PUSH BUTTON

POLE ID.	PEDESTRIAN SIGNAL HEAD NO. A-A	B-B	C-C	D-D	PED PB	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-1	6					6	(TY-C) (2 CONDR) (18 AWG)
POLE-2		6	6			12	(TY-C) (2 CONDR) (18 AWG)
POLE-3				6		6	(TY-C) (2 CONDR) (18 AWG)
TOTAL						24	

*ITEM 104-6015 NOTE:
INCLUDES REMOVAL OF ADA RAMPS, CURB AND GUTTER.

ESTIMATED TRAFFIC SIGNAL QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QTY
104-6015	REMOVING CONC (SIDEWALKS)	SY	43
416-6030	DRILL SHAFT (TRF SIG POLE) (24")	LF	18
529-6005	CONC CURB & GUTTER (MONO) (TY II)	LF	133
531-6019	CURB RAMPS (TY 2)	EA	2
531-6030	CURB RAMPS (TY 21)	EA	1
618-6029	CONDT (PVC) (SCH 40) (3")	LF	22
618-6030	CONDT (PVC) (SCH 40) (3") BORE	LF	173
620-6010	ELEC CONDR (NO. 6) INSULATED GROUND	LF	195
624-6002	GROUND BOX TY A (12231) W/ APRON	EA	3
682-6018	PED SIG SEC (LED) (COUNTDOWN)	EA	4
684-6010	TRAF SIG CBL (TY A) (12 AWG) (5 CONDR)	LF	317
684-6014	TRAF SIG CBL (TY A) (12 AWG) (9 CONDR)	LF	155
684-6082	TRAF SIG CBL (TY C) (18 AWG) (2 CONDR)	LF	448
687-6001	PED POLE ASSEMBLY	EA	3
688-6001	PED DETECT (PUSH BTN) (APS)	EA	3
690-6030	REMOVAL OF PEDESTRIAN PUSH BUTTONS	EA	1
690-6094	REMOV PED SIG LED TRAF SIG LAMP UNIT	EA	1

GROUND BOX SCHEDULE

GROUND BOX ID*	TYPE-A	TYPE-C	TYPE-D	TYPE-1	TYPE-2	W/ APRON
GB-1	1					1
GB-2	1					1
GB-3	1					1
GB-4	EXISTING					
TOTAL	3					3

NOTES:
'GB-*' - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION TRAFFIC SIGNALS.

'ICGB-*' - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION INTERCONNECT COMMUNICATIONS.

GEOMETRIC DATA

POINT ID*	NORTHING	EASTING	RADIUS (FT)
1	414376.4003	10655273.7390	17.08
2	414371.7354	10655251.7591	
3	414424.0563	10655222.4066	13.81
4	414404.0309	10655218.3721	
5	414342.7023	10655189.0318	39.07
6	414353.5107	10655168.6762	

PED POLE DATA

POLE ID*	NORTHING	EASTING
1	414380.7944	10655251.7689
2	414349.9322	10655228.7468
3	414326.9929	10655195.5415

0 20 40
SCALE: 1" = 40' (H)

LEGEND

- PROPOSED SIGN
- PROPOSED GROUND BOX
- DIRECTION OF TRAFFIC FLOW
- PROPOSED VEHICULAR SIGNAL HEAD
- PROPOSED MAST ARM/POLE SIGN
- PROPOSED MAST ARM
- PROPOSED SOLAR POWERED PANEL
- PROPOSED SIGNAL HEAD
- PROPOSED PUSH BUTTON

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3/30/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED
PROFESSIONAL ENGINEER

ENGINEER'S NOTE
"THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARVIN H. GOMEZ, P.E. No. 86920 ON MARCH 30, 2021
ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT"

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TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

PEDESTRIAN CROSSING GEORGE ORR ROAD INTERSECTION LAYOUT

STA 54+09.00 - STA 56+94.85

1 OF 9

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	163

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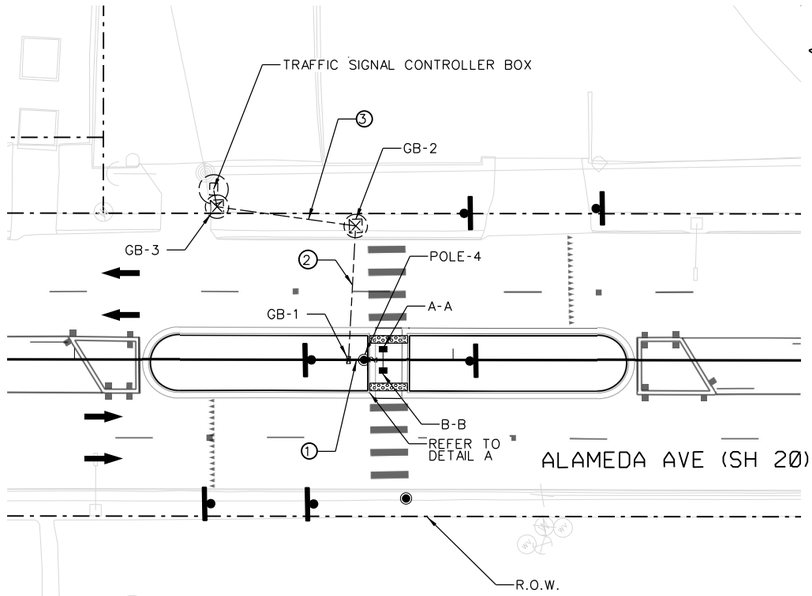
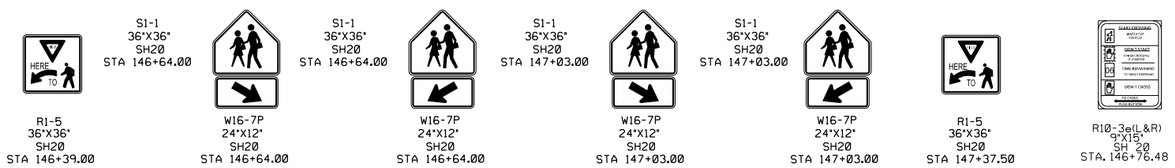
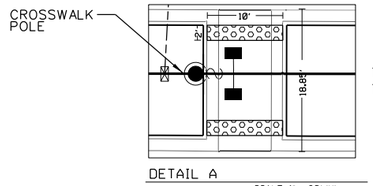




FOR CONTRACTOR INFORMATION ONLY

*NOTE:
QUANTITIES AND CALL OUTS REGARDING SIGNAGE ARE INCLUDED ON PAVEMENT MARKINGS FOR ALAMEDA AVENUE (SH 20).



0 20 40
SCALE: 1" = 40' (H)

LEGEND

- PROPOSED SIGN
- PROPOSED GROUND BOX
- DIRECTION OF TRAFFIC FLOW
- PROPOSED VEHICULAR SIGNAL HEAD
- PROPOSED MAST ARM/POLE SIGN
- PROPOSED MAST ARM
- PROPOSED SOLAR POWERED PANEL
- PROPOSED SIGNAL HEAD
- PROPOSED PUSH BUTTON

Texas Department of Transportation®

NO.	REVISION	BY	DATE

3/30/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
PROFESSIONAL ENGINEER

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AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

PEDESTRIAN CROSSING BRIO ALAMEDA AVENUE CORRIDOR LAYOUT 1

STA 145+82.20 - STA 147+91.90

2 OF 9

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021(624)HES		FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	164

CONDUIT & CONDUCTOR RUNS

CONDUIT RUN #	LENGTH OF RUN (FT)	CONDUIT # (BORED)	CONDUIT SIZE (INCHES) (BORED)	CONDUIT # (TRENCHED)	CONDUIT SIZE (INCHES) (TRENCHED)	ELEC CONDUCTOR (NO. 6) INSULATED GROUND	TRAF SIG CBL (TY C) (2 CONDR) (18 AWG) (PED BTN)	TRAF SIG CBL (TY A) (9 CONDR) (12 AWG)	TRAF SIG CBL (TY A) (5 CONDR) (12 AWG)
1	4			1	3	1	1	1	
2	36	1	3			1	1	1	
3	37			1	3	1	1		1
TOTAL	77	36		41		77	77	77	

NUMBER OF CONDUCTORS FROM POLE BASE TO PEDESTRIAN HEAD

POLE ID.	PEDESTRIAN SIGNAL HEAD NO. A-A	B-B	C-C	D-D	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-4	16				16	(TY-A) (9 CONDR) (12 AWG)
TOTAL					16	

NUMBER OF CONDUCTORS FROM POLE BASE ACCESSIBLE PEDESTRIAN SIGNALS PUSH BUTTON

POLE ID.	PEDESTRIAN SIGNAL HEAD NO. A-A	B-B	C-C	D-D	PED PB	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-4	6	6				12	(TY-C) (2 CONDR) (18 AWG)
TOTAL						12	

ESTIMATED TRAFFIC SIGNAL QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QTY
416-6030	DRILL SHAFT (TRF SIG POLE) (24")	LF	6
531-6019	CURB RAMPS (TY 2)	EA	1
618-6029	CONDT (PVC) (SCH 40) (3")	LF	41
618-6030	CONDT (PVC) (SCH 40) (3") BORE	LF	36
620-6010	ELEC CONDR (NO. 6) INSULATED GROUND	LF	77
624-6002	GROUND BOX TY A (12231) W/ APRON	EA	1
682-6018	PED SIG SEC (LED) (COUNTDOWN)	EA	2
684-6014	TRAF SIG CBL (TY A) (12 AWG) (9 CONDR)	LF	93
684-6082	TRAF SIG CBL (TY C) (18 AWG) (2 CONDR)	LF	89
687-6001	PED POLE ASSEMBLY	EA	1
688-6001	PED DETECT (PUSH BTN) (APS)	EA	1

GROUND BOX SCHEDULE

GROUND BOX ID#	TYPE-A	TYPE-C	TYPE-D	TYPE-1	TYPE-2	W/ APRON
GB-1	1					1
GB-2			EXISTING			
GB-3			EXISTING			
TOTAL	1					1

NOTES:
"GB-#" - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION TRAFFIC SIGNALS.
"ICGB-#" - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION INTERCONNECT COMMUNICATIONS.

PED POLE DATA

POLE ID#	NORTHING	EASTING
4	420699.5630	10648577.5297

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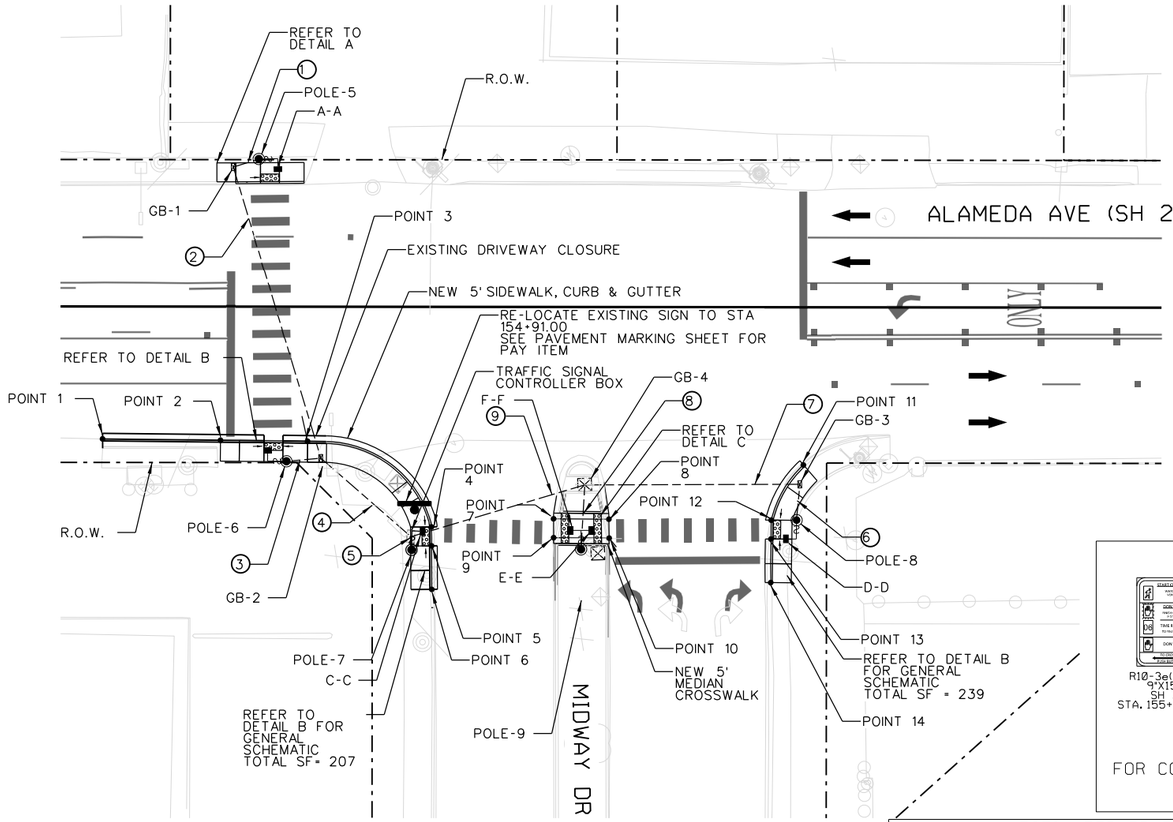

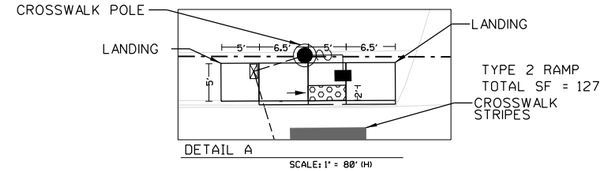

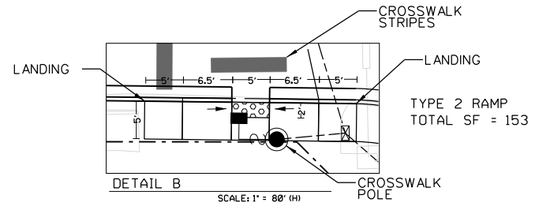

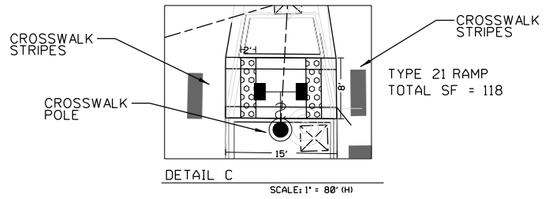

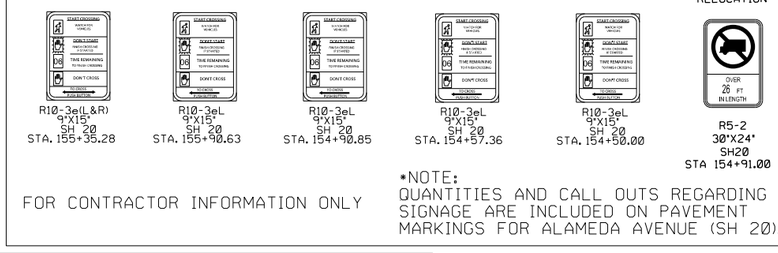

FOR CONTRACTOR INFORMATION ONLY

*NOTE:
QUANTITIES AND CALL OUTS REGARDING SIGNAGE ARE INCLUDED ON PAVEMENT MARKINGS FOR ALAMEDA AVENUE (SH 20).

CONDUIT & CONDUCTOR RUNS

CONDUIT RUN #	LENGTH OF RUN (FT)	CONDUIT # (BORED)	CONDUIT SIZE (INCHES) (BORED)	CONDUIT # (TRENCHED)	CONDUIT SIZE (INCHES) (TRENCHED)	ELEC CONDUCTOR (NO. 6) INSULATED GROUND	TRAF SIG CBL (TY C) (2 CONDR) (18 AWG) (PED BTN)	TRAF SIG CBL (TY A) (9 CONDR) (12 AWG)	TRAF SIG CBL (TY A) (5 CONDR) (12 AWG)
1	7			1	3	1	1		1
2	81	1	3			1	1		1
3	10			1	3	1	1		1
4	32			1	3	1	2		2
5	4			1	3	1	1		1
6	10			1	3	1	1		1
7	57	1	3			1	1		1
8	18			1	3	1	1	1	
9	48	1	3			1	2	1	1
TOTAL	267	186		81		267	347	66	281

ESTIMATED TRAFFIC SIGNAL QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QTY
104-6015	REMOVING CONC (SIDEWALKS)	SY	173
416-6030	DRILL SHAFT (TRF SIG POLE) (24")	LF	30
529-6005	CONC CURB & GUTTER (MOND) (TY II)	LF	231
531-6001	CONC SIDEWALKS (4")	SY	63
531-6019	CURB RAMPS (TY 2)	EA	4
531-6030	CURB RAMPS (TY 21)	EA	1
618-6029	CONDT (PVC) (SCH 40) (3")	LF	101
618-6030	CONDT (PVC) (SCH 40) (3") BORE	LF	184
620-6010	ELEC CONDR (NO. 6) INSULATED GROUND	LF	285
624-6002	GROUND BOX TY A (122311) W/ APRON	EA	3
682-6018	PED SIG SEC (LED) (COUNTDOWN)	EA	6
684-6010	TRAF SIG CBL (TY A) (12 AWG) (5 CONDR)	LF	352
684-6014	TRAF SIG CBL (TY A) (12 AWG) (9 CONDR)	LF	93
684-6082	TRAF SIG CBL (TY C) (18 AWG) (2 CONDR)	LF	395
687-6001	PED POLE ASSEMBLY	EA	5
688-6001	PED DETECT (PUSH BTN) (APS)	EA	5
690-6089	REMOVE PED POLE ASSM	EA	4

*ITEM 104-6015 NOTE:
INCLUDES REMOVAL OF ADA RAMPS, CURB AND GUTTER.

*ITEM 690-6089 NOTE:
INCLUDES THE REMOVAL OF THE PEDESTRIAN POLE ASSEMBLY, FOUNDATION, SIGNAL LED TRAFFIC LAMP UNIT, AND PEDESTRIAN PUSH BUTTON.

NUMBER OF CONDUCTORS FROM POLE BASE TO PEDESTRIAN HEAD

POLE ID.	PEDESTRIAN SIGNAL HEAD NO. A-A	B-B	C-C	D-D	E-E	F-F	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-5	16						16	(TY-A) (5 CONDR) (12 AWG)
POLE-6		16					16	(TY-A) (5 CONDR) (12 AWG)
POLE-7			16				16	(TY-A) (5 CONDR) (12 AWG)
POLE-8				16			16	(TY-A) (5 CONDR) (12 AWG)
POLE-9					16		16	(TY-A) (9 CONDR) (12 AWG)
TOTAL							80	

NUMBER OF CONDUCTORS FROM POLE BASE ACCESSIBLE PEDESTRIAN SIGNALS PUSH BUTTON

POLE ID.	PED PB	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-5	6	6	(TY-C) (2 CONDR) (18 AWG)
POLE-6	6	6	(TY-C) (2 CONDR) (18 AWG)
POLE-7	6	6	(TY-C) (2 CONDR) (18 AWG)
POLE-8	6	6	(TY-C) (2 CONDR) (18 AWG)
POLE-9	6	6	(TY-C) (2 CONDR) (18 AWG)
TOTAL		30	

*NOTES:
"GB-#" - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION TRAFFIC SIGNALS.
"ICGB-#" - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION INTERCONNECT COMMUNICATIONS.

GROUND BOX SCHEDULE

GROUND BOX ID#	TYPE-A	TYPE-C	TYPE-D	TYPE-1	TYPE-2	W/ APRON
GB-1	1					1
GB-2	1					1
GB-3	1					1
GB-4	EXISTING					
TOTAL	3					3

GEOMETRIC DATA

POINT ID#	NORTHING	EASTING	RADIUS (FT)
1	421179.5175	10648023.5175	
2	421200.7763	10648000.5661	
3	421216.4748	10647983.7566	29.5
4	421222.7338	10647944.4705	
5	421219.1344	10647941.0000	
6	421210.8572	10647933.0108	
7	421246.5702	10647922.6271	
8	421256.5819	10647911.9943	
9	421242.9591	10647919.1685	
10	421253.0171	10647908.4864	
11	421302.4658	10647884.7269	28.75
12	421286.0299	10647880.8301	
13	421282.3756	10647877.4174	
14	421274.0140	10647869.5133	

PED POLE DATA

POLE ID#	NORTHING	EASTING
5	421261.4808	10648044.5663
6	421208.8067	10647984.1367
7	421214.7264	10647944.0899
8	421290.6603	10647875.9755
9	421245.7568	10647911.8210

0 20 40
SCALE: 1" = 40' (H)

LEGEND

- PROPOSED SIGN
- PROPOSED GROUND BOX
- DIRECTION OF TRAFFIC FLOW
- PROPOSED VEHICULAR SIGNAL HEAD
- PROPOSED MAST ARM/POLE SIGN
- PROPOSED MAST ARM
- PROPOSED SOLAR POWERED PANEL
- PROPOSED SIGNAL HEAD
- PROPOSED PUSH BUTTON

Texas Department of Transportation®

NO.	REVISION	BY	DATE

3/30/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED
PROFESSIONAL ENGINEER

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PH: (915) 351-6701 FAX: (915) 243-6010
www.integratedengineeringsolutions.com
TBPE F#15313 TBPLS F#10194278

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

PEDESTRIAN CROSSING MIDWAY DRIVE INTERSECTION LAYOUT

STA 153+97.65 - STA 156+88.50

3 OF 9

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624)HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	165

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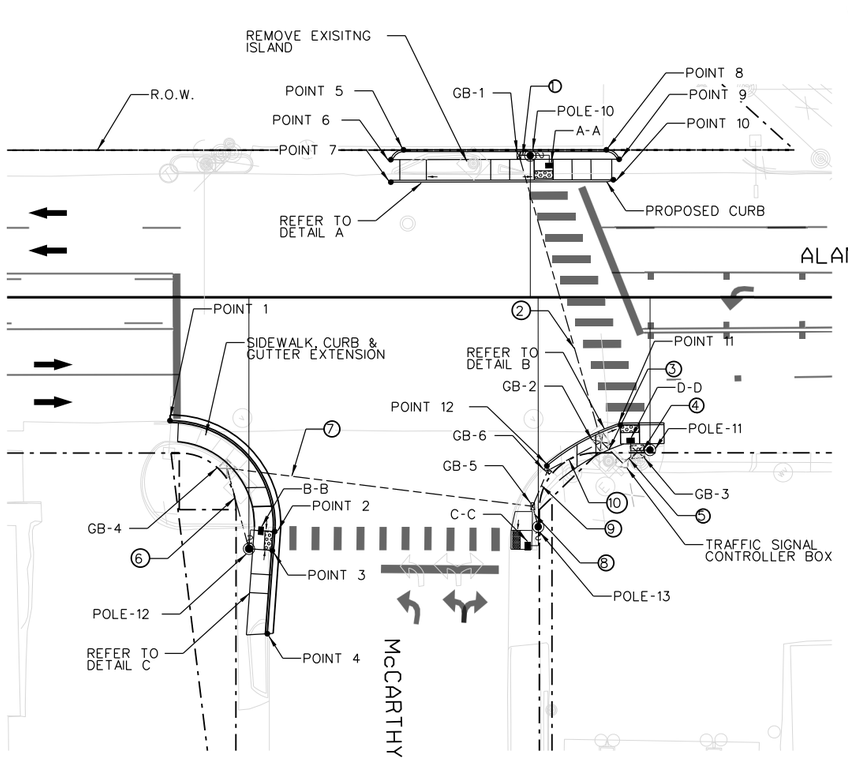

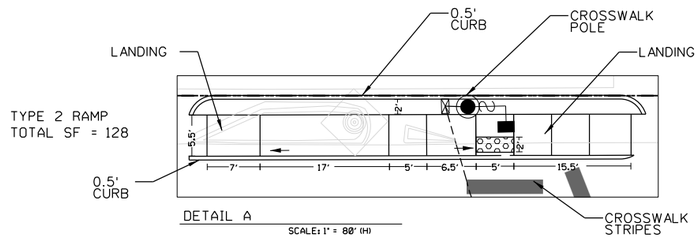

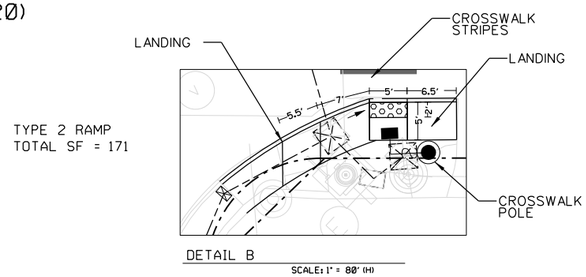

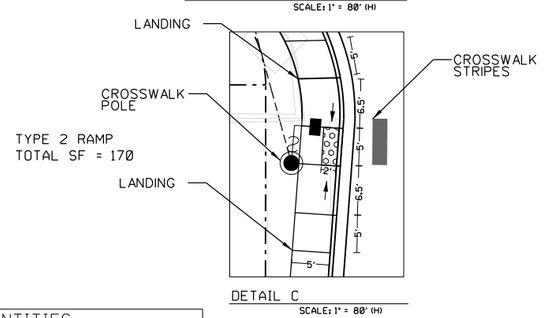

0 20 40
SCALE: 1" = 40' (H)

LEGEND

- PROPOSED SIGN
- PROPOSED GROUND BOX
- DIRECTION OF TRAFFIC FLOW
- PROPOSED VEHICULAR SIGNAL HEAD
- PROPOSED MAST ARM/POLE SIGN
- PROPOSED MAST ARM
- PROPOSED SOLAR POWERED PANEL
- PROPOSED SIGNAL HEAD
- PROPOSED PUSH BUTTON

Texas Department of Transportation®

NO.	REVISION	BY	DATE

3/30/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED PROFESSIONAL ENGINEER
ENGINEER'S NOTE

"THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARVIN H. GOMEZ, P.E. No. 86920 ON MARCH 30, 2021 ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT"

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BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

PEDESTRIAN CROSSING McCARTHY AVENUE INTERSECTION LAYOUT

STA 158+80.78 - STA 160+98.63

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	166

CONDUIT & CONDUCTOR RUNS

CONDUIT RUN #	LENGTH OF RUN (FT)	CONDUIT # (BORED)	CONDUIT SIZE (INCHES) (BORED)	CONDUIT # (TRENCHED)	CONDUIT SIZE (INCHES) (TRENCHED)	ELEC CONDUCTOR (NO. 6) INSULATED GROUND	TRAF SIG CBL (TY C) (2 CONDR) (18 AWG) (PED BTN)	TRAF SIG CBL (TY A) (5 CONDR) (12 AWG)
1	4			1	3	1	1	1
2	79	1	3			1	1	1
3	8			1	3	1	3	3
4	4			1	3	1	1	1
5	5			1	3	1	1	1
6	23			1	3	1	1	1
7	82	1	3			1	1	1
8	6			1	3	1	1	1
9	11			1	3	1	2	2
10	16			1	3	1	2	2
TOTAL	238	161		77		238	281	281

NUMBER OF CONDUCTORS FROM POLE BASE TO PEDESTRIAN HEAD

POLE ID.	PEDESTRIAN SIGNAL HEAD NO. A-A	B-B	C-C	D-D	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-10	16				16	(TY-A) (5 CONDR) (12 AWG)
POLE-11		16			16	(TY-A) (5 CONDR) (12 AWG)
POLE-12			16		16	(TY-A) (5 CONDR) (12 AWG)
POLE-13				16	16	(TY-A) (5 CONDR) (12 AWG)
TOTAL					64	

NUMBER OF CONDUCTORS FROM POLE BASE ACCESSIBLE PEDESTRIAN SIGNALS PUSH BUTTON

POLE ID.	PEDESTRIAN SIGNAL HEAD NO. A-A	B-B	C-C	D-D	PED PB	SUB TOTAL (FT)	CONDUCTOR (TYPE) NO.) (SIZE)
POLE-10	6					6	(TY-C) (2 CONDR) (18 AWG)
POLE-11		6				6	(TY-C) (2 CONDR) (18 AWG)
POLE-12			6			6	(TY-C) (2 CONDR) (18 AWG)
POLE-13				6		6	(TY-C) (2 CONDR) (18 AWG)
TOTAL						24	

ESTIMATED TRAFFIC SIGNAL QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QTY
104-6015	REMOVING CONC (SIDEWALKS)	SY	85
416-6030	DRILL SHAFT (TRF SIG POLE) (24")	LF	24
529-6005	CONC CURB & GUTTER (MONO) (TY II)	LF	135
531-6001	CONC SIDEWALKS (4")	SY	44
531-6019	CURB RAMPS (TY 2)	EA	3
618-6029	CONDT (PVC) (SCH 40) (3")	LF	77
618-6030	CONDT (PVC) (SCH 40) (3") BORE	LF	161
620-6010	ELEC CONDR (NO. 6) INSULATED GROUND	LF	238
624-6002	GROUND BOX TY A (122311) W/ APRON	EA	3
682-6018	PED SIG SEC (LED) (COUNTDOWN)	EA	4
684-6010	TRAF SIG CBL (TY A) (12 AWG) (5 CONDR)	LF	345
684-6082	TRAF SIG CBL (TY C) (18 AWG) (2 CONDR)	LF	305
687-6001	PED POLE ASSEMBLY	EA	4
688-6001	PED DETECT (PUSH BTN) (APS)	EA	4
690-6030	REMOVAL OF PEDESTRIAN PUSH BUTTONS	EA	3
690-6089	REMOVE PED POLE ASSM	EA	1
690-6094	REMOV PED SIG LED TRAF SIG LAMP UNIT	EA	3

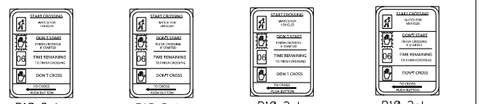
*ITEM 104-6015 NOTE:
INCLUDES REMOVAL OF ADA RAMPS, CURB AND GUTTER.

*ITEM 690-6089 NOTE:
INCLUDES THE REMOVAL OF THE PEDESTRIAN POLE ASSEMBLY, FOUNDATION, SIGNAL LED TRAFFIC LAMP UNIT, AND PEDESTRIAN PUSH BUTTON.

GROUND BOX SCHEDULE

GROUND BOX ID#	TYPE-A	TYPE-C	TYPE-D	TYPE-1	TYPE-2	W/ APRON
GB-1	1					1
GB-2			EXISTING			
GB-3			EXISTING			
GB-4			EXISTING			
GB-5	1					1
GB-6	1					1
TOTAL	3					3

NOTES:
'GB-#' - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION TRAFFIC SIGNALS.
'ICGB-#' - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION INTERCONNECT COMMUNICATIONS.



FOR CONTRACTOR INFORMATION ONLY

*NOTE:
QUANTITIES AND CALL OUTS REGARDING SIGNAGE ARE INCLUDED ON PAVEMENT MARKINGS FOR ALAMEDA AVENUE (SH 20).

GEOMETRIC DATA

POINT ID#	NORTHING	EASTING	RADIUS (FT)
1	421536.6313	10647652.2225	27.5
2	421534.5379	10647611.9849	
3	421530.4484	10647608.9910	
4	421513.6274	10647594.7848	
5	421630.9806	10647656.9090	3.5
6	421626.7649	10647657.5626	
7	421622.4768	10647653.4580	
8	421667.9604	10647618.1298	3.5
9	421668.4659	10647613.9772	
10	421663.4747	10647611.3506	
11	421617.8674	10647565.3003	58.8
12	421596.6804	10647571.9203	

PED POLE DATA

POLE ID#	NORTHING	EASTING
10	421652.9713	10647631.6578
11	421618.5025	10647555.1145
12	421526.5303	10647613.7680
13	421583.4455	10647562.4836

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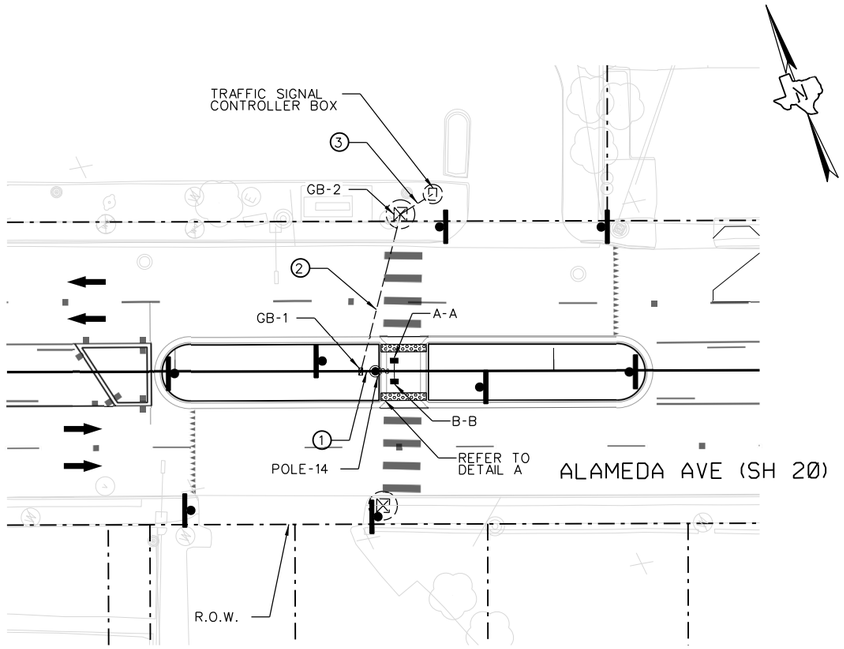
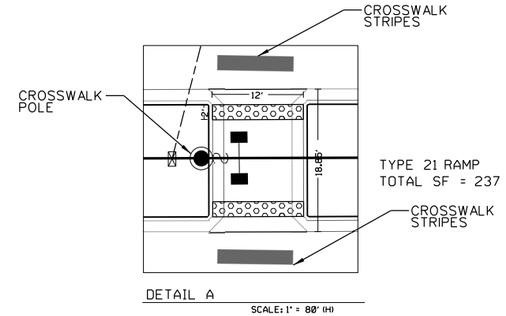
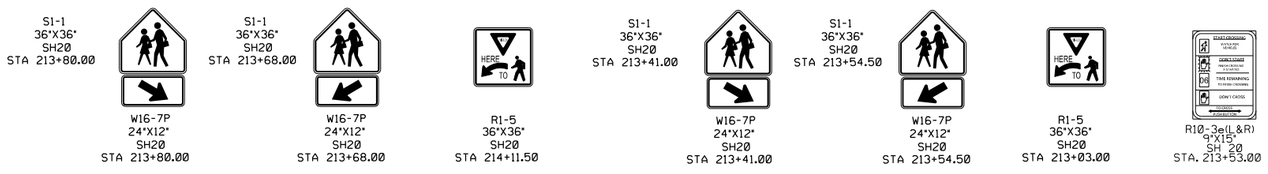




DETAIL A

SCALE: 1" = 80' (H)



FOR CONTRACTOR INFORMATION ONLY

*NOTE:
QUANTITIES AND CALL OUTS REGARDING SIGNAGE ARE INCLUDED ON PAVEMENT MARKINGS FOR ALAMEDA AVENUE (SH 20).

CONDUIT & CONDUCTOR RUNS

CONDUIT RUN #	LENGTH OF RUN (FT)	CONDUIT # (BORED)	CONDUIT SIZE (INCHES) (BORED)	CONDUIT # (TRENCHED)	CONDUIT SIZE (INCHES) (TRENCHED)	ELEC CONDUCTOR (NO. 6) INSULATED GROUND	TRAF SIG CBL (TY C) (2 CONDR) (18 AWG) (PED BTN)	TRAF SIG CBL (TY A) (9 CONDR) (12 AWG)
1	4			1	3	1	1	1
2	43	1	3			1	1	1
3	10			1	3	1	1	1
TOTAL	57	43		14		57	57	57

NUMBER OF CONDUCTORS FROM POLE BASE TO PEDESTRIAN HEAD

POLE ID.	PEDESTRIAN SIGNAL HEAD NO. A-A	B-B	C-C	D-D	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-14	16				16	(TY-A) (9 CONDR) (12 AWG)
TOTAL					16	

NUMBER OF CONDUCTORS FROM POLE BASE ACCESSIBLE PEDESTRIAN SIGNALS PUSH BUTTON

POLE ID.	PEDESTRIAN SIGNAL HEAD NO. A-A	B-B	C-C	D-D	PED PB	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-14	6	6				12	(TY-C) (2 CONDR) (18 AWG)
TOTAL						12	

ESTIMATED TRAFFIC SIGNAL QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QTY
416-6030	DRILL SHAFT (TRF SIG POLE) (24")	LF	6
531-6030	CURB RAMPS (TY 21)	EA	1
618-6029	CONDT (PVC) (SCH 40) (3")	LF	14
618-6030	CONDT (PVC) (SCH 40) (3") BORE	LF	43
620-6010	ELEC CONDR (NO. 6) INSULATED GROUND	LF	57
624-6002	GROUND BOX TY A (122311) W/ APRON	EA	1
682-6018	PED SIG SEC (LED) (COUNTDOWN)	EA	2
684-6014	TRAF SIG CBL (TY A) (12 AWG) (9 CONDR)	LF	73
684-6082	TRAF SIG CBL (TY C) (18 AWG) (2 CONDR)	LF	69
687-6001	PED POLE ASSEMBLY	EA	1
688-6001	PED DETECT (PUSH BTN) (APS)	EA	1

GROUND BOX SCHEDULE

GROUND BOX ID#	TYPE-A	TYPE-C	TYPE-D	TYPE-1	TYPE-2	W/ APRON
GB-1	1					1
GB-2	EXISTING					
TOTAL	1					1

NOTES:
"GB-#" - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION TRAFFIC SIGNALS.
"ICGB-#" - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION INTERCONNECT COMMUNICATIONS.

PED POLE DATA

POLE ID#	NORTHING	EASTING
14	425098.1942	10643587.9593

0 20 40

SCALE: 1" = 40' (H)

LEGEND

- PROPOSED SIGN
- PROPOSED GROUND BOX
- DIRECTION OF TRAFFIC FLOW
- PROPOSED VEHICULAR SIGNAL HEAD
- PROPOSED MAST ARM/POLE SIGN
- PROPOSED MAST ARM
- PROPOSED SOLAR POWERED PANEL
- PROPOSED SIGNAL HEAD
- PROPOSED PUSH BUTTON

Texas Department of Transportation®

NO.	REVISION	BY	DATE

3/30/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
PROFESSIONAL ENGINEER

ENGINEER'S NOTE

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HALFF
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BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

PEDESTRIAN CROSSING BRIO ALAMEDA AVENUE CORRIDOR LAYOUT 2

STA 212+55.60 - STA 214+53.45

5 OF 9

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021(624)HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	167

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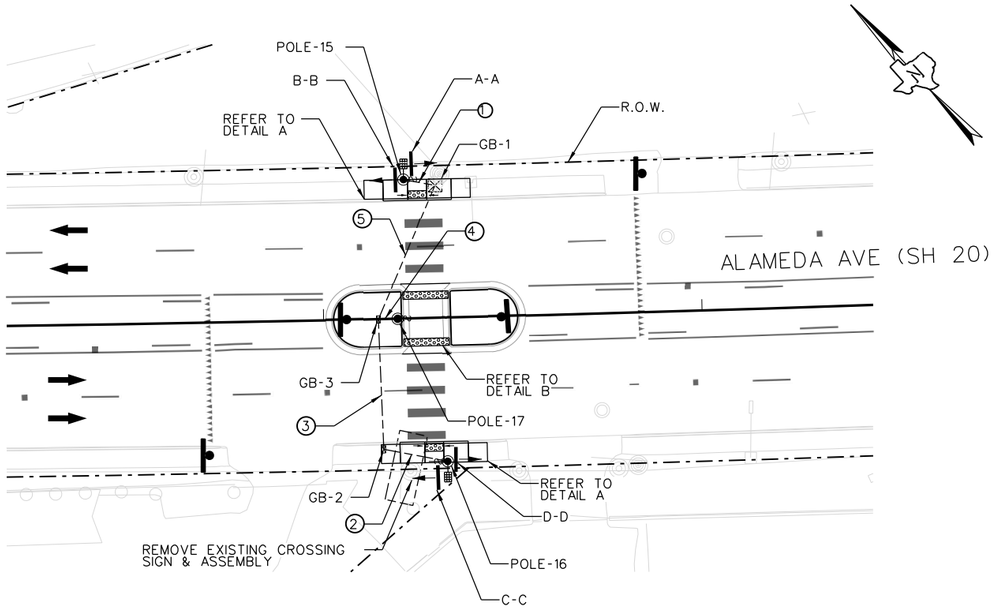
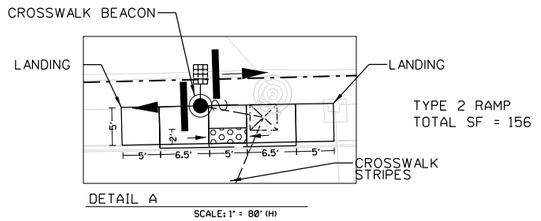
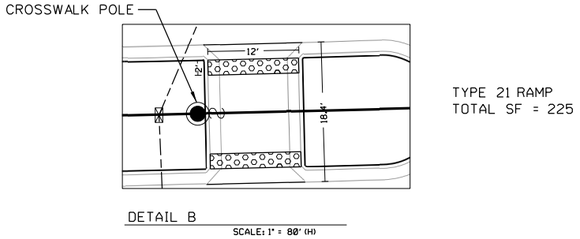




DETAIL A
SCALE: 1" = 80' (H)



DETAIL B
SCALE: 1" = 80' (H)

S1-1 36"X36" SH20 STA 253+43.00 — W16-7P 24"X12" SH20 STA 253+43.00

S1-1 36"X36" SH20 STA 253+22.00 — W16-7P 24"X12" SH20 STA 253+22.00

S1-1 36"X36" SH20 STA 253+22.00 — W16-7P 24"X12" SH20 STA 253+22.00

S1-1 36"X36" SH20 STA 253+07.00 — W16-7P 24"X12" SH20 STA 253+07.00

S1-1 36"X36" SH20 STA 253+32.00 — W16-7P 24"X12" SH20 STA 253+32.00

S1-1 36"X36" SH20 STA 253+32.00 — W16-7P 24"X12" SH20 STA 253+32.00

R1-5 36"X36" SH20 STA 252+70.00

R1-5 36"X36" SH20 STA 253+80.00

R10-25 9"X12" SH 20 STA 253+22.00 — PUSH BUTTON TO TURN ON WARNING LIGHTS

R10-25 9"X12" SH 20 STA 253+32.00 — PUSH BUTTON TO TURN ON WARNING LIGHTS

R10-25 9"X12" SH 20 STA 253+20.00 — PUSH BUTTON TO TURN ON WARNING LIGHTS

R1-6 12"X36" SH 20 STA 253+22.00

R1-6 12"X36" SH 20 STA 253+22.00

R1-6 12"X36" SH 20 STA 253+32.00

R1-6 12"X36" SH 20 STA 253+32.00

*NOTE:
QUANTITIES AND CALL OUTS REGARDING SIGNAGE ARE INCLUDED ON PAVEMENT MARKINGS FOR ALAMEDA AVENUE (SH 20).

FOR CONTRACTOR INFORMATION ONLY

CONDUIT & CONDUCTOR RUNS

CONDUIT RUN #	LENGTH OF RUN (FT)	CONDUIT # (BORED)	CONDUIT SIZE (INCHES) (BORED)	CONDUIT # (TRENCHED)	CONDUIT SIZE (INCHES) (TRENCHED)	ELEC CONDUCTOR (NO. 6) INSULATED GROUND	TRAF SIG CBL (TY C) (2 CONDR) (18 AWG) (PED BTN)	TRAF SIG CBL (TY A) (5 CONDR) (12 AWG)
1	9			1	3	1	1	1
2	18			1	3	1	1	1
3	35	1	3			1	1	1
4	6			1	3	1	1	
5	39	1	3			2	2	1
TOTAL	107	74		33		146	146	101

NUMBER OF CONDUCTORS FROM POLE BASE TO PEDESTRIAN BEACON

POLE ID.	PEDESTRIAN BEACON? NO. A-A	B-B	C-C	D-D	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-15	16	16			32	(TY-A) (5 CONDR) (12 AWG)
POLE-16			16	16	32	(TY-A) (5 CONDR) (12 AWG)
TOTAL					64	

NUMBER OF CONDUCTORS FROM POLE BASE ACCESSIBLE PEDESTRIAN SIGNALS PUSH BUTTON

POLE ID.	PEDESTRIAN BEACON NO. A-A	B-B	C-C	D-D	PED PB	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-15	6					6	(TY-C) (2 CONDR) (18 AWG)
POLE-16			6			6	(TY-C) (2 CONDR) (18 AWG)
POLE-17					6	6	(TY-C) (2 CONDR) (18 AWG)
TOTAL						18	

ESTIMATED TRAFFIC SIGNAL QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QTY
104-6015	REMOVING CONC (SIDEWALKS)	SY	42
416-6030	DRILL SHAFT (TRF SIG POLE) (24")	LF	18
531-6019	CURB RAMPS (TY 2)	EA	2
531-6030	CURB RAMPS (TY 21)	EA	1
618-6029	CONDT (PVC) (SCH 40) (3")	LF	33
618-6030	CONDT (PVC) (SCH 40) (3") BORE	LF	74
620-6010	ELEC CONDR (NO. 6) INSULATED GROUND	LF	146
624-6002	GROUND BOX TY A (122311) W/ APRON	EA	2
644-6076	REMOVE SM RD SN SUP&AM	EA	1
684-6010	TRAF SIG CBL (TY A) (12 AWG) (5 CONDR)	LF	165
684-6082	TRAF SIG CBL (TY C) (18 AWG) (2 CONDR)	LF	164
687-6001	PED POLE ASSEMBLY	EA	3
688-6001	PED DETECT (PUSH BTN) (APS)	EA	3

*ITEM 104-6015 NOTE: INCLUDES REMOVAL OF ADA RAMPS, CURB AND GUTTER.

GROUND BOX SCHEDULE

GROUND BOX ID#	TYPE-A	TYPE-C	TYPE-D	TYPE-1	TYPE-2	W/ APRON
GB-1	EXISTING					
GB-2	1					1
GB-3	1					1
TOTAL	2					2

NOTES:
"GB-#" - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION TRAFFIC SIGNALS.
"ICGB-#" - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION INTERCONNECT COMMUNICATIONS.

PED POLE DATA

POLE ID#	NORTHING	EASTING
15	426916.4933	10640060.5865
16	426855.1873	10640016.8091
17	426882.9412	10640045.5069

0 20 40
SCALE: 1" = 40' (H)

LEGEND

- PROPOSED SIGN
- PROPOSED GROUND BOX
- DIRECTION OF TRAFFIC FLOW
- PROPOSED VEHICULAR SIGNAL HEAD
- PROPOSED MAST ARM/POLE SIGN
- PROPOSED MAST ARM
- PROPOSED SOLAR POWERED PANEL
- PROPOSED SIGNAL HEAD
- PROPOSED PUSH BUTTON

Texas Department of Transportation®

NO.	REVISION	BY	DATE

3/30/2021

STATE OF TEXAS — MARVIN H. GOMEZ — 86920 — LICENSED PROFESSIONAL ENGINEER

ENGINEER'S NOTE

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TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

PEDESTRIAN CROSSING RAPID FLASHING BEACON LAYOUT 1

STA 252+83.75 - STA 254+45.22

6 OF 9

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	168

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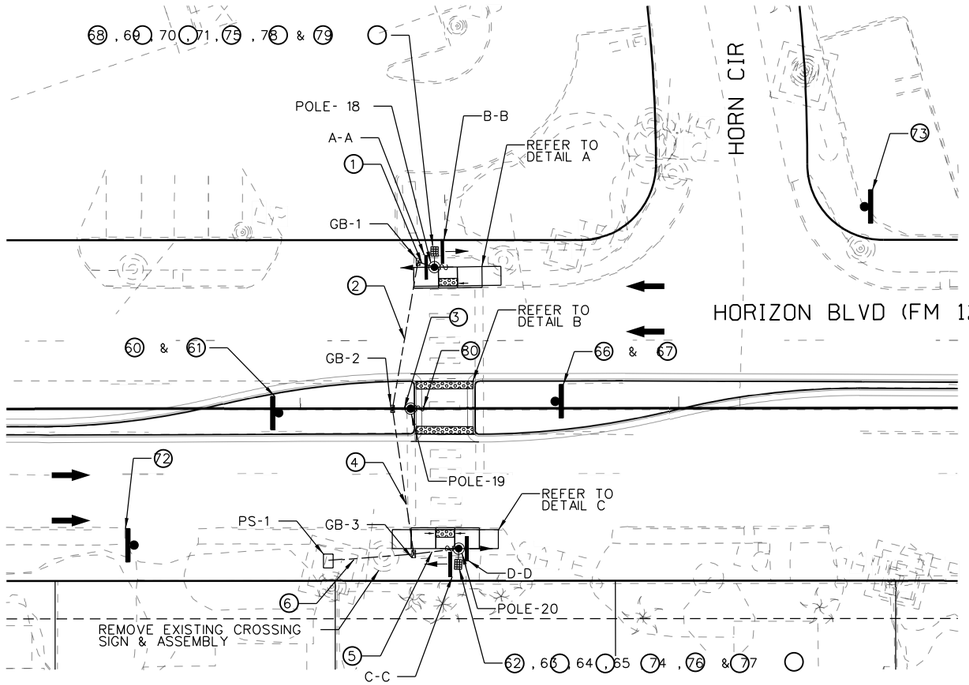
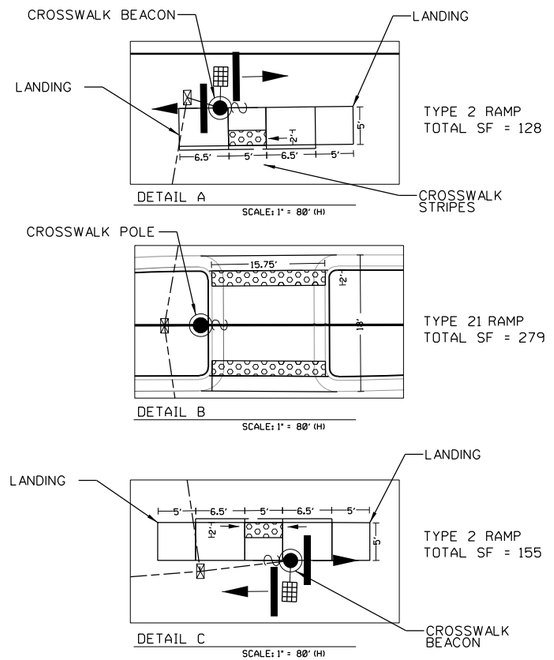
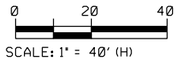
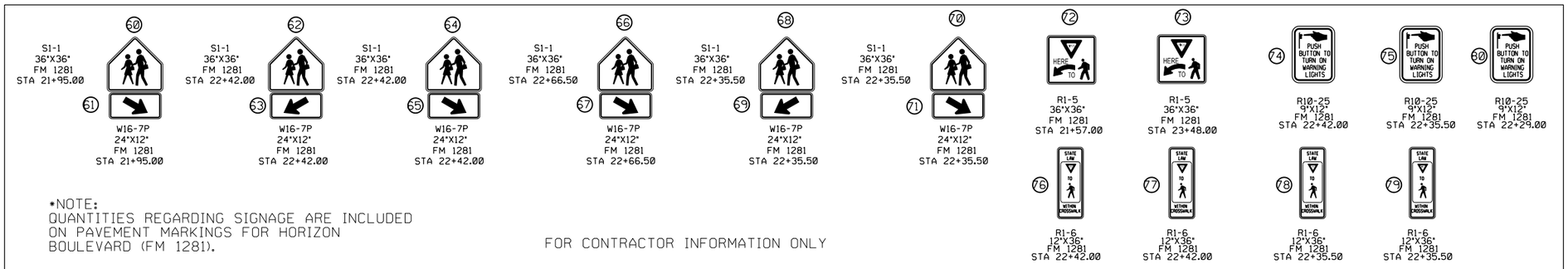






LEGEND

- PROPOSED SIGN
- PROPOSED GROUND BOX
- DIRECTION OF TRAFFIC FLOW
- PROPOSED VEHICULAR SIGNAL HEAD
- PROPOSED MAST ARM/POLE SIGN
- PROPOSED MAST ARM
- PROPOSED SOLAR POWERED PANEL
- PROPOSED SIGNAL HEAD
- PROPOSED PUSH BUTTON



*NOTE:
QUANTITIES REGARDING SIGNAGE ARE INCLUDED ON PAVEMENT MARKINGS FOR HORIZON BOULEVARD (FM 1281).

FOR CONTRACTOR INFORMATION ONLY

CONDUIT & CONDUCTOR RUNS

CONDUIT RUN #	LENGTH OF RUN (FT)	CONDUIT # (BORED)	CONDUIT SIZE (INCHES) (BORED)	CONDUIT # (TRENCHED)	CONDUIT SIZE (INCHES) (TRENCHED)	ELEC CONDUCTOR (NO. 6) INSULATED GROUND	ELEC CONDUCTOR (NO. 6) INSULATED POWER	TRAF SIG CBL (TY C) (2 CONDR) (18 AWG) (PED BTN)	TRAF SIG CBL (TY A) (9 CONDR) (12 AWG)	TRAF SIG CBL (TY A) (5 CONDR) (12 AWG)
1	5			1	3	1		1		1
2	40	1	3			1		1		1
3	5			1	3	1		1	1	
4	39			1	3	1		2	1	1
5	12	1	3			1		3	1	2
6	22			1	3	1	1			
TOTAL	123	52		71		123	22	164	56	108

ESTIMATED TRAFFIC SIGNAL QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QTY
104-6015	REMOVING CONC (SIDEWALKS)	SY	61
416-6030	DRILL SHAFT (TRF SIG POLE) (24")	LF	18
531-6019	CURB RAMPS (TY 2)	EA	2
531-6030	CURB RAMPS (TY 21)	EA	1
618-6029	CONDT (PVC) (SCH 40) (3")	LF	71
618-6030	CONDT (PVC) (SCH 40) (3") BORE	LF	52
620-6010	ELEC CONDR (NO. 6) INSULATED GROUND	LF	123
624-6002	GROUND BOX TY A (122311) W/ APRON	EA	3
644-6076	REMOVE SM RD SN SUP&AM	EA	1
684-6010	TRAF SIG CBL (TY A) (12 AWG) (5 CONDR)	LF	108
684-6014	TRAF SIG CBL (TY A) (12 AWG) (9 CONDR)	LF	56
684-6082	TRAF SIG CBL (TY C) (18 AWG) (2 CONDR)	LF	182
687-6001	PED POLE ASSEMBLY	EA	3
688-6001	PED DETECT (PUSH BTN) (APS)	EA	3

*ITEM 104-6015 NOTE:
INCLUDES REMOVAL OF ADA RAMPS, CURB AND GUTTER.

NUMBER OF CONDUCTORS FROM POLE BASE ACCESSIBLE PEDESTRIAN SIGNALS PUSH BUTTON

POLE ID.	PEDESTRIAN BEACON NO. A-A	B-B	C-C	D-D	PED PB	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-18	6					6	(TY-C) (2 CONDR) (18 AWG)
POLE-19					6	6	(TY-C) (2 CONDR) (18 AWG)
POLE-20			6			6	(TY-C) (2 CONDR) (18 AWG)
TOTAL						18	

NUMBER OF CONDUCTORS FROM POLE BASE TO PEDESTRIAN BEACON

POLE ID.	PEDESTRIAN SIGNAL BEACON NO. A-A	B-B	C-C	D-D	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-18	16	16			32	(TY-A) (5 CONDR) (12 AWG)
POLE-20			16	16	32	(TY-A) (5 CONDR) (12 AWG)
TOTAL					64	

PED POLE DATA

POLE ID#	NORTHING	EASTING
18	451809.4175	10616353.6812
19	451812.5971	10616315.9352
20	451834.0448	10616283.2520

GROUND BOX SCHEDULE

GROUND BOX ID#	TYPE-A	TYPE-C	TYPE-D	TYPE-1	TYPE-2	W/ APRON
GB-1	1					1
GB-2	1					1
GB-3	1					1
TOTAL	3					3

NOTES:
'GB-#' - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION TRAFFIC SIGNALS.
'ICGB-#' - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION INTERCONNECT COMMUNICATIONS.

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AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

FM 1281 (HORIZON BLVD)

PEDESTRIAN CROSSING RAPID FLASHING BEACON LAYOUT 2

STA 21+22.35 - STA 23+73.60

7 OF 9

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC. / 169

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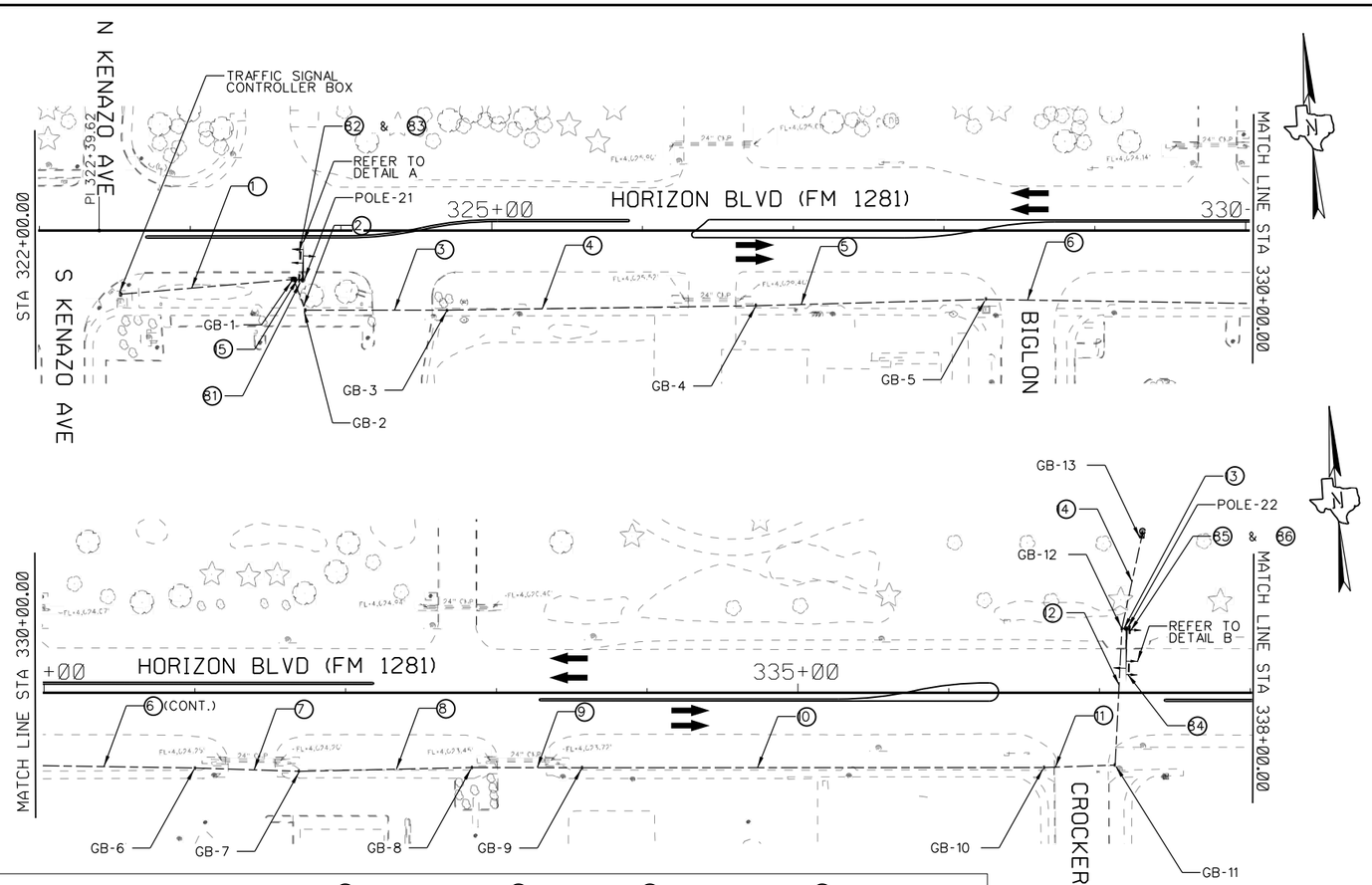
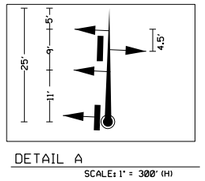
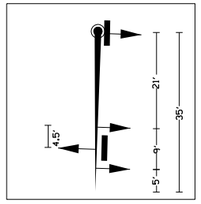




DETAIL A
SCALE: 1" = 300' (H)



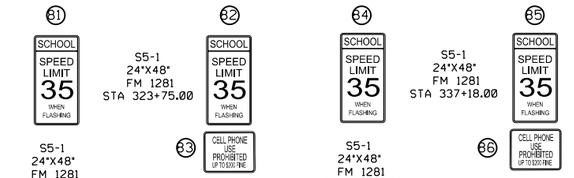
DETAIL B
SCALE: 1" = 300' (H)

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- PROPOSED SIGN
- PROPOSED GROUND BOX
- DIRECTION OF TRAFFIC FLOW
- PROPOSED VEHICULAR SIGNAL HEAD
- PROPOSED MAST ARM/POLE SIGN
- PROPOSED MAST ARM
- PROPOSED SOLAR POWERED PANEL
- PROPOSED SIGNAL HEAD
- PROPOSED PUSH BUTTON

*NOTE:
QUANTITIES REGARDING SIGNAGE ARE INCLUDED ON PAVEMENT MARKINGS FOR HORIZON BOULEVARD (FM 1281).



FOR CONTRACTOR INFORMATION ONLY

*ITEM 685-6003 NOTE:
INCLUDES THE REMOVAL OF THE POLE ASSEMBLY, FOUNDATION, SIGNAL HEAD, SIGNANGE, AND GPS CONTROLLER CLOCK.

ESTIMATED TRAFFIC SIGNAL QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QTY
416-6031	DRILL SHAFT (TRF SIG POLE) (30")	LF	14
416-6033	DRILL SHAFT (TRF SIG POLE) (36")	LF	14
618-6029	CONDT (PVC) (SCH 40) (3")	LF	401
618-6030	CONDT (PVC) (SCH 40) (3") BORE	LF	1236
620-6010	ELEC CONDR (NO. 6) INSULATED GROUND	LF	1542
624-6002	GROUND BOX TY A (122311) W/ APRON	EA	12
684-6012	TRAF SIG CBL (TY A) (12 AWG) (7 CONDR)	LF	2166
685-6003	REMOVE RDSD FLASH BEACON ASSEMBLY	EA	2
685-6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA	2
686-6029	INS TRF SIG PL AM (S) 1 ARM (28')	EA	1
686-6037	INS TRF SIG PL AM (S) 1 ARM (36')	EA	1

CONDUIT & CONDUCTOR RUNS

CONDUIT RUN #	LENGTH OF RUN (FT)	CONDUIT # (BORED)	CONDUIT SIZE (INCHES) (BORED)	CONDUIT # (TRENCHED)	CONDUIT SIZE (INCHES) (TRENCHED)	ELEC CONDUCTOR (NO. 6) INSULATED GROUND	ELEC CONDUCTOR (NO. 6) INSULATED POWER	TRAF SIG CBL (TY A) (7 CONDR) (12 AWG)
1	116			1	3	1		1
2	22	1	3			1		1
3	95	1	3	1	3	1		1
4	204	1	3			1		2
5	53	1	3			1		3
6	273	1	3			1		1
7	70	1	3			1		1
8	115			1	3	1		1
9	74	1	3			1		1
10	306	1	3			1		1
11	48	1	3			1		1
12	91	1	3			1		1
13	4			1	3	1		1
14	64			1	3	1	1	
15	7			1	3	1		1
TOTAL	1542	1236		401		1542		1788

GROUND BOX SCHEDULE

GROUND BOX ID*	TYPE-A	TYPE-C	TYPE-D	TYPE-1	TYPE-2	W/ APRON
GB-1			EXISTING			
GB-2	1					1
GB-3	1					1
GB-4	1					1
GB-5	1					1
GB-6	1					1
GB-7	1					1
GB-8	1					1
GB-9	1					1
GB-10	1					1
GB-11	1					1
GB-12	1					1
GB-13	1					1
GB-14			EXISTING			
TOTAL	12					12

NOTES:
"GB-#" - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION TRAFFIC SIGNALS.
"ICGB-#" - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION INTERCONNECT COMMUNICATIONS.

NUMBER OF CONDUCTORS FROM POLE BASE TO PEDESTRIAN HEAD

POLE ID.	PEDESTRIAN SIGNAL HEAD NO. 1	2	3	4	1	2	3	4	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-21	23	39	45	54					161	(TY-A) (7 CONDR) (12 AWG)
POLE-22					23	58	64	72	217	(TY-A) (7 CONDR) (12 AWG)
TOTAL									378	

PED POLE DATA

POLE ID*	NORTHING	EASTING
21	476618.8361	10626080.8612
22	477964.2172	10626086.9109

NO.	REVISION	BY	DATE

3/30/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED
PROFESSIONAL ENGINEER

ENGINEER'S NOTE
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TBPELS FIRM NO. F-312

FM 1281 (HORIZON BLVD)

PEDESTRIAN CROSSING SCHOOL FLASHER LAYOUT 1

STA 322+00.00 - STA 338+00.00

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	170

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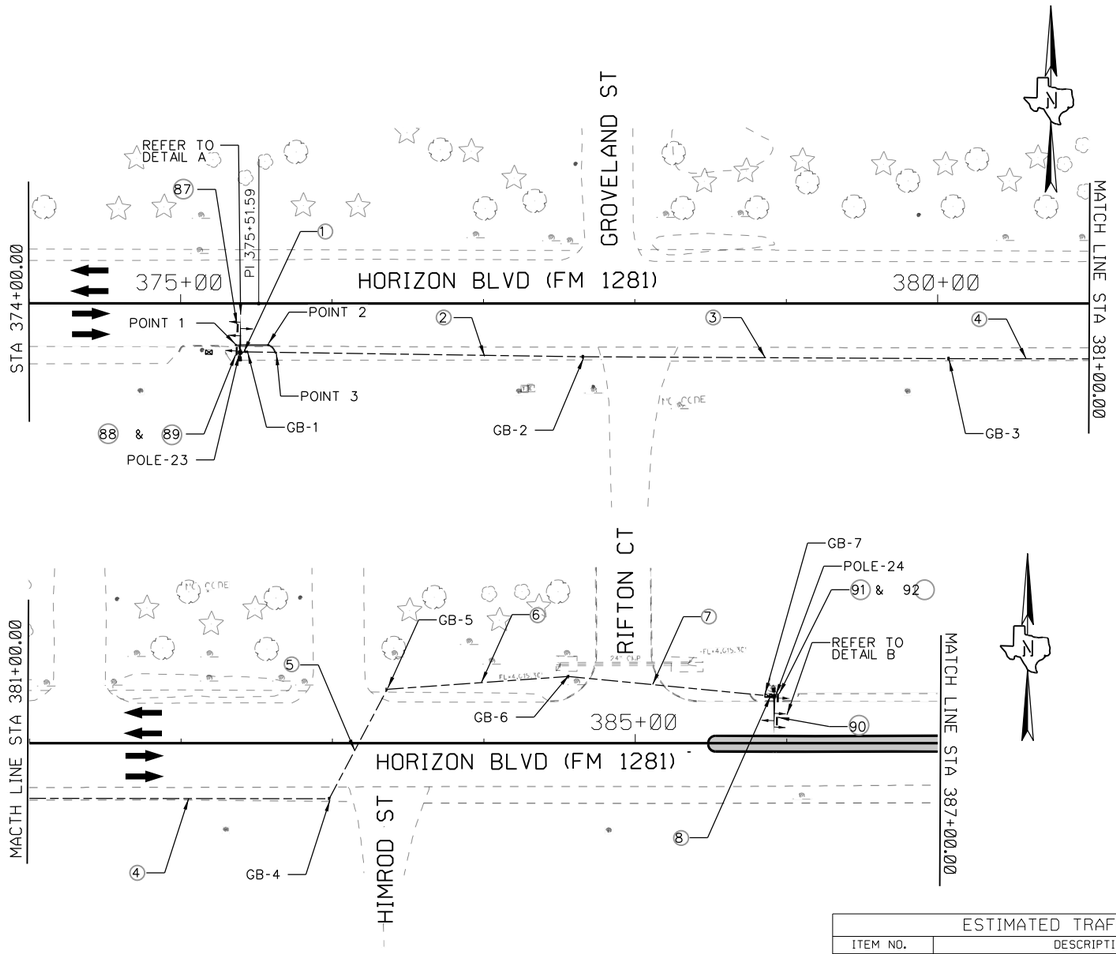
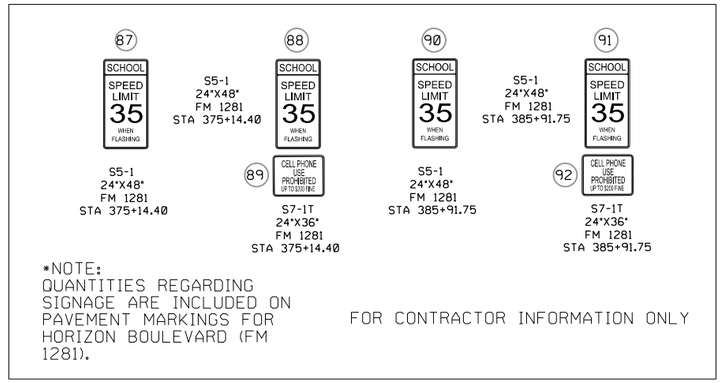
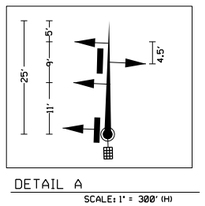
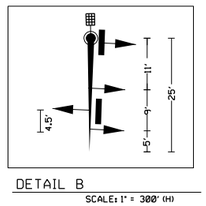






DETAIL A
SCALE: 1" = 300' (H)



DETAIL B
SCALE: 1" = 300' (H)

CONDUIT & CONDUCTOR RUNS

CONDUIT RUN #	LENGTH OF RUN (FT)	CONDUIT # (BORED)	CONDUIT SIZE (INCHES) (BORED)	CONDUIT # (TRENCHED)	CONDUIT SIZE (INCHES) (TRENCHED)	ELEC CONDUCTOR (NO. 6) INSULATED GROUND	TRAF SIG CBL (TY A) (7 CONDR) (12 AWG)
1	4			1	3	1	1
2	222			1	3	1	1
3	241			1	3	1	1
4	291			1	3	1	1
5	82	1	3			1	1
6	120			1	3	1	1
7	133	1	3			1	1
8	4			1	3	1	1
TOTAL	1097	215		882		1097	1097

NUMBER OF CONDUCTORS FROM POLE BASE TO PEDESTRIAN HEAD

POLE ID.	PEDESTRIAN SIGNAL HEAD NO. 1	2	3	4	1	2	3	4	SUB TOTAL (FT)	CONDUCTOR (TYPE) (NO.) (SIZE)
POLE-23	23	39	45	54					161	(TY-A) (7 CONDR) (12 AWG)
POLE-24					23	39	45	54	161	(TY-A) (7 CONDR) (12 AWG)
TOTAL									322	

ESTIMATED TRAFFIC SIGNAL QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QTY
416-6031	DRILL SHAFT (TRF SIG POLE) (30")	LF	28
529-6005	CONC CURB & GUTTER (MONO) (TY II)	LF	30
618-6029	CONDT (PVC) (SCH 40) (3")	LF	882
618-6030	CONDT (PVC) (SCH 40) (3") BORE	LF	215
620-6010	ELEC CONDR (NO. 6) INSULATED GROUND	LF	1097
624-6002	GROUND BOX TY A (122311) W/ APRON	EA	5
684-6012	TRAF SIG CBL (TY A) (12 AWG) (7 CONDR)	LF	1416
685-6003	REMOVE RDSD FLASH BEACON ASSEMBLY	EA	2
685-6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA	2
686-6029	INS TRF SIG PL AM (S) 1 ARM (28')	EA	2

*ITEM 685-6003 NOTE:
INCLUDES THE REMOVAL OF THE POLE ASSEMBLY, FOUNDATION, SIGNAL HEAD, SIGNANGE, AND GPS CONTROLLER CLOCK.

GROUND BOX SCHEDULE

GROUND BOX ID#	TYPE-A	TYPE-C	TYPE-D	TYPE-1	TYPE-2	W/ APRON
GB-1	EXISTING					
GB-2	1					1
GB-3	1					1
GB-4	1					1
GB-5	1					1
GB-6	1					1
GB-7	EXISTING					
TOTAL	5					5

NOTES:
'GB-#' - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION TRAFFIC SIGNALS.
'ICGB-#' - INDICATES PROPOSED GROUND BOXES ASSOCIATED WITH THIS INTERSECTION INTERCONNECT COMMUNICATIONS.

PED POLE DATA

POLE ID#	NORTHING	EASTING
23	481776.7007	10625817.0299
24	482830.9725	10625826.0866

GEOMETRIC DATA

POINT ID#	NORTHING	EASTING	RADIUS (FT)
1	481774.0647	10625822.2099	
2	481795.5014	10625821.1100	6.00
3	481800.2698	10625815.6407	

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- PROPOSED SIGN
- PROPOSED GROUND BOX
- DIRECTION OF TRAFFIC FLOW
- PROPOSED VEHICULAR SIGNAL HEAD
- PROPOSED MAST ARM/POLE SIGN
- PROPOSED MAST ARM
- PROPOSED SOLAR POWERED PANEL
- PROPOSED SIGNAL HEAD
- PROPOSED PUSH BUTTON

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NO.	REVISION	BY	DATE

3/30/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED PROFESSIONAL ENGINEER

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FM 1281 (HORIZON BLVD)

PEDESTRIAN CROSSING SCHOOL FLASHER LAYOUT 2

STA 374+00.00 - STA 387+00.00

9 OF 9

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC. / 171

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DATE:
FILE:

GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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REVISIONS		3451	01	035, ETC.		FM 1281, ETC.	
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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

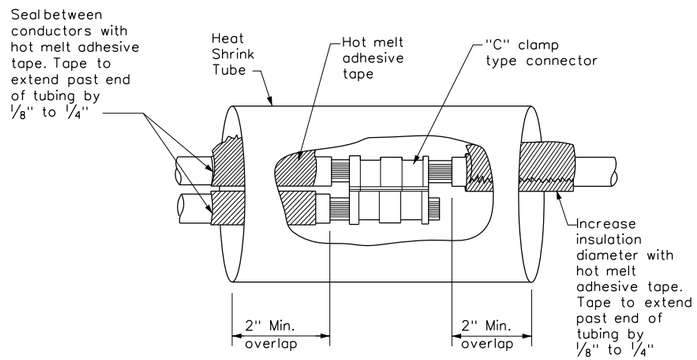
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

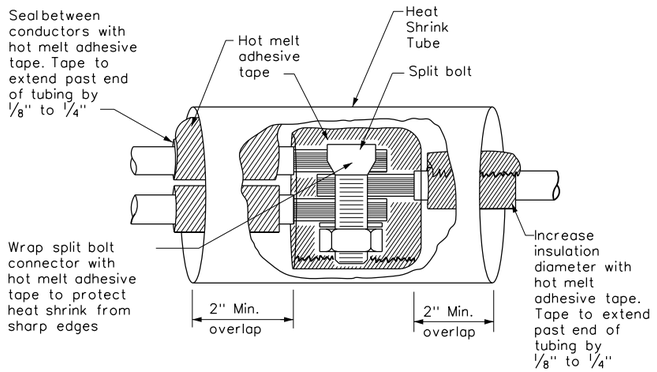
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

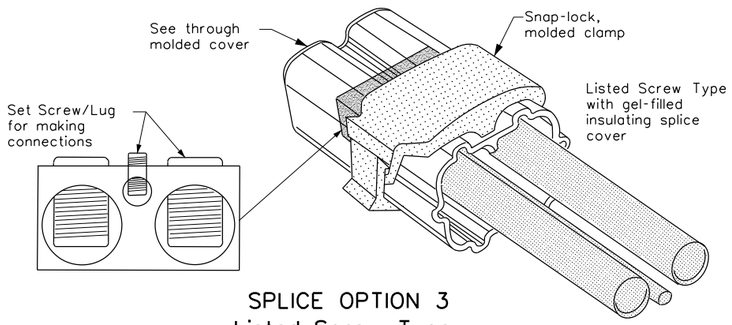
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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	ELP	EL PASO		173

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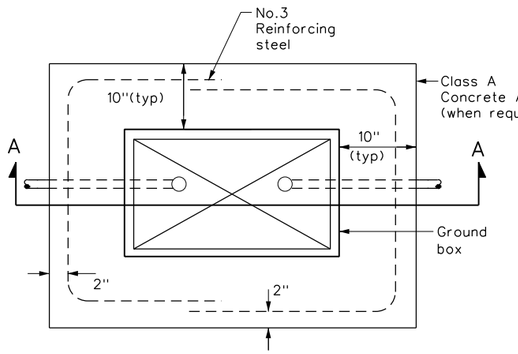
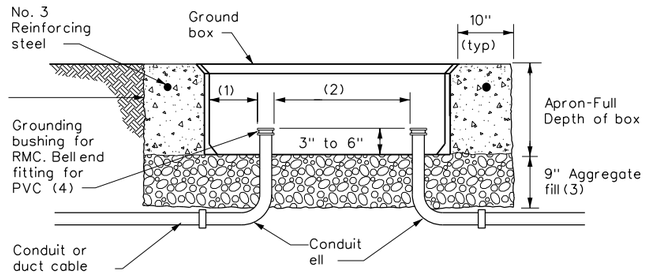


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

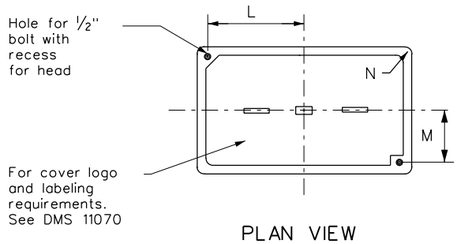
8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

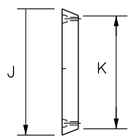
10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

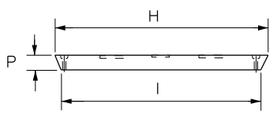
GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



END



SIDE

GROUND BOX COVER

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

ED(4)-14

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ELECTRICAL SERVICES NOTES

1.Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2.Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services,"DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3.Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4.Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5.The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed *2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock *2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock *2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6.Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7.When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8.Provide wiring and electrical components rated for 75° C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9.All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10.Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11.Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12.Ensure all mounting hardware and installation details of services conform to utility company specifications.

13.For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14.When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15.Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1.Provide threaded hub for all conduit entries into the top of enclosure.

2.Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3.Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4.Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1.Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2.When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1.Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit ** Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/*2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/*6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/*6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

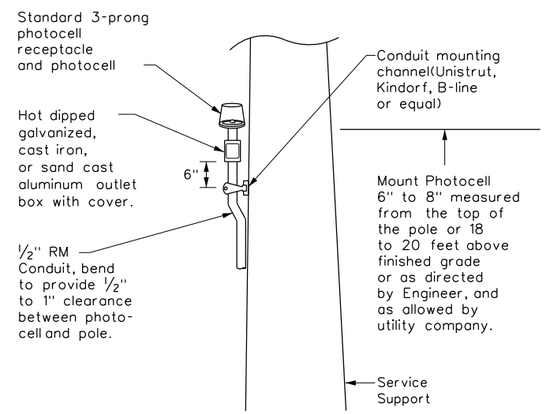
* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National Electrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

- Schematic Type
- Service Voltage V / V
- Disconnect Amp Rating
  000 indicates main lug only/
  Typically Type T
- (SS)= Safety Switch Ahead of Meter-Check with Utility
- (NS)= No safety Switch Ahead of Meter-Check with Utility
- Enclosure Type
  - GS= Galvanized steel("off the shelf")
  - SS= Stainless steel(Custom Enclosure)See MPL
  - AL= Aluminum (Custom Enclosure)See MPL
- Photocell Mounting Location
  - (E)= Inside Service/Enclosure Mounted
  - (T)= Top of pole
  - (L)= Luminaire mounted
  - (N)= None/No Photocell or Lighting Contactor Required
- Service Support Type
  - GC= Granite concrete
  - OC= Other concrete
  - TP= Timber pole
  - SP= Steel pole
  - SF= Steel frame
  - OT= Pole by others or paid for separately
  - EX= Existing pole
  - TS= Service on traffic signal pole
  - PS= Pedestal Service
- O= Overhead Service Feed from Utility
- U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

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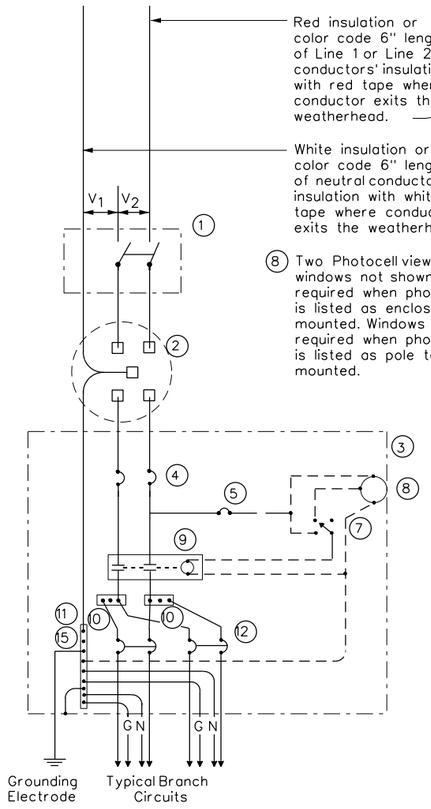
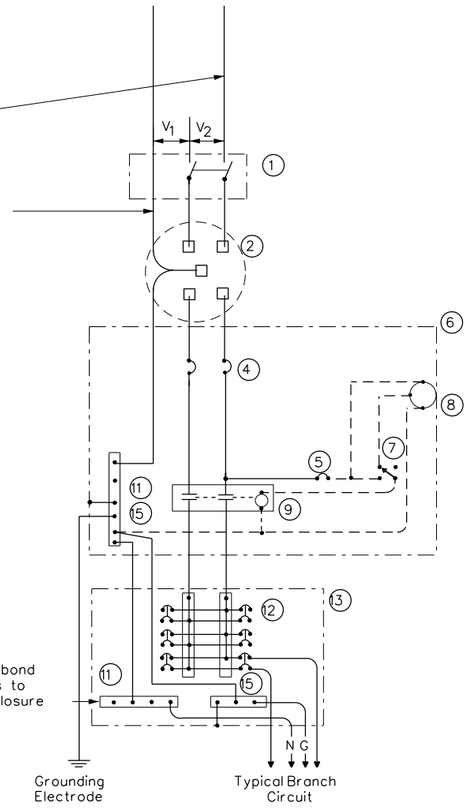
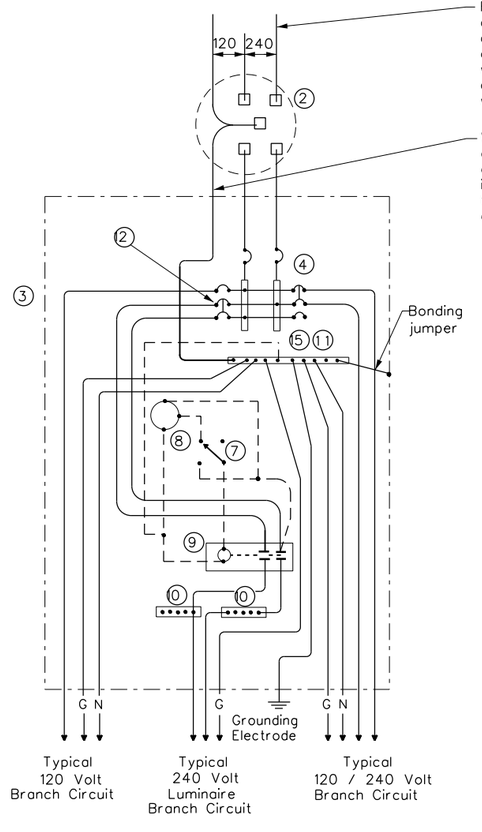


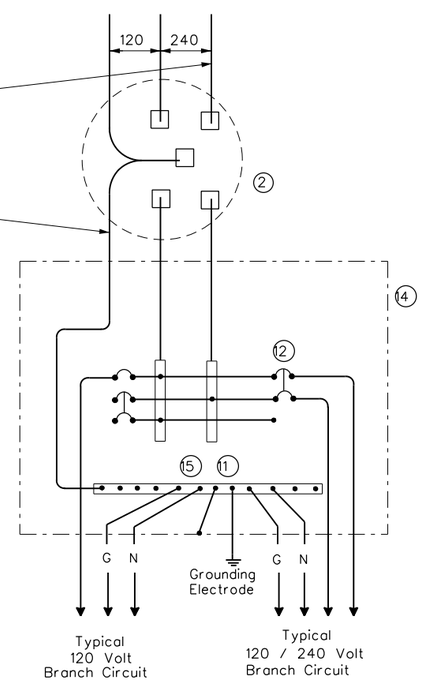
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
———	Power Wiring
· – – – –	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

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SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 1/2 in. or 1 5/8 in. wide by 1 in. up to 3 3/4 in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.

2. Provide poles for overhead service with an eyebolt or similar fitting for attachment of the service drop to the pole in conformance with the electric utility provider's specifications.

3. Provide and install galvanized 3/4 in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized 3/4 in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 1/4 in. to 3 1/2 in. of the exposed anchor bolt projecting above finished foundation. Provide and install leveling nuts for all anchor bolts.

4. Bond one of the anchor bolts to the rebar cage with 6 AWG bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. See Inset B.

5. Furnish and install rigid metallic ells in all steel pole and steel frame foundations for all conduits entering the service from underground.

6. Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.

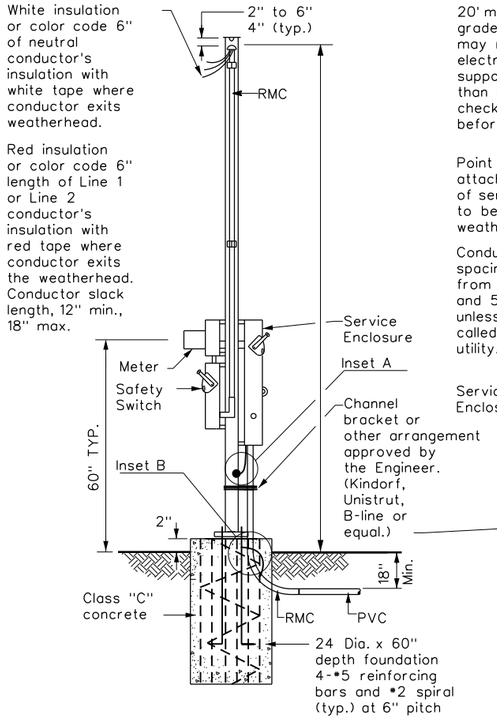
7. Drill and tap steel poles and frames for 1/2 in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. For steel frame service supports, provide and install tank ground fitting on steel frame post. Install service grounding electrode conductor in a non-metallic conduit or tubing from the enclosure to the steel frame post. Connect electrical service grounding electrode conductor to the tank ground fitting. See steel frame and steel pole details and Inset A for more information. Size service entrance conduit and branch circuit conduit as shown in the plans. For underground conduit runs from the electrical service, extend RMC from the service enclosure to an RMC elbow, and then connect the schedule type and size of conduit shown in the plans. Provide and install grounding bushings where RMC terminates in the enclosure. Grounding bushings are not required when RMC is fitted into a sealing hub or threaded boss.

8. If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.

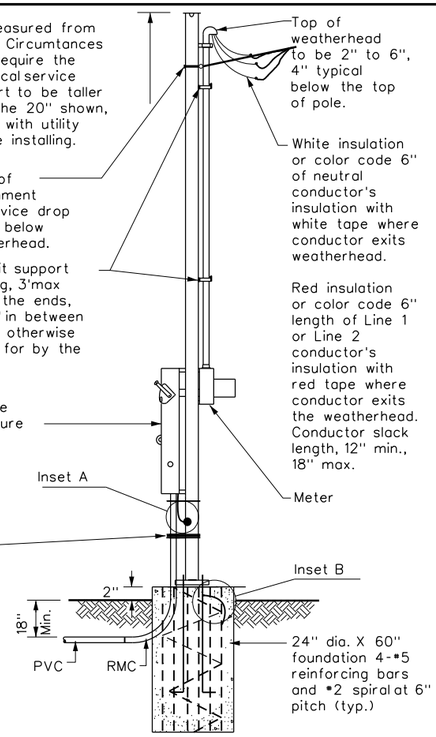
9. Provide 1/4" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

10. Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.

11. Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.

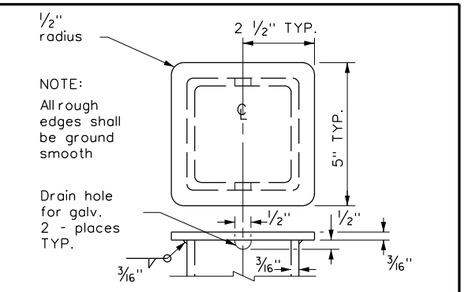


WITH SAFETY SWITCH

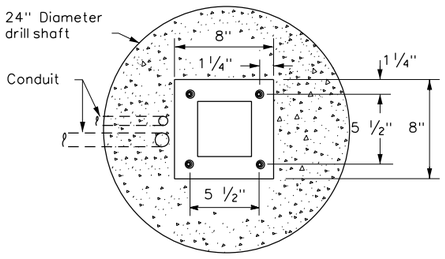


WITHOUT SAFETY SWITCH

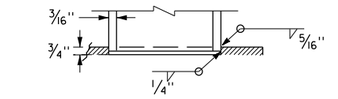
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



POLE TOP PLATE

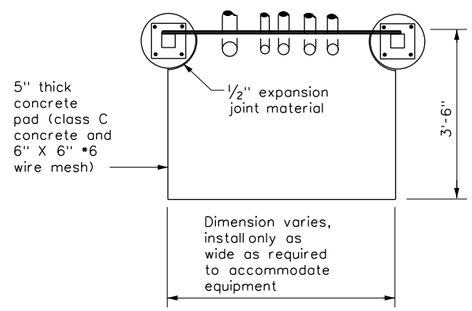


BASE PLATE DETAIL



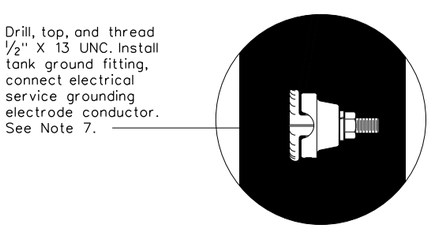
BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



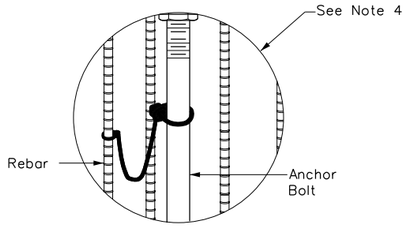
TOP VIEW

SERVICE SUPPORT TY SF (O) & SF (U)

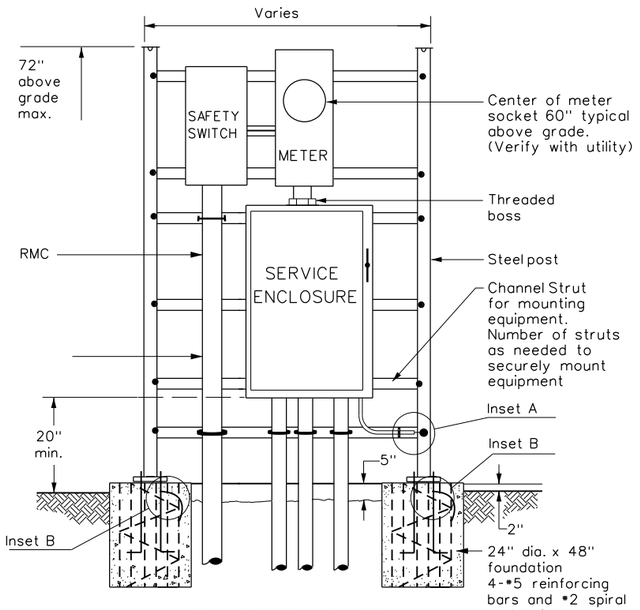


FRONT VIEW

INSET A

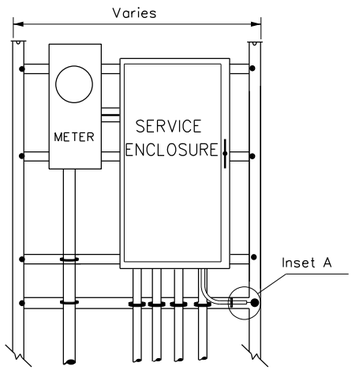


INSET B



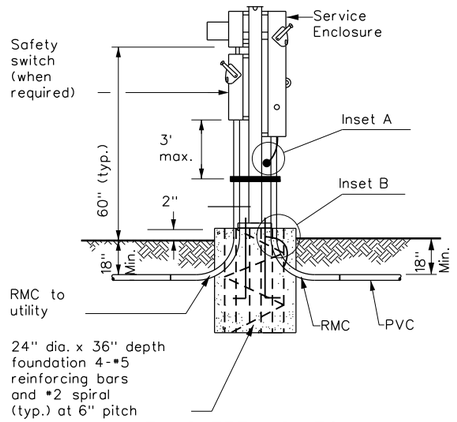
WITH SAFETY SWITCH

FRONT VIEW

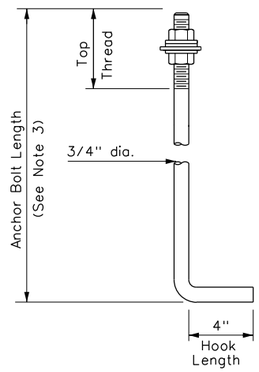


WITHOUT SAFETY SWITCH

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE



WITH SAFETY SWITCH



HOOKED ANCHOR DETAIL

SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

ED(7)-14

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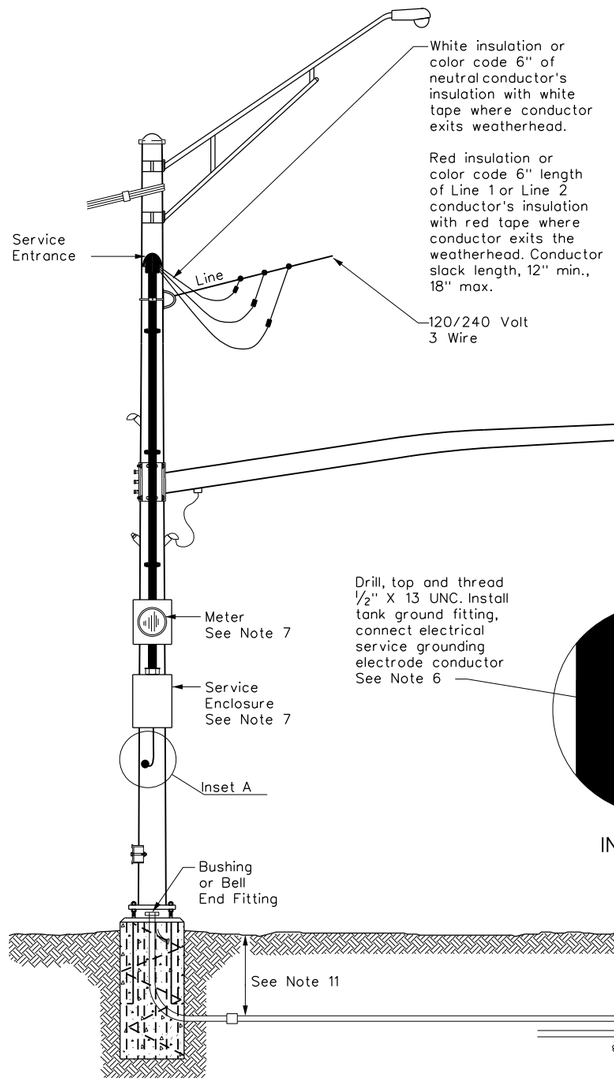
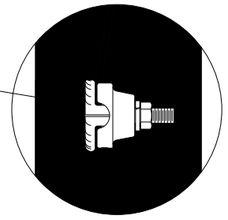
TRAFFIC SIGNAL NOTES

1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TXDOT standard TS-FD for further details.
6. Drill and tap signal poles for $\frac{1}{2}$ in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of $\frac{3}{4}$ in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".

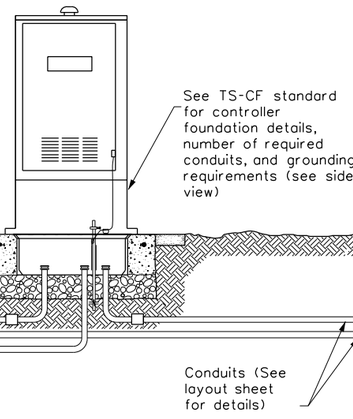


SIGNAL POLE WITH SERVICE

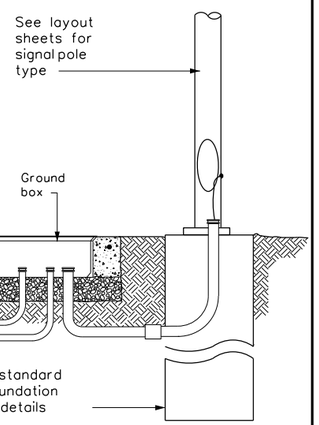
Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.



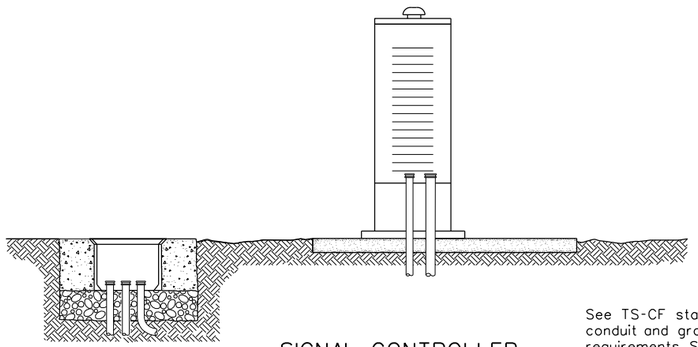
INSET A



SIGNAL CONTROLLER FRONT VIEW



SIGNAL POLE



SIGNAL CONTROLLER SIDE VIEW

See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

ED(8)-14

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TIMBER POLE(TP)SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.

2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrial service.

3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.

4. Gain pole as required to provide flat surface for each channel. Gain timber pole to 5/8 in. max. depth and 1 7/8 in. max. height. Gain pole in a neat and workmanlike manner.

5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to 3 3/4 in. maximum depth, and 1 1/2 in. to 1 5/8 in. maximum width. File smooth the cut ends of galvanized channel and paint with zinc rich paint before installing on pole. Secure each channel section to timber pole with two galvanized or SS lag bolts, 1/4 in. minimum diameter by 1 1/2 in. minimum length. Use a galvanized or SS flat washer on each lag bolt. Do not stack channel.

6. When excess length must be trimmed from poles, trim from the top end only.

(1) Class 5 pole, height as required

(2) Service drop from utility company (attached below weatherhead)

(3) Service conduit (RMC)and service entrance conductors - One Red, One Black, One White (See Electrical Service Data)

(4) Safety switch (when required)

(5) Meter (when required)

(6) Service enclosure

(7) 6 AWG bare grounding electrode conductor in 1/2 in. PVC to ground rod - extend 1/2 in. PVC 6 in. underground.

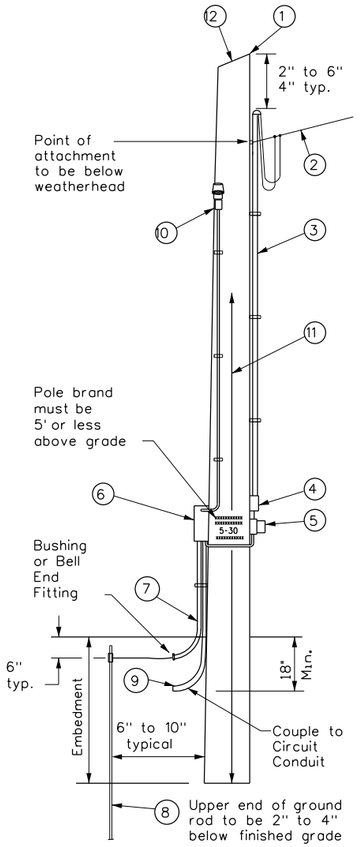
(8) 5/8 in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.

(9) RMC same size as branch circuit conduit.

(10) See pole-top mounted photocell detail on ED(5).

(11) When required by the serving utility provide bare 6 AWG copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor with non-conductive material to a height of 8 ft. above finished grade.

(12) When required by utility, cut top of pole at an angle to enhance rain run off.



SERVICE SUPPORT TYPE TP (O)

GRANITE CONCRETE(GC)& OTHER CONCRETE(OC)NOTES

Ensure electrical service support structures bid as type Granite Concrete (GC) or Other Concrete (OC) meet the following requirements.

1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."

2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.

3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4' above final grade. Use the two-point pickup locations when handling pole in horizontal position, and one-point pickup location for use in raising the pole to a vertical position. These marks are small but conspicuous.

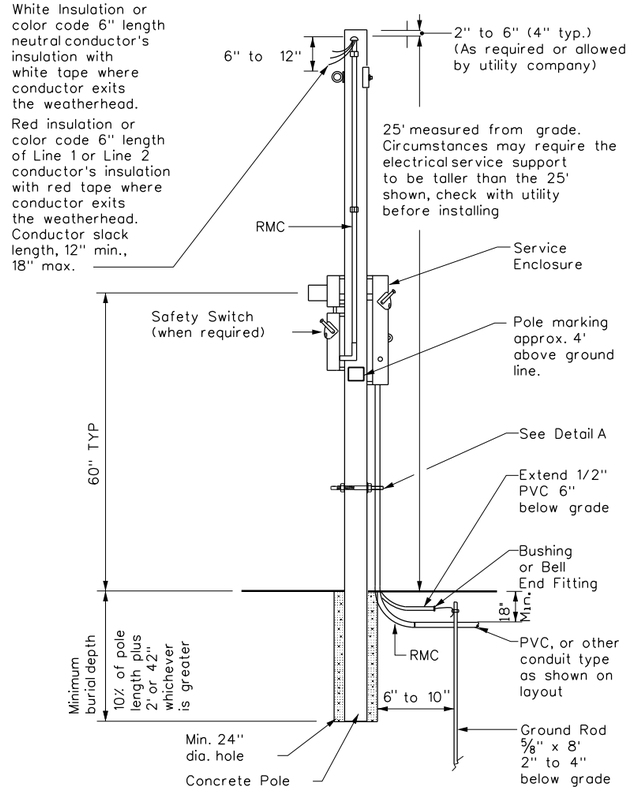
4. Embed poles 42 in. or 10% of the length plus 2 ft., whichever is greater.

5. Ensure all installation details of services are in accordance with utility company specifications.

6. Install a one point rack or eye bolt bracket 6 inches to 12 inches below the weatherhead as an overhead service drop anchoring point for the electric utility.

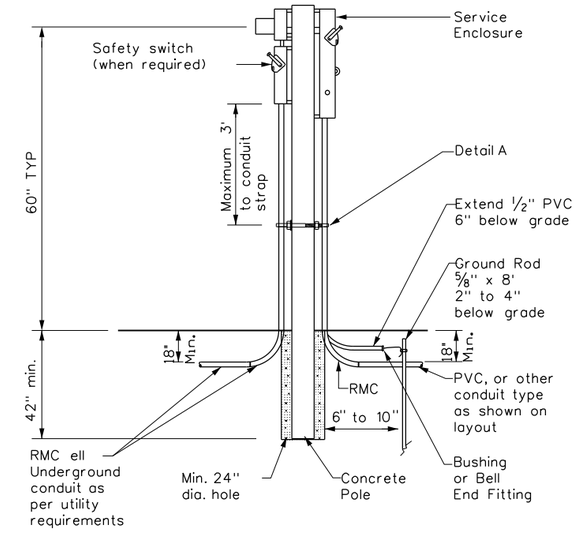
7. Furnish and install galvanized or stainless steel channel strut 1 1/2 in. or 1 5/8 in. wide by 1 in. up to 3 3/4 in. deep (Unistrut, Kindorf, B-line or equal). Attach channel strut with stainless steel concrete anchors (max. 1" depth), square U-bolts or back to back channel strut with long bolts, or other secure mounting as approved by the Engineer. Ensure bolts are galvanized in accordance with ASTM A153. Do not stack channel struts.

8. Backfill the holes thoroughly by tamping in 6 in. lifts. After tamping to grade, place additional backfill material in a 6 inch high cone around the pole to allow for settling. Use material equal in composition and density to the surrounding area. Backfilling will not be paid for directly but is subsidiary to various bid items.



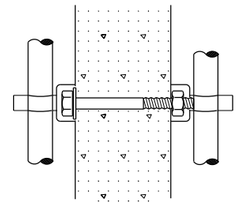
CONCRETE SERVICE SUPPORT

Overhead(O)

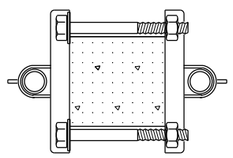


CONCRETE SERVICE SUPPORT

Underground(U)



Side View



Top View

DETAIL A

See Note 7. Before installing channel that has been cut, file sharp edges and paint with zinc-rich paint. Ensure there is no paint splatter on the pole.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES GC, OC, & TP

ED(10)-14

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DUCT CABLE & HDPE CONDUIT NOTES

1. Provide duct cable in accordance with Departmental Material Specification (DMS) 11060 "Duct Cable" and Item 622 "Duct Cable." Provide duct cable as listed on the Material Producer List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 622.

2. Provide High-Density Polyethylene (HDPE) conduit in accordance with DMS 11060 and Item 618, "Conduit." Provide HDPE as listed on the MPL on the Department web site under "Roadway Illumination and Electrical Supplies," Item 618.

3. Supply duct cable with a minimum 2 in. diameter, unless otherwise shown in the plans. Provide duct cable and HDPE conduit as shown by descriptive code or on the plans. Bend duct cable and HDPE conduit as recommended by the manufacturer, with a minimum bending radius of 26 in. for 2 in. duct. Follow manufacturers' recommendations when handling duct cable and HDPE conduit reels and during installation of duct cable and HDPE conduit.

4. Do not splice conductors within duct cable or HDPE conduit. Couple duct cable and HDPE entering a ground box or foundation to a PVC elbow. When galvanized steel RMC elbows are called for in the plans and any portion of the RMC elbow is buried less than 18" from possible contact, ground the RMC elbow.

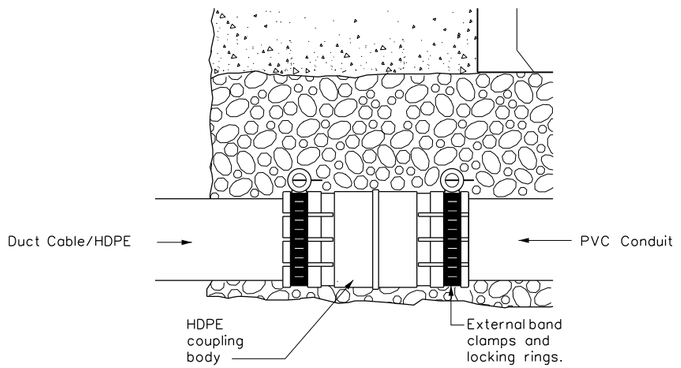
5. Furnish and install duct cable with factory installed conductors, sized as shown in the plans and as required by the National Electrical Code (NEC). The NEC contains specific requirements for duct cable in Article, "Nonmetallic Underground Conduit with Conductors: Type NUCC."

6. When conduit casing is called for in the plans, extend duct cable or HDPE conduit through the conduit casing in one continuous length without connection to the casing.

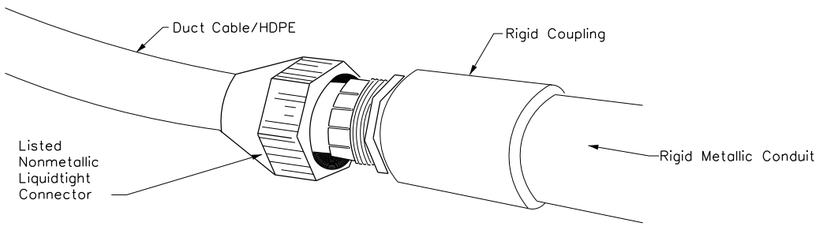
7. Seal the ends of duct cable or HDPE conduit with duct seal, expandable foam, or other approved method after completing the pull tests required by Item 622.

8. Provide minimum cover of 24 in. under roadways, 18 in. in other locations, or as shown on the plans.

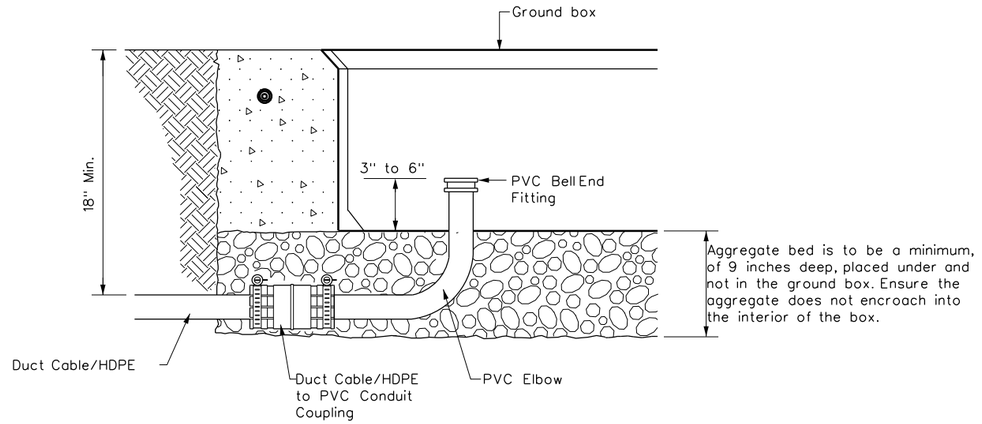
9. Furnish and install listed fittings to couple duct cable or HDPE conduit to other types of conduit. Duct cable and HDPE conduit may be field-threaded and spliced with PVC or RMC threaded couplings; connected with listed tie-wrap fittings; connected using listed coupling made of HDPE with stainless steel external banding clamps and locking rings; connected with approved electrofusion conduit couplings; or connected using an approved chemical fusion method using an epoxy or adhesive specifically designed for HDPE couplings and connectors all installed in accordance with their manufacturer's instructions. Do not use PVC glue on HDPE. Do not use water pipe fittings, or connect conduit with heat shrink tubing.



DUCT CABLE/HDPE TO PVC

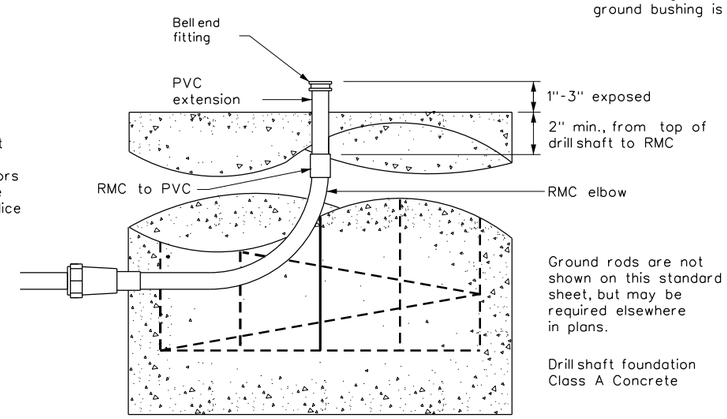


DUCT CABLE/HDPE TO RMC

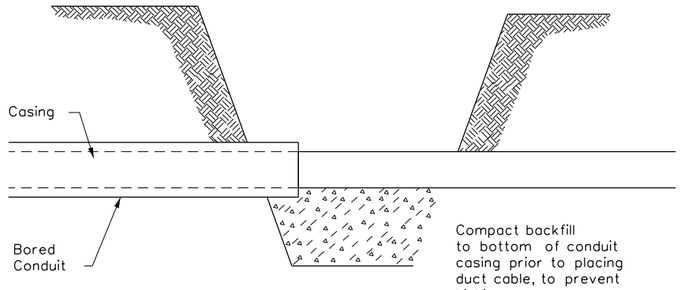


DUCT CABLE/HDPE AT GROUND BOX

When the upper end of an RMC Ell does not enter the ground box,it may be extended with a SCH-40 PVC conduit nipple and bell end, provided there is a minimum of 18" of cover over all parts of the elbow. If not, a rigid extension and ground bushing is required.



DUCT CABLE / HDPE AT FOUNDATION



BORE PIT DETAIL

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
DUCT CABLE/ HDPE CONDUIT

ED(11)-14

FILE: ed11-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		180

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BATTERY BOX GROUND BOXES NOTES

A. MATERIALS

1. Provide polymer concrete or fiberglass reinforced plastic (FRP) battery box ground box and cover in accordance with Departmental Material Specification (DMS) 11071 "Battery Box Ground Boxes." Battery box will accommodate up to 4 batteries, each measuring 8 in. x 13.5 in. x 10 in. (W x L x D). Label battery box ground box cover in accordance with DMS 11071.

2. Supply a marine grade batteries with covers. Secure the marine grade batteries with covers to the stainless steel rack in the bottom of the ground box with tie down straps.

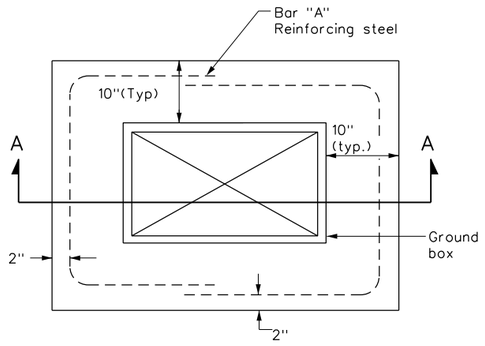
B. CONSTRUCTION METHODS

1. Ensure conduit entry will not interfere with placement of the batteries in the battery box ground box.

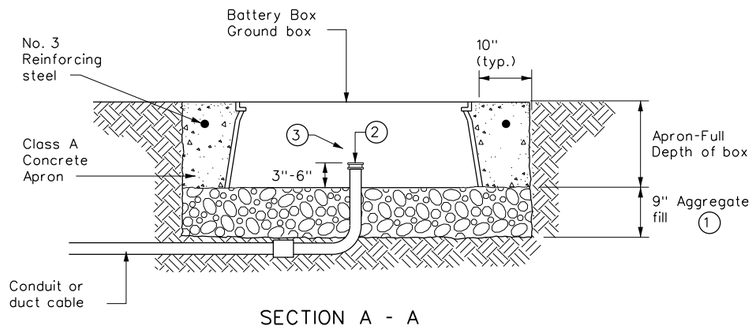
2. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting battery box ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure the aggregate bed is in place and is a minimum of 9 in. deep prior to setting the box. Install battery box ground box on top of aggregate.

3. Cast battery box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Battery box ground box aprons, including concrete and reinforcing steel, are subsidiary to battery box ground boxes when called for by descriptive code.

4. Bolt covers down when not working in battery box ground boxes. Keep bolt holes in the box clear of dirt.



PLAN VIEW



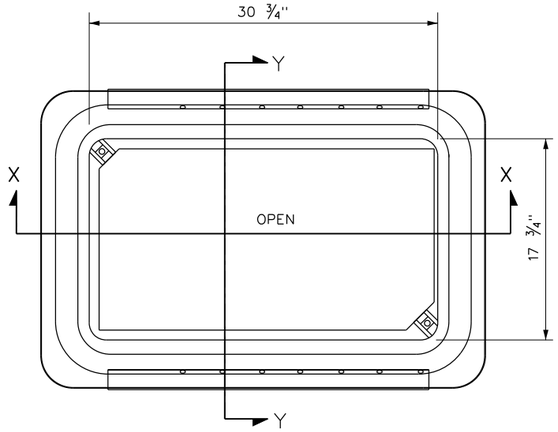
SECTION A - A

APRON FOR BATTERY BOX GROUND BOXES

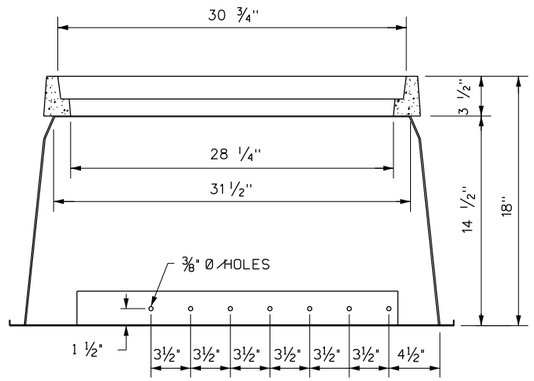
(1) Place aggregate under the box and not in the box. Aggregate should not encroach on the interior volume of the box.

(2) Install bushing or bell end fitting on the upper end of all ells.

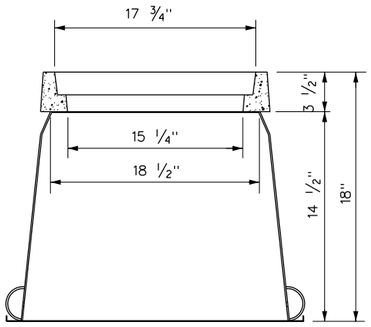
(3) Install all conduits in a neat and workmanlike manner.



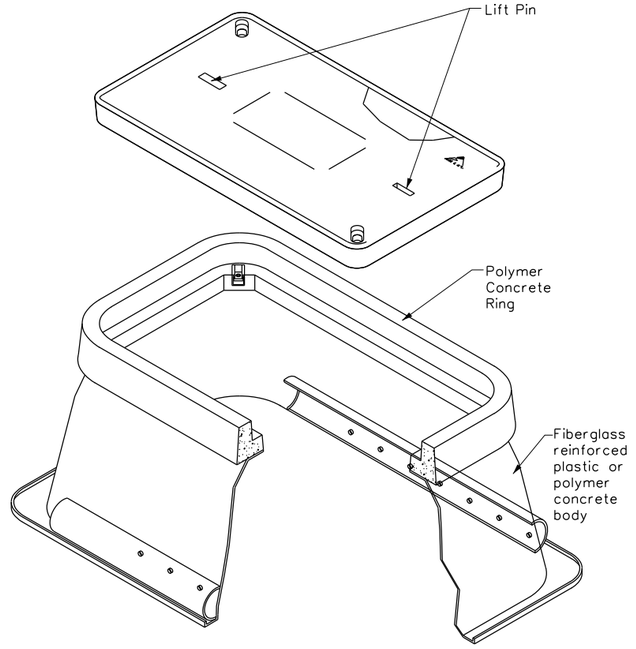
BATTERY BOX TOP VIEW



SECTION X-X



SECTION Y-Y



Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS BATTERY BOX GROUND BOXES

ED(12)-14

FILE: ed12-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		181

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ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC),TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA),and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.

   b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25′ above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25′ above the surrounding terrain, provide poles meeting the following requirements:

      i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedure:

   a. Anchor Bolt Tightening.

      i. Coat the threads of the anchor bolts with electrically conductive lubricant.

      ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.

      iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      v. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      iii. Tighten each nut to 150 ft-lb. using a torque wrench.

   c. Level and Plumb

      i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

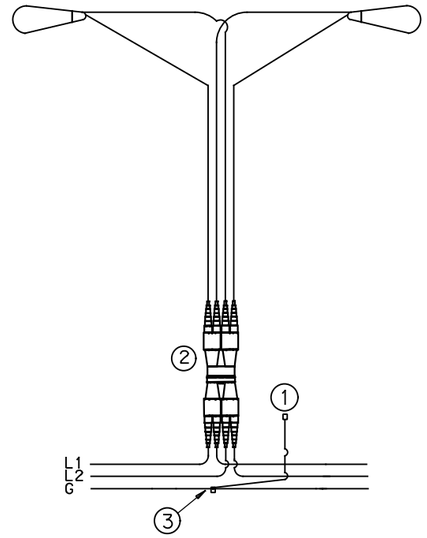
12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

Wiring Diagram Notes:

① Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.

② Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.

③ Split Bolt or other connector.



L1,L2 = Hot Conductors
G = Grounding Conductor

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):

   a. Provide NEMA 3R outdoor enclosure or as approved.

   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.

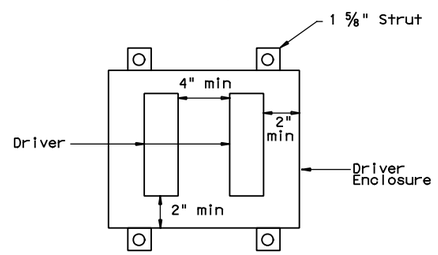
   c. Install drivers with at least 2 inches of space from enclosure walls.

   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronic equipment

   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.

   f. Provide remote drivers with a maximum of 100 watts

   g. Provide drivers with documentation of 100,000 hr lifetime at Tcase of 65C or higher.



Driver Spacing In Remote Enclosure

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS

RID(1)-20

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12-20	ELP	EL PASO		182

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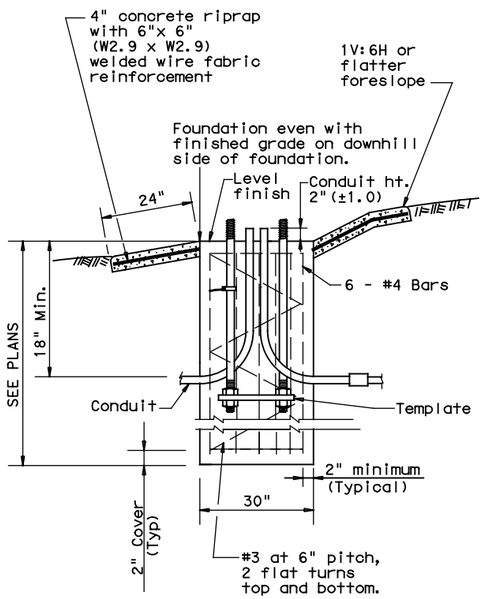
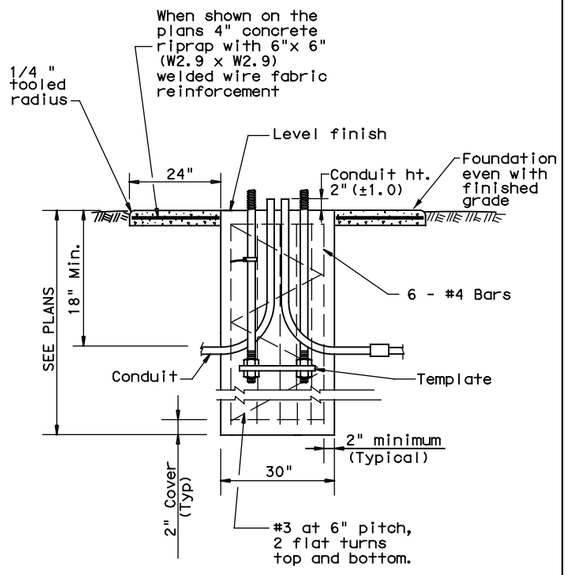


SECTION A-A
SHOWING SLOPED GRADE



SECTION A-A
SHOWING CONSTANT GRADE

TABLE 1

ANCHOR BOLTS

POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1in.x 30in.
40-50 ft.	15 in.	17 ¼in.	1 ¼in. x 30in.

TABLE 2

RECOMMENDED FOUNDATION LENGTHS (See note 1)

MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
≤20 ft.	6′	6′	6′
>20 ft. to 30 ft.	8′	6′	6′
>30 ft. to 40 ft.	8′	8′	6′
>40 ft. to 50 ft.	10′	8′	6′

TABLE 3

PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)

Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

GENERAL NOTES:

1. "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
2. Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
3. Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
4. Use appropriate class of concrete as specified in Items 416 and 432. Concrete for riprap may be upgraded to Class C at no extra cost to the Department.
5. Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
6. Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e. 2.5 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less. See Roadway Design Manual for further information.
7. Use 4 hold down and 4 connecting washers on transformer base poles as recommended by the manufacturer and supplied with base.
8. Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
9. Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
10. 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.
11. Grade earthwork around T-base foundations even with the finished grade as shown in Section A-A to ensure proper function of the breakaway device. Use riprap on T-base foundations that are located on sloped grades, and as shown on the plans for level grades.

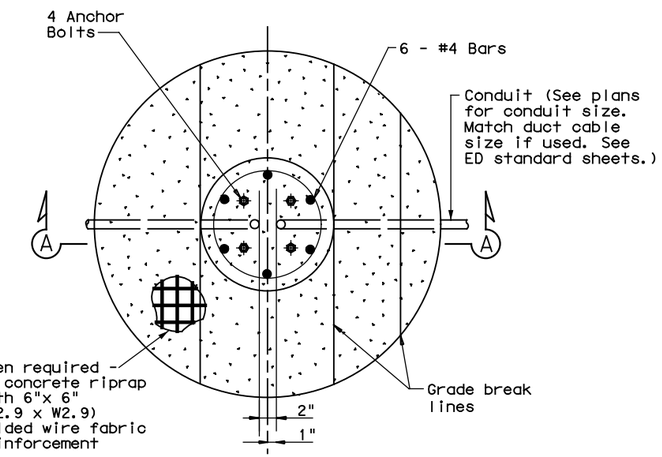
TABLE 4

BREAKAWAY POLE PLACEMENT (See note 6)

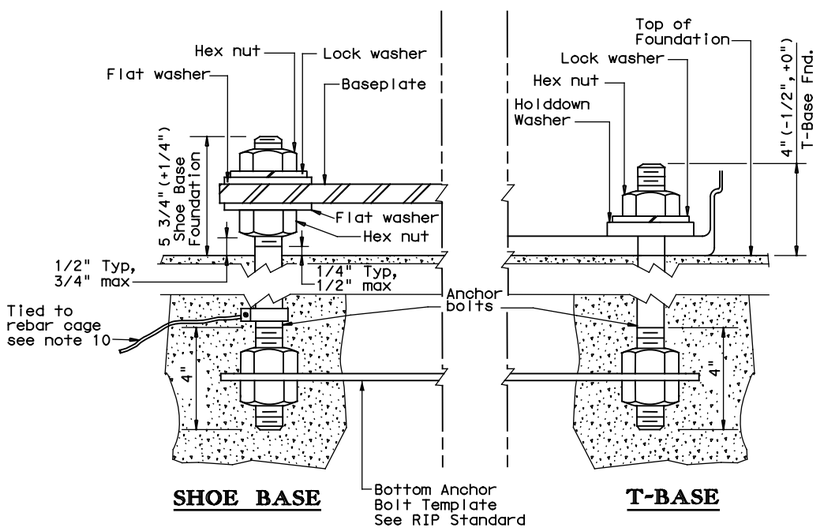
ROADWAY FUNCTIONAL CLASSIFICATION	** POLE OFFSET (DISTANCE TO FACE OF TRANSFORMER BASE)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum*(15 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.



FOUNDATION DETAIL



SHOE BASE **T-BASE**

ANCHOR BOLT DETAIL

Texas Department of Transportation — Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS
(RDWY ILLUM FOUNDATIONS)

RID(2)-20

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SHIPPING PARTS LIST - POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base Designation				Quantity	T-Base Designation				Quantity	CSB/SSCB Mounted Designation				Quantity
	Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire	
20	(Type SA 20 S - 4)			(150W EQ) LED		(Type SA 20 T - 4)			(150W EQ) LED						
	(Type SA 20 S - 4 - 4)			(150W EQ) LED		(Type SA 20 T - 4 - 4)			(150W EQ) LED						
30	(Type SA 30 S - 4)			(250W EQ) LED		(Type SA 30 T - 4)			(250W EQ) LED		(Type SP 28 S - 4)			(250W EQ) LED	
	(Type SA 30 S - 4 - 4)			(250W EQ) LED		(Type SA 30 T - 4 - 4)			(250W EQ) LED		(Type SP 28 S - 4 - 4)			(250W EQ) LED	
	(Type SA 30 S - 8)			(250W EQ) LED		(Type SA 30 T - 8)			(250W EQ) LED		(Type SP 28 S - 8)			(250W EQ) LED	
	(Type SA 30 S - 8 - 8)			(250W EQ) LED		(Type SA 30 T - 8 - 8)			(250W EQ) LED		(Type SP 28 S - 8 - 8)			(250W EQ) LED	
40	(Type SA 40 S - 4)			(250W EQ) LED		(Type SA 40 T - 4)			(250W EQ) LED		(Type SP 38 S - 4)			(250W EQ) LED	
	(Type SA 40 S - 4 - 4)			(250W EQ) LED		(Type SA 40 T - 4 - 4)			(250W EQ) LED		(Type SP 38 S - 4 - 4)			(250W EQ) LED	
	(Type SA 40 S - 8)			(250W EQ) LED		(Type SA 40 T - 8)			(250W EQ) LED		(Type SP 38 S - 8)			(250W EQ) LED	
	(Type SA 40 S - 8 - 8)			(250W EQ) LED		(Type SA 40 T - 8 - 8)			(250W EQ) LED		(Type SP 38 S - 8 - 8)			(250W EQ) LED	20
	(Type SA 40 S - 10)			(250W EQ) LED		(Type SA 40 T - 10)			(250W EQ) LED	6	(Type SP 38 S - 10)			(250W EQ) LED	
	(Type SA 40 S - 10 - 10)			(250W EQ) LED		(Type SA 40 T - 10 - 10)			(250W EQ) LED		(Type SP 38 S - 10 - 10)			(250W EQ) LED	
	(Type SA 40 S - 12)			(250W EQ) LED		(Type SA 40 T - 12)			(250W EQ) LED	94	(Type SP 38 S - 12)			(250W EQ) LED	
	(Type SA 40 S - 12 - 12)			(250W EQ) LED		(Type SA 40 T - 12 - 12)			(250W EQ) LED		(Type SP 38 S - 12 - 12)			(250W EQ) LED	
50	(Type SA 50 S - 4)			(400W EQ) LED		(Type SA 50 T - 4)			(400W EQ) LED		(Type SP 48 S - 4)			(400W EQ) LED	
	(Type SA 50 S - 4 - 4)			(400W EQ) LED		(Type SA 50 T - 4 - 4)			(400W EQ) LED		(Type SP 48 S - 4 - 4)			(400W EQ) LED	
	(Type SA 50 S - 8)			(400W EQ) LED		(Type SA 50 T - 8)			(400W EQ) LED		(Type SP 48 S - 8)			(400W EQ) LED	
	(Type SA 50 S - 8 - 8)			(400W EQ) LED		(Type SA 50 T - 8 - 8)			(400W EQ) LED		(Type SP 48 S - 8 - 8)			(400W EQ) LED	
	(Type SA 50 S - 10)			(400W EQ) LED		(Type SA 50 T - 10)			(400W EQ) LED		(Type SP 48 S - 10)			(400W EQ) LED	
	(Type SA 50 S - 10 - 10)			(400W EQ) LED		(Type SA 50 T - 10 - 10)			(400W EQ) LED		(Type SP 48 S - 10 - 10)			(400W EQ) LED	
	(Type SA 50 S - 12)			(400W EQ) LED		(Type SA 50 T - 12)			(400W EQ) LED		(Type SP 48 S - 12)			(400W EQ) LED	
	(Type SA 50 S - 12 - 12)			(400W EQ) LED		(Type SA 50 T - 12 - 12)			(400W EQ) LED		(Type SP 48 S - 12 - 12)			(400W EQ) LED	

OTHER Designation				Quantity
Pole	A1	A2	Luminaire	

GENERAL NOTES:

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the Department such warranties or guarantees.

2. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.

4. Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.

   a. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal of an engineer licensed in the State of Texas, in accordance with Item 441, "Steel Structures." The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.
   b. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. All poles shall be designed for 110 mph 3-second gust wind speeds. The Gust Factor, G, and Wind Importance Factor, Ir, shall be applied as per the AASHTO Specifications assuming a 25-year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non-hurricane Wind Importance Factor, Ir, value. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
   c. Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 60-pound luminaire having an effective projected area of 1.6 square feet.
   d. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

5. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.

   a. Meet all of the requirements stated above for optional steel pole designs and the following:
      1. Aluminum poles shall be fabricated in accordance with "Structural Welding Code-Aluminum" AWS D1.2.
      2. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
      3. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
      4. Pole components shall be constructed using the following material:
         Shaft: ASTM B221 or B241 Alloy 6063-T6, ASTM B209 Alloy 5086-H34, ASTM B221 Alloy 6005-T5.
         Base Flange: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 (Yield strength test required).
         Mast Arm Fitting: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
         Mast Arms: ASTM B241 Alloy 6061-T6 or Alloy 6063-T6.
         Pole Cap: ASTM B209 Alloy 5086-H32 or ASTM B108 or B26 Alloy 356.0-T6.
         Bolts: Stainless Steel AISI 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133K or equal.

6. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

7. Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole-arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'-0" lower than the nominal height, unless otherwise shown or directed.

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS

(TYPE SA 50 T - X - X) (400W EQ) LED

- SA: Pole and mast arm may be steel or aluminum.
- ST: Pole and mast arm must be steel.
- AL: Pole and mast arm must be aluminum.
- SP: Special (ovalized) steel or aluminum pole for installing on CSB or SSCB. See standard sheet CSB (4), or SSCB (4).

Two numerical digits denote nominal mounting height in feet.

Next letter denotes type of base, (S-Shoe Base, T-Transformer Base, or B-Bridge/Ret.Wall Mount)

First number denotes length of mast arm in feet.

Use of second mast arm is indicated by second dashed number which denotes length in feet.

Luminaire rating in watts (i.e. 400W). Equivalent wattage LED fixtures will include EQ (i.e. 400W EQ)

Last letters indicate light source (S - High Pressure Sodium; LED - LED luminaire)

SHEET 1 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(1)-19

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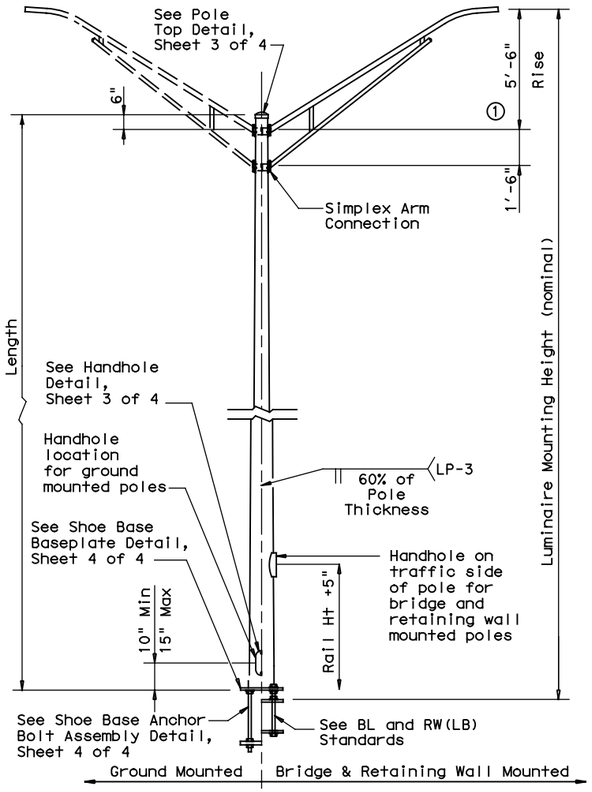
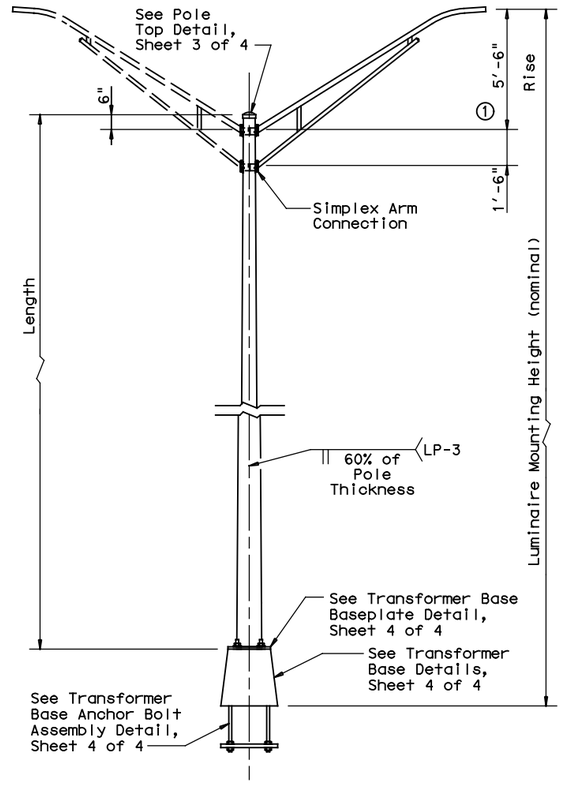


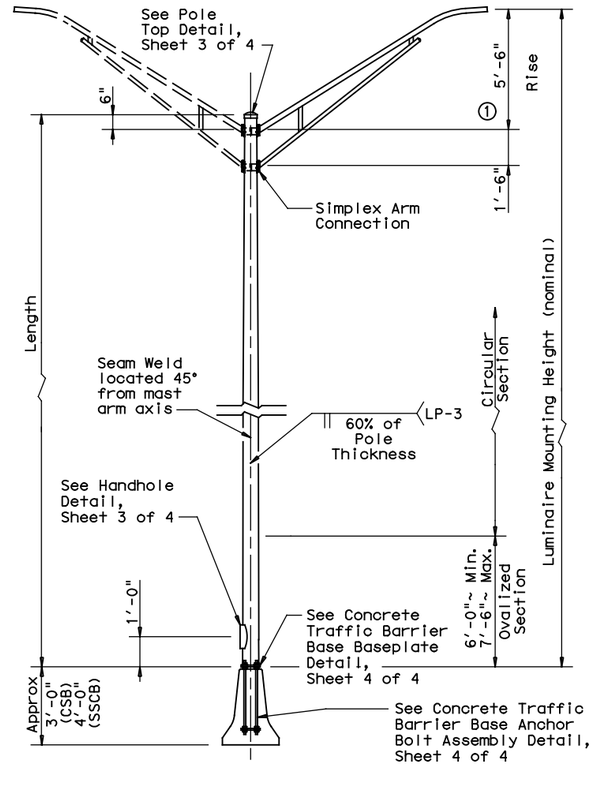
SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.00	25.00	0.1196	13.2
31.00-39.00	8.00	4.36-3.24	26.00-34.00	0.1196	20.7
40.00	8.50	3.60	35.00	0.1196	20.7
50.00	10.50	4.20	45.00	0.1196	30.3



TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-39.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3



CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)						
Luminaire Mounting Height (Nominal) (ft)	Base ② Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)	
					About ℄ of Rail	Perp. to Rail
28.00	9.00	5.78	23.00	0.1196	10.3	13.2
38.00	9.00	4.38	33.00	0.1196	16.6	20.8
48.00	10.50	4.48	43.00	0.1345	25.1	30.5

MATERIAL DATA		
COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft (0.14"/ft. Taper)	A572 Gr 50, A595 Gr A, A1011 HSLAS Gr 50 Cl 2 ③, or A1008 HSLAS Gr 50 Cl 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H, or A563 Gr DH	
Flat Washers	F436	

NOTES:

① 2'-6" rise for 4 ft. luminaire arms.

② Before ovalized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.

③ A1011 SS Gr 50 may be used instead of HSLAS, provided the material meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Shaft length	+1"
I.D. of outside piece of slip fitting pieces	+1/8", -1/16"
O.D. of inside piece of slip fitting pieces	+1/32", -1/8"
Shaft diameter: other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 ft
Twist in multi-sided shaft	4° in 50 ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of Attachments	±1/4"
Bolt hole spacing	±1/16"

GENERAL NOTES:

1. Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals , 6th Edition (2013) and Interim Revisions thereto. Design 3-Second Gust Wind Speed equals 110 mph with a 1.14 gust factor. A wind importance factor of 0.80 is applied to adjust the wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is 25' above natural ground level.
2. Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 60-pound luminaire having an effective projected area of 1.6 square feet.
3. Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Do not submit shop drawings for roadway illumination pole assemblies fabricated in accordance with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of these sheets and the Specifications. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
4. For mounting heights between values shown in the tables, use base diameter and thickness values for the larger height.
5. Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."
6. Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with AWS D1.1, Structural Welding Code-Steel.
7. Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint.
8. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
9. Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."
10. All poles, except Transformer Base Poles, shall have hand holes with reinforcing frames and covers. For ground mounted shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or a retaining wall lighting bracket, hand hole shall be on traffic side of the pole, at a height that will clear the barrier.
11. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."
12. Pole length is based on a 5'-6" luminaire arm rise. 4 ft. luminaire arms have a 2'-6" rise. A pole with 4 ft. luminaire arms will have an actual mounting height 3'-0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.
13. Erect transformer base poles in accordance with sheet RID(1).

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ROADWAY ILLUMINATION POLES

RIP(2)-19

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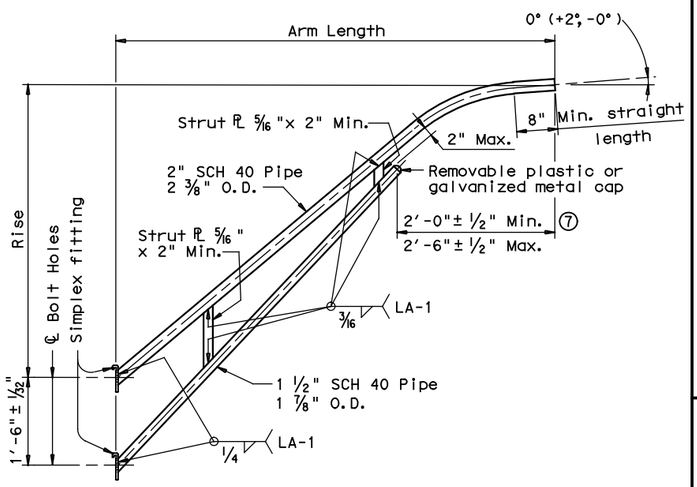
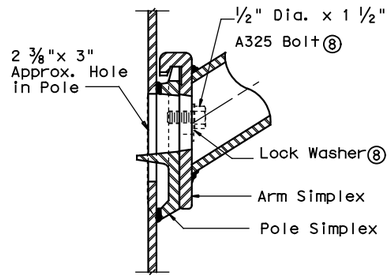


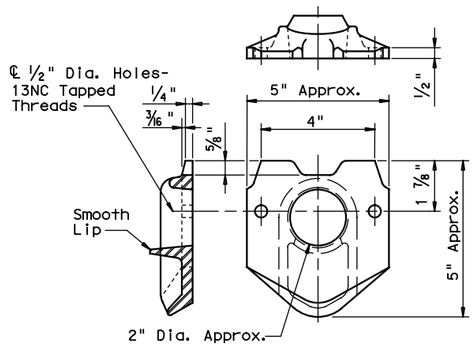
LUMINAIRE ARM

LUMINAIRE ARM DIMENSIONS		
Nominal Arm Length	Arm Length	Rise
4'-0"	3'-6"	2'-6"
6'-0"	5'-6"	5'-6"
8'-0"	7'-6"	5'-6"
10'-0"	9'-6"	5'-6"
12'-0"	11'-6"	5'-6"

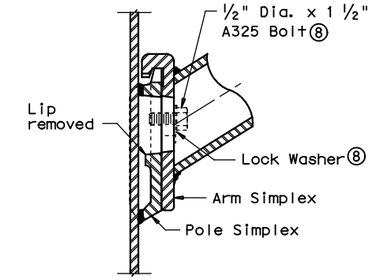
ARM ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Arm Length	±1"
Arm Rise	±1"
Deviation from flat	1/8" in 12"
Spacing between holes	±1/32"



UPPER SIMPLEX FITTING
(Gusset not shown for clarity)

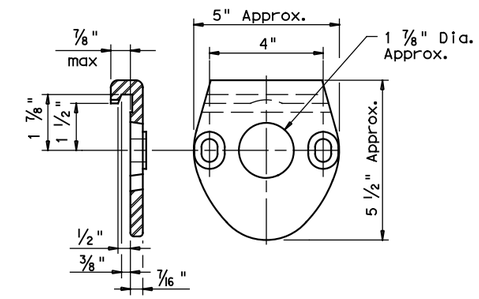


POLE SIMPLEX DETAIL ⑨



LOWER SIMPLEX FITTING
(Gusset not shown for clarity)

SECTION B-B



ARM SIMPLEX DETAIL ⑨

NOTES:

④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

⑤ A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.

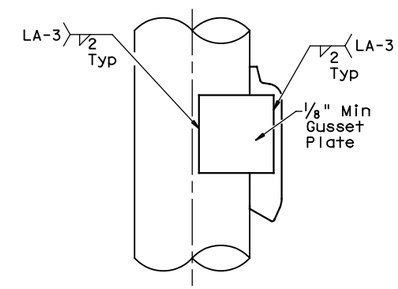
⑦ Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

⑧ Each pole simplex fitting shall be supplied with 2 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.

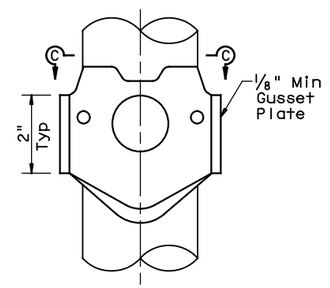
⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.

⑩ A welded handhole frame is permissible. Maximum of two (2) CJP weld splices is allowed.

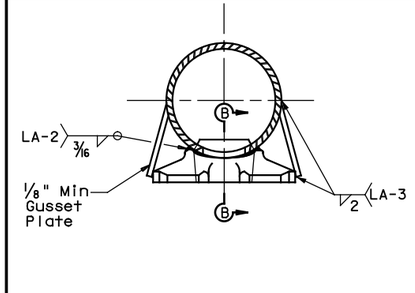
MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 ⑤, or A36 (Arm only)
Arm Pipes	ASTM A53 Gr A or B, A500 Gr B, A501, A 1008 HSLAS-F Gr 50 ⑥, or A1011 HSLAS-F Gr 50 ⑥
Arm Struts and Gusset Plates ④	ASTM A36, A572 Gr 50 ⑥, or A588
Misc.	ASTM designations as noted



SIDE

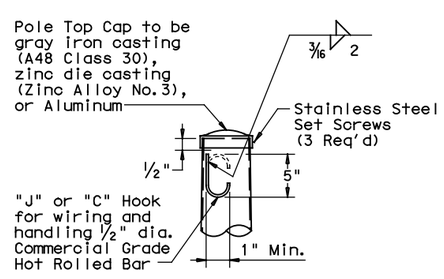


ELEVATION

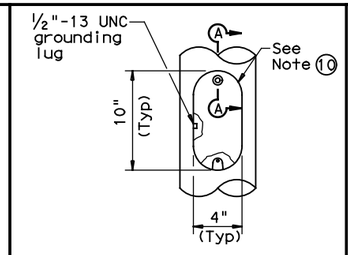


SECTION C-C

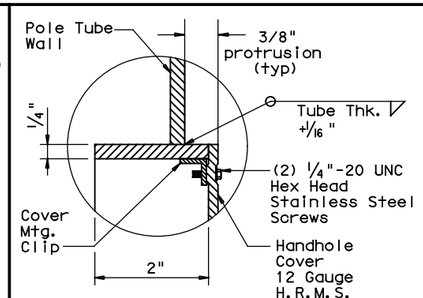
SIMPLEX ATTACHMENT DETAIL



POLE TOP



ELEVATION



SECTION A-A

HANDHOLE

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

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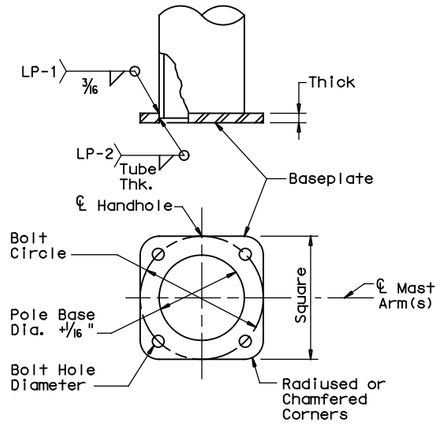
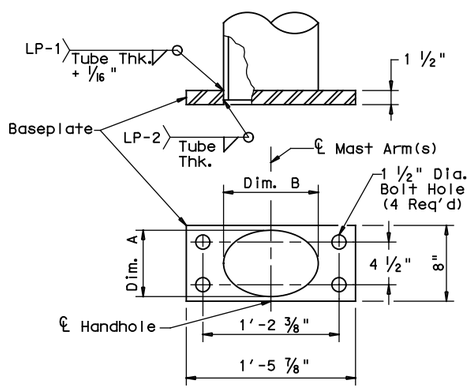


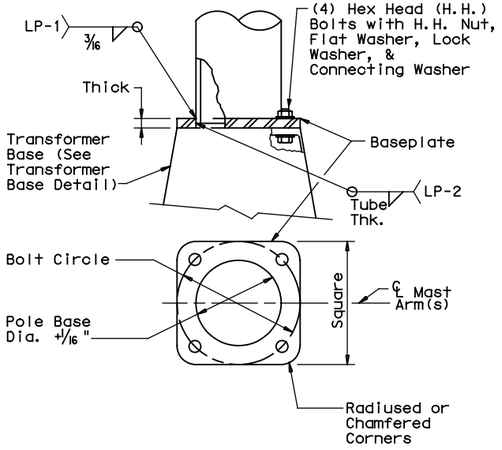
SHOE BASE BASEPLATE

SHOE BASE BASEPLATE TABLE				
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	BOLT HOLE DIAMETER
20′- 39′	13"	13"	1 1/4"	1 1/4"
40′	15"	15"	1 1/4"	1 1/2"
50′	15"	15"	1 1/2"	1 1/2"



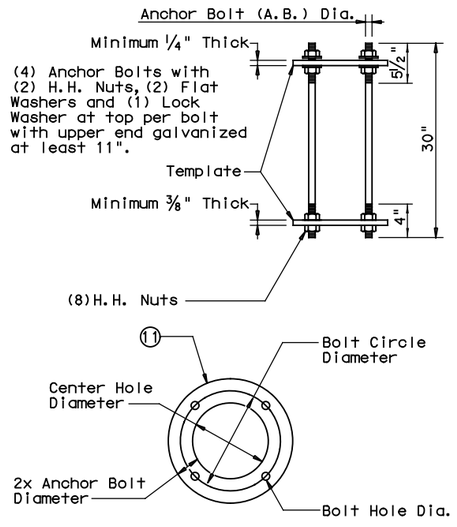
CONCRETE TRAFFIC BARRIER BASE BASEPLATE

CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE			
MOUNTING HEIGHTS (nominal)	POLE DIA.(12)	DIM. A	DIM. B
28′- 38′	9"	7"± 1/4"	10"± 1/4"
48′	10 1/2"	7"± 1/4"	13"± 1/4"



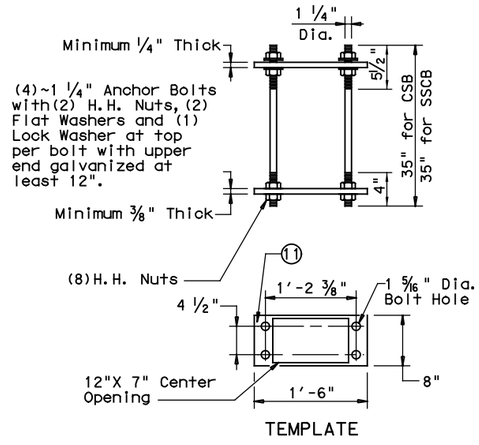
TRANSFORMER BASE BASEPLATE

TRANSFORMER BASE BASEPLATE TABLE						
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	CONNECTING BOLT DIA.	BOLT HOLE DIAMETER	TRANSFOMER BASE TYPE
20′- 39′	13"	13"	1 1/4"	1"	1 1/4"	A
40′	15"	15"	1 1/4"	1 1/4"	1 1/2"	B
50′	15"	15"	1 1/2"	1 1/4"	1 1/2"	B



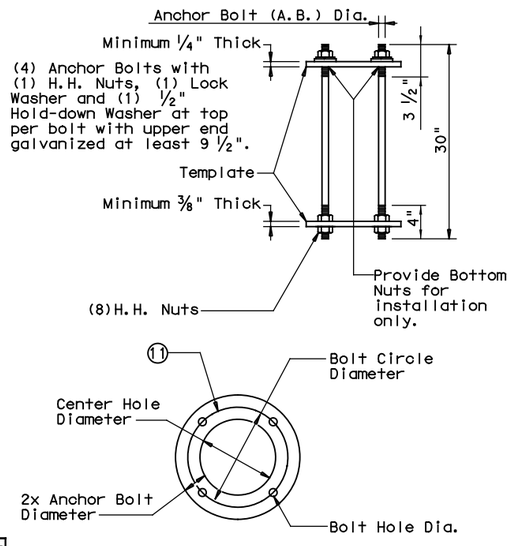
SHOE BASE ANCHOR BOLT ASSEMBLY

SHOE BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′-39′	1"	13"	11"	1 1/16"
40′-50′	1 1/4"	15"	12 1/2"	1 5/16"



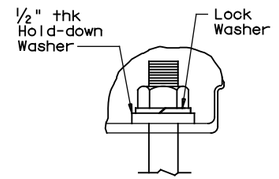
CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′- 39′	1"	14"	12"	1 1/16"
40′- 50′	1 1/4"	17 1/4"	14 3/4"	1 5/16"

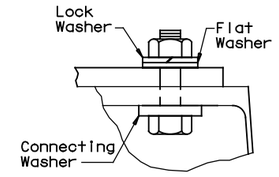


TRANSFORMER BASE ANCHOR BOLT ASSEMBLY

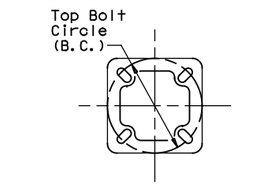
TRANSFORMER BASE TABLE		
TYPE	TOP B.C.	BTM. B.C.
A	13"	14"
B	15"	17 1/4"



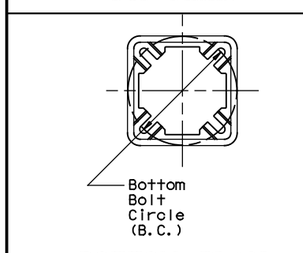
DETAIL A



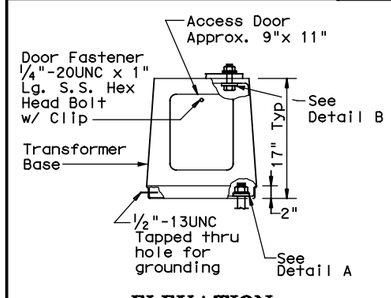
DETAIL B



TOP PLAN



BOTTOM PLAN



ELEVATION

TRANSFORMER BASE DETAILS

GENERAL NOTES:

1. For mounting heights between those shown in the table, use the values in the table for the larger mounting height.
2. All breakaway bases shall meet the breakaway requirements of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto, and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to resist 150% of the design moment.
3. Transformer bases shall be cast from aluminum, ASTM B108 or B26 Alloy 356.0-T6, or other material approved by the Engineer. Four Hex Head (H.H.) bolts with four H.H. nuts, four lock washers, four flat washers, and connecting and hold-down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 grade DH galvanized.
4. Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
5. Doors for transformer bases shall be made of plastic, fiberglass or other non-metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.

NOTES:

(11) Anchor Bolt Templates do not need to be galvanized.

(12) Pole diameter before ovalized.

ANCHOR BOLT FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Length	± 1/2"
Threaded length	± 1/2"
Galvanized length (if required)	- 1/4"

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(4)-19

FILE: rip-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS 7-17 12-19	3451	01	035, ETC.	FM 1281, ETC.
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		187

730

DATE:
FILE:

GENERAL NOTES:

1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.

2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.

3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.

4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.

5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".

6. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.

7. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."

8. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.

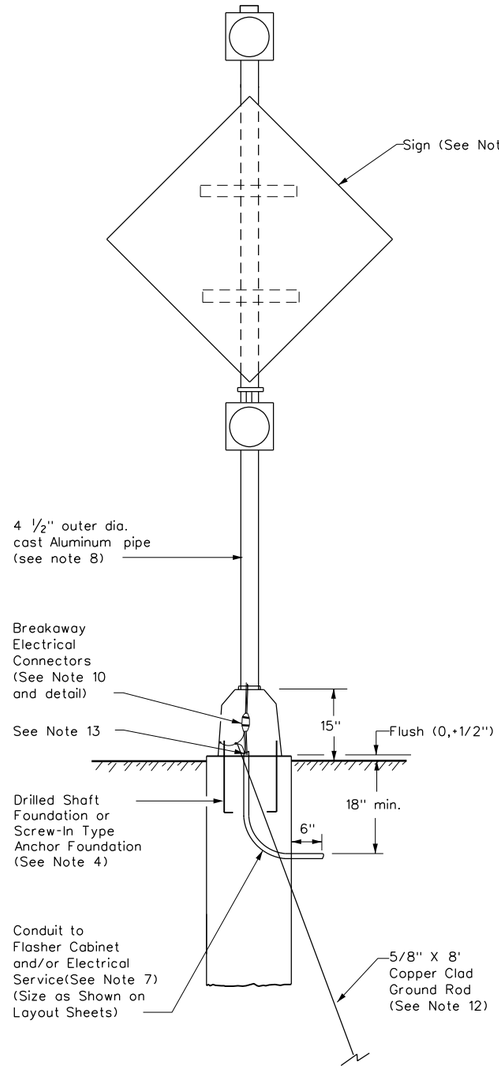
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening of connection.

10. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies." Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).

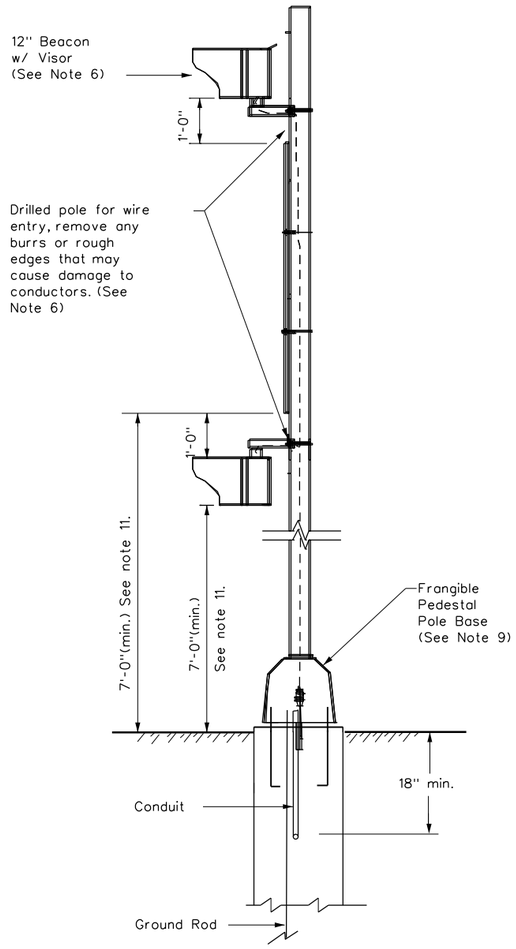
11. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.

12. Make connections to ground rods according to NEC. Ground rod clamps shall be listed for their intended purpose.

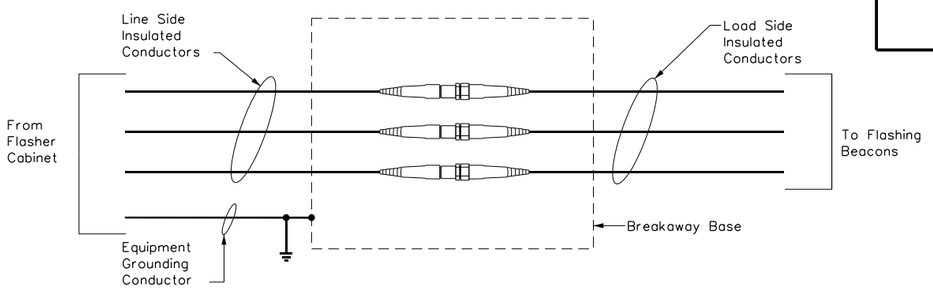
13. Ensure height of conduit and ground rod is below top of anchor bolts.



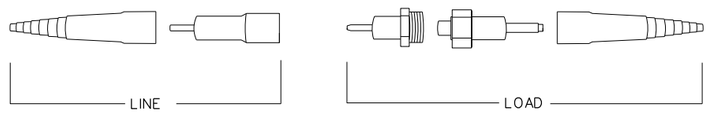
FRONT



SIDE



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

ROADSIDE FLASHING BEACON ASSEMBLY

RFBA-13

FILE: rfba-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
5-93 12-04	DIST	COUNTY		SHEET NO.
10-93 3-13	ELP	EL PASO		188
4-98				

74

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DATE:
FILE:

GENERAL NOTES:

1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.

2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.

3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.

4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.

5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".

6. Use materials specifically designed for attaching cabinets, beacon heads, solar panels, etc., to poles.

7. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.

8. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."

9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening on connection.

10. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies." Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).

11. Install the batteries in a battery box. Place the batteries on a 3/16" thick plastic sheet and connect together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3/16" plastic sheet are subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies." When required, install batteries in the flasher cabinet. Wire batteries according to manufacturers recommendations. Provide the number of batteries as required by the manufacturer.

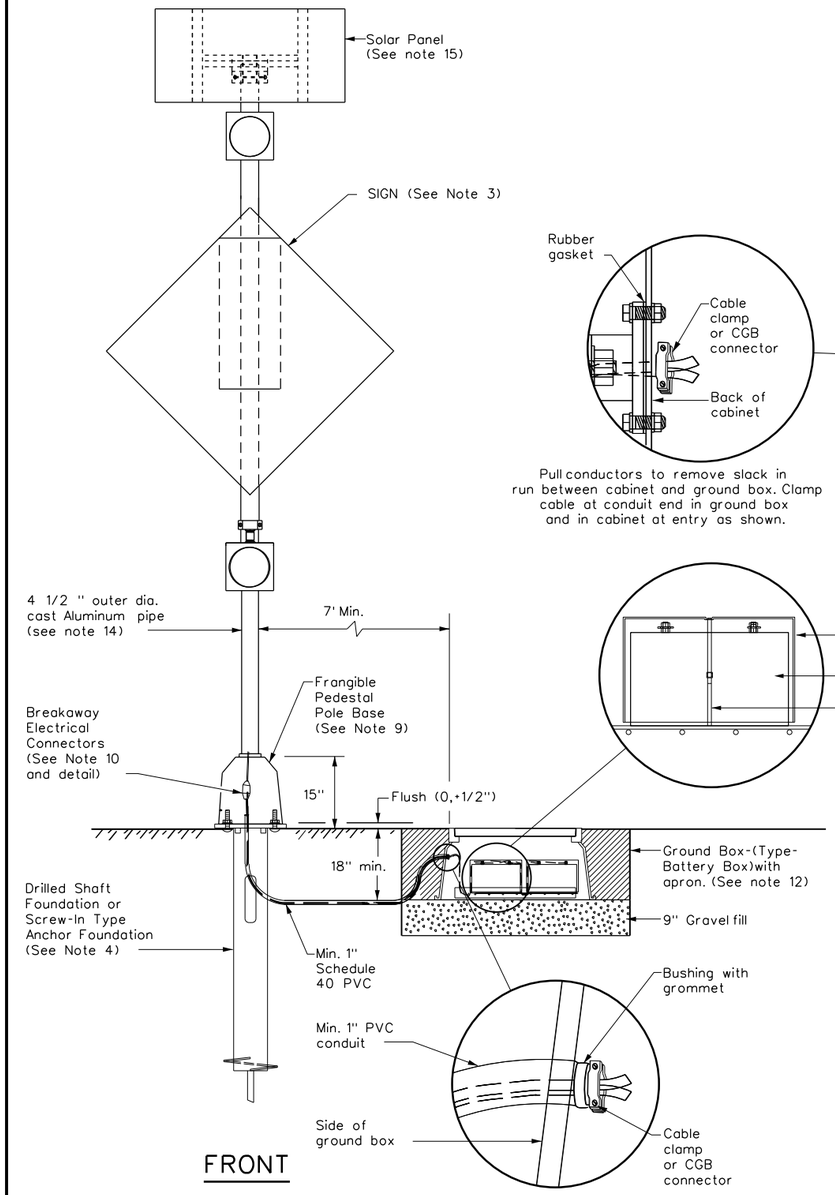
12. See standard sheet Electrical Details (ED) for additional requirements regarding the installation of ground boxes/battery boxes, conduit, and cabinets.

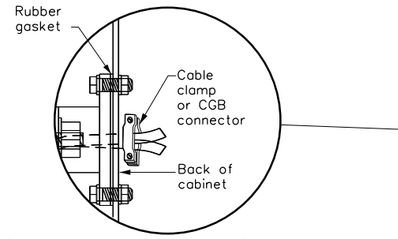
13. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.

14. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.

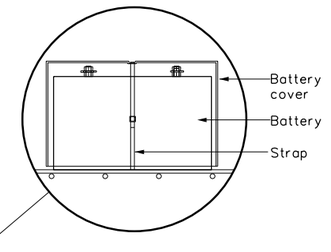
15. Orient solar panel for optimum exposure to sunlight (face to the south). Prior to installation, check the location to ensure there is no overhead obstruction that would block the solar panel from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14' above grade.

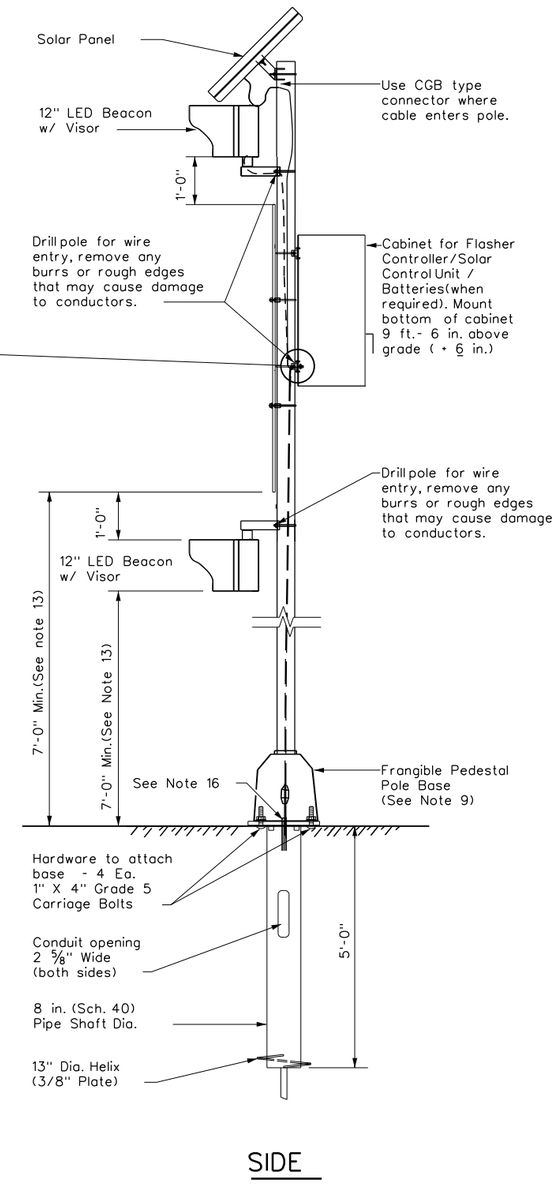
16. Ensure height of conduit is below top of anchor bolts.

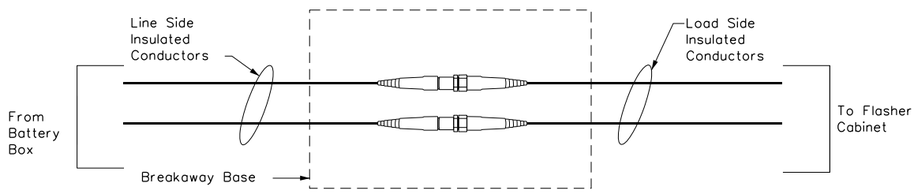




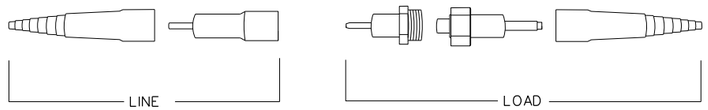
Pull conductors to remove slack in run between cabinet and ground box. Clamp cable at conduit end in ground box and in cabinet at entry as shown.







NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS

SPRFBA(1)-13

FILE: spb1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
12-04	DIST	COUNTY		SHEET NO.
3-13	ELP	EL PASO		189

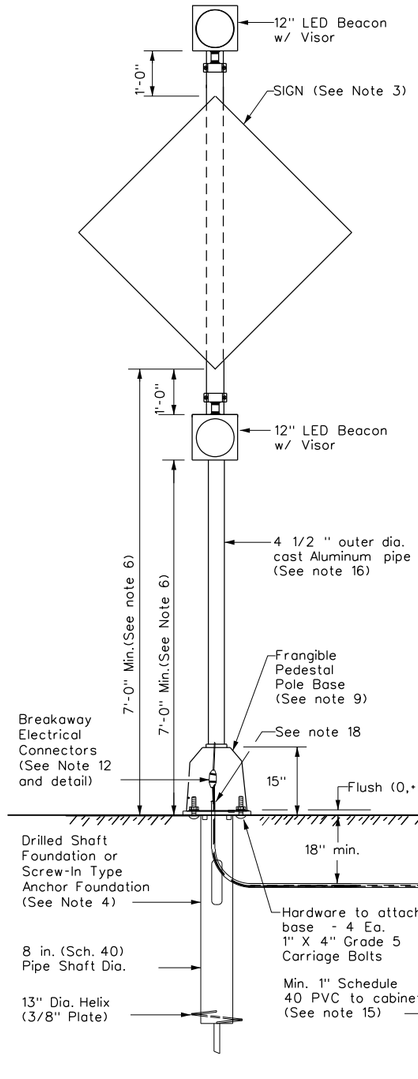
75A

GENERAL NOTES:

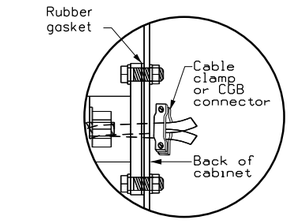
1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
7. Use materials specifically designed for attaching cabinets, beacon heads, solar panels, etc., to poles.
8. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening on connection.
10. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
11. Install the cable clamp in the bottom third of the back of the cabinet. See Detail A.
12. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies". Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse (slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
13. Install the batteries in a battery box. Place the batteries on a 3/16" thick plastic sheet and connect together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3/16 " plastic sheet are subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies." When required, install batteries in the flasher cabinet. Wire batteries according to manufacturers recommendations. Provide the number of batteries as required by the manufacturer.
14. See standard sheet Electrical Details (ED) for additional requirements regarding the installation of ground boxes/battery boxes, conduit, and cabinets.
15. Unless otherwise shown on the plans or recommended by the manufacturer, use the following table to determine the wire size from cabinet to beacons.

Distance from Cabinet to Beacons (ft.)	Minimum Required Wire Size (AWG)
0 - 35	#14
35 - 60	#12
60 - 100	#10
> 100	#8

16. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
17. Orient solar panel for optimum exposure to sunlight (face to the south). Prior to installation, check the location to ensure there is no overhead obstruction that would block the solar panel from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14' above grade.
18. Ensure height of conduit is below top of anchor bolts.

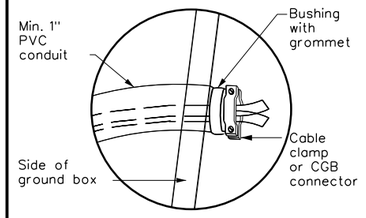


DETAIL FOR SOLAR PANEL, CABINET, AND BATTERIES LOCATED OUT OF CLEAR ZONE ON SEPARATE ALUMINUM POLE ASSEMBLY

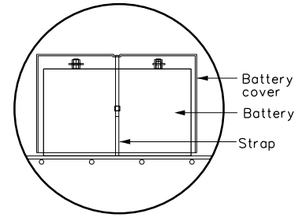


Pull conductors to remove slack in run between cabinet and ground box. Clamp cable at conduit end in ground box and in cabinet at entry as shown.

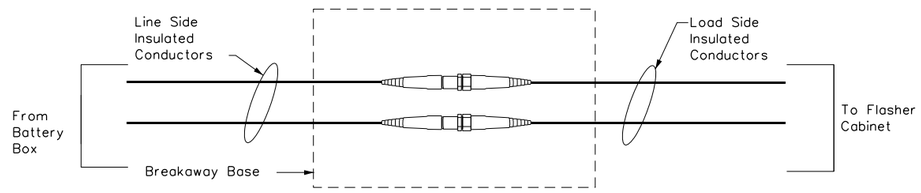
DETAIL A



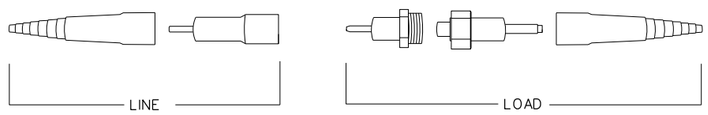
DETAIL B



DETAIL C



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS (ALUMINUM)

SPRFBA(3)-13

FILE: spb3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
12-04	DIST	COUNTY		SHEET NO.
3-13	ELP	EL PASO		190

DATE:
FILE:

75C

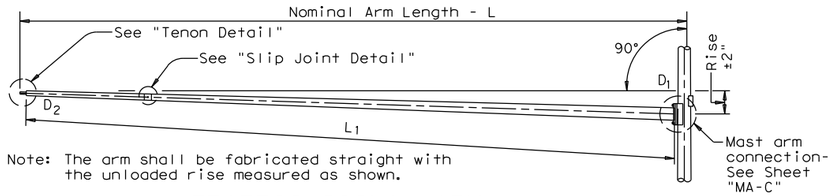
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179	12.5	9.5	8.7	7.8	.179	30-A
32	12.5	9.8	9.1	8.3	.179	12.0	9.0	8.2	7.3	.239	30-A
36	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
40	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
44	12.5	9.8	9.1	8.3	.239	14.0	11.0	10.2	9.3	.239	36-A
48	13.0	10.3	9.6	8.8	.239	15.0	12.0	11.2	10.3	.239	36-A

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	① thk	Rise	L_1	D_1	② D_2	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"
48	47.0	10.5	4.1	.239	3'-4"	47.0	11.0	3.5	.239	2'-9"

D_B = Pole Base O.D.
D_{19} = Pole Top O.D. with no Luminaire and no ILSN
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.

② D_2 may be increased by up to 1" for polygonal arms.



Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

TRAFFIC SIGNAL ARM

(Fixed Mount)

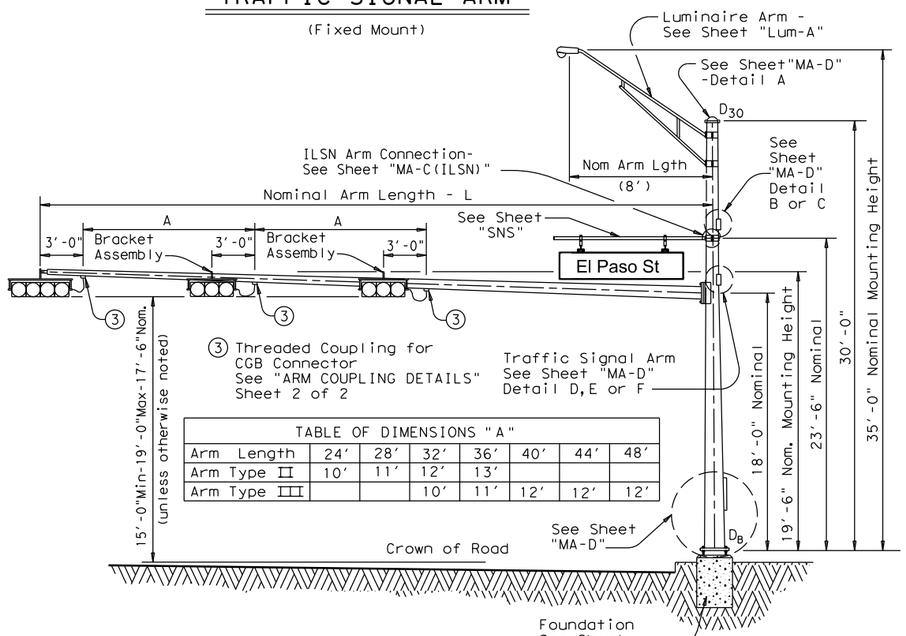


TABLE OF DIMENSIONS "A"							
Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	12'	12'	12'

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30' Poles With Luminaire		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-80		20S-80		20-80	
24	24L-80		24S-80	3	24-80	
28	28L-80		28S-80		28-80	
32	32L-80		32S-80		32-80	
36	36L-80		36S-80	1	36-80	
40	40L-80		40S-80		40-80	
44	44L-80		44S-80		44-80	
48	48L-80		48S-80		48-80	

Traffic Signal Arms (1 per Pole) Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80	3		
28	28I-80		28II-80			
32			32II-80		32III-80	
36			36II-80	1	36III-80	
40					40III-80	
44					44III-80	
48					48III-80	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 ½"	3'-4"	4
1 ¾"	3'-10"	

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

SMA-80(1)-12

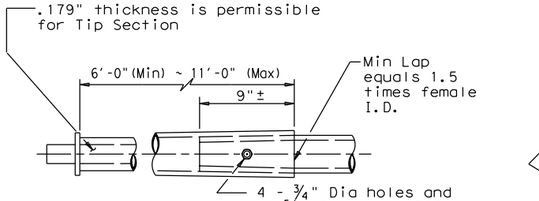
REVISIONS

DATE:
FILE:

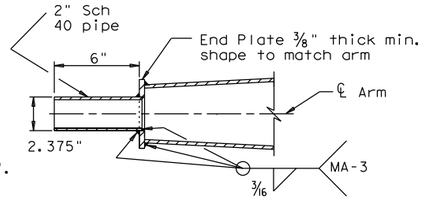
DN: MS	CK: JSY	DW: MWF	CK: JSY

CONT	SECT	JOB	HIGHWAY
3451	01	035, ETC.	FM 1281, ETC
DIST	COUNTY		SHEET NO.
ELP	EL PASO		191

DATE:
FILE:



SLIP JOINT DETAIL



TENON DETAIL

VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

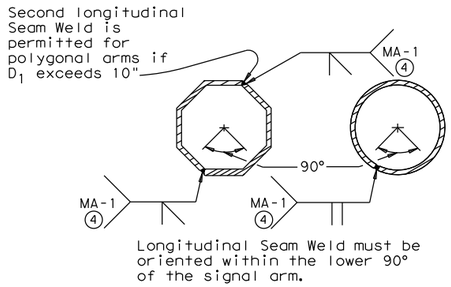
If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

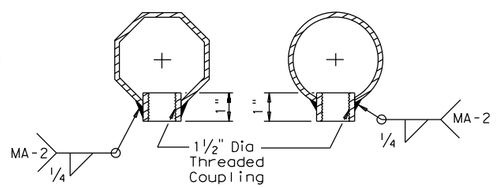
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

④ 60% Min. penetration 100% pemetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

SMA-80(2)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

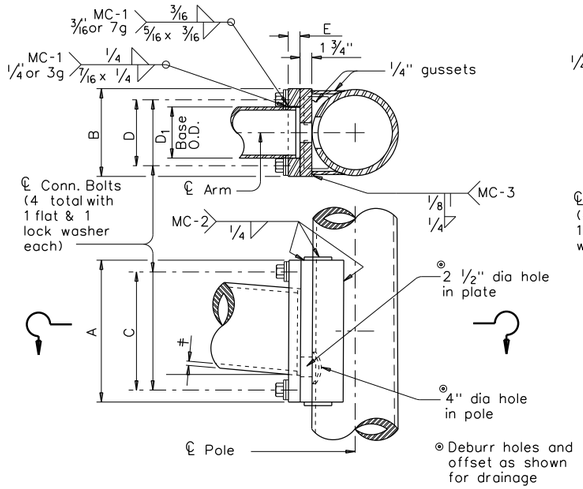
REVISIONS
5-96
1-12

CONT	SECT	JOB	HIGHWAY
3451	01	035, ETC.	FM 1281, ETC
DIST	COUNTY		SHEET NO.
ELP	EL PASO		192

122B

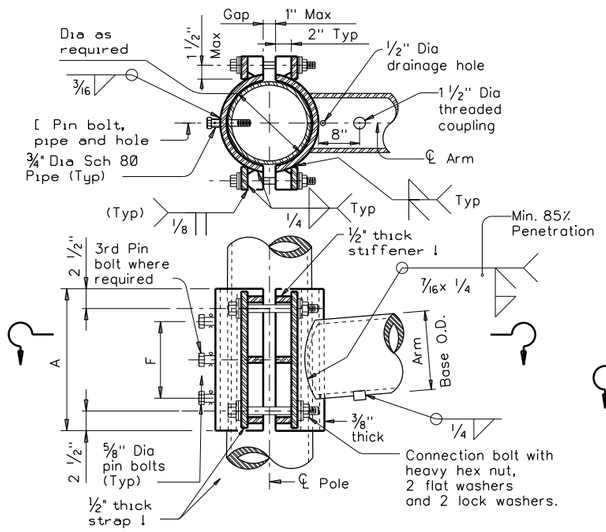
DATE:
FILE:

ARM SIZE D_1	ARM SIZE ǂ	A	B	C	D	E	CONN BOLT DIA
in.	in.	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	16	11	13	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	18	12	15	9	2	1 1/4
10.5	.239	18	13	15	10	3	1 1/2
11.0	.239	18	13	15	10	3	1 1/2

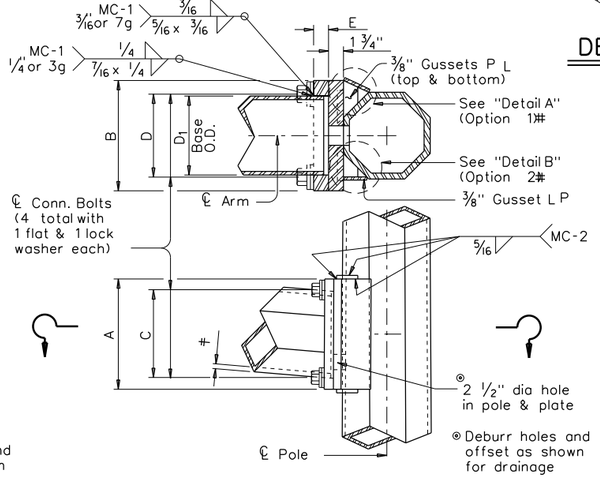


FIXED MOUNT DETAIL 1

ARM SIZE D_1	ARM SIZE ǂ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	4	1 1/4	3	5/8
9.5	.239	18	12	4	1 1/4	3	5/8
10.0	.239	18	12	4	1 1/4	3	5/8

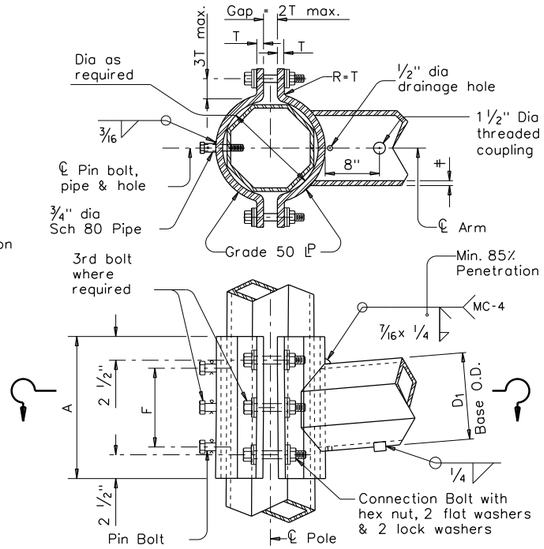


CLAMP-ON DETAIL 1

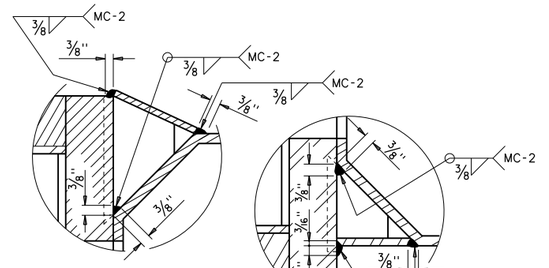


FIXED MOUNT DETAIL 2

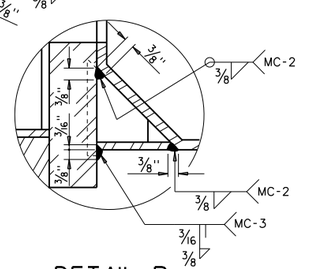
ARM SIZE D_1	ARM SIZE ǂ	A	F	T	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	in.	ea.	in.	ea.	in.
7.0	.179	12	6	3/4	4	3/4	2	5/8
7.5	.179	14	8	3/4	4	3/4	2	5/8
8.0	.179	14	8	3/4	4	3/4	2	5/8
9.0	.179	16	10	7/8	4	1	2	5/8
10.0	.179	18	10	7/8	4	1	2	5/8
9.5	.239	18	10	1	6	1	3	5/8
10.0	.239	18	10	1	6	1	3	5/8



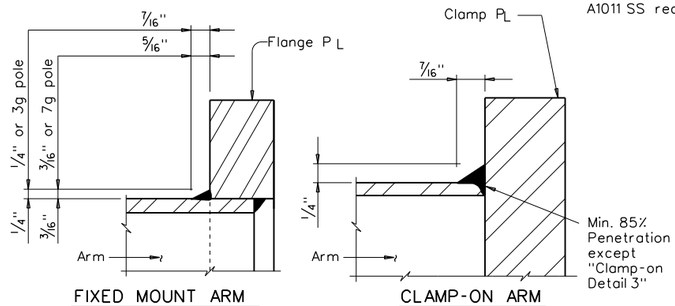
CLAMP-ON DETAIL 2



DETAIL A

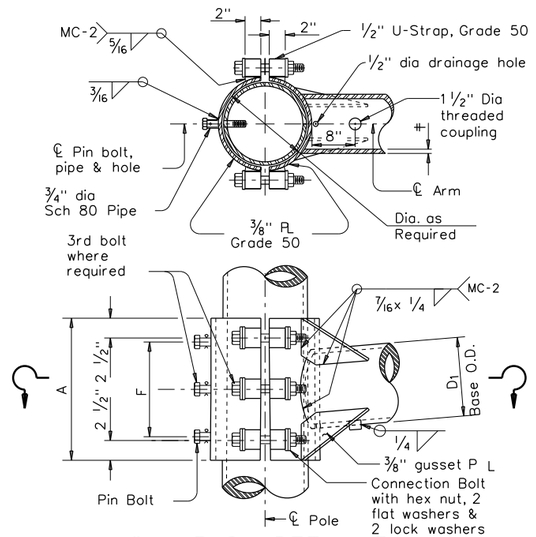


DETAIL B



ARM BASE WELD DETAILS

ARM SIZE D_1	ARM SIZE ǂ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8



CLAMP-ON DETAIL 3

MATERIALS	
Round Shafts or Polygonal Shafts ①	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ②
Plates ①	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ①	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 1/2" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and 3/4" dia pipe shall have 3/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

MA-C-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
5-09
1-12

CONT	SECT	JOB	HIGHWAY
3451	01	035, ETC.	FM 1281, ETC.
DIST	COUNTY		SHEET NO.
ELP	EL PASO		193

126A

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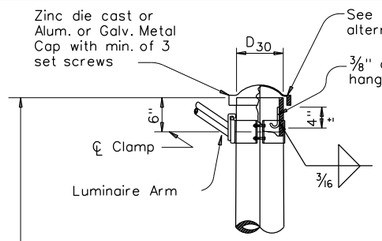
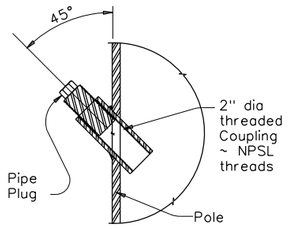
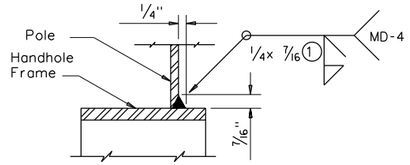


DETAIL A

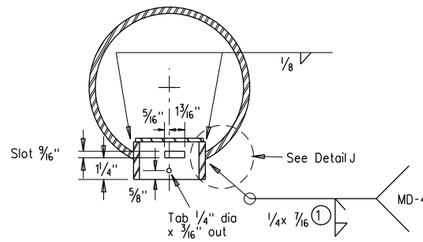
(for pole with luminaire)



POLE COUPLING DETAIL

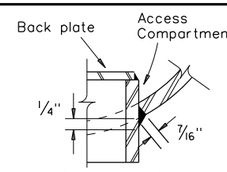


DETAIL G

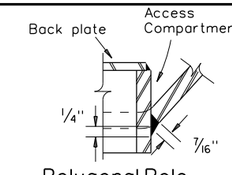


SECTION X-X

Opening for access compartment shall be no more than 1/16inch wider than the access compartment itself.

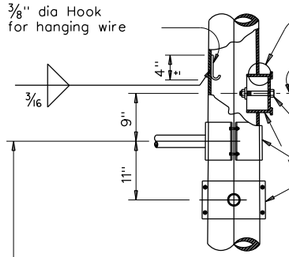


Round Pole

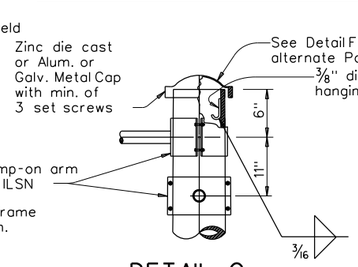


Polygonal Pole

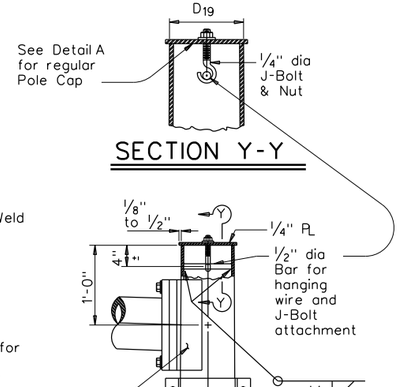
DETAIL J



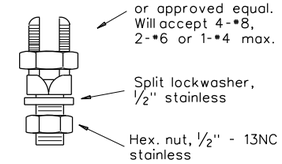
DETAIL B



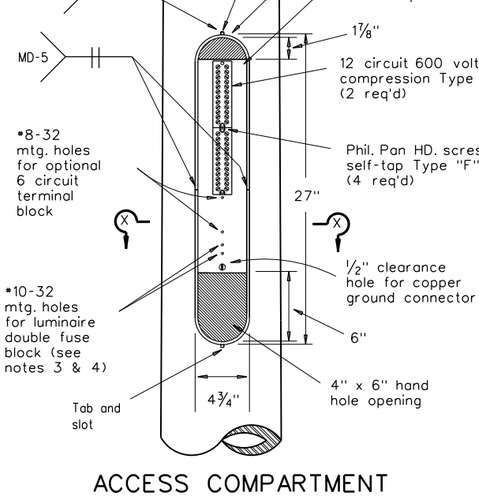
DETAIL C



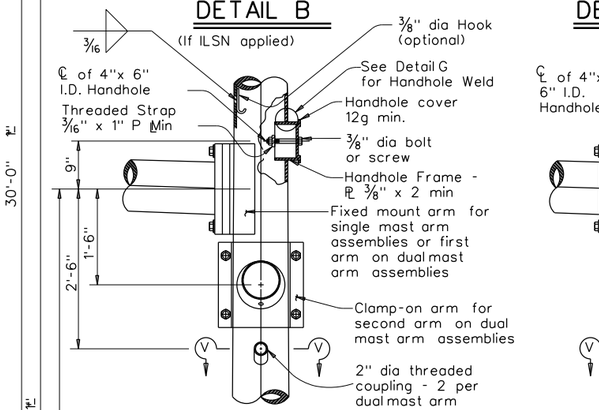
SECTION Y-Y



COPPER GROUND CONNECTOR

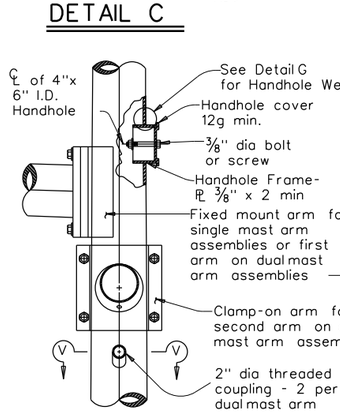


ACCESS COMPARTMENT



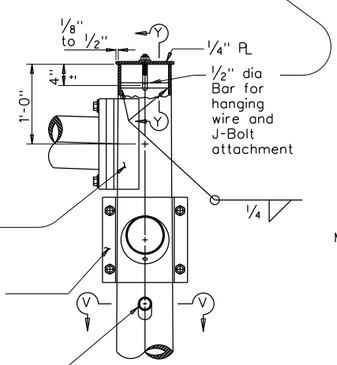
DETAIL D

(for 30' pole with luminaire and ILSN sign)



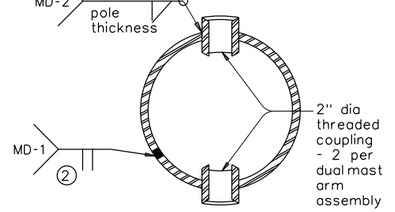
DETAIL E

(for 24' pole with ILSN sign and no luminaire)

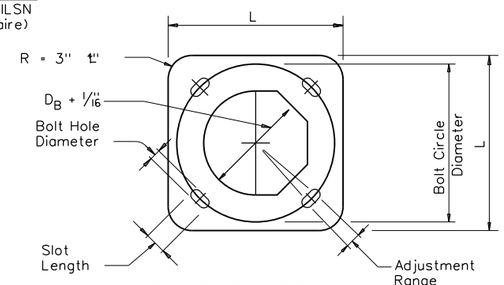


DETAIL F

(for 19' pole with no ILSN sign and no luminaire)

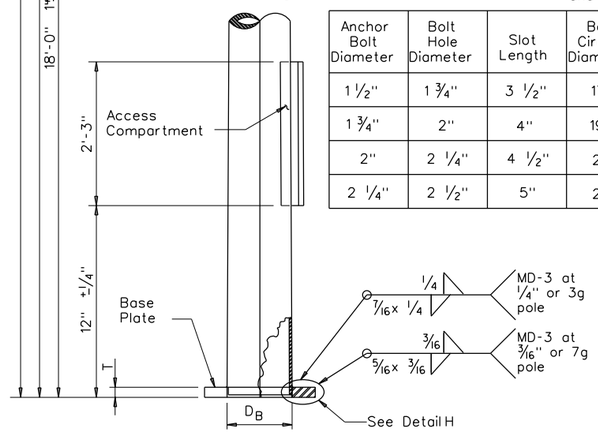


SECTION V-V

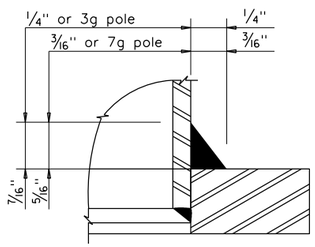


BASE PLATE PLAN

Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base PL Dim. L x T	Adjust. Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4°
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5°
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6°
2 1/4"	2 1/2"	5"	23"	24" x 2 1/4"	13.7°



POLE ELEVATION



DETAIL H

NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon *985GP12CU or approved equal), four *8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon *985GP12 terminal strips, one Marathon *985GP06CU terminal strip, and one Bussmann *BM6032B fuse block.
4. Install one Bussmann *BM6032B, Littelfuse *L60030M-2C, or Ferraz-Shawmut *30352 fuse block for poles where luminaires are to be installed.

(1) 85% Min. penetration

(2) 60% Min. penetration 100% pemetration within 6" of circumferential base welds.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12

DN: MS	CK: JSY	DW: FDN	CK: CAL

REVISIONS
8-99
1-12

CONT	SECT	JOB	HIGHWAY
3451	01	035, ETC.	FM 1281, ETC.
DIST	COUNTY		SHEET NO.
ELP	EL PASO		194

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FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft (4), (5), (6)			ANCHOR BOLT DESIGN (1)				FOUNDATION DESIGN LOAD (2)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
24-A	24"	4- #5	#2 at 12"	5.7	5.3	4.5	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 ½"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 ¾"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #9	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11.9	2 ¼"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

NOTES:

(1) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

(2) Foundation Design Loads are the allowable moments and shears at the base of the structure.

(3) Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

(4) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

(5) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

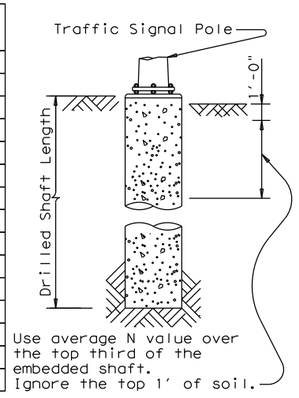
(6) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

FOUNDATION SUMMARY TABLE (3)

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH (6) (FEET)				
				24-A	30-A	36-A	36-B	42-A
POLE-1	10	24-A	1	6				
POLE-2	10	24-A	1	6				
POLE-3	10	24-A	1	6				
POLE-4	10	24-A	1	6				
POLE-5	10	24-A	1	6				
POLE-6	10	24-A	1	6				
POLE-7	10	24-A	1	6				
POLE-8	10	24-A	1	6				
POLE-9	10	24-A	1	6				
POLE-10	10	24-A	1	6				
POLE-11	10	24-A	1	6				
POLE-12	10	24-A	1	6				
POLE-13	10	24-A	1	6				
POLE-14	10	24-A	1	6				
POLE-15	10	24-A	1	6				
POLE-16	10	24-A	1	6				
POLE-17	10	24-A	1	6				
POLE-18	10	24-A	1	6				
POLE-19	10	24-A	1	6				
POLE-20	10	24-A	1	6				
POLE-21	10	30-A	1			14		
POLE-22	10	36-A	1			15		
POLE-23	10	30-A	1			14		
POLE-24	10	30-A	1			14		
TOTAL DRILLED SHAFT LENGTHS				120		57		

FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
			44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' x24'	40' X 36'
					44' x 36'



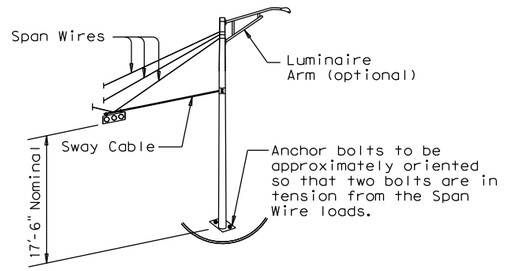
ANCHOR BOLT & TEMPLATE SIZES

BOLT DIA IN.	(7) BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3'-4"	6"	4"	17"	10"	7"
1 ¾"	3'-10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-9"	9"	5 ½"	23"	13 ¾"	9 ¼"

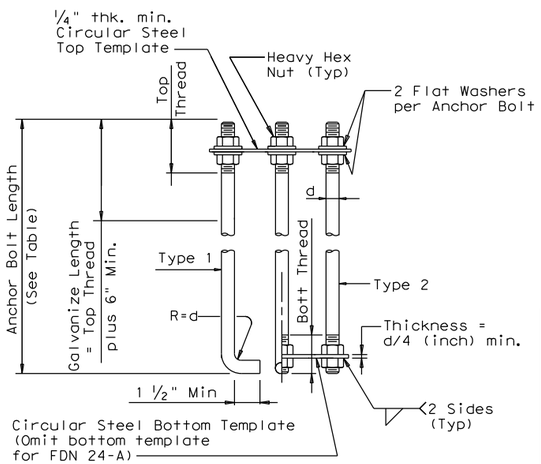
(7) Min dimensions given, longer bolts are acceptable.

EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'

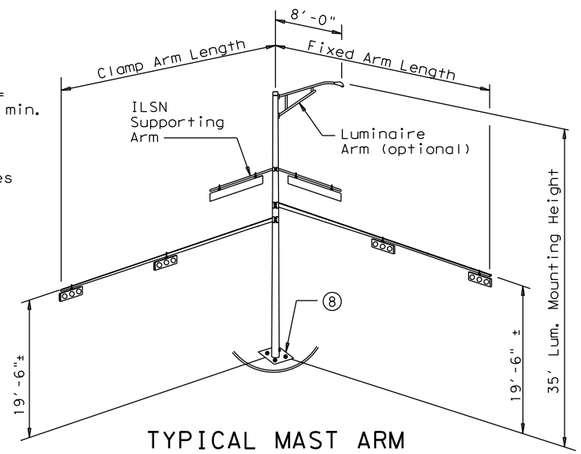
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



TYPICAL STRAIN POLE ASSEMBLY



ANCHOR BOLT ASSEMBLY



TYPICAL MAST ARM ASSEMBLY

⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.

FOUNDATION DETAILS

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

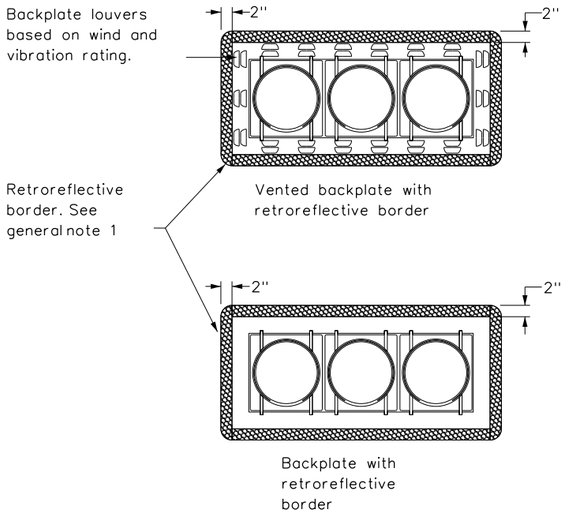
TS-FD-12

REVISIONS

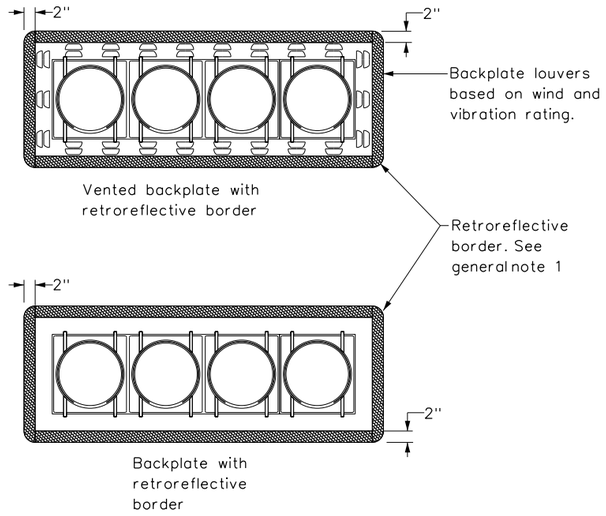
DN: MS	CK: JSY	DW: MAO/MWF	CK: JSY/TEB

CONT	SECT	JOB	HIGHWAY
3451	01	035, ETC.	FM 1281, ETC
DIST	COUNTY		SHEET NO.
EL PASO	EL PASO		195

DATE:
FILE:



THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



FOUR-SECTION HEAD
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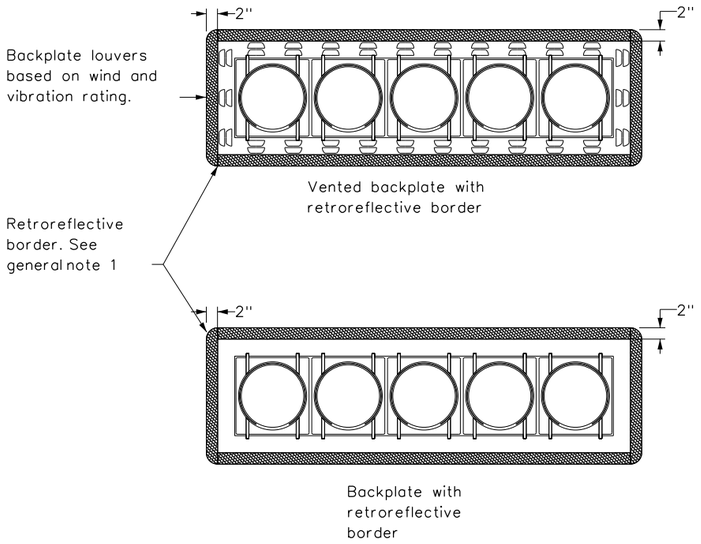
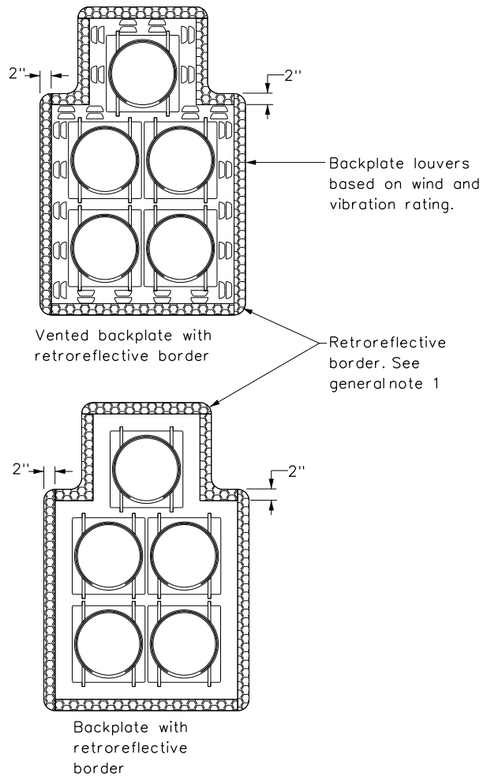
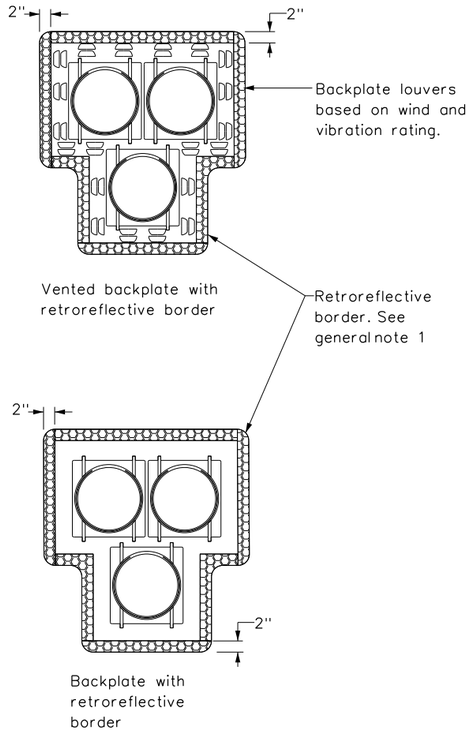


FIVE-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
CLUSTER



PEDESTRIAN HYBRID
BEACON

GENERAL NOTES:

1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type B or $\frac{C}{L}$ $\frac{L}{R}$ retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatability must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
   - Pole mounted
   - Overhead mounted
   - Span wire mounted
   - Mast arm mounted
   - Vertical signal heads
   - Horizontal signal heads
   - Clustered signal heads
   - Pedestrian hybrid beacons

Texas Department of Transportation

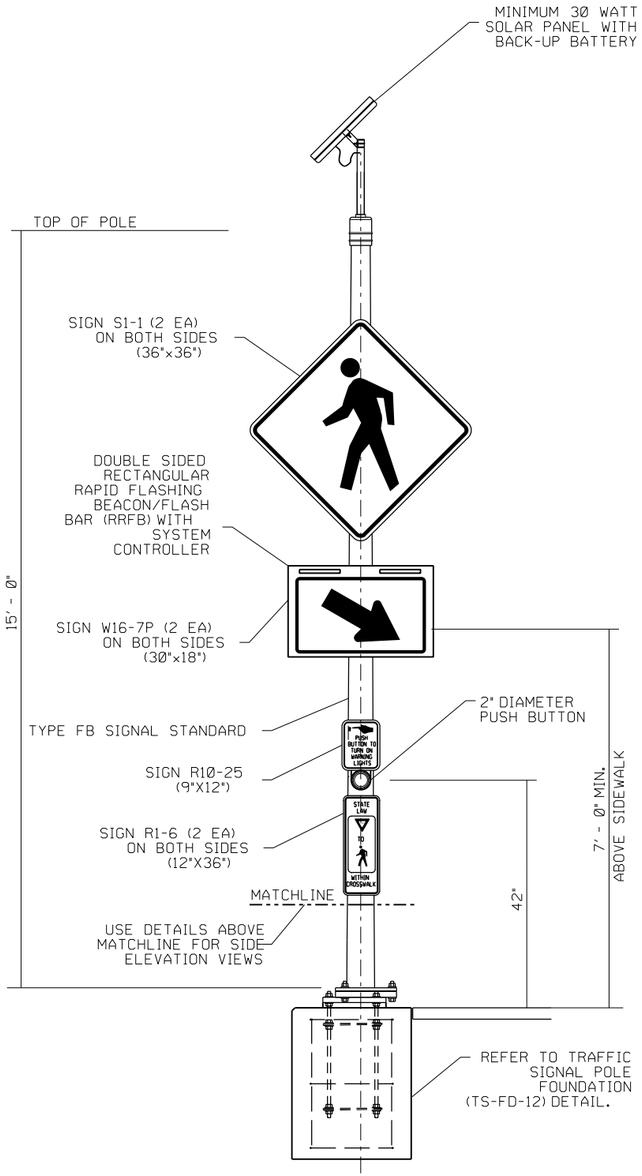
Traffic Safety Division Standard

TRAFFIC SIGNAL HEAD WITH BACKPLATE

TS-BP-20

FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM, 1281, ETC.
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		196

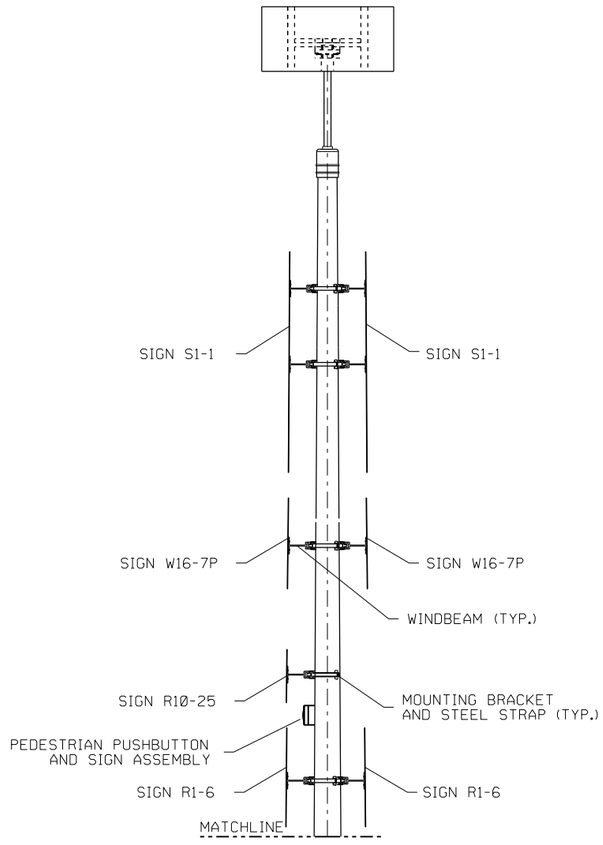
FINAL SUBMITTAL



FRONT ELEVATION VIEW

RECTANGULAR RAPID-FLASHING BEACON

SLIP BASE AND CONCRETE SQUARE FOUNDATION SHOWN



SIDE ELEVATION VIEW

UNI-DIRECTIONAL CONFIGURATION DETAILS

NOTES

1. SEVERAL UTILITIES MAY EXIST IN THE AREA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE UTILITY LOCATES PRIOR TO ANY DRILLING OR EXCAVATION ON THE PROJECT.
2. THE CONTRACTOR SHALL TAKE ALL RRFB ASSEMBLY LOCATIONS AFTER UTILITY LOCATES ARE FINALIZED. PEDESTRIAN PUSH BUTTONS SHALL MAINTAIN A MAXIMUM OF 10" OF REACH FROM THE SIDEWALK.
3. THIS WARNING LIGHT ASSEMBLY SHALL BE AN INTEGRATED ONE PUSH BUTTON PEDESTRIAN-ACTIVATED SYSTEM THAT CONTROLS THE RECTANGULAR RAPID FLASHING BEACON (RRFB).
4. CONTRACTOR MUST SUBMIT SHOP DRAWINGS FOR ALL MATERIALS AND FOUNDATIONS.
5. RRFB LOCATIONS ARE SCHEMATIC AND MAY NEED TO BE ADJUSTED BASED ON ACTUAL FIELD CONDITION TO MEET ADA STANDARDS.
6. SIGN LOCATIONS ARE SCHEMATIC AND MAY BE ADJUSTED BASED ON ACTUAL FIELD CONDITIONS.
7. PEDESTRIAN PUSH BUTTONS ON THE RRFB ASSEMBLY SHALL BE INSTALLED TO FACE THE LEVEL LANDING AREA.

3/30/2021

ENGINEER'S NOTE

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TBPE F#15313 TBPLS F#10194278

R10-25
9"X12"

R1-6
12"X36"

S1-1
36"X36"

W16-7P
24"X12"

NO.	REVISION	BY	DATE

SH 20 (ALAMEDA AVE) &
FM 1281 (HORIZON BLVD)

RECTANGULAR RAPID FLASHING BEACONS (RRFB)

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO	3451	01	035, ETC.	197

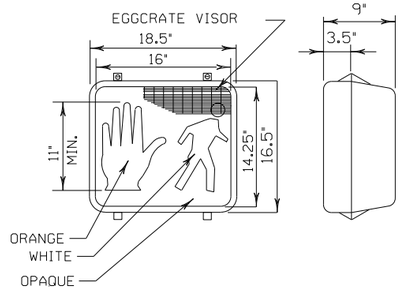
FINAL SUBMITTAL

NOTES:

1. ALL SIGNAL HEADS SHALL BE OF THE SAME MANUFACTURER AND ALL OF THESE SHALL BE INTERCHANGEABLE WITH OTHER UNITS OF THE SAME TYPE.

2. ALL SIGNALS SHALL HAVE 12" ADJUSTABLE HEADS WITH DETACHABLE 12" VISORS.

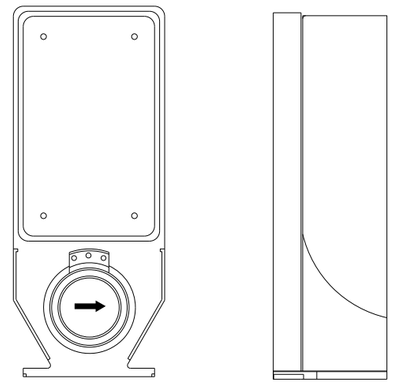
3. SEE SMD STANDARD SHEETS FOR LATERAL AND VERTICAL CLEARANCES AND SIGN MOUNTING DETAILS.



PEDESTRIAN SIGNAL HEAD
NTS

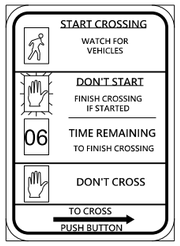
NOTE:

PEDESTRIAN SIGNAL HEADS SHALL BE EQUIPPED WITH EGGCRATE VISORS AND SHALL COMPLY WITH MATERIAL SPECIFICATION TO-7062. BOTH SYMBOLIC PEDESTRIAN SIGNAL INDICATIONS SHALL BE SOLID. OUTLINED INDICATIONS ARE NOT ACCEPTABLE.



APS PUSH BUTTON NOTES

1. CONTRACTOR MUST COORDINATE WITH THE CITY OF EL PASO STREETS AND MAINTENANCE DEPARTMENT FOR VOICE PROGRAMMING.



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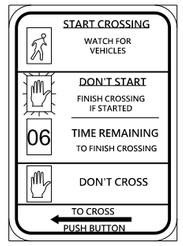

R10-3eL
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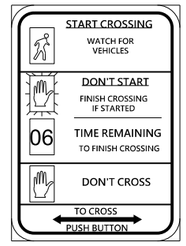
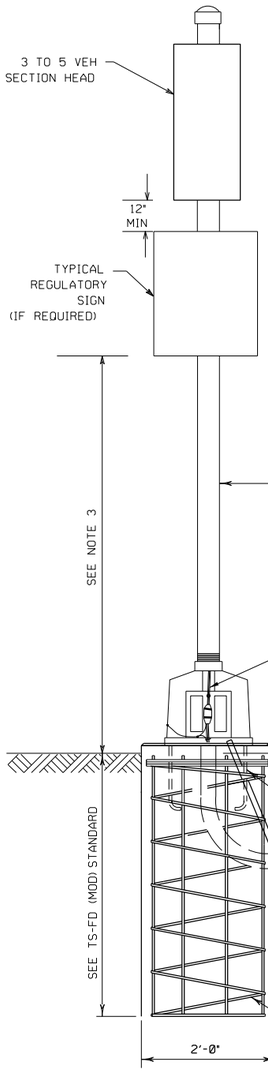
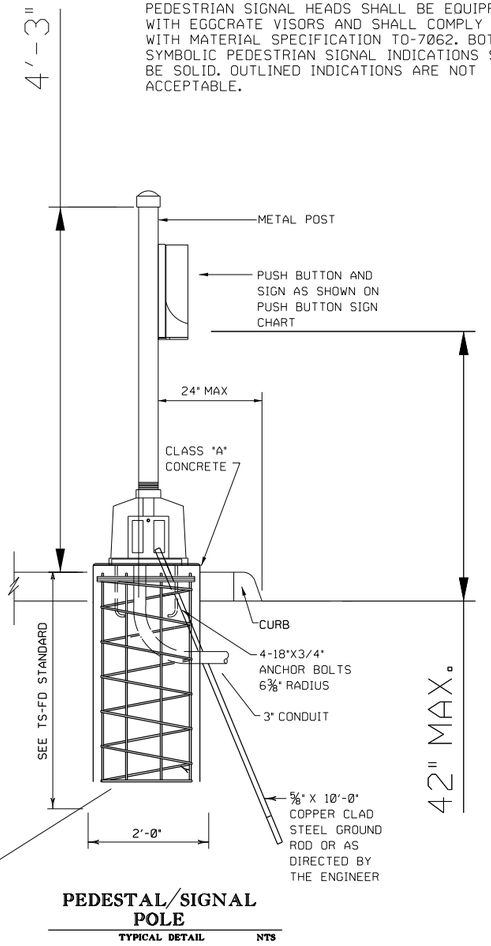


R10-3e(L&R)
9"X15"

APS
PEDESTRIAN PUSH BUTTON UNIT WITH MOUNTABLE SIGNS
NTS



PEDESTAL POLE AND FOUNDATION DETAIL
TYPICAL DETAIL NTS



PEDESTAL/SIGNAL POLE
TYPICAL DETAIL NTS

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3/30/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED PROFESSIONAL ENGINEER

ENGINEER'S NOTE

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TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE) &
FM 1281 (HORIZON BLVD)

PEDESTAL POLE DETAILS

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021(624)HES			FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED:	ELP	EL PASO	3451	01	035, ETC.	198	

3/30/2021 10:18:30 AM
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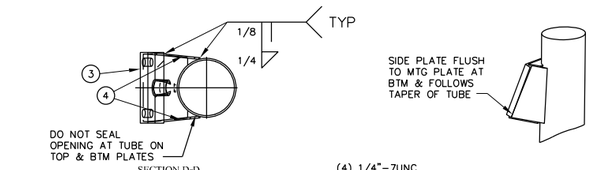
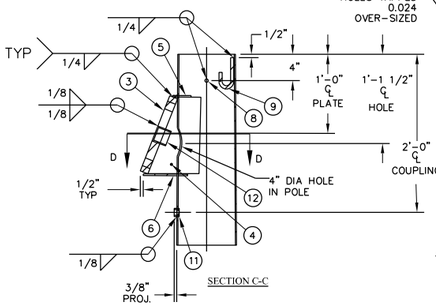
FINAL SUBMITTAL

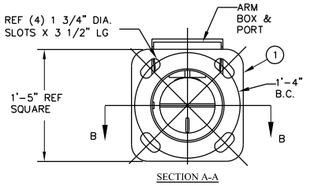


SECTION D-D

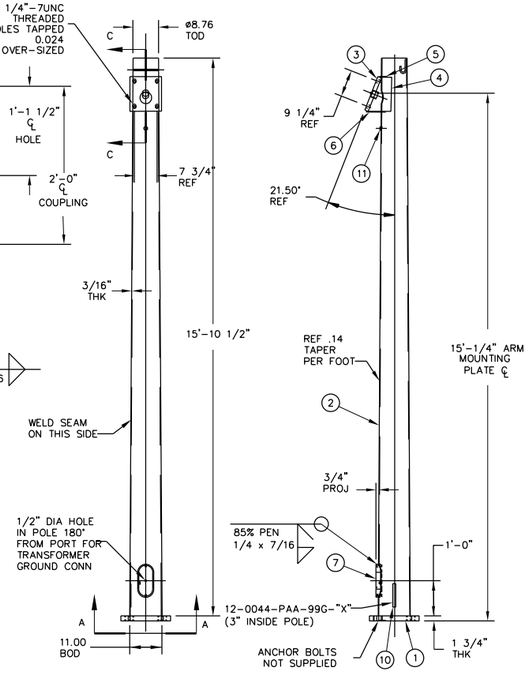


SECTION C-C

SECTION B-B



SECTION A-A



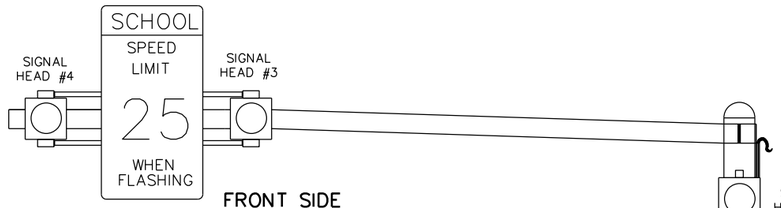
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION	MATERIAL	WT EA.	EXT. WT.
1	1	12-0044-BPL-99	BASE PLATE 1 3/4" THK X 1'-5" X 1'-5"	A572-GR50	81.88	81.88
2	1	12-0044-PSA-99G	ROUND SHAFT 3/16" THK X 11.00" BOD X 8.76" TOD X 16'-0" LG	A572-GR65	311.53	311.53
3	1	12-0044-PCP-99	POLE ARM PLATE 1 1/4" THK X 10 3/4" X 1'-1/4"	A572-GR50	43.31	43.31
4	2	12-0044-GPL-99	POLE SIDE PLATE 1/4" THK X 8 1/16" X 11 5/8" LG	A572-GR50	4.64	9.28
5	1	12-0044-GPL-97	POLE TOP PLATE 1/4" THK X 2 3/4" X 10" LG	A572-GR50	1.11	1.11
6	1	12-0044-GPL-97	POLE BTM PLATE 1/4" THK X 6 3/4" X 10 1/4" LG	A572-GR50	4.17	4.17
7	1	12-0044-HHA-99G	HANDOLE FRAME ASS'Y 5" X 10 1/2" INSIDE	A572-GR65	5.82	5.82
8	1	12-0044-PTD-99	ROD 1/2" DIA X 8 3/8" LG	A36	0.48	0.48
9	1	JHK-01G	J-HOOK 1/2" DIA BAR	A36	0.44	0.44
10	1	SID-01G	SECTION ID TAG	A36	0	0
11	1	CPL-07G	1/2" NPT PIPE HALF COUPLING	A197	0	0
12	1	12-0044-PPE-99	2" SCH 40 (.1540) PIPE X 2" LG	A197	0.62	0.62
				TOTAL WEIGHT		458.64

SECTION ID TAG

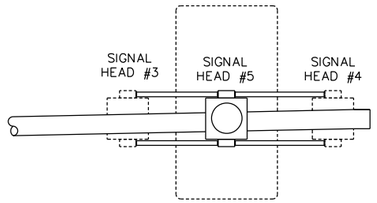
INSIDE POLE SHAFT= 12-0044-PAA-99G-"X"
"X" - NEXT TRAVELER SEQUENCE

NOTE:

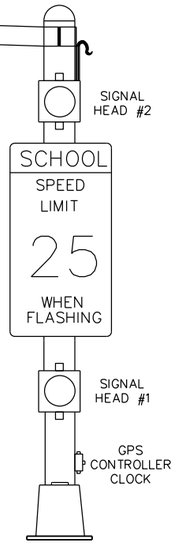
1. ALL WELDING TO MEET OR EXCEED AWS D1.1.
2. COMPONENTS GALVANIZED PER ASTM A123.
3. HARDWARE GALVANIZED PER ASTM A-153.
4. STRUCTURE DETAILED IN ACCORDANCE WITH THE CITY OF EL PASO STANDARD DRAWINGS AND TxDOT REQUIREMENTS.
5. ALL THREADS TO BE PROTECTED DURING GALVANIZING, CLEANED AND RE-TAPPED IF REQ'D. PLUGS TO BE INSTALLED BEFORE SHIPMENT AND MUST BE ABLE TO BE REMOVED WHITEOUT THE USE OF EXCESSIVE FORCE, SPECIAL TOOLS OR HEAT.
6. ALL MATERIAL UP TO 2" THK TO BE CHARPY V-NOTCH TESTED TO 15 FT-LBS @ 70 DEG. F.
7. 16" BOLT CIRCLE DIAMETER FOR BASE PLATE SHALL APPLY FOR 30-A TRAFFIC SIGNAL FOUNDATION ONLY.
8. TRAFFIC SIGNAL FOUNDATION 30-A SHALL APPLY FOR 20' TO 35' MAST ARM LENGTHS AND 16' HIGH POLE.
9. TRAFFIC SIGNAL JOINT FIXED MOUNT ARM ANGLE OF 90 DEGREES MUST BE USED FOR 35' MAST ARM LENGTHS AND HIGHER.



FRONT SIDE



BACK SIDE



MAST ARM DETAIL

MAST ARM AND SIGN DETAILS

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NO.	REVISION	BY	DATE

3/30/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED PROFESSIONAL ENGINEER

ENGINEER'S NOTE

"THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARVIN H. GOMEZ, P.E. No. 86920 ON MARCH 30, 2021
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11385 JAMES WATT DR., SUITE B-13
EL PASO, TEXAS 79936
PH: (915) 351-6701 FAX: (915) 243-6010
www.integratedengineeringsolutions.com
TBPE F#15313 TBPLS F#10194278

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

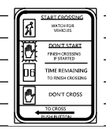
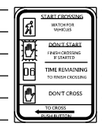
SH 20 (ALAMEDA AVE) &
FM 1281 (HORIZON BLVD)

SCHOOL FLASHER DETAIL

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.	
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.	
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	ELP	EL PASO	3451	Ø1	035, ETC.	199

3/30/2021 10:22:11 AM
C:\Users\mgomez\GRVIES Dropbox\Projects\Drawings\20-012\Details and Standards\signal stdrds\2021 03 30 STDS TO PDF\SEALED STDS\School Flasher Detail.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	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
212	1	R4-7		24 x 30	X		10 B W G	1	SA	P		
212	2	S1-1		36 X 36	X							
212	3	W16-7P		24 X 12	X		10 B W G	1	SA	P		
212	4	S1-1		36 X 36	X							
212	5	W16-7P		24 X 12	X		10 B W G	1	SA	P		
212	6	S1-1		36 X 36	X							
212	7	W16-7P		24 X 12	X		10 B W G	1	SA	P		
212	8	R10-3eL		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
212	9	R10-3eL		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
212	10	R10-3e (L&R)		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		

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:

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS (SH 20)

SOSS

1 OF 7

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		200

18

DATE: 4/22/2021 10:28:23 AM
FILE: $FILE$

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	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
214	11	R1-5		36 X 36	X		10 B W G	1	SA	P		
214	12	R1-5		36 X 36	X		10 B W G	1	SA	P		
217	13	S1-1		36 X 36	X		10 B W G	1	SA	P		
217	14	W16-7P		24 X 12	X							
217	15	R1-5		36 X 36	X		10 B W G	1	SA	P		
217	16	R1-5		36 X 36	X							
217	17	S1-1		36 X 36	X		10 B W G	1	SA	P		
217	18	W16-7P		24 X 12	X							
217	19	S1-1		36 X 36	X		10 B W G	1	SA	P		
217	20	W16-7P		24 X 12	X							
217	21	S1-1		36 X 36	X		10 B W G	1	SA	P		
217	22	W16-7P		24 X 12	X							

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 (SH 20)

SOSS

2 OF 7

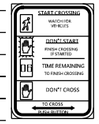
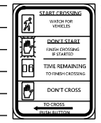
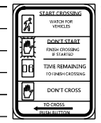
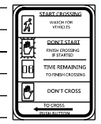
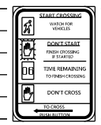
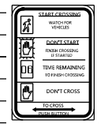
FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC
4-16	DIST	COUNTY		SHEET NO.
8-16	ELP	EL PASO		201

18

DATE: 4/22/2021 10:28:56 AM
FILE: $FILE$

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	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
217	23	R10-3e (L&R)		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
217	24	R10-3eL		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
217	25	R10-3eL		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
217	26	R10-3eL		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE					
217	27	R10-3eL		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
217	28	R10-3e (L&R)		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
217	29	R10-3eL		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		

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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FILE: $FILE$

Texas Department of Transportation

Traffic Operations Division Standard

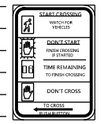
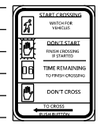
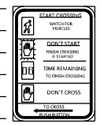
SUMMARY OF SMALL SIGNS (SH 20)

SOSS

3 OF 7

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		202

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	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
218	30	R10-3eL		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
218	31	R10-3eL		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
218	32	R10-3eL		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
220	33	R1-5		36 X 36	X		10 B W G	1	SA	P		
220	34	R1-5		36 X 36	X		10 B W G	1	SA	P		
220	35	S1-1		36 X 36	X					P		
220	36	W16-7P		24 X 12	X		10 B W G	1	SA	P		
220	37	S1-1		36 X 36	X					P		
220	38	W16-7P		24 X 12	X		10 B W G	1	SA	P		
220	39	S1-1		36 X 36	X					P		
220	40	W16-7P		24 X 12	X		10 B W G	1	SA	P		

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SUMMARY OF SMALL SIGNS (SH 20)

SOSS

4 OF 7

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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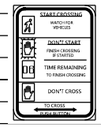
REVISIONS 4-16 8-16	3451	01	035, ETC.	FM 1281, ETC
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		203

18

DATE: 4/22/2021 10:29:53 AM
FILE: $FILE$

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	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
220	41	S1-1		36 X 36	X							
							10 B W G	1	SA	P		
220	42	W16-7P		24 X 12	X							
220	43	R10-3e (L&R)		9 X 15	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE					
										P		
221	44	R10-7		24 x 30	X		10 B W G	1	SA	P		
222	45	R1-5		36 X 36	X		10 B W G	1	SA	P		
222	46	S1-1		36 X 36	X		10 B W G	1	SA	P		
222	47	W16-7P		24 X 12	X							
222	48	S1-1		36 X 36	X		10 B W G	1	SA	P		
222	49	W16-7P		24 X 12	X							
222	50	S1-1		36 X 36	X		10 B W G	1	SA	P		
222	51	W16-7P		24 X 12	X							

ALUMINUM SIGN BLANKS THICKNESS	
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7.5 to 15	0.100"
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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS (SH 20)

SOSS

5 OF 7

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC
4-16	DIST	COUNTY		SHEET NO.
8-16	ELP	EL PASO		204

18

DATE: 4/22/2021 10:30:23 AM
FILE: $FILE$

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	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
222	52	S1-1		36 X 36	X							
							10 B W G	1	SA	P		
222	53	W16-7P		24 X 12	X							
222	54	S1-1		36 X 36	X							
							10 B W G	1	SA	P		
222	55	W16-7P		24 X 12	X							
222	56	S1-1		36 X 36	X							
							10 B W G	1	SA	P		
222	57	W16-7P		24 X 12	X							
222	58	R1-5		36 X 36	X		10 B W G	1	SA	P		
222	59	R1-6		12 X 36	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
22	60	R1-6		12 X 36	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
222	61	R10-25		9 X 12	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		

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.

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS (SH 20)

SOSS

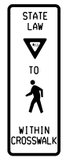
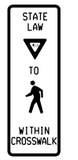
6 OF 7

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC
4-16	DIST	COUNTY		SHEET NO.
8-16	ELP	EL PASO		205

18

DATE: 4/22/2021 10:30:49 AM
FILE: $FILE$

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	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
222	62	R10-25		9 X 12	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
222	63	R1-6		12 X 36	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
222	64	R1-6		12 X 36	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		
222	65	R10-25		9 X 12	X		SIGN TO BE MOUNTED ON PED SIGNAL POLE			P		

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.

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS (SH 20)

SOSS

7 OF 7

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC
4-16 8-16	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		206

18

DATE: 4/22/2021 10:31:23 AM
FILE: $FILE$

DATE:
FILE:

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	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
228	1	R1-5		36" X 36"	X		10BWG	1	SA	P		
228	2	R1-5		36" X 36"	X		10BWG	1	SA	P		
228	3	S1-1		36" X 36"	X		10BWG	1	SA	P		
228	4	W16-7PR		24" X 12"	X							
228	5	S1-1		36" X 36"	X							
228	6	W16-7PR		24" X 12"	X		10BWG	1	SA	P		
228	7	S1-1		36" X 36"	X							
228	8	W16-7PR		24" X 12"	X							
228	9	S1-1		36" X 36"	X							
228	10	W16-7PR		24" X 12"	X		10BWG	1	SA	P		
228	11	S1-1		36" X 36"	X							
228	12	W16-7PL		24" X 12"	X							
228	13	S1-1		36" X 36"	X		10BWG	1	SA	P		
228	14	W16-7PL		24" X 12"	X							

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:

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.

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS (FM 1281)

SOSS

1 OF 4

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035; ETC.	FM 1281, ETC.
4-16 8-16	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		207

18

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	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
228	15	R1-6	STATE LAW / STOP / TO / WITHIN CROSSWALK	24" X 12"			SIGN TO BE MOUNTED ON PED SIGNAL POLE					
228	16	R1-6	STATE LAW / STOP / TO / WITHIN CROSSWALK	24" X 12"			SIGN TO BE MOUNTED ON PED SIGNAL POLE					
228	17	R1-6	STATE LAW / STOP / TO / WITHIN CROSSWALK	24" X 12"			SIGN TO BE MOUNTED ON PED SIGNAL POLE					
228	18	R1-6	STATE LAW / STOP / TO / WITHIN CROSSWALK	24" X 12"			SIGN TO BE MOUNTED ON PED SIGNAL POLE					
228	19	R10-25	PUSH BUTTON TO TURN ON WARNING LIGHTS	9" X 12"			SIGN TO BE MOUNTED ON PED SIGNAL POLE					
228	20	R10-25	PUSH BUTTON TO TURN ON WARNING LIGHTS	9" X 12"			SIGN TO BE MOUNTED ON PED SIGNAL POLE					
228	21	R6-1R	ONE WAY	9" X 12"			10BWG	1	SA	P		
228	22	R4-7		24" X 30"	X		10BWG	1	SA	P		
231	23	R4-7		24" X 30"	X		10BWG	1	SA	P		
231	24	R4-7		24" X 30"	X		10BWG	1	SA	P		
234	25	R6-1R	ONE WAY	9" X 12"			10BWG	1	SA	P		
234	26	R3-2		36"X36"	X		10BWG	1	SA	P		

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 (FM 1281)

SOSS

2 OF 4

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
4-16 8-16	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		208

18

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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	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
236	27	R4-7		24" X 30"	X		10BWG	1	SA	P	
237	28	R4-7		24" X 30"	X		10BWG	1	SA	P	
237	29	R6-1R	ONE WAY	9" X 12"			10BWG	1	SA	P	
238	30	R4-7		24" X 30"	X		10BWG	1	SA	P	
239	31	S5-1	SCHOOL SPEED LIMIT 30 WHEN FLASHING	24" X 48"	X		10BWG	1	SA	P	
239	32	S5-1	SCHOOL SPEED LIMIT 30 WHEN FLASHING	24" X 48"	X						
239	33	S7-1T	CELL PHONE USE PROHIBITED UP TO $1,000 FINE	24" X 32"	X		10BWG	1	SA	P	
239	34	R6-1R	ONE WAY	9" X 12"			10BWG	1	SA	P	
239	35	R4-7		24" X 30"	X		10BWG	1	SA	P	
239	36	S5-1	SCHOOL SPEED LIMIT 30 WHEN FLASHING	24" X 48"	X		10BWG	1	SA	P	
239	37	S5-1	SCHOOL SPEED LIMIT 30 WHEN FLASHING	24" X 48"	X						
239	38	S7-1T	CELL PHONE USE PROHIBITED UP TO $1,000 FINE	24" X 32"	X		10BWG	1	SA	P	
240	39	R4-7		24" X 30"	X		10BWG	1	SA	P	
241	40	S5-1	SCHOOL SPEED LIMIT 35 WHEN FLASHING	24" X 48"	X		10BWG	1	SA	P	
241	41	S5-1	SCHOOL SPEED LIMIT 35 WHEN FLASHING	24" X 48"	X						
241	42	S7-1T	CELL PHONE USE PROHIBITED UP TO $1,000 FINE	24" X 32"	X		10BWG	1	SA	P	
241	43	S5-1	SCHOOL SPEED LIMIT 35 WHEN FLASHING	24" X 48"	X		10BWG	1	SA	P	

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 (FM 1281)

SOSS

3 OF 4

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		3451	01	035; ETC.	FM 1281, ETC.
4-16		DIST	COUNTY		SHEET NO.
8-16		ELP	EL PASO		209

18

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DATE:
FILE:

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	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	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"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY N TY S
241	44	R4-7		24" X 30"	X		10BWG	1	SA	P		
241	45	S5-1		24" X 48"	X							
							10BWG	1	SA	P		
241	46	S7-1T		24" X 32"	X							

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 (FM 1281)

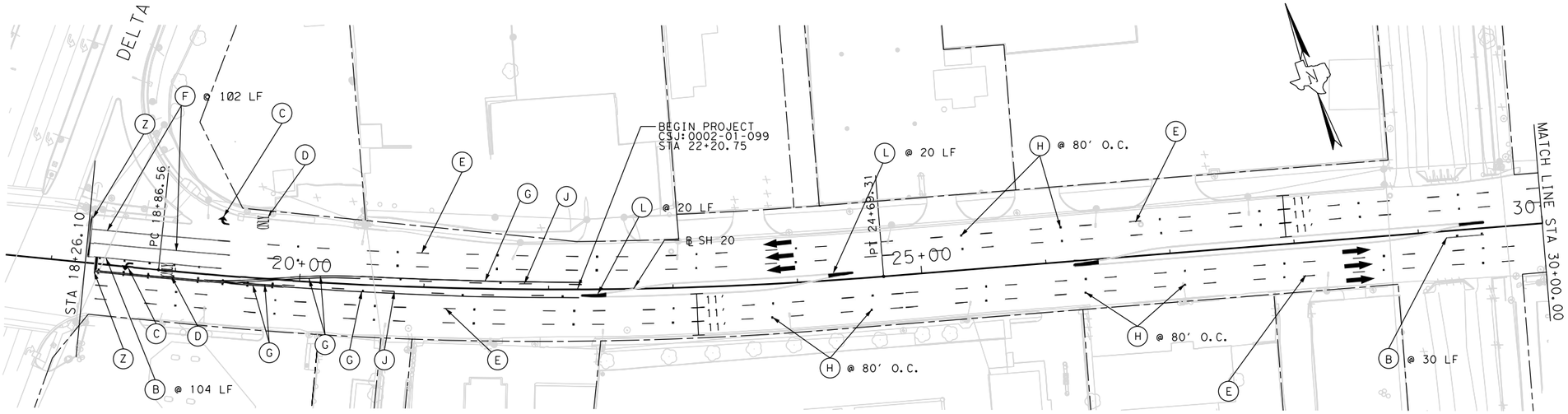
SOSS

4 OF 4

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
4-16 8-16	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		210

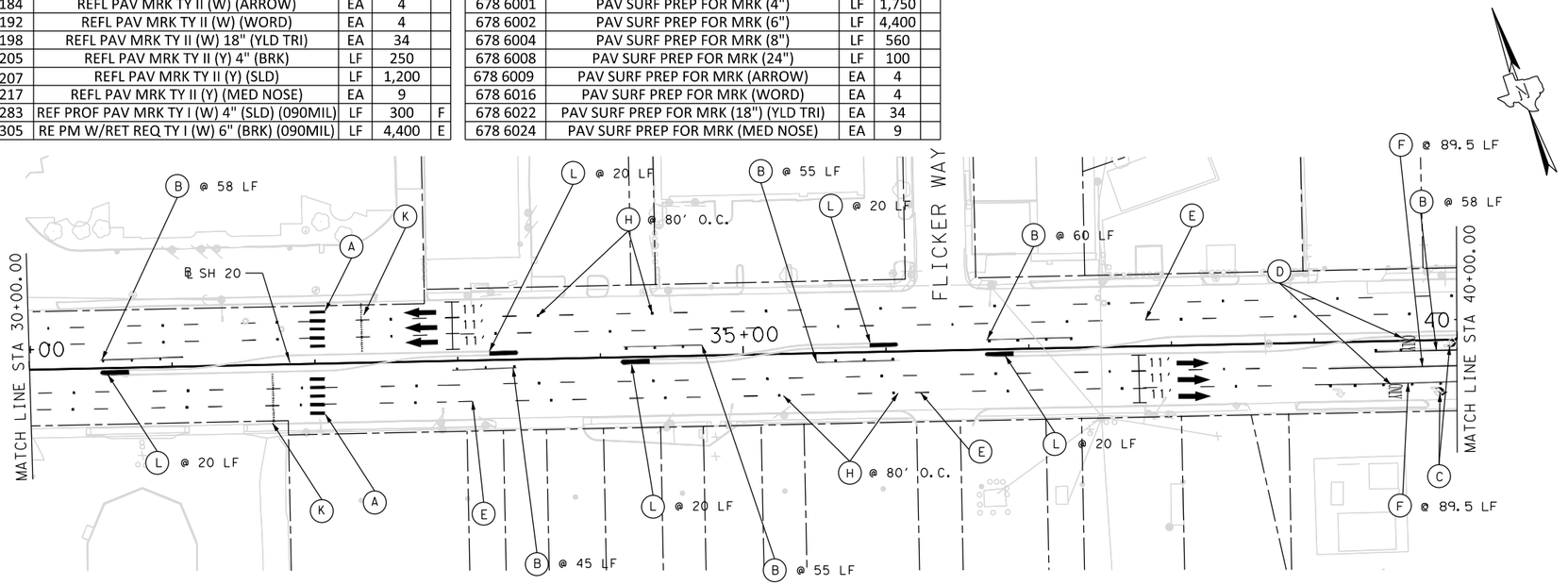
18

FINAL SUBMITTAL



ITEM	DESCRIPTION	UNIT	QTY	ID
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	560	B
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	100	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	4	C
666 6077	REFL PAV MRK TY I (W) (WORD) (090MIL)	EA	4	D
666 6155	REFL PAV MRK TY I (Y) (MED NOSE) (090 MIL)	EA	9	L
666 6098	REFL PAV MRK TY I (W) 18" (YLD TRI) (090 MIL)	EA	34	K
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	300	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	4,400	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	560	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	100	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	4	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	4	
666 6198	REFL PAV MRK TY II (W) 18" (YLD TRI)	EA	34	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	250	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	1,200	
666 6217	REFL PAV MRK TY II (Y) (MED NOSE)	EA	9	
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	300	F
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	4,400	E

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	250	J
666 6344	REF PROF PAV MRK TY I(Y) 4" (SLD) (090MIL)	LF	1,200	G
672 6009	REFL PAV MRKR TY II-A-A	EA	480	I
672 6010	REFL PAV MRKR TY II-C-R	EA	505	H
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	1,725	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	545	
677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	100	
677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	3	
677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	2	
677 6019	ELIM EXT PAV MRK & MRKS (36")(YLD TRI)	EA	34	
678 6001	PAV SURF PREP FOR MRK (4")	LF	1,750	
678 6002	PAV SURF PREP FOR MRK (6")	LF	4,400	
678 6004	PAV SURF PREP FOR MRK (8")	LF	560	
678 6008	PAV SURF PREP FOR MRK (24")	LF	100	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	4	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	4	
678 6022	PAV SURF PREP FOR MRK (18") (YLD TRI)	EA	34	
678 6024	PAV SURF PREP FOR MRK (MED NOSE)	EA	9	



0 50 100

SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

NOTES

1. REFER TO STANDARD STRIPING DETAILS SHEET FOR ALL LANE PAVEMENT MARKING DETAILS.
2. ALL EXISTING CONFLICTING STRIPING SHALL BE REMOVED AND SHALL BE PAID BY ITEM 677.
3. LOCATION OF THE NEW STRIPING WILL BE BASED ON THE EXISTING STRIPING.
4. ALL SIGN LOCATIONS SHOWN ARE APPROXIMATE AND CAN BE FIELD ADJUSTED AS NECESSARY TO AVOID OBSTRUCTIONS.
5. SIGNS SHALL BE RETRO-REFLECTIVE TO SHOW THE SAME SHAPE AND SIMILAR COLORS BY BOTH DAY AND NIGHT.

NO.	REVISION	BY	DATE

4/22/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED PROFESSIONAL ENGINEER

ENGINEER'S NOTE

"THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARVIN H. GOMEZ, P.E. No. 86920 ON APRIL 22, 2021 ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT"

GRV Integrated Engineering Solutions LLC
11385 JAMES WATT DR., SUITE B-13
EL PASO, TEXAS 79936
PH: (915) 351-6701 FAX: (915) 243-6010
www.integratedengineeringsolutions.com
TBPE F#15313 TBPLS F#10194278

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 18+26.10 - STA 40+00.00

1 OF 17

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC. / 211

4/22/2021 9:11:14 AM
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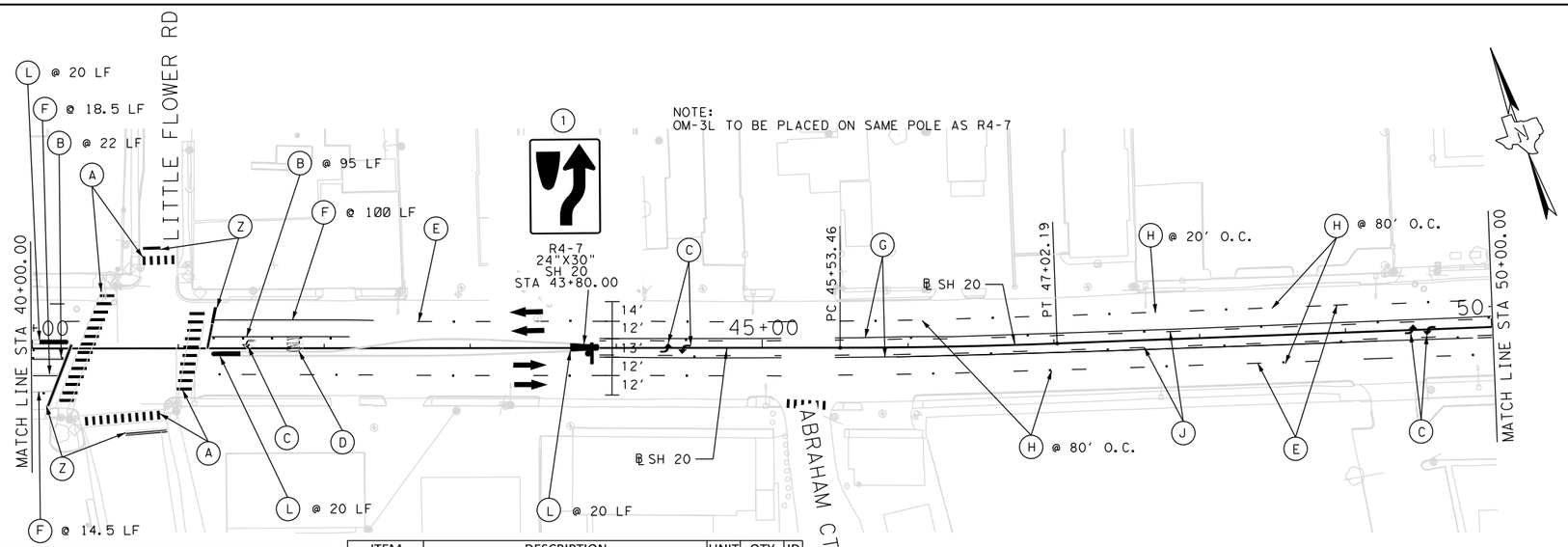
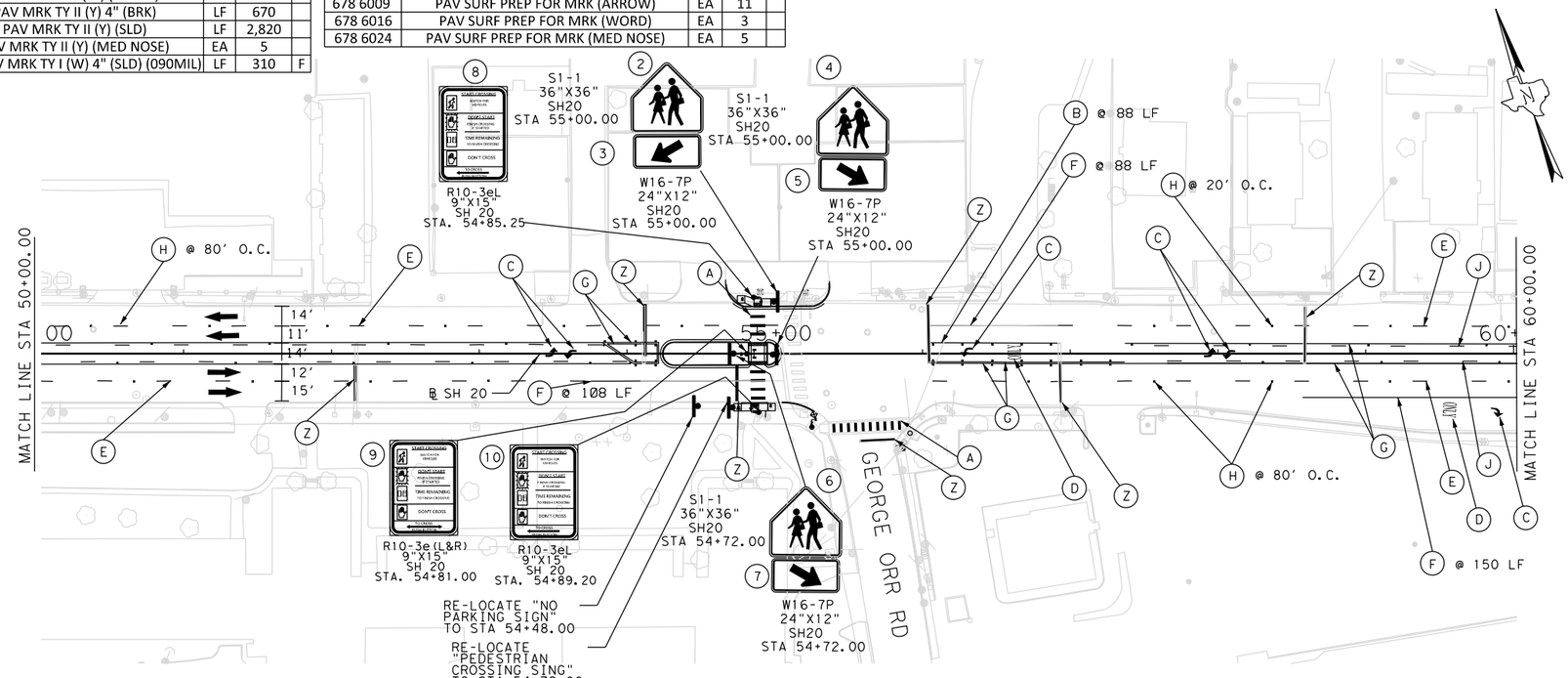
FINAL SUBMITTAL



ITEM	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY 10BWG (1) SA(P)	EA	11	
644 6068	RELOCATE SM RD RN SUP&AM TY 10BWG	EA	2	
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	320	B
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	330	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	510	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	11	C
666 6077	REFL PAV MRK TY I (W) (WORD) (090MIL)	EA	3	D
666 6155	REFL PAV MRK TY I (Y) (MED NOSE) (090 MIL)	EA	5	L
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	310	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	4,317	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	320	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	330	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	510	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	11	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	3	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	670	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	2,820	
666 6217	REFL PAV MRK TY II (Y) (MED NOSE)	EA	5	
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	310	F

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	4,320	E
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	690	J
666 6344	REF PROF PAV MRK TY I (Y) 4" (SLD) (090MIL)	LF	2,820	G
672 6009	REFL PAV MRKR TY II-A-A	EA	2,080	I
672 6010	REFL PAV MRKR TY II-C-R	EA	126	H
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	4,924	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	895	
677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	190	
677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	1	
677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	1	
678 6001	PAV SURF PREP FOR MRK (4")	LF	3,820	
678 6002	PAV SURF PREP FOR MRK (6")	LF	4,320	
678 6004	PAV SURF PREP FOR MRK (8")	LF	320	
678 6006	PAV SURF PREP FOR MRK (12")	LF	330	
678 6008	PAV SURF PREP FOR MRK (24")	LF	510	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	11	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	3	
678 6024	PAV SURF PREP FOR MRK (MED NOSE)	EA	5	



0 50 100
SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

NOTES

1. REFER TO STANDARD STRIPING DETAILS SHEET FOR ALL LANE PAVEMENT MARKING DETAILS.
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4. ALL SIGN LOCATIONS SHOWN ARE APPROXIMATE AND CAN BE FIELD ADJUSTED AS NECESSARY TO AVOID OBSTRUCTIONS.
5. SIGNS SHALL BE RETRO-REFLECTIVE TO SHOW THE SAME SHAPE AND SIMILAR COLORS BY BOTH DAY AND NIGHT.

NO.	REVISION	BY	DATE

4/22/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED
PROFESSIONAL ENGINEER

ENGINEER'S NOTE

"THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARVIN H. GOMEZ, P.E. No. 86920 ON APRIL 22, 2021 ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT"

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BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 40+00.00 - STA 60+00.00

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	212

4/22/2021 9:13:54 AM
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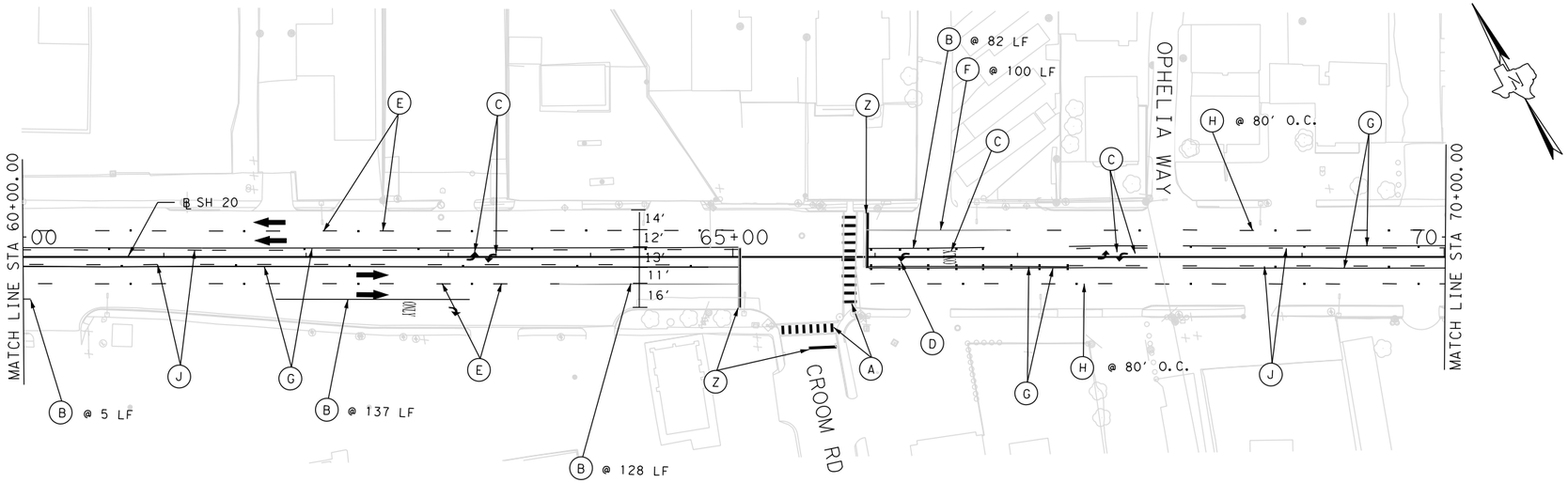
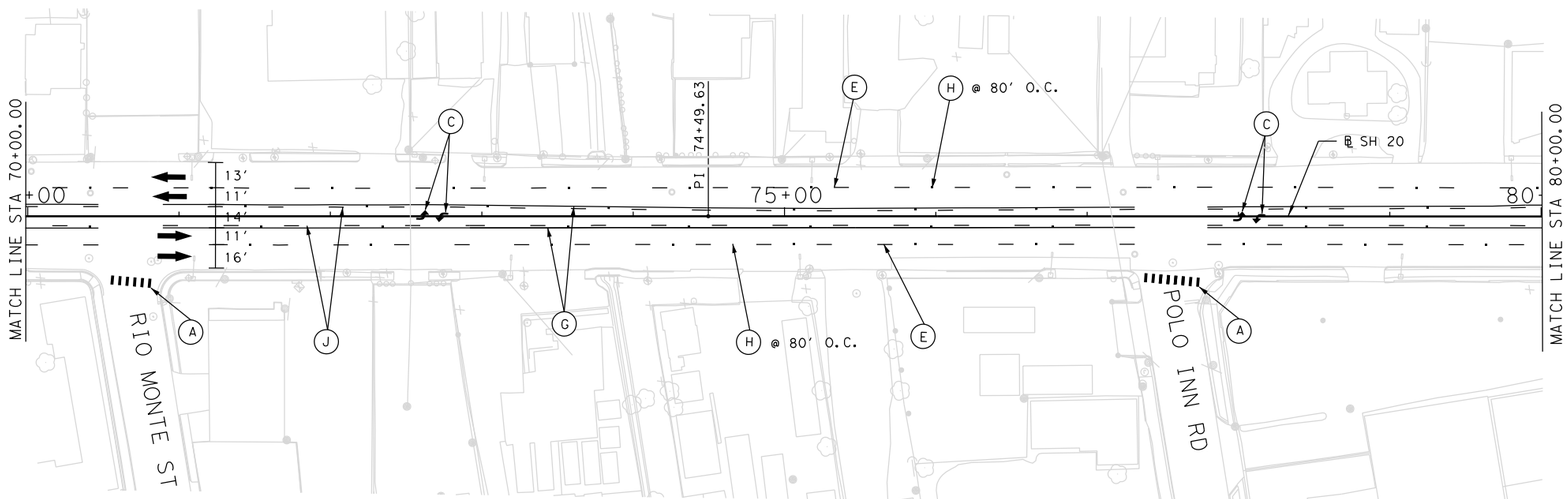
FINAL SUBMITTAL



ITEM	DESCRIPTION	UNIT	QTY	ID
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	290	B
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	140	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	380	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	11	C
666 6077	REFL PAV MRK TY I (W) (WORD) (090MIL)	EA	2	D
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	310	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,000	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	290	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	140	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	380	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	11	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	2	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	1,900	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	3,800	
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	310	F

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	1,000	E
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	1,900	J
666 6344	REF PROF PAV MRK TY I (Y) 4" (SLD) (090MIL)	LF	3,800	G
672 6010	REFL PAV MRKR TY II-C-R	EA	109	H
672 6009	REFL PAV MRKR TY II-A-A	EA	1,536	I
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	5,650	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	200	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	340	
678 6001	PAV SURF PREP FOR MRK (4")	LF	6,010	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1,000	
678 6004	PAV SURF PREP FOR MRK (8")	LF	290	
678 6006	PAV SURF PREP FOR MRK (12")	LF	140	
678 6008	PAV SURF PREP FOR MRK (24")	LF	380	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	11	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	2	



0 50 100

SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

NOTES

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Texas Department of Transportation®

NO.	REVISION	BY	DATE

4/22/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED PROFESSIONAL ENGINEER

ENGINEER'S NOTE

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TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 60+00.00 - STA 80+00.00

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	213

4/22/2021 9:16:07 AM
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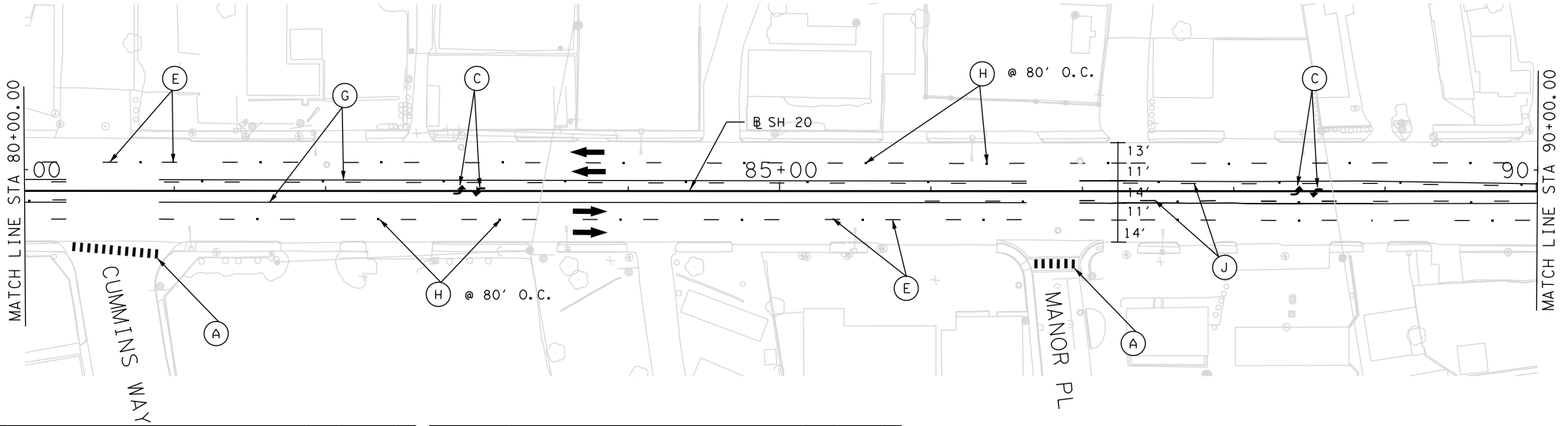
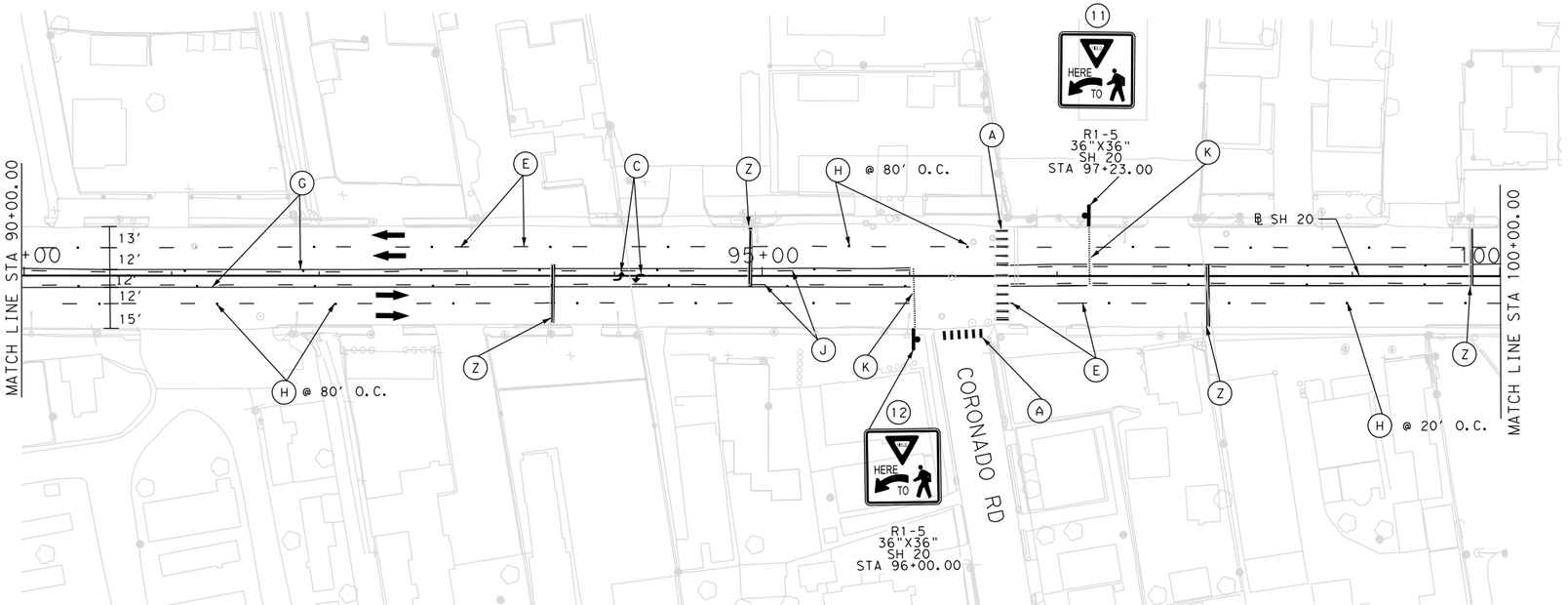


ITEM	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY 10BWG (1) SA(P)	EA	2	
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	170	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	260	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	6	C
666 6098	REFL PAV MRK TY I (W) 18" (YLD TRI) (090 MIL)	EA	40	K
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,000	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	170	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	260	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	6	D
666 6198	REFL PAV MRK TY II (W) 18" (YLD TRI)	EA	40	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	2,000	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	4,000	
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	1,000	E

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	2,000	J
666 6344	REF PROF PAV MRK TY I (Y) 4" (SLD) (090MIL)	LF	4,000	G
672 6009	REFL PAV MRKR TY II-A-A	EA	1,600	I
672 6010	REFL PAV MRKR TY II-C-R	EA	100	H
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	6,000	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	203	
677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	110	
678 6001	PAV SURF PREP FOR MRK (4")	LF	6,000	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1,000	
678 6006	PAV SURF PREP FOR MRK (12")	LF	170	
678 6008	PAV SURF PREP FOR MRK (24")	LF	260	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	6	
678 6022	PAV SURF PREP FOR MRK (18") (YLD TRI)	EA	40	



0 50 100

SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

NOTES

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NO.	REVISION	BY	DATE

4/22/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED PROFESSIONAL ENGINEER

ENGINEER'S NOTE

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AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 80+00.00 - STA 100+00.00

4 OF 17

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	214

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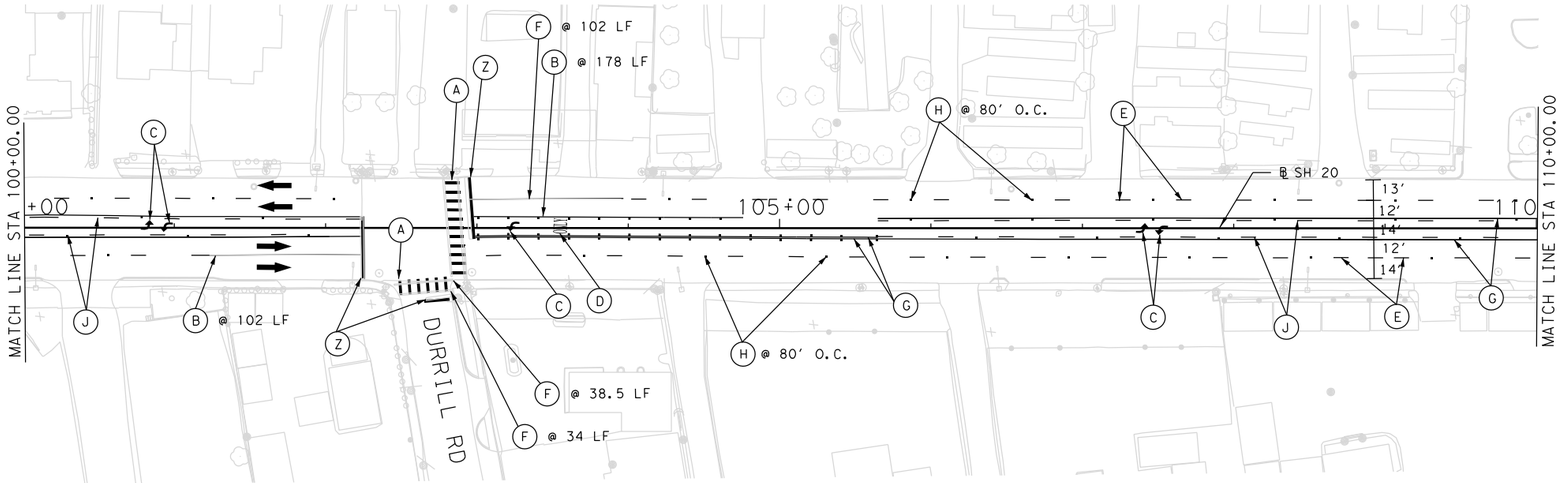
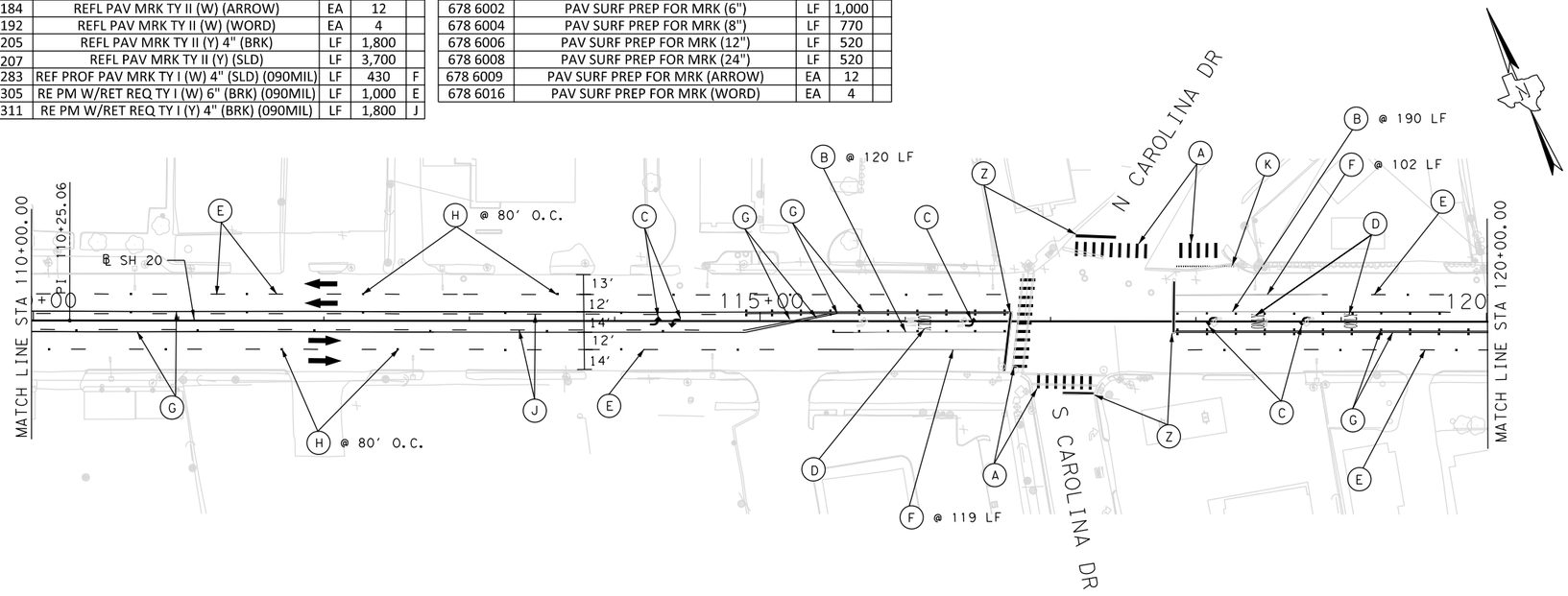


ITEM	DESCRIPTION	UNIT	QTY	ID
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	770	B
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	520	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	520	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	12	C
666 6077	REFL PAV MRK TY I (W) (WORD) (090MIL)	EA	4	D
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	430	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,000	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	770	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	520	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	520	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	12	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	4	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	1,800	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	3,700	
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	430	F
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	1,000	E
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	1,800	J

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6344	REF PROF PAV MRK TY I (Y) 4" (SLD) (090MIL)	LF	3,800	G
672 6009	REFL PAV MRKR TY II-A-A	EA	1,510	I
672 6010	REFL PAV MRKR TY II-C-R	EA	144	H
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	8,500	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	600	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	723	
677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	180	
677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	3	
677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	2	
678 6001	PAV SURF PREP FOR MRK (4")	LF	6,030	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1,000	
678 6004	PAV SURF PREP FOR MRK (8")	LF	770	
678 6006	PAV SURF PREP FOR MRK (12")	LF	520	
678 6008	PAV SURF PREP FOR MRK (24")	LF	520	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	12	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	4	



0 50 100

SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

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SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 100+00.00 - STA 120+00.00

5 OF 17

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	215

4/22/2021 9:17:30 AM
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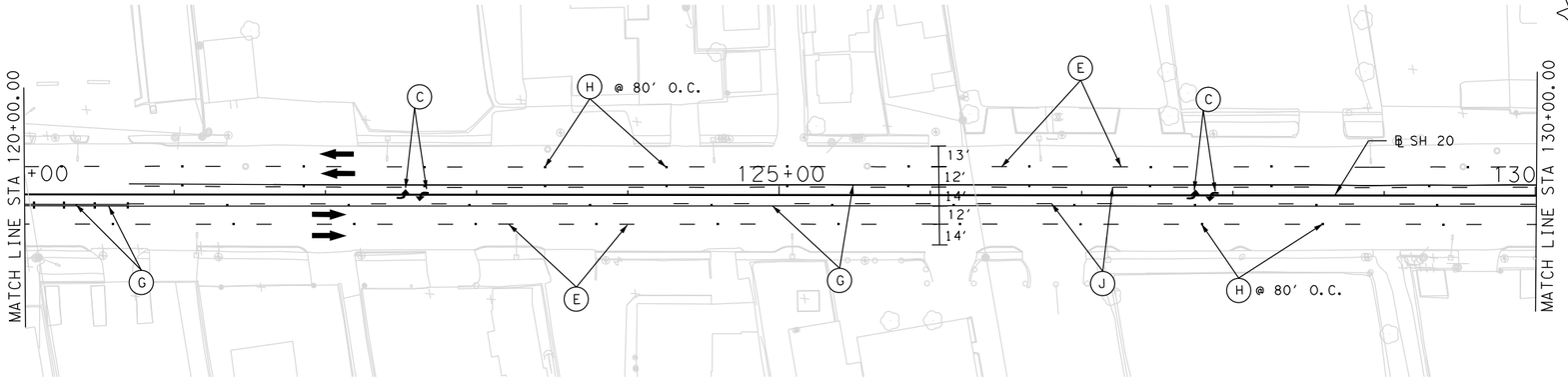

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	570	B
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	110	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	200	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	11	C
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	4	D
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	220	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,000	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	570	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	110	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	200	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	11	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	4	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	1,840	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	3,680	
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	220	F

ITEM	DESCRIPTION	UNIT	QTY	ID
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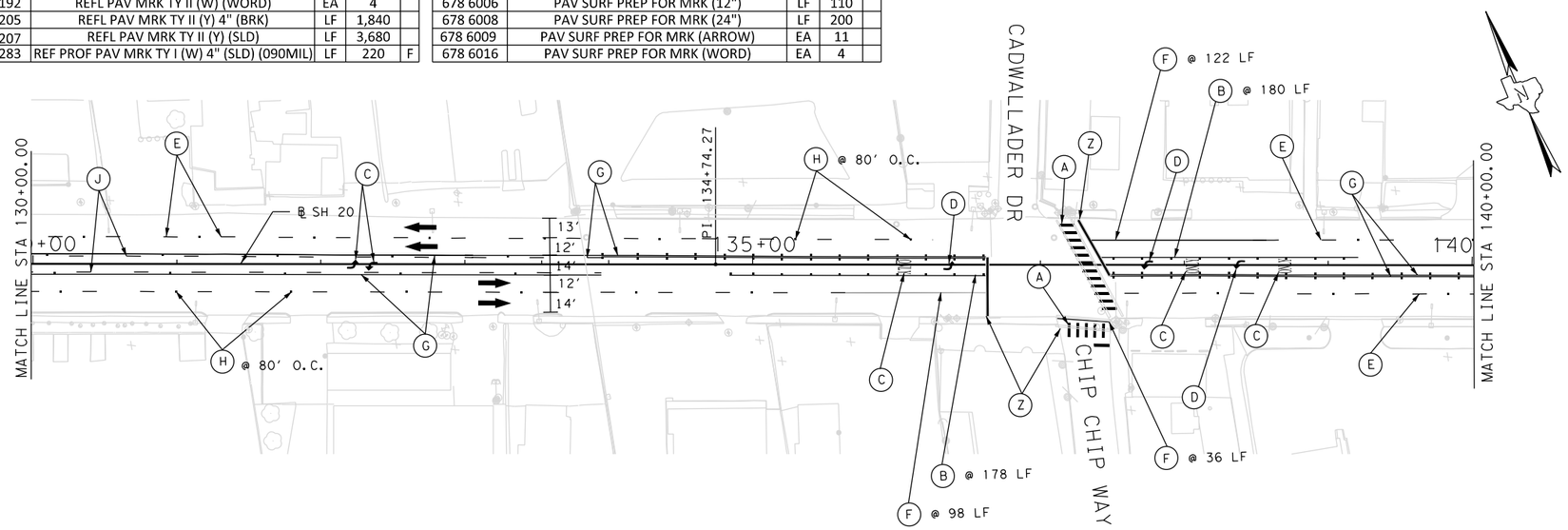
672 6009	REFL PAV MRKR TY II-A-A	EA	1,534	I
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	5,740	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	210	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	238	
678 6001	PAV SURF PREP FOR MRK (4")	LF	5,740	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1,000	
678 6004	PAV SURF PREP FOR MRK (8")	LF	570	
678 6006	PAV SURF PREP FOR MRK (12")	LF	110	
678 6008	PAV SURF PREP FOR MRK (24")	LF	200	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	11	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	4	



0 50 100

SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

NOTES

1. REFER TO STANDARD STRIPING DETAILS SHEET FOR ALL LANE PAVEMENT MARKING DETAILS.
2. ALL EXISTING CONFLICTING STRIPING SHALL BE REMOVED AND SHALL BE PAID BY ITEM 677.
3. LOCATION OF THE NEW STRIPING WILL BE BASED ON THE EXISTING STRIPING.
4. ALL SIGN LOCATIONS SHOWN ARE APPROXIMATE AND CAN BE FIELD ADJUSTED AS NECESSARY TO AVOID OBSTRUCTIONS.
5. SIGNS SHALL BE RETRO-REFLECTIVE TO SHOW THE SAME SHAPE AND SIMILAR COLORS BY BOTH DAY AND NIGHT.

NO.	REVISION	BY	DATE

4/22/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED PROFESSIONAL ENGINEER

ENGINEER'S NOTE

"THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARVIN H. GOMEZ, P.E. No. 86920 ON APRIL 22, 2021 ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT"

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HALFF
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BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 120+00.00 - STA 140+00.00

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	216

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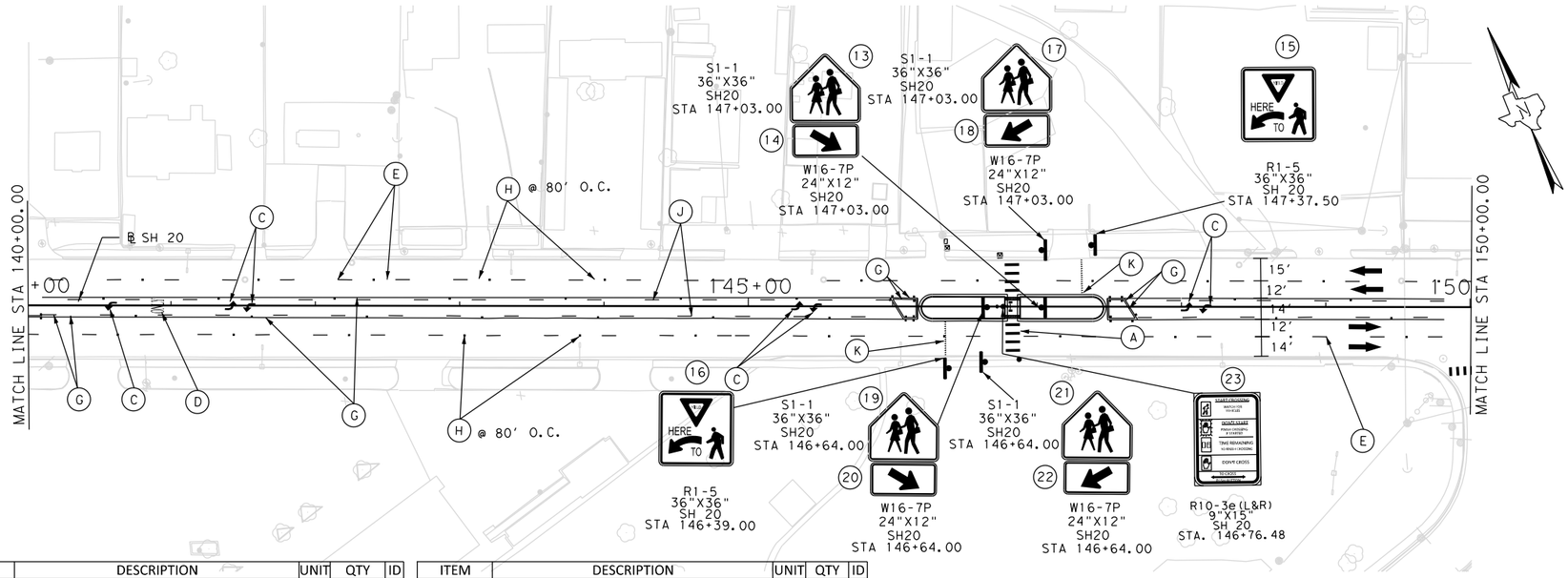
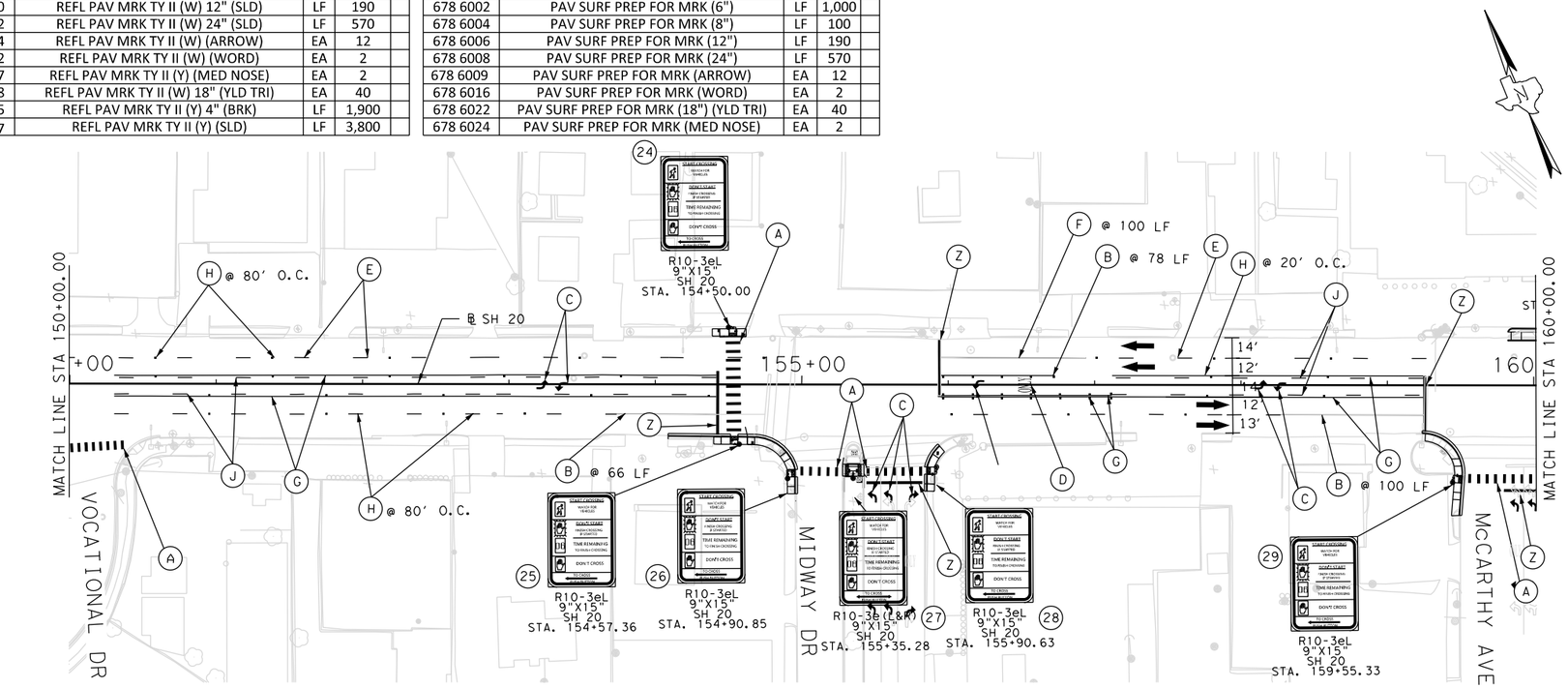


ITEM	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY 10BWG (1) SA(P)	EA	13	
644 6068	RELOCATE SM RD RN SUP&AM TY 10BWG	EA	1	
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	100	B
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	190	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	570	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	12	C
666 6077	REFL PAV MRK TY I (W) (WORD) (090MIL)	EA	2	D
666 6155	REFL PAV MRK TY I (Y) (MED NOSE) (090 MIL)	EA	2	L
666 6098	REFL PAV MRK TY I (W) 18" (YLD TRI) (090 MIL)	EA	40	K
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	270	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,000	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	100	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	190	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	570	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	12	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	2	
666 6217	REFL PAV MRK TY II (Y) (MED NOSE)	EA	2	
666 6198	REFL PAV MRK TY II (W) 18" (YLD TRI)	EA	40	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	1,900	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	3,800	

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	270	F
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	1,000	J
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	1,900	G
666 6344	REF PROF PAV MRK TY I(Y) 4" (SLD) (090MIL)	LF	3,800	G
672 6010	REFL PAV MRKR TY II-C-R	EA	103	H
672 6009	REFL PAV MRKR TY II-A-A	EA	1,553	I
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	5,315	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	100	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	688	
677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	110	
677 6019	ELIM EXT PAV MRK & MRKS (36")(YLD TRI)	EA	40	
678 6001	PAV SURF PREP FOR MRK (4")	LF	5,970	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1,000	
678 6004	PAV SURF PREP FOR MRK (8")	LF	100	
678 6006	PAV SURF PREP FOR MRK (12")	LF	190	
678 6008	PAV SURF PREP FOR MRK (24")	LF	570	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	12	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	2	
678 6022	PAV SURF PREP FOR MRK (18") (YLD TRI)	EA	40	
678 6024	PAV SURF PREP FOR MRK (MED NOSE)	EA	2	



0 50 100
SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

NOTES

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NO.	REVISION	BY	DATE

4/22/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED
PROFESSIONAL ENGINEER

ENGINEER'S NOTE

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(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 140+00.00 - STA 160+00.00

7 OF 17

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	217

4/22/2021 9:24:19 AM
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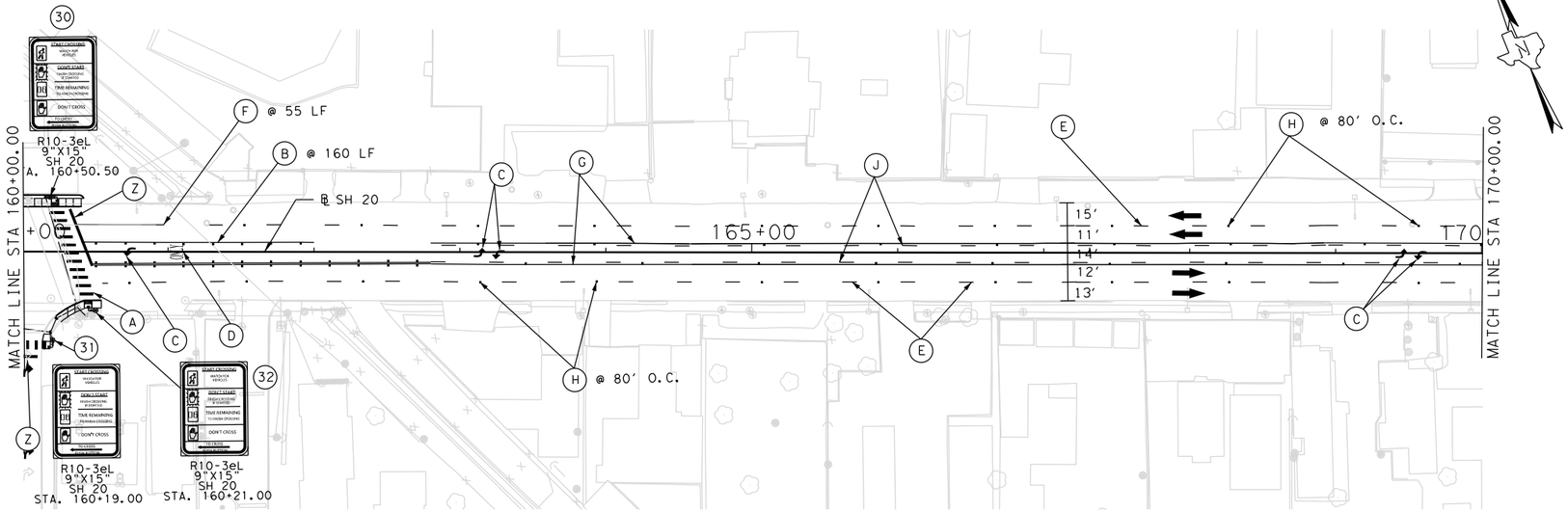
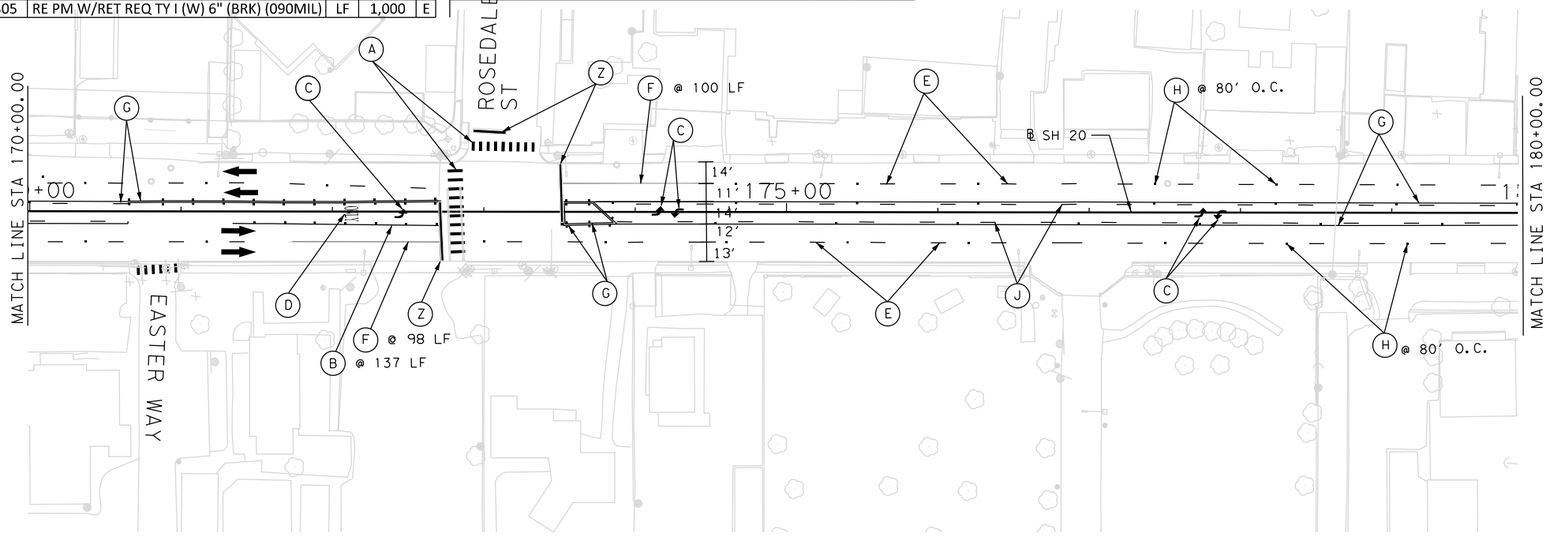
FINAL SUBMITTAL



ITEM	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY 10BWG (1) SA(P)	EA	3	
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	300	B
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	160	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	320	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	12	C
666 6077	REFL PAV MRK TY I (W) (WORD) (090MIL)	EA	2	D
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	300	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,000	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	300	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	160	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	320	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	12	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	2	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	1,890	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	3,780	
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	1,000	E

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	1,890	J
666 6344	REF PROF PAV MRK TY I (Y) 4" (SLD) (090MIL)	LF	3,780	G
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	300	F
672 6010	REFL PAV MRKR TY II-C-R	EA	130	H
672 6009	REFL PAV MRKR TY II-A-A	EA	1,568	I
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	5,600	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	300	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	442	
678 6001	PAV SURF PREP FOR MRK (4")	LF	5,970	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1,000	
678 6004	PAV SURF PREP FOR MRK (8")	LF	300	
678 6006	PAV SURF PREP FOR MRK (12")	LF	160	
678 6008	PAV SURF PREP FOR MRK (24")	LF	320	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	12	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	2	



0 50 100
SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

NOTES

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Texas Department of Transportation®

NO.	REVISION	BY	DATE

4/22/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED PROFESSIONAL ENGINEER

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TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 160+00.00 - STA 180+00.00

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	055, ETC.	218

4/22/2021 7:58:37 AM
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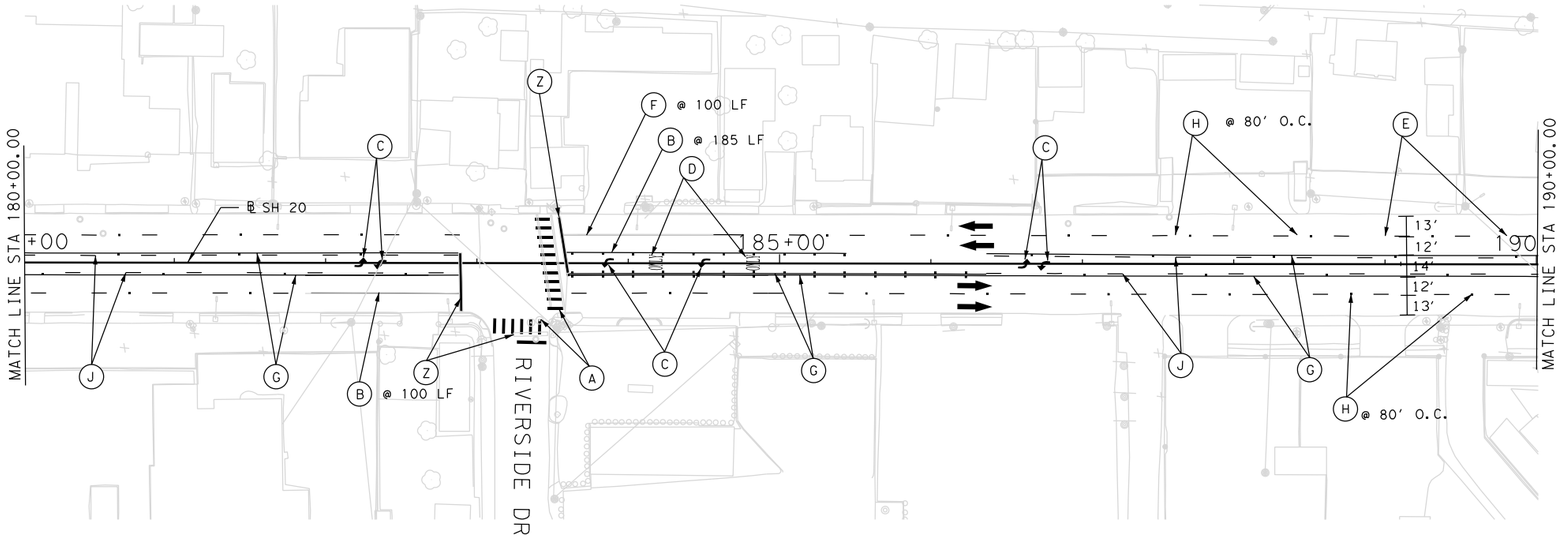
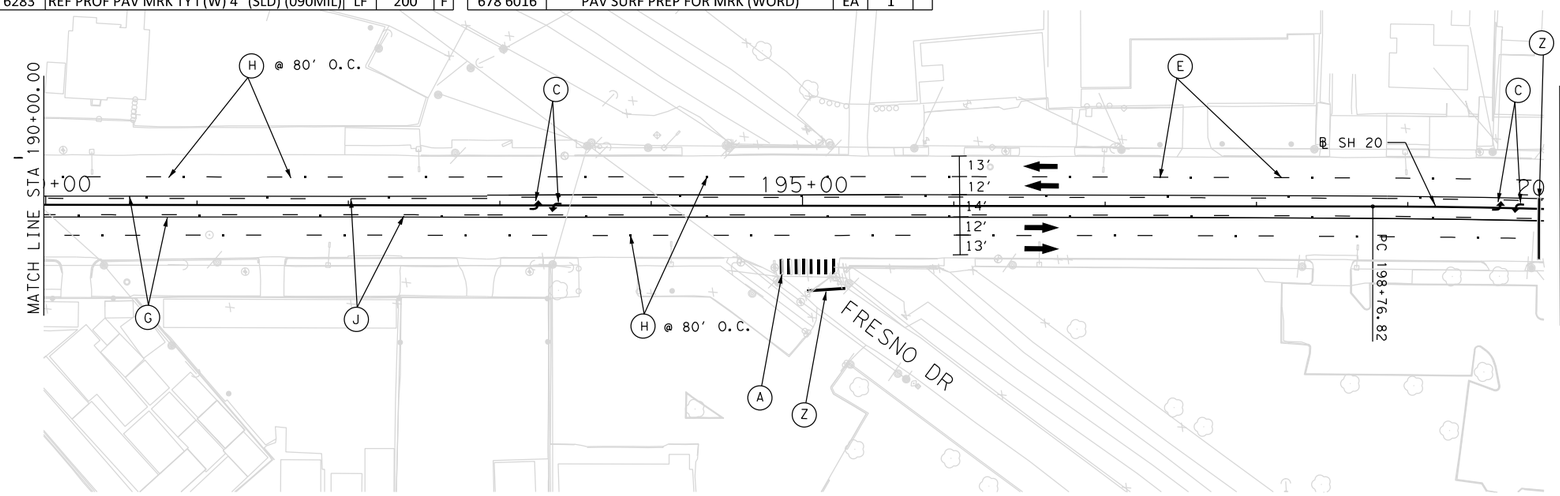


ITEM	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY 10BWG (1) SA(P)	EA	1	
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	390	B
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	150	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	250	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	10	C
666 6077	REFL PAV MRK TY I (W) (WORD) (090MIL)	EA	1	D
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	200	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,000	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	390	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	150	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	250	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	10	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	1	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	1,870	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	3,800	
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	200	F

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	1,000	E
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	1,870	J
666 6344	REF PROF PAV MRK TY I (Y) 4" (SLD) (090MIL)	LF	3,740	G
672 6010	REFL PAV MRKR TY II-C-R	EA	120	H
672 6009	REFL PAV MRKR TY II-A-A	EA	1,524	I
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	5,870	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	200	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	288	
677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	80	
678 6001	PAV SURF PREP FOR MRK (4")	LF	6,000	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1,000	
678 6004	PAV SURF PREP FOR MRK (8")	LF	390	
678 6006	PAV SURF PREP FOR MRK (12")	LF	150	
678 6008	PAV SURF PREP FOR MRK (24")	LF	250	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	10	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	1	



0 50 100
SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

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SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 180+00.00 - STA 200+00.00

9 OF 17

	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
DESIGNED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
CHECKED:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
DRAWN:	EL PASO	EL PASO	3451	01	055, ETC.	219
CHECKED:						

4/22/2021 8:00:04 AM
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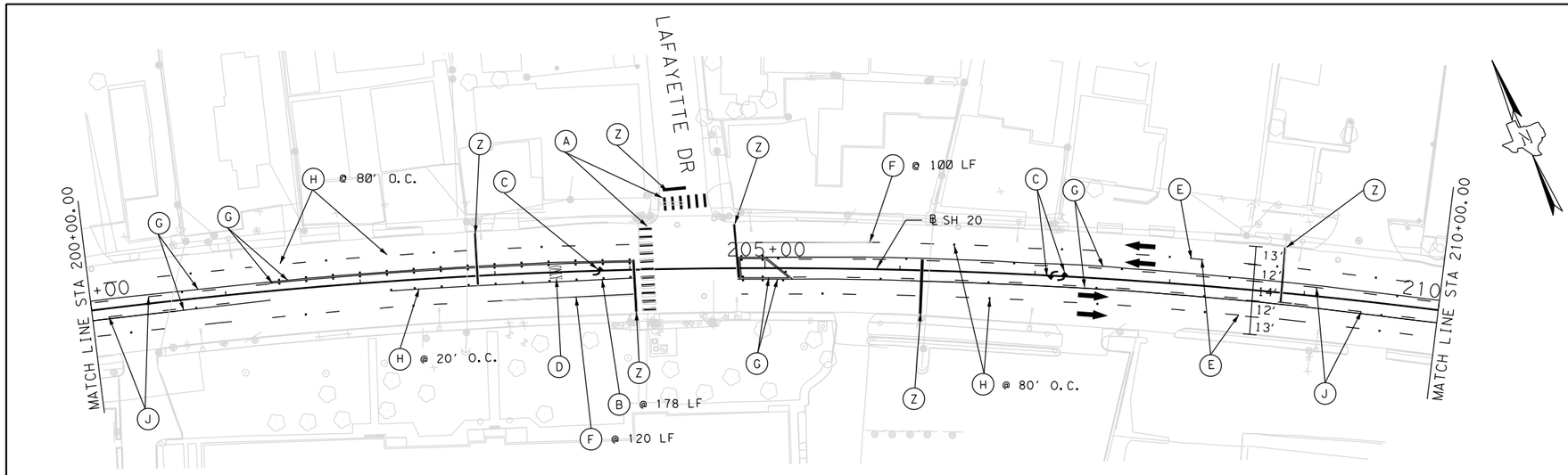
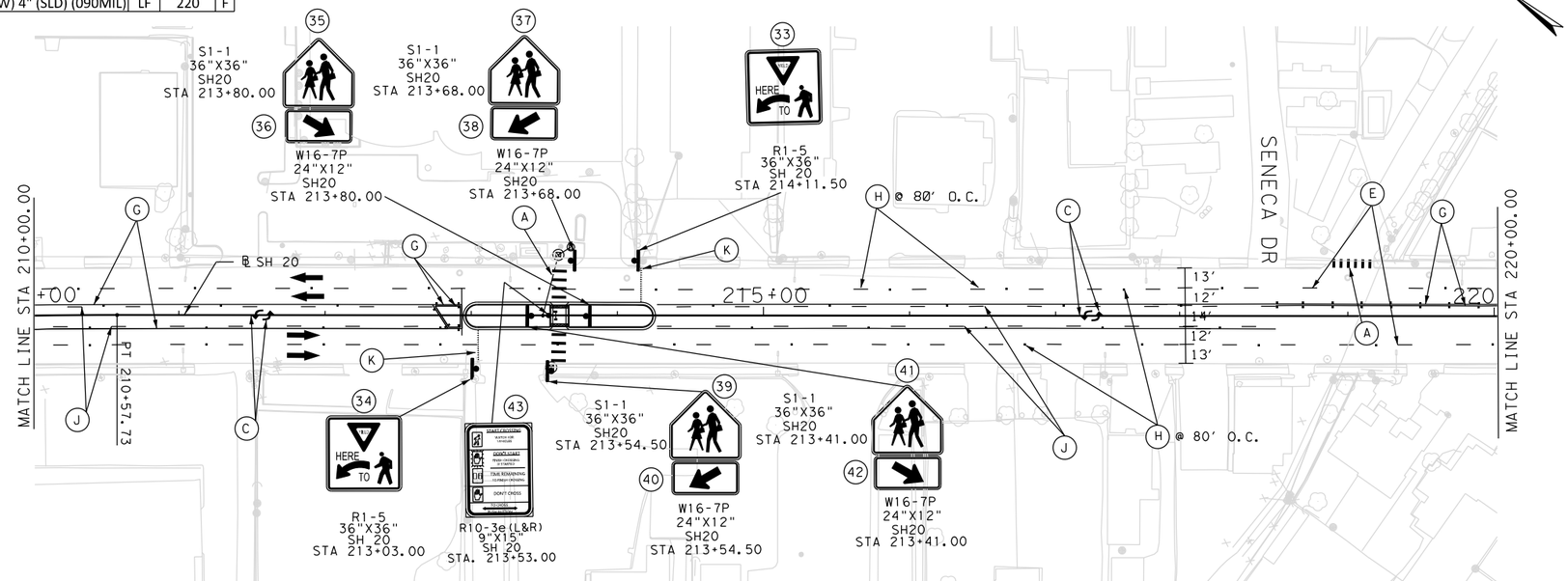
FINAL SUBMITTAL



ITEM	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY 10BWG (1) SA(P)	EA	10	
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	380	B
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	200	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	340	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	10	C
666 6077	REFL PAV MRK TY I (W) (WORD) (090MIL)	EA	3	D
666 6155	REFL PAV MRK TY I (Y) (MED NOSE) (090 MIL)	EA	2	L
666 6098	REFL PAV MRK TY I (W) 18" (YLD TRI) (090 MIL)	EA	40	K
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	220	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,000	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	380	
666 6155	REFL PAV MRK TY II (W) 12" (SLD)	LF	200	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	340	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	10	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	3	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	1,190	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	3,910	
666 6217	REFL PAV MRK TY II (Y) (MED NOSE)	EA	2	
666 6198	REFL PAV MRK TY II (W) 18" (YLD TRI)	EA	40	
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	220	F

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	1,000	E
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	1,190	J
666 6344	REF PROF PAV MRK TY I (Y) 4" (SLD) (090MIL)	LF	3,910	G
672 6010	REFL PAV MRKR TY II-C-R	EA	120	H
672 6009	REFL PAV MRKR TY II-A-A	EA	1,624	I
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	5,710	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	190	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	200	
677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	210	
677 6019	ELIM EXT PAV MRK & MRKS (36")(YLD TRI)	EA	40	
678 6001	PAV SURF PREP FOR MRK (4")	LF	5,320	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1,000	
678 6004	PAV SURF PREP FOR MRK (8")	LF	380	
678 6006	PAV SURF PREP FOR MRK (12")	LF	200	
678 6008	PAV SURF PREP FOR MRK (24")	LF	340	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	10	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	3	
678 6022	PAV SURF PREP FOR MRK (18") (YLD TRI)	EA	40	
678 6024	PAV SURF PREP FOR MRK (MED NOSE)	EA	2	



0 50 100
SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

NOTES

1. REFER TO STANDARD STRIPING DETAILS SHEET FOR ALL LANE PAVEMENT MARKING DETAILS.
2. ALL EXISTING CONFLICTING STRIPING SHALL BE REMOVED AND SHALL BE PAID BY ITEM 677.
3. LOCATION OF THE NEW STRIPING WILL BE BASED ON THE EXISTING STRIPING.
4. ALL SIGN LOCATIONS SHOWN ARE APPROXIMATE AND CAN BE FIELD ADJUSTED AS NECESSARY TO AVOID OBSTRUCTIONS.
5. SIGNS SHALL BE RETRO-REFLECTIVE TO SHOW THE SAME SHAPE AND SIMILAR COLORS BY BOTH DAY AND NIGHT.

Texas Department of Transportation®

NO.	REVISION	BY	DATE

4/22/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED PROFESSIONAL ENGINEER

ENGINEER'S NOTE

"THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARVIN H. GOMEZ, P.E. No. 86920 ON APRIL 22, 2021 ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT"

GRV Integrated Engineering Solutions LLC
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HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 200+00.00 - STA 220+00.00

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	220

4/22/2021 8:01:47 AM
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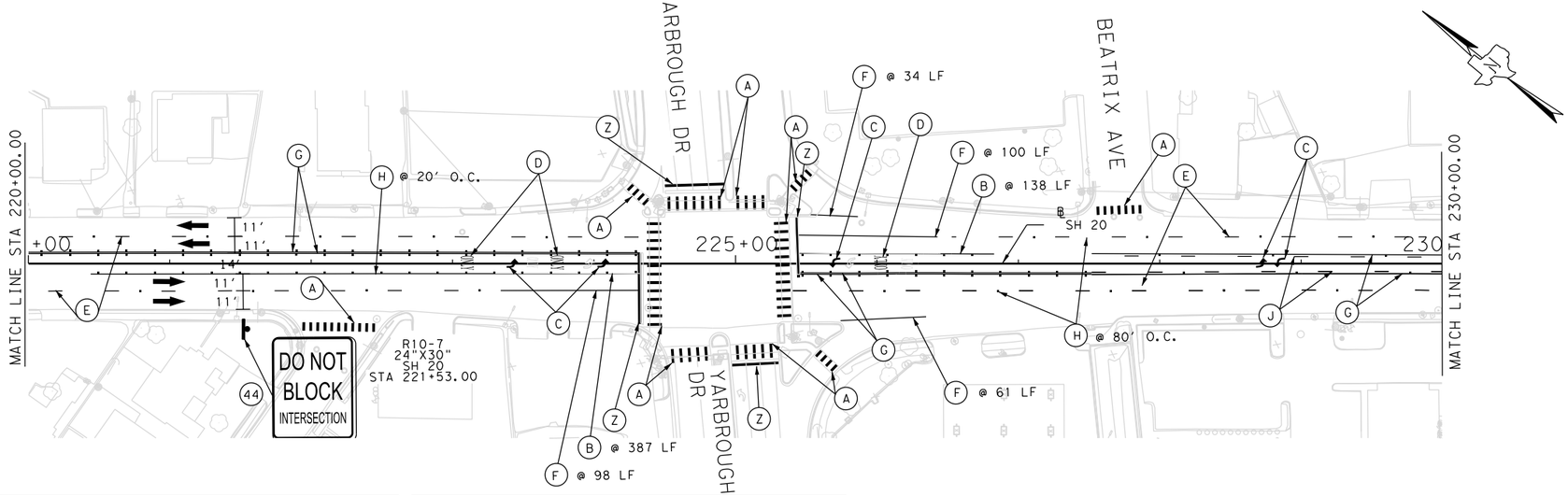
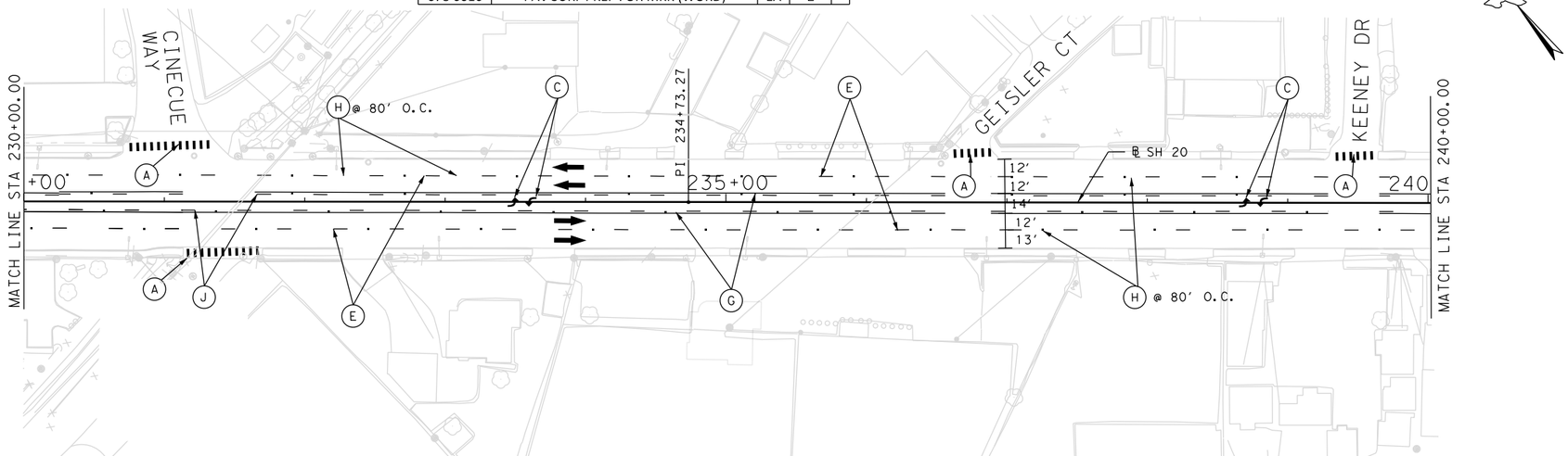
FINAL SUBMITTAL



ITEM	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY 10BWG (1) SA(P)	EA	1	
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	730	B
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	170	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	980	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	10	C
666 6077	REFL PAV MRK TY I (W) (WORD) (090MIL)	EA	2	D
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	200	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,000	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	730	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	170	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	980	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	10	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	2	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	1,180	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	3,770	
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	200	F

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	1,000	E
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	1,180	J
666 6344	REF PROF PAV MRK TY I (Y) 4" (SLD) (090MIL)	LF	3,770	G
672 6009	REFL PAV MRKR TY II-A-A	EA	1,574	I
672 6010	REFL PAV MRKR TY II-C-R	EA	155	H
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	5,370	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	200	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	917	
677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	2	
677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	2	
678 6001	PAV SURF PREP FOR MRK (4")	LF	5,150	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1,000	
678 6004	PAV SURF PREP FOR MRK (8")	LF	730	
678 6006	PAV SURF PREP FOR MRK (12")	LF	170	
678 6008	PAV SURF PREP FOR MRK (24")	LF	980	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	10	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	2	



0 50 100
SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

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STATE OF TEXAS
MARVIN H. GOMEZ
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PROFESSIONAL ENGINEER

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SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 220+00.00 - STA 240+00.00

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CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
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CHECKED:	EL PASO	EL PASO	3451	01	035, ETC. / 221

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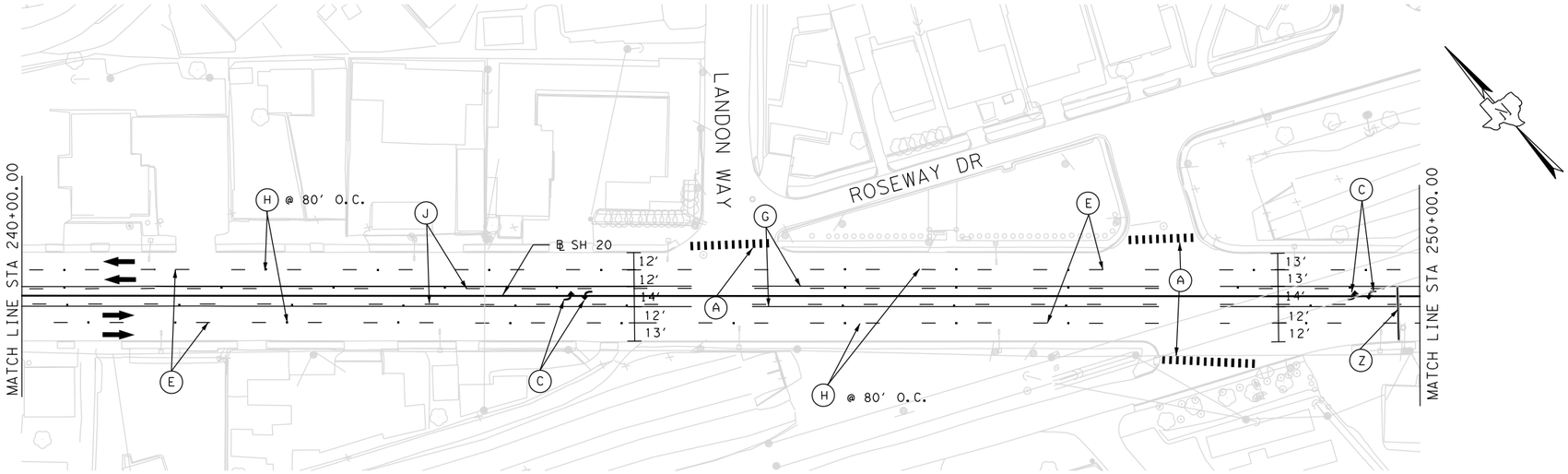
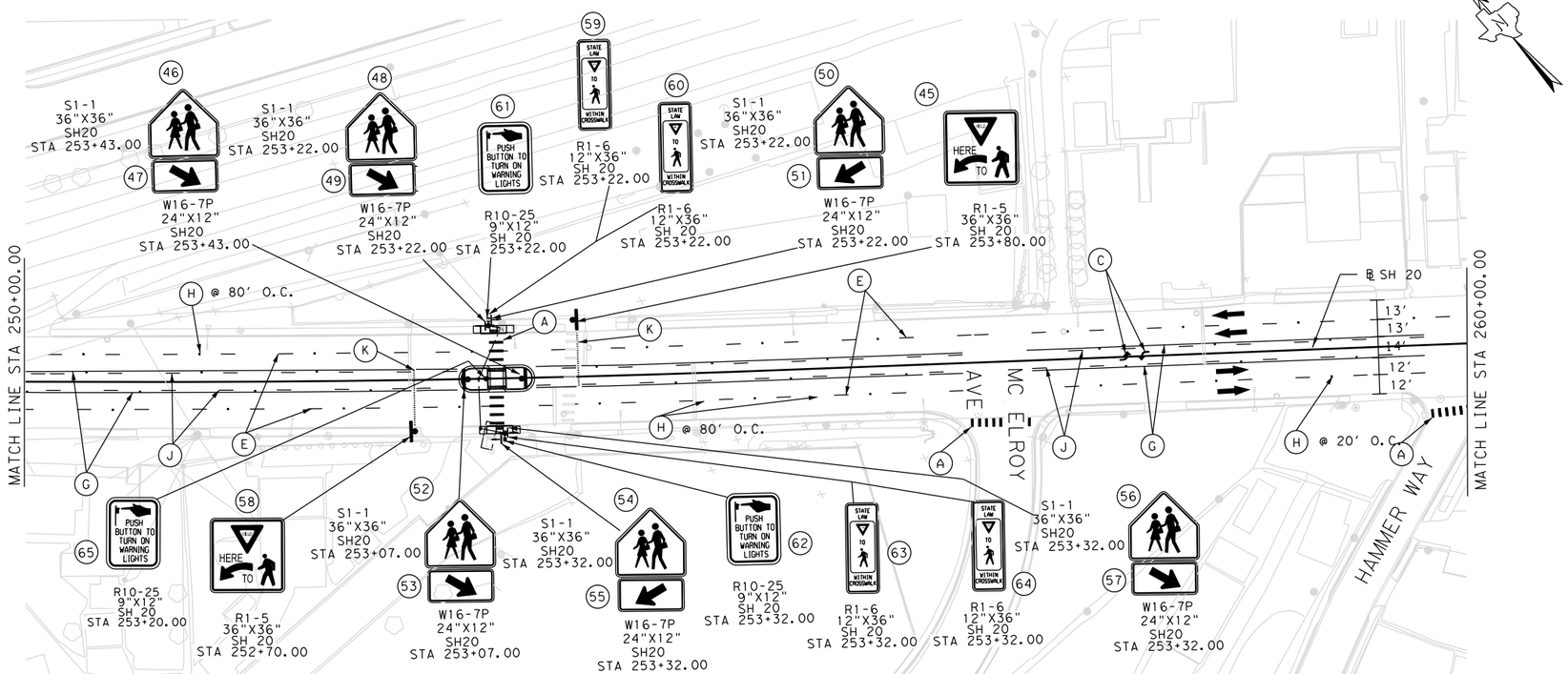


ITEM	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY 10BWG (1) SA(P)	EA	21	
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	160	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	420	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	6	C
666 6155	REFL PAV MRK TY I (Y) (MED NOSE) (090 MIL)	EA	2	L
666 6098	REFL PAV MRK TY I (W) 18" (YLD TRI) (090 MIL)	EA	40	K
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,000	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	160	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	420	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	6	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	1,660	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	3,310	
666 6198	REFL PAV MRK TY II (W) 18" (YLD TRI)	EA	40	
666 6217	REFL PAV MRK TY II (Y) (MED NOSE)	EA	2	

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	1,000	E
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	1,660	J
666 6344	REF PROF PAV MRK TY I (Y) 4" (SLD) (090MIL)	LF	3,310	G
672 6010	REFL PAV MRKR TY II-C-R	EA	100	H
672 6009	REFL PAV MRKR TY II-A-A	EA	1,323	I
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	6,000	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	210	
677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	100	
678 6001	PAV SURF PREP FOR MRK (4")	LF	4,970	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1,000	
678 6006	PAV SURF PREP FOR MRK (12")	LF	160	
678 6008	PAV SURF PREP FOR MRK (24")	LF	340	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	6	
678 6022	PAV SURF PREP FOR MRK (18") (YLD TRI)	EA	40	
678 6024	PAV SURF PREP FOR MRK (MED NOSE)	EA	2	



0 50 100

SCALE: 1" = 100′ (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

NOTES

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NO.	REVISION	BY	DATE

4/22/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED PROFESSIONAL ENGINEER

ENGINEER'S NOTE

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SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 240+00.00 - STA 260+00.00

12 OF 17

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035: ETC.	222

4/22/2021 8:05:55 AM
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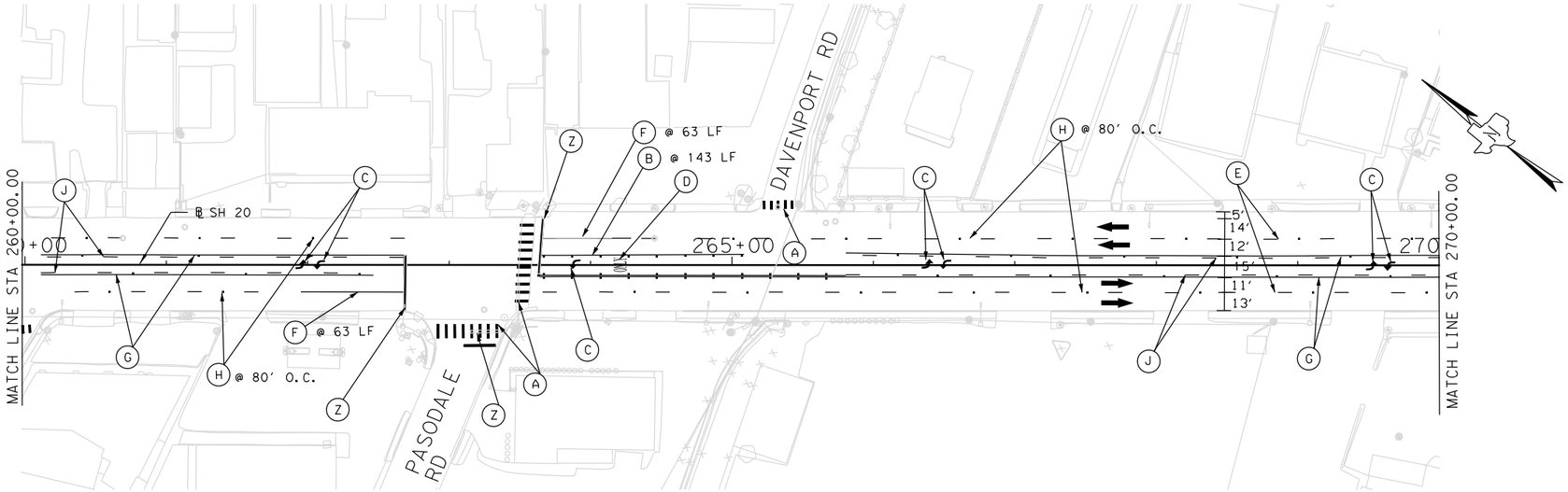
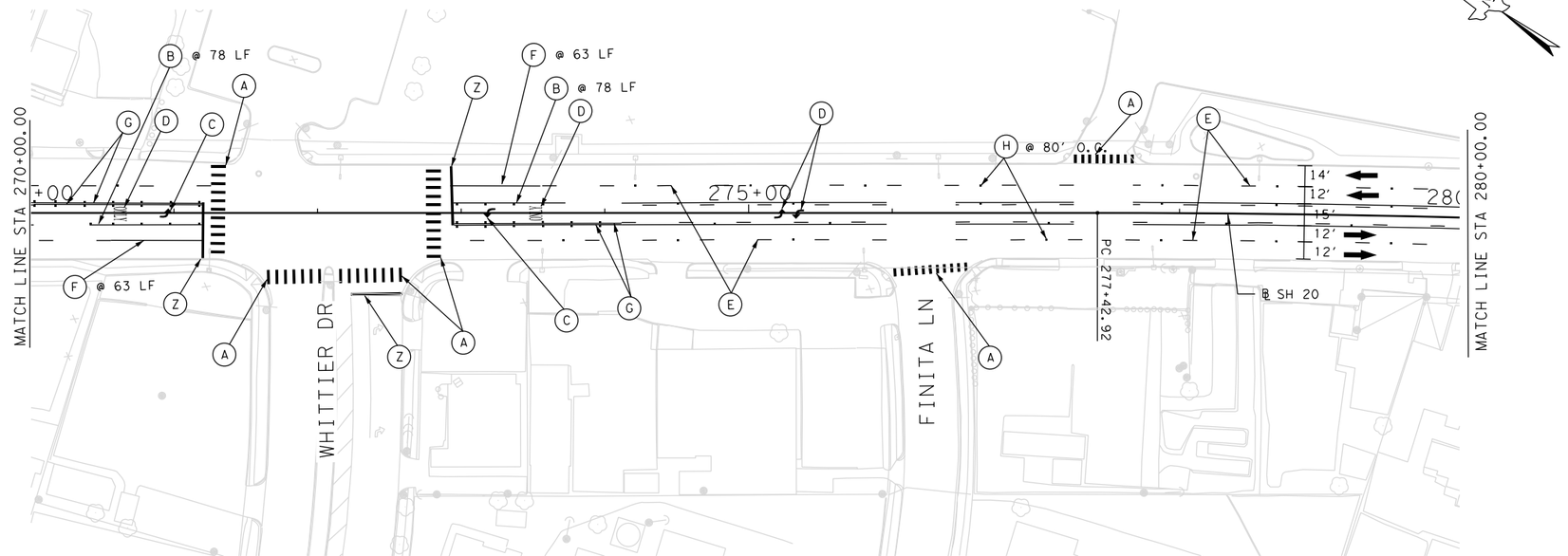
FINAL SUBMITTAL



ITEM	DESCRIPTION	UNIT	QTY	ID
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	230	B
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	230	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	670	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	12	C
666 6077	REFL PAV MRK TY I (W) (WORD) (090MIL)	EA	2	D
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	260	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,000	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	230	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	230	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	670	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	12	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	2	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	1,340	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	3,520	
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	260	F
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	1,000	E

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	1,340	J
666 6344	REF PROF PAV MRK TY I(Y)4"(SLD) (090MIL)	LF	3,520	G
672 6009	REFL PAV MRKR TY II-A-A	EA	1,456	I
672 6010	REFL PAV MRKR TY II-C-R	EA	115	H
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	5,145	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	670	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	603	
677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4	
677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	2	
678 6001	PAV SURF PREP FOR MRK (4")	LF	5,120	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1,000	
678 6004	PAV SURF PREP FOR MRK (8")	LF	230	
678 6006	PAV SURF PREP FOR MRK (12")	LF	230	
678 6008	PAV SURF PREP FOR MRK (24")	LF	670	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	12	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	2	



0 50 100

SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

NOTES

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4/22/2021

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

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SH 20 (ALAMEDA AVE)

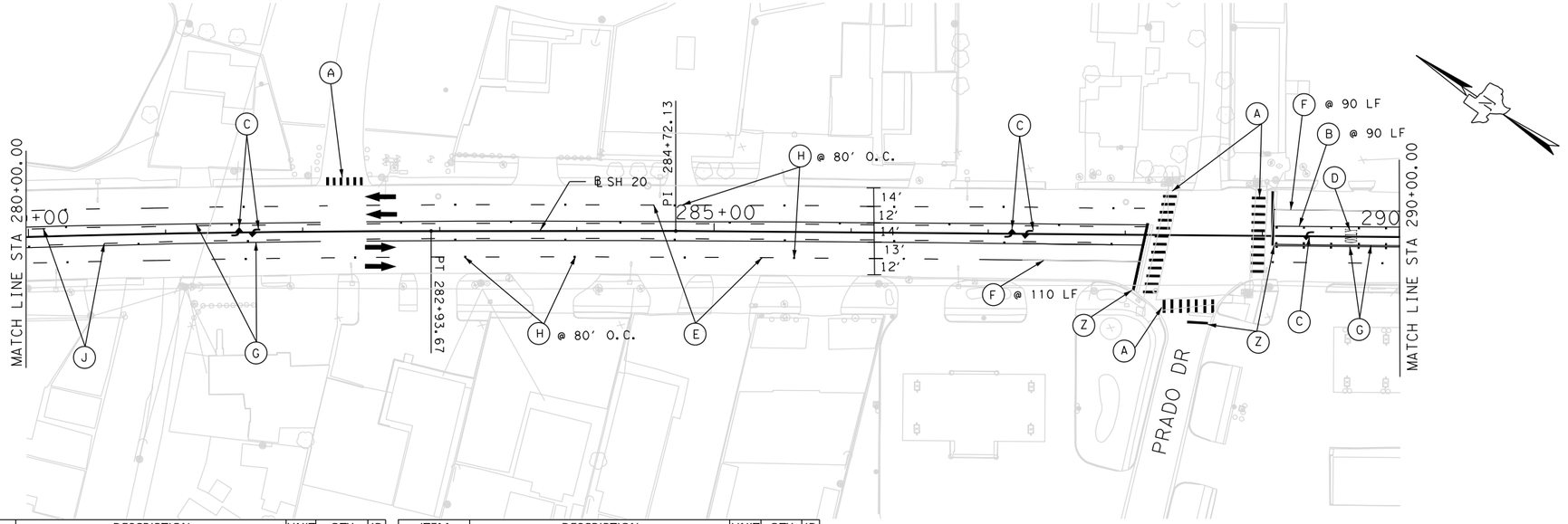
SIGNING AND PAVEMENT MARKING LAYOUT

STA 260+00.00 - STA 280+00.00

13 OF 17

	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
DESIGNED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
CHECKED:						
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	223

FINAL SUBMITTAL



ITEM	DESCRIPTION	UNIT	QTY	ID
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	200	B
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	110	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	400	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	9	C
666 6077	REFL PAV MRK TY I (W) (WORD) (090MIL)	EA	1	D
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	230	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,000	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	200	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	110	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	400	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	9	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	1	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	1,730	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	3,800	
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	230	F

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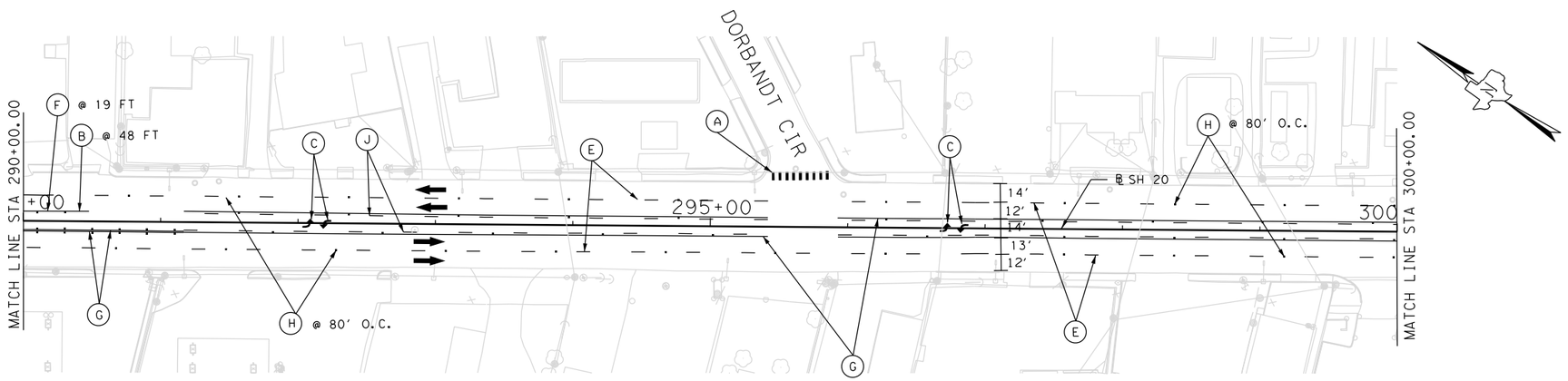
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	5,650	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	200	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	510	
678 6001	PAV SURF PREP FOR MRK (4")	LF	5,760	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1,000	
678 6004	PAV SURF PREP FOR MRK (8")	LF	200	
678 6006	PAV SURF PREP FOR MRK (12")	LF	110	
678 6008	PAV SURF PREP FOR MRK (24")	LF	400	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	9	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	1	



0 50 100
SCALE: 1" = 100' (H)

LEGEND

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TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 280+00.00 - STA 300+00.00

14 OF 17

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	OSS, ETC. / 224

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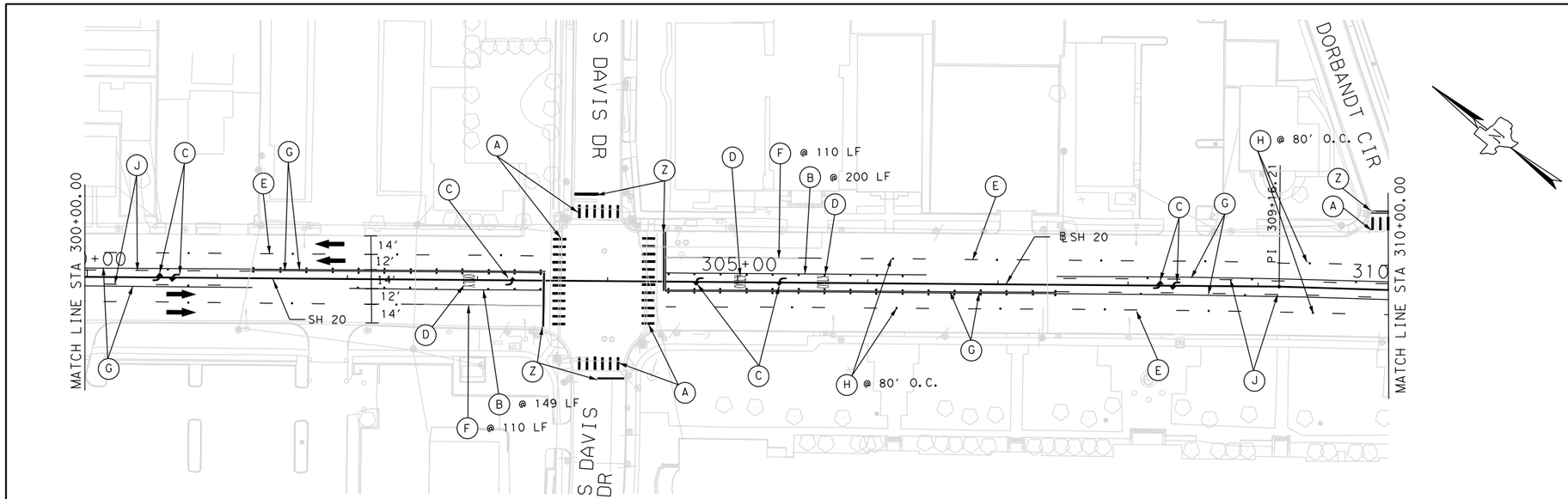
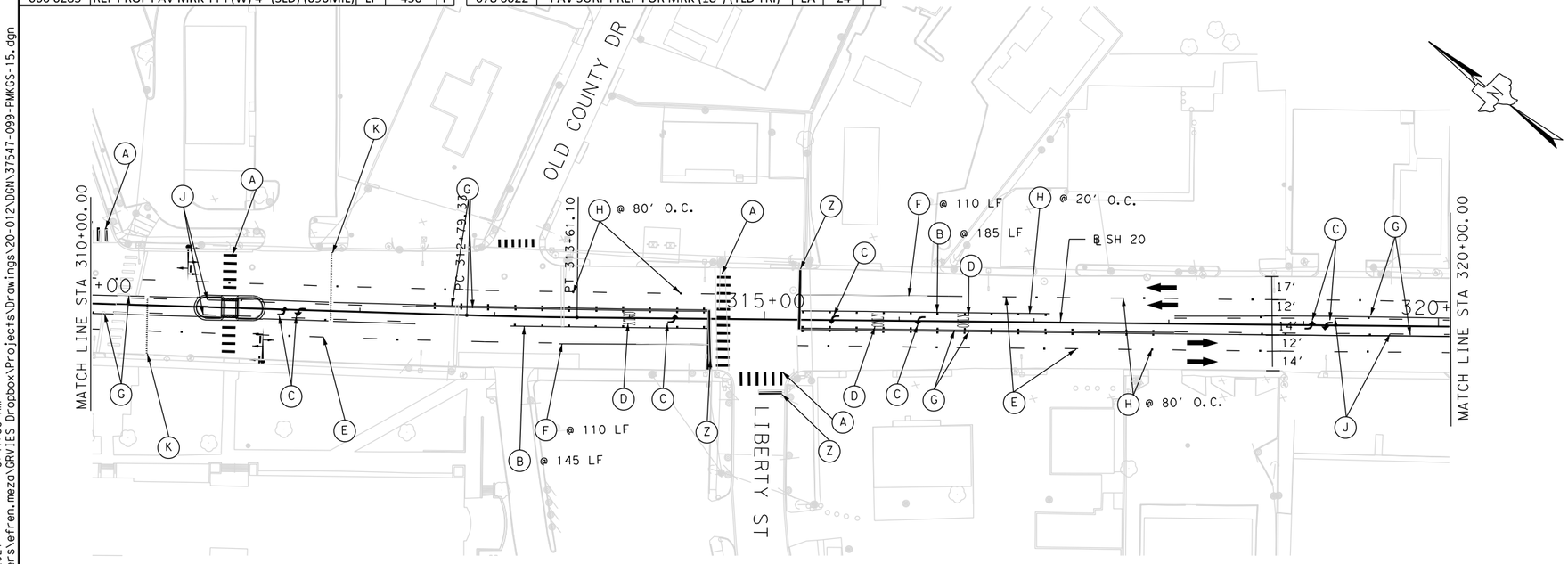
FINAL SUBMITTAL



ITEM	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY 10BWG (1) SA(P)	EA	2	
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	800	B
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	430	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	800	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	16	C
666 6077	REFL PAV MRK TY I (W) (WORD) (090MIL)	EA	6	D
666 6098	REFL PAV MRK TY I (W) 18" (YLD TRI) (090 MIL)	EA	24	K
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	450	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,000	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	800	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	430	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	800	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	16	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	6	
666 6198	REFL PAV MRK TY II (W) 18" (YLD TRI)	EA	24	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	900	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	3,800	
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	450	F

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	1,000	E
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	900	J
666 6344	REF PROF PAV MRK TY I (Y) 4" (SLD) (090MIL)	LF	3,640	G
672 6009	REFL PAV MRKR TY II-A-A	EA	1,562	I
672 6010	REFL PAV MRKR TY II-C-R	EA	188	H
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	5,510	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	245	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	1,068	
677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	510	
677 6019	ELIM EXT PAV MRK & MRKS (36")(YLD TRI)	EA	24	
678 6001	PAV SURF PREP FOR MRK (4")	LF	4,990	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1,000	
678 6004	PAV SURF PREP FOR MRK (8")	LF	800	
678 6006	PAV SURF PREP FOR MRK (12")	LF	430	
678 6008	PAV SURF PREP FOR MRK (24")	LF	800	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	16	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	6	
678 6022	PAV SURF PREP FOR MRK (18") (YLD TRI)	EA	24	



SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

NOTES

1. REFER TO STANDARD STRIPING DETAILS SHEET FOR ALL LANE PAVEMENT MARKING DETAILS.
2. ALL EXISTING CONFLICTING STRIPING SHALL BE REMOVED AND SHALL BE PAID BY ITEM 677.
3. LOCATION OF THE NEW STRIPING WILL BE BASED ON THE EXISTING STRIPING.
4. ALL SIGN LOCATIONS SHOWN ARE APPROXIMATE AND CAN BE FIELD ADJUSTED AS NECESSARY TO AVOID OBSTRUCTIONS.
5. SIGNS SHALL BE RETRO-REFLECTIVE TO SHOW THE SAME SHAPE AND SIMILAR COLORS BY BOTH DAY AND NIGHT.

NO.	REVISION	BY	DATE

4/22/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
PROFESSIONAL ENGINEER

ENGINEER'S NOTE

"THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARVIN H. GOMEZ, P.E. No. 86920 ON APRIL 22, 2021 ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT"

GRV Integrated Engineering Solutions LLC
11385 JAMES WATT DR., SUITE B-13
EL PASO, TEXAS 79936
PH: (915) 351-6701 FAX: (915) 243-6010
www.integratedengineeringsolutions.com
TBPE F#15313 TBPLS F#10194278

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 300+00.00 - STA 320+00.00

15 OF 17

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No. / SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC. / 225

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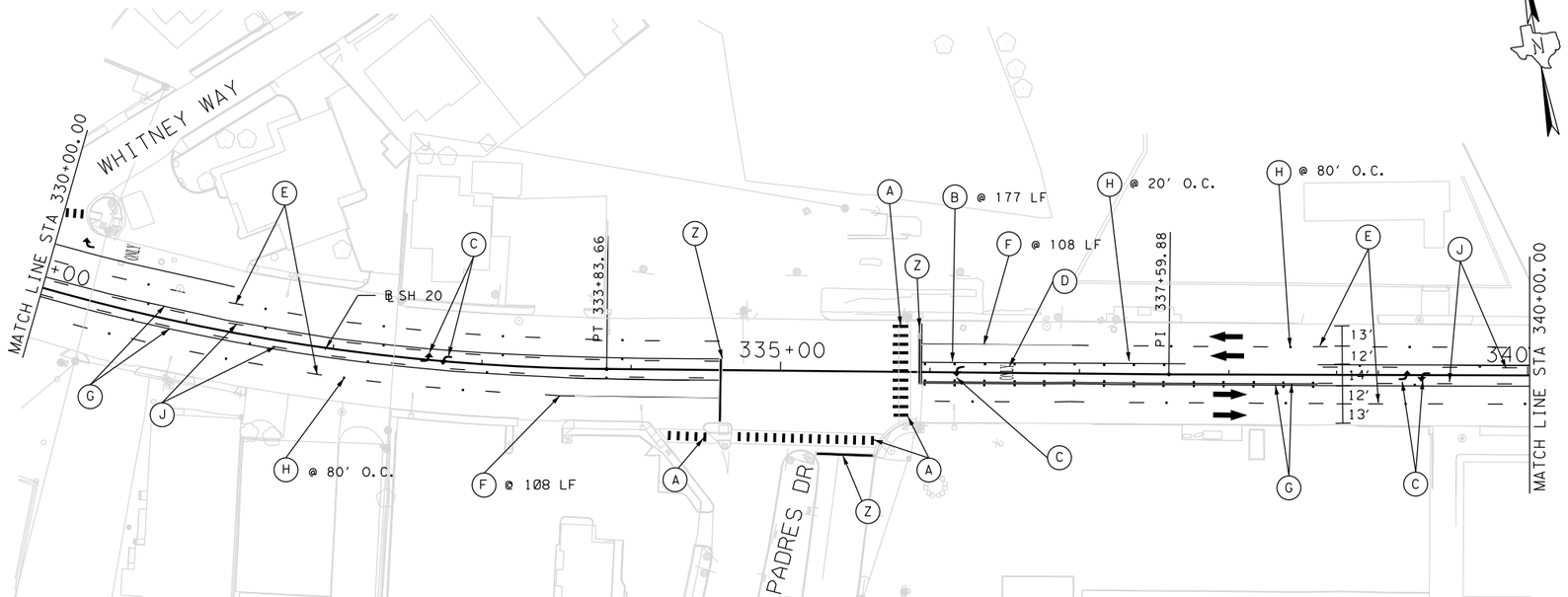
FINAL SUBMITTAL

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6035	REFL PAV MRK TY I (W) 8" (SLD) (090MIL)	LF	400	B
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	130	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	310	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	8	C
666 6077	REFL PAV MRK TY I (W) (WORD) (090MIL)	EA	2	D
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	300	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	900	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	400	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	130	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	310	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	8	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	2	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	1,500	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	3,720	
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	300	F

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	900	E
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	1,500	J
666 6344	REF PROF PAV MRK TY I (Y) 4" (SLD) (090MIL)	LF	3,720	G
672 6009	REFL PAV MRKR TY II-A-A	EA	1,516	I
672 6010	REFL PAV MRKR TY II-C-R	EA	115	H
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	5,508	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	200	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	532	
678 6001	PAV SURF PREP FOR MRK (4")	LF	5,520	
678 6002	PAV SURF PREP FOR MRK (6")	LF	900	
678 6004	PAV SURF PREP FOR MRK (8")	LF	400	
678 6006	PAV SURF PREP FOR MRK (12")	LF	130	
678 6008	PAV SURF PREP FOR MRK (24")	LF	310	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	8	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	2	



0 50 100
SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

NOTES

1. REFER TO STANDARD STRIPING DETAILS SHEET FOR ALL LANE PAVEMENT MARKING DETAILS.
2. ALL EXISTING CONFLICTING STRIPING SHALL BE REMOVED AND SHALL BE PAID BY ITEM 677.
3. LOCATION OF THE NEW STRIPING WILL BE BASED ON THE EXISTING STRIPING.
4. ALL SIGN LOCATIONS SHOWN ARE APPROXIMATE AND CAN BE FIELD ADJUSTED AS NECESSARY TO AVOID OBSTRUCTIONS.
5. SIGNS SHALL BE RETRO-REFLECTIVE TO SHOW THE SAME SHAPE AND SIMILAR COLORS BY BOTH DAY AND NIGHT.

NO.	REVISION	BY	DATE

4/22/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED
PROFESSIONAL ENGINEER

ENGINEER'S NOTE

"THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARVIN H. GOMEZ, P.E. No. 86920 ON APRIL 22, 2021
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BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 320+00.00 - STA 340+00.00

16 OF 17

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	226

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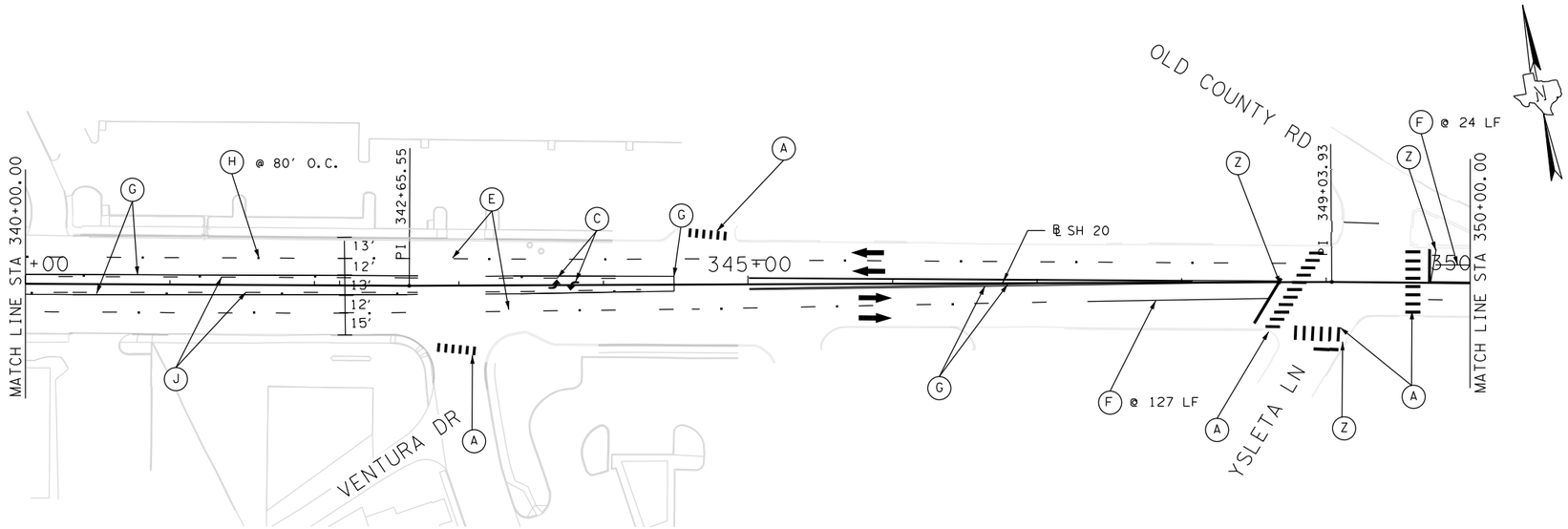
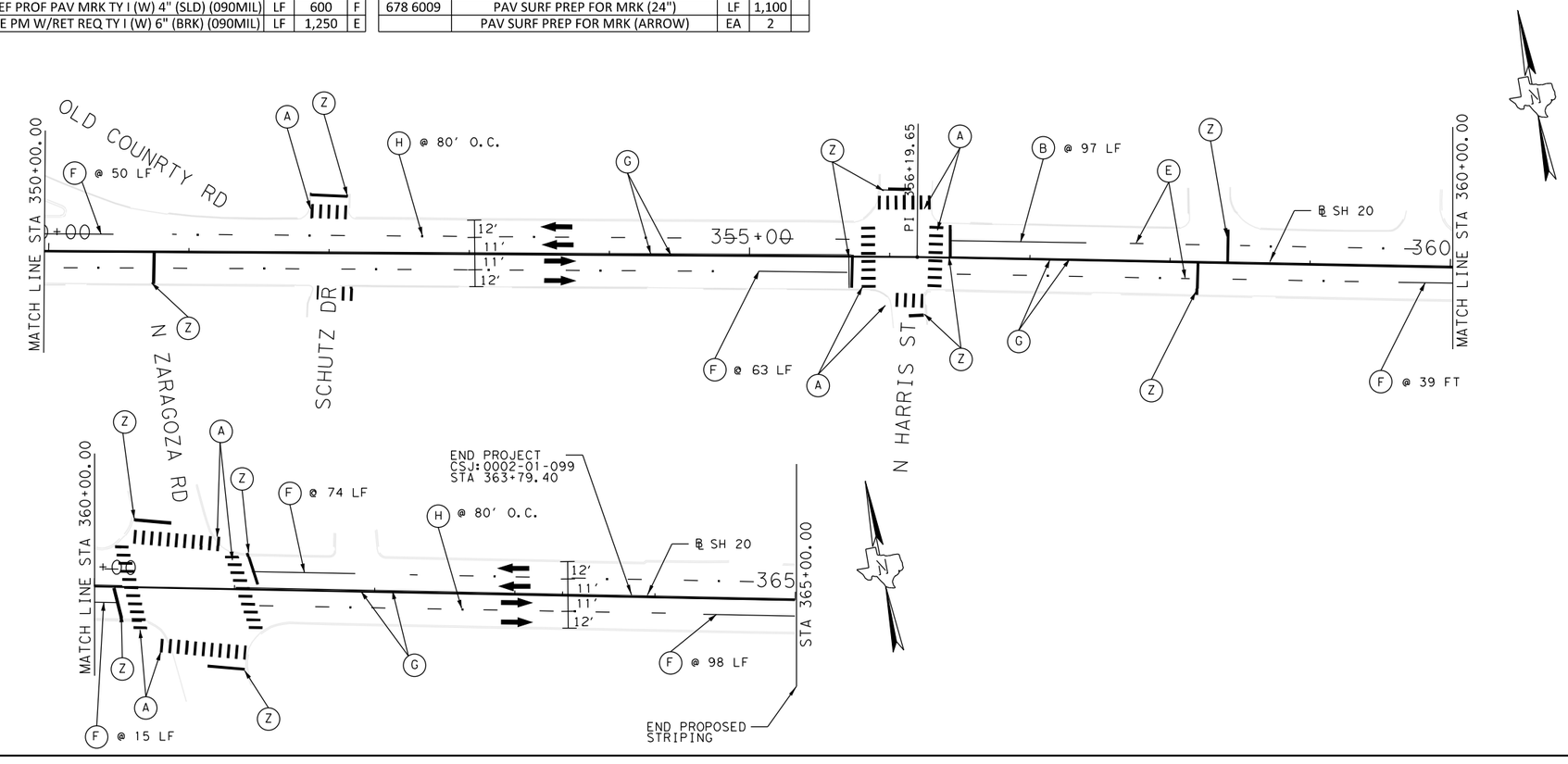
FINAL SUBMITTAL



ITEM	DESCRIPTION	UNIT	QTY	ID
666 6041	REFL PAV MRK TY I (W) 12" (SLD) (090MIL)	LF	370	Z
666 6047	REFL PAV MRK TY I (W) 24" (SLD) (090MIL)	LF	1,100	A
666 6053	REFL PAV MRK TY I (W) (ARROW) (090MIL)	EA	2	C
666 6170	REFL PAV MRK TY II (W)4"(SLD)	LF	600	
666 6171	REFL PAV MRK TY II (W)6"(BRK)	LF	1,250	
666 6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	370	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	1,100	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	2	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	1,300	
666 6207	REFL PAV MRK TY II (Y) (SLD)	LF	5,050	
666 6283	REF PROF PAV MRK TY I (W) 4" (SLD) (090MIL)	LF	600	F
666 6305	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	LF	1,250	E

ITEM	DESCRIPTION	UNIT	QTY	ID
666 6311	RE PM W/RET REQ TY I (Y) 4" (BRK) (090MIL)	LF	1,300	J
666 6344	REF PROF PAV MRK TY I (Y) 4" (SLD) (090MIL)	LF	5,050	G
672 6009	REFL PAV MRKR TY II-A-A	EA	2,020	I
672 6010	REFL PAV MRKR TY II-C-R	EA	126	H
677 6005	ELIM EXT PAV MRK & MRKS (4")	LF	6,160	
677 6007	ELIM EXT PAV MRK & MRKS (12")	LF	1,130	
678 6001	ELIM EXT PAV MRK & MRKS (24")	LF	270	
678 6002	PAV SURF PREP FOR MRK (4")	LF	6,950	
678 6006	PAV SURF PREP FOR MRK (6")	LF	1,250	
678 6008	PAV SURF PREP FOR MRK (12")	LF	370	
678 6009	PAV SURF PREP FOR MRK (24")	LF	1,100	
	PAV SURF PREP FOR MRK (ARROW)	EA	2	



0 50 100

SCALE: 1" = 100' (H)

LEGEND

PROPOSED SIGN

DIRECTION OF TRAFFIC FLOW

NOTES

1. REFER TO STANDARD STRIPING DETAILS SHEET FOR ALL LANE PAVEMENT MARKING DETAILS.
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NO.	REVISION	BY	DATE

4/22/2021

STATE OF TEXAS
MARVIN H. GOMEZ
86920
LICENSED PROFESSIONAL ENGINEER

ENGINEER'S NOTE

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TBPELS FIRM NO. F-312

SH 20 (ALAMEDA AVE)

SIGNING AND PAVEMENT MARKING LAYOUT

STA 340+00.00 - STA 365+00.00

17 OF 17

DESIGNED:	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED:	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN:	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED:	EL PASO	EL PASO	3451	01	035, ETC.	227

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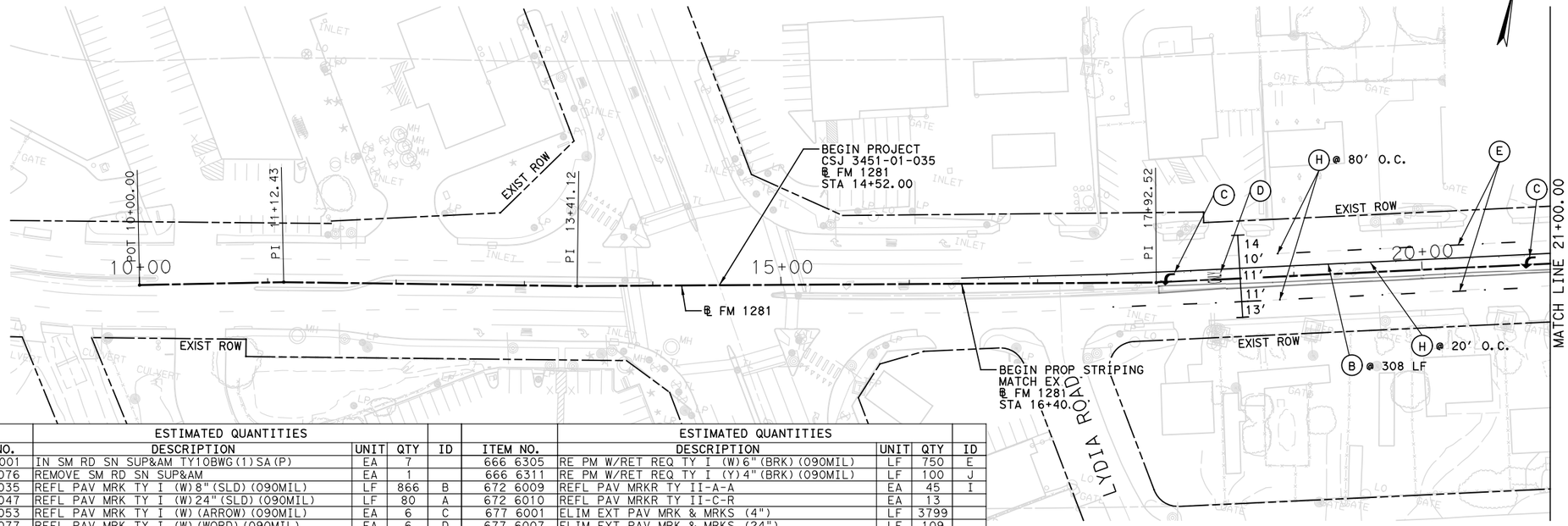
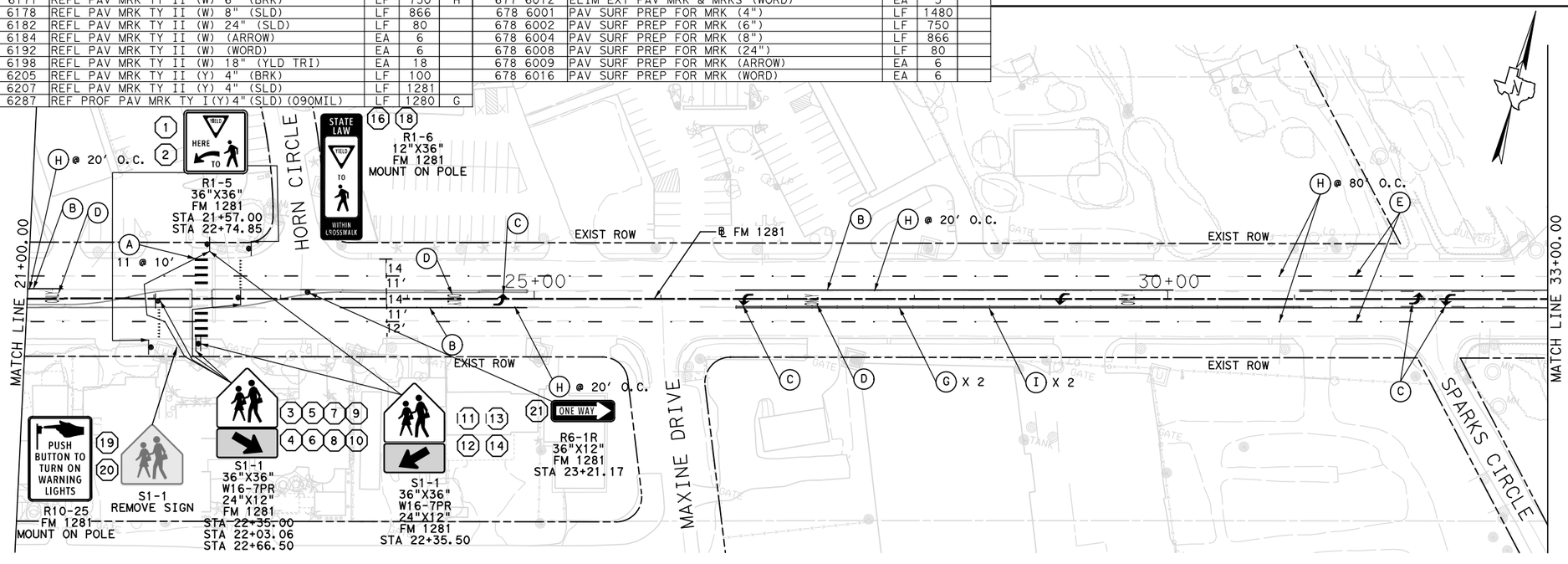
FINAL SUBMITTAL



ESTIMATED QUANTITIES					ESTIMATED QUANTITIES				
ITEM NO.	DESCRIPTION	UNIT	QTY	ID	ITEM NO.	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	7		666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	750	E
644 6076	REMOVE SM RD SN SUP&AM	EA	1		666 6311	RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)	LF	100	J
666 6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	866	B	672 6009	REFL PAV MRKR TY II-A-A	EA	45	I
666 6047	REFL PAV MRK TY I (W)24"(SLD)(090MIL)	LF	80	A	672 6010	REFL PAV MRKR TY II-C-R	EA	13	
666 6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	6	C	677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	3799	
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	6	D	677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	109	
666 6098	REF PAV MRK TY I(W)18"(YLD TRI)(090MIL)	EA	18		677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4	
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	750	H	677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	5	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	866		678 6001	PAV SURF PREP FOR MRK (4")	LF	1480	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	80		678 6002	PAV SURF PREP FOR MRK (6")	LF	750	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	6		678 6004	PAV SURF PREP FOR MRK (8")	LF	866	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	6		678 6008	PAV SURF PREP FOR MRK (24")	LF	80	
666 6198	REFL PAV MRK TY II (W) 18" (YLD TRI)	EA	18		678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	6	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	100		678 6016	PAV SURF PREP FOR MRK (WORD)	EA	6	
666 6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	1281						
666 6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF	1280	G					



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PLANIMETRICS

NOTES:

1. ALL EXISTING CONFLICTING STRIPING SHALL BE REMOVED AND SHALL BE PAID BY ITEM 677.
2. ALL SIGN LOCATIONS SHOWN ARE APPROXIMATE AND CAN BE FIELD ADJUSTED AS NECESSARY TO AVOID OBSTRUCTIONS.
3. ALL DELINEATORS INSTALLED ON CONCRETE TRAFFIC BARRIER SHALL BE PLACED ON BOTH SIDES AT 40' SPACING.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
04-20-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 10+00 - STA 33+00

1 OF 15

DESIGNED: GR	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED: RS	ELP	EL PASO	3451	01	030, ETC.	228	

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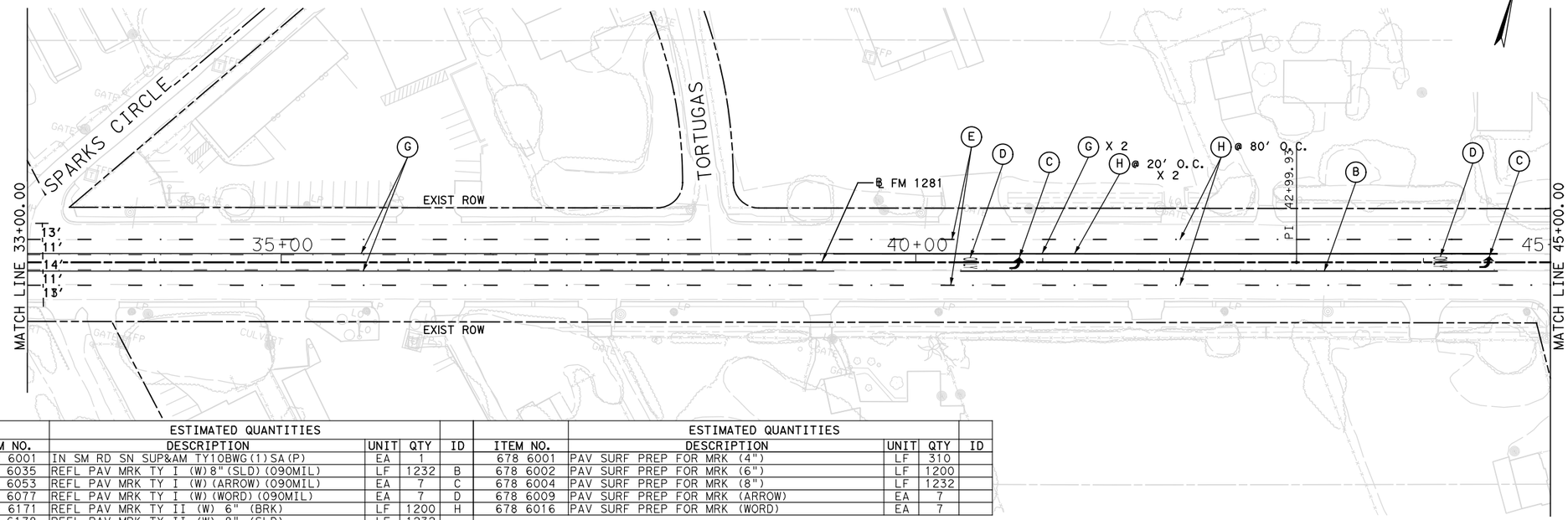
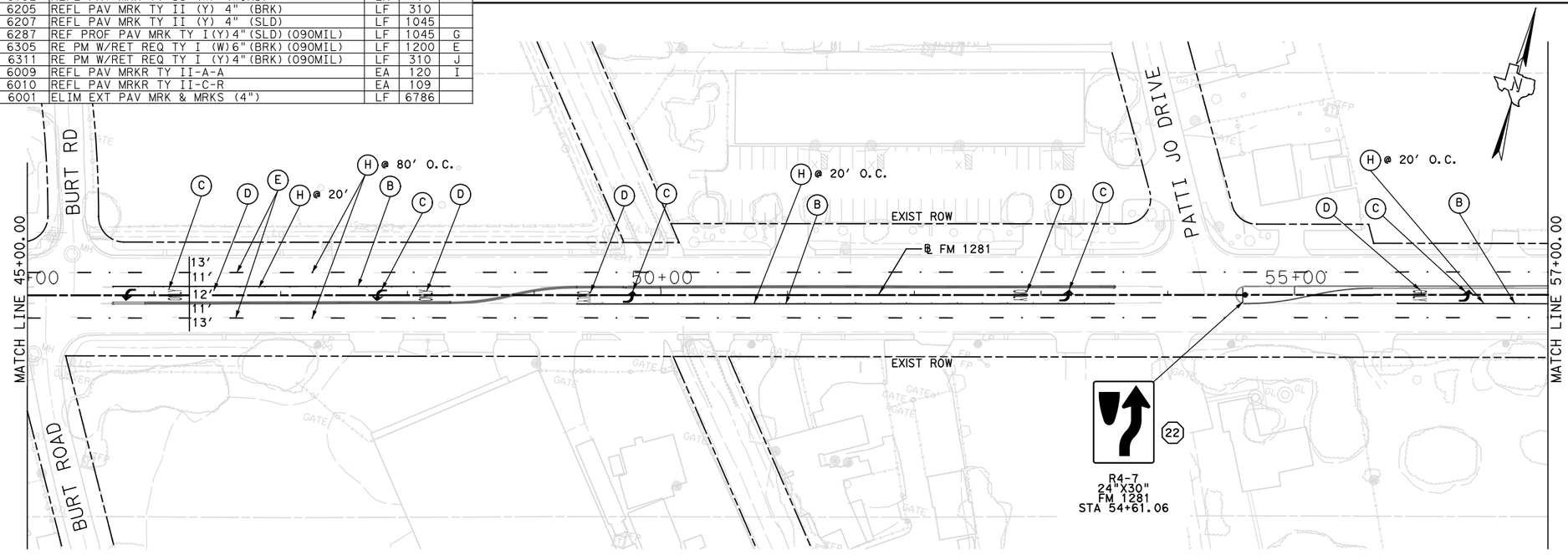
FINAL SUBMITTAL



ESTIMATED QUANTITIES				
ITEM NO.	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	1	
666 6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	1232	B
666 6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	7	C
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	7	D
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	1200	H
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	1232	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	7	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	7	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	310	
666 6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	1045	
666 6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF	1045	G
666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	1200	E
666 6311	RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)	LF	310	J
672 6009	REFL PAV MRKR TY II-A-A	EA	120	I
672 6010	REFL PAV MRKR TY II-C-R	EA	109	
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	6786	

ESTIMATED QUANTITIES				
ITEM NO.	DESCRIPTION	UNIT	QTY	ID
678 6001	PAV SURF PREP FOR MRK (4")	LF	310	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1200	
678 6004	PAV SURF PREP FOR MRK (8")	LF	1232	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	7	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	7	



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PLANIMETRICS

NOTES:

1. ALL EXISTING CONFLICTING STRIPING SHALL BE REMOVED AND SHALL BE PAID BY ITEM 677.
2. ALL SIGN LOCATIONS SHOWN ARE APPROXIMATE AND CAN BE FIELD ADJUSTED AS NECESSARY TO AVOID OBSTRUCTIONS.
3. ALL DELINEATORS INSTALLED ON CONCRETE TRAFFIC BARRIER SHALL BE PLACED ON BOTH SIDES AT 40' SPACING.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER

L.V. Short 04-20-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 33+00 - STA 57+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	032, ETC.	229

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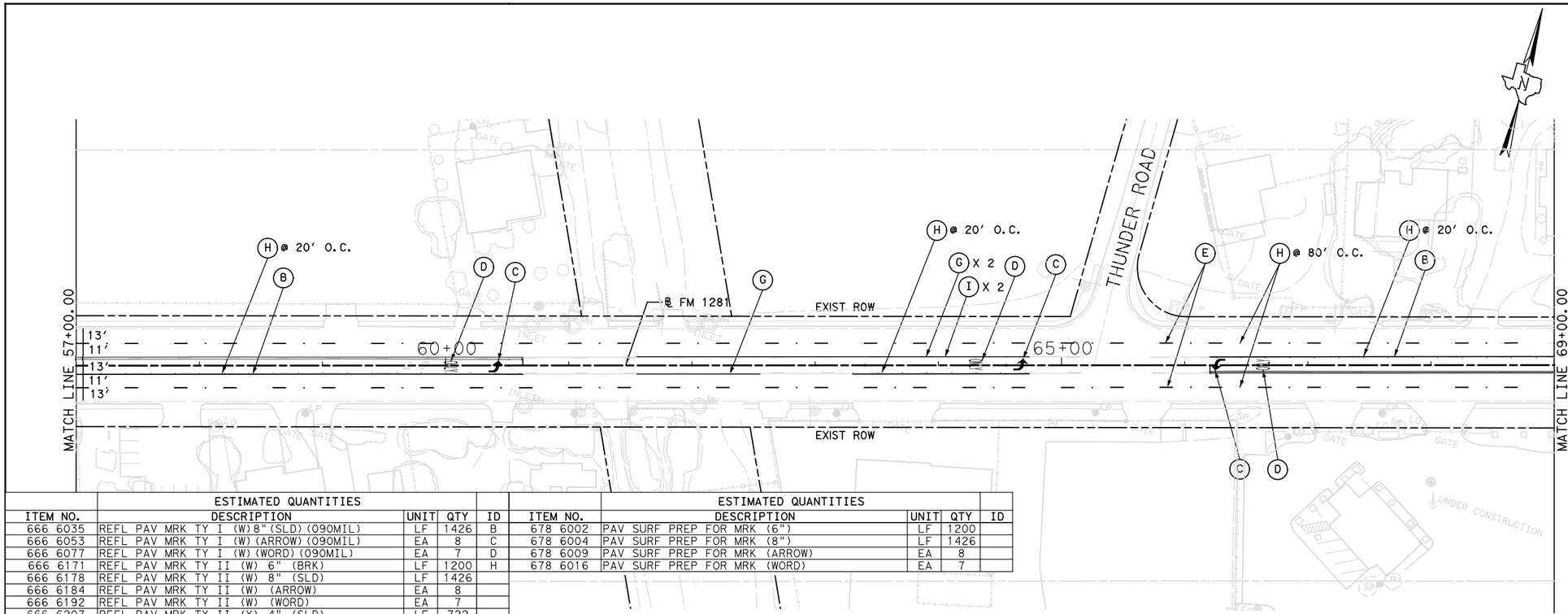
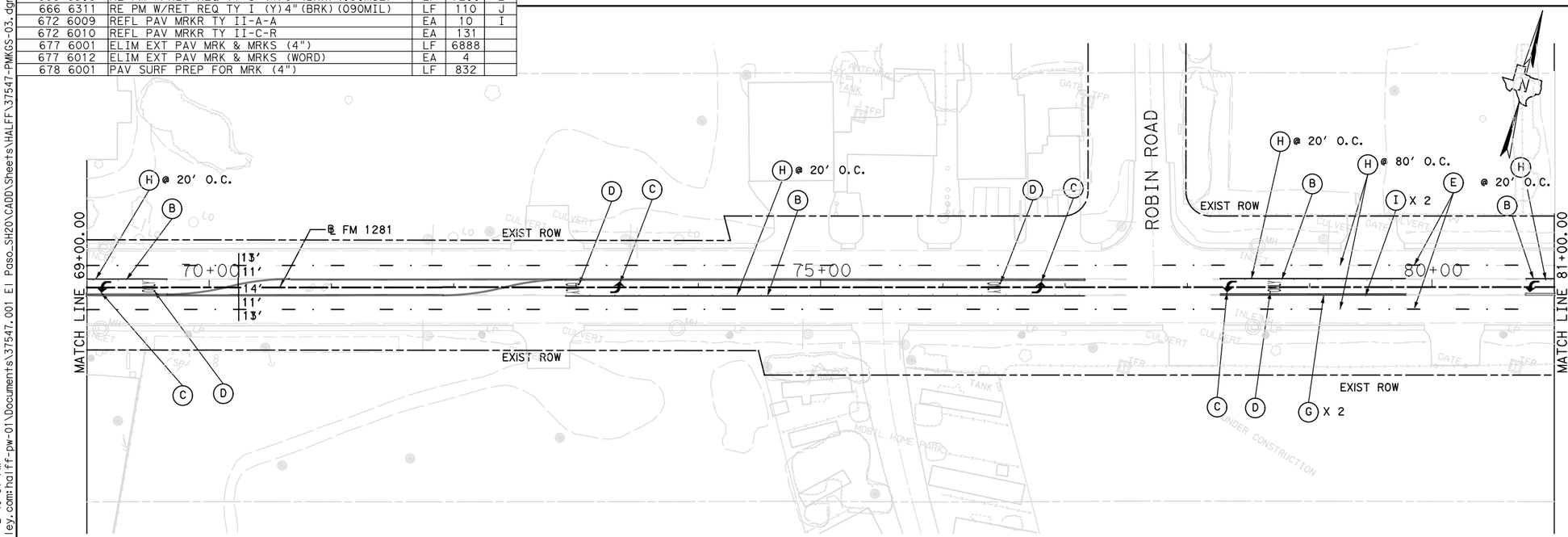
FINAL SUBMITTAL



ESTIMATED QUANTITIES				
ITEM NO.	DESCRIPTION	UNIT	QTY	ID
666 6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	1426	B
666 6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	8	C
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	7	D
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	1200	H
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	1426	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	8	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	7	
666 6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	722	
666 6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF	722	G
666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	1200	E
666 6311	RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)	LF	110	J
672 6009	REFL PAV MRKR TY II-A-A	EA	10	I
672 6010	REFL PAV MRKR TY II-C-R	EA	131	
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	6888	
677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	4	
678 6001	PAV SURF PREP FOR MRK (4")	LF	832	

ESTIMATED QUANTITIES				
ITEM NO.	DESCRIPTION	UNIT	QTY	ID
678 6002	PAV SURF PREP FOR MRK (6")	LF	1200	
678 6004	PAV SURF PREP FOR MRK (8")	LF	1426	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	8	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	7	



0 50 100
SCALE: 1" = 100′ (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PLANIMETRICS

NOTES:

1. ALL EXISTING CONFLICTING STRIPING SHALL BE REMOVED AND SHALL BE PAID BY ITEM 677.
2. ALL SIGN LOCATIONS SHOWN ARE APPROXIMATE AND CAN BE FIELD ADJUSTED AS NECESSARY TO AVOID OBSTRUCTIONS.
3. ALL DELINEATORS INSTALLED ON CONCRETE TRAFFIC BARRIER SHALL BE PLACED ON BOTH SIDES AT 40′ SPACING.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
04-20-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 57+00 - STA 81+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	230

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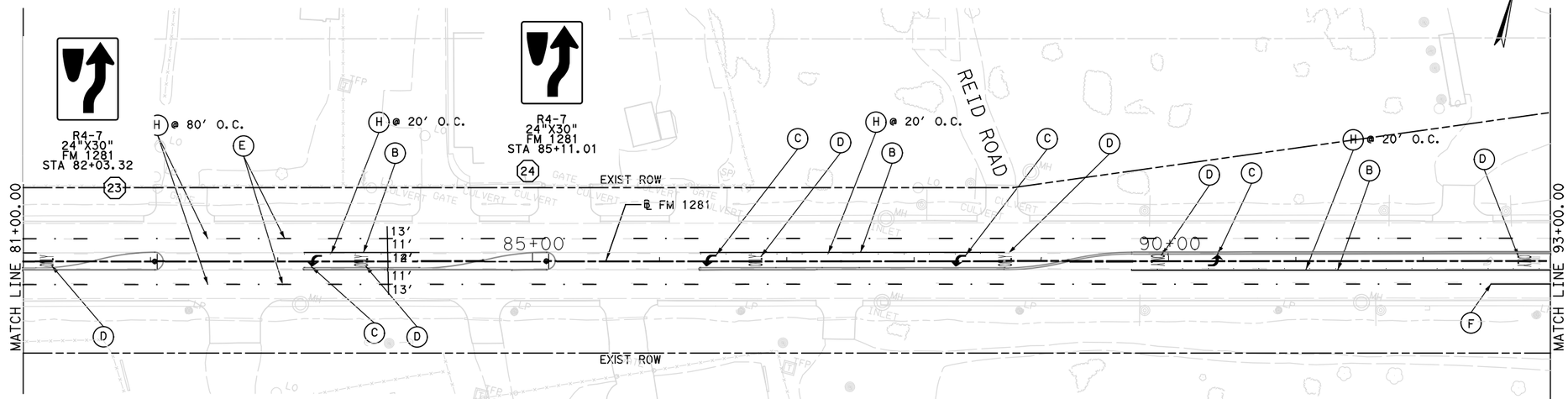
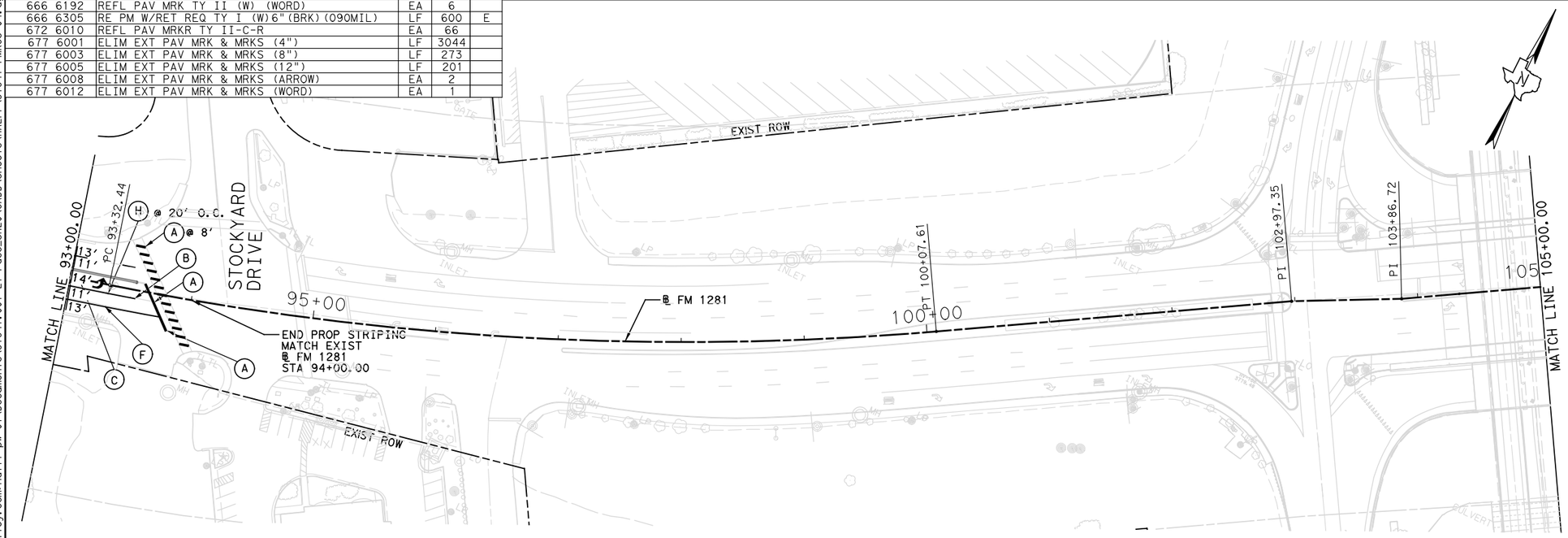
FINAL SUBMITTAL



ITEM NO.	DESCRIPTION	UNIT	QTY	ID
666 6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	836	B
666 6047	REFL PAV MRK TY I (W)24"(SLD)(090MIL)	LF	146	A
666 6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	5	C
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	6	D
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	600	H
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	836	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	146	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	5	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	6	
666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	600	E
672 6010	REFL PAV MRKR TY II-C-R	EA	66	
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	3044	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	273	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	201	
677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	2	
677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	1	

ITEM NO.	DESCRIPTION	UNIT	QTY	ID
678 6002	PAV SURF PREP FOR MRK (6")	LF	600	
678 6004	PAV SURF PREP FOR MRK (8")	LF	836	
678 6008	PAV SURF PREP FOR MRK (24")	LF	146	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	5	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	6	



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PLANIMETRICS

NOTES:

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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
04-20-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 81+00 - STA 105+00

4 OF 15

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	030 ETC.	231

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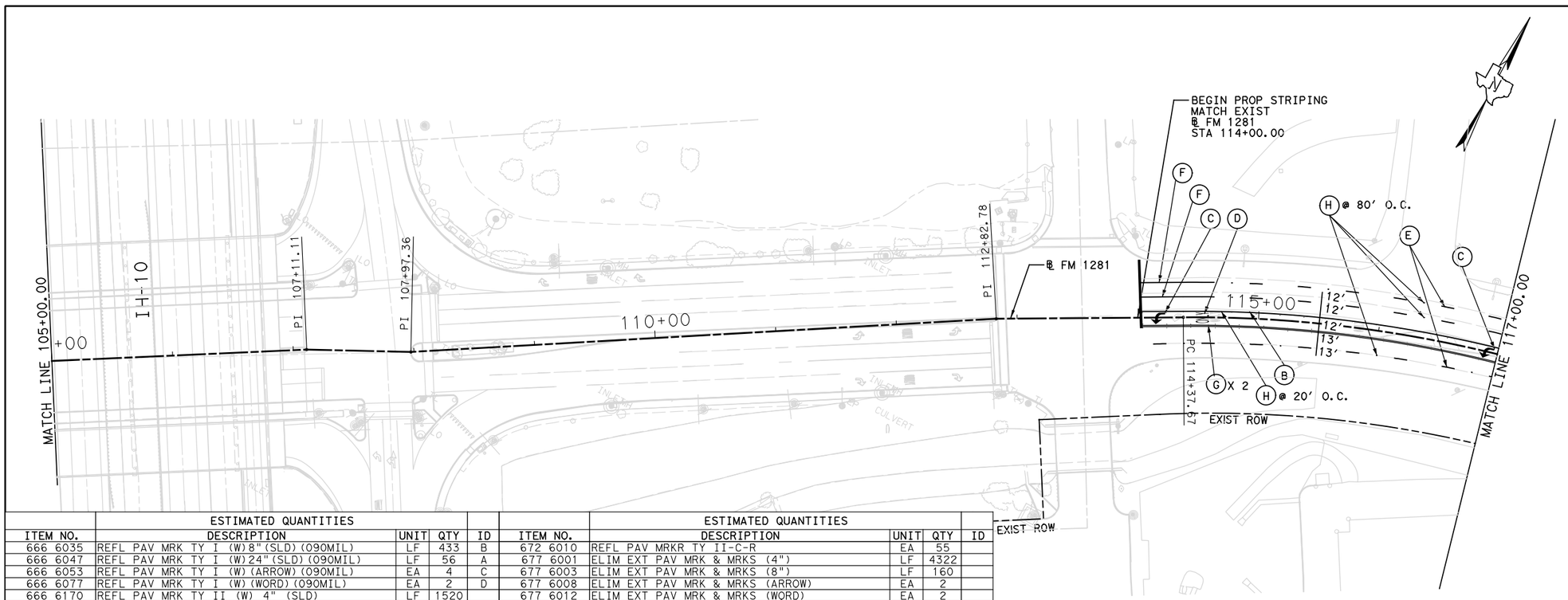
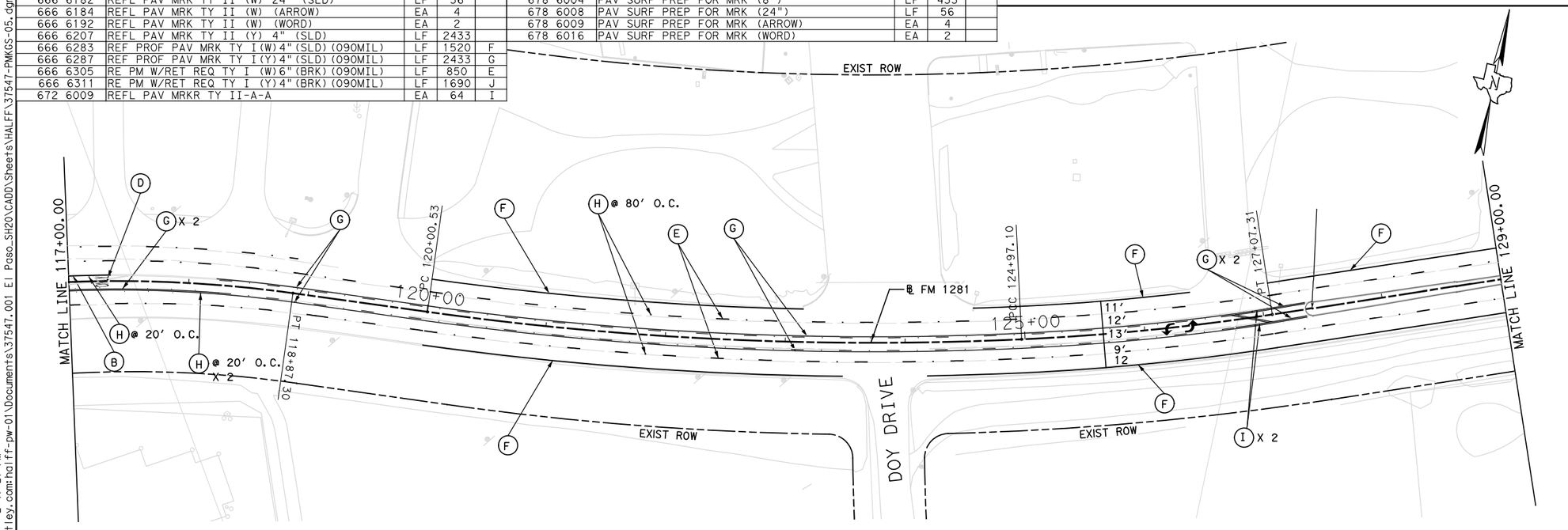


ESTIMATED QUANTITIES					ESTIMATED QUANTITIES				
ITEM NO.	DESCRIPTION	UNIT	QTY	ID	ITEM NO.	DESCRIPTION	UNIT	QTY	ID
666 6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	433	B	672 6010	REFL PAV MRKR TY II-C-R	EA	55	
666 6047	REFL PAV MRK TY I (W)24"(SLD)(090MIL)	LF	56	A	677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	4322	
666 6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	4	C	677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	160	
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	2	D	677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	2	
666 6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	1520		677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	2	
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	850	H	678 6001	PAV SURF PREP FOR MRK (4")	LF	5643	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	433		678 6002	PAV SURF PREP FOR MRK (6")	LF	850	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	56		678 6004	PAV SURF PREP FOR MRK (8")	LF	433	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	4		678 6008	PAV SURF PREP FOR MRK (24")	LF	56	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	2		678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	4	
666 6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	2433		678 6016	PAV SURF PREP FOR MRK (WORD)	EA	2	
666 6283	REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	LF	1520	F					
666 6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF	2433	G					
666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	850	E					
666 6311	RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)	LF	1690	J					
672 6009	REFL PAV MRKR TY II-A-A	EA	64	I					



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PLANIMETRICS

NOTES:

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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
04-20-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 105+00 - STA 129+00

5 OF 15

DESIGNED: GR	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	030, ETC.	232

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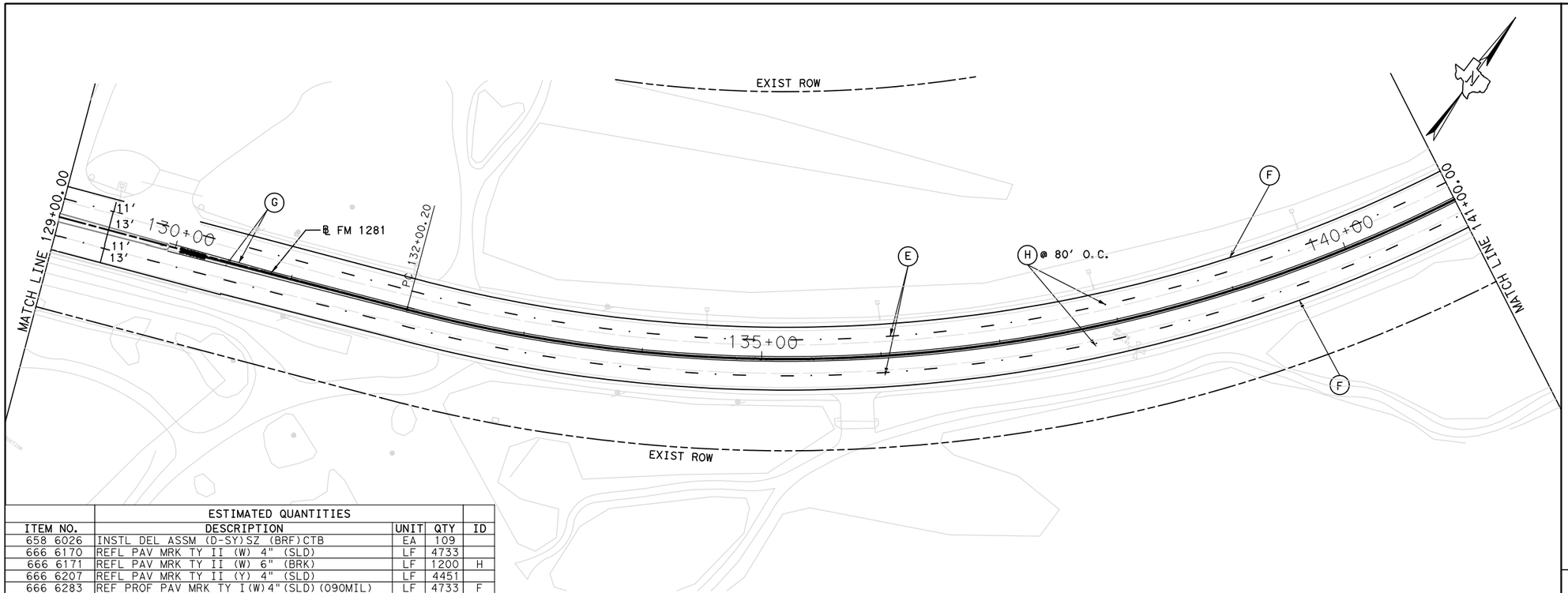
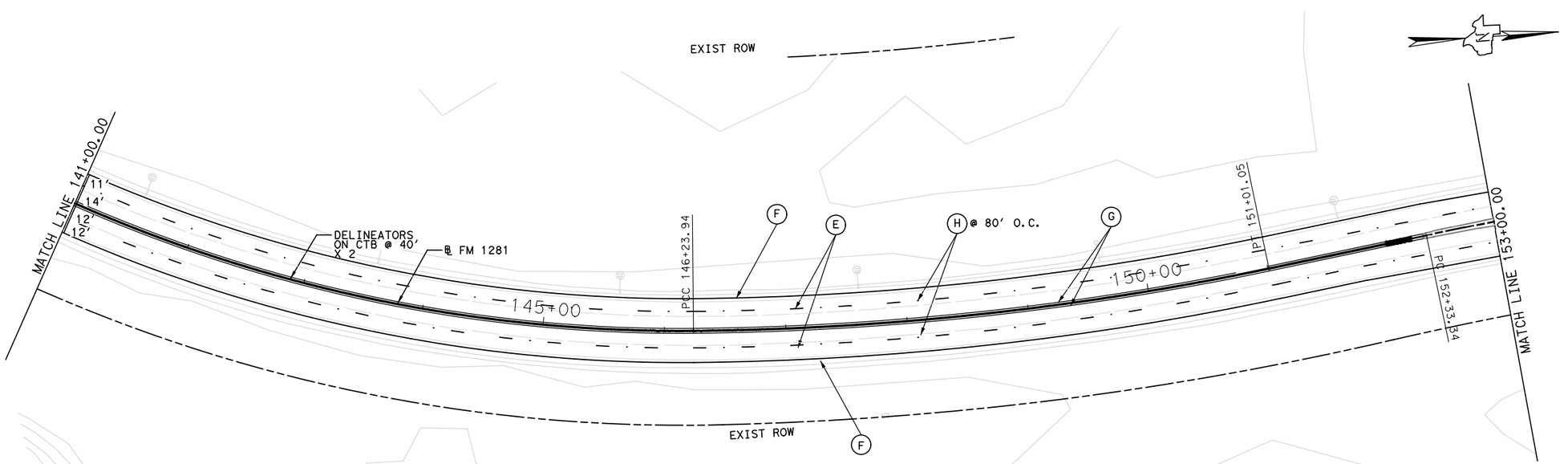


	ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY	ID
658 6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	109	
666 6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	4733	
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	1200	H
666 6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	4451	
666 6283	REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	LF	4733	F
666 6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF	4451	G
666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	1200	E
672 6009	REFL PAV MRKR TY II-A-A	EA	60	I
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	10088	
678 6001	PAV SURF PREP FOR MRK (4")	LF	9184	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1200	



0 50 100
SCALE: 1" = 100' (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PLANIMETRICS

NOTES:

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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER

L.V. Short
04-20-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 129+00 - STA 153+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.		HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES		FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC.	233

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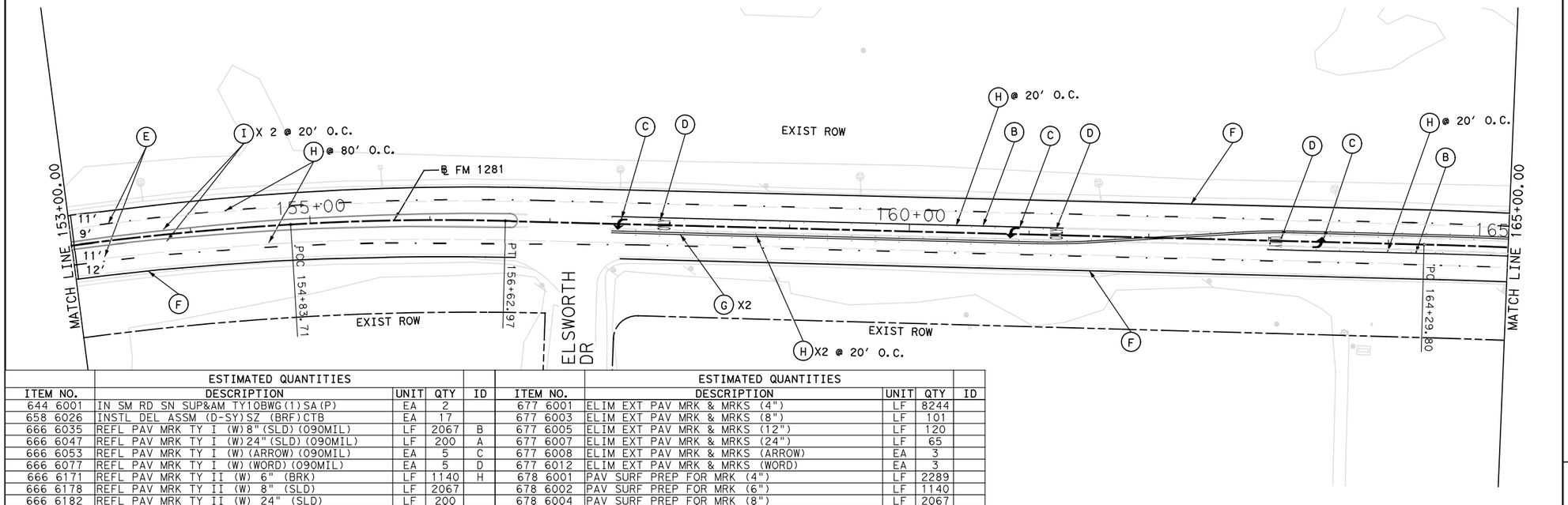
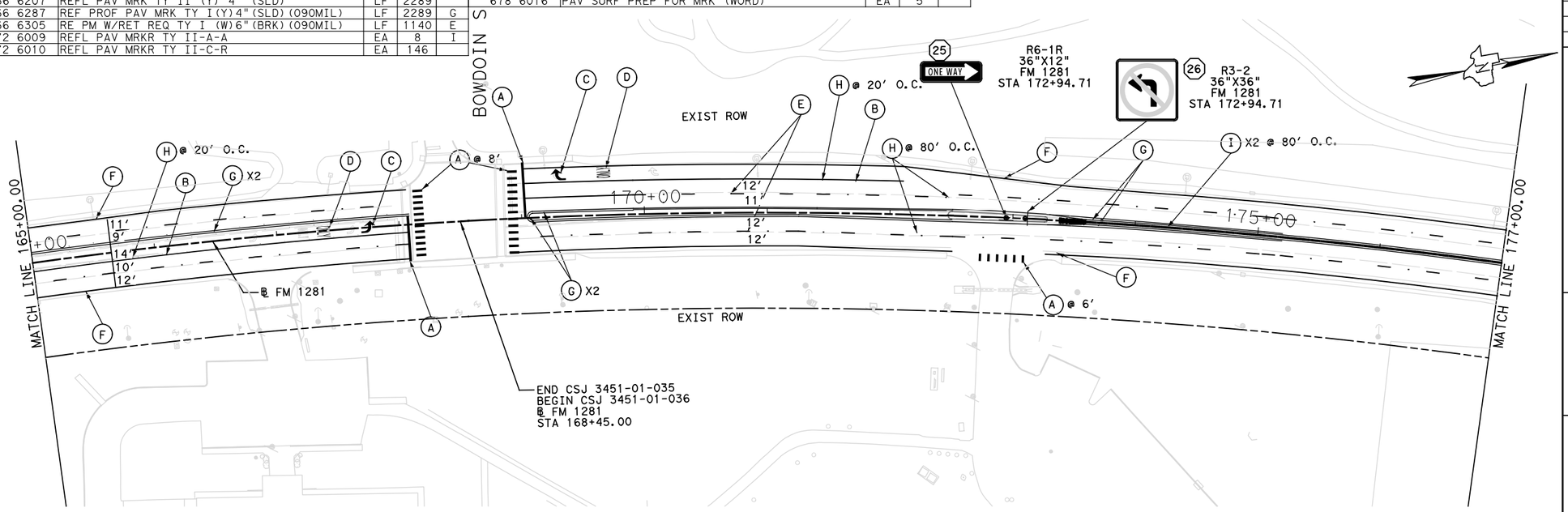
FINAL SUBMITTAL



ESTIMATED QUANTITIES					ESTIMATED QUANTITIES				
ITEM NO.	DESCRIPTION	UNIT	QTY	ID	ITEM NO.	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	2		677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	8244	
658 6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	17		677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	101	
666 6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	2067	B	677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	120	
666 6047	REFL PAV MRK TY I (W)24"(SLD)(090MIL)	LF	200	A	677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	65	
666 6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	5	C	677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	3	
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	5	D	677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	3	
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	1140	H	678 6001	PAV SURF PREP FOR MRK (4")	LF	2289	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	2067		678 6002	PAV SURF PREP FOR MRK (6")	LF	1140	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	200		678 6004	PAV SURF PREP FOR MRK (8")	LF	2067	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	5		678 6008	PAV SURF PREP FOR MRK (24")	LF	200	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	5		678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	5	
666 6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	2289		678 6016	PAV SURF PREP FOR MRK (WORD)	EA	5	
666 6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF	2289	G					
666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	1140	E					
672 6009	REFL PAV MRKR TY II-A-A	EA	8	I					
672 6010	REFL PAV MRKR TY II-C-R	EA	146						



0 50 100

SCALE: 1" = 100' (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PLANIMETRICS

NOTES:

1. ALL EXISTING CONFLICTING STRIPING SHALL BE REMOVED AND SHALL BE PAID BY ITEM 677.
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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
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LICENSED PROFESSIONAL ENGINEER
04-20-21

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(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 153+00 - STA 177+00

7 OF 15

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.	
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.	
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED: RS	ELP	EL PASO	3451	01	035, ETC.	234	

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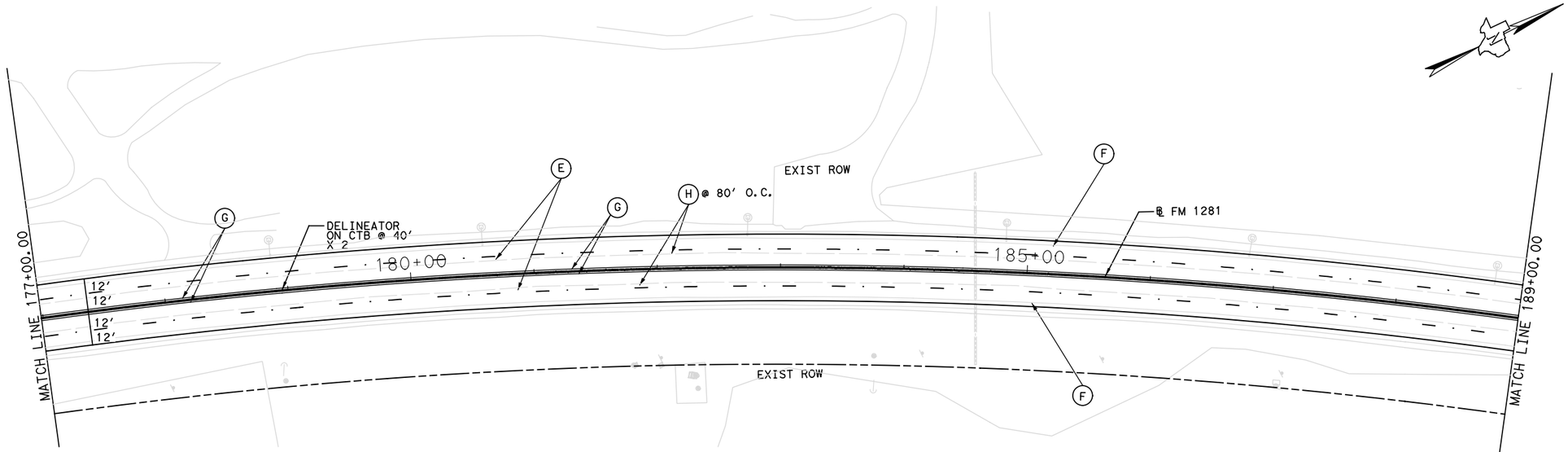
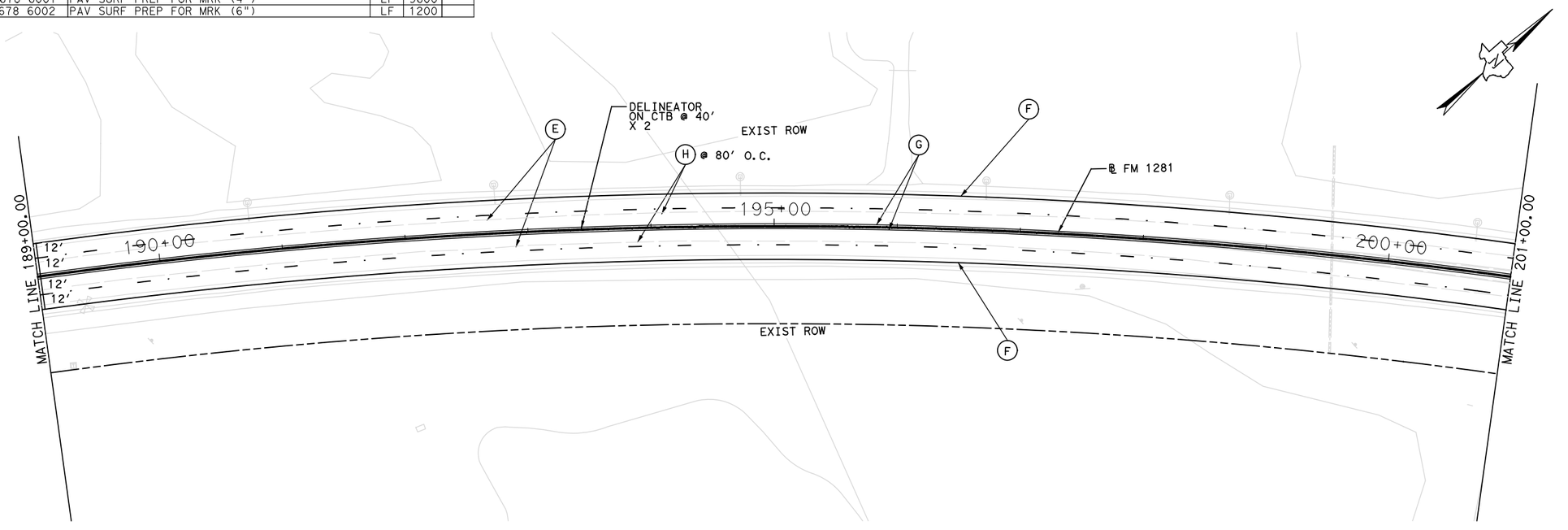
FINAL SUBMITTAL



	ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QTY	ID
658 6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	120	
666 6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	4800	
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	1200	H
666 6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	4800	
666 6283	REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	LF	4800	F
666 6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF	4800	G
666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	1200	E
672 6010	REFL PAV MRKR TY II-C-R	EA	60	
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	10800	
678 6001	PAV SURF PREP FOR MRK (4")	LF	9600	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1200	



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SCALE: 1" = 100′ (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PLANIMETRICS

NOTES:

1. ALL EXISTING CONFLICTING STRIPING SHALL BE REMOVED AND SHALL BE PAID BY ITEM 677.
2. ALL SIGN LOCATIONS SHOWN ARE APPROXIMATE AND CAN BE FIELD ADJUSTED AS NECESSARY TO AVOID OBSTRUCTIONS.
3. ALL DELINEATORS INSTALLED ON CONCRETE TRAFFIC BARRIER SHALL BE PLACED ON BOTH SIDES AT 40′ SPACING.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER

L.V. Short 04-20-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 177+00 - STA 201+00

8 OF 15

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	030, ETC.	235

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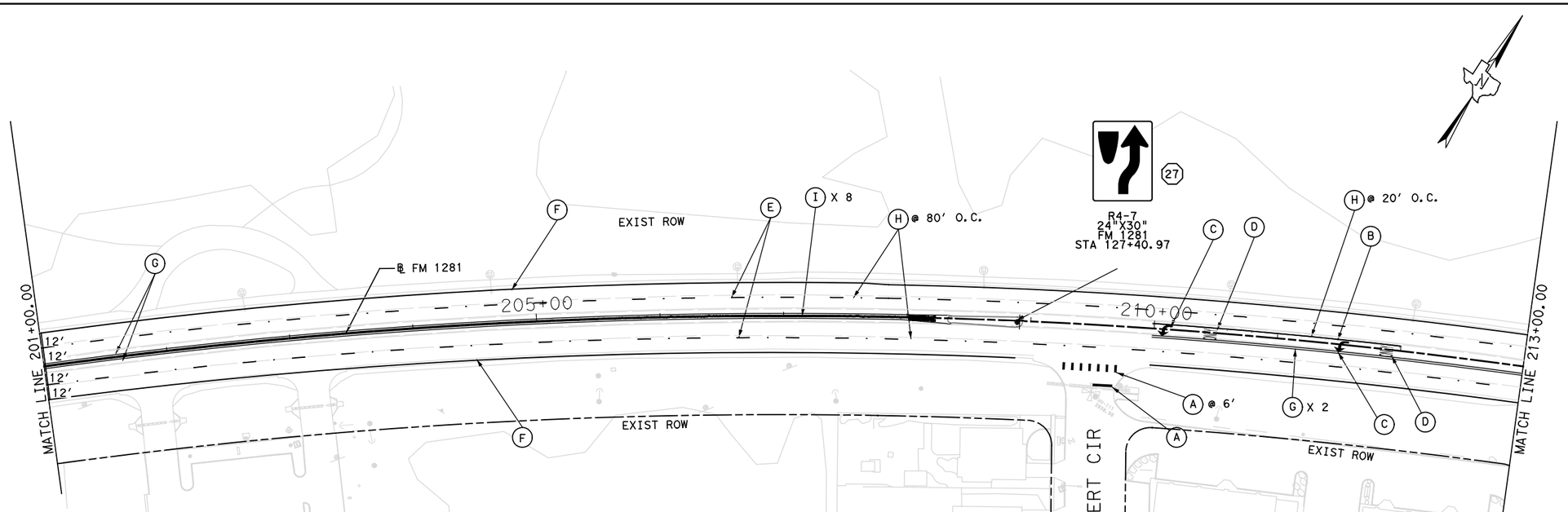
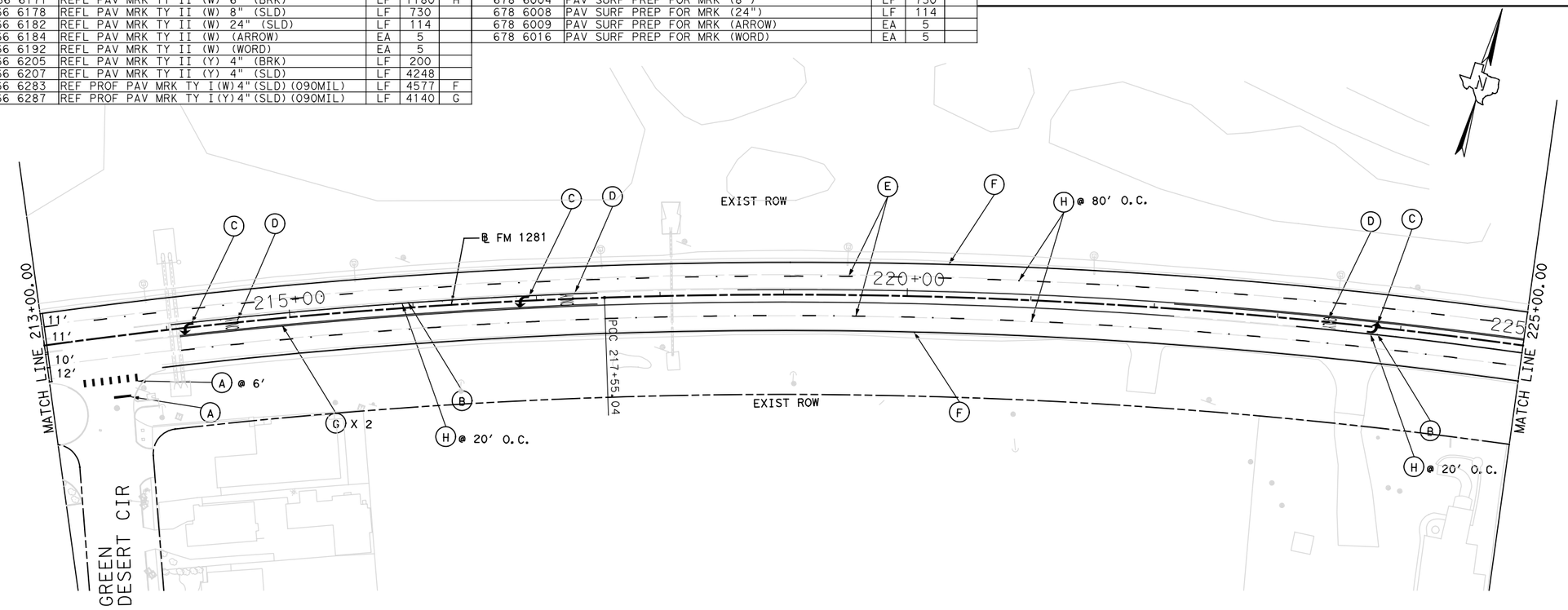
FINAL SUBMITTAL



ESTIMATED QUANTITIES					ESTIMATED QUANTITIES				
ITEM NO.	DESCRIPTION	UNIT	QTY	ID	ITEM NO.	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	1		666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	1180	E
658 6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	36		666 6311	RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)	LF	200	J
666 6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	730	B	672 6009	REFL PAV MRKR TY II-A-A	EA	206	I
666 6047	REFL PAV MRK TY I (W)24"(SLD)(090MIL)	LF	114	A	672 6010	REFL PAV MRKR TY II-C-R	EA	95	
666 6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	5	C	677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	4343	
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	5	D	678 6001	PAV SURF PREP FOR MRK (4")	LF	9117	
666 6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	4577		678 6002	PAV SURF PREP FOR MRK (6")	LF	1180	
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	1180	H	678 6004	PAV SURF PREP FOR MRK (8")	LF	730	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	730		678 6008	PAV SURF PREP FOR MRK (24")	LF	114	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	114		678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	5	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	5		678 6016	PAV SURF PREP FOR MRK (WORD)	EA	5	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	5						
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	200						
666 6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	4248						
666 6283	REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	LF	4577	F					
666 6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF	4140	G					



0 50 100

SCALE: 1" = 100' (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PLANIMETRICS

NOTES:

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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER

L.V. Short 04-20-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 201+00 - STA 255+00

9 OF 15

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	236

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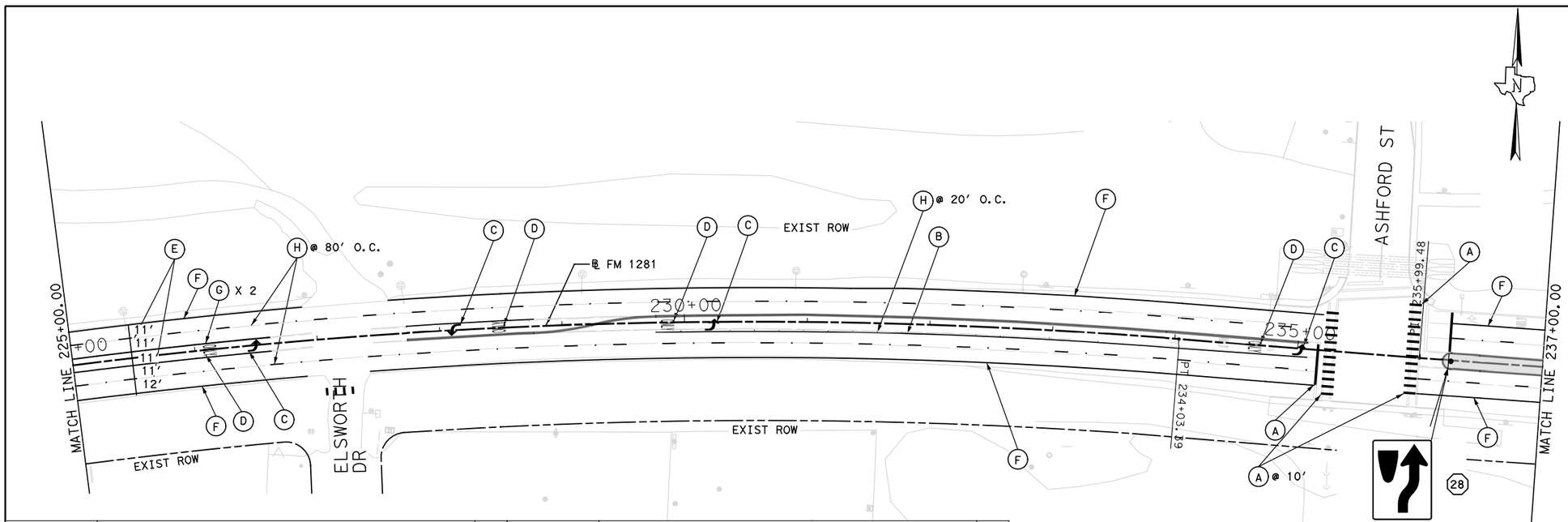
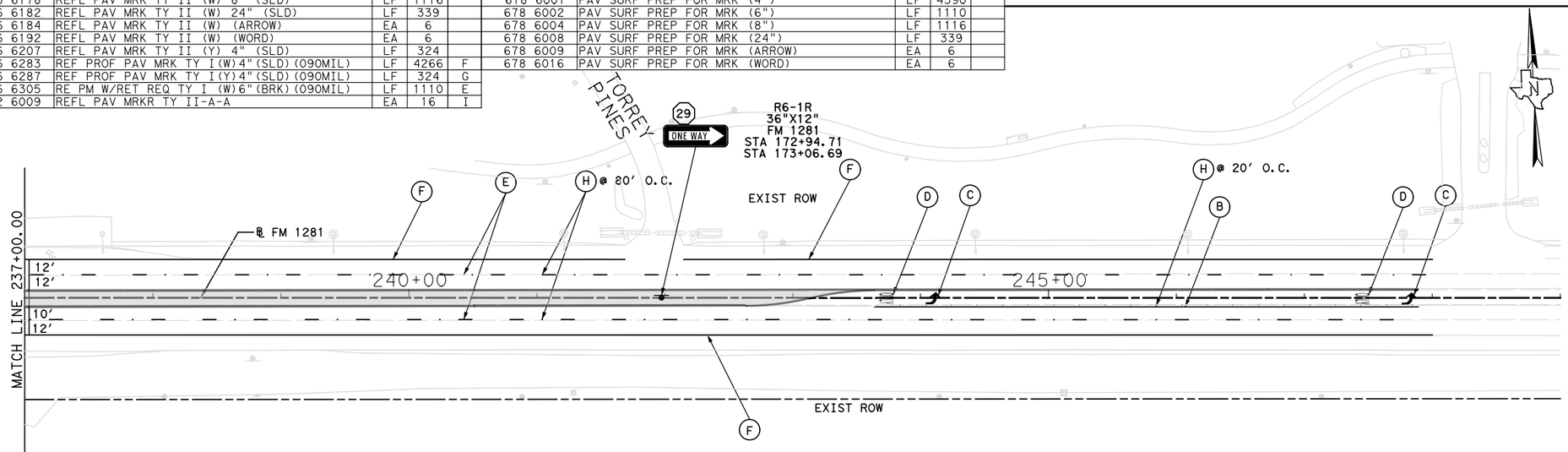
FINAL SUBMITTAL





ITEM NO.	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	2	
666 6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	1116	B
666 6047	REFL PAV MRK TY I (W)24"(SLD)(090MIL)	LF	339	A
666 6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	6	C
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	6	D
666 6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	4266	
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	1110	H
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	1116	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	339	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	6	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	6	
666 6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	324	
666 6283	REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	LF	4266	F
666 6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF	324	G
666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	1110	E
672 6009	REFL PAV MRKR TY II-A-A	EA	16	I

ITEM NO.	DESCRIPTION	UNIT	QTY	ID
672 6010	REFL PAV MRKR TY II-C-R	EA	116	
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	11324	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	135	
677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	300	
677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	170	
677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	2	
677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	1	
678 6001	PAV SURF PREP FOR MRK (4")	LF	4590	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1110	
678 6004	PAV SURF PREP FOR MRK (8")	LF	1116	
678 6008	PAV SURF PREP FOR MRK (24")	LF	339	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	6	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	6	

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PLANIMETRICS

NOTES:

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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER

L.V. Short 04-20-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 225+00 - STA 249+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	030, ETC.	237

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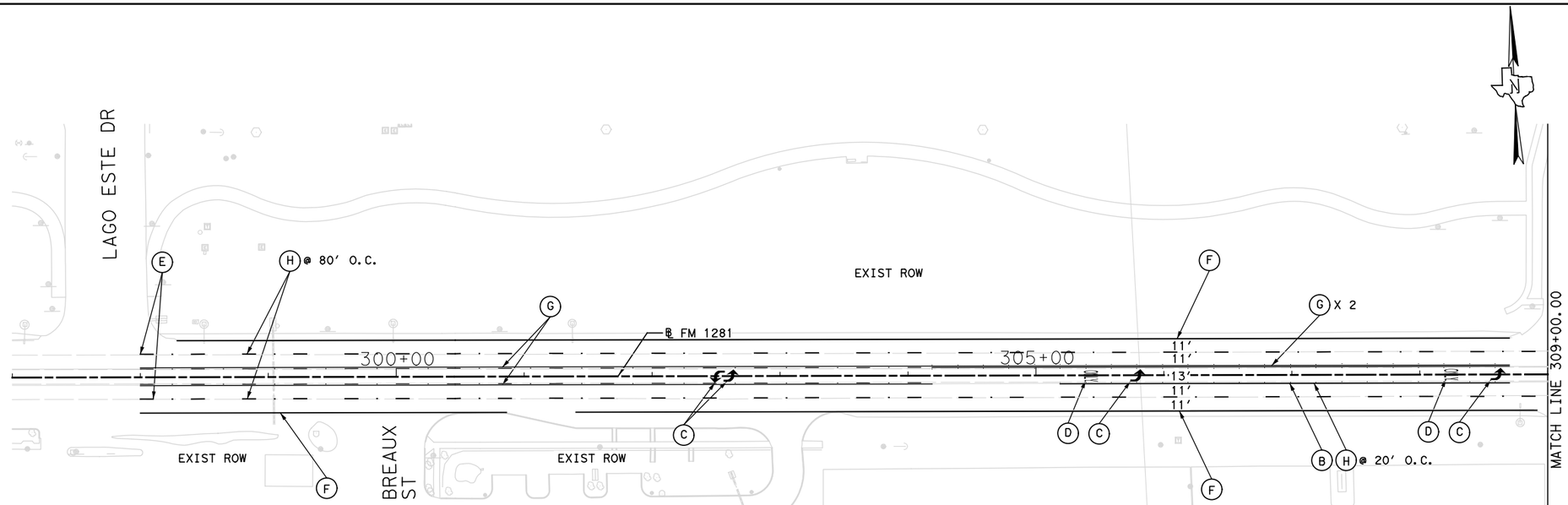
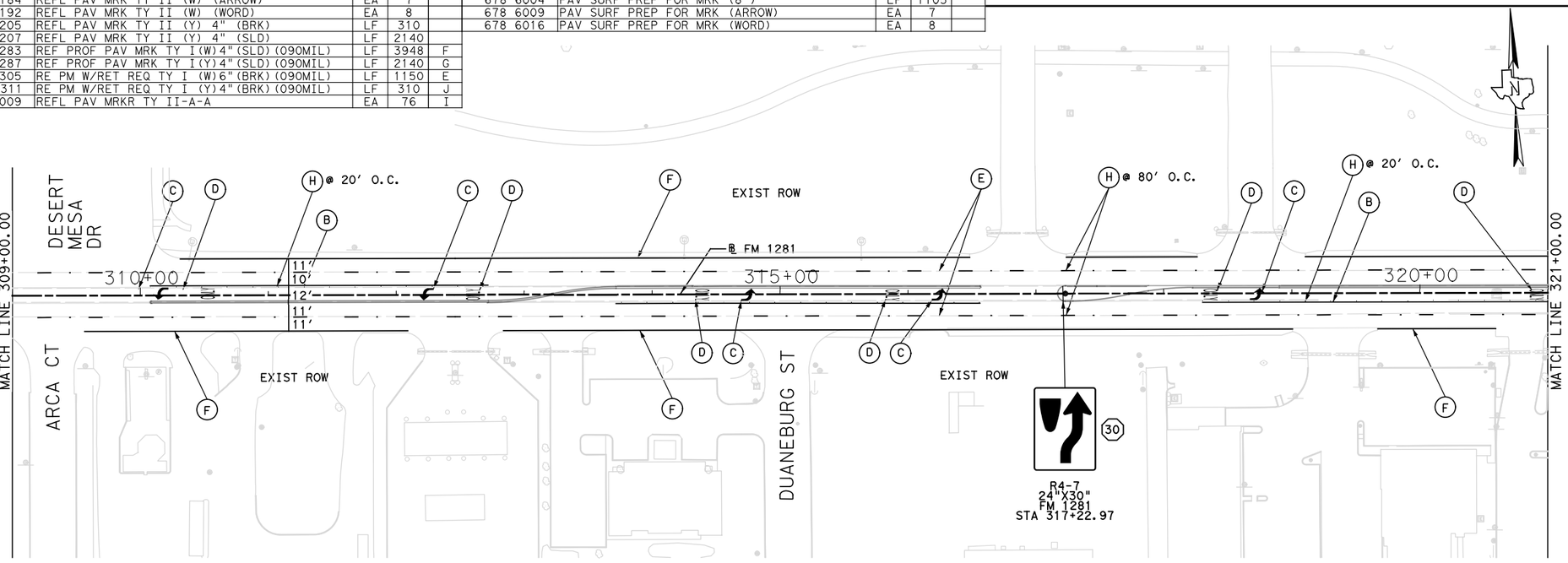
FINAL SUBMITTAL



ITEM NO.	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	1	
666 6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	1105	B
666 6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	7	C
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	8	D
666 6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	3948	
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	1150	H
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	1105	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	7	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	8	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	310	
666 6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	2140	
666 6283	REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	LF	3948	F
666 6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF	2140	G
666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	1150	E
666 6311	RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)	LF	310	J
672 6009	REFL PAV MRKR TY II-A-A	EA	76	I

ITEM NO.	DESCRIPTION	UNIT	QTY	ID
672 6010	REFL PAV MRKR TY II-C-R	EA	213	
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	11270	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	130	
677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	1	
677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	1	
678 6001	PAV SURF PREP FOR MRK (4")	LF	6708	
678 6002	PAV SURF PREP FOR MRK (6")	LF	1150	
678 6004	PAV SURF PREP FOR MRK (8")	LF	1105	
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	7	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	8	



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SCALE: 1" = 100' (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PLANIMETRICS

NOTES:

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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
04-20-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 297+00 - STA 321+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	030, ETC.	238

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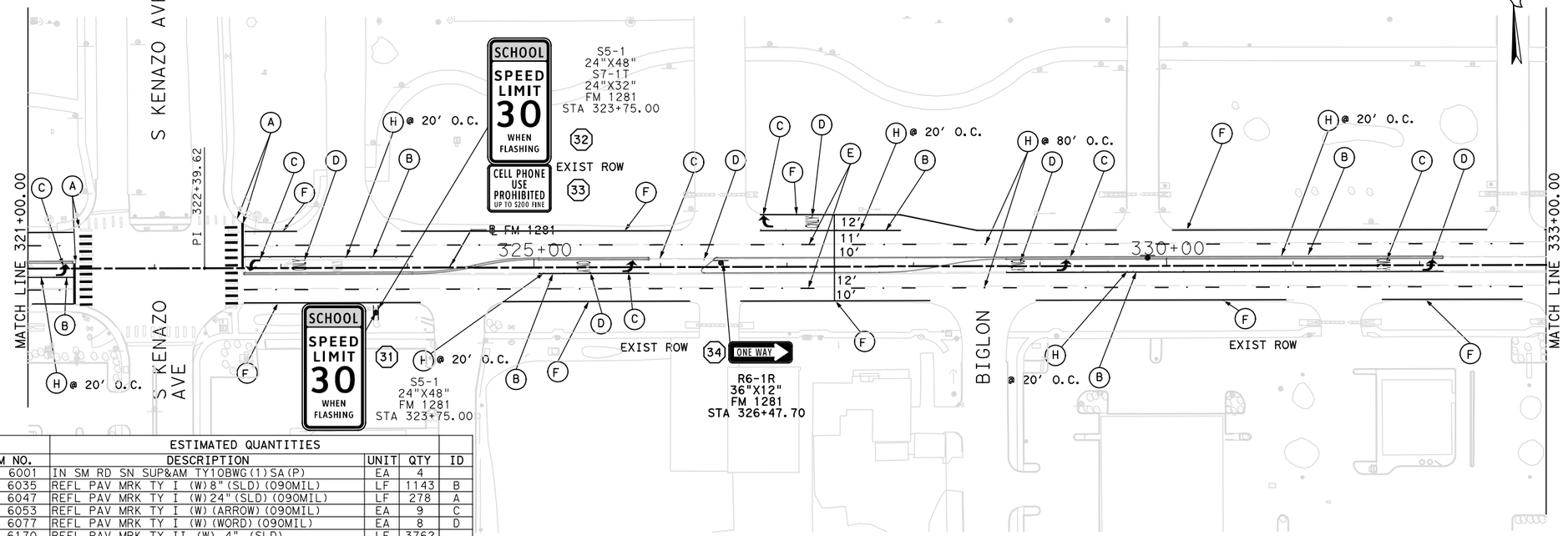
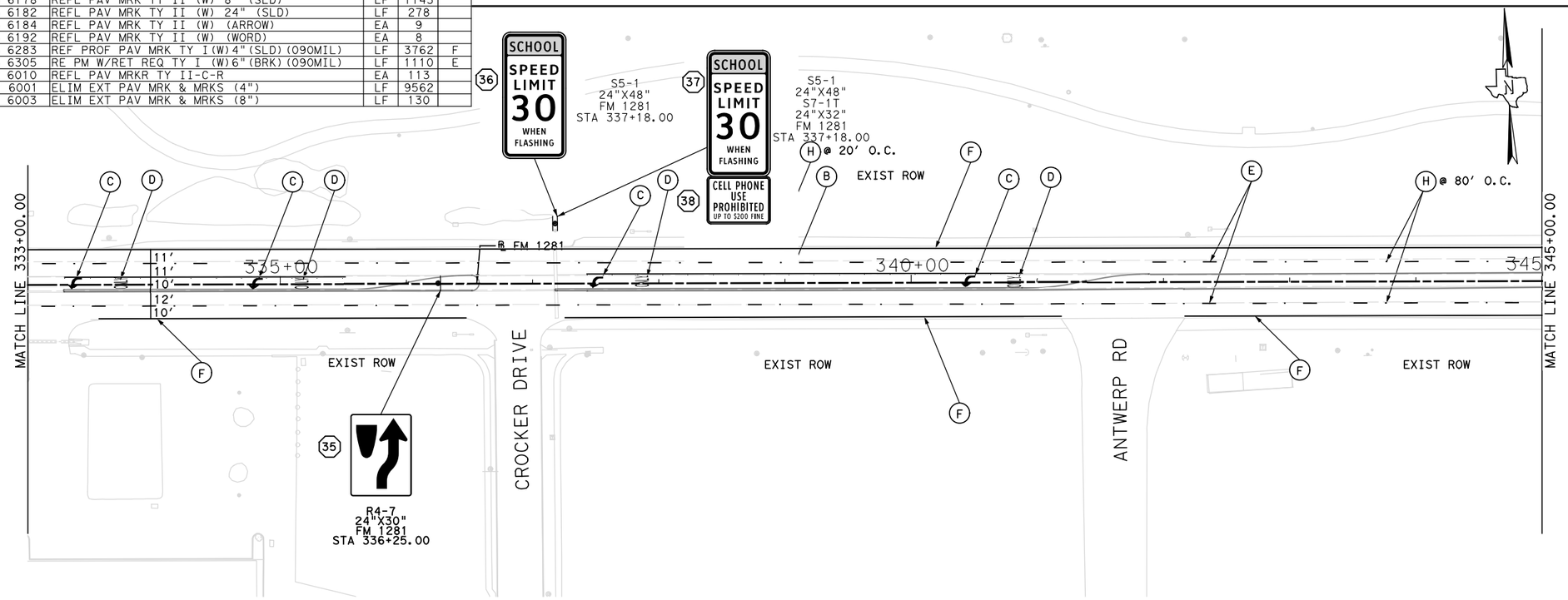


ESTIMATED QUANTITIES				
ITEM NO.	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	4	
666 6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	1143	B
666 6047	REFL PAV MRK TY I (W)24"(SLD)(090MIL)	LF	278	A
666 6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	9	C
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	8	D
666 6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	3762	
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	1110	H
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	1143	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	278	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	9	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	8	
666 6283	REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	LF	3762	F
666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	1110	E
672 6010	REFL PAV MRKR TY II-C-R	EA	113	
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	9562	
677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	130	



0 50 100
SCALE: 1" = 100′ (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
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Texas Department of Transportation

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STATE OF TEXAS
L.V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
04-20-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 321+00 - STA 345+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	030, ETC.	239

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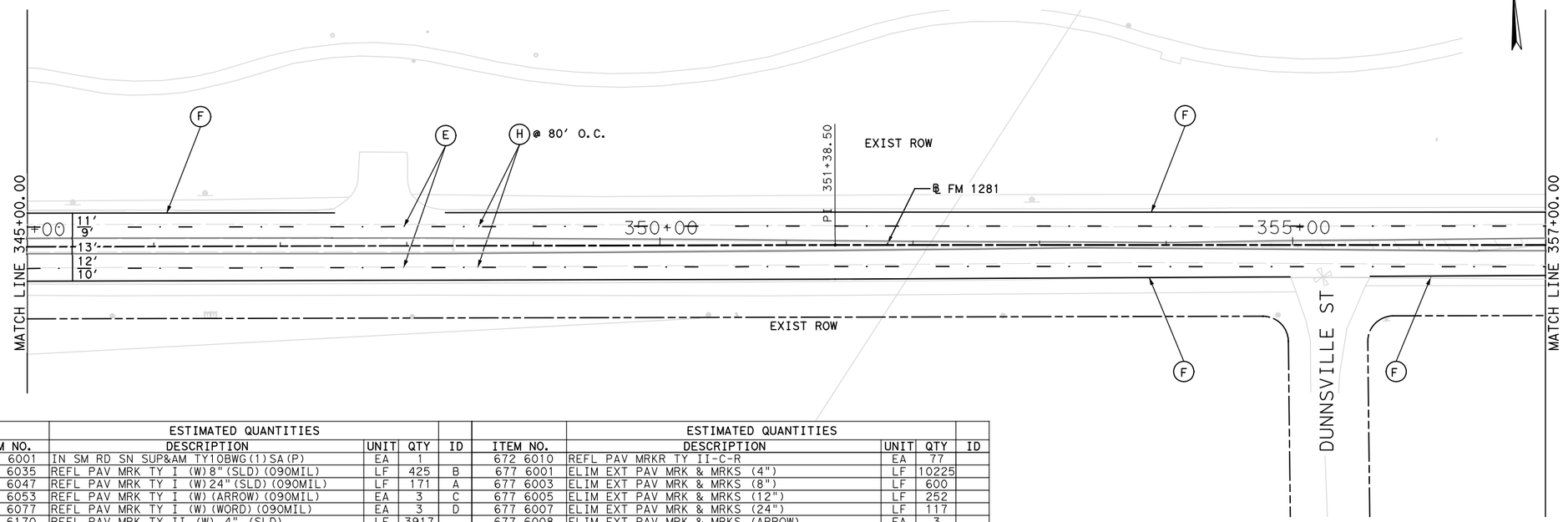
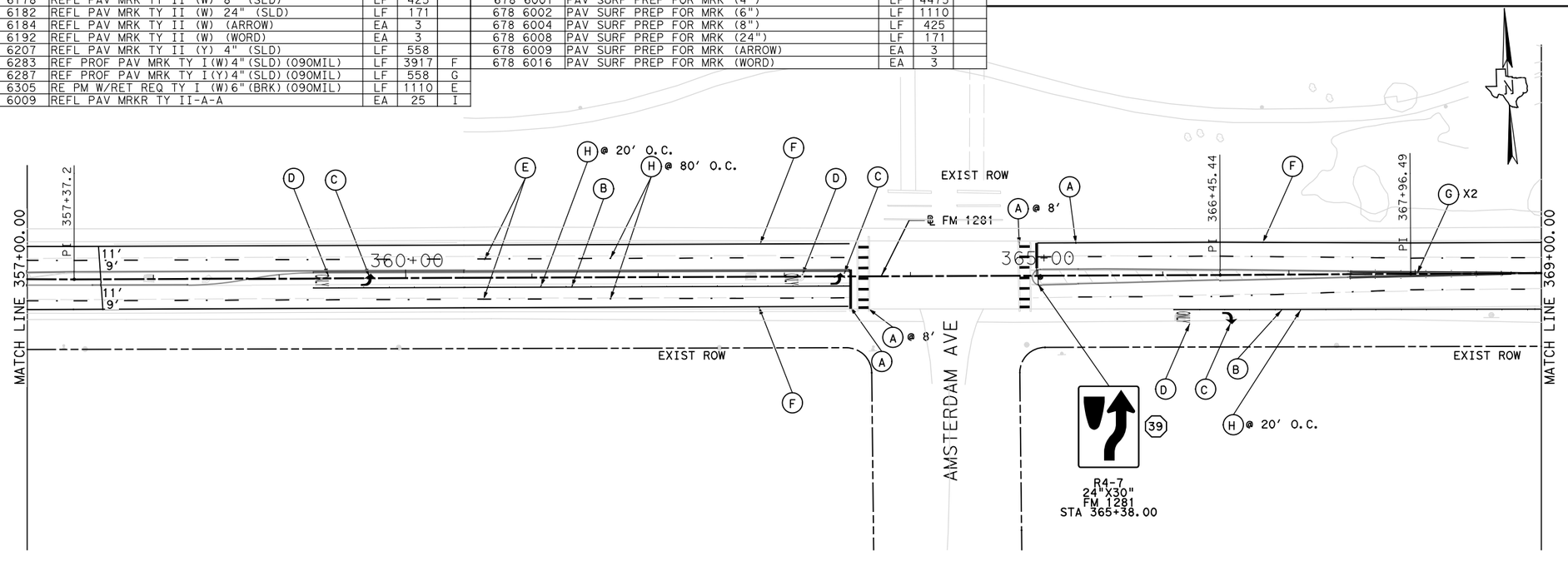


ESTIMATED QUANTITIES					ESTIMATED QUANTITIES				
ITEM NO.	DESCRIPTION	UNIT	QTY	ID	ITEM NO.	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	1		672 6010	REFL PAV MRKR TY II-C-R	EA	77	
666 6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	425	B	677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	10225	
666 6047	REFL PAV MRK TY I (W)24"(SLD)(090MIL)	LF	171	A	677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	600	
666 6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	3	C	677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	252	
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	3	D	677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	117	
666 6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	3917		677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	3	
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	1110	H	677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	3	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	425		678 6001	PAV SURF PREP FOR MRK (4")	LF	4475	
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	171		678 6002	PAV SURF PREP FOR MRK (6")	LF	1110	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	3		678 6004	PAV SURF PREP FOR MRK (8")	LF	425	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	3		678 6008	PAV SURF PREP FOR MRK (24")	LF	171	
666 6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	558		678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	3	
666 6283	REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	LF	3917	F	678 6016	PAV SURF PREP FOR MRK (WORD)	EA	3	
666 6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF	558	G					
666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	1110	E					
672 6009	REFL PAV MRKR TY II-A-A	EA	25	I					



0 50 100
SCALE: 1" = 100′ (H)

LEGEND

- OBJECT MARKER (OM-2Z)
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Texas Department of Transportation

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L.V. Short 04-20-21

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AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 345+00 - STA 369+00

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	030, ETC.	240

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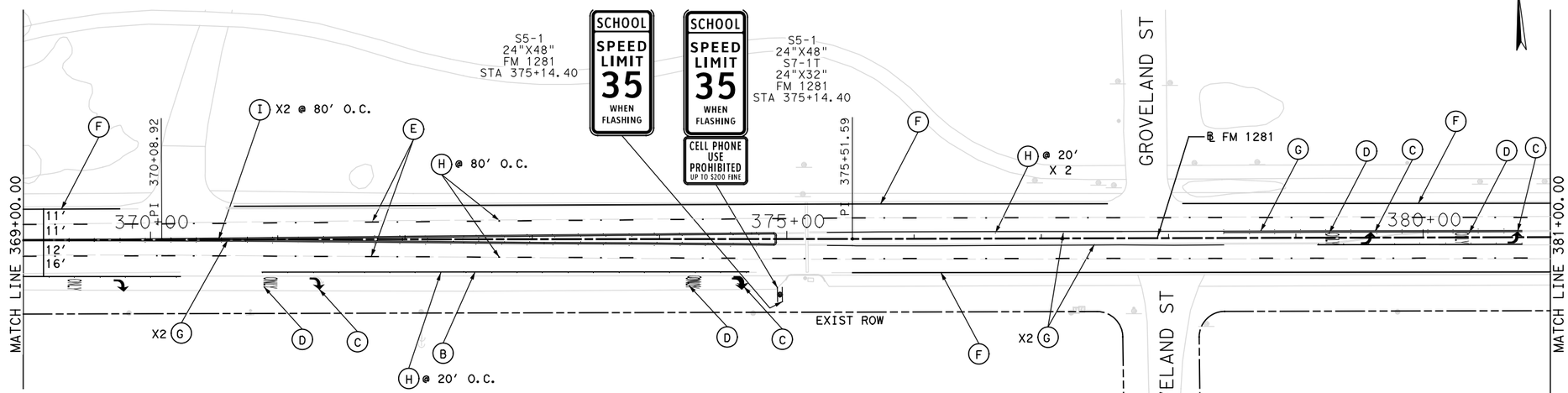
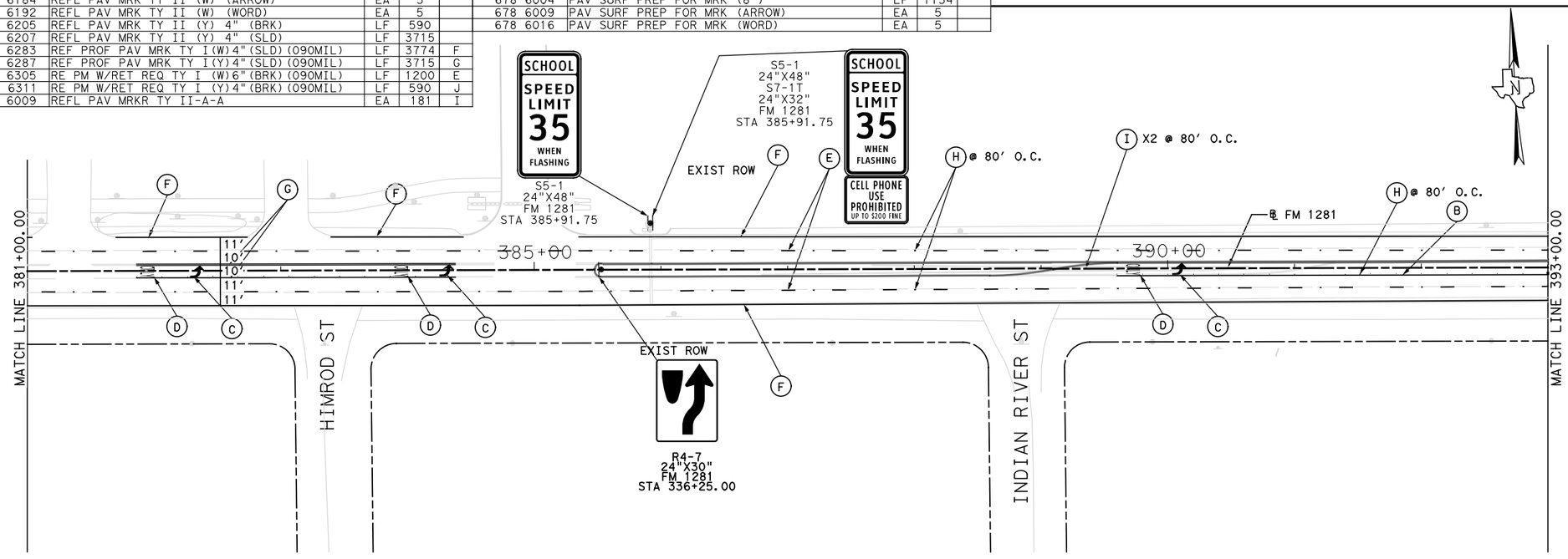
FINAL SUBMITTAL



ESTIMATED QUANTITIES					ESTIMATED QUANTITIES				
ITEM NO.	DESCRIPTION	UNIT	QTY	ID	ITEM NO.	DESCRIPTION	UNIT	QTY	ID
644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	3		672 6010	REFL PAV MRKR TY II-C-R	EA	117	
666 6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	1134	B	677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	4686	
666 6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	5	C	677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	505	
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	5	D	677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	1	
666 6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	3774		677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	1	
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	1200	H	678 6001	PAV SURF PREP FOR MRK (4")	LF	15568	
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	1134		678 6002	PAV SURF PREP FOR MRK (6")	LF	1200	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	5		678 6004	PAV SURF PREP FOR MRK (8")	LF	1134	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	5		678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	5	
666 6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	590		678 6016	PAV SURF PREP FOR MRK (WORD)	EA	5	
666 6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	3715						
666 6283	REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	LF	3774	F					
666 6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF	3715	G					
666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	1200	E					
666 6311	RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)	LF	590	J					
672 6009	REFL PAV MRKR TY II-A-A	EA	181	I					



0 50 100
SCALE: 1" = 100′ (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PLANIMETRICS

NOTES:

1. ALL EXISTING CONFLICTING STRIPING SHALL BE REMOVED AND SHALL BE PAID BY ITEM 677.
2. ALL SIGN LOCATIONS SHOWN ARE APPROXIMATE AND CAN BE FIELD ADJUSTED AS NECESSARY TO AVOID OBSTRUCTIONS.
3. ALL DELINEATORS INSTALLED ON CONCRETE TRAFFIC BARRIER SHALL BE PLACED ON BOTH SIDES AT 40′ SPACING.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER
04-20-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 369+00 - STA 393+00

DESIGNED: GR	FED. RD DIV. NO.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	241

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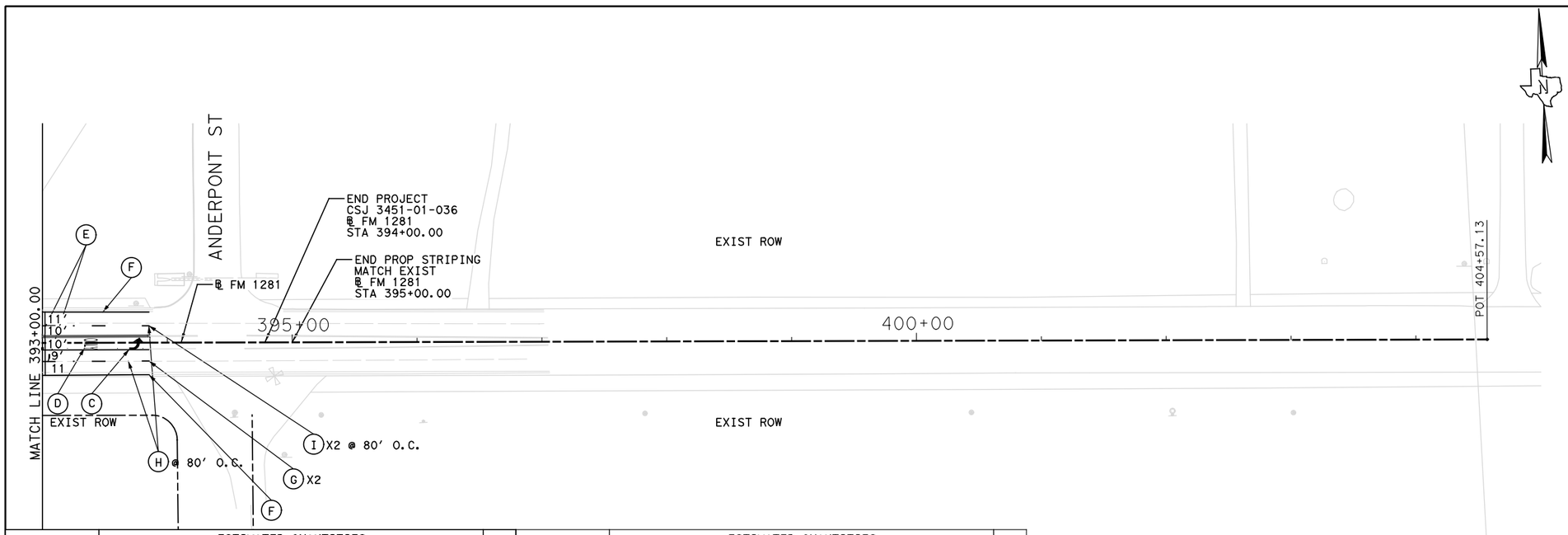
FINAL SUBMITTAL



ITEM NO.	DESCRIPTION	UNIT	QTY	ID
666 6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	85	B
666 6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	1	C
666 6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	1	D
666 6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	170	
666 6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	50	H
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	85	
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	1	
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	1	
666 6283	REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	LF	170	F
666 6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	50	E
672 6009	REFL PAV MRKR TY II-A-A	EA	5	I
672 6010	REFL PAV MRKR TY II-C-R	EA	5	
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	900	
678 6001	PAV SURF PREP FOR MRK (4")	LF	340	
678 6002	PAV SURF PREP FOR MRK (6")	LF	50	
678 6004	PAV SURF PREP FOR MRK (8")	LF	85	

ITEM NO.	DESCRIPTION	UNIT	QTY	ID
678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	1	
678 6016	PAV SURF PREP FOR MRK (WORD)	EA	1	

0 50 100
SCALE: 1" = 100' (H)

LEGEND

- OBJECT MARKER (OM-2Z)
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PLANIMETRICS

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Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L.V. SHORT
69192
LICENSED
PROFESSIONAL ENGINEER

L.V. Short 04-20-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

SIGNING AND PAVEMENT MARKING LAYOUT

STA 393+00 - STA 395+00

15 OF 15

DESIGNED: GR	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.	HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES	FM 1281, ETC.

DRAWN: GR	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	242

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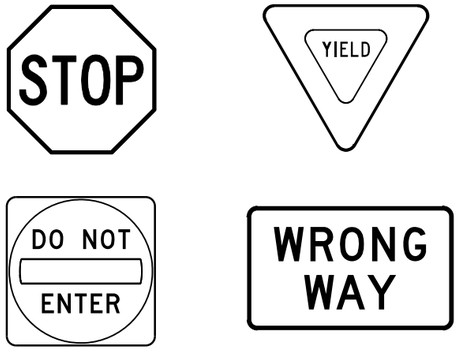
DATE:
FILE:

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

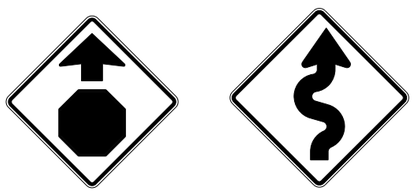
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

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

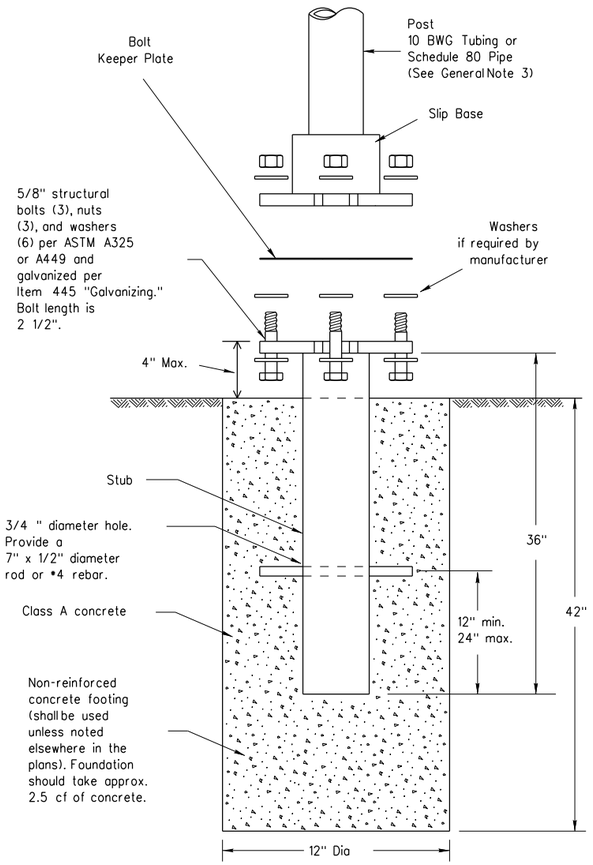
TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	0.35, ETC.	FM 1281, ETC.
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ELP	EL PASO		243

4

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:

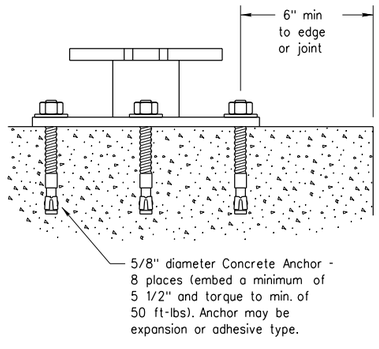
1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   - 10 BWG Tubing (2.875" outside diameter)
     - 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

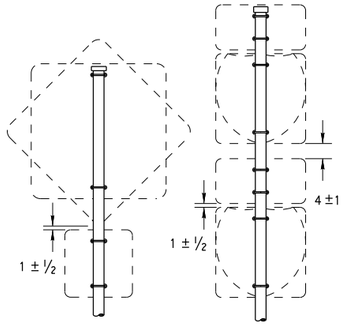
SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

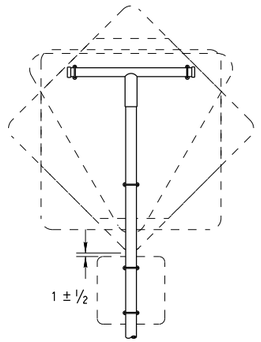
REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
3451	01	035, ETC.	FM 1281, ETC.
DIST	COUNTY		SHEET NO.
ELP	EL PASO		244

DATE:
FILE:



SM RD SGN ASSM TY XXXXX(1)XX(P)



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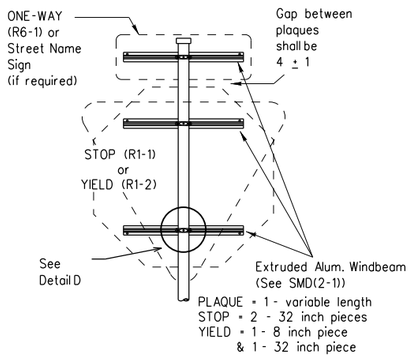

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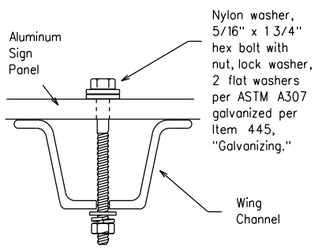
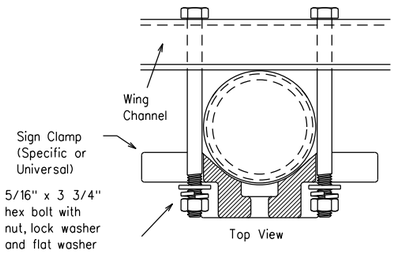
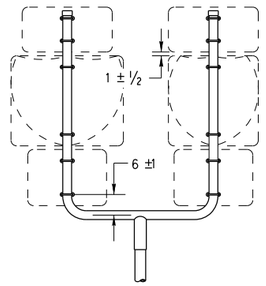


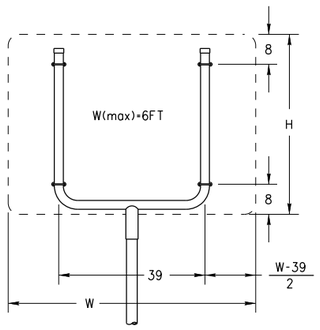
Detail A



Detail B



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



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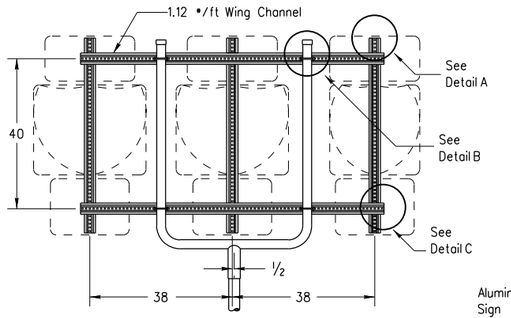
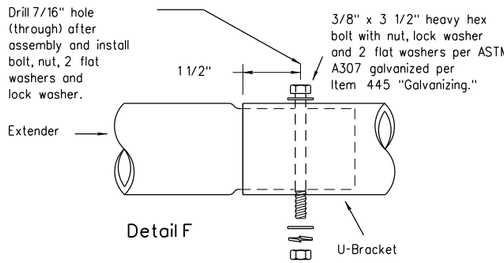
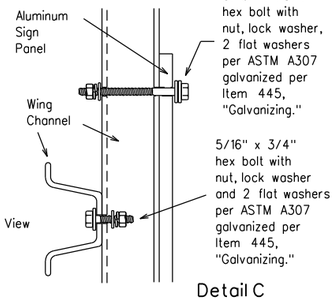


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

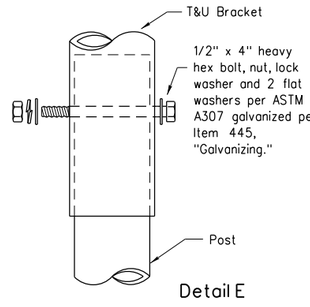


Detail F

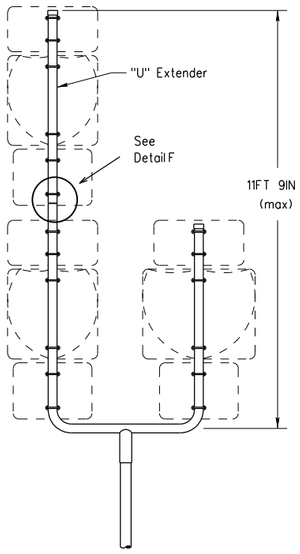
Splices shall only be allowed behind the sign substrate.



Detail C



Detail E



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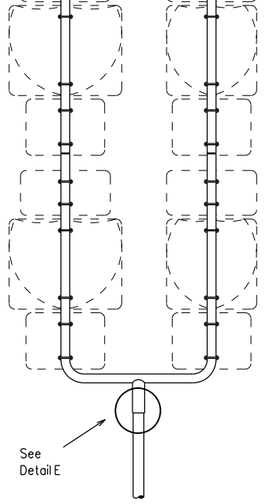

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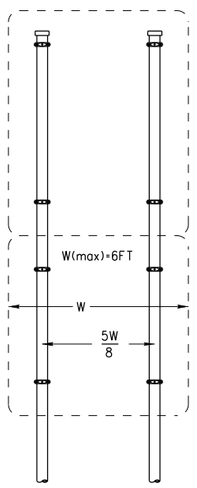
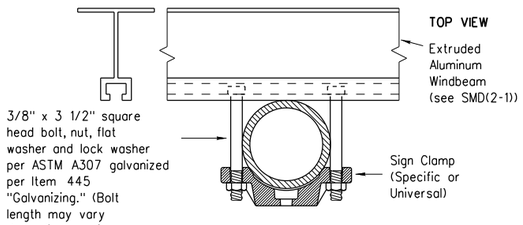
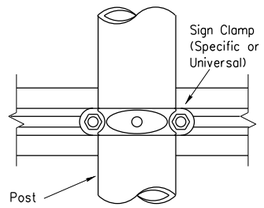


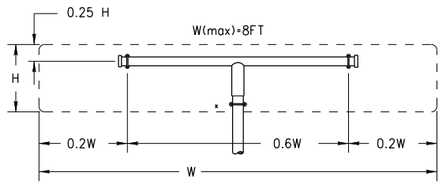
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

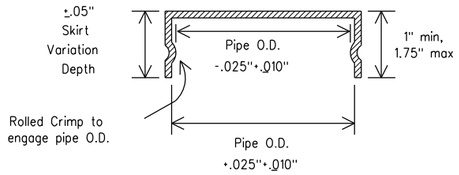




All dimensions are in english unless detailed otherwise.

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

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

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

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

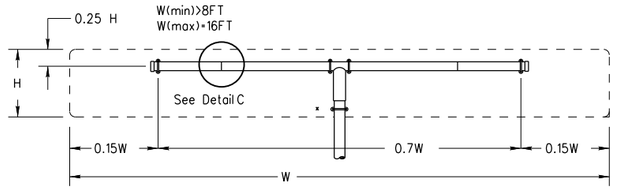
SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

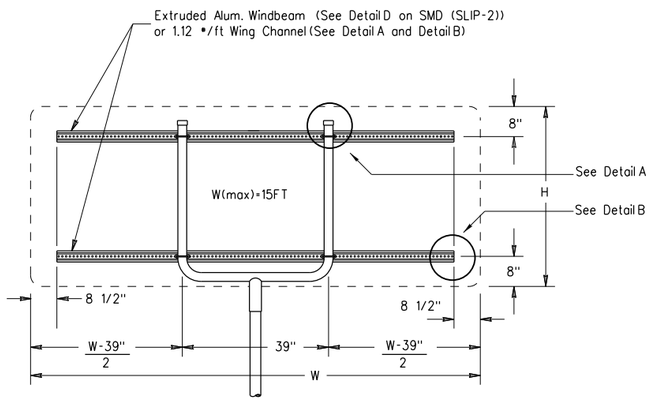
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	3451	01	035, ETC.	FM 1281, ETC.
	DIST		COUNTY	SHEET NO.
	ELP		EL PASO	245

DATE:
FILE:

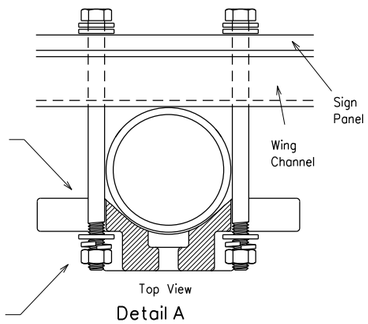
DATE:
FILE:



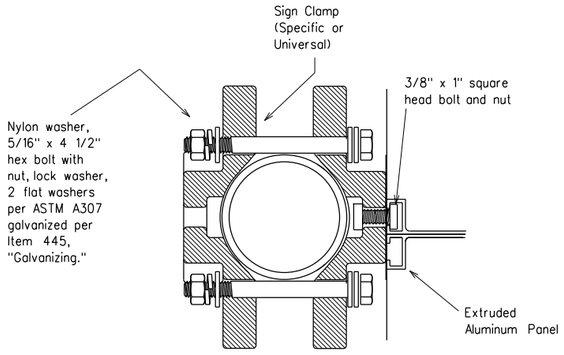
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



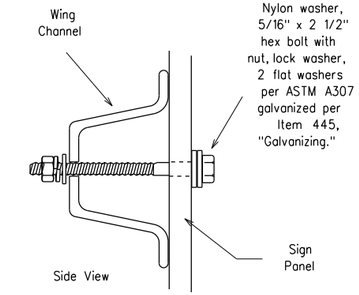
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



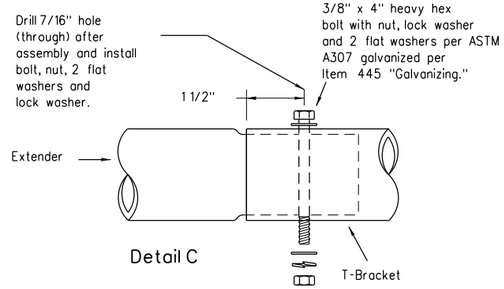
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

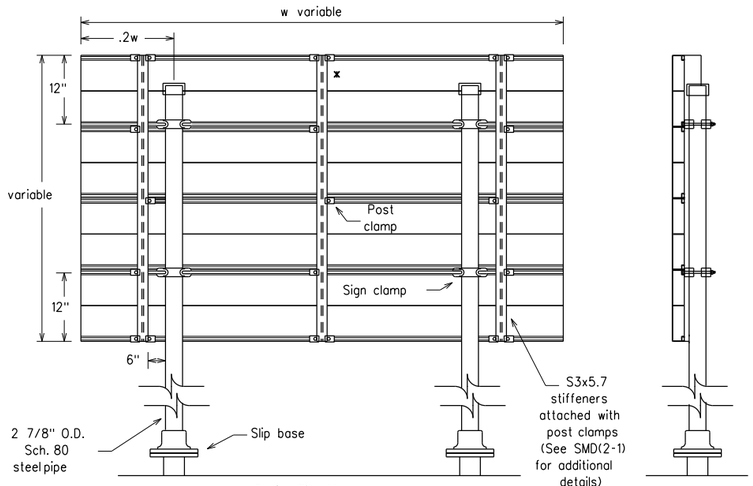


Detail B



Detail C

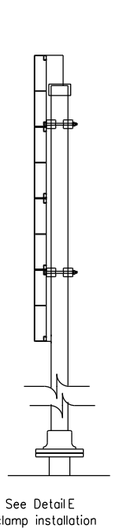
Splices shall only be allowed behind the sign substrate.



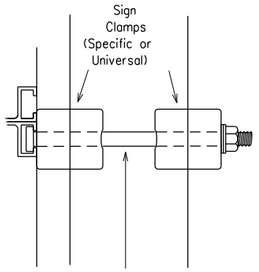
Typical Sign Mount

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

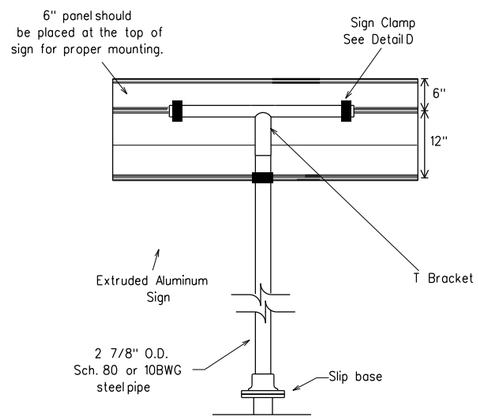
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



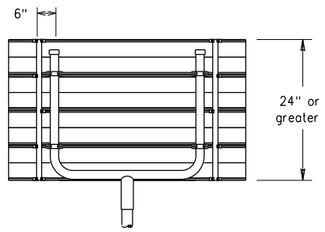
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

1.

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

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

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

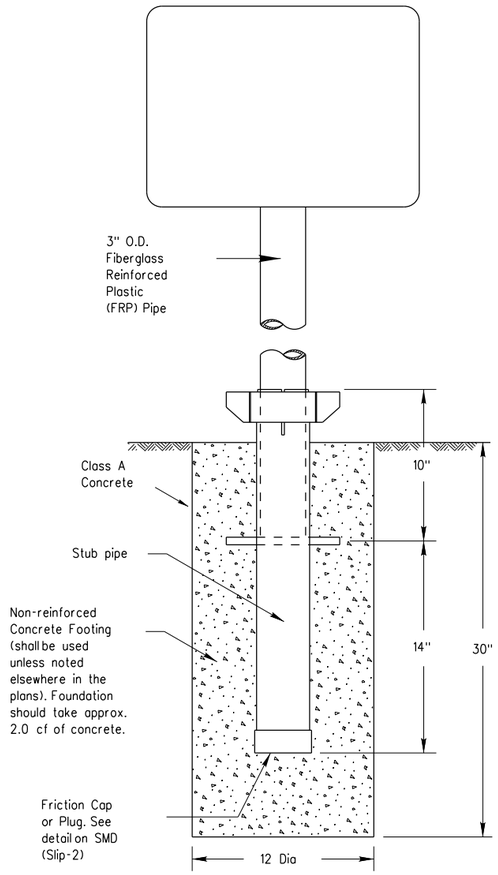
SMD(SLIP-3)-08

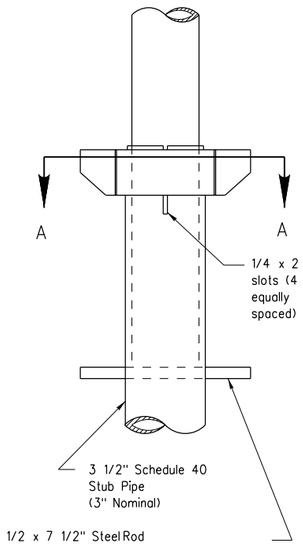
REVISIONS
9-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
3451	01	035, ETC.	FM 1281, ETC.
DIST	COUNTY		SHEET NO.
ELP	EL PASO		246

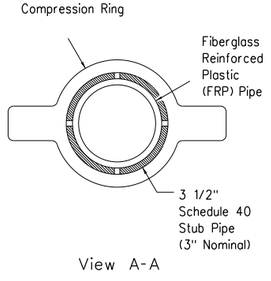
26D

Universal Anchor System with Fiberglass Reinforced Plastic (FRP) Post



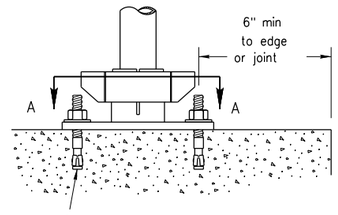


1/2 x 7 1/2" Steel Rod
Acts as a "stop" for the sign post and prevents stub from turning in the foundation.



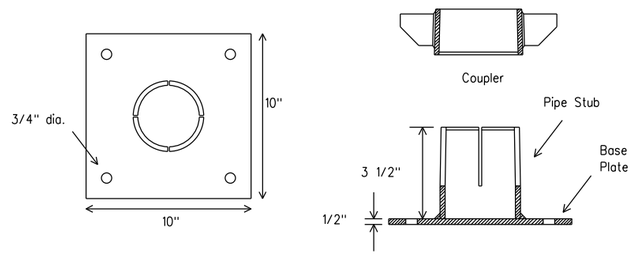
View A-A

SM RD SGN ASSM TY FRP(X)UA(P)



Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. 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.

BOLT-DOWN DETAILS



SM RD SGN ASSM TY FRP(X)UB(P)

GENERAL NOTES:

1. FRP sign supports for a single type sign support may be used for signs up to and including 16 square feet. Dual post installation may be used for signs up to and including 32 square feet.
2. All nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing."
3. See the Traffic Operations Division website for detailed drawings of sign clamps. The website address is: http://www.txdot.gov/publications/traffic.htm

FRP POST REQUIREMENTS

1. Materials shall conform to the requirements of Departmental Material Specification DMS-4410 and will be furnished in a yellow or gray color as specified elsewhere in the plans.
2. Thickness of FRP sign support is 0.125" + 0.031", - 0.0".
3. FRP sign supports are prequalified by the Traffic Operations Division. Prequalification procedures are obtained by writing:
   Texas Department of Transportation
   Traffic Operations Division
   125 East 11th Street
   Austin, Texas 78701-2483

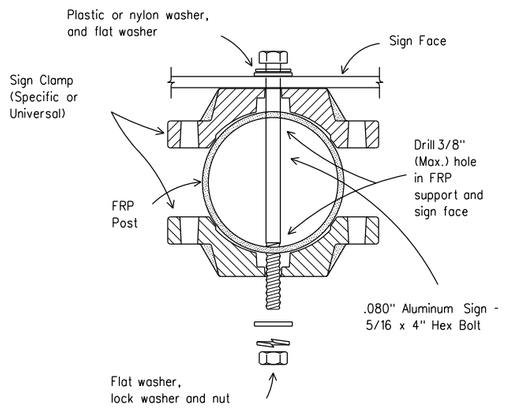
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
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. Insert base post in foundation hole to depths shown and fill hole with concrete. Cut base post from bottom and ensure a minimum of 18" embedment if installed in solid rock.
4. Level and plumb the base post with coupler using a torpedo level and let concrete set a minimum of 4 days, unless otherwise directed by Engineer. Bottom of base post slots shall be above the concrete footing.
5. Attach sign to FRP post.
6. Insert sign post into base post. Lower until the post comes to rest on the steel rod.
7. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
8. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

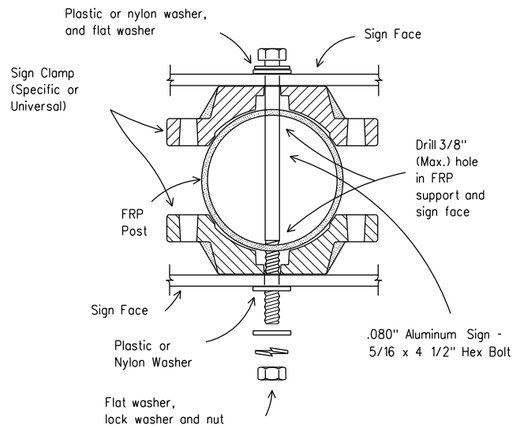
BOLT DOWN SIGN SUPPORT

1. Position base plate with coupler on existing concrete.
2. Drill holes into concrete and insert the 5/8" diameter bolts with wedge anchors, and tighten nuts.
3. Attach sign to FRP post.
4. Insert bottom of sign post into pipe stub.
5. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
6. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

Typical Sign Mounting Detail for FRP Support with Single Sign



Typical Sign Mounting Detail for FRP Support with Back-to-Back Signs



Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS UNIVERSAL ANCHOR SYSTEM WITH FRP POST

SMD(FRP)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
3451	01	035, ETC.	FM 1281, ETC.
DIST	COUNTY		SHEET NO.
ELP	EL PASO		247

26F

DATE:
FILE:

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

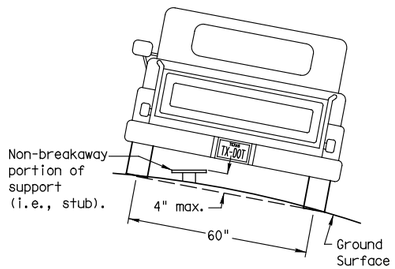
Anchor Type

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

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

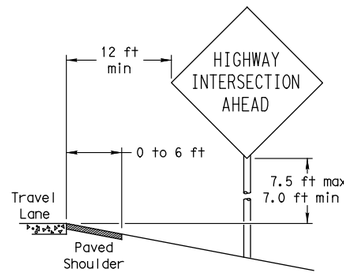
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

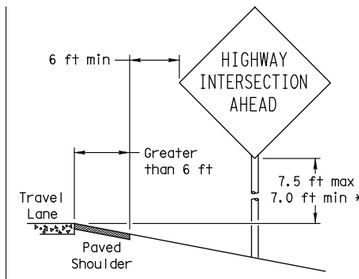
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

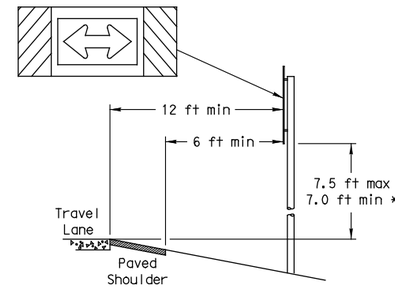
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



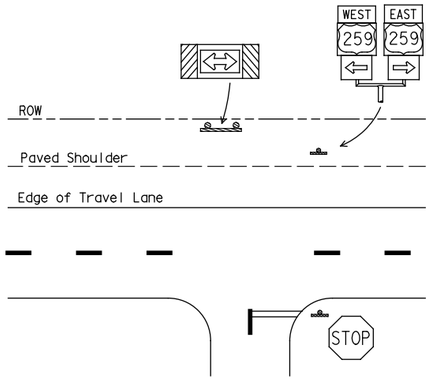
GREATER THAN 6 FT. WIDE

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

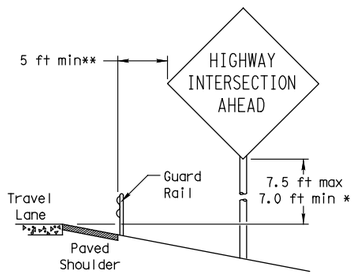
T-INTERSECTION



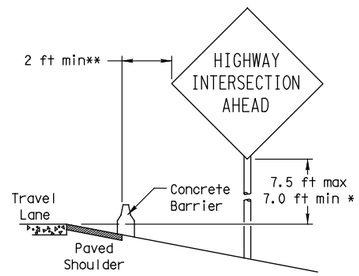
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

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

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

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

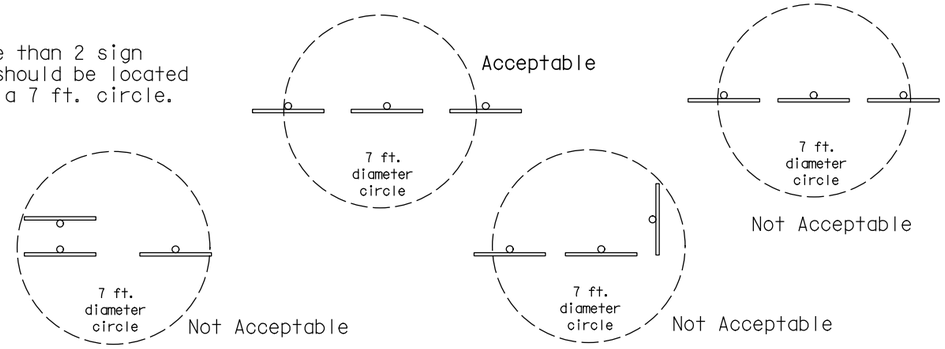
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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

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

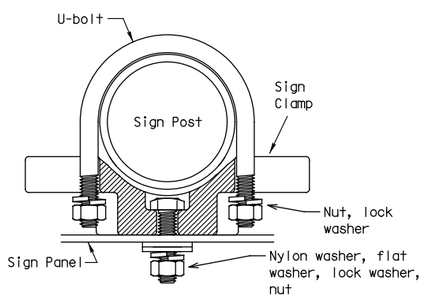
The website address is:
http://www.txdot.gov/publications/traffic.htm

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

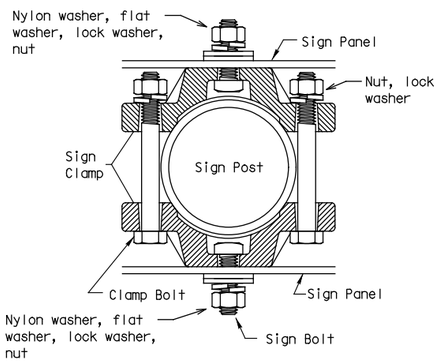


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

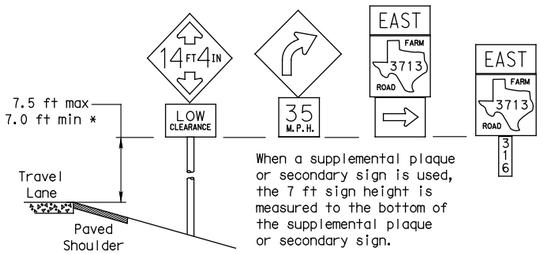
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



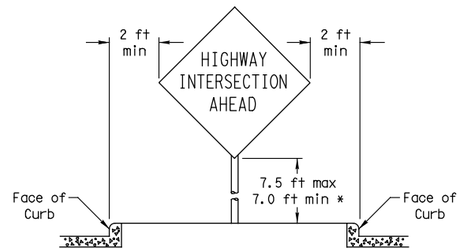
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



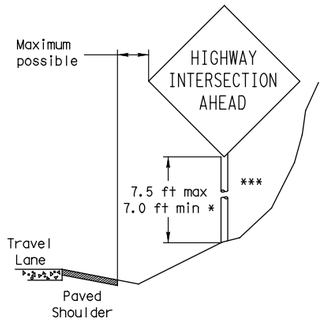
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

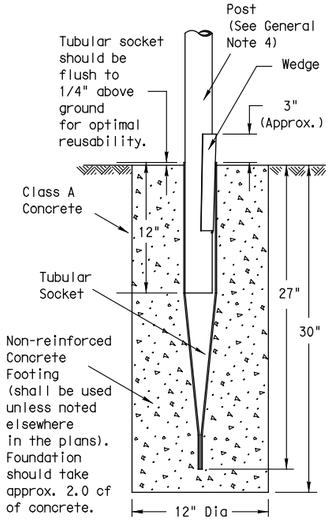
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	3451	01	035, ETC.	FM 1281, ETC.
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		248

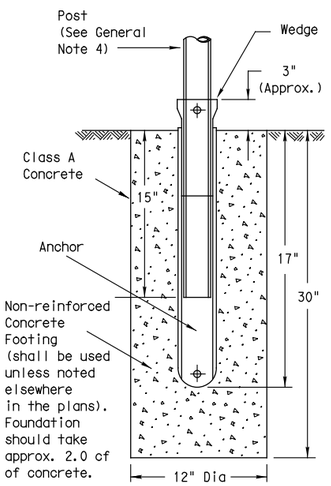
26A

Wedge Anchor Steel System



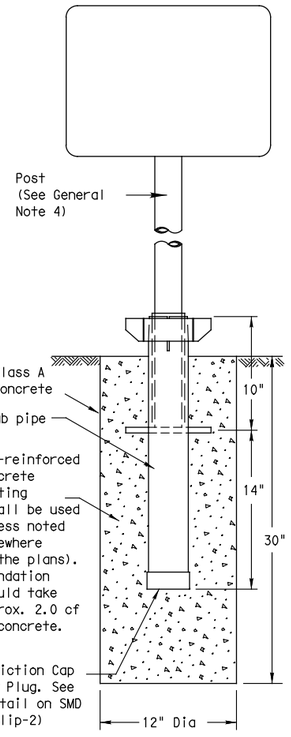
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

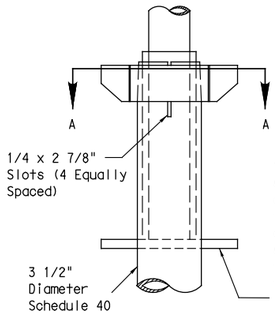


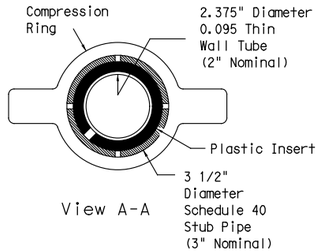
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



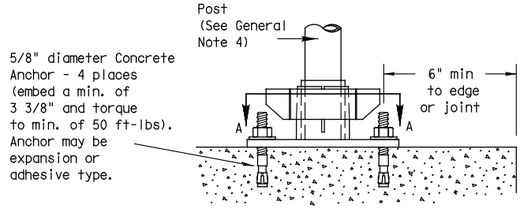
SM RD SGN ASSM TY TWT(X)UA(P)



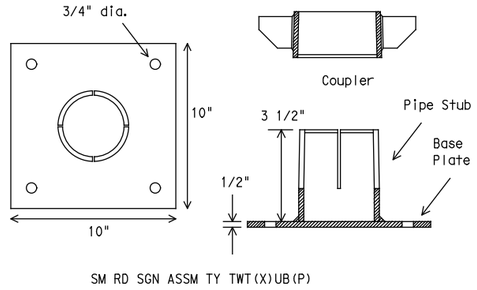


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

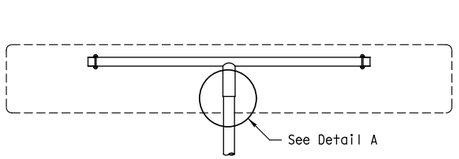


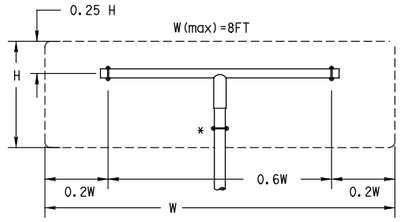
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. 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.



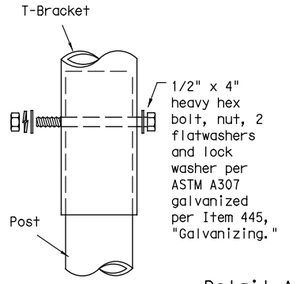
SM RD SGN ASSM TY TWT(X)UB(P)

Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)
(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   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
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
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. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

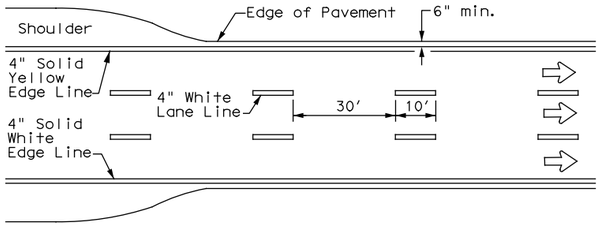
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
3451	01	035, ETC.	FM 1281, ETC.
DIST	COUNTY		SHEET NO.
ELP	EL PASO		249

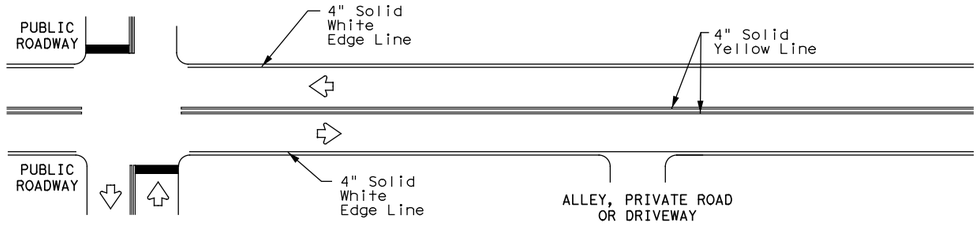
9-08 REVISIONS

26E

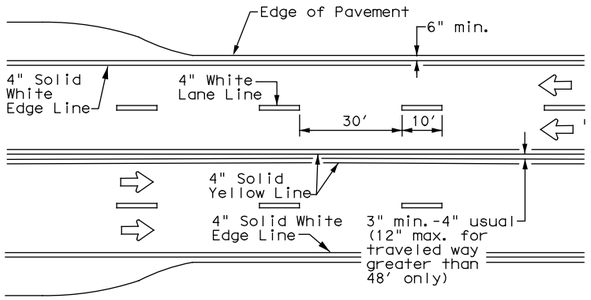
DATE:
FILE:



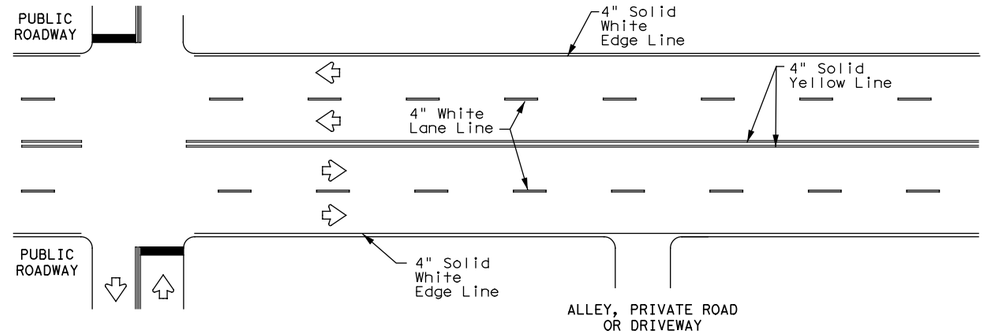
EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



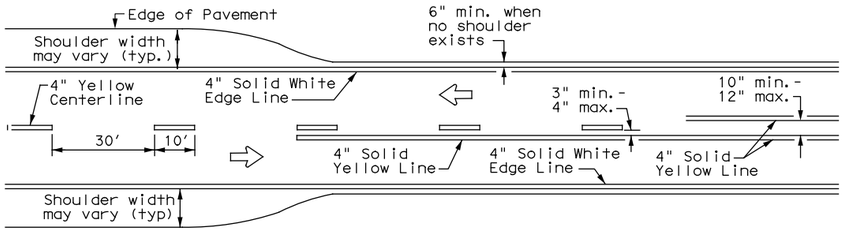
TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



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

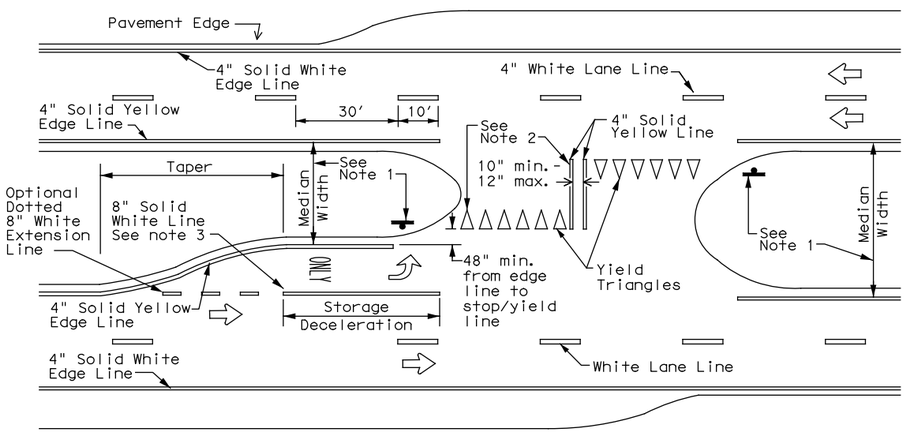


TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS

YIELD LINES



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 are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

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

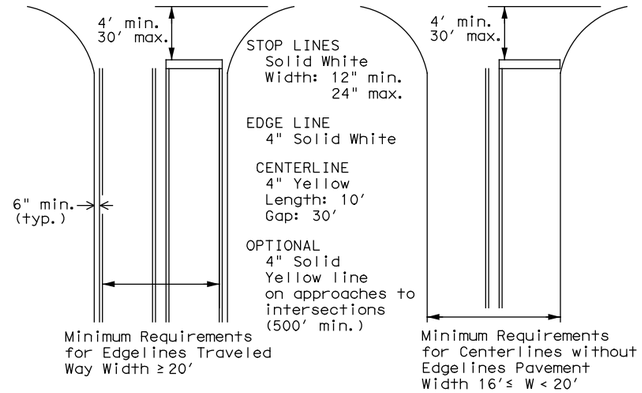
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

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

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



GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE
Based on Traveled Way and Pavement Widths
for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

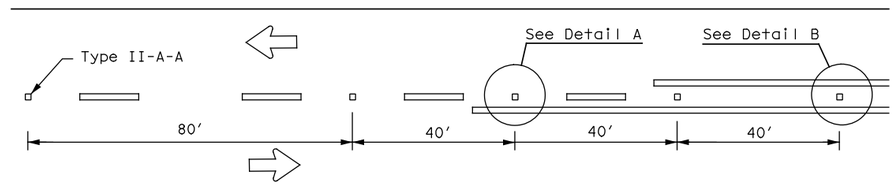
PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
©TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	3451	01	035, ETC.	FM 1281, ETC.
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	ELP	EL PASO		250

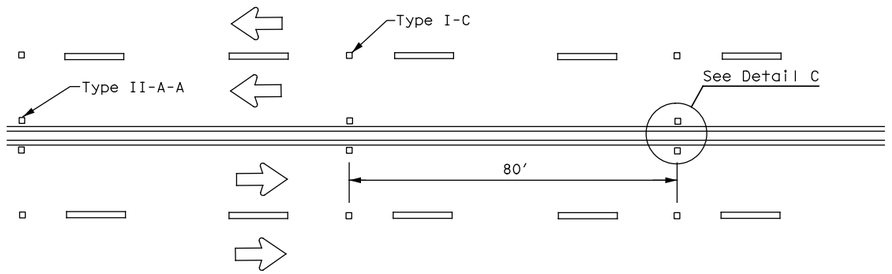
22A

3/30/2021
...\37547.001 El Paso*SH20\CADD\Sheets\HALFF\STANDARDS\pm1-20.dgn

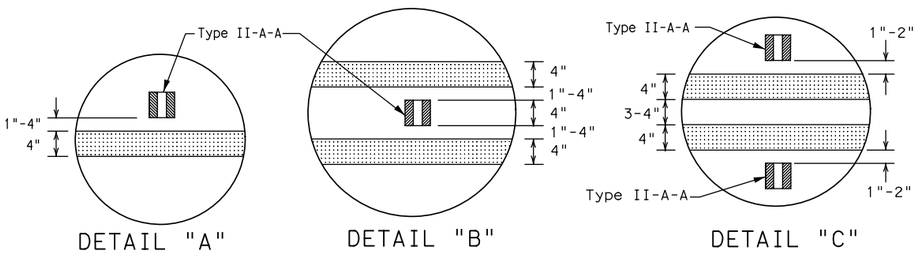
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



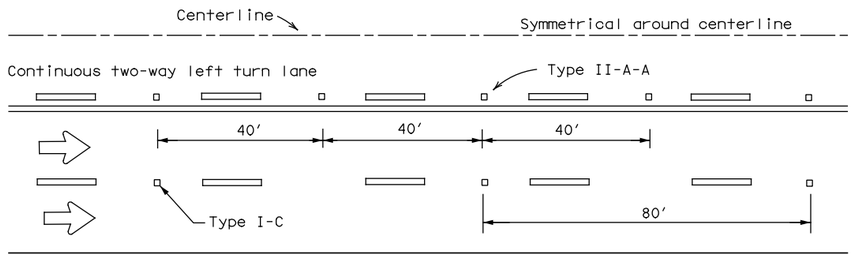
CENTERLINE FOR ALL TWO LANE ROADWAYS



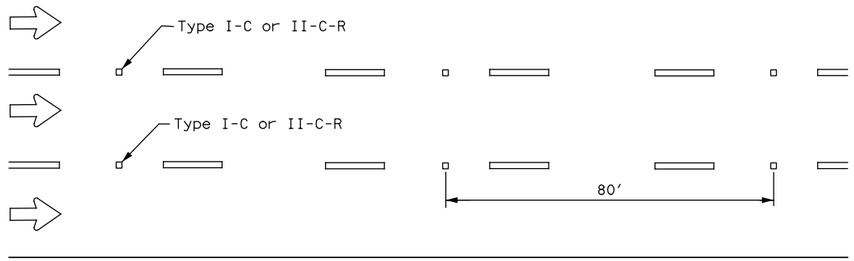
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" DETAIL "B" DETAIL "C"

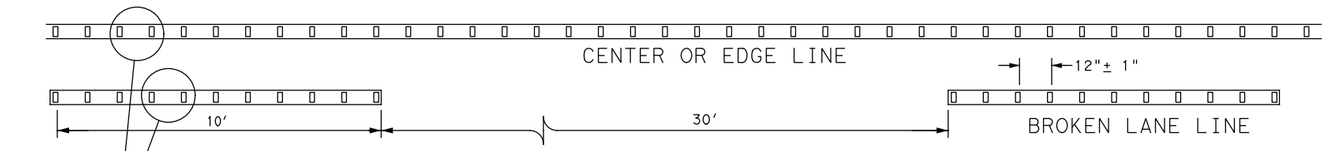


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



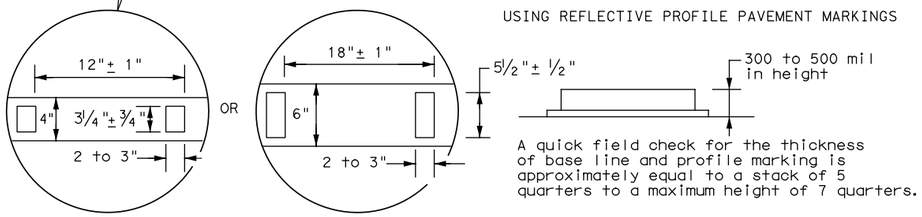
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

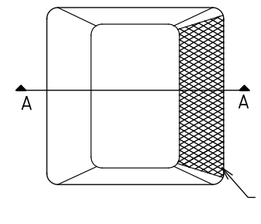
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

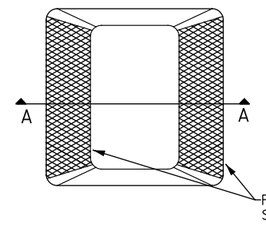
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

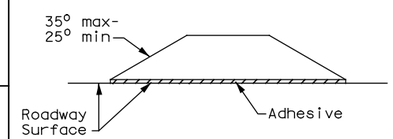
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

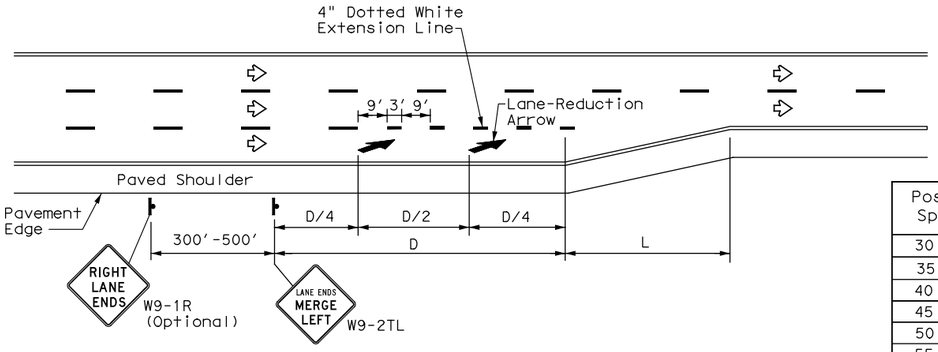
Traffic Safety Division Standard

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

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10	3451	01	035, ETC.	FM 1281, ETC.
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	ELP	EL PASO		251

22B

3/30/2021
\37547.001 El Paso\SH20\CADD\Sheets\HALFF\STANDARDS\pm2-20.dgn

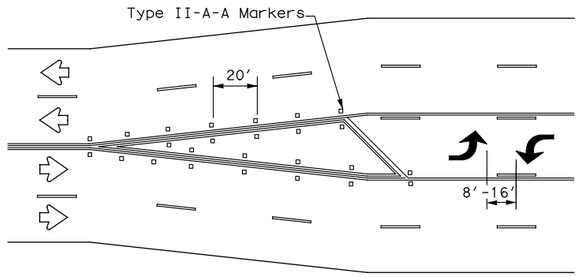


LANE REDUCTION

Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.



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

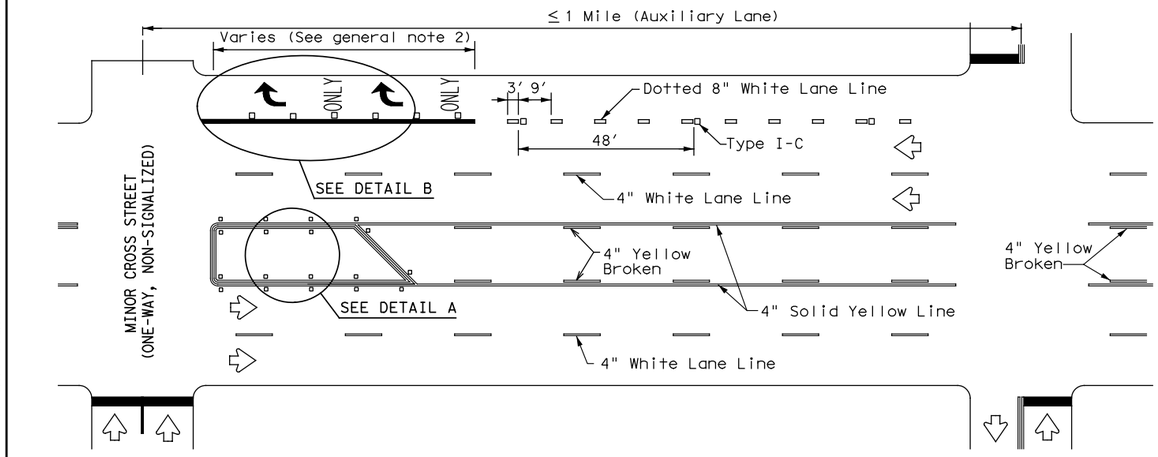
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

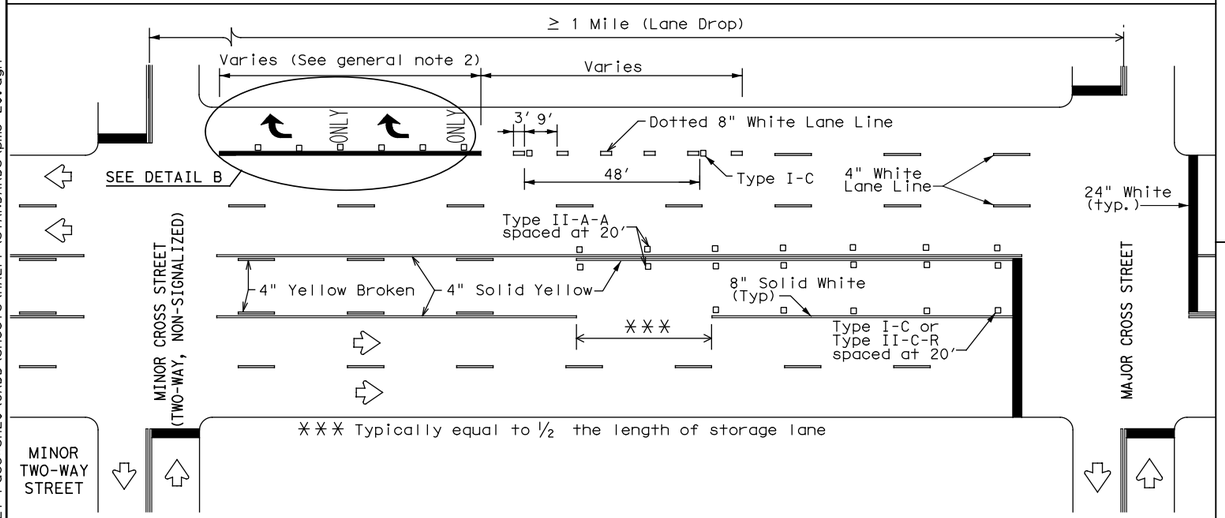
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

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

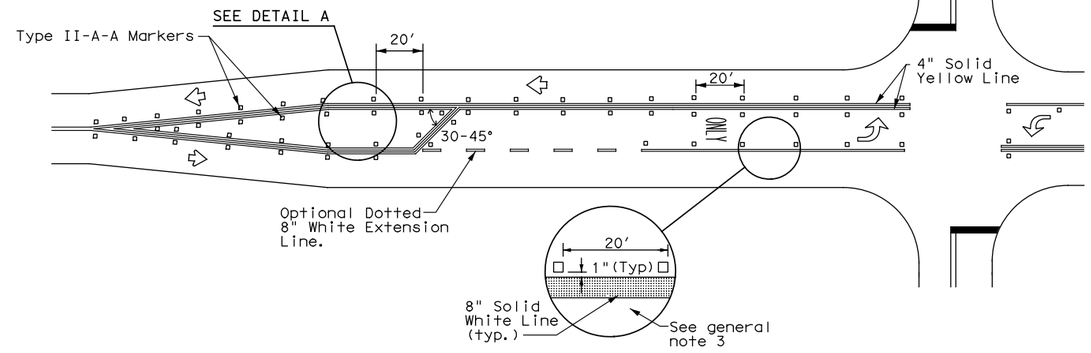
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



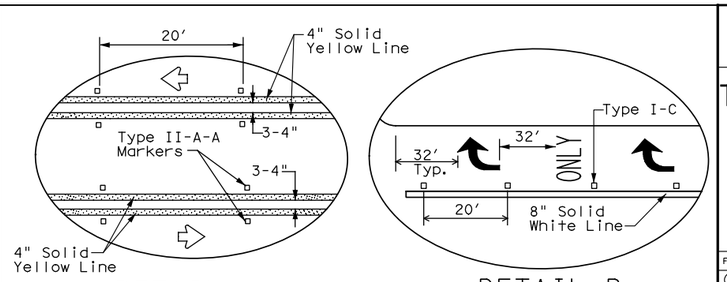
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



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



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



Texas Department of Transportation

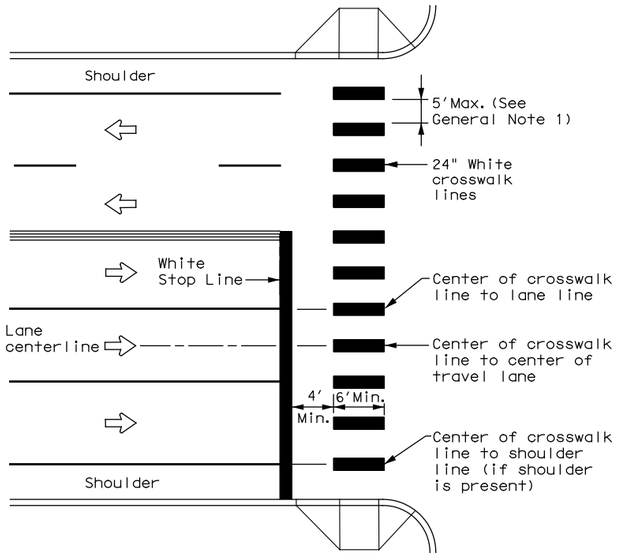
Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	ELP	EL PASO		252
3-03 6-20				

22C

3/30/2021
...\37547.001 El Paso*SH20\CADD\Sheets\HALFF\STANDARDS\pm3-20.dgn



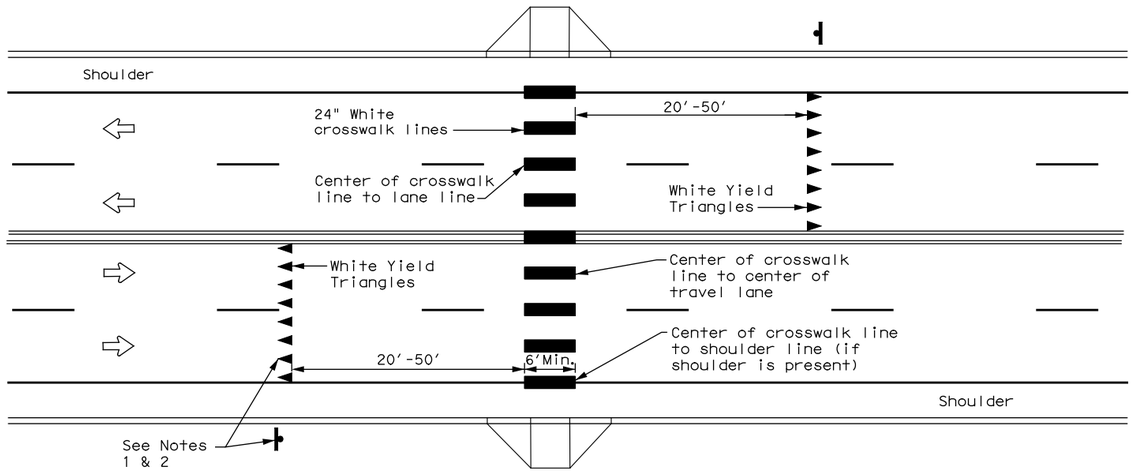
HIGH-VISIBILITY LONGITUDINAL CROSSWALK
AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6′ wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar/Yield Triangles and Crosswalk shall be approved by the Engineer in the field.

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

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



UNSIGNALIZED MID BLOCK HIGH-VISIBILITY
LONGITUDINAL CROSSWALK

NOTES

1. Use yield triangles with "Yield Here to Pedestrians" signs at unsignalized mid block crosswalks.
2. Use stop bars with "Stop Here on Red" signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

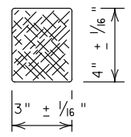
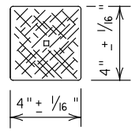
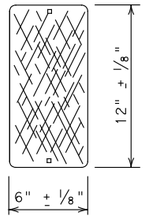
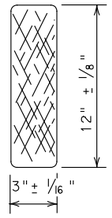
PM(4)-20

FILE: pm4-20.dgn	DN:	CK:	DW:	CK:
©TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	3451	01	035, ETC.	FM 1281, ETC.
	DIST	COUNTY		SHEET NO.
	ELP	EL PASO		253

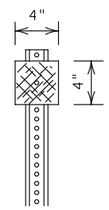
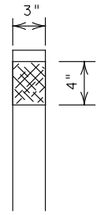
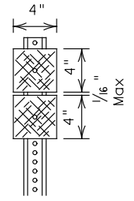
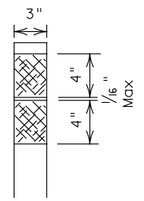
22D

3/30/2021
\3547.001 El Paso*SH20\CADD\Sheets\HALFF\STANDARDS\pm4-20.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)

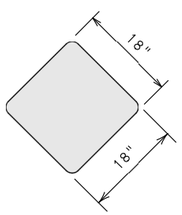
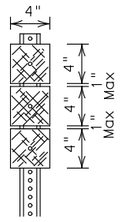
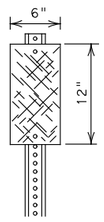
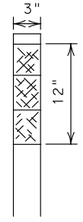
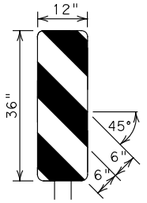
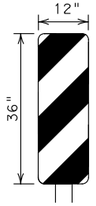
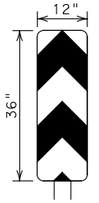
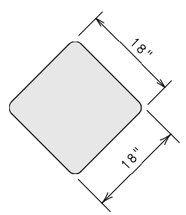
TYPE OF POST
- WC = Wing Channel Post
- WFLX = White Flexible Post
- TWT = Thin Walled Tubing

TYPE OF MOUNT
- GND = Embedded (drivable)
- SRF = Surface Mount
- WAS = Wedge Anchor Steel
- WAP = Wedge Anchor Plastic

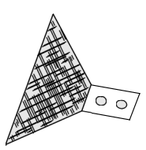
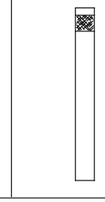
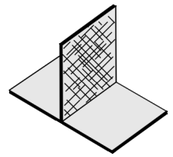
DIRECTION
If Required
- BI = Bi-Directional

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

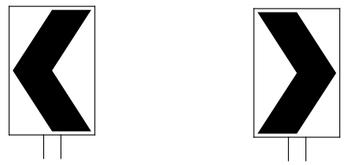
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

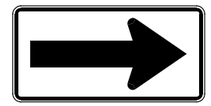
BARRIER REFLECTORS (BRF)

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

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
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	3451	01	035, ETC.	FM 1281, ETC.
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ELP	EL PASO		254

20A

3/30/2021
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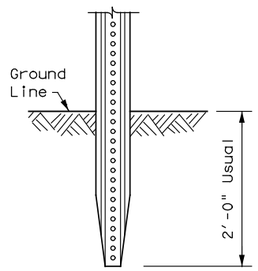
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

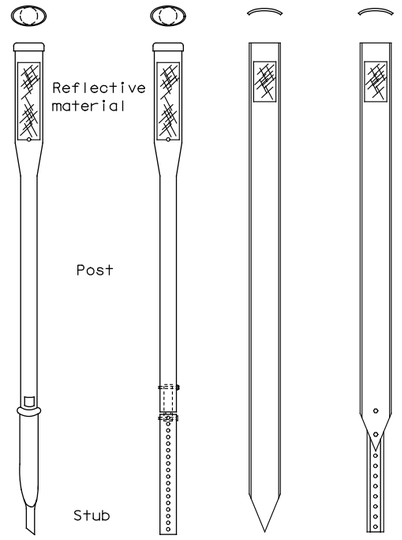


NOTES

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

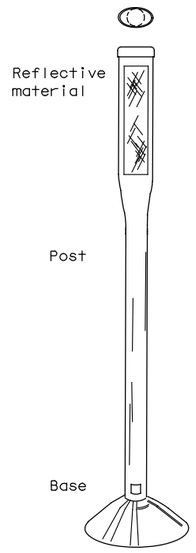
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



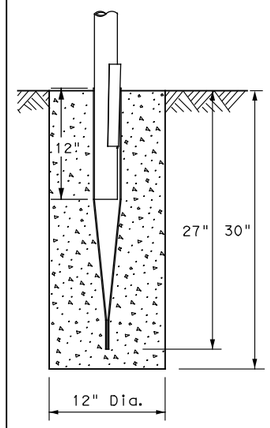
SURFACE MOUNT

NOTES

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

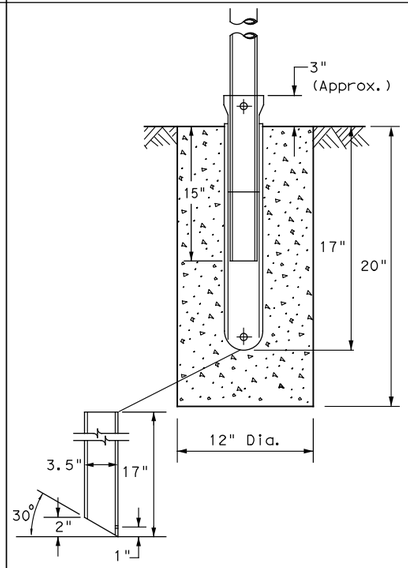
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

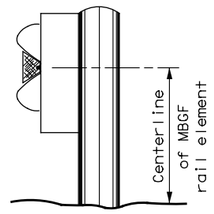
NOTE

1. Install per manufacturer's recommendations.

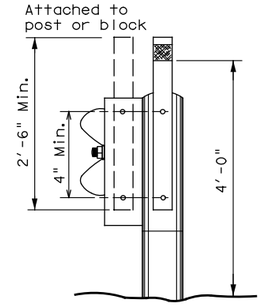
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

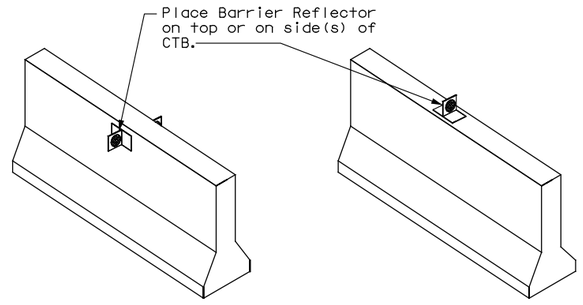
GF1



GF2



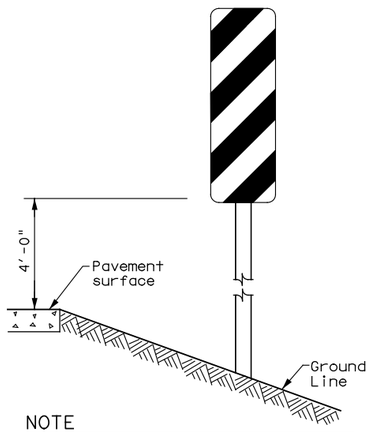
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

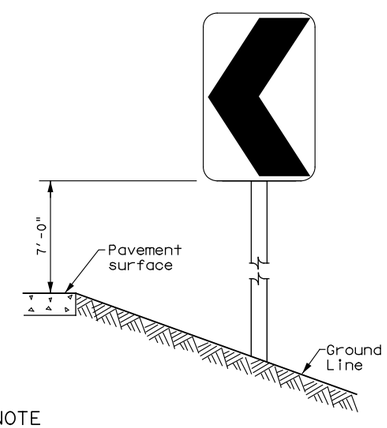
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

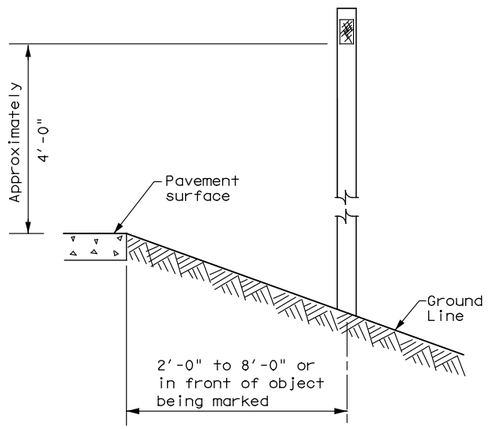
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

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	3451	01	035, ETC.	FM 1281, ETC.
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ELP	EL PASO		255

20B

3/30/2021
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STORM WATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TPDES General Permit TXR150000. The operator, The Texas Department of Transportation ensures that: Project specifications provide that adequate BMPs have been developed for this project. The contractor shall be the party responsible for implementing the BMPs described herein. The contractor shall implement changes approved by the Project Engineer to the SWP3 within the times specified in the SWP3 or the TPDES General Permit. Operators affected by modifications to specifications will be notified in a timely manner.

1. SITE OR PROJECT DESCRIPTION:

NATURE OF THE CONSTRUCTION ACTIVITY: SEE TITLE SHEET

POTENTIAL POLLUTANTS AND SOURCES:	
Sediment laden storm water	*Storm water conveyance over disturbed areas*
Fuels, oils, and lubricants	*Construction vehicles and storage areas*
Construction debris and waste	*Various construction activities*
Sanitary waste	*Restroom facilities*
Trash	*Construction site and Receptacles*

SEQUENCE OF ACTIVITIES THAT WILL DISTURB SOILS:

1. *Prep existing ROW.*
2. *Prep ROW for sidewalk construction.*
3. *Finish roadway side slopes / construct side ditches for sidewalk construction*
4.
5.
6.
7.

AREAS:

TOTAL AREA OF PROJECT: 150.4 ACRES

TOTAL AREA OF SOIL DISTURBANCE: 4.4 ACRES

TOTAL AREA OFF-SITE: 0.00

WEIGHTED RUNOFF COEFFICIENT (BEFORE AND AFTER CONSTRUCTION): *N/A*

DATA DESCRIBING THE SOIL: *N/A*

GENERAL LOCATION MAP: *SEE TITLE SHEET*

DETAILED SITE MAP: *SEE SWP3 LAYOUT SHEETS*

THE LOCATION AND DESCRIPTION OF CONCRETE AND ASPHALT PLANTS:

N/A

N/A

NAME OF RECEIVING WATERS: *Storm water runoff passing through project will be intercepted on site with the existing and proposed culverts and drainage system. Water will drain into an existing arroyo which will drain into the Rio Grande/Pecos River*

A COPY OF TPDES CGP TXR150000 IS INCLUDED IN THE SWP3 FILE.

See SWP3 Notebook for environmental, archeological and historical documentation

401 WATER QUALITY CERTIFICATION: YES____ NO__X__

2. BEST MANAGEMENT PRACTICES (BMPs):

EROSION AND SEDIMENT CONTROLS: Erosion and sediment controls have been designed to retain sediment on-site. Controls shall be utilized to reduce off site transport of suspended sediments and pollutants if it is necessary to pump water from the site. Control measures shall be installed per specifications or as directed. Sediment must be removed from controls per the plan requirements or manufacturers recommendations, but no later than the time that design capacity has been reduced by 50%. If sediment escapes the site, accumulations will be removed to minimize further negative effects. Controls will be developed to limit the off site transportation of litter, construction debris, and construction materials.

INTERIM(INT), PERMANENT(PER), AND 401 CERTIFICATION BMP'S:

EROSION CONTROLS:	401	INT	PER
☐ *Compaction & Tracking of slopes*		X	
☐ *Diversion Dike*			
☐ *Preserve Existing Vegetation*			
☐ *Soil Stabilization*		X	
☐ *Permanent Vegetation*			
☒ *No Erosion Controls are Required.*			

SEDIMENT CONTROLS:	401	INT	PER
☒ *Silt Fence*		X	
☐ *Rock Berm*			
☐ *Erosion Control Logs*			
☐ *Vegetative Filter Strips*			
☐ *Ditch Block*			
☐ *No Sediment Controls are Required.*			

POST CONSTRUCTION TSS CONTROL (401 CERTIFICATION ONLY):

- ☐ *Vegetation Lined Drainage Ditch*
- ☐ *Retention/Irrigation*
- ☐ *Erosion Control Compost*
- ☐ *Grassy Swales*
- ☐ *Vegetative Filter Strips*
- ☒ *No Post Construction TSS Control Required.*

SEQUENCE OR SCHEDULE OF IMPLEMENTATION:

1. *Install construction exits by TCP phasing*
2. *Maintain sediment control measures until all disturbed areas are stabilized*
3. *Remove construction exits as TCP phasing is completed*
4. *Remove all SWPPP measures before final project clean-up.*
5.
6.

The El Paso District of the Texas Department of Transportation uses Site-Manager, a computer based construction record-keeping system. Documentation describing major grading activities, temporary or permanent cessation of construction, and stabilization measures is a part of this system and is incorporated by reference into this SWPPP.

Stabilization measures must be initiated within 14 days when practicable in portions of the site where construction has temporarily or permanently ceased, if earth disturbing activities will not be resumed within 21 days.

3. STRUCTURAL CONTROL PRACTICES:

Structural control practices for this project are listed elsewhere herein.

4. PERMANENT STORM WATER CONTROLS:

Structural control practices installed during construction will be maintained and inspected after construction has ceased on the site and until final stabilization is attained. Unless specified in the plans, after project acceptance TxDOT will assume maintenance responsibilities for the controls and measures. Other permanent controls include existing and proposed; riprap at culvert inlets and outlets, diversion dikes, swales, retaining walls, and other similar devices.

5. OTHER CONTROLS:

OFF-SITE VEHICLE TRACKING OF SEDIMENTS AND THE GENERATION OF DUST: The off site vehicle tracking of sediments shall be minimized by removal of excess dirt from the road and at entrances to the work site. The generation of dust will be minimized as directed by the Project Engineer by dampening haul roads and covering haul trucks with a tarpaulin.

CONSTRUCTION AND WASTE MATERIALS: The contractor will maintain a clean, orderly construction site. Construction waste including trash, rubble, scrap and vegetation shall be disposed of in lidded dumpsters or in a manner approved by the Project Engineer. Disposal methods must meet Federal, State, and Local waste management guidelines. No construction waste will be buried or burned on site. Spoils disposal, material storage, and materials resulting from the destruction of existing roads and structures shall be stored in areas designated by the Project Engineer and protected from run-off. All waterways shall be cleared of temporary embankment, temporary bridges, matting, false work, piling, debris, or other obstructions placed during construction operations, that are not part of the finished work, as soon as practicable. All excess soil generated by the construction will be collected and disposed of by the contractor. 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 wetland, water body, or stream bed.

POLLUTANT SOURCES FROM AREAS OTHER THAN CONSTRUCTION: Staging areas and vehicle maintenance areas shall be located and constructed in a manner to minimize the runoff of pollutants. If potential pollutant sources are identified after the start of construction, controls and measures shall be implemented as directed by the Project Engineer.

5. OTHER CONTROLS (CONT):

DEDICATED ASPHALT PLANTS: Asphalt or asphaltic material for this project will be produced off site. If the project requires a dedicated asphalt plant and the plant within 1 mile of the project limits it will be considered an off site PSL. Consideration shall be given to on site plant and storage facilities and measures implemented as directed by the Project Engineer.

DEDICATED CONCRETE PLANTS: Cement or Concrete material for this project will be produced off site. If the project requires a dedicated concrete plant and the plant is within 1 mile of the project limits it will be considered an off site PSL. Consideration shall be given to on site plant and storage facilities and measures implemented as directed by the Project Engineer. Concrete trucks shall be wasted or washed out in locations designated by the Project Engineer. The locations shall be protected by a berm sufficient to contain all waste and wash water. Wash water shall not be allowed to enter any storm drainage system or waterway. The residual material and contaminated soil shall be collected and disposed of in accordance with Federal, State, and Local guidelines. Staging areas and vehicle maintenance areas shall be located and constructed in a manner to minimize the runoff of pollutants.

HAZARDOUS MATERIALS AND SPILL REPORTING: The contractor shall take appropriate measures to prevent, minimize, and control the spillage or leakage of hazardous materials and any associated wastes on site and in maintenance and staging areas. hazardous materials shall include but are not limited to paints, acids, solvents, asphalt products, chemical additives, curing compounds, oils, fuels, and lubricants. Hazardous materials shall not be stored, accumulated, or transported in open containers subject to precipitation or spillage, but shall be stored, accumulated, or transported in closed containers of the type recommended by the manufacturer. In the event of a spill the Project Engineer should be contacted immediately. All spills shall be immediately cleaned and any contaminated soil removed and disposed of in accordance with Local, State, and Federal laws. Fuel tanks shall be protected by a secondary containment, such as a lined berm, capable of containing 1.5 times the capacity of the tank, or as approved by the Project Engineer.

OFF SITE PSLs: All off site project specific locations including dedicated asphalt plants, concrete plants, or utility installations, required by the contractor, are the contractor's responsibility. The contractor shall secure all permits required by local, state, or federal laws for off site PSLs. The contractor shall provide diagrams and areas of disturbance for all PSL's within 1 mile of the project.

SANITARY FACILITIES: All sanitary or septic wastes that are generated onsite shall be treated and disposed of in accordance with state and local regulations. Raw sewage or septage shall not be discharged or buried on site. Precaution shall be taken to prevent illicit discharges to storm water. Licensed waste management contractors shall be required to dispose of sanitary waste. Porta johns will be required for the construction site or as directed by the Project Engineer.

VELOCITY DISSIPATION DEVICES: Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel as shown in the plans or as directed by the Project Engineer to provide a non-erosive flow velocity from the structure to a watercourse so that the natural physical and biological characteristics and functions are maintained and protected.

6. APPROVED STATE AND LOCAL PLANS:

This SWP3 is consistent with requirements specified in applicable sediment and erosion site plans or site permits, or storm water management site plans or permits approved by federal, state, or local officials.

7. MAINTENANCE:

Control measures shall be properly installed according to specifications. If inspections or other information indicates a control has been installed, used, or is performing inadequately, the contractor must replace or modify the control as soon as practicable after discovery. Control measures shall be maintained in effective operating condition. If inspections determine that BMPs are not operating effectively maintenance will be performed as necessary to continue the effectiveness of the controls. Maintenance must be accomplished as soon as practicable. Controls adjacent to creeks, culverts, bridges, and water crossings shall have priority. Controls that have been disabled, run over, removed, or otherwise rendered ineffective must be corrected immediately upon discovery.

8. INSPECTION OF CONTROLS:

A TxDOT inspector will inspect disturbed areas of the site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, and structural controls for evidence of, or the potential for, pollutants entering the drainage system. Sediment and erosion controls measures identified in the SWP3 will be inspected to ensure that they are operating correctly. Locations where vehicles enter or exit the site will be inspected for evidence of off-site vehicle tracking. Inspections will be conducted every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater. The SWP3 will be modified based on the result of these inspections. Revisions will be completed within 7 Calendar days following the inspection. Revised implementation schedules will be described in the SWP3 and implemented as soon as practicable. Rain gages will be maintained on site for the duration of the project. Reports summarizing the scope of the inspections are included in the SWP3 file.

9. NON-STORM WATER COMPONENTS:

The contractor shall be required to implement appropriate pollution prevention controls and measures for all eligible non-storm water components of the discharge as approved and directed by the Project Engineer.

STATE OF TEXAS
L.V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER

04-05-21

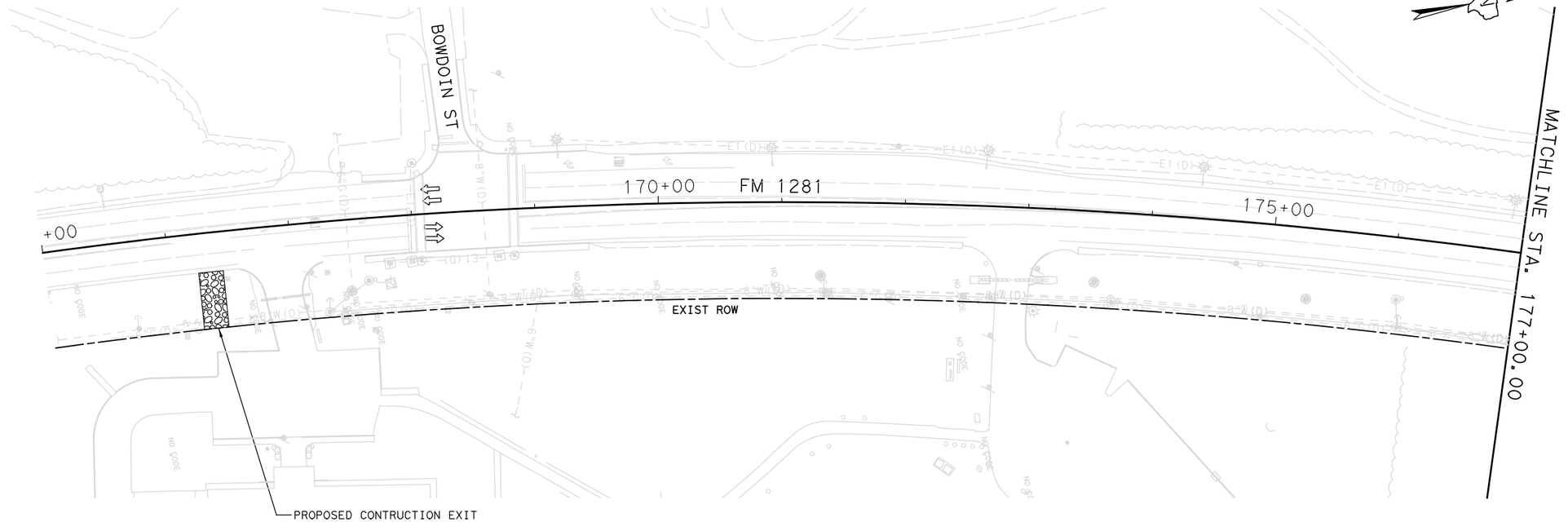
TxDOT STORM WATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.			SHEET NO.
6			256
STATE	STATE DIST.	COUNTY	
TEXAS	ELP	EL PASO	
CONT.	SECT.	JOB	HIGHWAY NO.
3451	01	035, ETC.	FM 1281, ETC.

REV: 07-2014

FINAL SUBMITTAL



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ITEM NO.	DESCRIPTION	UNIT	QTY
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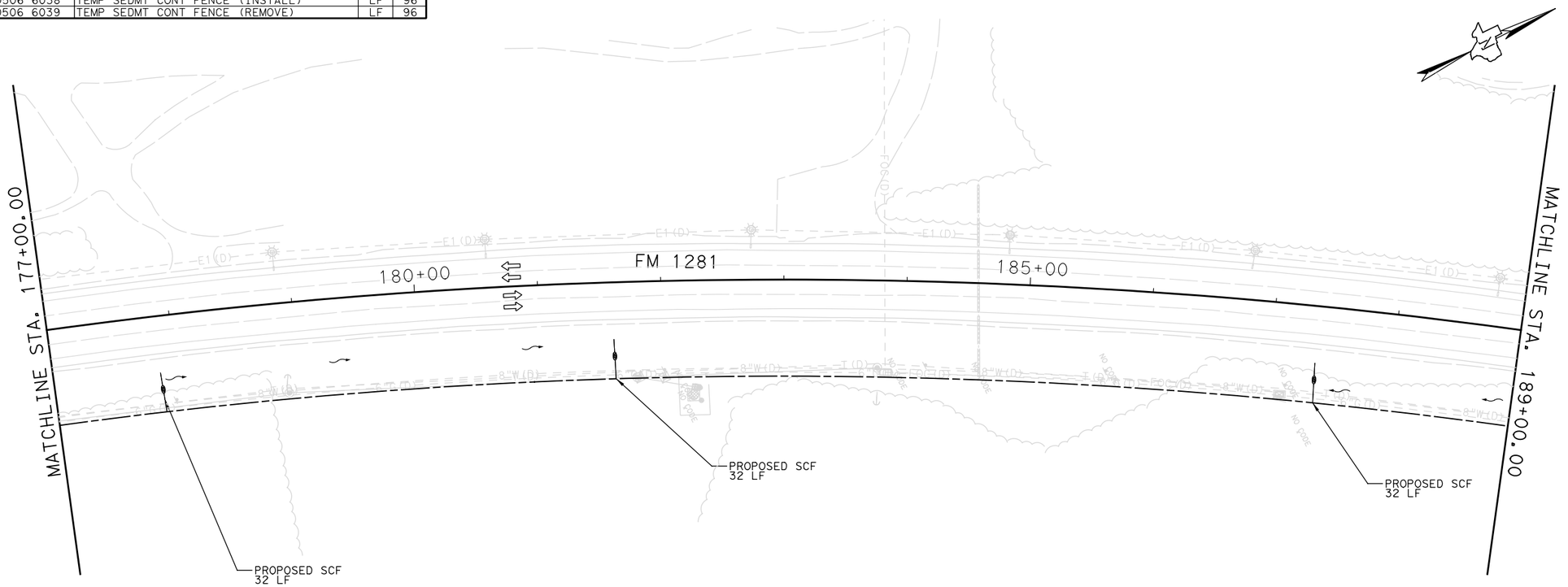
0506 6024	CONSTRUCTION EXITS (REMOVE)	SY	111
0506 6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	96
0506 6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	96



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LEGEND

- SCF — SEDIMENT CONTROL FENCE
- PROPOSED CONSTRUCTION EXIT
- TRAFFIC ARROW
- EXISTING ROW
- FLOW ARROW

NOTES:

1. CONSTRUCTION EXIT LOCATIONS TO BE APPROVED BY THE ENGINEER.

Texas Department of Transportation

NO.	REVISION	BY	DATE

STATE OF TEXAS
L. V. SHORT
69192
LICENSED PROFESSIONAL ENGINEER
04-05-21

HALFF
9500 AMBERGLEN BLVD
BLDG F, STE 125
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SH 20 & FM 1281

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

DESIGNED: BC	FED. RD DIV. No.	STATE	FEDERAL AID PROJECT No.			HIGHWAY No.
CHECKED: RS	6	TEXAS	STP 2021 (624) HES			FM 1281, ETC.
DRAWN: BC	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: RS	ELP	EL PASO	3451	01	036, ETC.	257

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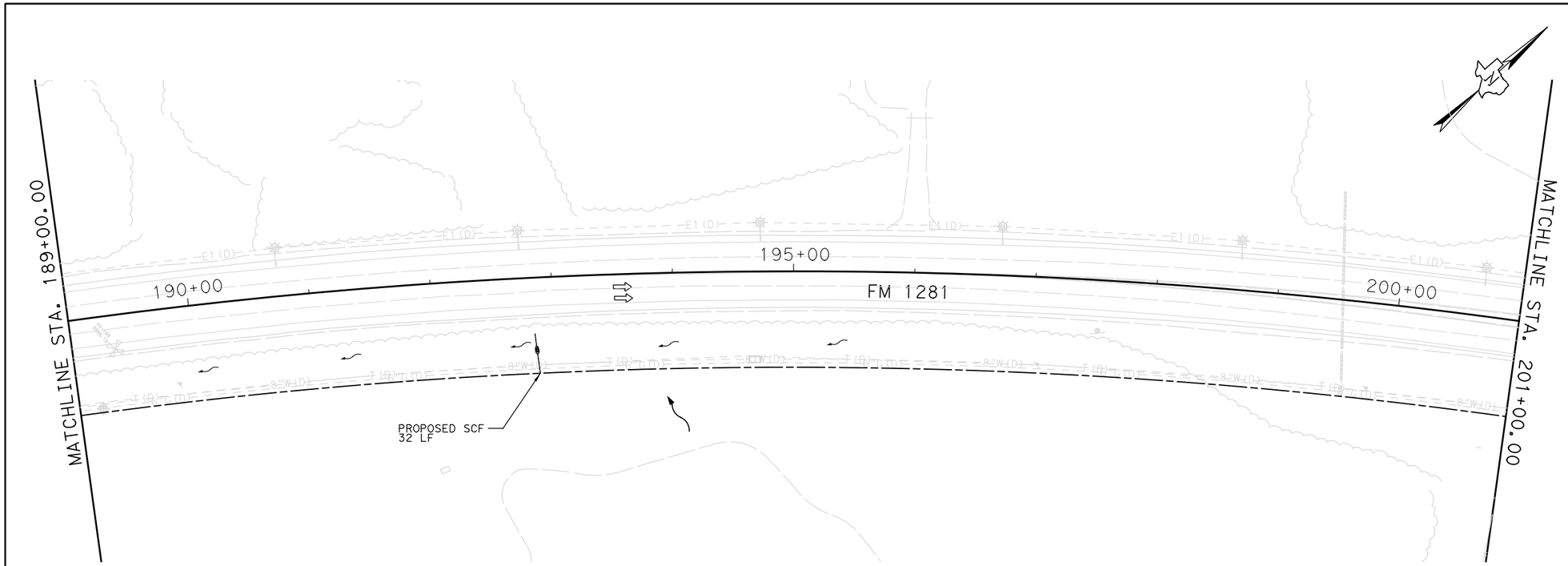

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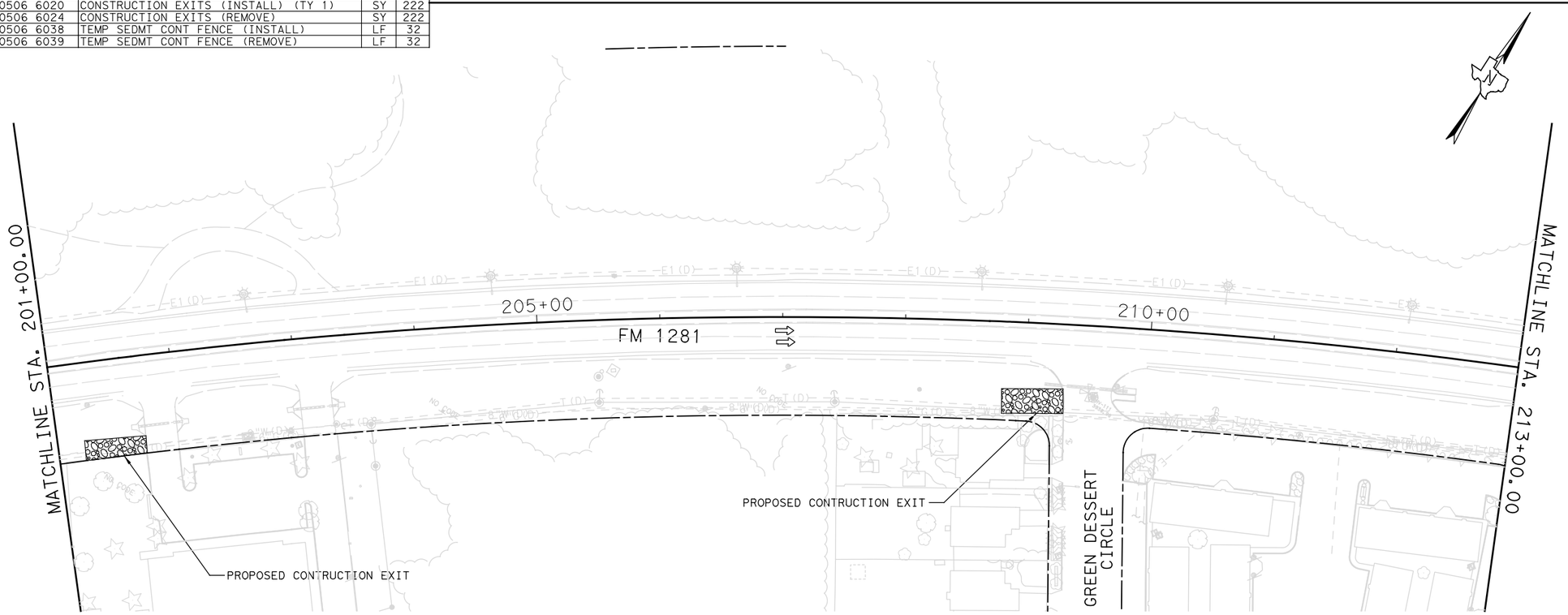

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SCALE: 1" = 100' (H)

LEGEND

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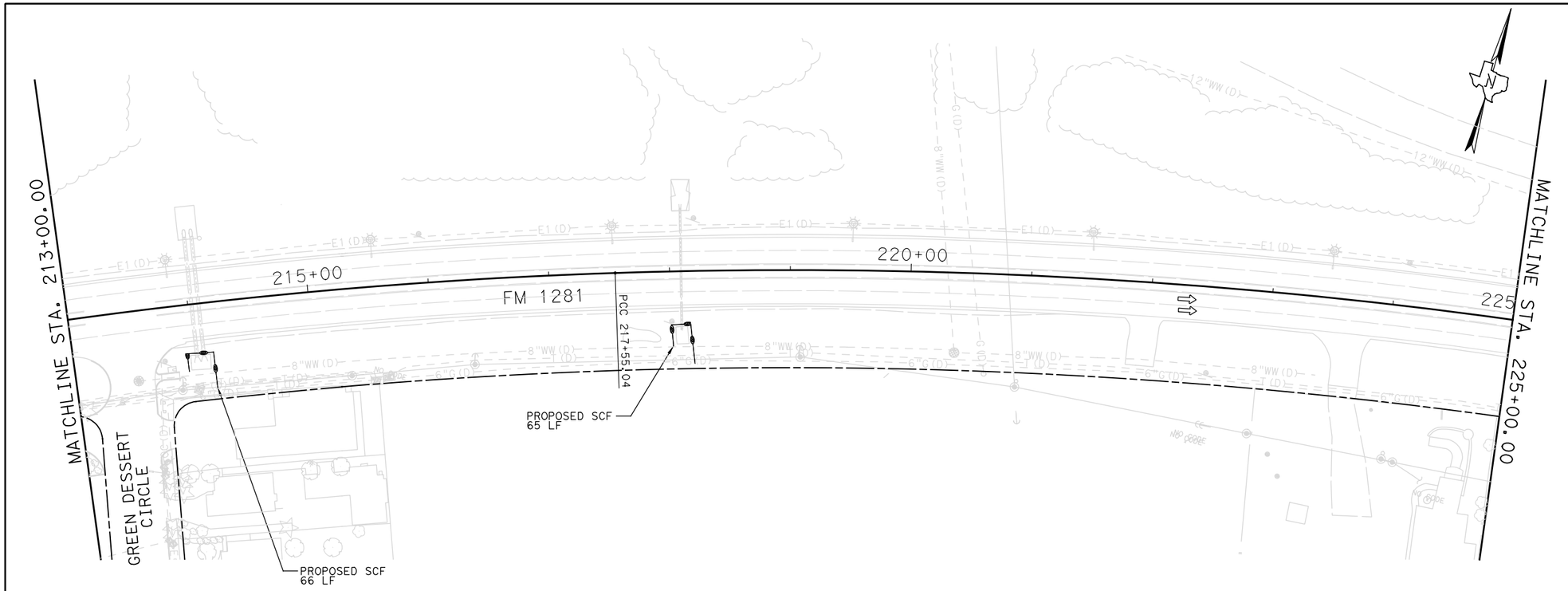

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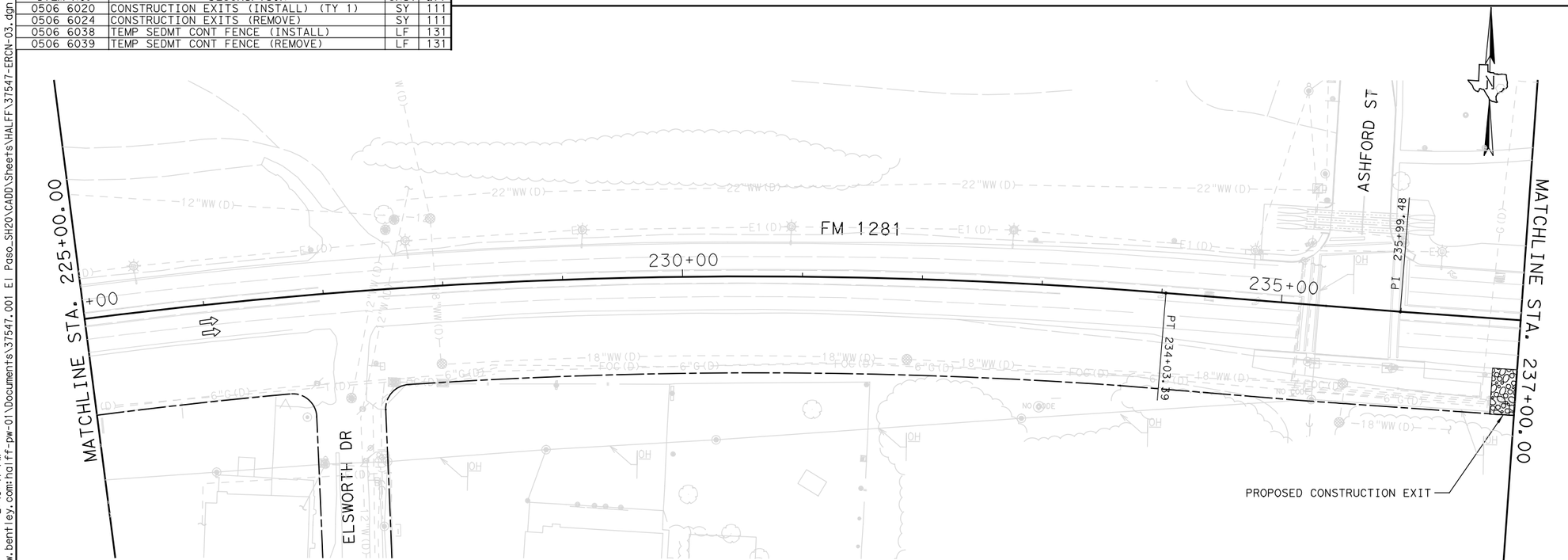

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LEGEND

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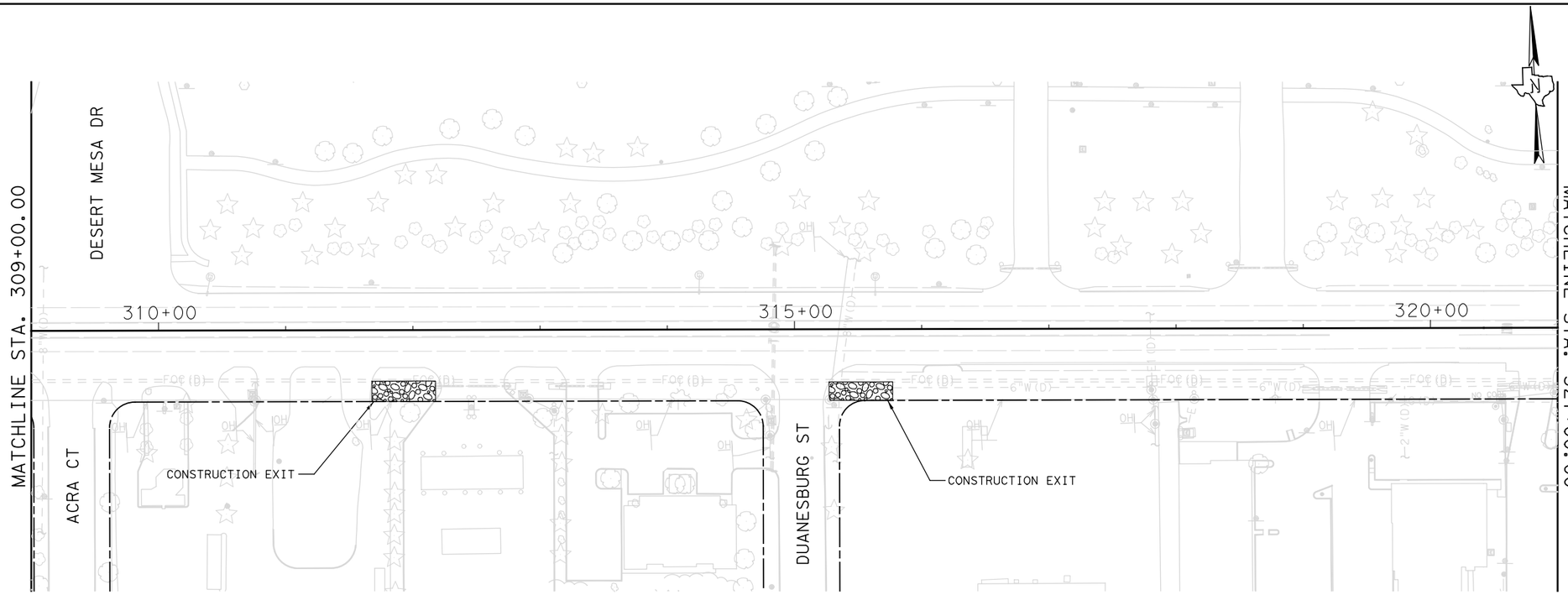

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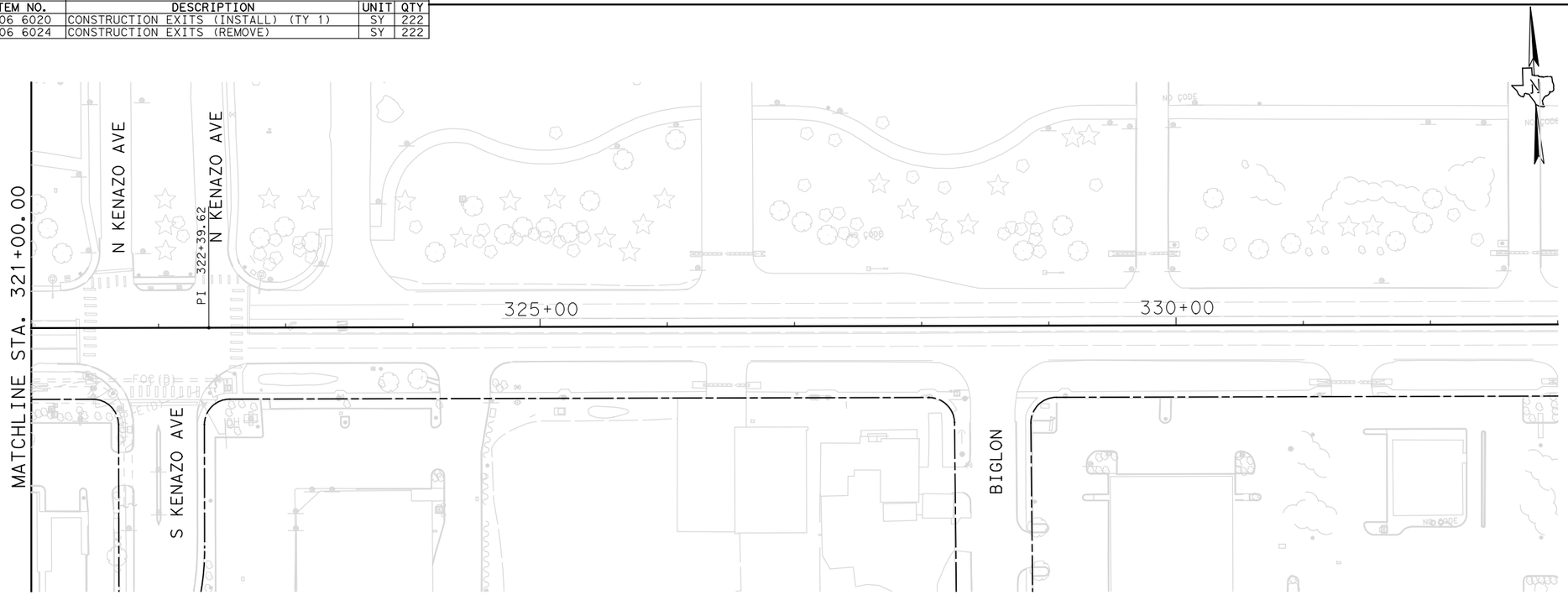

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LEGEND

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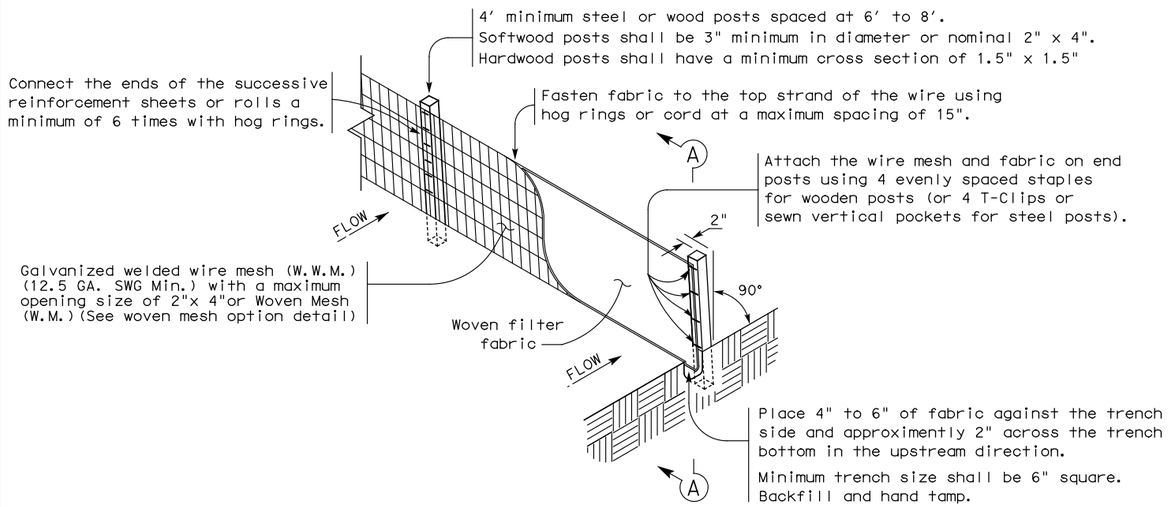
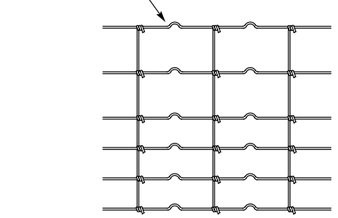
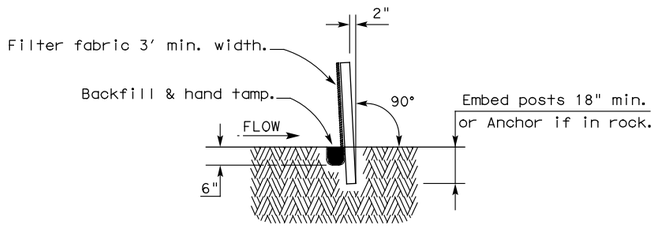


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

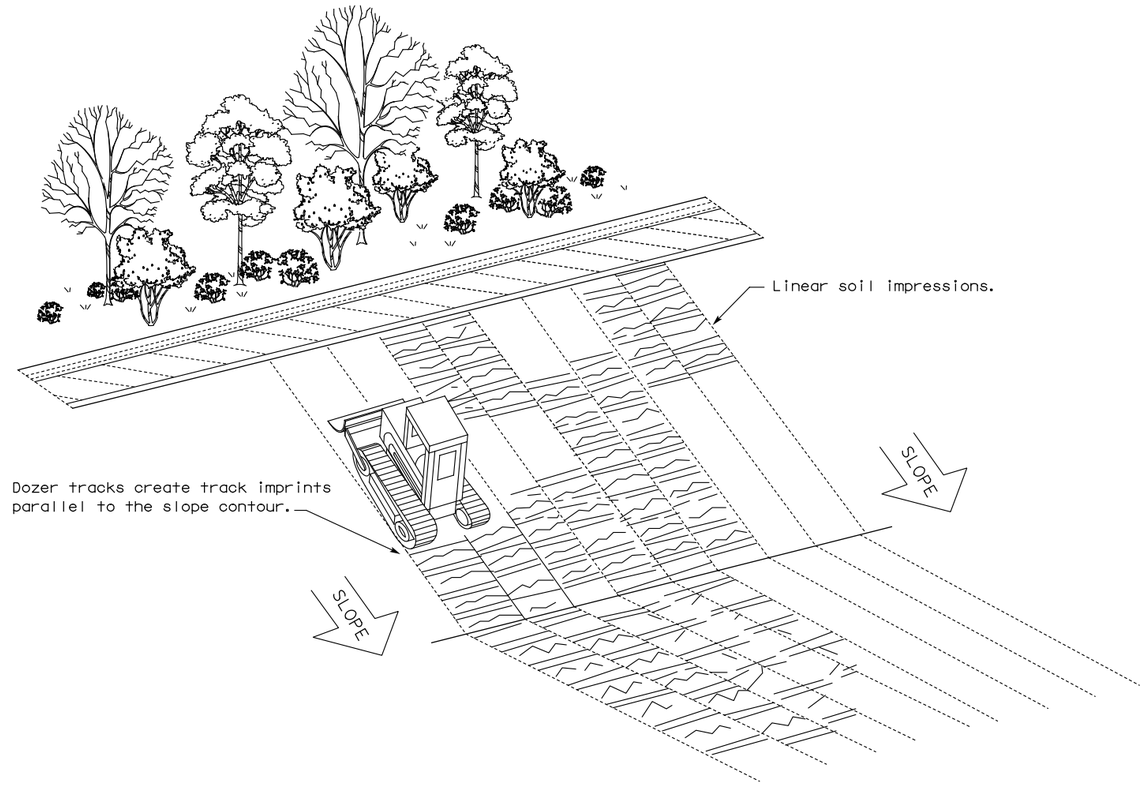
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

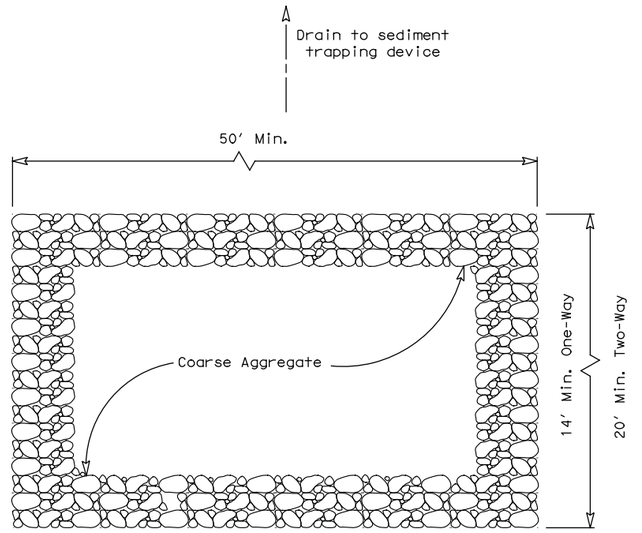
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

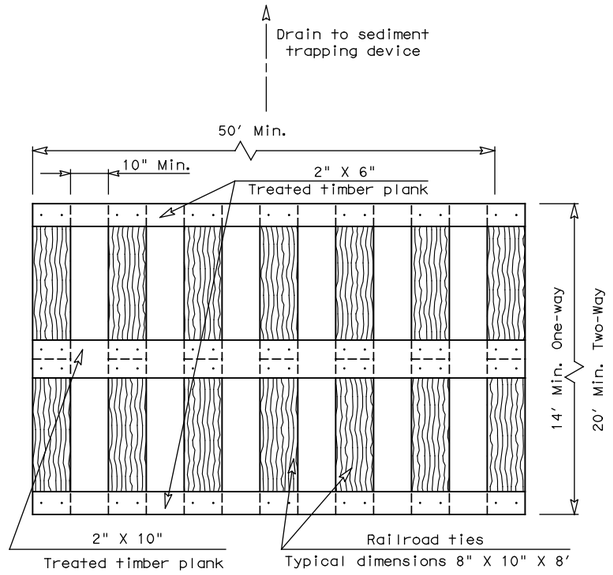
FENCE & VERTICAL TRACKING

EC(1)-16

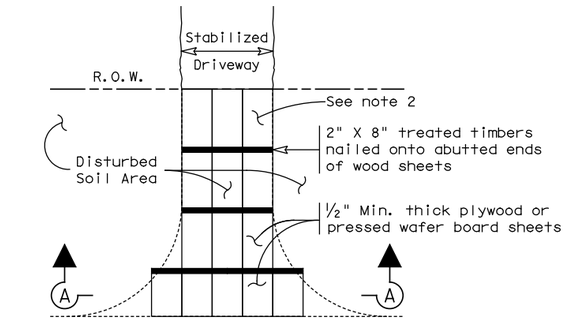
FILE: ec116	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	3451	01	035, ETC.		FM 1281, ETC.	
	DIST	COUNTY				SHEET NO.
	ELP	EL PASO				261



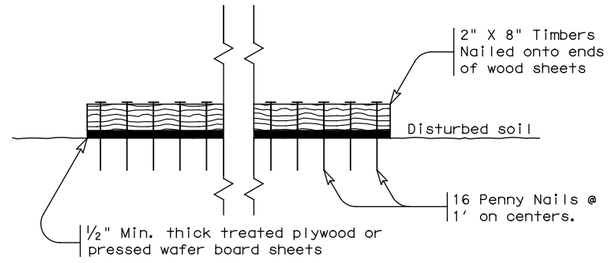
PLAN VIEW



PLAN VIEW



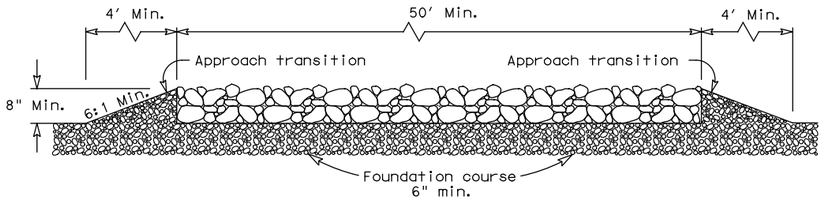
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

SHORT TERM



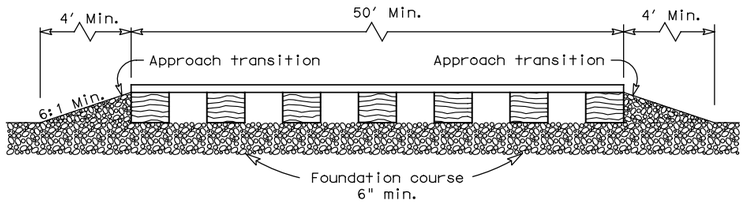
ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)

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.



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

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	3451	01	035, ETC.		FM 1281, ETC.		
	DIST	COUNTY				SHEET NO.	
	ELP	EL PASO				262	

3/30/2021
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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. City of El Paso

2.

☒ No Action Required ☐ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SWP3 and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SWP3 information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

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 (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SWP3:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) 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 Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the 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 (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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 is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a 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 demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK:	DW:		CK:	
©TxDOT: February 2015	CONT	SECT	JOB		HIGHWAY	
REVISIONS 12-12-2011 (DS)	3451	01	035, ETC.		FM 1281, ETC.	
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY			SHEET NO.	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	ELP	EL PASO			263	