FED.RD. DIV.NO.	FEDERAL PROJECT NO.		SHEET NO.
6	F 2824(078)		1
STATE	STATE DIST.	COUNTY	
TEXAS	AMA	GRAY	
CONT.	SECT.	JOB	HIGHWAY NO.
0455	03	038	SH 152

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT
FEDERAL PROJECT: F 2824(078)
HIGHWAY - SH 152
GRAY COUNTY

CONTROL: 0455 - 03 - 038

FOR THE CONSTRUCTION OF : SUPER 2 PASSING LANES
CONSISTING OF: PAVEMENT REPAIR, SAFETY TREAT FIXED OBJECTS, TWLT EXTENSION, OVERLAY AND ADA IMPROVEMENTS

PROJECT LIMITS FROM: CARSON COUNTY LINE
TO: SH 70 IN PAMPA
ROADWAY LENGTH = 33,880 FT. = 6.417 MILES
BRIDGE LENGTH = 0.0 FT. = 0.0 MILES
TOTAL LENGTH = 33,880 FT. = 6.417 MI.

DESIGN SPEED = 40 MPH
2024 ADT = 5,600
2044 ADT = 7,800
RURAL MINOR ARTERIAL

FINAL PLANS

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS COMPLETED & ACCEPTED: _____

FINAL CONTRACT COST: $ _____

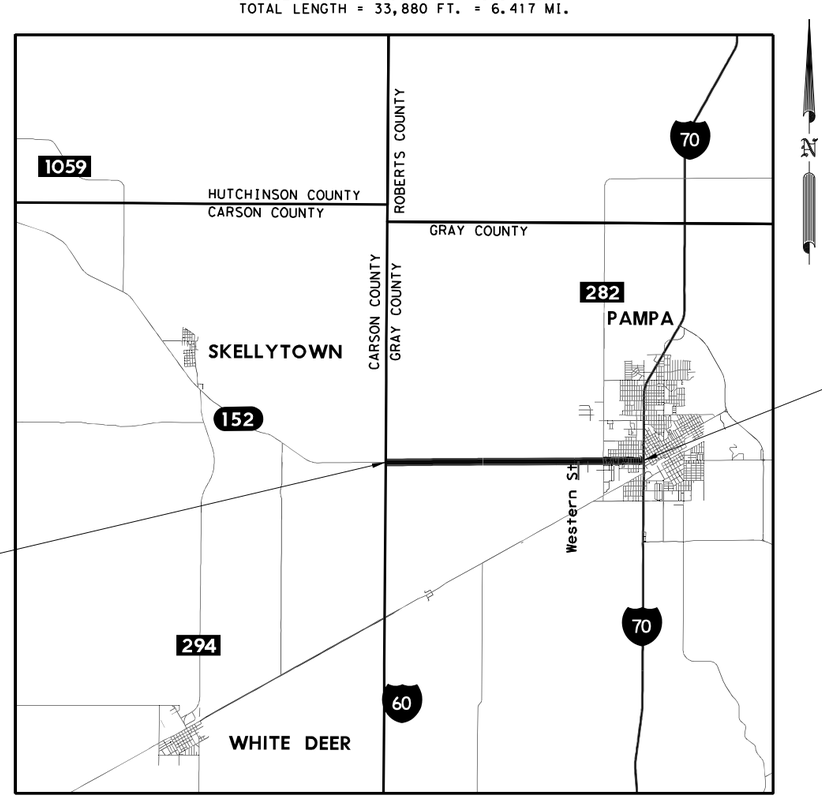
CONTRACTOR : _____

AREA ENGINEER : _____

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	INDEX OF SHEETS

TDLR REVIEW & INSPECTION REQUIRED
TABS2024011598



STA. 0+00.00
BEGIN CONTROL: 0455-03
BEGIN CSJ: 0455-03-038
RM: 352+1.134

STA. 338+80.00
END CONTROL: 0455-03
END CSJ: 0455-03-038
RM: 360+0.185

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

2024 **Texas Department of Transportation**

EXCEPTIONS:
NONE

RAILROADS:
NONE

EQUATIONS:
NONE

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, OCTOBER 23, 2022).

RECOMMENDED FOR LETTING: DATE: 2/27/2024
DocuSigned by: Zachary Mayer 3719DE174B2A4C6...
AREA ENGINEER

DATE: 3/1/2024
DocuSigned by: kit Black 9B5A6EA6AE8B46E...
DISTRICT DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: DATE: 3/1/2024
DocuSigned by: Blair Johnson 8B80E3AEB2BC43A...
DISTRICT ENGINEER

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SHEET NO.		DESCRIPTION
		GENERAL
1		TITLE SHEET
2		INDEX OF SHEETS
3-4		EXISTING TYPICAL SECTIONS
5-8		PROPOSED TYPICAL SECTIONS
9,9A-9F		GENERAL NOTES
10,10A-10B		ESTIMATE & QUANTITY SHEET
11-17		SUMMARY OF QUANTITIES
		TRAFFIC CONTROL PLAN
18		TCP NARRATIVE
19		TRAFFIC CONTROL PLAN TYPICAL SECTION PHASE I STAGE I
20-22		TRAFFIC CONTROL PLAN TYPICAL SECTION PHASE I STAGE II
23-30		TRAFFIC CONTROL PLAN PHASE I STAGE I
31-42		TRAFFIC CONTROL PLAN PHASE I STAGE II
		TRAFFIC CONTROL STANDARDS
43-54	*	BC(1) THRU BC(12)-21
55	*	TCP(1-1)-18
56	*	TCP(2-1)-18
57	*	TCP(2-3)-23
58	*	TCP(2-4)-18
59	*	TCP(3-1)-13
60	*	TCP(3-3)-14
61	*	TCP(7-1)-13
62	*	WZ(STPM)-23
63	*	WZ(UL)-13*
64		WZ(RS)-22
		ROADWAY DETAILS
65-72		HORIZONTAL AND VERTICAL CONTROL INDEX
73-76		HORIZONTAL AND VERTICAL CONTROL SHEET
77-91		ROADWAY PLAN
92-97		DRIVEWAYS AND INTERSECTIONS DETAILS
98		PAVEMENT REPAIR DETAIL
99		SIDEWALK JOINT DETAIL
100		MISCELLANEOUS ROADWAY DETAILS
		ROADWAY STANDARDS
101	*	TE (HMAC)-11
102	*	GF(31)-19
103	*	GF(31)DAT-19
104-105	*	GF(31)TR TL3-20
106	*	GF(31)MS-19
107	*	SGT(10S)31-16

SHEET NO.		DESCRIPTION
108	*	SGT(12S)31-18
109	*	CCCG-22
110-113	*	PED-18
114-117	*	MB(1)-21 THRU MB(4)-21
		DRAINAGE DETAILS
118		DRAINAGE AREA MAP
119-124		DITCH HYDRAULIC COMPUTATION
125-128		DITCH PLAN & PROFILE
129		CULVERT PLAN & PROFILE
		DRAINAGE STANDARDS
130	*	BCS
131-133	*	SETB-SW-0
134	*	SCC-MD
135-136	*	SCC-3&4
137	*	SETP-PD
138	*	PSET-RP
139	*	PSET-RR
140	*	PSET-SP
		SIGNING & PAVEMENT MARKING DETAILS
141-155		SIGNING AND PAVEMENT MARKINGS
156-158		SUMMARY OF SMALL SIGNS
		SIGNING & PAVEMENT MARKING STANDARDS
159-161	*	PM(1)-22, PM(2)-22, PM(3)-22
162		AMARILLO DISTRICT RECESSED RAISED PAVEMENT MARKER DETAIL
163	*	SMD(GEN)-08
164-166	*	SMD(SLIP-1)-08 THRU SMD(SLIP-3)-08
167	*	SMD(TWT)-08
168	*	TS2(PL-1)-23
169	*	TSR(3)-13
170	*	TSR(4)-13
171-176	*	D&OM(1)-20-D&OM(5)-20, D&OM(VIA)-20
177	*	RS(6)-23
178	*	RS(4)-23
		ENVIRONMENTAL ISSUES
179-180		STORM WATER POLLUTION PREVENTION PLAN (SWP3)
181		ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)
182-184		EROSION CONTROL LAYOUT
		ENVIRONMENTAL STANDARDS
185-187	*	EC(9)-16
188	*	VEGETATION SPECIFICATION SHEET

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

M.N. MOZAFFAR, P.E. 2/25/2024
DATE

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/25/2024

Texas Department of Transportation

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

SH 152

INDEX OF SHEETS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	2
CONTROL	SECTION	JOB	
0455	03	038	

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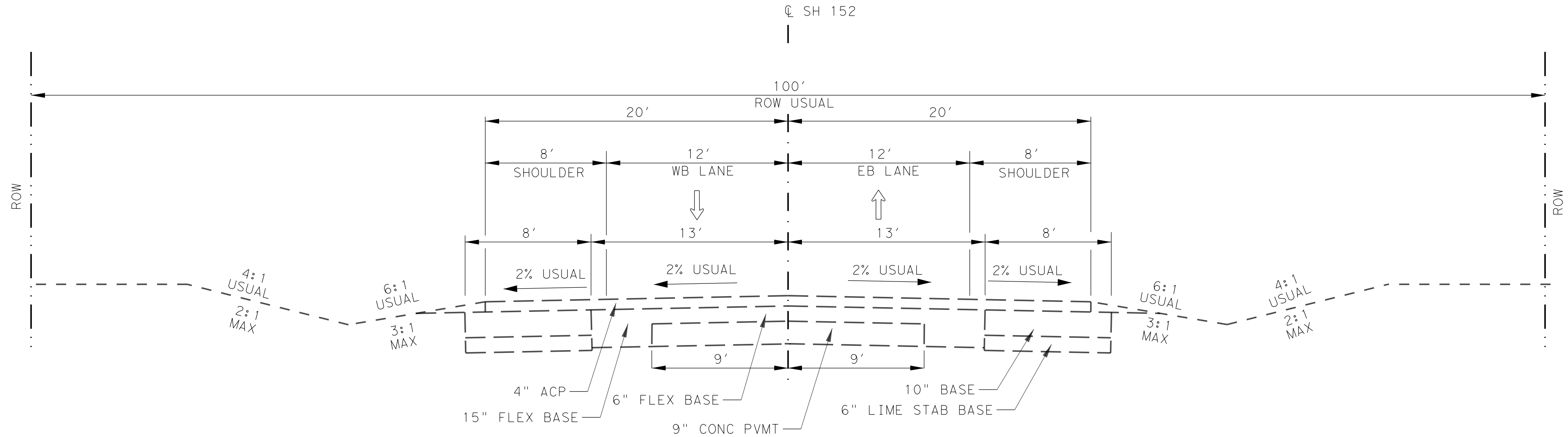
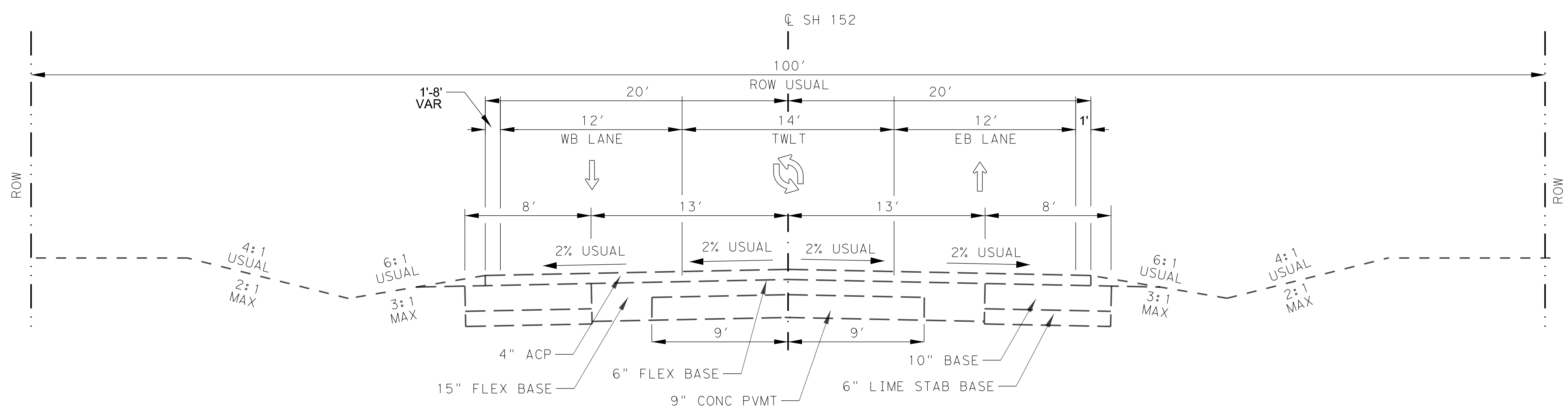
HORZ 0′ 5′ 10′
VERT 0′ 2.5′ 5′
SCALE IN FEET



EXISTING TYPICAL SECTION A

STA 000+00.00 TO 244+00.00



EXISTING TYPICAL SECTION B

STA 244+00.00 TO STA 246+50.00 LT & RT SHLDR TRANSITION (8′ TO 1′)
STA 246+50.00 TO STA 278+00.00
STA 278+00.00 TO STA 287+40.36 LT & RT TRANSITION (40′ TO 80′)(AVG 60′)

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

2/22/2024

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

Texas Department of Transportation

SH 152

EXISTING
TYPICAL SECTIONS

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		3

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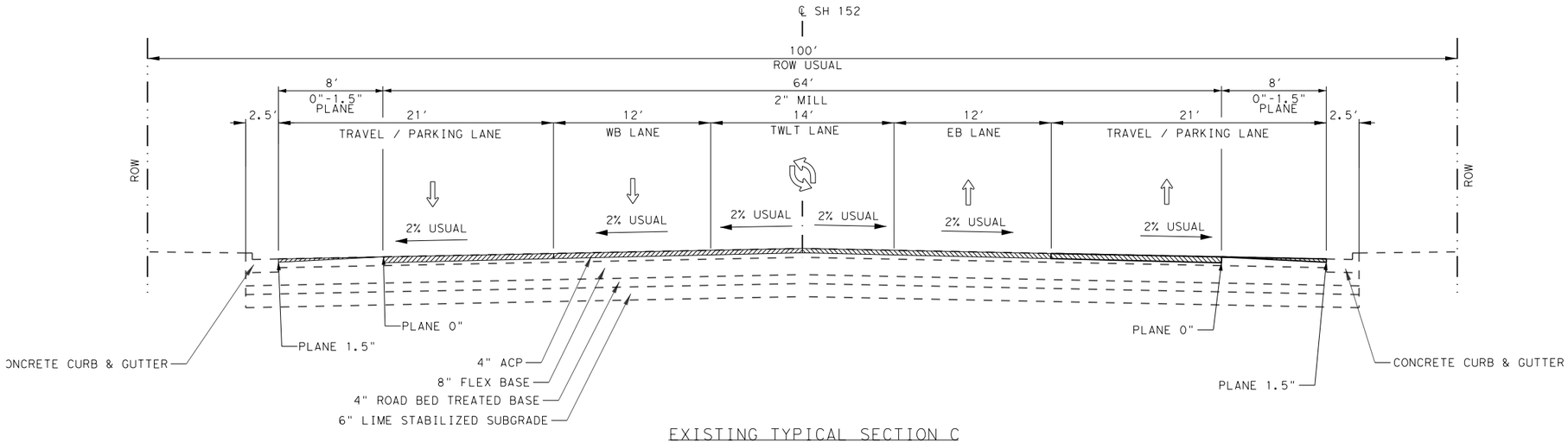
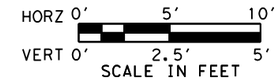
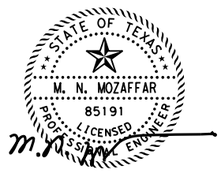


EXISTING TYPICAL SECTION C

STA 287+40.36 TO STA 338+80.00





2/22/2024

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

Texas Department of Transportation

SH 152

EXISTING
TYPICAL SECTIONS

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152

DIST	COUNTY	SHEET NO.
AMA	GRAY	4

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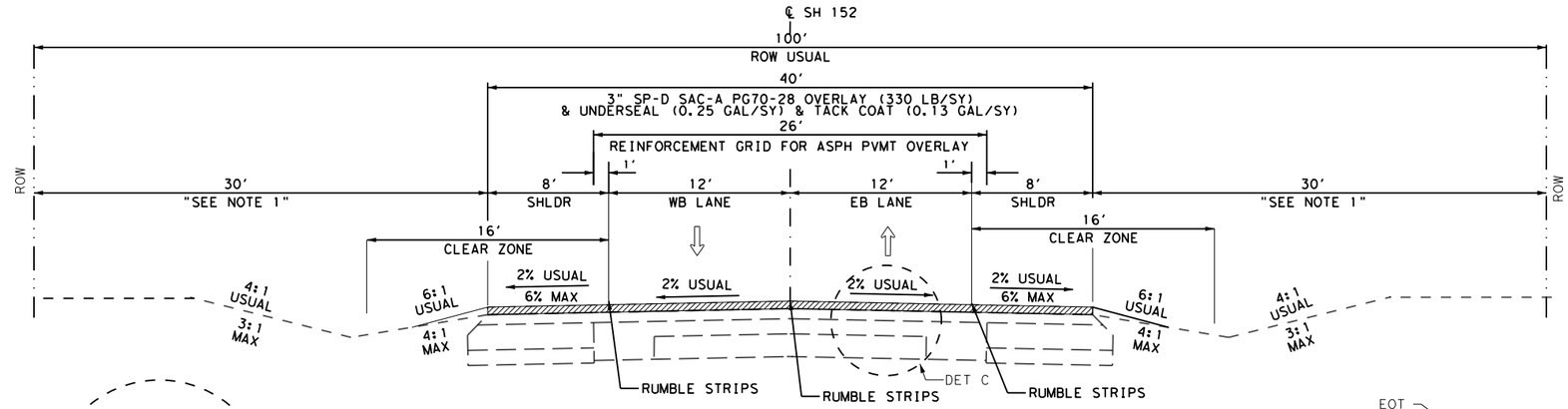
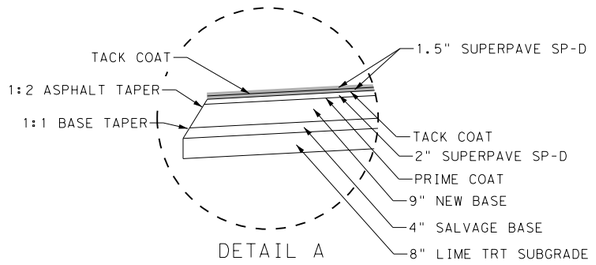


A PROPOSED TYPICAL SECTION - OVERLAY

STA 00+00.00 TO STA 10+50.00



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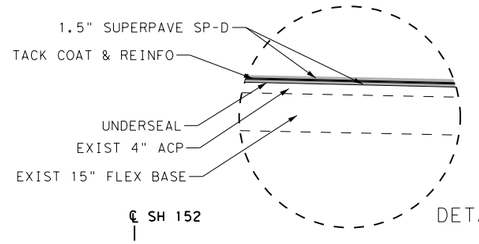

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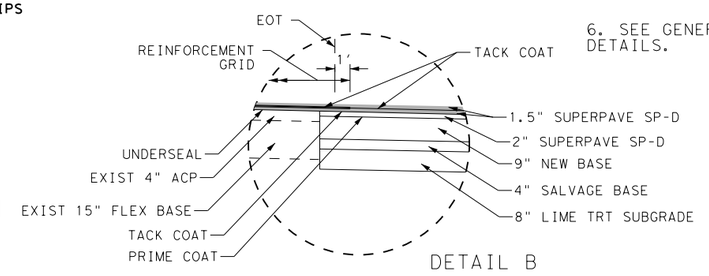

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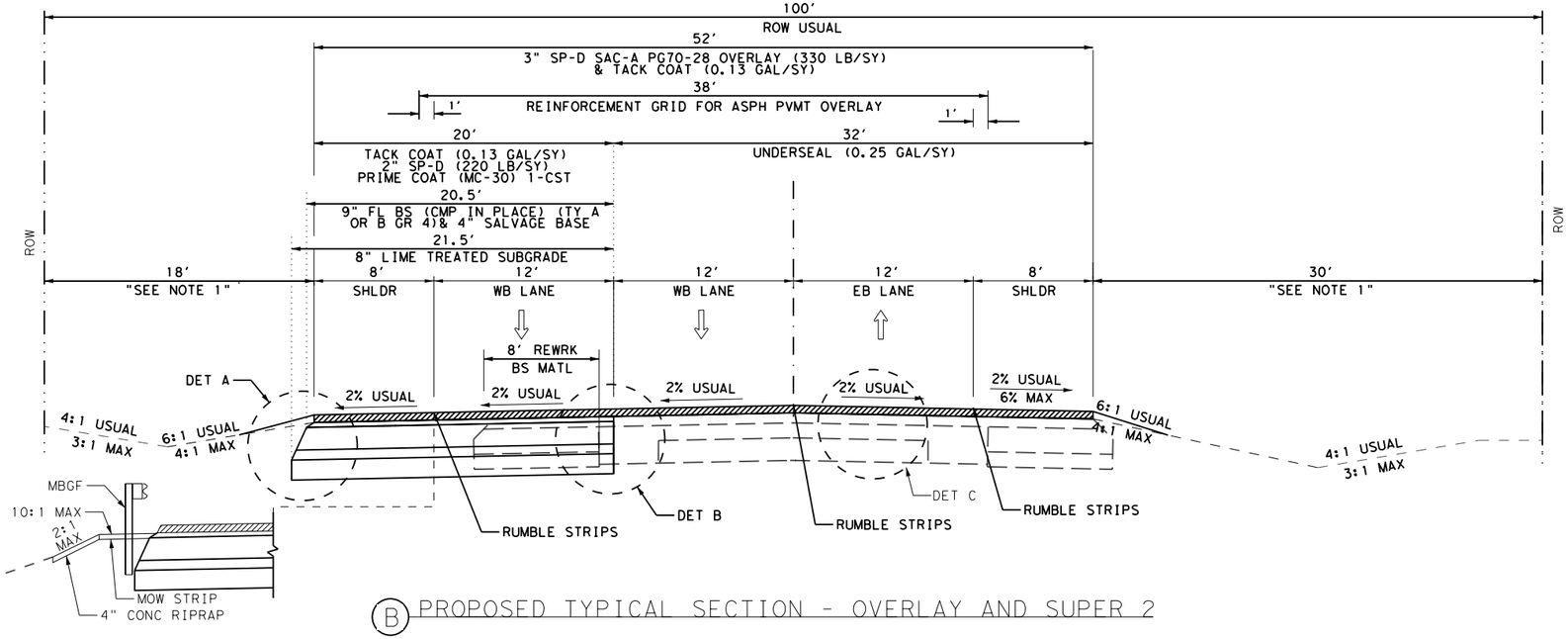

B PROPOSED TYPICAL SECTION - OVERLAY AND SUPER 2

STA 15+20.00 TO STA 20+68.07
STA 47+40.00 TO STA 57+05.00
STA 61+50.00 TO STA 68+75.00

STA 10+50.00 TO STA 19+50.00 LT TRANSITION (40' TO 52')(AVG 46'),
LT WIDENING TRANSITION (8' TO 20')(AVG 14')
STA 19+50.00 TO STA 121+25.00

HORZ 0' 5' 10'
VERT 0' 2.5' 5'
SCALE IN FEET

NOTE:

1. PREP ROW AND BACKFILL TY A. REFER TO SW3P DRILL SEEDING DETAIL SHEET FOR SEEDING AND EROSION CONTOROL INFORMATION.

2. A LAYER OF GEOTEXTILE REINFORCEMENT PER TXDOT SPECIAL SPECIFICATION 3057 SHALL BE PLACED FROM EDGE THROUGH EDGE OF SHOULDER

3. PLACE PAVING GRID BETWEEN 1.5" LIFTS IN SP-D (SS 3057)

4. PLACE 3" SP-D OVERLAY IN TWO EQUAL LIFTS.

5. SEE ROADWAY PLANS FOR LIMITS OF MBGF AND RIPRAP.

6. SEE GENERAL NOTES FOR RUMBLE STRIP DETAILS.

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

2/25/2024

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

Texas Department of Transportation

SH 152

PROPOSED
TYPICAL SECTIONS

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		5

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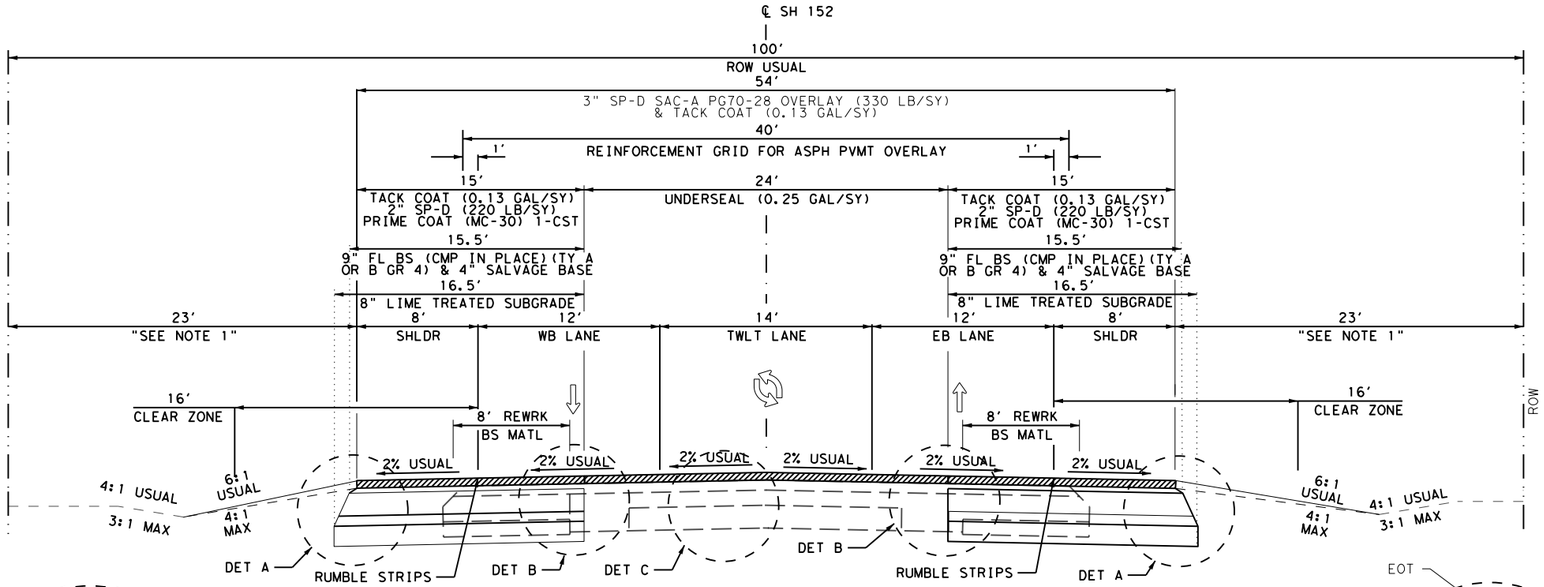
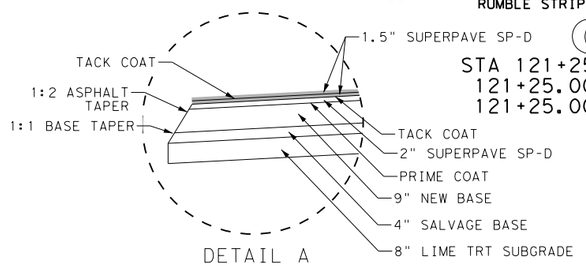
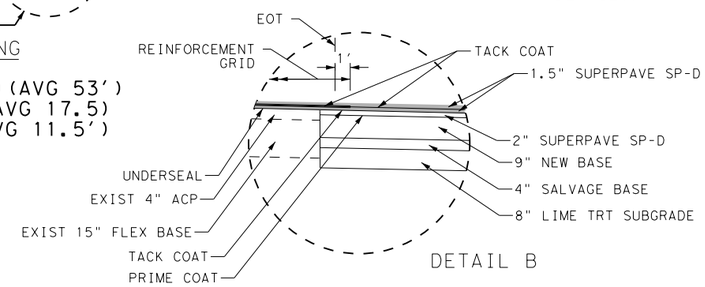


PROPOSED TYPICAL SECTION - TWLT OVERLAY AND WIDENING

STA 121+25.00 TO STA 126+50.00 LT & RT TRANSITION (52' TO 54')(AVG 53')
121+25.00 TO STA 126+50 LT WIDENING TRANSITION (20' TO 15')(AVG 17.5)
121+25.00 TO STA 126+50 RT WIDENING TRANSITION (8' TO 15')(AVG 11.5')
STA 126+50.00 TO STA 234+00.00



DETAIL A

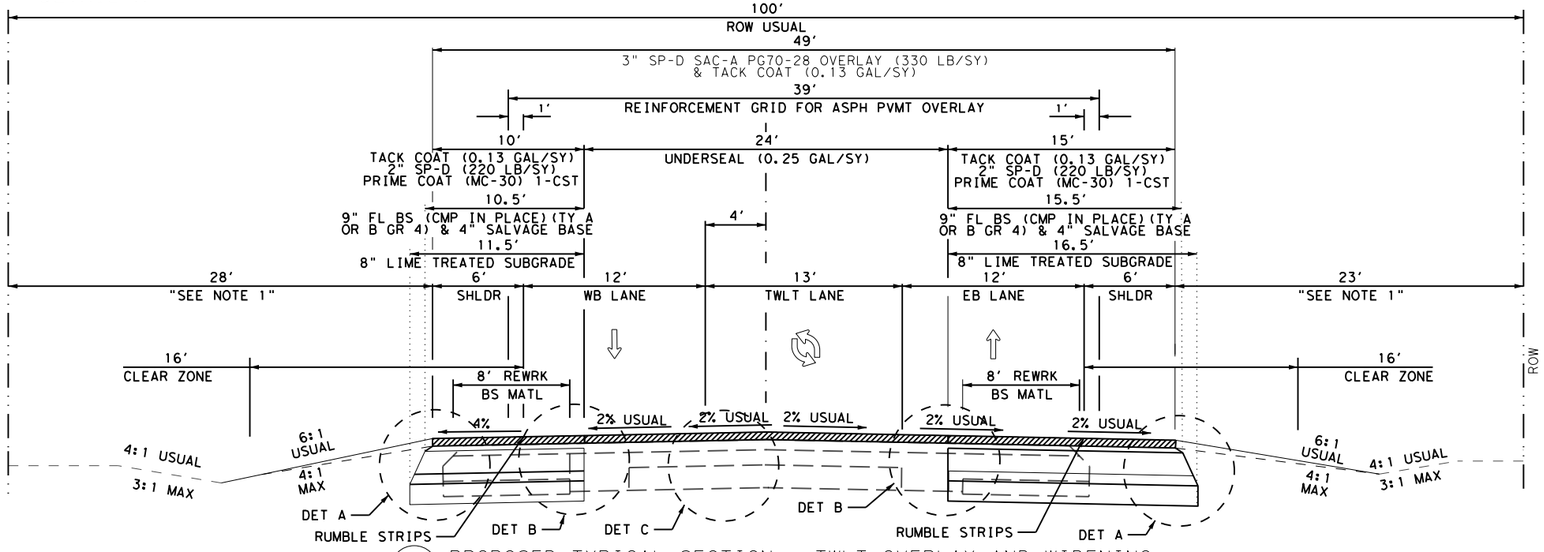


DETAIL B

HORZ 0' 5' 10'
VERT 0' 2.5' 5'
SCALE IN FEET

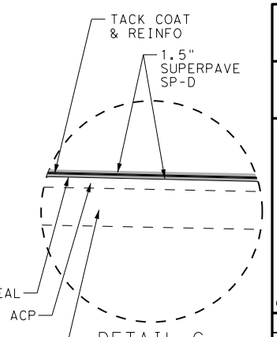
NOTE:

1. PREP ROW AND BACKFILL TY A. REFER TO SW3P DRILL SEEDING DETAIL SHEET FOR SEEDING AND EROSION CONTOROL INFORMATION.
2. PLACE PAVING GRID BETWEEN 1.5" LIFTS IN SP-D (SS 3057)
3. A LAYER OF GEOTEXTILE REINFORCEMENT PER TXDOT SPECIAL SPECIFICATION 3057 SHALL BE PLACED.
4. PLACE 3" SP-D OVERLAY IN TWO EQUAL LIFTS.
5. SEE ROADWAY PLANS FOR LIMITS OF MBGF AND RIPRAP.
6. SEE GENERAL NOTES FOR RUMBLE STRIP DETAILS.



PROPOSED TYPICAL SECTION - TWLT OVERLAY AND WIDENING

STA 234+00.00 TO STA 235+20.00
LT & RT TRANSITION (54' TO 49')(AVG 51.5'), LT WIDENING TRANSITION (15' TO 10')(AVG 12.5'),
LT & RT SHLDR TRANSITION (8' TO 6), LT SHLDR CROSS SLOPE TRANSITION (2% TO 4%), TWLT TRANSITION (14' TO 13)
STA 235+20.00 TO STA 241+80.61
STA 241+80.61 TO STA 246+50.00
LT WIDENING TRANSITION (10' TO 17')(AVG 13.5'), RT WIDENING TRANSITION (15' TO 8')(AVG 11.5')



DETAIL C

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/25/2024

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

Texas Department of Transportation

SH 152

PROPOSED
TYPICAL SECTIONS

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		6

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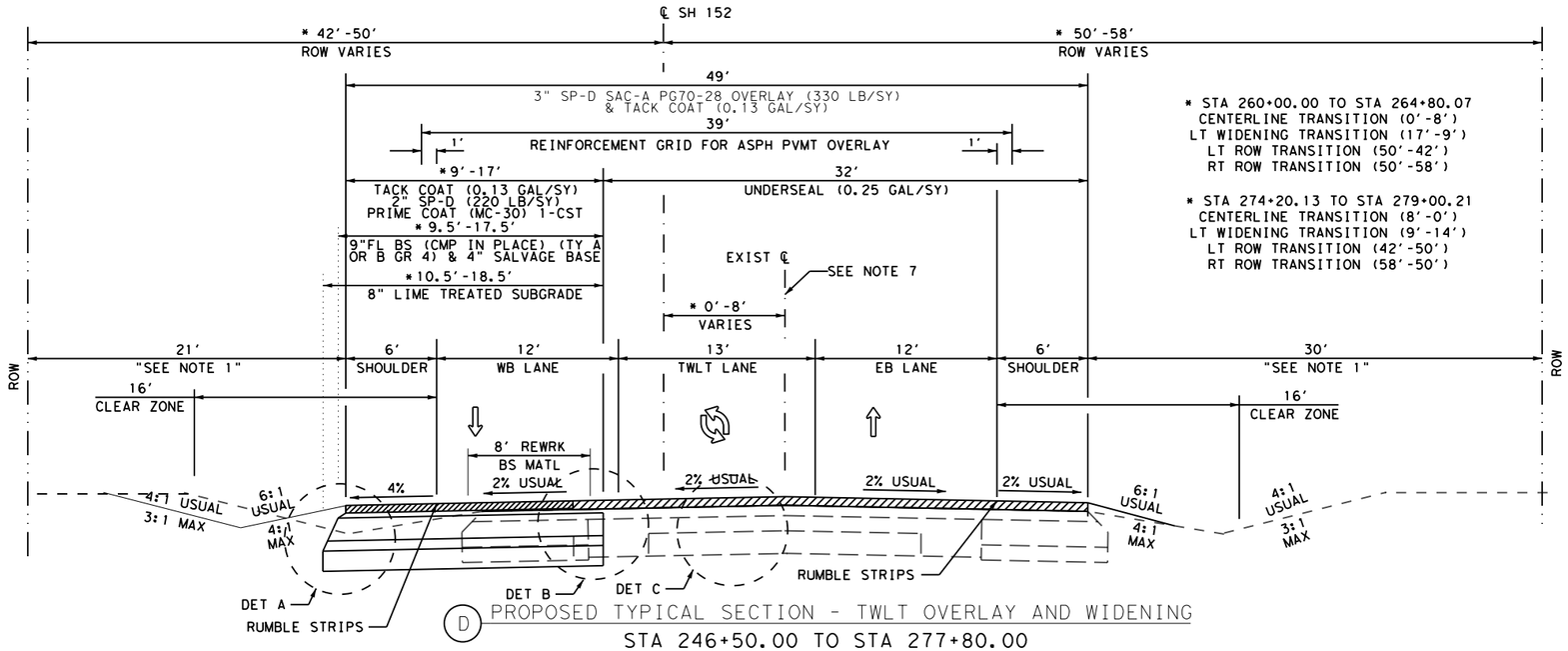
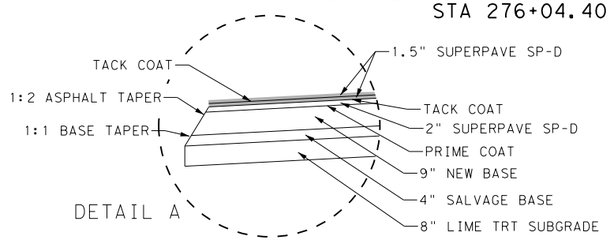


D PROPOSED TYPICAL SECTION - TWLT OVERLAY AND WIDENING

STA 246+50.00 TO STA 277+80.00

STA 277+80.00 TO STA 279+00.00 LT & RT TRANSITION (49' TO 54')(AVG 51.5'),TWLT TRANSITION (13' TO 14'), LT SHLDR TRANSITION (6' TO EXIST), LT SHLDR CROSS SLOPE TRANSITION (4% TO EXIST)

STA 276+04.40 TO STA 278+00.00 RT SHLDR TRANSITION (6' TO EXIST)



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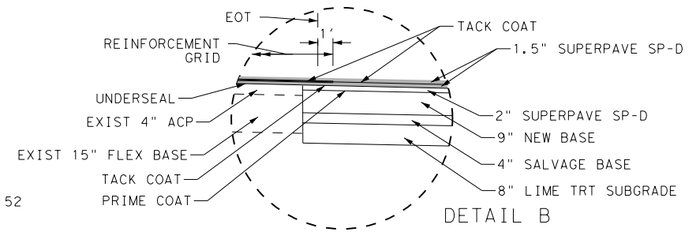

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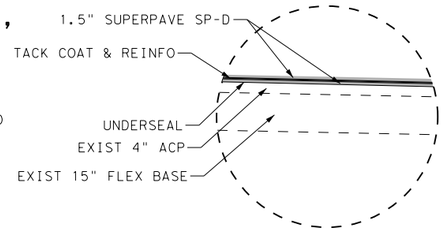

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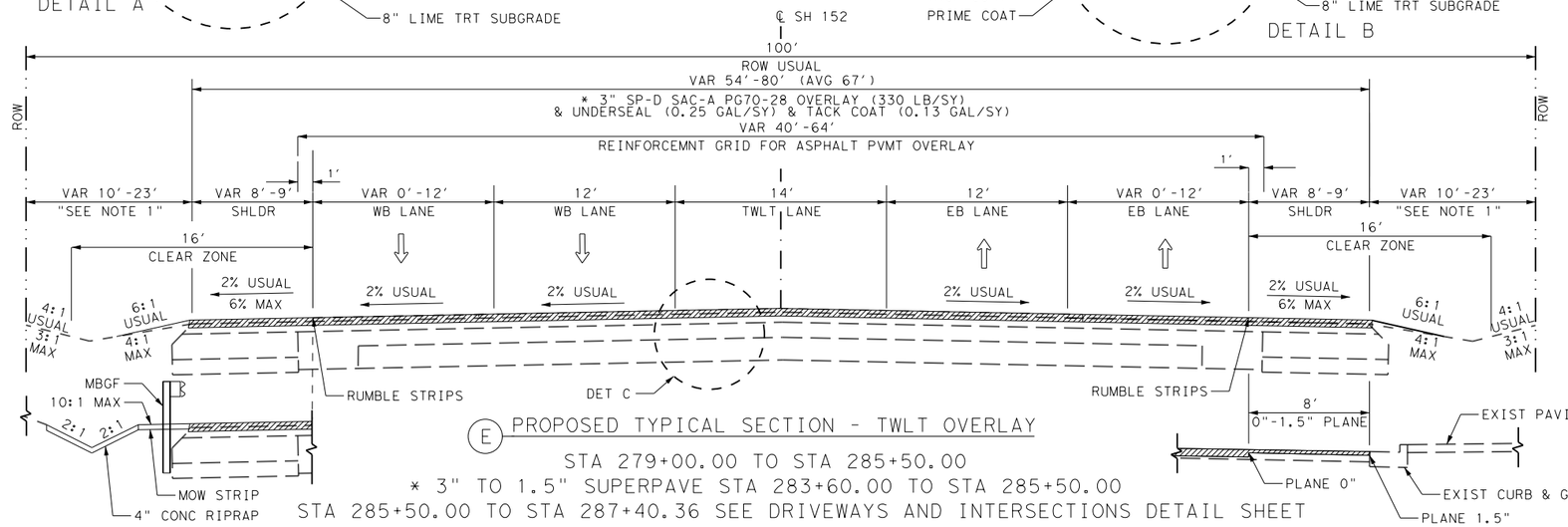

E PROPOSED TYPICAL SECTION - TWLT OVERLAY

STA 279+00.00 TO STA 285+50.00

* 3" TO 1.5" SUPERPAVE STA 283+60.00 TO STA 285+50.00

STA 285+50.00 TO STA 287+40.36 SEE DRIVEWAYS AND INTERSECTIONS DETAIL SHEET

STA 281+00.00 TO STA 286+11.29

STA 283+18.70 TO STA 285+50.00

HORZ 0' 5' 10'
VERT 0' 2.5' 5'
SCALE IN FEET

NOTE:

1. PREP ROW AND BACKFILL TY A. REFER TO SW3P DRILL SEEDING DETAIL SHEET FOR SEEDING AND EROSION CONTOROL INFORMATION.
2. PLACE PAVING GRID BETWEEN 1.5" LIFTS IN SP-D (SS 3057).
3. A LAYER OF GEOTEXTILE REINFORCEMENT PER TXDOT SPECIAL SPECIFICATION 3057 SHALL BE PLACED.
4. PLACE 3" SP-D OVERLAY IN TWO EQUAL LIFTS.
5. SEE ROADWAY PLANS FOR LIMITS OF MBGF AND RIPRAP.
6. SEE GENERAL NOTES FOR RUMBLE STRIP DETAILS.
7. MAINTAIN EXIST CL CROWN.

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/25/2024

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

Texas Department of Transportation

SH 152

PROPOSED
TYPICAL SECTIONS

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		7

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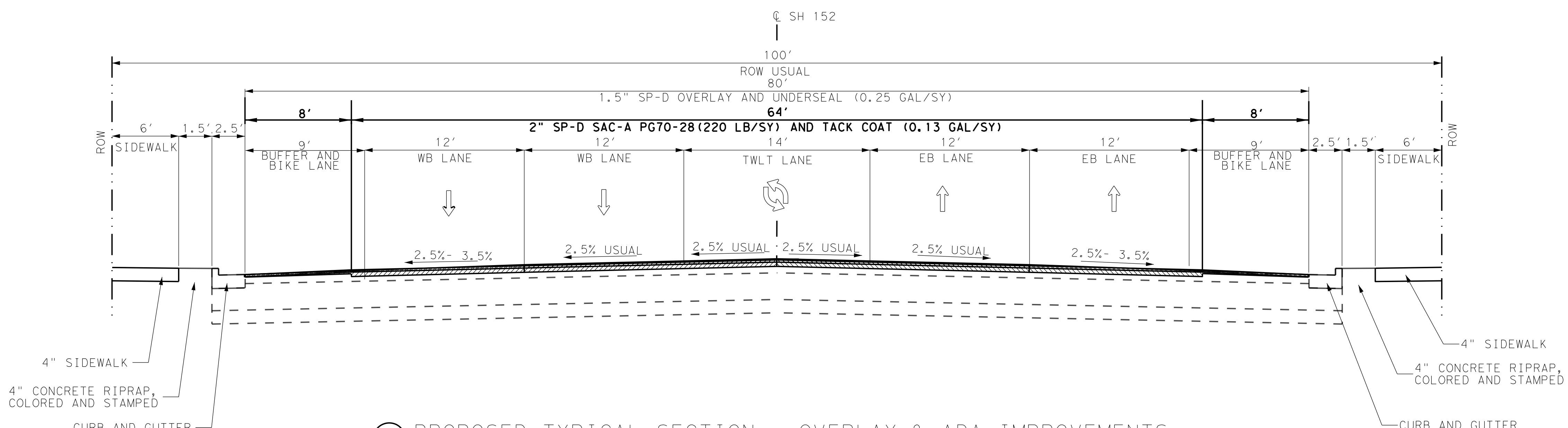
VERT 0′ 2.5′ 5′
SCALE IN FEET



(F) PROPOSED TYPICAL SECTION - OVERLAY & ADA IMPROVEMENTS

STA 287+40.36 TO STA 338+80.00

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED PROFESSIONAL ENGINEER
2/22/2024

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

Texas Department of Transportation

SH 152

PROPOSED
TYPICAL SECTIONS

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		8

GENERAL NOTES

CSJ: 0455-03-038

BASIS OF ESTIMATE FOR CONSTRUCTION

Item	Description	Unit	Rate
164	SEEDING		SEE PLAN SHEETS
166	FERTILIZER		SEE PLAN SHEETS
168	VEGETATIVE WATERING	MG	81.0 MG/AC
260	LIME (HYD, COM, OR QK (SLURRY))	TON	3% Lime at 23.4 LBS/SY
310	PRIME COAT (MC-30)	GAL	0.25 GAL/SY
314	EMULSION ASPHALT (MULTI) (MS-2 OR SS-1)	GAL	SEE NOTE 2
316	ASPH (AC-5)	GAL	0.38 GAL/SY
	AGGR (TY-B GR-4 SAC-B)	CY	110 SY/CY
3077(1)	SUPERPAVE MIXTURES	TON	2" 220 LB/SY/2000
		TON	3" 330 LB/SY/2000
3085	UNDERSEAL COARSE	GAL	SEE GENERAL NOTE FOR RATE INFORMATION

NOTE:

(1)	SP-D SAC-A PG70-28 Weight Based On 110Lbs/SY/In
(2)	40% Emulsified Asphalt 60% Water Mixture Applied At 0.25 Gal/Sy. Paid using 0.1 Gal/Sy.

General

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

TO: Pampa Area Engineer Zachary.Mayer@txdot.gov
CC: Assistant Area Engineer Ivan.Fuentes@txdot.gov
Director of Construction Kit.Black@txdot.gov (interim)
Construction Manager Darrell.Caldwell@txdot.gov

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

For Q&A's on Proposals navigate to:

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

Use the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink of the project you want to view the Q&A for and click on the link in the window that pops up.

All relevant project documentation including CTD and cross sections (if applicable) will be posted to TxDOT District's FTP website.

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

Verify all survey control prior to beginning construction. Notify Engineer of any discrepancies in control prior to beginning construction.

There are approximately 3 "reference markers" within the project limits. If a marker needs to be moved for any reason during construction operations, the Contractor is to remove it, install it in a temporary location and then reinstall it in its correct permanent location. Both the temporary and permanent locations are to be on a line that is perpendicular to the original "station" along the roadway. The temporary location is to be at or near the right-of-way. The permanent location is to be directed by the Engineer.

The Contractor is advised that a construction speed zone will be applicable for this project and is to be limited to the actual work areas under construction. The approved construction speed limit will be made available upon request to the Engineer.

If Contractor damages any sprinkler heads, risers or water lines that are not to be relocated, he or she is required to replace or repair all damage at his or her own expense and to the Engineer's satisfaction.

If portions of the right-of-way is used to store materials, equipment, and other uses with the approval of the Engineer, materials, equipment, etc., must either be located outside the 30 foot traffic safety clearance zone or be adequately protected.

Contractor facilities, such as asphalt plants, concrete plants, rock crushers, etc. are not allowed to be located within Department right of way.

Do not store any equipment or material under any bridge.

The slopes indicated on the typical sections may be varied when fixed features required slopes are re-established as directed by the Engineer.

Dust caused by construction operations is to be controlled by applying water in conformance with the requirements of Item 204, "Sprinkling". Sprinkling for dust control will not be paid for directly, but will be considered as subsidiary work to the various bid items.

Any work necessary to provide temporary ingress and egress during construction (such as building gravel ramps, etc.) Will not be paid for directly, but will be considered as subsidiary work to the various bid items.

Verify all existing grades, elevations, and cross slopes that will connect to any proposed grades and elevations. If adjustments are warranted, the Contractor is to submit proposed changes to the Engineer for verification.

Item 6 Control of Materials

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

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

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

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

Item 7 Legal Relations and Responsibilities

No significant traffic generator events identified.

The total area disturbed for this project is approximately 7.80 acres. The disturbed area in this project, all project locations in the Contract, and the Contractor Project Specific Locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer and to the local government that operates a separate storm sewer system.

Item 8 Prosecution and Progress

Create, maintain, and submit for acceptance, a Critical Path Method (CPM) project schedule and a Project Schedule Summary Report (PSSR) using computer software that is fully compatible with the latest version of Primavera Systems, Inc. or Primavera P6.

Prosecute the work following the sequence shown in the traffic control plan narrative and corresponding traffic control plan. Prosecuting the work in concurrent phases is not allowed unless approved in writing by the Engineer

Item 100 Preparing Right Of Way

Preparing right of way will consist exclusively of mowing the vegetation to the width shown in the plans for Backfilling Pavement Edges. Set mower cutting height to cut as low as practical but no higher than 6 inches. Payment for Preparing Right Of Way will be made only in the case where mowing is actually used.

Item 110 Excavation

Before grading begins, the vegetative cover within the areas to be graded are to be bladed into a windrow outside the limits of the slopes. After all grading is complete; the vegetative cover is to be spread over the adjacent disturbed areas. This work is not to be paid for directly, but will be considered subsidiary work to the various bid items.

Prior to excavation and placement of embankment, the top-soil (6-inch depth) within the areas to be disturbed will be bladed into a windrow, or stockpiled, outside the limits of the fill slope. After all grading is completed; the top soil (6-inch depth) will be spread over the disturbed areas that will not receive concrete riprap. This work is not paid for directly, but will be considered as subsidiary work to the various bid items.

Item 132 Embankment

The plasticity index for TY B will not exceed 25.

Materials excavated from the project will be allowed to be used on the project as directed by the Engineer.

Item 134 Backfilling Pavement Edges

Mow according to Item 100 just prior to backfill pavement edge operations.

Do not overlay any roadway unless the pavement edges can be backfilled within 24 hours. Preferably, both edges of all roadways should be completely backfilled at the end of each day's overlay operations. Damage to delineators, signs, or other roadside features will be repaired or replaced at the expense of the Contractor.

The backfill material will not be obtained from within the right-of-way or from any area that contains perennial plants such as "bindweed" or "jointgrass" that would be detrimental to agricultural land.

Item 164 Seeding for Erosion Control

Perform planting operations in accordance with the recommendations contained in the latest version of the TxDOT manual "A Guide to Roadside Vegetation Establishment" developed by the Vegetation Management Section of the Maintenance Division.

Seeding may require more than one mobilization, depending upon the Contractor's sequence of work.

Item 166 Fertilizer

Fertilize all areas of project to be seeded or sodded in accordance with the Amarillo District Vegetation Specification Sheet.

Item 247 Flexible Base

SPECIFICATION FOR FLEX BASE TY A, B OR D, GR 4								
GRADING REQUIREMENTS PERCENT RETAINED – SIEVES SIEVE SIZES INCHES					*SOIL CONSTANTS*		*MAX WET BALL* *	*MAX % INCREASE IN PASSING # 40* *
1 3/4	*7/8*	*3/8*	*# 4*	*# 40*	*L.L. MAX*	*P.I. MAX*		
0	*17-32*	*40-60*	*50-70*	*70-85*	*40*	*12*	*45*	*20*

*Applies to TY A & D material only.

Item 260 Lime Treatment (Road-Mixed)

All required moisture added for mixing and compaction operations is to be injected through the mixing process. Sprinkle the subgrade or base to prevent excessive loss of moisture as directed by the Engineer.

Spread the lime with a vane feeder system approved by the Engineer that is capable of spreading the lime uniformly to within 5 percent of the specified rate.

Item 314 Emulsified Asphalt Treatment

In rural area of this project, a 10' strip of finished material adjacent to each shoulder is to be treated with an emulsified asphalt mixture. The mixture may be placed in one or more applications at a total rate of 0.25 gallons per square yard, unless directed otherwise by the Engineer. The homogeneous mixture may be composed of approximately 40% asphalt (MS-2 or SS-1) and 60% water, unless directed otherwise by the Engineer.

Item 316 Seal Coat

Place one course surface treatment on finished base course as soon as practical, but no later than 7 calendar days after completion of the base treatment process.

The rates shown are for estimating purposes and that the Engineer can dictate higher or lower rates based on roadway conditions

Item 320 Equipment for Asphalt Concrete Pavement

A self-propelled, wheel mounted material transfer vehicle (MTV) capable of receiving hot mix from the haul trucks separate from the paver is required on all courses and all types of hot mix for this project. The MTV is to have a minimum storage capacity of approximately 25 tons, and equipped with a pivoting discharge conveyor and a means of completely remixing the hot mix prior to placement. The paver hopper is to be equipped with a separate surge storage insert with a minimum capacity of approximately 20 tons.

If used, the IR bar read out screen must be visible at all times to the Engineer.

When performing any scheduled work during night time hours (sunset to sunrise) all work areas will be fully illuminated using devices designed to not incumber or distract oncoming traffic. All illumination equipment must be approved by the Engineer in writing 48 hours before any scheduled night time work can begin. All associated equipment and labor is considered subsidiary to the item of work and will not be paid for directly.

Item 351 Flexible Pavement Structure Repair

Contractor is not to remove more pavement than can be replaced that same day.

All flexible pavement structure repairs must be overlaid within the same asphalt season.

Item 354 Planing and Texturing Pavement

The Contractor will retain ownership of planed materials.

Item 421 Hydraulic Cement Concrete

The sand equivalent value of fine aggregate is not to be less than 85 when subjected to test method tex-203-F.

The Engineer will perform all job control testing for acceptance.

The Engineer will provide strength-testing equipment when required in accordance with the Contract-controlling tests.

Furnish and maintain the following testing equipment:

♦ Test Molds

All cast-in-place concrete except for drilled shafts are to be air-entrained. Pre-cast and drilled shaft concrete may be air-entrained at the Contractor's option.

Item 432 Riprap

24" tie bars (#3 bars at 18" c-c) are to be used across all construction joints. Tie bars should be 12'' into each side of the construction joint. When tying new riprap into existing riprap drill and epoxy grout 8" minimum into existing concrete. This is to be considered subsidiary to the payment for riprap.

Use of #3 rebar for reinforcing is required.

Item 462 Concrete Box Culverts and Storm Drains

Joint material for reinforced concrete pipe is to be either cold applied preformed plastic gaskets or cold applied plastic asphalt sewer joint compound.

Backfill pipe up to the springline with granular material. The ponding method of backfilling will be allowed for the granular material only.

Item 464 Reinforced Concrete Pipe

Joint material for all pipes will be cold applied plastic asphalt sewer joint compound.

Bedding for pipe culverts is to be 6 inches of sand. The excavation required to place the sand will not be paid for directly but will be considered subsidiary to this item.

Backfill pipe up to the springline with granular material. The ponding method of backfilling will be allowed for the granular material only.

Item 467 Safety End Treatment

Pre-cast Safety End Treatments are allowed; however, a cast-in-place concrete apron will be required as shown on the plans & will be subsidiary to the Safety End Treatment.

Item 502 Barricades, Signs, and Traffic Handling

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

Temporary rumble strips will be required as shown on WZ(RS)-22 regardless of loose gravel, and/or soft or bleeding asphalt. Adjust the traffic control setup such that rumble strips are not placed in areas of heavily rutted pavements, unpaved surfaces, or horizontal curves. Temporary rumble strips will not be allowed on interstate highway.

The Contractor is to have the option of using either plastic drums, vertical panels, grabber cones or a combination where drums are shown as channelizing devices, as approved by the Engineer. Plastic drums are to be used in all transition areas in accordance with BC(8)-21.

Furnish and install "soft shoulder" signs as directed by the Engineer. This work will not be paid for directly, but will be considered as subsidiary to item 502, "Barricades, Signs and Traffic Handling".

Provide a 3:1 backfill "safety slope" at the end of the day for any drop off exceeding 2" that is adjacent to a travel lane.

Lane closures are to be limited to a maximum of: 3 miles.

If more than one lane closure location is desired a minimum of 2 miles passing zone is required between each location.

Notify the Engineer 24 hours prior to any lane closure.

Item 504 Field Office and Laboratory

The following building(s) will be required for this project:

One Type (D) structure, asphalt mix control laboratory

Each building is to be provided before work is begun on the pertinent construction items for which it is needed.
Any laboratory furnished is to be a minimum of 10 ft in width.

All-weather parking area and chain link security fence will not be required.

The Type D structures are to be equipped with the following in addition to requirements specified under item 504:

a. Safety equipment
   (1) One eye wash station
   (2) One fire extinguisher
   (3) One first aid kit

Furnish a Type D structure for the asphalt mix control laboratory for the Engineer's exclusive use. In addition to requirements of item 504, this structure is to have a minimum height of 8 feet and provide a minimum 400 square feet gross floor area for permanently located plants or 200 square feet for temporary located plants serving one project. The floor area will be partitioned

into a minimum of two interconnected rooms, each room furnished with an exterior door and a minimum of two windows. The floor is to have sufficient strength to support the testing equipment and have an impervious covering.

The Type D structures are to be adequately air conditioned and be furnished with a minimum of one desk and three chairs. The structure is to be provided with a 240-volt electrical service entrance. The service is to consist of a minimum of 4 - 120 volt circuits with 20 amp breakers and no more than two grounded convenience outlets per circuit and provisions for a minimum of two 220-volt ovens with vents to the outside. The structure is to have a minimum of 2 convenience outlets per wall, and a utility sink with an adequate clean potable water supply for testing. The state building is to be equipped with at minimum a hot water dispenser or hot water heater capable of generating 1 gallon of water per use at 140º F with adequate water pressure. Space heaters for heating the structure are unacceptable. Portable structures are to be support blocked for stability and are to be tied down.

For this project, asphalt content will be determined utilizing the ignition method so the structure is to provide for the following in lieu of the item 504 requirements for asphalt content by extraction. The room to contain the ignition oven is to be adequately power ventilated and contain a NEMA 6-50r (208/240 v, 50 a) outlet within 2.5 feet of the ignition oven location and an independent exhaust outlet to the outside no further than 8 feet from the oven. The surface for the ignition oven location is to be level, sturdy, and fireproof with at least 6-inch clearance between the furnace and other vertical surfaces.

If needed, each building is to be moved to a new location as directed by the Engineer. Any building that is no longer required on the job after completion of the pertinent construction items may be released to the Contractor upon consent of the Engineer.

Item 506 Temporary Erosion, Sedimentation, and Environmental Controls

Erosion control devices are to be installed as needed in coordination with the work progress, or as directed by the Engineer.

Use wooden stakes to secure erosion control logs. Do not use rebar stakes.

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

Expansion joints are to be at least one-half inch thick and spaced at maximum intervals of 40 feet. Planes of weakness are to be spaced at approximately ten feet intervals. Joint material will comply with ASTM-D 1751.

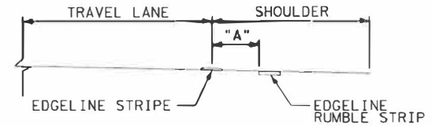
Item 531 Sidewalks

Sidewalks may be constructed using reinforcing steel: 6"x6" W1.4 x W1.4 welded wire mesh (1 1/2" above sand)

Item 533 Milled Rumble Strips

Use the applicable option in the table below for installation of the continuous milled depressions, as shown on the Edge Line Rumble Strips standards RS(1)-23 and RS(2)-23.

Edge Line Rumble Strips, on the outer shoulder of divided highway, will require a gap spacing of 20' following 60' of rumble strip to allow for bicycle consideration as shown on RS(6)-23.



EDGELINE RUMBLE STRIP DETAIL
NTS
(MIRROR FOR INSIDE SHOULDER)

SHOULDER WIDTH (SW)	RUMBLE STRIP WIDTH (RS)	PLACEMENT "A"	OPTION (SEE RS(1)-23 or RS(2)-23)
SW ≤ 2'	8" RS	SEE RS(1)-13	Option 1
2' < SW ≤ 8'	8" RS	4" OFF EDGELINE	Option 3
SW ≥ 8'	16" RS	24" OFF EDGELINE	Option 4
All Inside Shoulders on 4-lane Divided Highways	16" RS	4" OFF EDGELINE	Option 3

Use milled option 1 for installation of the Centerline Rumble Strips, as shown on the Standard Sheet RS(3)-23 and RS(4)-23.

Item 540 Metal Beam Guard Fence

Drive steel posts for metal beam guard fence a minimum of 1/3 of the post length to final specified depth.

Item 542 Removing Metal Beam Guard Fence

All MBGF, GET & TAS materials will remain property of the Contractor.

Item 544 Guardrail End Treatments

Use Single Guardrail End Treatment (Ty III)(Steel Post).

Item 585 Ride Quality for Pavement Surfaces

Use Surface Test Type B pay adjustment schedule 1 to evaluate ride quality of the travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces."

Item 644 Small Roadside Sign Supports and Assemblies

ALUMINUM SIGN BLANKS THICKNESS	Square Feet	Minimum Thickness
	Less than 7.5	0.100
	7.5 or Greater	0.125

All slip base signs will have a triangular slip base with a 2-bolt clamp to prevent rotation of signpost. Set screw type slip base will not be allowed.

A 7" x 1/2" diameter galvanized rod or #4 rebar is to be installed in the sign stub as shown on SMD(SLIP-1)-08 to prevent rotation of the sign stub in the concrete footing.

The exact locations of the large and small roadside signs are to be as designated by the Engineer.

The existing riprap aprons are to be removed and disposed of as approved by the Engineer. This work is not to be paid for directly, but will be considered subsidiary to the removal of foundations under this item.

Probe before drilling for foundations to determine the location of all utilities and structures. This work will not be paid for directly, but will be considered subsidiary to bid items involved.

Details for standard signs not shown on the signing standards of the signing detail plan sheets are to be in conformance with the department's "Standard Highway Sign Designs for Texas" Manual, Latest Edition.

Install a wrap of retroreflective sheeting conforming to DMS-8300 on all posts for small road sign assemblies. Sign post wraps will not be paid for directly, but are considered subsidiary to Item 644.

Install red sheeting on the posts containing the following signs:
Stop, Yield, Wrong Way & Do Not Enter

Install yellow sheeting on all other small sign posts.

Install all retroreflective wraps at a height of 4 ft. from bottom of the wrap to the edge of the travel lane surface. All retroreflective wraps will cover the full circumference of the sign post for a vertical width of 12 inches.

Item 658 Delineator and Object Marker Assemblies

For all ground mount applications provide hollow or tubular posts embedded in concrete using plastic wedged anchor system.

For all concrete barrier, bridge rail, and guard fence post mounted applications provide hollow or tubular posts with approved anchorage.

Item 666 Reflectorized Pavement Markings

Retroreflectivity Requirements:

All Type I markings must meet the minimum retroreflectivity values for edgeline markings, centerline or no passing barrier-line, and lane lines when measured any time after 3 days, but not later than 10 days after application:

- White markings: 250 millicandelas per square meter per lux (mcd/m^2/lx)
- Yellow markings: 175 mcd/m^2/lx

Retroreflectivity Measurements: Mobile or portable retroreflectometers may be used at the Contractor's discretion.

All Type I markings must meet the minimum retroreflectivity values for edgeline markings, centerline or no passing barrier-line, and lane lines when measured any time after 3 days, but not later than 10 days after application.

shoulder. An alternate tack coat material is permitted in small production areas such as flexible pavement structure repair, driveways, mailbox pullouts or other areas as designated by the Engineer. All alternate tack coat material must adhere to the requirements of SS3076.

Item 3077 Superpave Mixtures

Use aggregate that meets the SAC requirement of class A.

Only fractionated RAP is allowed.

Use of RAS is not allowed.

All SP-D on this project is considered surface mix. A substitution PG binder is not allowed, as shown in Table 5.

When laying ACP on a roadway that has two or more lanes and the work is being done under traffic, then the adjacent lane or lanes are to be overlaid by the end of the following day.

The District Lab will perform a maximum of 2(two) design verification tests. If additional verification tests are needed, the Contractor will be billed $3,500.00 per each additional verification test required to obtain an approved asphaltic concrete pavement mix design.

If lime is not used as an antistrip agent, then the production and placement testing frequency for the Boil test (TEX-530-C) shown in the table below.

Description	Test Method	Minimum Contractor Testing Frequency	Minimum Engineer Testing Frequency
Boil test	Tex-530-C	1 per lot	1 per 12 sublots

If used, the IR bar read out screen must be visible at all times to the Engineer.

Item 3085 Underseal Course

For estimating purposes the Underseal Course is applied at a rate of 0.25 Gal/SY.

Item	Option	Material	Application Rate	Conversion Rate
316	Seal Coat	AGGR[4]	110 SY/CY	0.66[1]
		ASPH[5]	0.38 Gal/SY	
3002	Spray Applied Underseal Membrane	ASPH	0.25 Gal/SY	1.0[2]
3019	TRAIL-Ultrafuse and Jebro	ASPH	0.15 Gal/SY	1.67[3]

1. Aggregate is considered subsidiary to the asphalt. For estimating purposes 0.66 Gallons of Seal Coat Asphalt is equivalent to 1.0 Gallons of Underseal Course. Refer to Item 316 in these General notes for more information on this option.
2. For estimating purposes 1.0 Gallon of Spray Applied Underseal Membrane is equivalent to 1.0 Gallon of Underseal Course. Refer to Special Specification SS3002 for more information on this item.
3. For estimating purposes 1.67 Gallons of TRAIL is equivalent to 1.0 Gallons of Underseal Course. Refer to Special Specification SS3085 for more information on this item.
4. Use GR4 TY B SAC B in accordance with Item 316
5. Use AC-10 or other equivalent as approved by the Engineer.

Example: If TRAIL Option Is Selected For Use.
A conversion rate of 1.67 will be applied to every one gallon of oil that is used.
If the NET gallons determined after strapping the tank is 1,000 gallons. Then the 1,000 gallons will be multiplied by the 1.67 conversion rate in the table above.
1,000 GAL * 1.67 CR = 1670 gallons for payment.

Ultrafuse and Jebro is the only allowed "seal" for the TRAIL option. None of the "tack" options are allowed.

If the Spray Applied Underseal Membrane or TRAIL options are used, the use of tack is not required.

Item 3096 Asphalts, Oils, and Emulsions

Asphalt from different sources is not to be blended.

The "Open" seasons for applying asphaltic materials and mixtures for the listed items are to be as follows, unless authorized otherwise in writing by the Engineer:

ITEMS	OPEN SEASON
314	All Year
316	All Year
351, 3077	From April 15th through October 31st

Item 6001 Portable Changeable Message Sign

Supply 2 Portable Changeable Message Signs (Type II – Lamp Matrix) for this project.
No payment will be made for removing and replacing damaged PCMS.

If the Contractor chooses to have more than one lane closure set-up at a time, provide additional PCMS in accordance with TCP at no additional charge to the department.

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

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required on the traffic control plan for this project, provide 0 additional shadow vehicle(s) with TMA for TCP (1-1)-18, (2-1)-18, (2-3)-18, (2-4)-18, (3-1)-13, (3-3)-14, (7-1)-13 as detailed on the General Notes of this standard sheets.

Therefore, 2 total shadow vehicles with TMA will be required for this type of work. The Contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

Item 6362 Recessed Reflective Pavement Markers

Remove all existing raised pavement markers as directed by the Engineer, removing existing markers will be subsidiary to Item 6362.

Place all recessed reflective pavement markers in proper alignment with the guides/stripes. The maximum deviation rate in alignment is 1 in. per 200 ft. of roadway. The maximum deviation is to not exceed 2 in. or be abrupt.

Reflector face must be free of any adhesive or the reflector shall be cleaned or replaced.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0455-03-038 **DISTRICT** Amarillo **COUNTY** Gray
HIGHWAY SH 152

			CONTROL SECTION JOB		**0455-03-038**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00184860**		
			COUNTY		**Gray**		
			HIGHWAY		**SH 152**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	287.000		287.000	
	104-6022	REMOVING CONC (CURB AND GUTTER)	LF	257.000		257.000	
	104-6044	REMOVING CONC (FLUME)	SY	73.000		73.000	
	104-6054	REMOVING CONCRETE(MOW STRIP)	LF	198.000		198.000	
	110-6001	EXCAVATION (ROADWAY)	CY	14,842.000		14,842.000	
	132-6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	7,342.000		7,342.000	
	134-6001	BACKFILL (TY A)	STA	287.000		287.000	
	164-6036	DRILL SEEDING (PERM) (RURAL) (CLAY)	AC	13.270		13.270	
	164-6053	DRILL SEEDING (TEMP)(WARM OR COOL)	AC	13.270		13.270	
	247-6228	FL BS (CMP IN PLC)(TY A OR B GR 4)(9")	SY	69,778.000		69,778.000	
	251-6088	REWORK BS MTL (TY B)(15")(DEN CONT)	SY	35,000.000		35,000.000	
	260-6012	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY)	TON	874.000		874.000	
	260-6073	LIME TRT (SUBGRADE)(8")	SY	74,694.000		74,694.000	
	310-6009	PRIME COAT (MC-30)	GAL	16,898.000		16,898.000	
	314-6009	EMULS ASPH (EROSN CONT)(MULTI)	GAL	6,776.000		6,776.000	
	316-6010	ASPH (AC-5)	GAL	25,684.000		25,684.000	
	316-6076	AGGR(TY-B GR-3 SAC-A)	CY	614.000		614.000	
	351-6019	FLEXIBLE PAVEMENT STRUCTURE REPAIR(3")	SY	15,814.000		15,814.000	
	354-6022	PLANE ASPH CONC PAV(0" TO 3")	SY	4,384.000		4,384.000	
	354-6045	PLANE ASPH CONC PAV (2")	SY	36,549.000		36,549.000	
	354-6051	PLANE ASPH CONC PAV (0" TO 1 1/2")	SY	13,060.000		13,060.000	
	403-6001	TEMPORARY SPL SHORING	SF	300.000		300.000	
	432-6001	RIPRAP (CONC)(4 IN)	CY	190.000		190.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY	0.800		0.800	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	147.000		147.000	
	462-6048	CONC BOX CULV (4 FT X 3 FT)(EXTEND)	LF	25.000		25.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	30.000		30.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	483.000		483.000	
	467-6143	SET (TY I)(S= 4 FT)(HW= 4 FT)(3:1) (C)	EA	1.000		1.000	
	467-6148	SET (TY I)(S= 4 FT)(HW= 5 FT)(3:1) (C)	EA	1.000		1.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	4.000		4.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	30.000		30.000	
	479-6001	ADJUSTING MANHOLES	EA	20.000		20.000	
	480-6001	CLEAN EXIST CULVERTS	EA	5.000		5.000	
	496-6004	REMOV STR (SET)	EA	34.000		34.000	
	496-6005	REMOV STR (WINGWALL)	EA	2.000		2.000	
	496-6007	REMOV STR (PIPE)	LF	463.000		463.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0455-03-038 **DISTRICT** Amarillo **COUNTY** Gray
HIGHWAY SH 152

			CONTROL SECTION JOB		**0455-03-038**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00184860**			
			COUNTY		**Gray**			
			HIGHWAY		**SH 152**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**		EST.	FINAL		
	496-6008	REMOV STR (BOX CULVERT)	LF		4.000		4.000	
	496-6057	REMOVE STR (PIPE SUPPORT STRUCTURE)	LF		44.000		44.000	
	500-6001	MOBILIZATION	LS		1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO		12.000		12.000	
	506-6040	BIODEG EROSN CONT LOGS (INSTL) (8")	LF		1,060.000		1,060.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF		1,060.000		1,060.000	
	528-6001	COLORED TEXTURED CONC (4")	SY		1,713.000		1,713.000	
	529-6008	CONC CURB & GUTTER (TY II)	LF		257.000		257.000	
	530-6002	INTERSECTIONS (ACP)	SY		9,169.000		9,169.000	
	530-6004	DRIVEWAYS (CONC)	SY		200.000		200.000	
	530-6008	TURNOUTS (ACP)	SY		37.000		37.000	
	530-6021	DRIVEWAYS (ACP) (TYPE 2)	SY		3,838.000		3,838.000	
	531-6001	CONC SIDEWALKS (4")	SY		4,895.000		4,895.000	
	531-6024	CURB RAMPS (TY 7)	SY		627.000		627.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF		57,249.000		57,249.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF		12,125.000		12,125.000	
	536-6004	CONC DIRECTIONAL ISLAND	SY		45.000		45.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF		2,856.000		2,856.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA		4.000		4.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF		510.000		510.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA		1.000		1.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA		2.000		2.000	
	560-6025	RELOCATE EXISTING MAILBOX	EA		3.000		3.000	
	636-6001	ALUMINUM SIGNS (TY A)	SF		129.000		129.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA		10.000		10.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA		5.000		5.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	EA		1.000		1.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA		1.000		1.000	
	644-6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA		20.000		20.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA		30.000		30.000	
	658-6092	INSTL DEL ASSM (D-DW)SZ 1(WFLX)GND	EA		2.000		2.000	
	658-6094	INSTL DEL ASSM (D-DW)SZ 1(WFLX)SRF	EA		4.000		4.000	
	658-6099	INSTL OM ASSM (OM-2Z)(WFLX)GND	EA		11.000		11.000	
	662-6008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF		41,990.000		41,990.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF		84,764.000		84,764.000	
	662-6067	WK ZN PAV MRK REMOV (W)6"(SLD)	LF		13,783.000		13,783.000	
	666-6017	REFL PAV MRK TY I (W)6"(DOT)(090MIL)	LF		396.000		396.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0455-03-038 **DISTRICT** Amarillo **COUNTY** Gray
HIGHWAY SH 152

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0455-03-038**			
		PROJECT ID		**A00184860**			
		COUNTY		**Gray**			
		HIGHWAY		**SH 152**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	666-6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	1,933.000		1,933.000	
	666-6047	REFL PAV MRK TY I (W)24"(SLD)(090MIL)	LF	503.000		503.000	
	666-6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	12.000		12.000	
	666-6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	12.000		12.000	
	666-6101	REF PAV MRK TY I(W)36"(YLD TRI)(090MIL)	EA	4.000		4.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	126,754.000		126,754.000	
	3057-6001	REINFORMT GRID FOR ASPHALT PVMT OVERLAY	SY	123,842.000		123,842.000	
	3077-6058	SP MIXES SP-D SAC-A PG70-28	TON	43,053.000		43,053.000	
	3077-6075	TACK COAT	GAL	35,614.000		35,614.000	
	3085-6001	UNDERSEAL COURSE	GAL	35,235.000		35,235.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6024-6008	HPPM W/RET REQ TY I(W)6"(BRK)(090MIL)	LF	4,778.000		4,778.000	
	6024-6011	HPPM W/RET REQ TY I(W)6"(SLD)(090MIL)	LF	67,587.000		67,587.000	
	6024-6020	HPPM W/RET REQ TY I(Y)6"(BRK)(090MIL)	LF	10,199.000		10,199.000	
	6024-6023	HPPM W/RET REQ TY I(Y)6"(SLD)(090MIL)	LF	64,700.000		64,700.000	
	6185-6002	TMA (STATIONARY)	DAY	190.000		190.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	100.000		100.000	
	6362-6002	REC REFL PAV MRKR TY I-C	EA	296.000		296.000	
	6362-6004	REC REFL PAV MRKR TY II-A-A	EA	1,342.000		1,342.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

SUMMARY OF ROADWAY ITEMS

LOCATION	100	104	104	104	134	247	251	260	260
	6002	6022	6044	6054	6001	6228	6088	6012	6073
	PREPARING ROW	* REMOVING CONC (CURB AND GUTTER)	REMOVING CONC (FLUME)	REMOVING CONCRETE(MOW STRIP)	BACKFILL (TY A)	FL BS (CMP IN PLC)(TY A OR B GR 4)(9")	REWORK BS MTL (TY B)(15")(DEN CONT)	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY) 23.4 LBS/SY	LIME TRT (SUBGRADE)(8")
	STA	LF	SY	LF	STA	SY	SY	TON	SY
TYPICAL SECTION A	11				11				
TYPICAL SECTION B	111				111	24626	9844	303	25857
TYPICAL SECTION C ***	125				125	42422	22267	529	45206
TYPICAL SECTION D	33		73		33	2729	2889	42	3632
TYPICAL SECTION E	8			198	8				
TYPICAL SECTION F		257							
DRIVEWAYS & INTERSECTIONS									
PAVEMENT REPAIR									
0455-03-038 TOTALS	**287**	**257**	**73**	**198**	**287**	**69778**	**35000**	**874**	**74694**

SUMMARY OF ROADWAY ITEMS

LOCATION	310	316	316	351	354	354	354	432	432
	6009	6010	6076	6019	6022	6045	6051	6001	6045
	PRIME COAT (MC-30) (0.25 GAL/SY)	ASPH (AC-5) (0.38 GAL/SY)	AGGR(TY-B GR-3 SAC-A) (110 SY/CY)	** FLEXIBLE PAVEMENT STRUCTURE REPAIR(3")	PLANE ASPH CONC PAV(0" TO 3")	PLANE ASPH CONC PAV (2")	PLANE ASPH CONC PAV (0" TO 1 1/2")	RIPRAP (CONC)(4 IN)	RIPRAP (MOW STRIP)(4 IN)
	GAL	GAL	CY	SY	SY	SY	SY	CY	CY
TYPICAL SECTION A									
TYPICAL SECTION B	6003	9124	218					177	115
TYPICAL SECTION C ***	10258	15592	373						
TYPICAL SECTION D	637	968	23						
TYPICAL SECTION E							205.6	13	32
TYPICAL SECTION F						36549	9137		
DRIVEWAYS & INTERSECTIONS					4384		3717		
PAVEMENT REPAIR				15814					
0455-03-038 TOTALS	**16898**	**25684**	**614**	**15814**	**4384**	**36549**	**13060**	**190**	**147**

SUMMARY OF ROADWAY ITEMS

LOCATION	479	496	528	529
	6001	6057	6001	6008
	ADJUSTING MANHOLES	REMOVE STR (PIPE SUPPORT STRUCTURE)	COLORED TEXTURED CONC (4")	* CONC CURB & GUTTER (TY II)
	EA	LF	SY	LF
TYPICAL SECTION A				
TYPICAL SECTION B				
TYPICAL SECTION C ***				
TYPICAL SECTION D				
TYPICAL SECTION E				
TYPICAL SECTION F	20	44	1713	257
DRIVEWAYS & INTERSECTIONS				
PAVEMENT REPAIR				
0455-03-038 TOTALS	**20**	**44**	**1713**	**257**

* ESTIMATED QUANTITIES FOR CURB & GUTTER TO BE REPLACED AS DIRECTED BY THE ENGINEER IN THE FIELD.
** LOCATIONS OF THE PAVEMENT REPAIR TO BE DETERMINED BY THE ENGINEER IN THE FIELD.
*** ESTIMATED QUANTITIES ARE FOR BOTH TYPICAL SECTION C AND C1.
**** ESTIMATED QUANTITIES FOR CONCRETE AND ASPHALT DRIVEWAYS TO BE REPLACED AS DIRECTED BY THE ENGINEER IN THE FIELD.

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

Texas Department of Transportation

SH-152

SUMMARY OF
OF QUANTITIES

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		11

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SUMMARY OF ROADWAY ITEMS

LOCATION	530 6002 INTERSECTIONS (ACP) SY	530 6004 **** DRIVEWAYS (CONC) SY	530 6008 TURNOUTS (ACP) SY	530 6021 **** DRIVEWAYS (ACP) (TYPE 2) SY	531 6001 CONC SIDEWALKS (4") SY	531 6024 CURB RAMPS (TY 7) SY	533 6001 RUMBLE STRIPS (SHOULDER) LF	533 6002 RUMBLE STRIPS (CENTERLINE) LF	536 6004 CONC DIRECTIONAL ISLAND SY
TYPICAL SECTION A							2100	1050	
TYPICAL SECTION B							22150	11075	
TYPICAL SECTION C ***							25050		
TYPICAL SECTION D			37				6500		
TYPICAL SECTION E							1449		
TYPICAL SECTION F					4895	627			
DRIVEWAYS & INTERSECTIONS	9169	200		3838					45
PAVEMENT REPAIR									
0455-03-038 TOTALS	**9169**	**200**	**37**	**3838**	**4895**	**627**	**57249**	**12125**	**45**

SUMMARY OF ROADWAY ITEMS

LOCATION	540 6002 MTL W-BEAM GD FEN (STEEL POST) LF	540 6016 DOWNSTREAM ANCHOR TERMINAL SECTION EA	542 6001 REMOVE METAL BEAM GUARD FENCE LF	544 6001 GUARDRAIL END TREATMENT (INSTALL) EA	544 6003 GUARDRAIL END TREATMENT (REMOVE) EA	560 6025 RELOCATE EXISTING MAILBOX EA	3057 6001 REINFORMT GRID FOR ASPHALT PVMT OVERLAY SY	3077 6058 SP MIXES SP-D SAC-A PG70-28 (165 LB/SY) TON	3077 6058 SP MIXES SP-D SAC-A PG70-28 (220 LB/SY) TON
TYPICAL SECTION A							3033		
TYPICAL SECTION B	2240	3				1	46261		2641
TYPICAL SECTION C ***						2	55608		4502
TYPICAL SECTION D							14083		675
TYPICAL SECTION E	616	1	510	1	2		4855		
TYPICAL SECTION F								3769	4020
DRIVEWAYS & INTERSECTIONS									
PAVEMENT REPAIR									
0455-03-038 TOTALS	**2856**	**4**	**510**	**1**	**2**	**3**	**123842**	**3769**	**11839**

SUMMARY OF ROADWAY ITEMS

LOCATION	3077 6058 SP MIXES SP-D SAC-A PG70-28 (330 LB/SY) TON	3077 6075 TACK COAT (0.13 GAL/SY) GAL	3085 6001 UNDERSEAL COURSE (0.25 GAL/SY) GAL
TYPICAL SECTION A	770	607	1167
TYPICAL SECTION B	10459	11362	9844
TYPICAL SECTION C ***	12264	14983	8350
TYPICAL SECTION D	2920	3098	2889
TYPICAL SECTION E	1032	813	1564
TYPICAL SECTION F		4751	11421
DRIVEWAYS & INTERSECTIONS			
PAVEMENT REPAIR			
0455-03-038 TOTALS	**27445**	**35614**	**35235**

* ESTIMATED QUANTITIES FOR CURB & GUTTER TO BE REPLACED AS DIRECTED BY THE ENGINEER IN THE FIELD.
** LOCATIONS OF THE PAVEMENT REPAIR TO BE DETERMINED BY THE ENGINEER IN THE FIELD.
*** ESTIMATED QUANTITIES ARE FOR BOTH TYPICAL SECTION C AND C1.
**** ESTIMATED QUANTITIES FOR CONCRETE AND ASPHALT DRIVEWAYS TO BE REPLACED AS DIRECTED BY THE ENGINEER IN THE FIELD.

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Texas Department of Transportation

SH-152

SUMMARY OF
OF QUANTITIES

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		12

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SUMMARY OF DRAINAGE ITEMS

SHEET NAME	SHEET NO.	403 6001 TEMPORARY SPL SHORING SF	432 6002 RIPRAP (CONC)(5 IN) CY	462 6048 CONC BOX CULV (4 FT X 3 FT)(EXTEND) LF	464 6003 RC PIPE (CL III)(18 IN) LF	464 6005 RC PIPE (CL III)(24 IN) LF	467 6143 SET (TY I)(S= 4 FT)(HW= 4 FT)(3:1) (C) EA	467 6148 SET (TY I)(S= 4 FT)(HW= 5 FT)(3:1) (C) EA	467 6363 SET (TY II) (18 IN) (RCP) (6: 1) (P) EA	467 6395 SET (TY II) (24 IN) (RCP) (6: 1) (P) EA	480 6001 CLEAN EXIST CULVERTS EA	496 6005 REMOV STR (WINGWALL) EA	496 6004 REMOV STR (SET) EA	496 6007 REMOV STR (PIPE) LF	496 6008 REMOV STR (BOX CULVERT) LF
ROAD WAY PLAN	1 OF 15				30				2		1		2	30	
ROAD WAY PLAN	2 OF 15					65				10			10	65	
ROAD WAY PLAN	3 OF 15					29				2	2		2	29	
ROAD WAY PLAN	4 OF 15					118				6			6	106	
ROAD WAY PLAN	5 OF 15					90				6			6	71	
ROAD WAY PLAN	6 OF 15					38			2				2	30	
ROAD WAY PLAN	8 OF 15										1				
ROAD WAY PLAN	10 OF 15					43				2			2	43	
ROAD WAY PLAN	11 OF 15					100				4			4	89	
CULVERT PLAN AND PROFILE	1 OF 1	300	0.8	25			1	1			1	2			4
CSJ 0455-02-038 TOTALS		**300**	**0.8**	**25**	**30**	**483**	**1**	**1**	**4**	**30**	**5**	**2**	**34**	**463**	**4**

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	164 6036 DRILL SEEDING (PERM) (RURAL) (CLAY) AC	164 6053 DRILL SEEDING (TEMP)(WARM OR COOL) AC	506 6040 BIODEG EROSN CONT LOGS (INSTL) (8") LF	506 6043 BIODEG EROSN CONT LOGS (REMOVE) LF	314 6009 EMULS ASPH (EROSN CONT)(MULTI) (0.1 GAL/SY) GAL
SH 152					
CSJ 0455-02-038 TOTALS	**13.27**	**13.27**	**1060**	**1060**	**6776**

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	662 6008 WK ZN PAV MRK NON-REMOV (W)6"(SLD) LF	662 6037 WK ZN PAV MRK NON-REMOV (Y)6"(SLD) LF	662 6067 WK ZN PAV MRK REMOV (W)6"(SLD) LF	677 6001 ELIM EXT PAV MRK & MRKS (4") LF
PACKAGE 4 STAGE I	0	27480	13783	27480
PACKAGE 4 STAGE II	41990	57284	0	99274
0455-03-038 TOTALS	**41990**	**84764**	**13783**	**126754**

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Texas Department of Transportation

SH 152

SUMMARY OF QUANTITIES

2024 *SHEET 3 OF 7*

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		13

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SUMMARY OF SIGNING ITEMS

LOCATION	LOCATION (STA TO STA)	636 6001	644 6001	644 6004	644 6007	644 6030	644 6068
		ALUMINUM SIGNS (TY A)	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	IN SM RD SN SUP&AM TYS80(1)SA(T)	RELOCATE SM RD SN SUP&AM TY 10BWG
		SF	EA	EA	EA	EA	EA
SHEET 1 OF 15	BEGIN TO STA 22+00	18				1	
SHEET 2 OF 15	STA 22+00 TO 46+00	18		2			1
SHEET 3 OF 15	STA 46+00 TO STA 70+00						
SHEET 4 OF 15	STA 70+00 TO STA 94+00						1
SHEET 5 OF 15	STA 94+00 TO STA 118+00						2
SHEET 6 OF 15	STA 118+00 TO STA 142+00	9		1			4
SHEET 7 OF 15	STA 142+00 TO STA 166+00						
SHEET 8 OF 15	STA 166+00 TO STA 190+00						2
SHEET 9 OF 15	STA 190+00 TO STA 214+00						3
SHEET 10 OF 15	STA 214+00 TO 238+00	16			1		5
SHEET 11 OF 15	STA 238+00 TO 262+00						2
SHEET 12 OF 15	STA 262+00 TO 286+00						
SHEET 13 OF 15	STA 286+00 TO STA 310	34	5	1			
SHEET 14 OF 15	STA 310+00 TO STA 334+00	21	4				
SHEET 15 OF 15	STA 334+00 TO END	13	1	1			
CSJ 0455-02-038 PROJECT TOTAL		**129**	**10**	**5**	**1**	**1**	**20**

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	LOCATION (STA TO STA)	658 6092	658 6094	658 6099	666 6017	666 6035	666 6047	666 6053	666 6077	666 6101	6024 6008	6024 6011	6024 6020	6024 6023	6362 6002	6362 6004
		INSTL DEL ASSM (D-DW)SZ 1(WFLX)GND	INSTL DEL ASSM (D-DW)SZ 1(WFLX)SRF	INSTL OM ASSM (OM-2Z)(WFLX)GND	REFL PAV MRK TY I (W)6"(DOT)(090MIL)	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)36"(YLD TRI)(090MIL)	HPPM W/RET REQ TY I(W)6"(BRK)(090MIL)	HPPM W/RET REQ TY I(W)6"(SLD)(090MIL)	HPPM W/RET REQ TY I(Y)6"(BRK)(090MIL)	HPPM W/RET REQ TY I(Y)6"(SLD)(090MIL)	REC REFL PAV MRKR TY I-C	REC REFL PAV MRKR TY II-A-A
		EA	EA	EA	LF	LF	LF	EA	EA	EA	LF	LF	LF	LF	EA	EA
SHEET 1 OF 15	BEGIN TO STA 22+00				65							4734	273	2300		30
SHEET 2 OF 15	STA 22+00 TO 46+00				196						416	4800		4800	22	62
SHEET 3 OF 15	STA 46+00 TO STA 70+00										610	4800		4800	31	62
SHEET 4 OF 15	STA 70+00 TO STA 94+00										610	4800		4800	31	62
SHEET 5 OF 15	STA 94+00 TO STA 118+00										610	4800		4800	31	62
SHEET 6 OF 15	STA 118+00 TO STA 142+00			2	135		19			4	92	5570	1018	5320		127
SHEET 7 OF 15	STA 142+00 TO STA 166+00											4800	1210	4800		121
SHEET 8 OF 15	STA 166+00 TO STA 190+00			4								4700	1200	4702		118
SHEET 9 OF 15	STA 190+00 TO STA 214+00											4800	1210	4800		121
SHEET 10 OF 15	STA 214+00 TO 238+00											4680	1200	4680		118
SHEET 11 OF 15	STA 238+00 TO 262+00											4800	1210	4800		121
SHEET 12 OF 15	STA 262+00 TO 286+00	2		5		316	43	2	2		70	4585	1010	4700	21	110
SHEET 13 OF 15	STA 286+00 TO STA 310					1067	415	6	6		1160	5028	800	4650	60	121
SHEET 14 OF 15	STA 310+00 TO STA 334+00										1050	4080	1000	4000	60	101
SHEET 15 OF 15	STA 334+00 TO END		4			550	26	4	4		160	610	68	748	40	6
CSJ 0455-02-038 PROJECT TOTAL		**2**	**4**	**11**	**396**	**1933**	**503**	**12**	**12**	**4**	**4778**	**67587**	**10199**	**64700**	**296**	**1342**

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TBPE REG. # F-11657

Texas Department of Transportation

SH 152

SUMMARY OF QUANTITIES

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		14

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SUMMARY OF EARTHWORK		
	110	132
	6001	6004
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)
SH 152	CY	CY
11+00.000	1.527	4.474
12+00.000	8.063	12.640
13+00.000	11.791	12.696
14+00.000	15.910	9.879
15+00.000	16.658	12.788
16+00.000	14.651	21.466
17+00.000	16.537	28.412
18+00.000	19.389	34.252
19+00.000	18.903	39.495
20+00.000	22.198	52.405
21+00.000	26.344	64.459
22+00.000	30.393	38.557
23+00.000	26.470	24.980
24+00.000	20.517	37.373
25+00.000	27.743	32.831
26+00.000	29.995	30.822
27+00.000	25.344	32.064
28+00.000	25.897	29.431
29+00.000	25.556	30.886
30+00.000	20.318	36.321
31+00.000	13.480	46.585
32+00.000	13.457	43.386
33+00.000	19.094	34.330
34+00.000	21.495	33.269
35+00.000	20.352	30.563
36+00.000	24.801	28.984
37+00.000	30.709	26.473
38+00.000	27.226	26.615
39+00.000	22.211	29.019
40+00.000	22.880	28.979
41+00.000	26.112	28.986
42+00.000	23.716	31.860
43+00.000	24.528	41.086
44+00.000	33.681	50.906

SUMMARY OF EARTHWORK		
	110	132
	6001	6004
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)
SH 152	CY	CY
45+00.000	29.063	46.872
46+00.000	17.085	47.982
47+00.000	12.897	81.730
48+00.000	9.149	131.020
49+00.000	9.606	123.133
50+00.000	14.400	66.891
51+00.000	22.452	31.935
52+00.000	22.889	25.636
53+00.000	18.551	32.005
54+00.000	16.624	31.328
55+00.000	15.788	29.463
56+00.000	13.459	37.619
57+00.000	20.536	30.642
58+00.000	26.427	18.761
59+00.000	24.418	17.428
60+00.000	24.045	15.523
61+00.000	22.092	15.334
62+00.000	19.702	27.511
63+00.000	15.559	44.162
64+00.000	17.643	38.926
65+00.000	17.973	33.570
66+00.000	14.034	39.262
67+00.000	13.856	69.616
68+00.000	14.373	99.500
69+00.000	20.448	76.053
70+00.000	26.326	52.190
71+00.000	31.957	46.181
72+00.000	35.118	30.155
73+00.000	40.988	17.304
74+00.000	51.906	16.912
75+00.000	39.236	19.735
76+00.000	26.747	26.305
77+00.000	45.707	20.096
78+00.000	61.325	11.310

SUMMARY OF EARTHWORK		
	110	132
	6001	6004
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)
SH 152	CY	CY
79+00.000	62.923	12.586
80+00.000	58.587	11.423
81+00.000	55.250	12.895
82+00.000	49.273	19.127
83+00.000	42.386	24.411
84+00.000	51.007	20.734
85+00.000	52.323	17.570
86+00.000	49.540	15.592
87+00.000	45.956	17.630
88+00.000	35.588	29.028
89+00.000	33.160	33.963
90+00.000	41.280	23.360
91+00.000	49.445	14.842
92+00.000	64.581	10.346
93+00.000	66.755	7.478
94+00.000	72.573	8.315
95+00.000	88.475	7.679
96+00.000	85.873	7.148
97+00.000	75.592	9.058
98+00.000	77.507	9.304
99+00.000	80.472	7.911
100+00.000	64.735	9.550
101+00.000	53.290	13.253
102+00.000	52.409	11.369
103+00.000	48.851	12.790
104+00.000	44.332	17.943
105+00.000	45.609	17.957
106+00.000	56.025	13.073
107+00.000	64.917	8.797
108+00.000	58.701	9.705
109+00.000	54.712	10.954
110+00.000	56.780	10.639
111+00.000	53.655	8.779

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DN: CK: DW: CK:

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

Texas Department of Transportation

SH 152

SUMMARY
OF QUANTITIES

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		15

SUMMARY OF EARTHWORK		
	110	132
	6001	6004
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)
SH 152	CY	CY
112+00.000	46.828	12.071
113+00.000	46.250	14.542
114+00.000	49.802	17.907
115+00.000	54.802	20.331
116+00.000	57.384	21.448
117+00.000	54.664	25.528
118+00.000	53.317	27.100
119+00.000	51.165	30.767
120+00.000	49.850	29.328
121+00.000	45.929	24.557
122+00.000	62.039	23.214
123+00.000	61.923	21.378
124+00.000	48.757	22.469
125+00.000	59.465	30.649
126+00.000	49.822	35.197
127+00.000	31.818	20.390
128+00.000	31.132	4.816
129+00.000	30.576	11.411
130+00.000	37.100	22.261
131+00.000	47.729	21.942
132+00.000	50.101	19.670
133+00.000	52.817	21.449
134+00.000	52.997	22.322
135+00.000	56.014	19.913
136+00.000	54.156	19.088
137+00.000	48.358	23.530
138+00.000	43.972	32.279
139+00.000	43.959	30.305
140+00.000	44.377	31.561
141+00.000	44.125	31.316
142+00.000	48.268	27.850
143+00.000	42.986	42.730
144+00.000	47.162	42.542
145+00.000	49.459	39.377

SUMMARY OF EARTHWORK		
	110	132
	6001	6004
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)
SH 152	CY	CY
146+00.000	39.666	50.655
147+00.000	37.714	55.422
148+00.000	31.676	66.761
149+00.000	30.582	69.177
150+00.000	35.159	62.447
151+00.000	35.768	64.200
152+00.000	38.112	62.387
153+00.000	42.078	69.300
154+00.000	44.929	80.567
155+00.000	57.968	74.645
156+00.000	87.812	63.384
157+00.000	107.811	62.800
158+00.000	138.000	57.695
159+00.000	164.433	38.376
160+00.000	164.125	22.270
161+00.000	154.043	19.451
162+00.000	144.744	17.849
163+00.000	113.373	16.062
164+00.000	67.959	18.882
165+00.000	52.273	22.975
166+00.000	43.302	28.638
167+00.000	41.510	30.608
168+00.000	48.525	26.211
169+00.000	54.064	23.704
170+00.000	65.412	22.747
171+00.000	74.382	20.907
172+00.000	76.012	21.223
173+00.000	81.919	22.462
174+00.000	79.918	27.050
175+00.000	73.027	32.430
176+00.000	77.960	36.391
177+00.000	87.004	37.241
178+00.000	92.942	31.789
179+00.000	97.944	36.237

SUMMARY OF EARTHWORK		
	110	132
	6001	6004
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)
SH 152	CY	CY
180+00.000	81.136	64.941
181+00.000	62.109	50.857
182+00.000	52.278	29.830
183+00.000	41.923	38.775
184+00.000	39.389	37.499
185+00.000	46.986	33.820
186+00.000	62.133	26.317
187+00.000	73.110	23.583
188+00.000	83.887	23.643
189+00.000	92.537	23.801
190+00.000	90.245	21.473
191+00.000	89.521	18.507
192+00.000	94.974	13.567
193+00.000	86.457	8.657
194+00.000	80.659	4.697
195+00.000	77.995	2.838
196+00.000	64.061	7.206
197+00.000	56.041	14.399
198+00.000	55.237	15.099
199+00.000	56.325	16.466
200+00.000	58.342	19.987
201+00.000	63.133	20.059
202+00.000	64.963	18.624
203+00.000	64.780	17.290
204+00.000	68.758	18.280
205+00.000	72.064	16.559
206+00.000	94.452	14.953
207+00.000	112.905	13.834
208+00.000	108.899	14.882
209+00.000	119.403	15.701
210+00.000	133.617	14.175
211+00.000	138.560	14.599
212+00.000	144.818	16.486
213+00.000	139.772	20.256

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

Texas Department of Transportation

SH 152

SUMMARY
OF QUANTITIES

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		16

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SUMMARY OF EARTHWORK		
	110	132
	6001	6004
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)
SH 152	CY	CY
214+00.000	131.307	20.930
215+00.000	143.286	19.859
216+00.000	135.196	23.339
217+00.000	107.842	28.055
218+00.000	101.062	26.163
219+00.000	98.457	23.917
220+00.000	96.912	25.373
221+00.000	99.058	23.525
222+00.000	88.485	23.950
223+00.000	74.289	31.157
224+00.000	74.766	31.566
225+00.000	87.002	24.919
226+00.000	96.126	23.740
227+00.000	102.311	24.823
228+00.000	107.542	26.087
229+00.000	108.430	28.707
230+00.000	117.669	29.197
231+00.000	123.655	30.049
232+00.000	120.393	32.054
233+00.000	122.609	24.166
234+00.000	93.665	35.267
235+00.000	60.736	63.141
236+00.000	52.684	65.609
237+00.000	47.849	49.976
238+00.000	47.631	43.823
239+00.000	44.984	50.774
240+00.000	43.461	49.588
241+00.000	37.150	49.617
242+00.000	32.471	47.662
243+00.000	31.784	31.833
244+00.000	40.809	11.408
245+00.000	50.851	1.421
246+00.000	49.555	2.159
247+00.000	48.094	2.559

SUMMARY OF EARTHWORK		
	110	132
	6001	6004
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)
SH 152	CY	CY
248+00.000	47.464	2.847
249+00.000	47.814	3.299
250+00.000	47.619	3.137
251+00.000	44.258	3.432
252+00.000	40.361	4.501
253+00.000	40.249	5.490
254+00.000	42.429	6.012
255+00.000	37.563	9.489
256+00.000	31.991	13.247
257+00.000	32.274	9.931
258+00.000	35.299	9.526
259+00.000	36.395	10.307
260+00.000	20.477	9.083
261+00.000	3.447	15.529
262+00.000	1.111	18.376
263+00.000	2.164	13.649
264+00.000	4.117	9.986
265+00.000	5.255	6.926
266+00.000	4.406	5.094
267+00.000	2.251	5.693
268+00.000	0.785	7.684
269+00.000	0.345	11.366
270+00.000	0.285	17.570
271+00.000	0.265	21.110
272+00.000	0.253	23.736
273+00.000	0.228	26.699
274+00.000	0.236	25.261
275+00.000	0.323	22.677
276+00.000	1.063	14.775
277+00.000	3.282	18.762
278+00.000	4.233	18.321
279+00.000	6.861	4.338
280+00.000	5.305	2.387
281+00.000	9.881	3.257
281+60.000	76.027	2.029
287+40 - 338+80	952.000	0
PROJECT TOTAL	**14842**	**7342**

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DN: CK: DW: CK:

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

Texas Department of Transportation

SH 152

SUMMARY
OF QUANTITIES

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		17

1. GENERAL GUIDELINES

1. MAINTAIN PROPERTY OWNER ACCESS ACROSS WORK ZONE AT ALL TIMES. TRAFFIC BARRELS WILL BE USED TO DELINEATE INTERSECTIONS AND DRIVEWAYS. UNLESS OTHERWISE NOTED.

2. PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) SHALL BE PLACED PER MUTCD GUIDELINES AND MUST BE PLACED 72 HOURS IN ADVANCE OF THE BEGINNIN OF THE CONSTRUCTION.

3. ALL BARRICADES, SIGNS, AND FLAGGERS SHALL BE SUBSIDARY TO ITEM 502 BARRICADES, SIGNS AND TRAFFIC HANDLING. ALL EROSION AND SEDIMENT CONTROL DEVICES WILL BE PAID FOR UNDER ITEM 506 TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROL. ALL OTHER WORK AND MATERIALS SHALL BE SUBSIDARY TO THE VARIOUS BID ITEMS UNLESS OTHERWISE INDICATED IN THE PLANS.

4. THE CONTRACTOR SHALL PROVIDE POSITIVE DRAINAGE THROUGHOUT THE CONSTRUCTION OF THE PROJECT. THE CONTRACTOR SHALL CORRECT DRAINAGE DEFICIENCIES THAT PRESENT A HAZARD TO THE TRAVELING PUBLIC AND/OR ADJACENT PROPERTY. CONTRACTOR WILL PLACE TEMPORARY CAPS WHERE NEEDED TO FACILITATE TEMPORARY DRAINAGE PATTERNS.

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

6. THE CONTRACTOR WILL BE REQUIRED TO PROVIDE PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) PER TMUTCD GUIDANCE AS SHOWN ON THE PLANS AND AS DIRECTED BY THE ENGINEER.

7. THE CONTRACTOR SHALL INSTALL AND MAINTAIN BARRICADES WARNING AND DIRECTIONS SIGNS AS INDICATED ON THE PLANS AND AS DIRECTED BY THE ENGINEER.

8. ALL SEQUENCE OF WORK ON THIS PROJECT SHALL BE COORDINATED TO COINCIDE WITH ANY PROJECTS WITHIN OR ADJACENT TO THIS PROJECT.

9. COVER ANY PERMANENT OR EXISTING SIGNS IF NOT USED AND IN CONFLICT WITH TEMPORARY TRAFFIC CONTROL OPERATIONS. THIS IS SUBSIDARY TO ITEM 502.

10. NOTIFY THE ENGINEER 5 BUSINESS DAYS IN ADVANCE OF ANY TEMPORARY OR PERMANENT LANE CLOSURES / DETOURS, RESTRICTIONS TO LANE WIDTHS. ANY OTHER MODIFICATIONS TO THE ROADWAY THAT MAY ADVERSELY AFFECT THE MOBILITY OF OVERSIZED / OVERWEIGHT TRUCKS ALSO REQUIRE 5 BUISINESS DAYS ADVANCE NOTICE TO THE ENGINEER.

11. THE EXISTING RUMBLE STRIPS, LOCATED AT THE CENTERLINE OF THE ROAD, MUST BE REMOVED PRIOR TO SHIFTING THE CENTERLINE.

12. ALL EDGE OF PAVEMENT DROP OFFS NOT PROTECTED BY A POSITIVE BARRIER, WHERETHER SHOWN IN THE TCP PLAN OR NOT, SHALL BE TREATED WITH A 3:1 (OR FLATTER) SAFETY SLOPE, EVERYDAY.

13. THE USE OF RUBBER-TIRED EQUIPMENT WILL BE REQUIRED FOR MOVING DIRT OR OTHER MATERIALS ALONG OR ACROSS PAVEMENTED 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 / APPROVED BY THE ENGINEER. 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.

14. TO ENSURE EFFICIENT CONSTRUCTION IN CARSON COUNTY AND GRAY COUNTY, IT IS CRUCIAL TO NOTE THAT DIFFERENT CONTRACTORS MAY HANDLE EACH PROJECT SEPARATELY AND ON DIFFERENT SCHEDULES. THEREFORE, PROVIDING CLEAR GUIDANCE IS STRONGLY RECOMMENDED TO COORDINATE THE CONTRACTORS' ACTIVITIES, EFFECTIVELY.

15. THIS IS A SUGGESTED TRAFFIC CONTROL PLAN (TCP). THE CONTRACTOR MAY USE A DIFFERENT CONSTRUCTION PHASING AND TRAFFIC CONTROL PLAN. ANY VARIATION FROM THE PLANS SHALL BE FORMALLY SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL. ANY CHANGES PROPOSED BY THE CONTRACTOR WILL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER.

2. SEQUENCE OF WORK

PHASE I STAGE I

1. THE WORK IN THIS PHASE IS TO CONSTRUCT THE PROPOSED SH 152 EB WIDENING ALONG WITH CURB, GUTTER, AND ADA SIDEWALK. IMPROVEMENTS FROM FM 282 TO SH 70 IN PAMPA. ADA SIDEWALK IMPROVEMENTS CAN BE CARRIED OUT SIMULTANEOUSLY WITH PHASE II CONSTRUCTION.

2. TO COMPLETE THIS WORK, A RIGHT SHOULDER CLOSURE WILL BE UTILIZED ALONG SH 152 EB ACCORDING TO TCP (2-1)-18.

3. PLACE ADVANCE WARNING SIGNS PER LATEST BC (2) STANDARDS PRIOR TO COMMENCING WORK.

4. INSTALL EROSION CONTROL DEVICES AS SHOWN ON SW3P LAYOUTS. THIS WORK MUCT BE DONE BEFORE ANY CLEARING OR CONSTRUCTION CAN TAKE PLACE AND MUST BE APPROVED BEFORE ANY FURTHER WORK CAN BEGIN AS DIRECTED BY THE ENGINEER.

5. REMOVE OR COVER EXISTING SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TEMPORARY TRAFFIC CONTROL OPERATIONS AS DIRECTED BY THE ENGINEER.

6. INSTALL CHANNELIZING DEVICES AS INDICATED IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

7. EXTEND CULVERTS AND CONSTRUCT END TREATMENTS IN ACCORDANCE WITH BC(10)-21 ON SOUTH SIDE OF ROADWAY.

8. PERFORM WIDENING AS SHOWN ON PLANS.

9. PERFORM CLEANUP AND REMOVE ALL CHANNELIZING DEVICES, TEMPORARY SIGNS, AND DETOUR SIGNS.

PHASE I STAGE II

1. THE WORK IN THIS PHASE IS TO CONSTRUCT THE PROPOSED SH 152 WB WIDENING.

2. TO COMPLETE THIS WORK, A RIGHT SHOULDER CLOSURE WILL BE UTILIZED ALONG SH 152 WB ACCORDING TO TCP (2-1)-18.

3. PLACE ADVANCE WARNING SIGNS PER LATEST BC (2) STANDARDS PRIOR TO COMMENCING WORK.

4. INSTALL EROSION CONTROL DEVICES AS SHOWN ON SW3P LAYOUTS. THIS WORK MUCT BE DONE BEFORE ANY CLEARING OR CONSTRUCTION CAN TAKE PLACE AND MUST BE APPROVED BEFORE ANY FURTHER WORK CAN BEGIN.

5. REMOVE OR COVER EXISTING SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TEMPORARY TRAFFIC CONTROL OPERATIONS AS DIRECTED BY THE ENGINEER.

6. INSTALL CHANNELIZING DEVICES AS INDICATED IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

7. EXTEND CULVERTS AND CONSTRUCT END TREATMENTS IN ACCORDANCE WITH BC(10)-21 ON NORTH SIDE OF ROADWAY.

8. PERFORM WIDENING AS SHOWN ON PLANS.

9. PERFORM CLEANUP AND REMOVE ALL CHANNELIZING DEVICES, TEMPORARY SIGNS, AND DETOUR SIGNS.

PHASE II

1. THE WORK IN THIS PHASE IS TO PERFORM THE PROPOSED FULL WIDTH OVERLAY OF SH 152.

2. PLACE 3" OR 1.5" SUPERPAVE MIXTURES (FULL WIDTH) AS SHOWN ON THE PROPOSED TYPICAL SECTIONS, IN ACCORDANCE WITH TCP (7-1)-13.

3. PLACE ADVANCE WARNING SIGNS PER LATEST BC (2) STANDARDS PRIOR TO COMMENCING WORK.

4. PLACE TRAFFIC CONTROL DEVICES ACCORDING TO APPLICABLE STANDARDS.

5. INSTALL PERMANENT SIGNING AND PAVEMENT MARKINGS ACCORDING TO LATEST EDITION OF TEXAS MUTCD, SIGNING AND PAVEMENT MARKING STANDARDS, SIGNING PAVEMENT MARKING LAYOUTS, OR AS DIRECTED BY THE ENGINEER. UTILIZE TCP (2-3)-18, TCP (2-4)-18 AND TCP (3-3)-14

6. INSTALL EROSION CONTROL DEVICES AS SHOWN ON SW3P LAYOUTS. THIS WORK MUST BE DONE BEFORE ANY CLEARING OR CONSTRUCTION CAN TAKE PLACE AND MUST BE APPROVED BEFORE ANY FURTHER WORK CAN BEGIN.

7. REMOVE OR COVER EXISTING SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TEMPORARY TRAFFIC CONTROL OPERATIONS AS DIRECTED BY THE ENGINEER.

8. INSTALL CHANNELIZING DEVICES AS INDICATED IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

9. PERFORM CLEANUP AND REMOVE ALL CHANNELIZING DEVICES, TEMPORARY SIGNS, DETOUR SIGNS.

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

2/21/2024

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

Texas Department of Transportation

SH 152

TCP NARRATIVE

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		18

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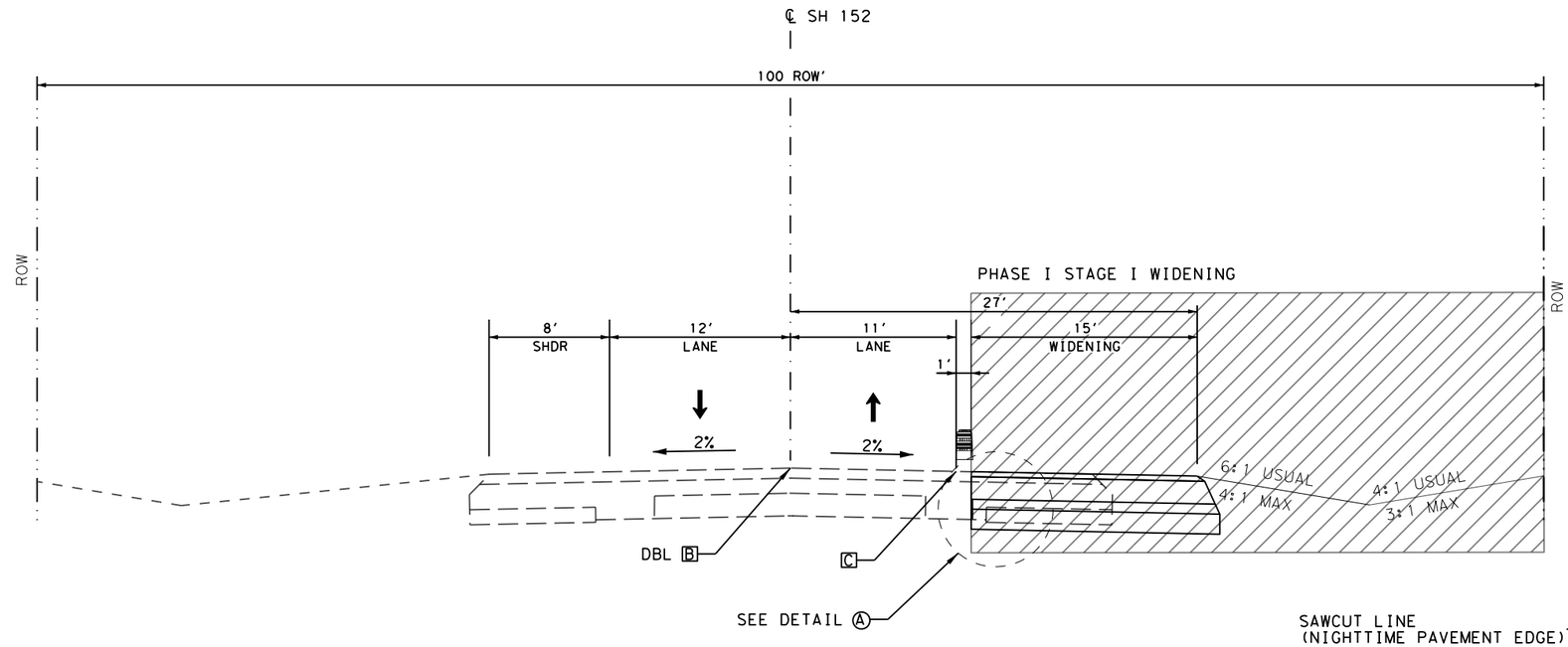
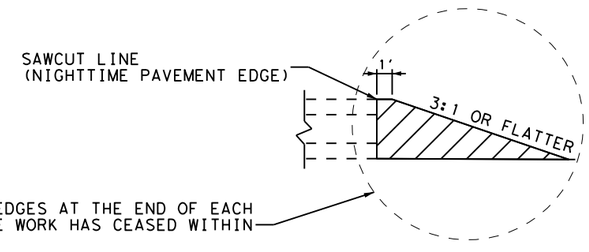
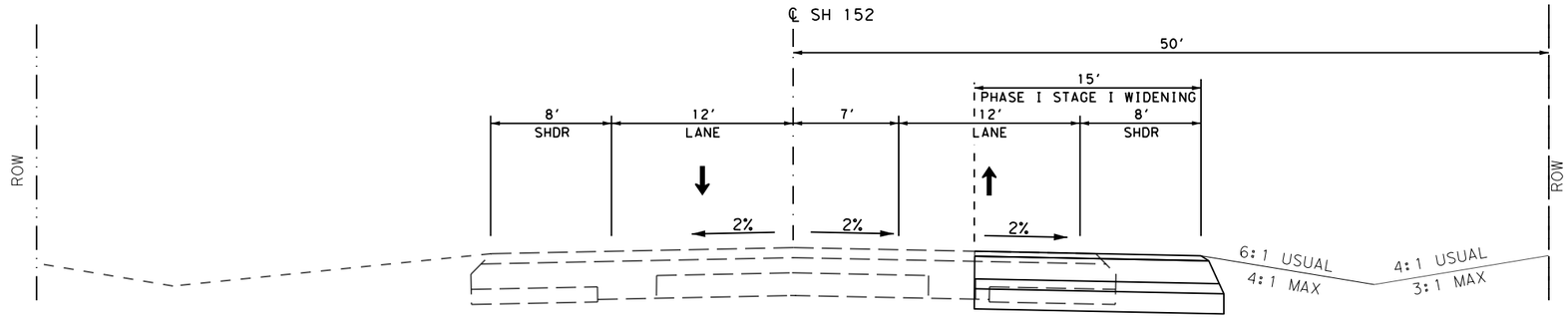




DETAIL (A)
NIGHTTIME EDGE CONDITION



PHASE I STAGE I - SH 152 EASTBOUND

TWLT LANE WIDENING
STA: 121+25.00 - 126+50.00 (VARIABLE, AVR:12.5')
126+50.00 - 246+50.00

HORZ 0' 5' 10'
VERT 0' 2.5' 5'
SCALE IN FEET

LEGEND:

- DIRECTION OF TRAFFIC
- CONSTRUCTION AREA
- CONSTRUCTION BARREL
- [A] WK ZN PAV MRK NON REMOV (W) 6" (SLD)
- [B] WK ZN PAV MRK NON REMOV (Y) 6" (SLD)
- [C] WK ZN PAV MRK REMOV (W) 6" (SLD)
- [D] WK ZN PAV MRK REMOV (Y) 6" (SLD)

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85191
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2/21/2024

I.S. ENGINEERS, LLC
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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

Texas Department of Transportation

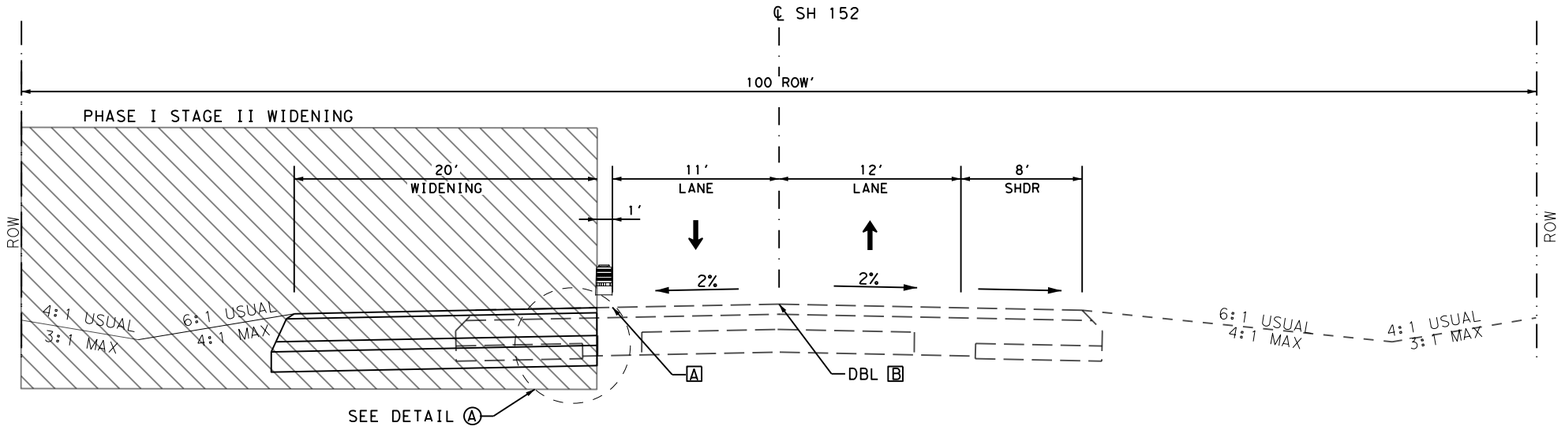
SH-152

TRAFFIC CONTROL PLAN
TYPICAL SECTION
PHASE I STAGE I

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		19

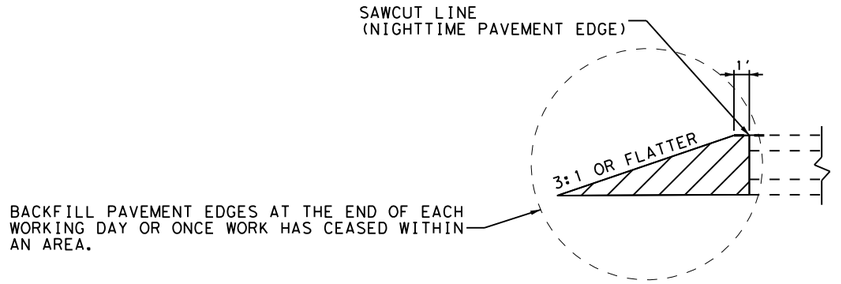
DATE: 2/20/2024 10:53:55 AM
FILE: c:\pw_working\txdot\p0097920d0245746\SH152_TYPICAL SECTIONS.dgn

HORZ 0′ 5′ 10′
VERT 0′ 2.5′ 5′
SCALE IN FEET

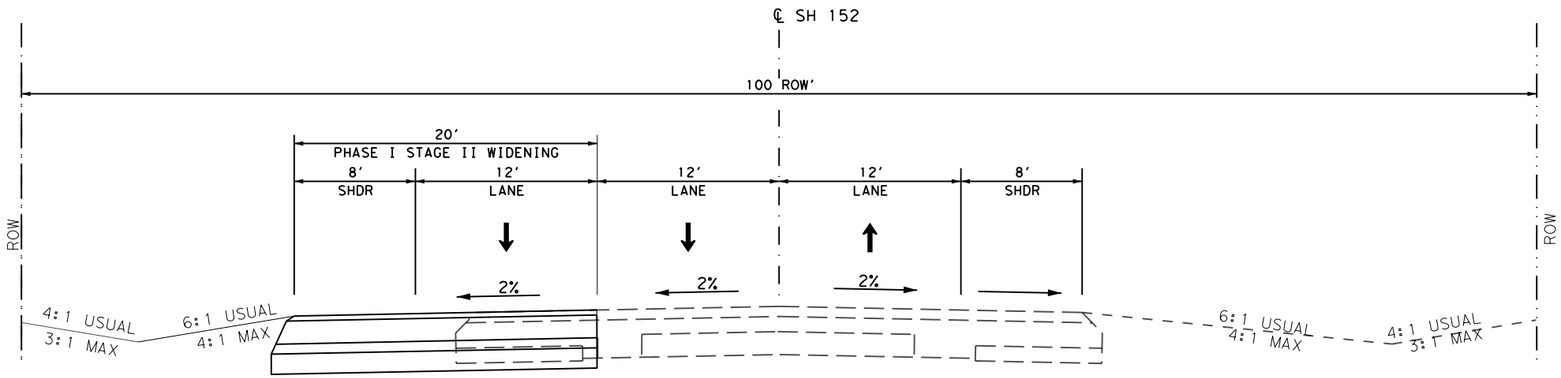


LEGEND:

- DIRECTION OF TRAFFIC
- CONSTRUCTION AREA
- CONSTRUCTION BARREL
- A WK ZN PAV MRK NON REMOV (W) 6" (SLD)
- B WK ZN PAV MRK NON REMOV (Y) 6" (SLD)
- C WK ZN PAV MRK REMOV (W) 6" (SLD)
- D WK ZN PAV MRK REMOV (Y) 6" (SLD)



DETAIL (A)
NIGHTTIME EDGE CONDITION



PHASE I STAGE II - SH 152 WESTBOUND
STA: 10+50.00 - 121+25.00

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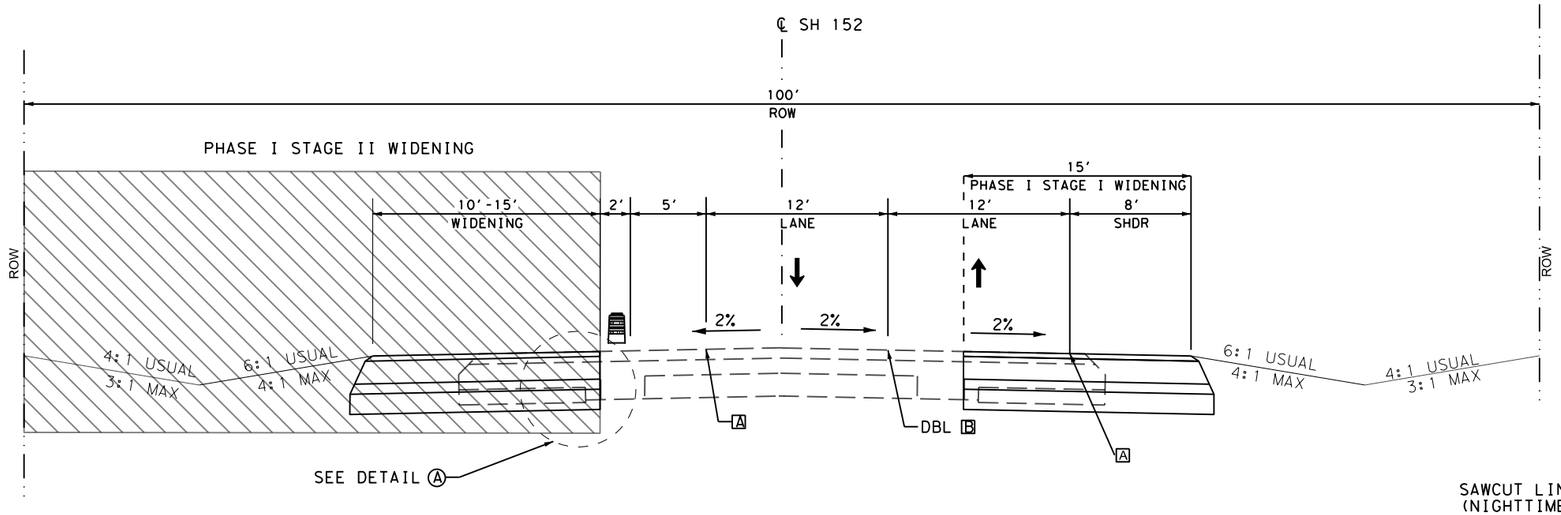
SH-152

TRAFFIC CONTROL PLAN
TYPICAL SECTION
PHASE I STAGE II

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		20

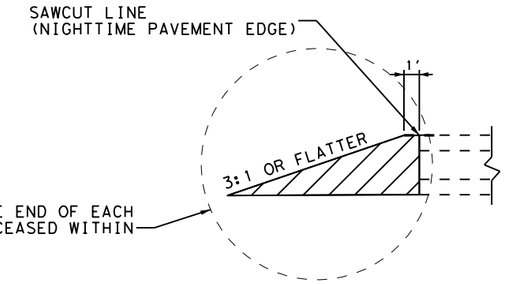
DATE: 2/20/2024 10:53:55 AM
FILE: c:\pw_working\txdot\p009792\0\d0245746\SH152_TYPICAL SECTIONS.dgn

HORZ 0′ 5′ 10′
VERT 0′ 2.5′ 5′
SCALE IN FEET

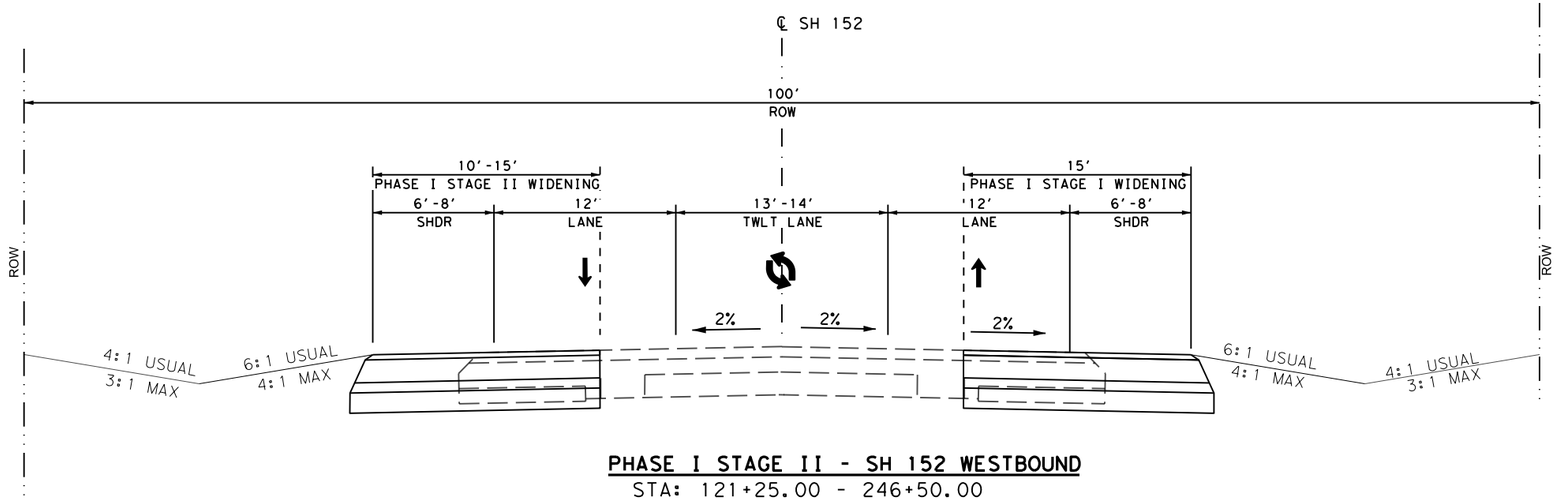


LEGEND:

- DIRECTION OF TRAFFIC
- CONSTRUCTION AREA
- CONSTRUCTION BARREL
- [A] WK ZN PAV MRK NON REMOV (W) 6" (SLD)
- [B] WK ZN PAV MRK NON REMOV (Y) 6" (SLD)
- [C] WK ZN PAV MRK REMOV (W) 6" (SLD)
- [D] WK ZN PAV MRK REMOV (Y) 6" (SLD)



DETAIL Ⓐ
NIGHTTIME EDGE CONDITION



PHASE I STAGE II - SH 152 WESTBOUND

STA: 121+25.00 - 246+50.00

STA 234+00.00 TO STA 235+20.00 LT & RT SHLDR TRANSITION (8′-6′), TWLT TRANSITION (14′ TO 13′)
STA 235+20.00 TO STA 246+50.00 13′ TWLT, LT & RT 6′ SHLDR

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Texas Department of Transportation

SH-152

TRAFFIC CONTROL PLAN
TYPICAL SECTION
PHASE I STAGE II

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		21

DATE: 2/20/2024 10:53:56 AM
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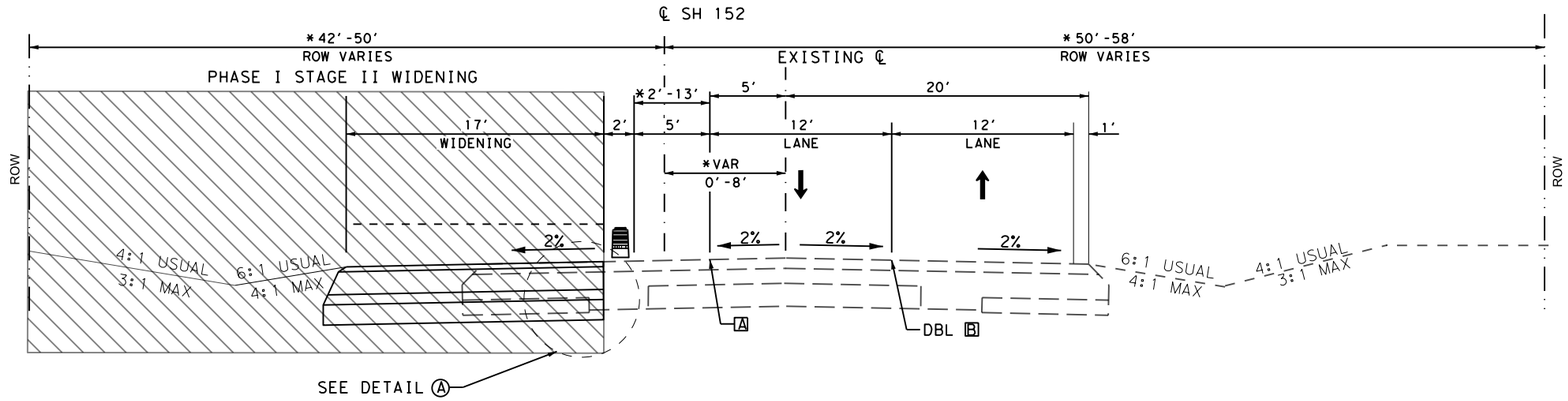
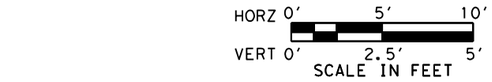
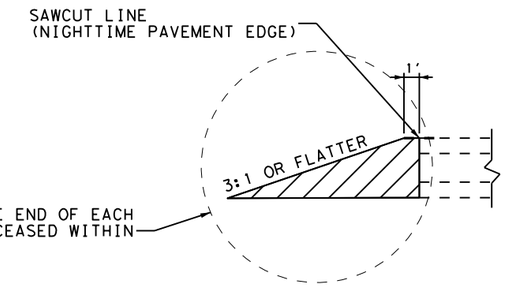




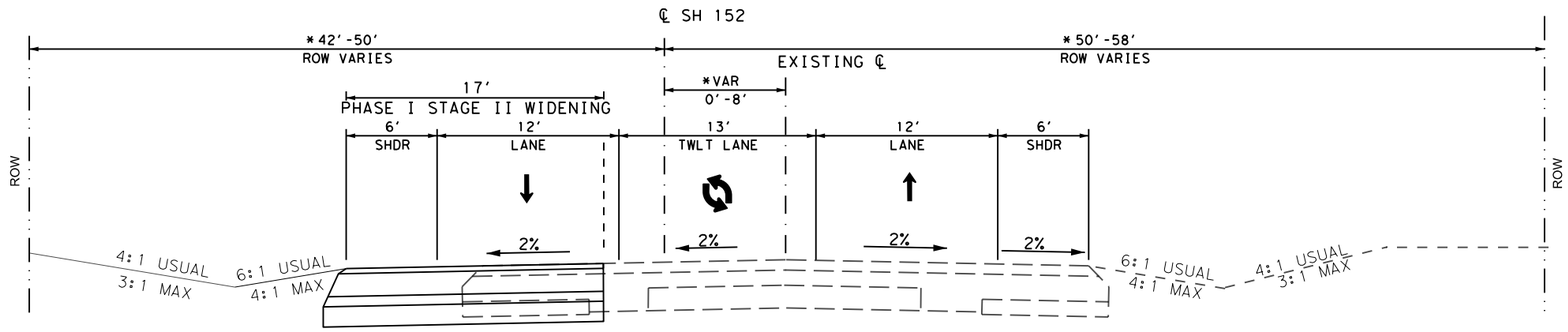
LEGEND:

- DIRECTION OF TRAFFIC
- CONSTRUCTION AREA
- CONSTRUCTION BARREL
- [A] WK ZN PAV MRK NON REMOV (W) 6" (SLD)
- [B] WK ZN PAV MRK NON REMOV (Y) 6" (SLD)
- [C] WK ZN PAV MRK REMOV (W) 6" (SLD)
- [D] WK ZN PAV MRK REMOV (Y) 6" (SLD)

*STA 260+00.00 TO STA 279+00.00 SHOULDER WIDTH VARIES BETWEEN 2'-13'



DETAIL (A)
NIGHTTIME EDGE CONDITION



PHASE I STAGE II - SH 152 WESTBOUND

STA: 246+50.00 - 279+00.00

*STA 260+00.00 TO STA 264+80.07 CENTERLINE TRANSITION
*STA 274+20.13 TO STA 279+00.21 CENTERLINE TRANSITION

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SH-152

TRAFFIC CONTROL PLAN
TYPICAL SECTION
PHASE I STAGE II

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		22

DATE: 2/20/2024 10:53:56 AM
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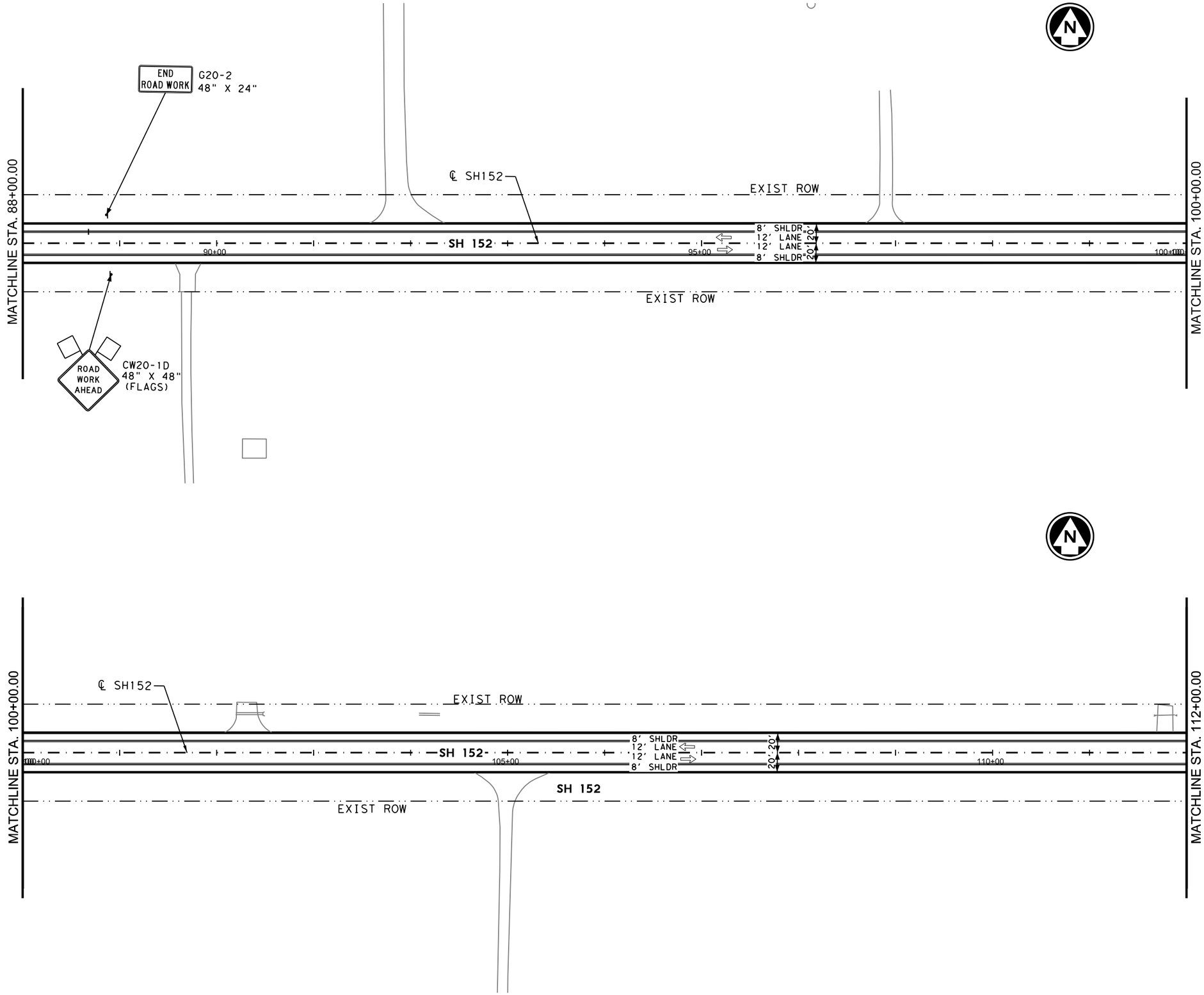

0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
2. ALL DRIVEWAYS AND CROSS STREETS SHALL REMAIN OPEN DURING CONSTRUCTION ACTIVITIES AND AS APPROVED BY THE ENGINEER.
3. CONTRACTOR SHALL COVER OR REMOVE THE EXISTING CONFLICTING SIGNS AS DIRECTED BY ENGINEER.

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LICENSED
PROFESSIONAL ENGINEER
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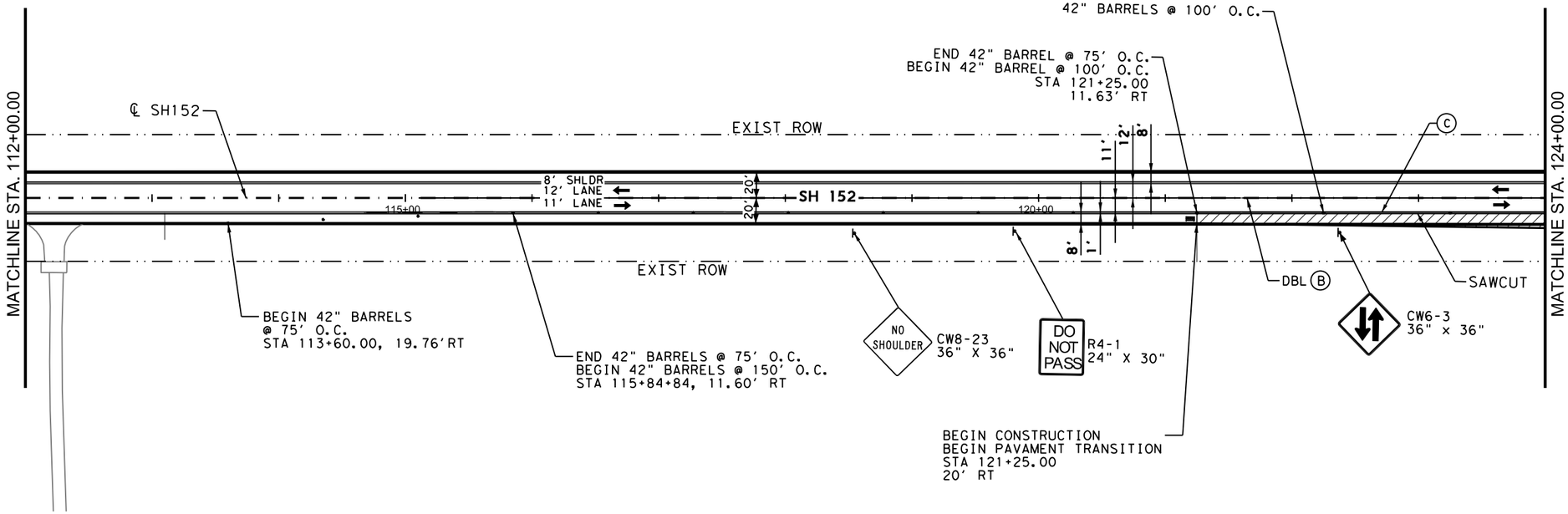
Texas Department of Transportation

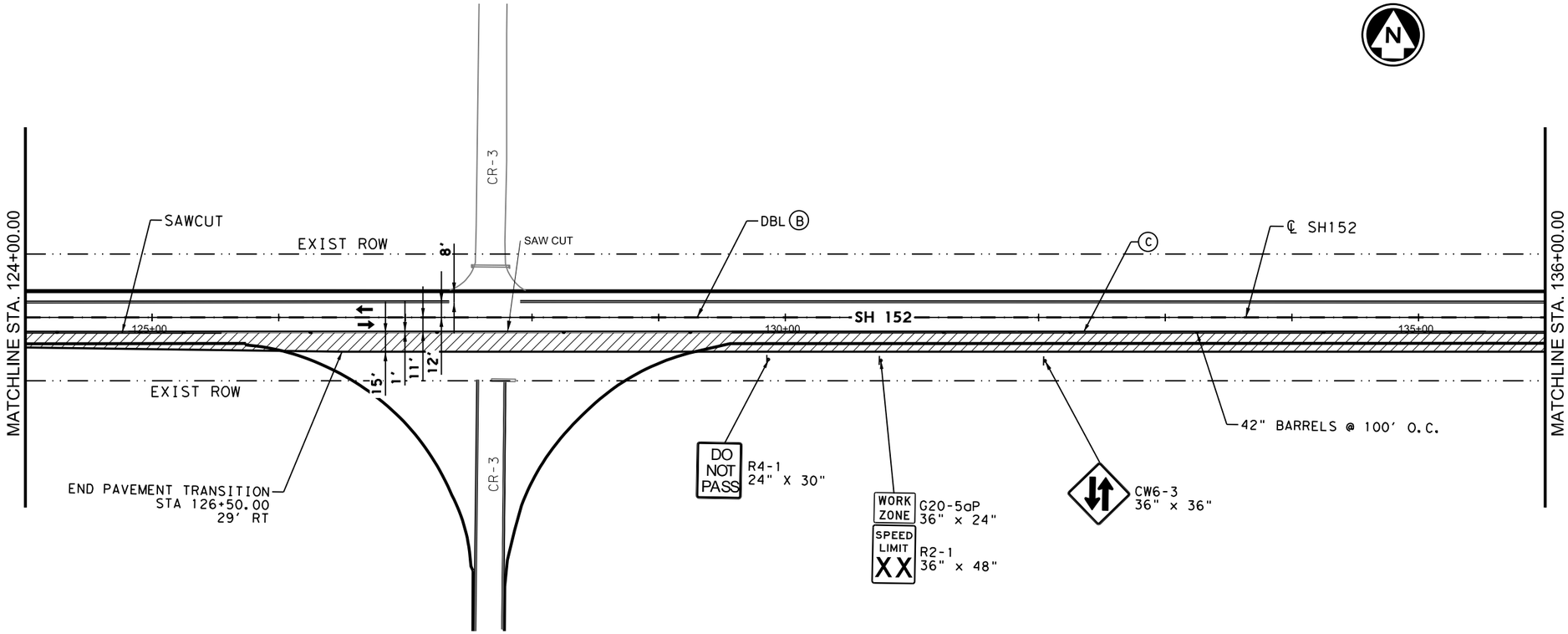
SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE I
STA: 88+00 TO STA: 112+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		23

DATE: 2/20/2024 10:54:12 AM
FILE: c:\pw_working\txdot\p0097920\d0245743\new PKG 3 SH_152_WIDENING_PHASE1_STAGE 1.dgn





0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
2. ALL DRIVEWAYS AND CROSS STREETS SHALL REMAIN OPEN DURING CONSTRUCTION ACTIVITIES AND AS APPROVED BY THE ENGINEER.
3. CONTRACTOR SHALL COVER OR REMOVE THE EXISTING CONFLICTING SIGNS AS DIRECTED BY ENGINEER.

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PROFESSIONAL ENGINEER
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TBPE REG. # F-11657

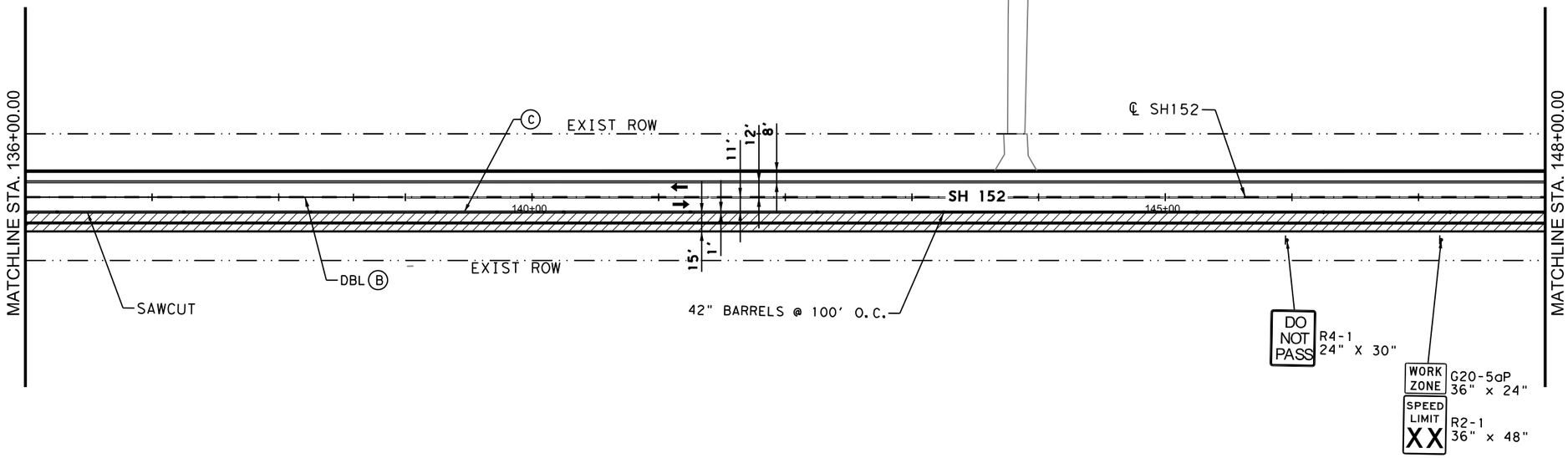
Texas Department of Transportation

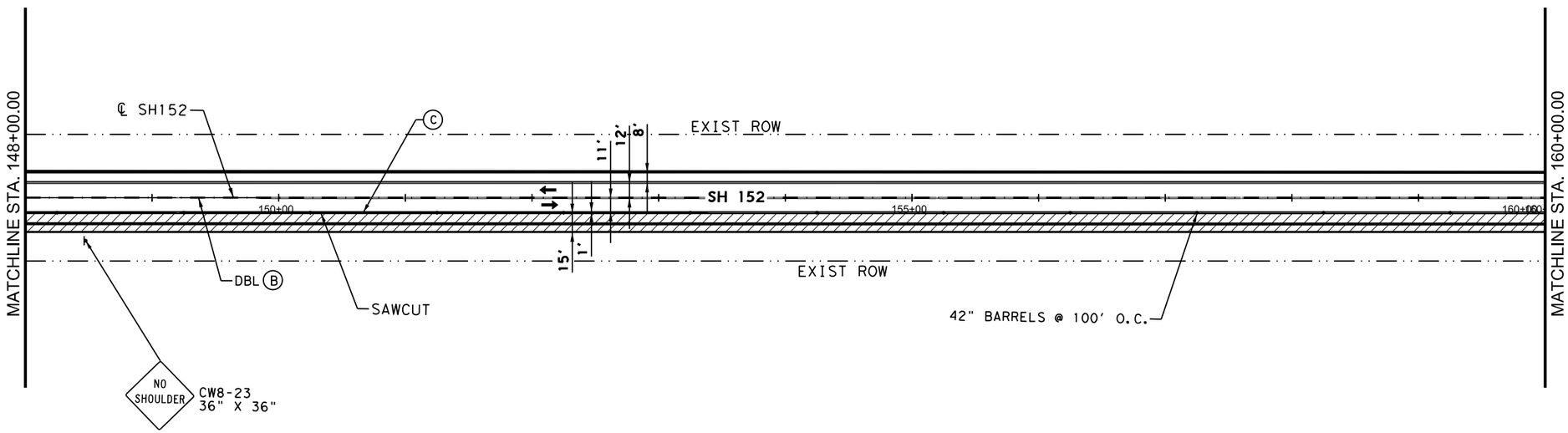
SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE I
STA: 112+00 TO STA: 136+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		24

DATE: 2/20/2024 10:54:12 AM
FILE: c:\pw_working\txdot\p0097920\d0245743\new PKG 3 SH_152_WIDENING_PHASE1_STAGE 1.dgn





0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
2. ALL DRIVEWAYS AND CROSS STREETS SHALL REMAIN OPEN DURING CONSTRUCTION ACTIVITIES AND AS APPROVED BY THE ENGINEER.
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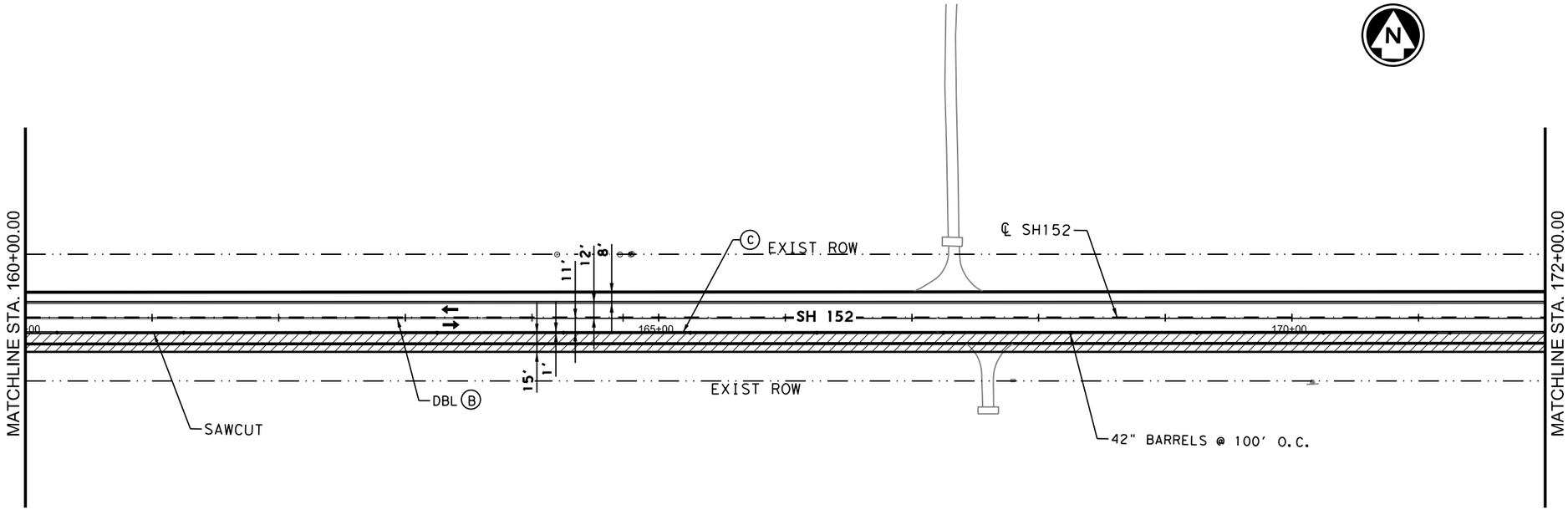
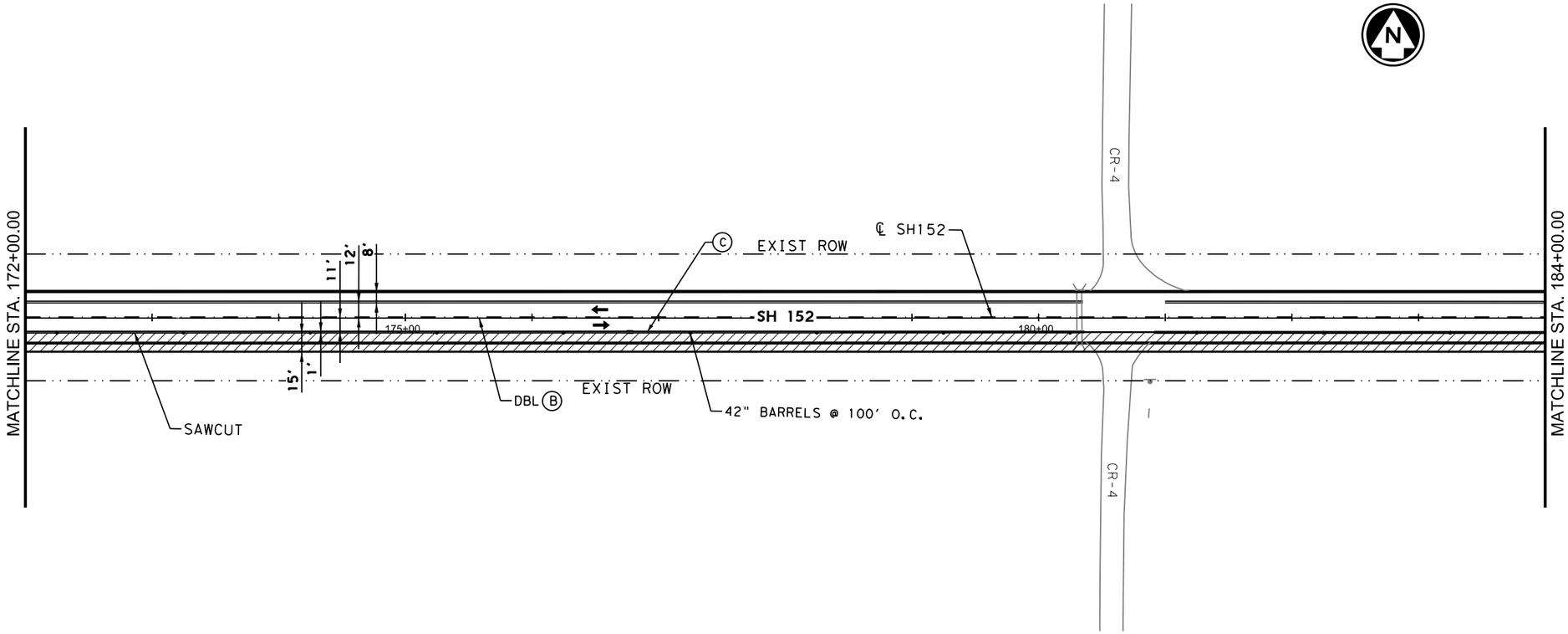
SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE I
STA: 130+00 TO STA: 160+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		25

DATE: 2/20/2024 10:54:13 AM
FILE: c:\pw_working\txdot\p0097920\d0245743\new PKG 3 SH_152_WIDENING_PHASE1_STAGE 1.dgn





0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
2. ALL DRIVEWAYS AND CROSS STREETS SHALL REMAIN OPEN DURING CONSTRUCTION ACTIVITIES AND AS APPROVED BY THE ENGINEER.
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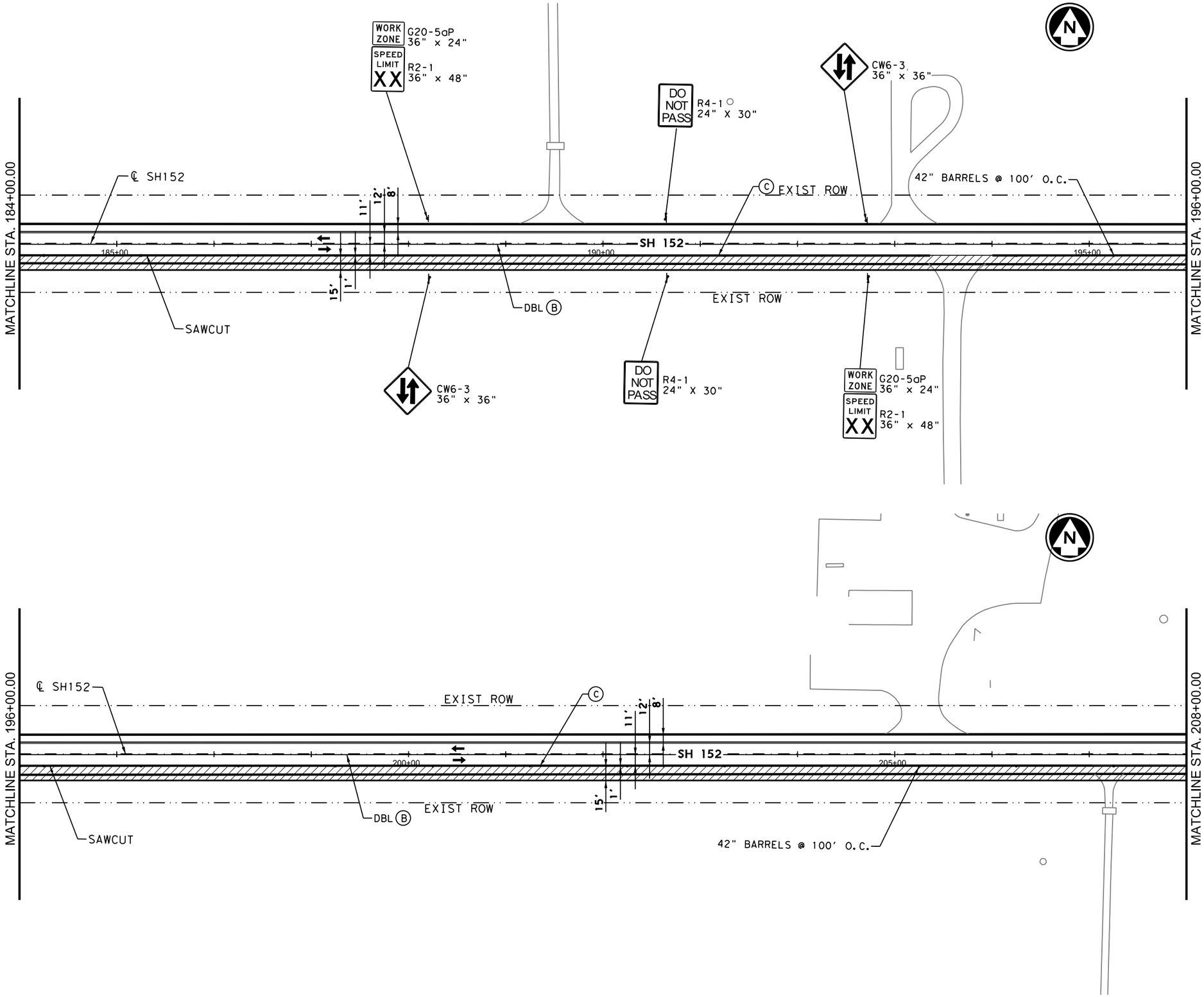
SH 152

TRAFFIC CONTROL PLAN PHASE I STAGE I

STA: 160+00 TO STA: 184+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		26

DATE: 2/20/2024 10:54:14 AM
FILE: c:\pw_working\txdot\p0097920\d0245743\new PKG 3 SH_152_WIDENING_PHASE1_STAGE 1.dgn



0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
2. ALL DRIVEWAYS AND CROSS STREETS SHALL REMAIN OPEN DURING CONSTRUCTION ACTIVITIES AND AS APPROVED BY THE ENGINEER.
3. CONTRACTOR SHALL COVER OR REMOVE THE EXISTING CONFLICTING SIGNS AS DIRECTED BY ENGINEER.

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Texas Department of Transportation

SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE I
STA: 184+00 TO STA: 208+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		27

DATE: 2/20/2024 10:54:15 AM
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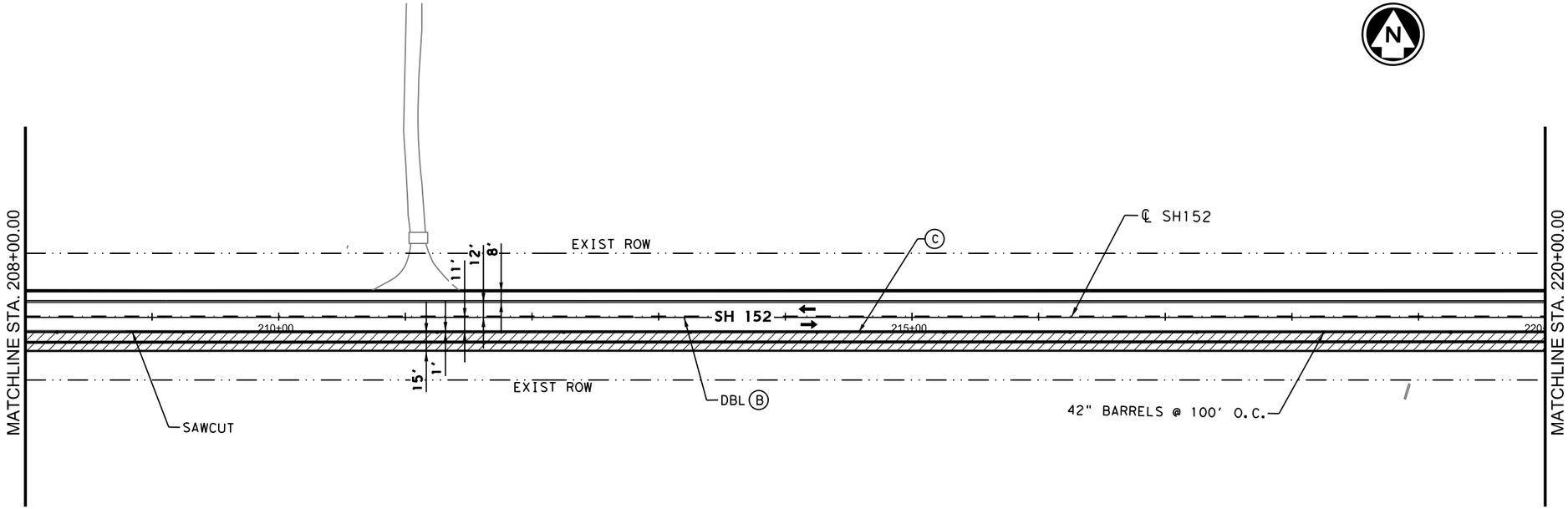

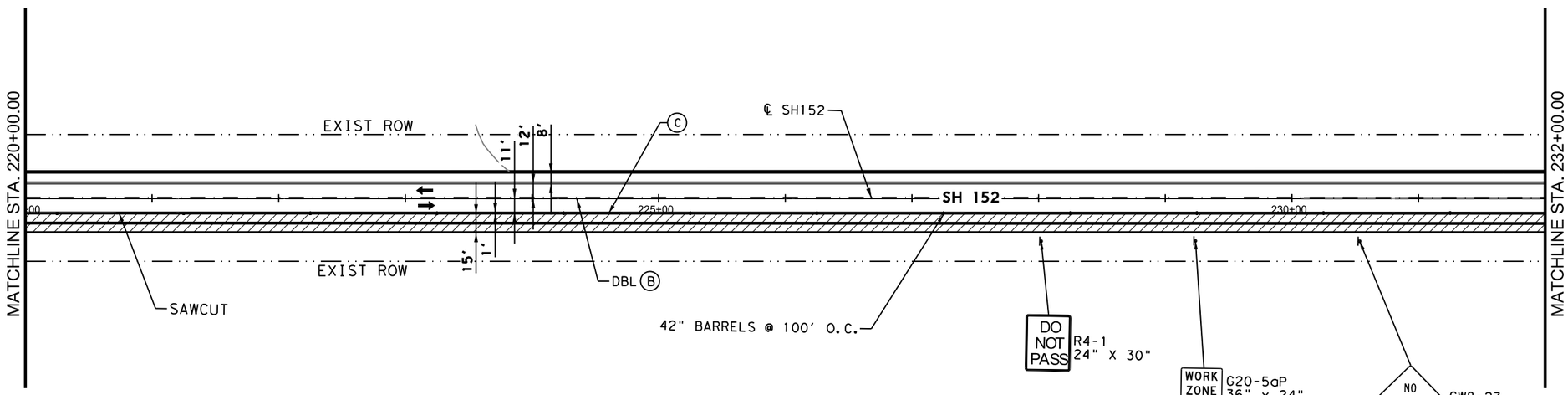

0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
2. ALL DRIVEWAYS AND CROSS STREETS SHALL REMAIN OPEN DURING CONSTRUCTION ACTIVITIES AND AS APPROVED BY THE ENGINEER.
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Texas Department of Transportation

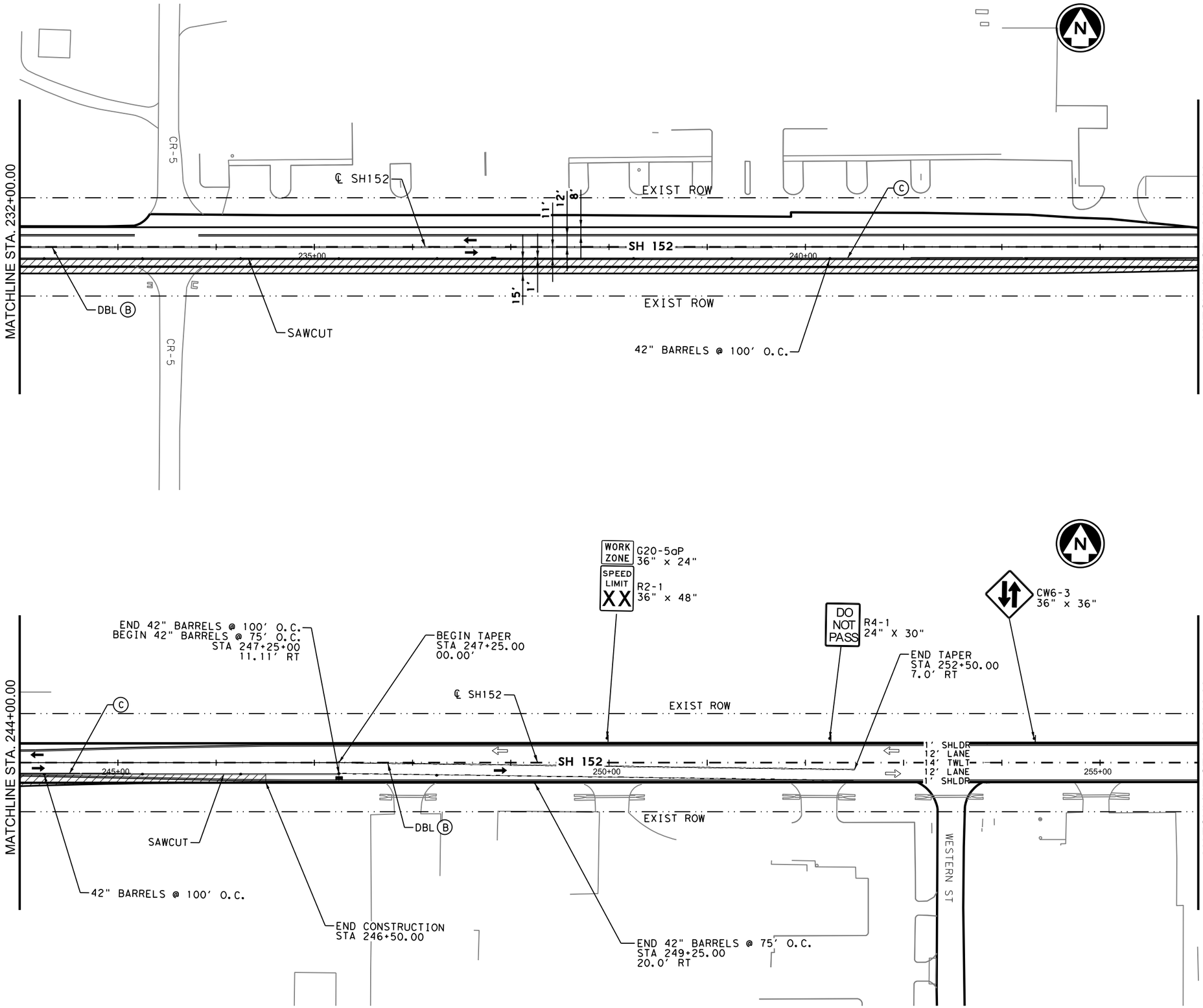
SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE I

STA: 208+00 TO STA: 232+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		28

DATE: 2/20/2024 10:54:16 AM
FILE: c:\pw_working\txdot\p0097920\d0245743\new PKG 3 SH_152_WIDENING_PHASE1_STAGE 1.dgn



0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
2. ALL DRIVEWAYS AND CROSS STREETS SHALL REMAIN OPEN DURING CONSTRUCTION ACTIVITIES AND AS APPROVED BY THE ENGINEER.
3. CONTRACTOR SHALL COVER OR REMOVE THE EXISTING CONFLICTING SIGNS AS DIRECTED BY ENGINEER.

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

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

Texas Department of Transportation

SH 152

TRAFFIC CONTROL PLAN
PHASE 1 STAGE 1
STA: 232+00 TO STA: 256+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		29

DATE: 2/20/2024 10:54:17 AM
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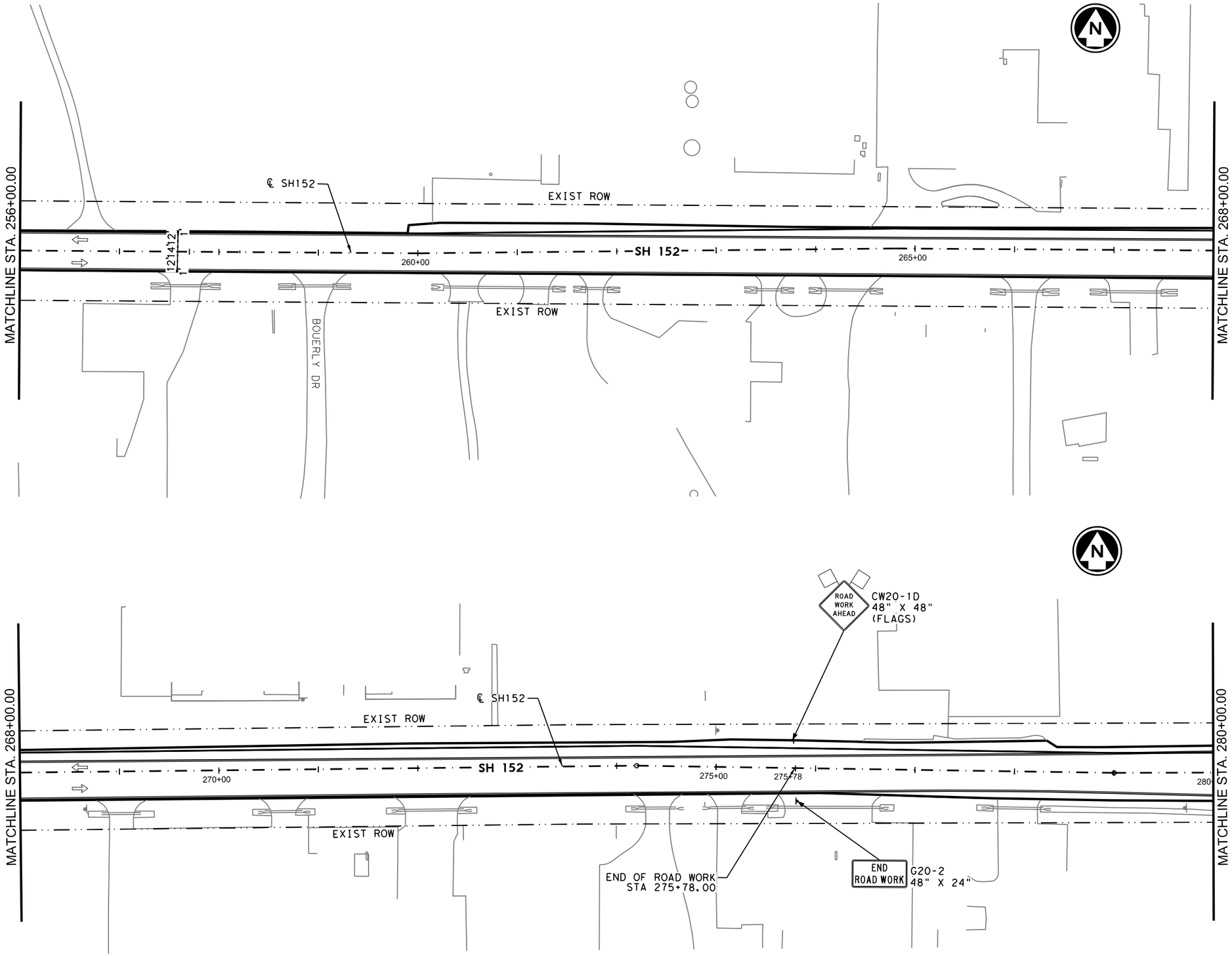

0' 50' 100'

SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
2. ALL DRIVEWAYS AND CROSS STREETS SHALL REMAIN OPEN DURING CONSTRUCTION ACTIVITIES AND AS APPROVED BY THE ENGINEER.
3. CONTRACTOR SHALL COVER OR REMOVE THE EXISTING CONFLICTING SIGNS AS DIRECTED BY ENGINEER.

STATE OF TEXAS
M. N. MOZAFFAR
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LICENSED
PROFESSIONAL ENGINEER

2/21/2024

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

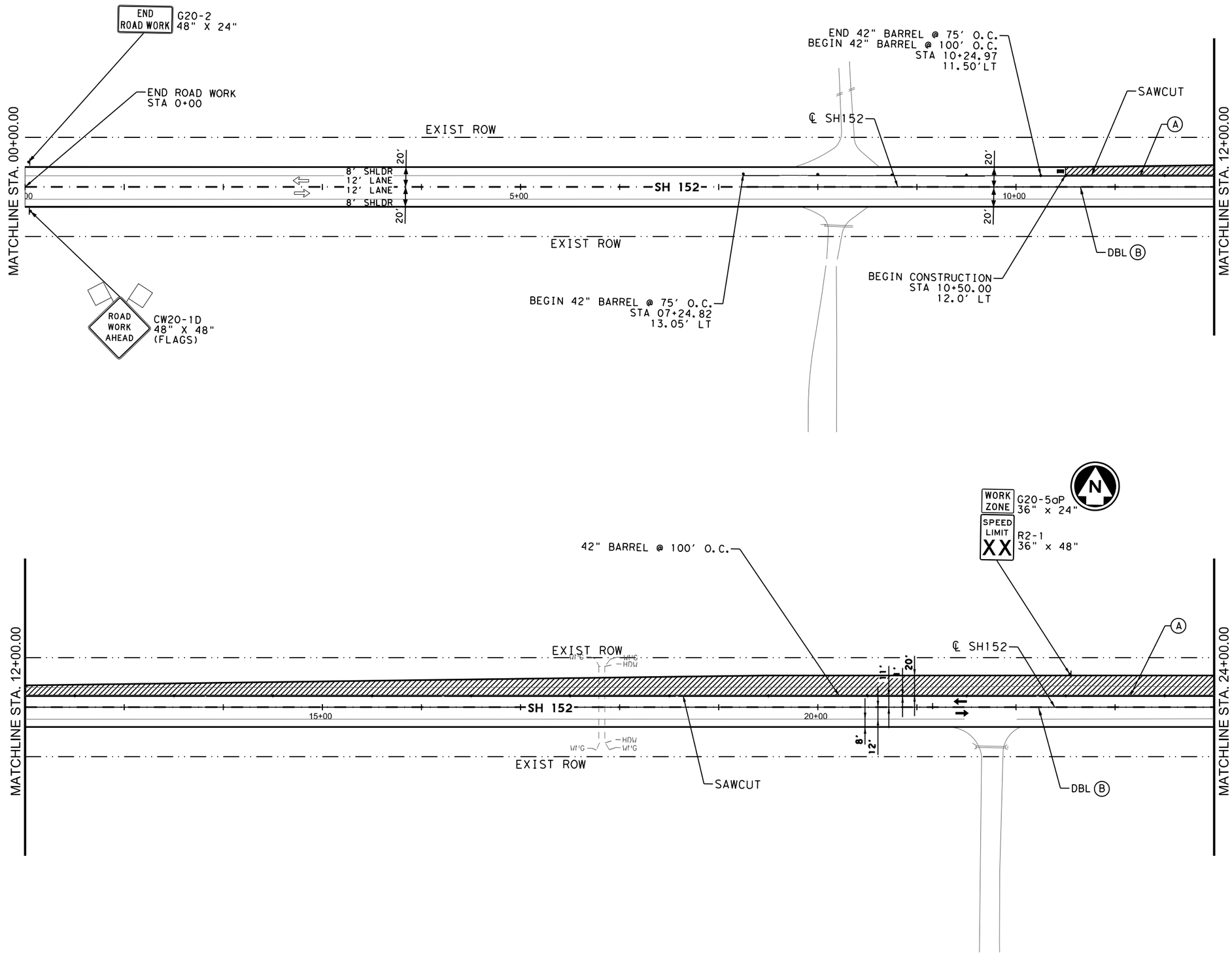
Texas Department of Transportation

SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE I
STA: 256+00 TO STA: 280+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		30

DATE: 2/20/2024 10:54:17 AM
FILE: c:\pw_working\txdot\p0097920\d0245743\new PKG 3 SH_152_WIDENING_PHASE1_STAGE 1.dgn



0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
2. ALL DRIVEWAYS AND CROSS STREETS SHALL REMAIN OPEN DURING CONSTRUCTION ACTIVITIES AND AS APPROVED BY THE ENGINEER.
3. CONTRACTOR SHALL COVER OR REMOVE THE EXISTING CONFLICTING SIGNS AS DIRECTED BY ENGINEER.

STATE OF TEXAS
M. N. MOZAFFAR
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LICENSED
PROFESSIONAL ENGINEER
2/21/2024

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

Texas Department of Transportation

SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE II
STA 00+00 TO STA 24+00

SHEET 1 OF 12

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		31

DATE: 2/20/2024 10:54:58 AM
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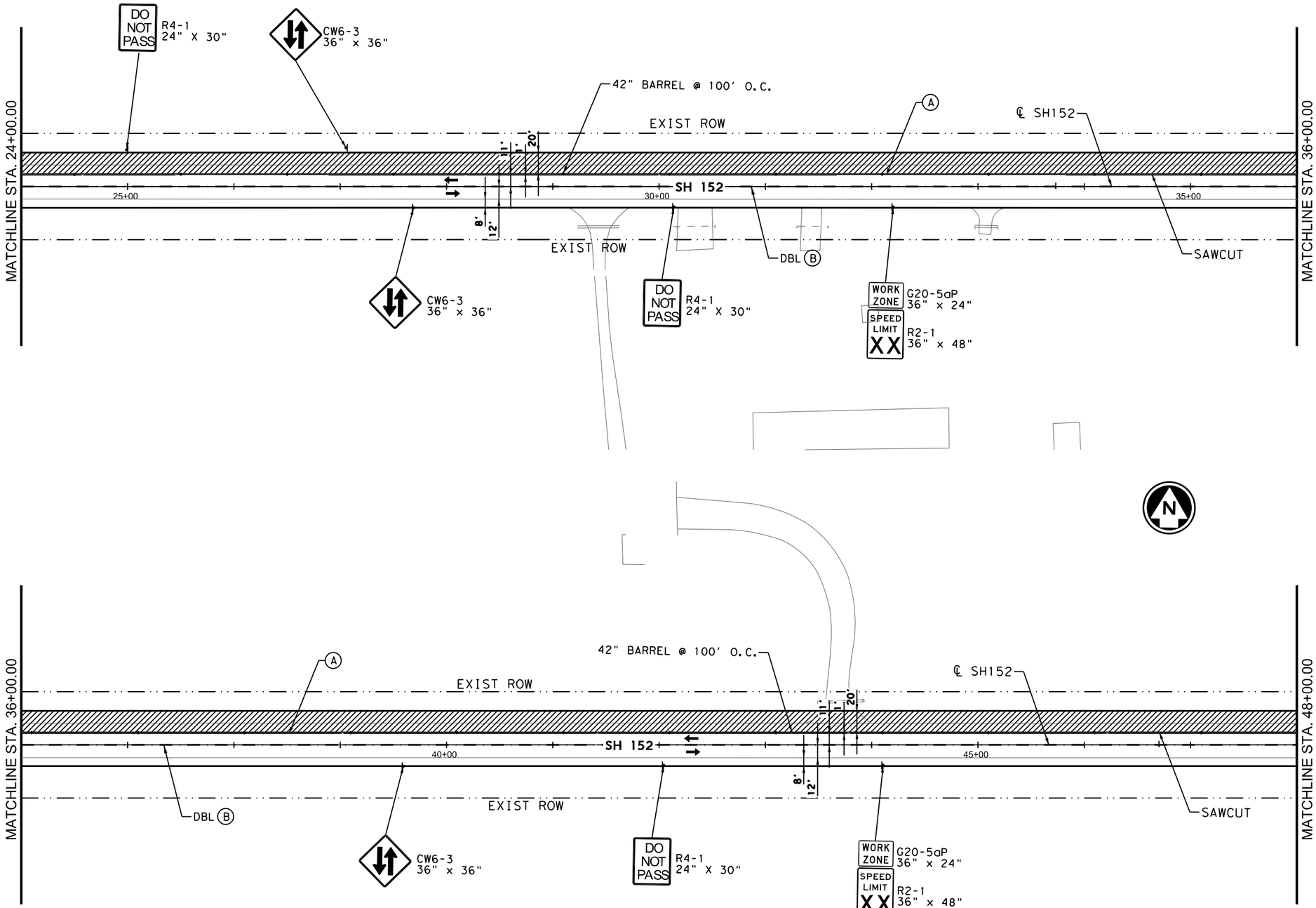

0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
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STATE OF TEXAS
M. N. MOZAFFAR
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LICENSED
PROFESSIONAL ENGINEER
2/21/2024

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

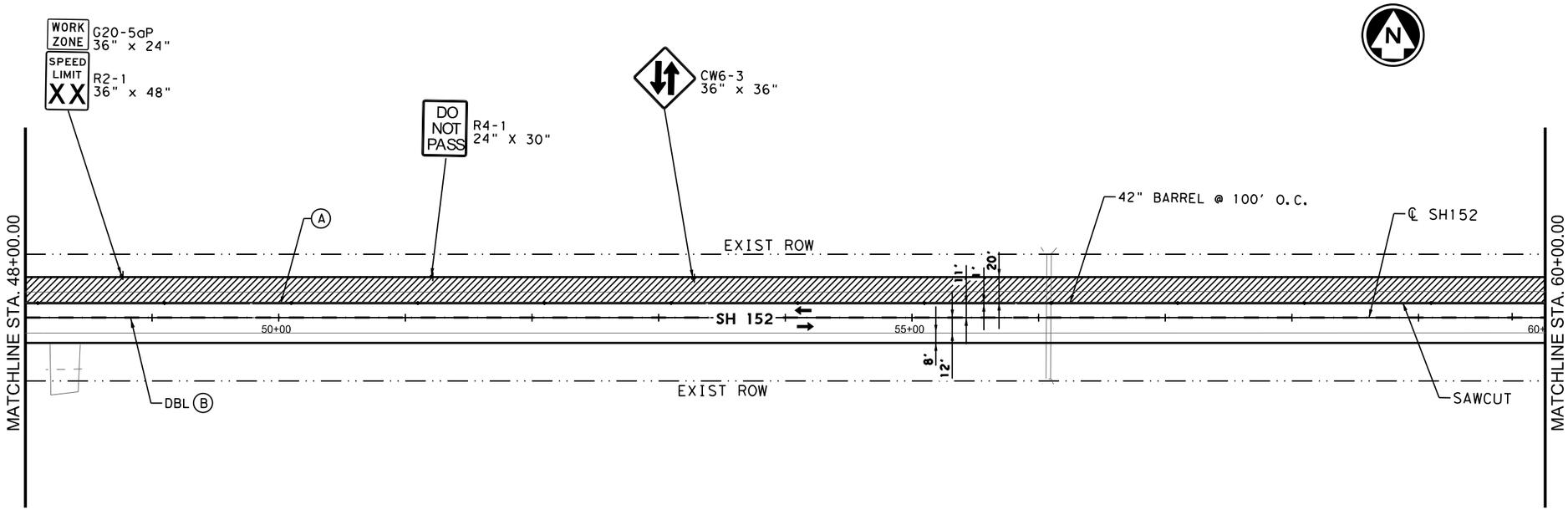
Texas Department of Transportation

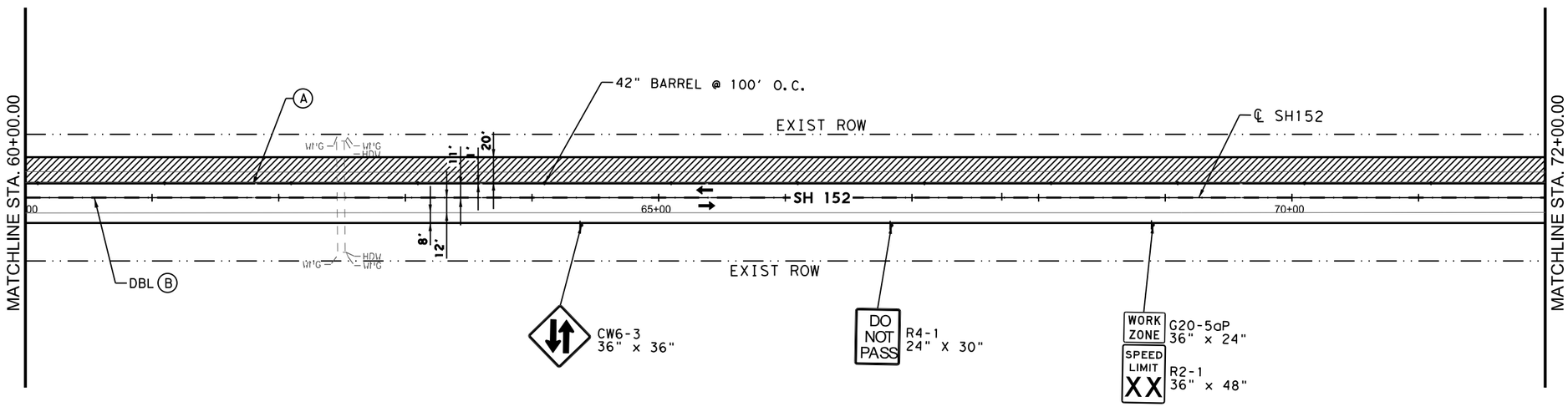
SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE II
STA 24+00 TO STA 48+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		32

DATE: 2/20/2024 10:54:59 AM
FILE: c:\pw_working\txdot\p0097920\d0245746\SH 152_WIDENING PHASE1 STAGE 2.dgn





0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
2. ALL DRIVEWAYS AND CROSS STREETS SHALL REMAIN OPEN DURING CONSTRUCTION ACTIVITIES AND AS APPROVED BY THE ENGINEER.
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2/21/2024

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

Texas Department of Transportation

SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE II
STA 48+00 TO STA 72+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		33

DATE: 2/20/2024 10:55:00 AM
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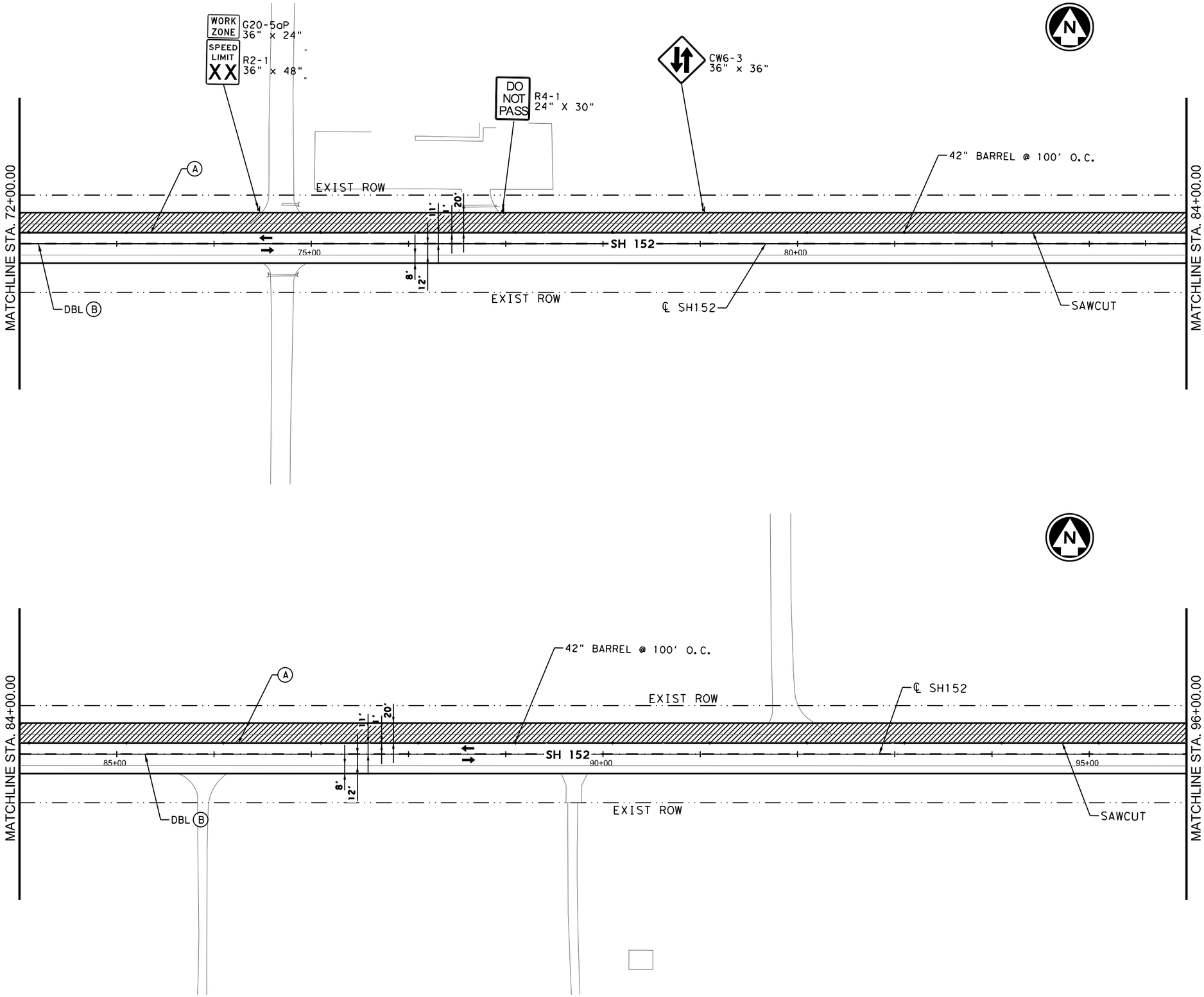

0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
2. ALL DRIVEWAYS AND CROSS STREETS SHALL REMAIN OPEN DURING CONSTRUCTION ACTIVITIES AND AS APPROVED BY THE ENGINEER.
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2/21/2024

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

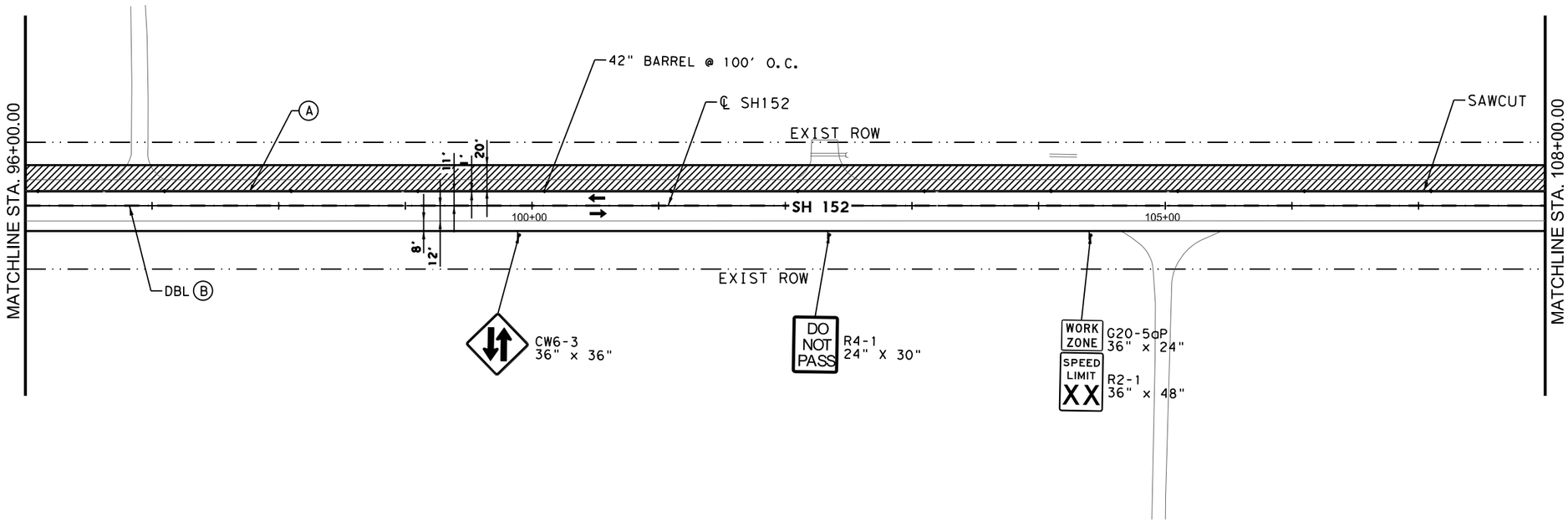
Texas Department of Transportation

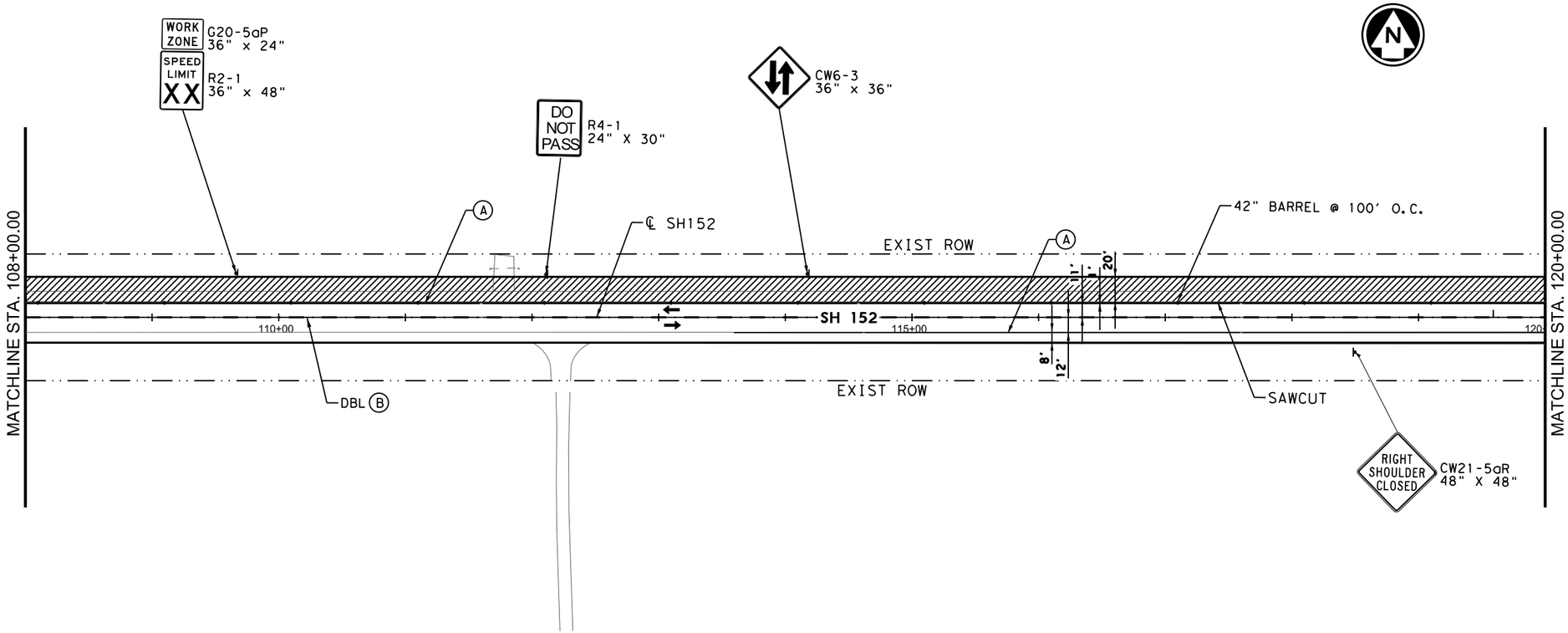
SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE II
STA 72+00 TO STA 96+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		34

DATE: 2/20/2024 10:55:01 AM
FILE: c:\pw_working\txdot\p0097920\d0245746\SH 152_WIDENING PHASE1 STAGE 2.dgn





0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
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STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

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

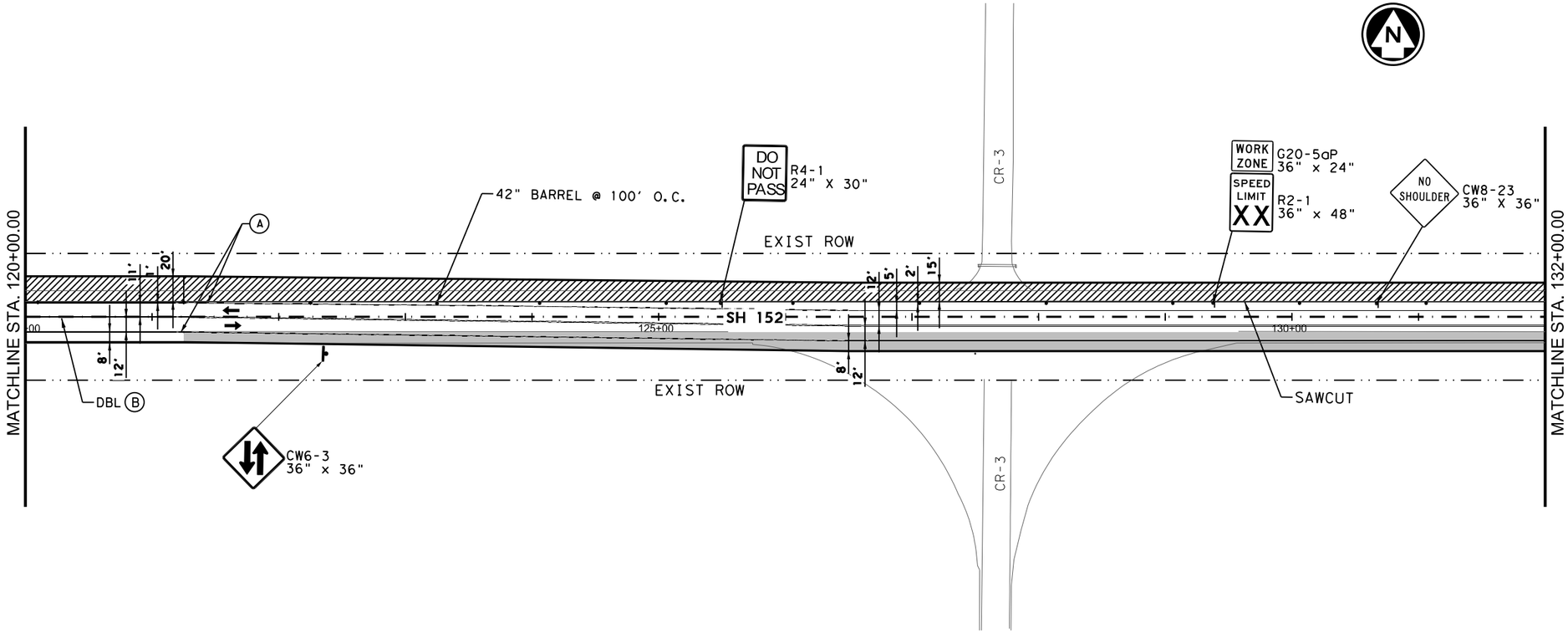
Texas Department of Transportation

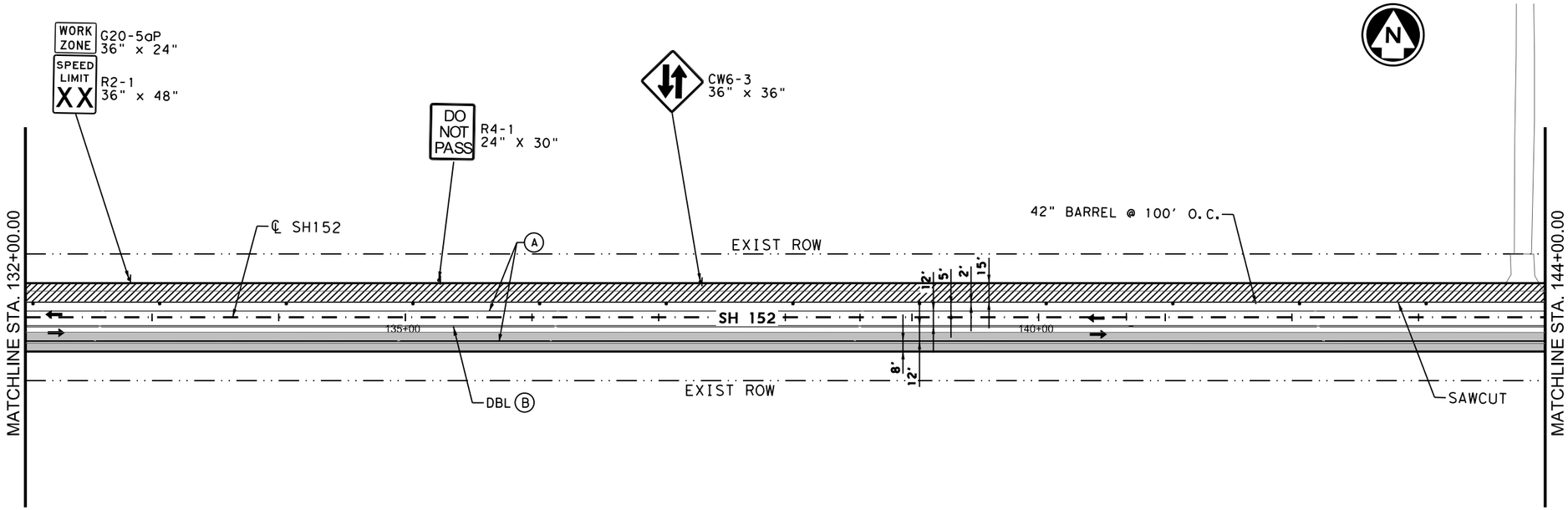
SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE II
STA 96+00 TO STA 120+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		35

DATE: 2/20/2024 10:55:01 AM
FILE: c:\pw_working\txdot\p0097920\d0245746\SH 152_WIDENING PHASE1 STAGE 2.dgn





0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
2. ALL DRIVEWAYS AND CROSS STREETS SHALL REMAIN OPEN DURING CONSTRUCTION ACTIVITIES AND AS APPROVED BY THE ENGINEER.
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STATE OF TEXAS
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85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

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

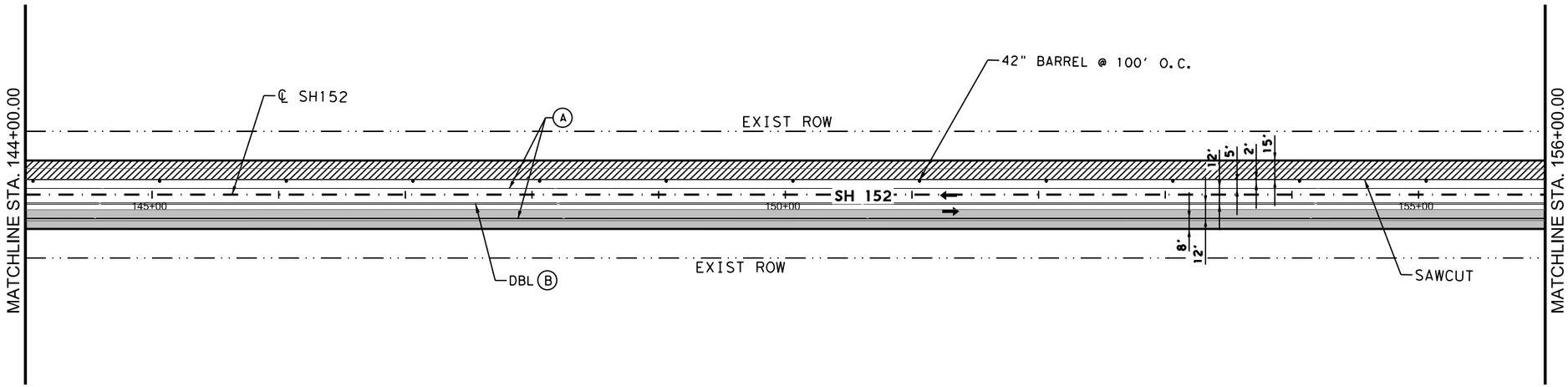
Texas Department of Transportation

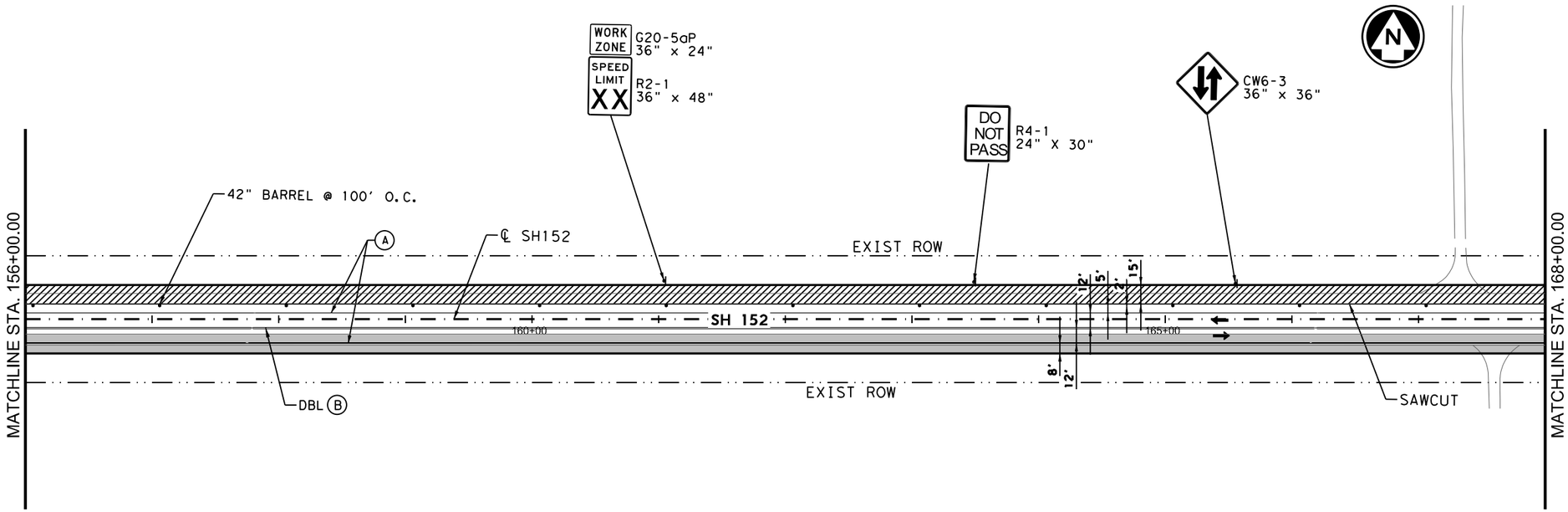
SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE II
STA 120+00 TO STA 144+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		36

DATE: 2/20/2024 10:55:02 AM
FILE: c:\pw_working\txdot\p0097920\d0245746\SH 152_WIDENING PHASE1 STAGE 2.dgn





0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
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STATE OF TEXAS
M. N. MOZAFFAR
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LICENSED
PROFESSIONAL ENGINEER
2/21/2024

L.S. ENGINEERS, LLC
7676 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

Texas Department of Transportation

SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE II
STA 144+00 TO STA 168+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		37

DATE: 2/20/2024 10:55:03 AM
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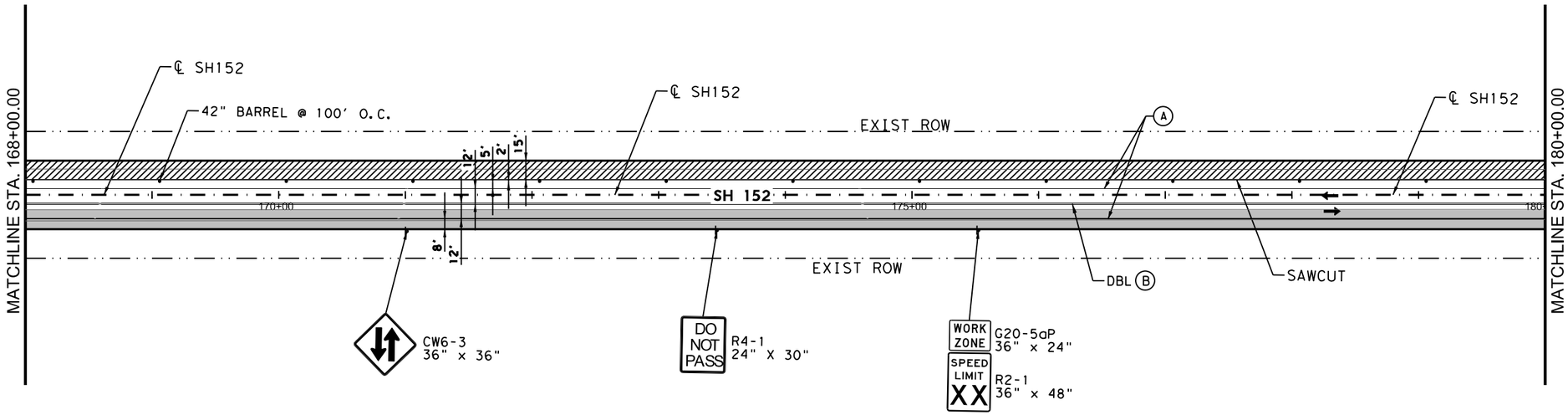

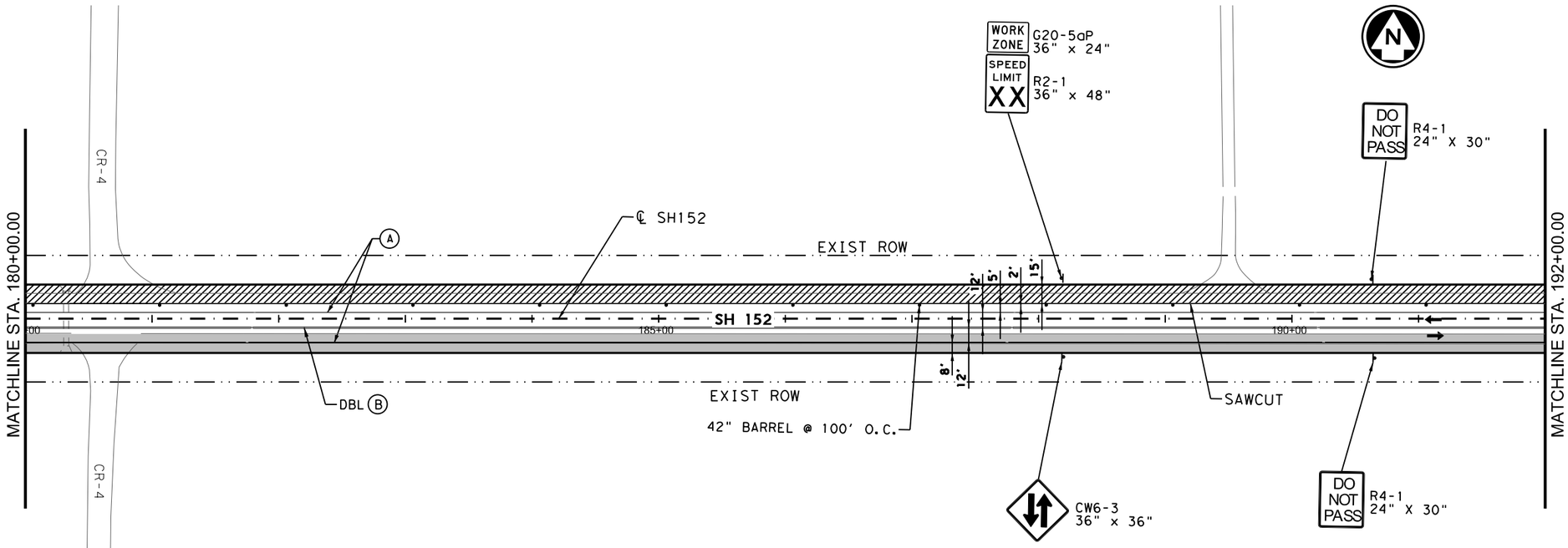

0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

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STATE OF TEXAS
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2/21/2024

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

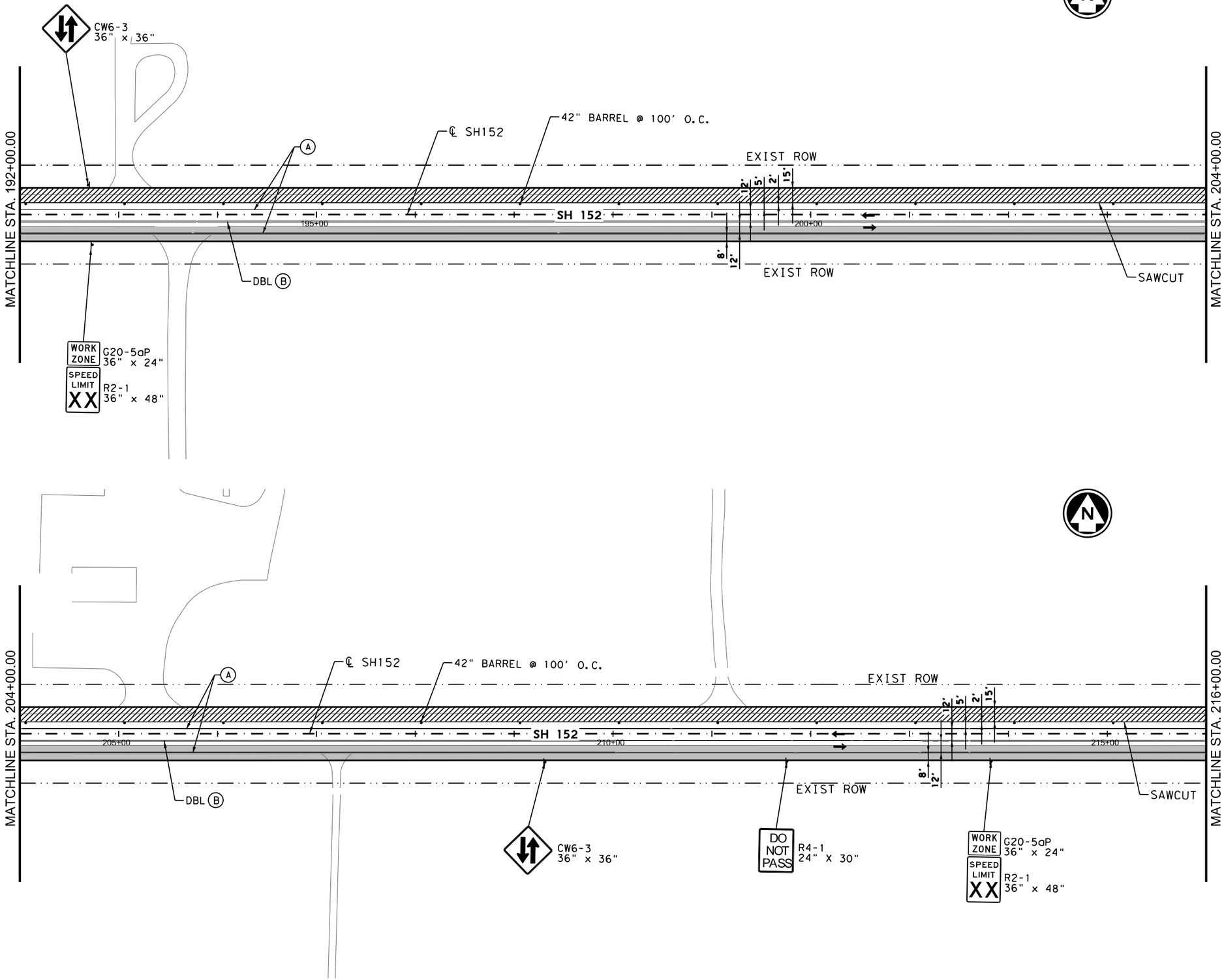
Texas Department of Transportation

SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE II
STA 168+00 TO STA 192+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		38

DATE: 2/20/2024 10:55:04 AM
FILE: c:\pw_working\txdot\p0097920\d0245746\SH 152_WIDENING PHASE1 STAGE 2.dgn



0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

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PROFESSIONAL ENGINEER
2/21/2024

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

Texas Department of Transportation

SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE II
STA 192+00 TO STA 216+00

SHEET 9 OF 12

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		39

DATE: 2/20/2024 10:55:04 AM
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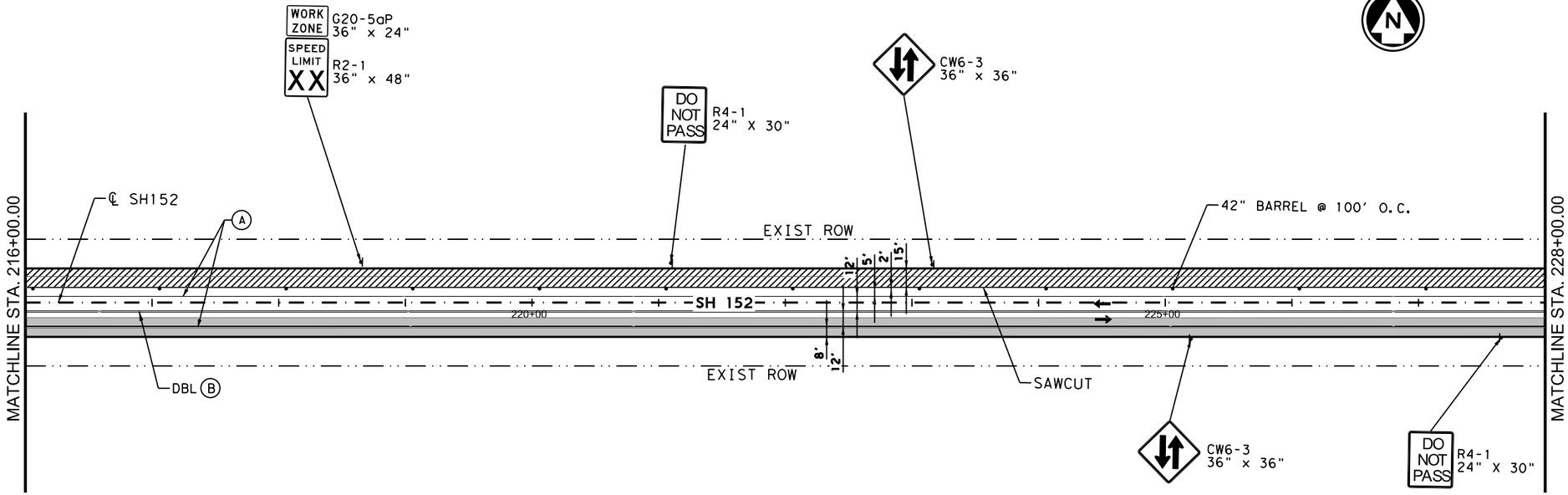

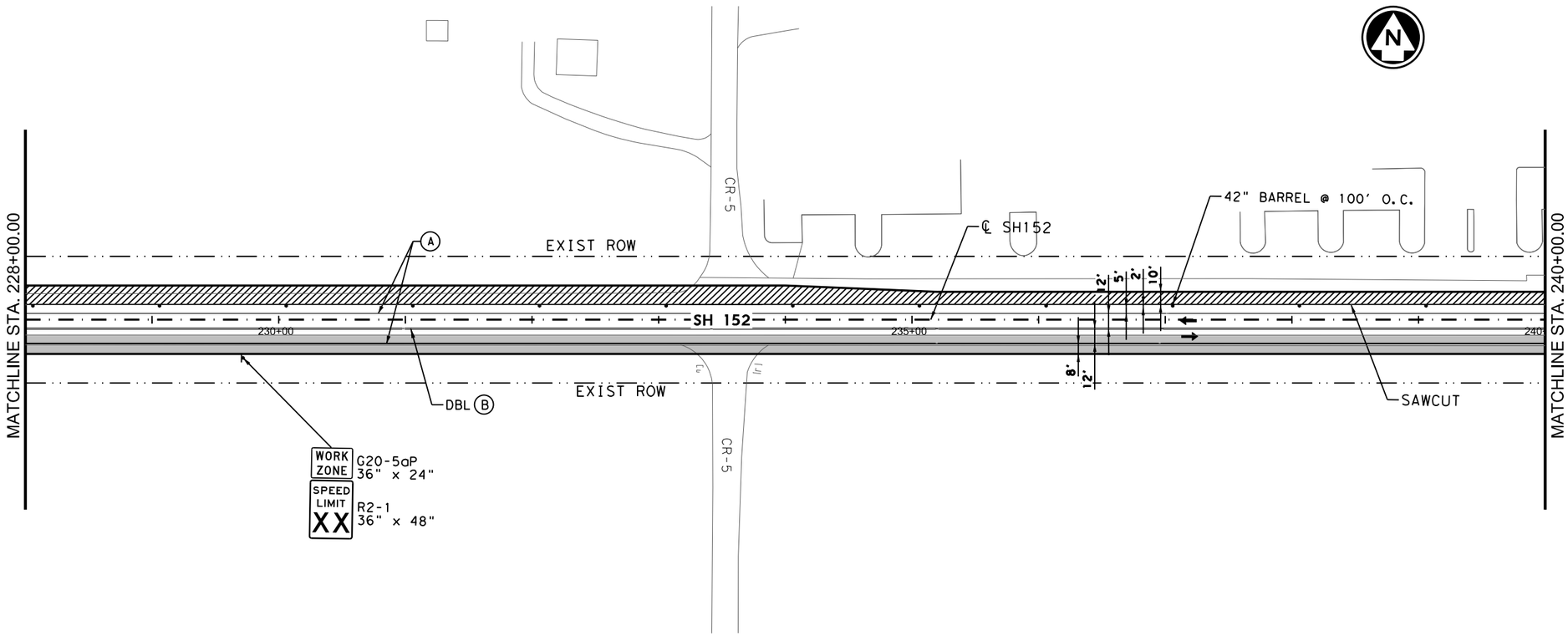

0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
- (C) WK ZN PAV MRK REMOV (W) 6"(SLD)
- (D) WK ZN PAV MRK REMOV (Y) 6"(SLD)
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- 42" BARREL
- TY III BARRICADES
- PERMANENT CONSTRUCTION THIS PHASE
- PERMANENT CONSTRUCTION PREVIOUS PHASE

NOTES:

1. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC (1)-21 THROUGH BC (12)-21 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENTS.
2. ALL DRIVEWAYS AND CROSS STREETS SHALL REMAIN OPEN DURING CONSTRUCTION ACTIVITIES AND AS APPROVED BY THE ENGINEER.
3. CONTRACTOR SHALL COVER OR REMOVE THE EXISTING CONFLICTING SIGNS AS DIRECTED BY ENGINEER.

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

L.S. ENGINEERS, LLC
7676 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

Texas Department of Transportation

SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE II
STA 216+00 TO STA 240+00

SHEET 10 OF 12

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		40

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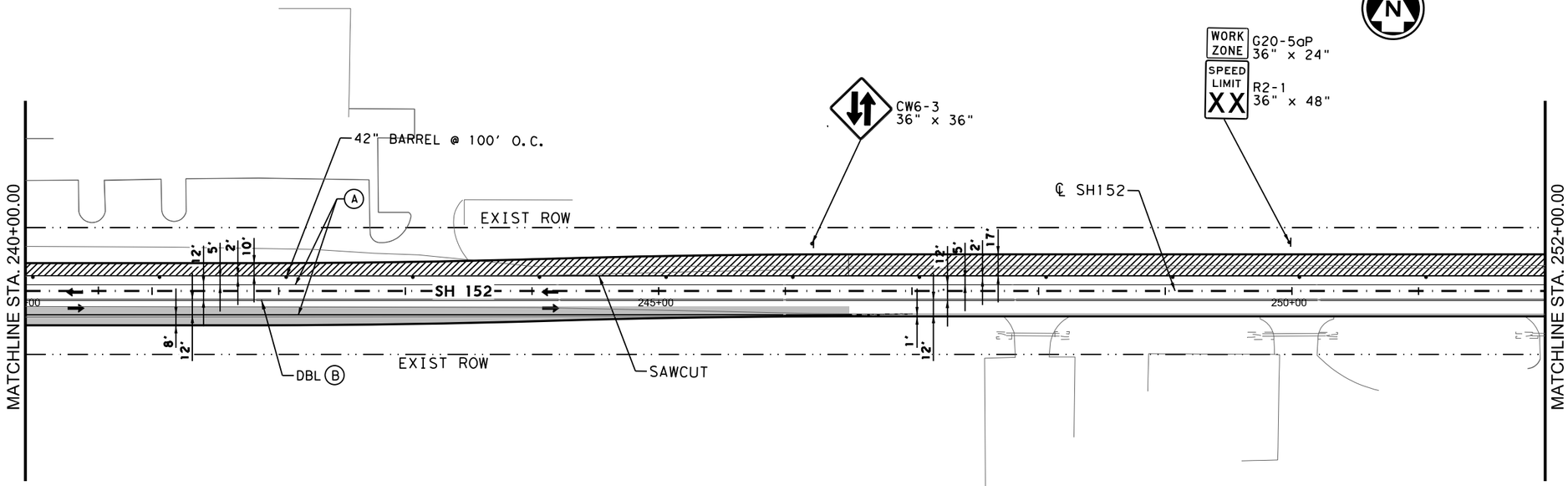

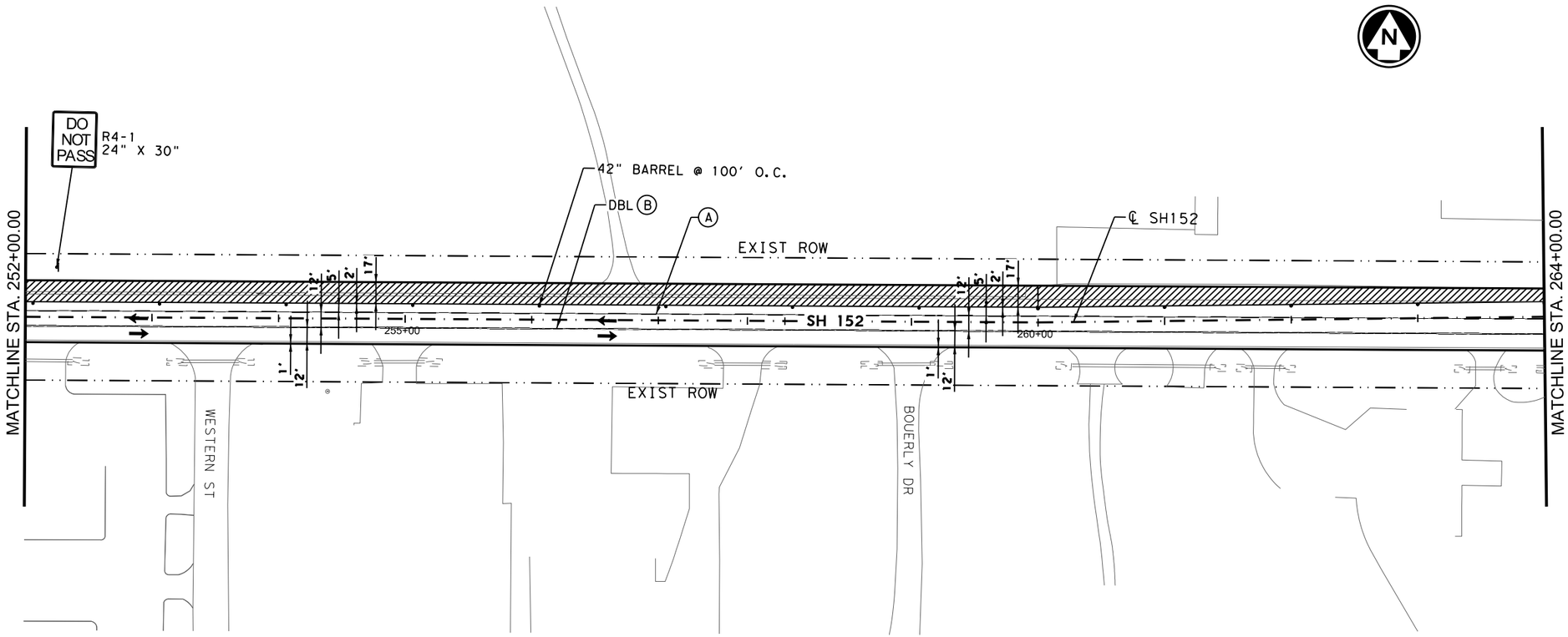

0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
- (B) WK ZN PAV MRK NON REMOV (Y) 6"(SLD)
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- PROPOSED TRAFFIC
- 42" BARREL
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- PERMANENT CONSTRUCTION PREVIOUS PHASE

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L.S. ENGINEERS, LLC
7676 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. = F-11657

Texas Department of Transportation

SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE II
STA 240+00 TO STA 264+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		41

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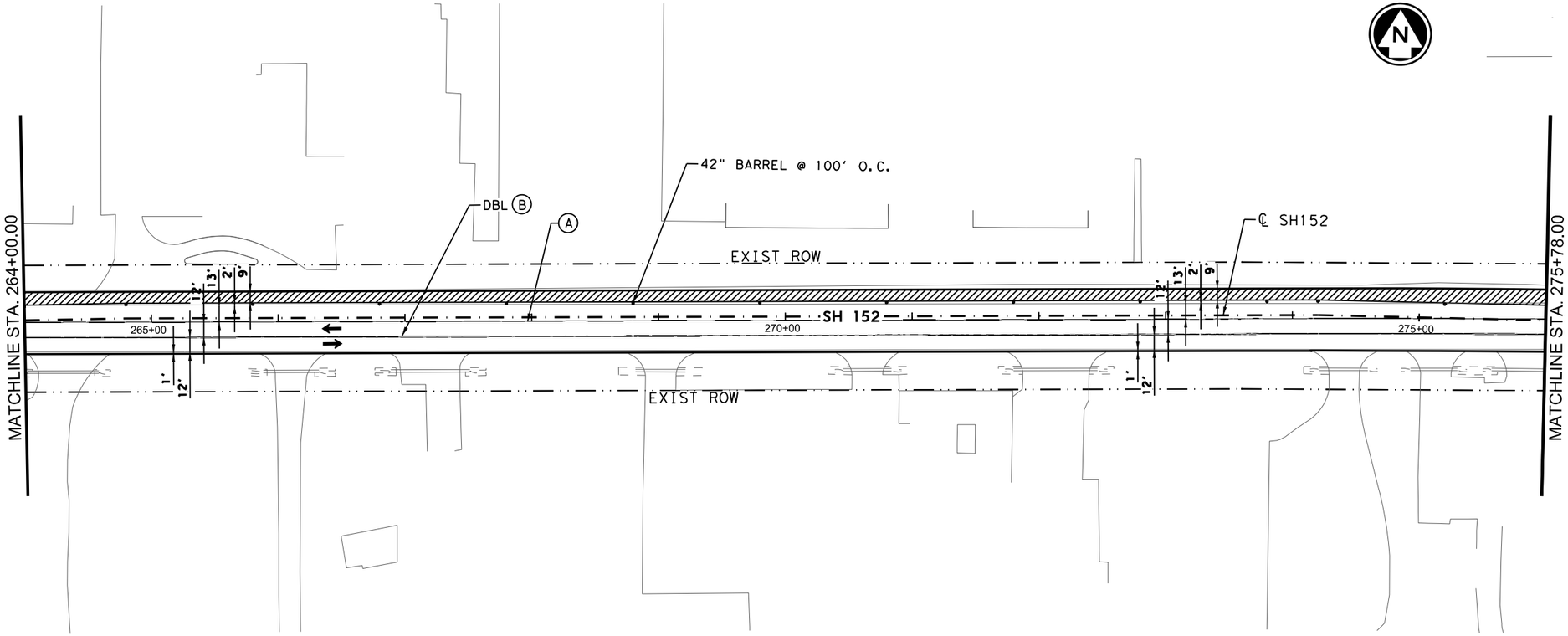

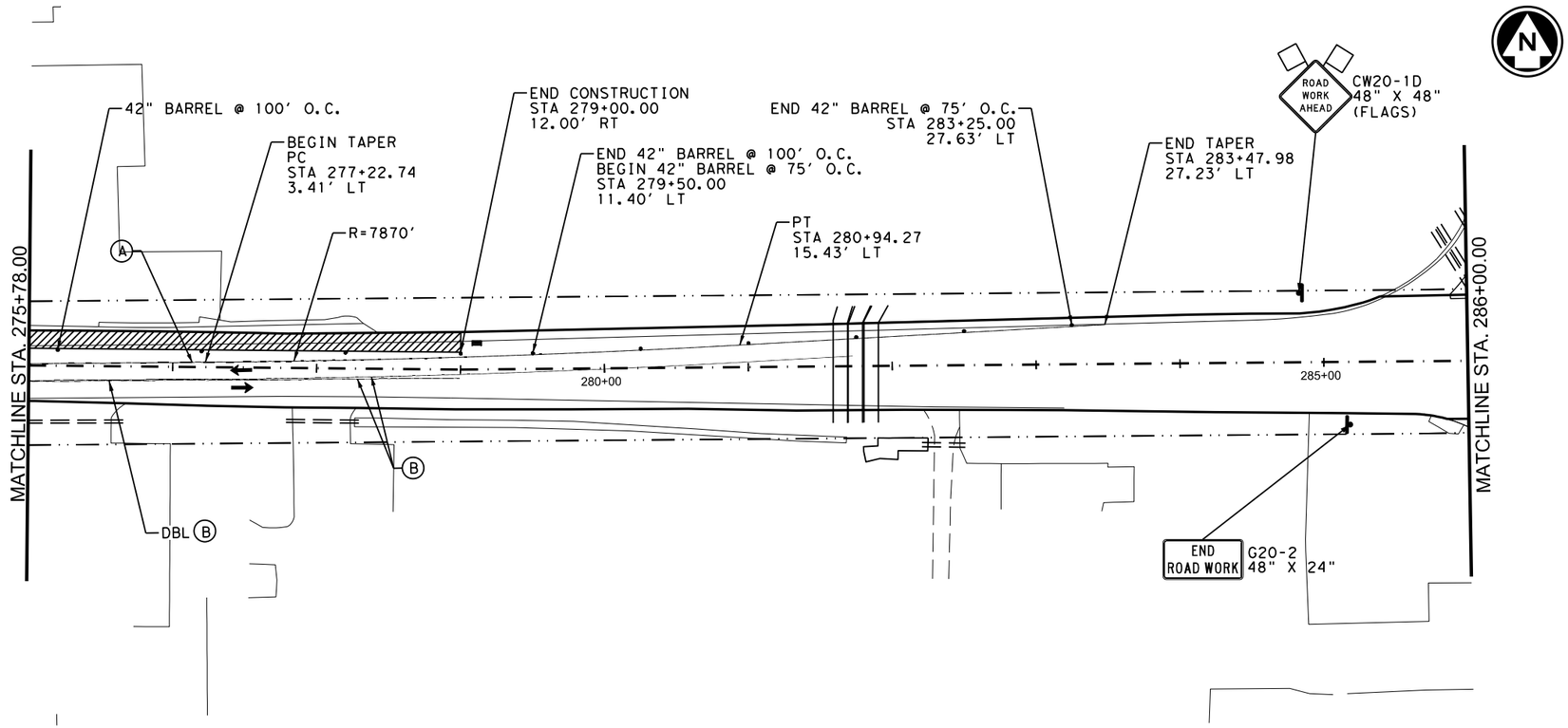

0' 50' 100'
SCALE IN FEET

LEGEND:

- (A) WK ZN PAV MRK NON REMOV (W) 6"(SLD)
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NOTES:

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Texas Department of Transportation

SH 152

TRAFFIC CONTROL PLAN
PHASE I STAGE II
STA 264+00 TO END

SHEET 12 OF 12

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		42

DATE: 2/20/2024 10:55:07 AM
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DATE: 2/21/2024 11:48:07 AM
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

SHEET 1 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		43

DATE: 2/21/2024 11:48:08 AM
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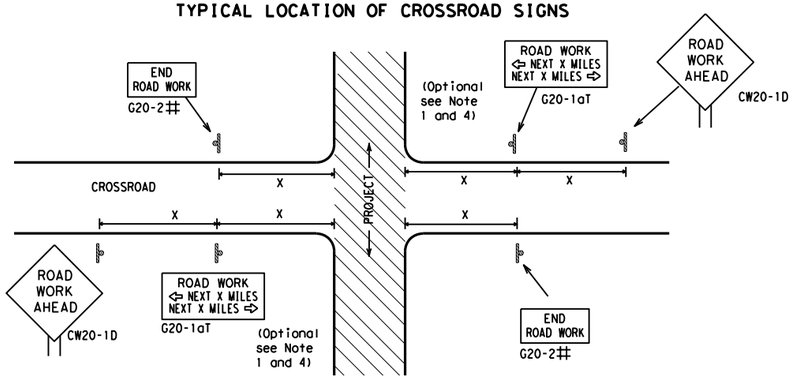
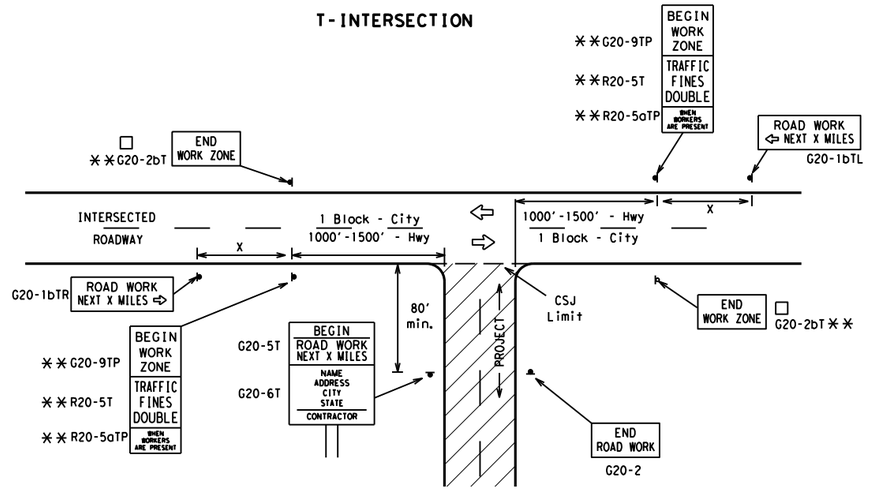
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

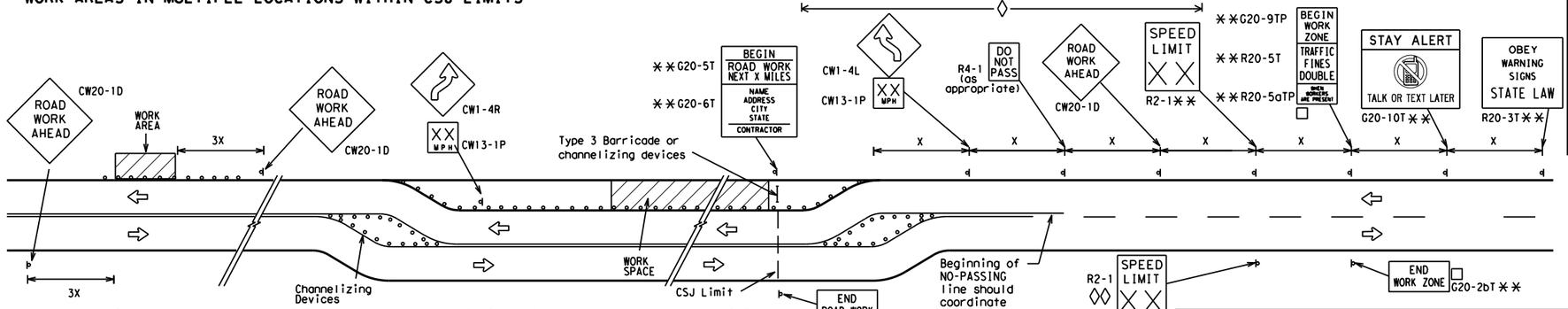
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

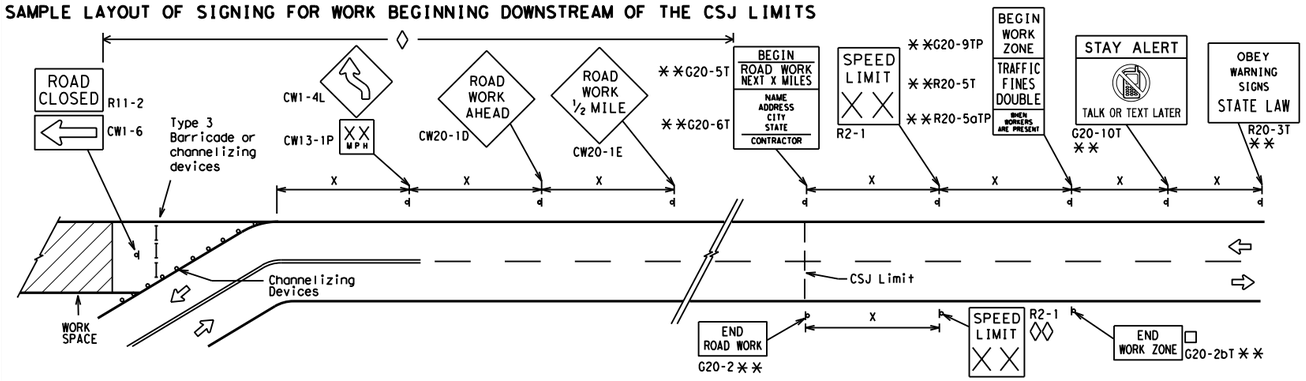
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



NOTES

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

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

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

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

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AMA	GRAY		44

DATE: 2/21/2024 11:48:09 AM
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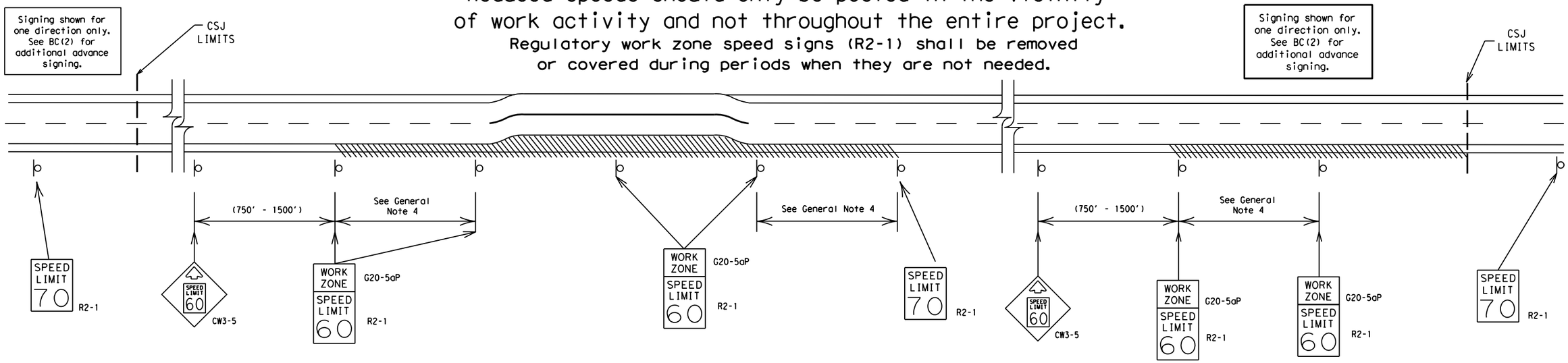
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AMA	GRAY		45

DATE: 2/21/2024 11:48:10 AM
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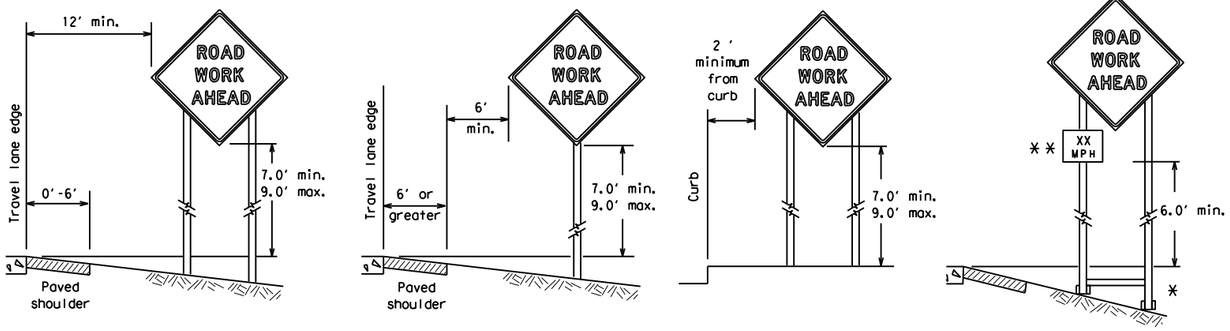
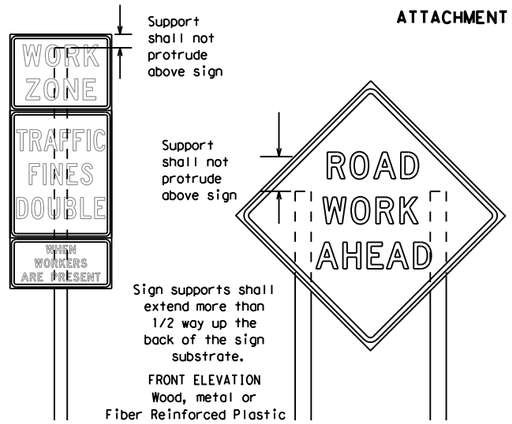
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

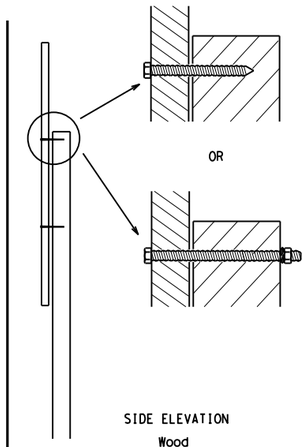


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





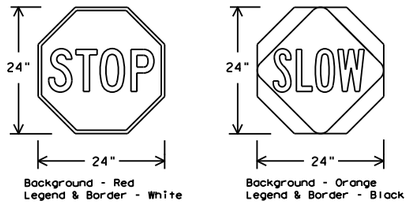
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AMA	GRAY		46

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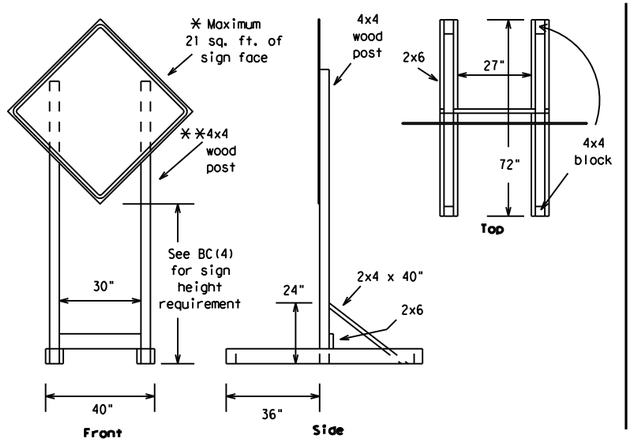
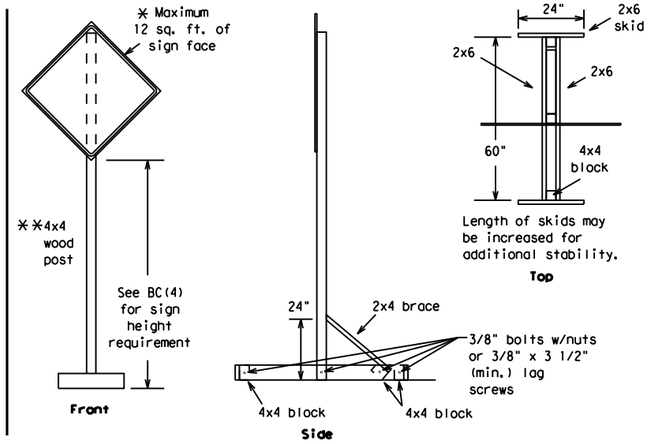
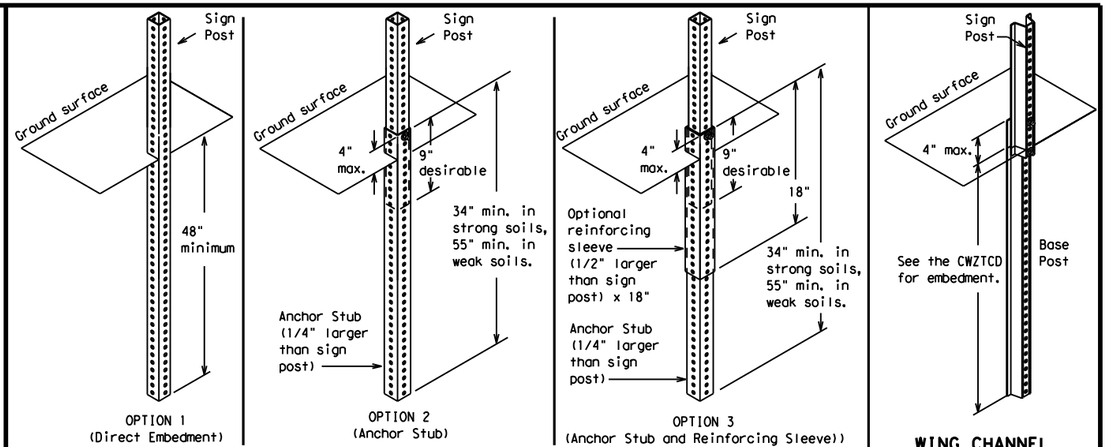




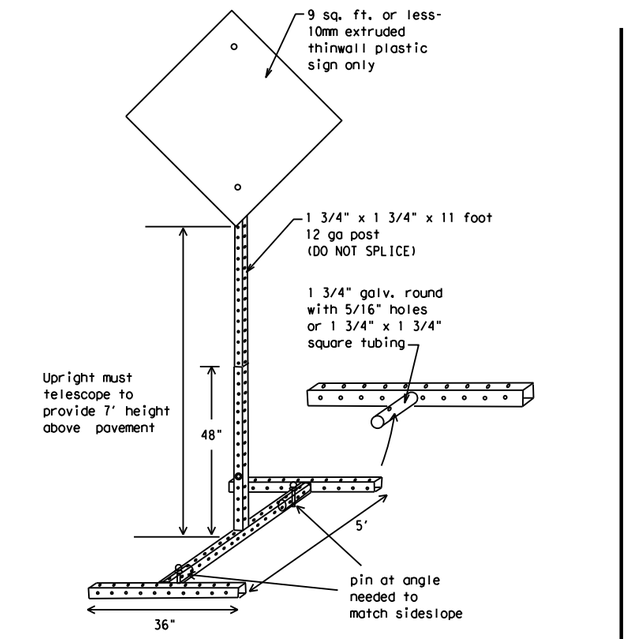
SKID MOUNTED WOOD SIGN SUPPORTS

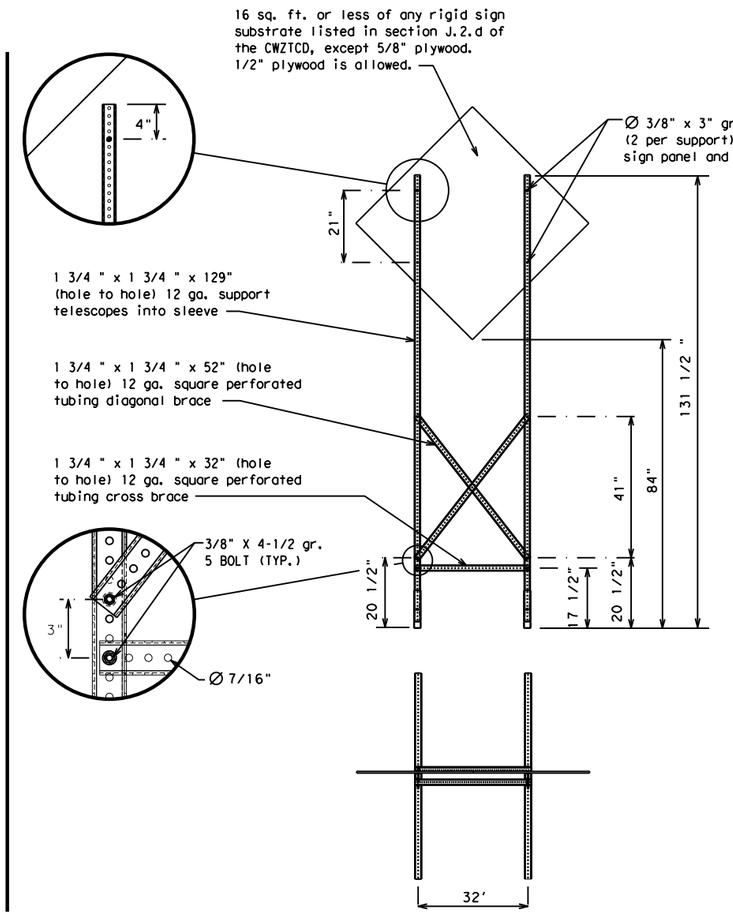
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

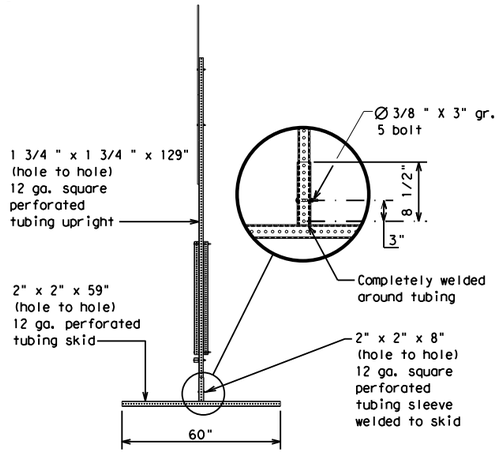


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

SHEET 5 OF 12

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AMA	GRAY		47

DATE: 2/21/2024 11:48:13 AM
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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AMA	GRAY		48

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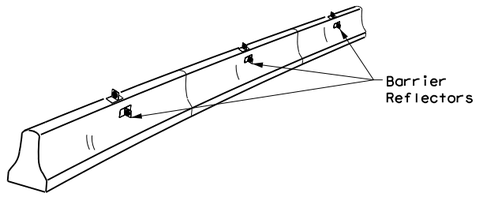
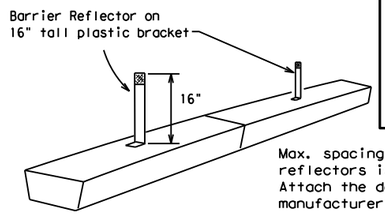
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)

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

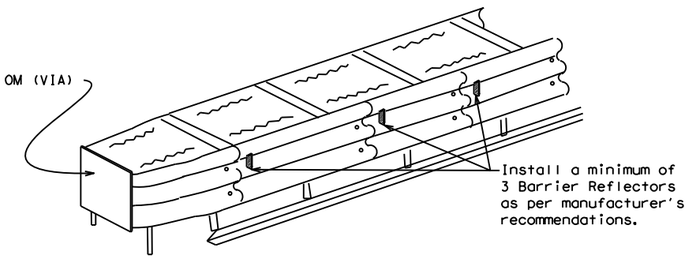


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

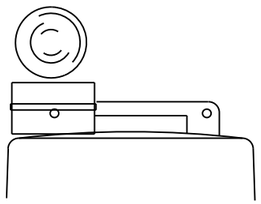


DELINEATION OF END TREATMENTS

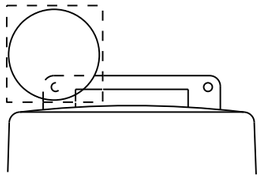
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

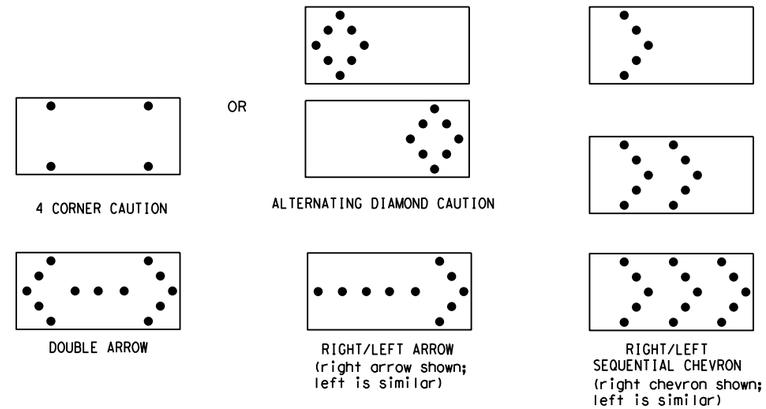
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AMA	GRAY		49

101

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

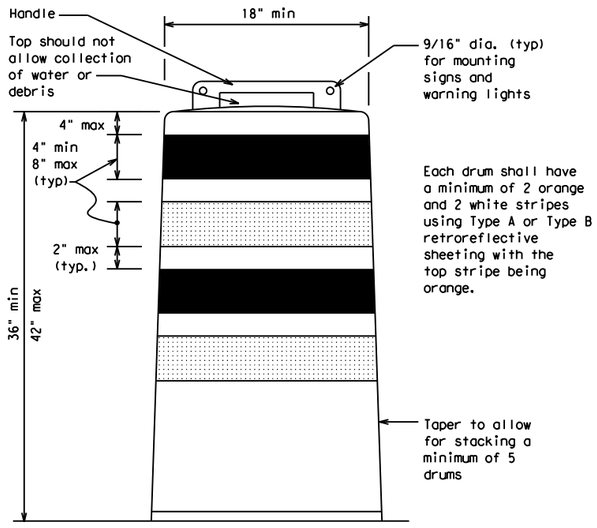
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

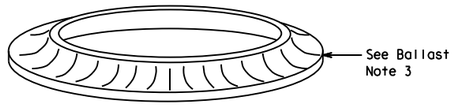
RETROREFLECTIVE SHEETING

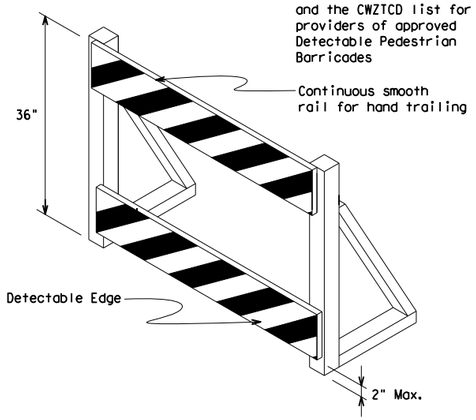
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

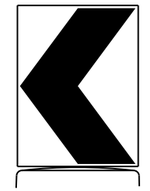




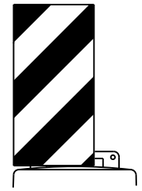


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	AMA	GRAY		50
7-13				

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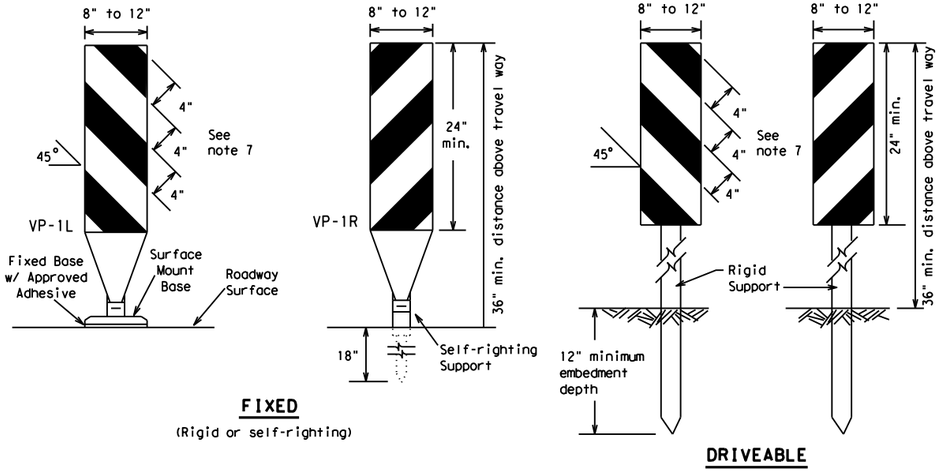
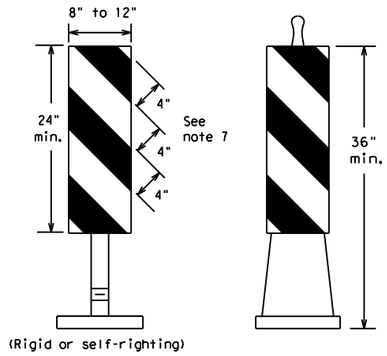


FIXED
(Rigid or self-righting)

DRIVEABLE

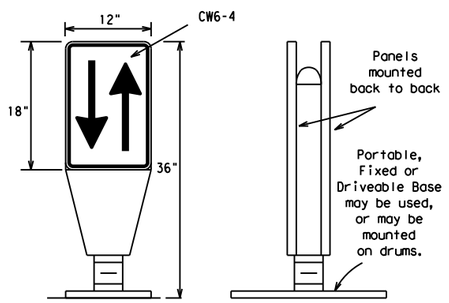


(Rigid or self-righting)

PORTABLE

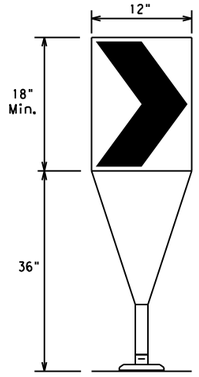
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



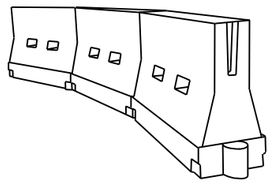
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0455	03	038	SH 152
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AMA	GRAY		51

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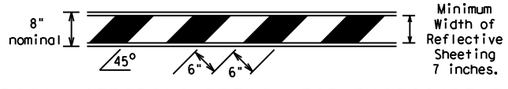
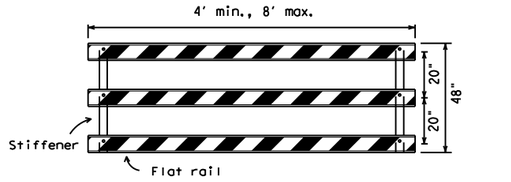
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



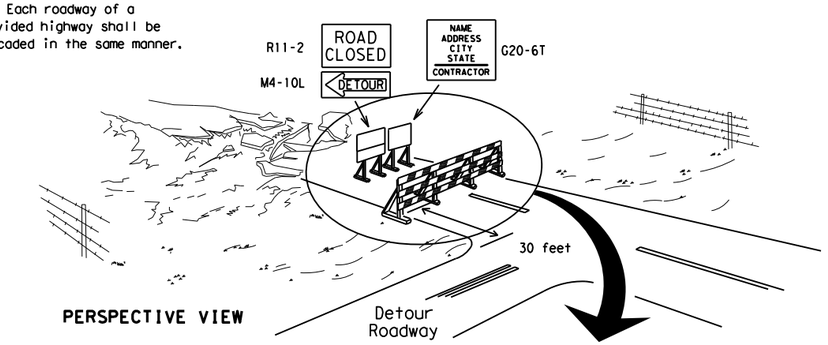
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

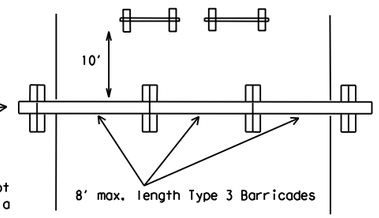
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

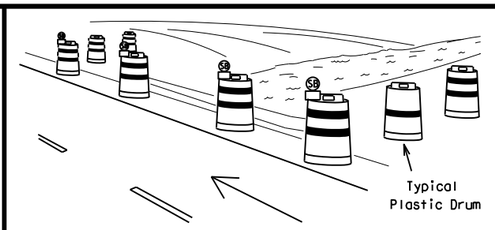
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

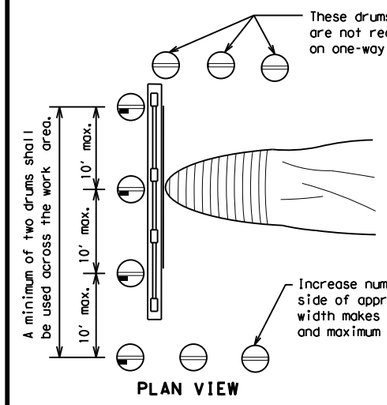
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

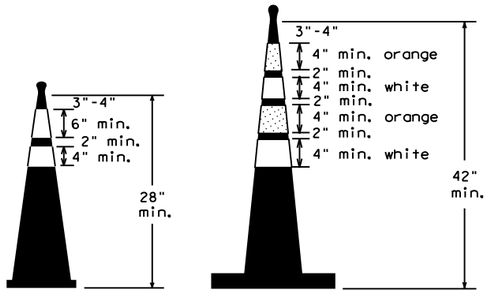
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



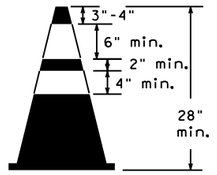
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

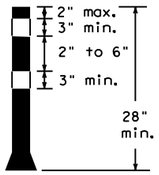
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

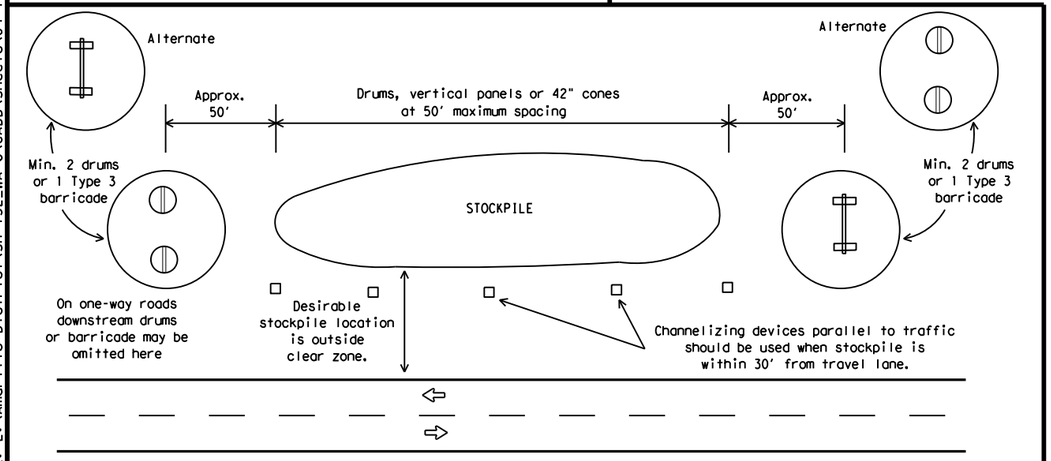


Tubular Marker

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

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

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined 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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

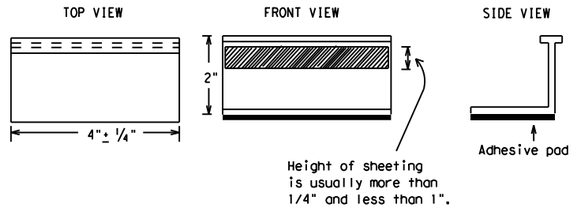
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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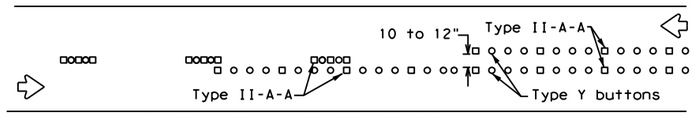
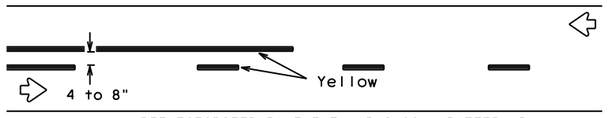
PAVEMENT MARKING PATTERNS

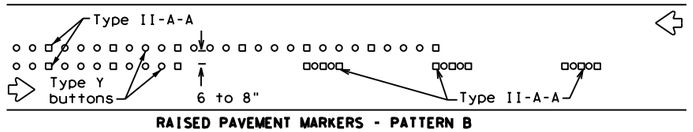
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



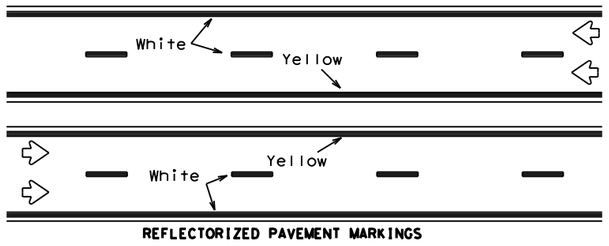
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



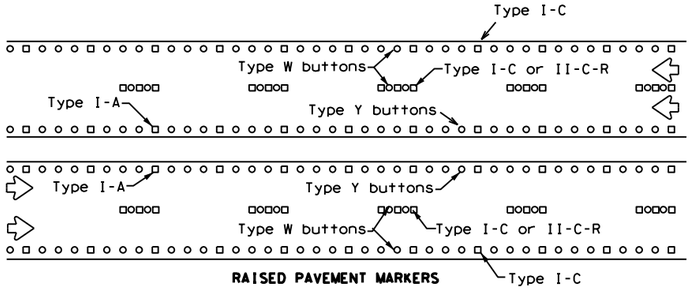
RAISED PAVEMENT MARKERS - PATTERN B

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

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



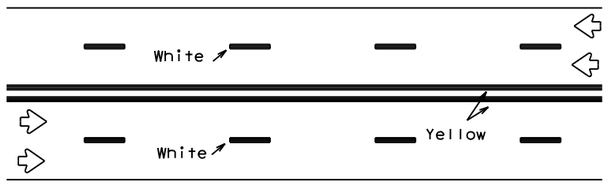
REFLECTORIZED PAVEMENT MARKINGS



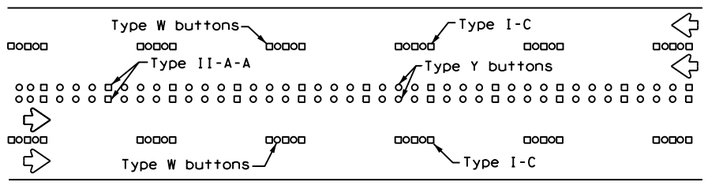
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



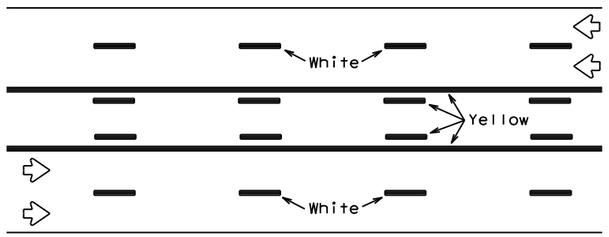
REFLECTORIZED PAVEMENT MARKINGS



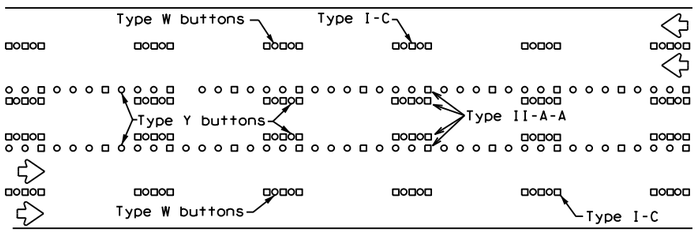
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

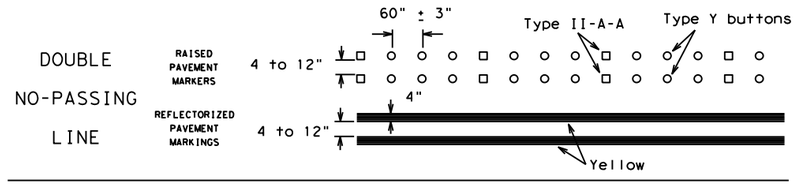
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

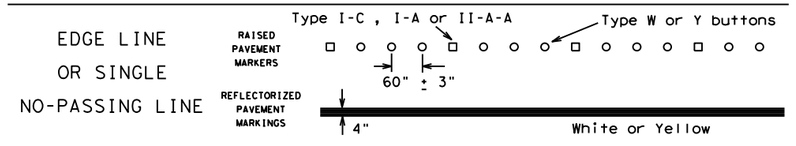
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

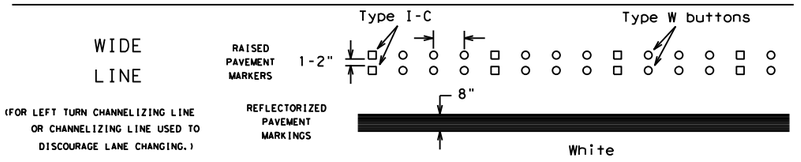


EDGE LINE OR SINGLE NO-PASSING LINE



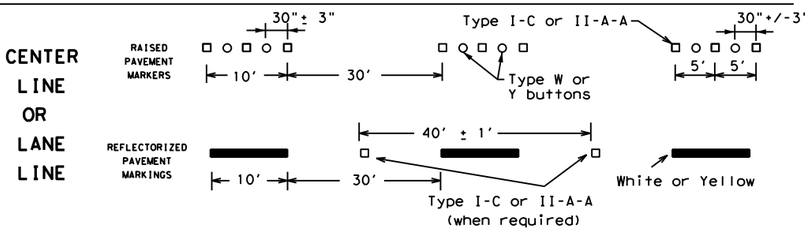
WIDE LINE

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

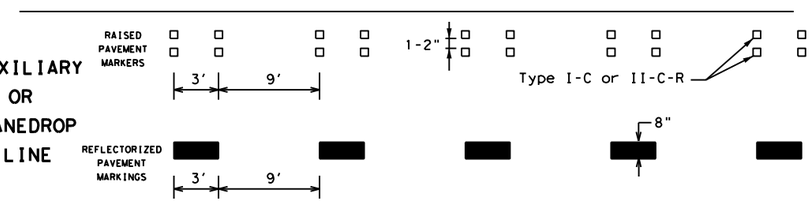


BROKEN LINES

CENTER LINE OR LANE LINE

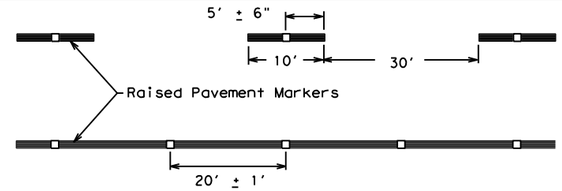


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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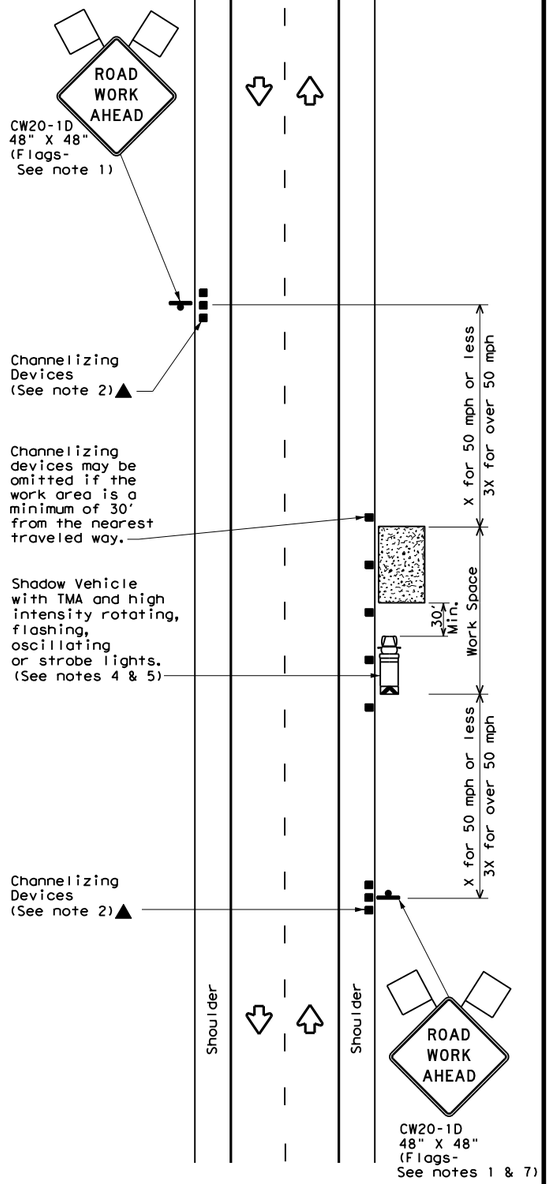
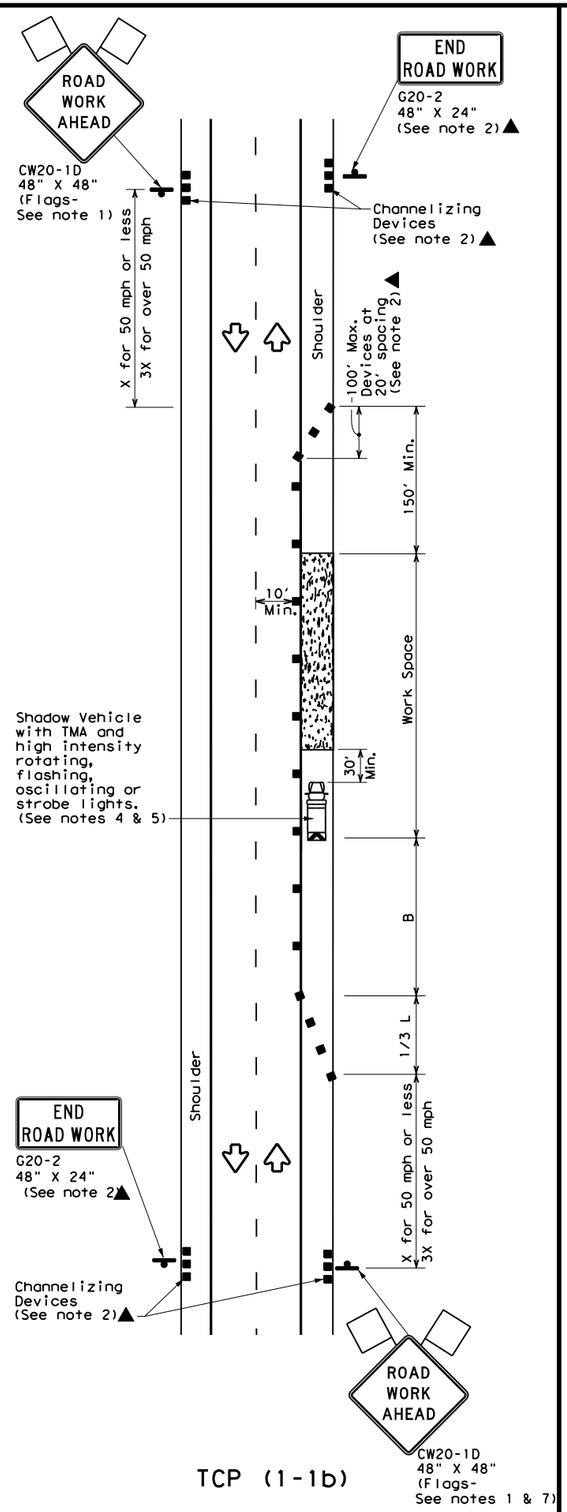


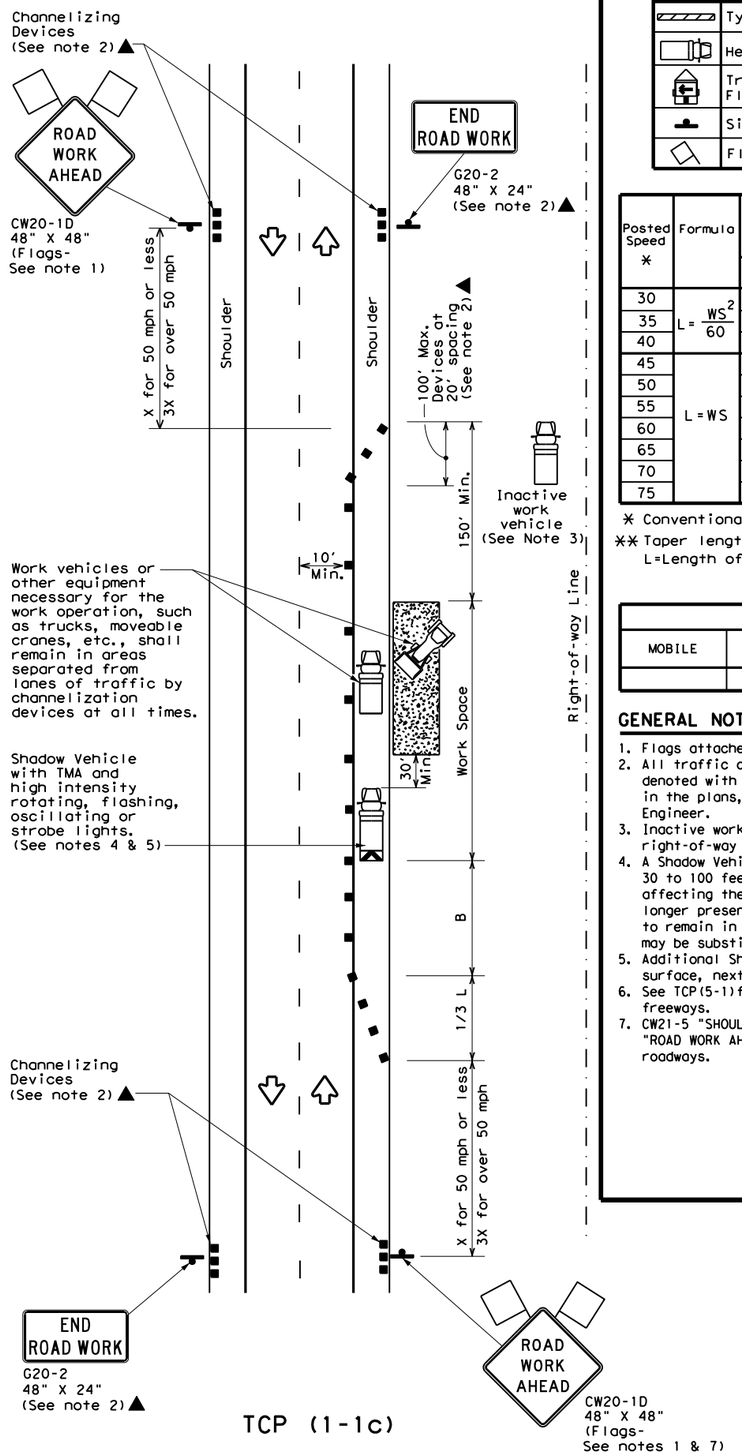
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	AMA	GRAY		55
1-97 2-18				

151

DATE: 2/21/2024 11:48:23 AM
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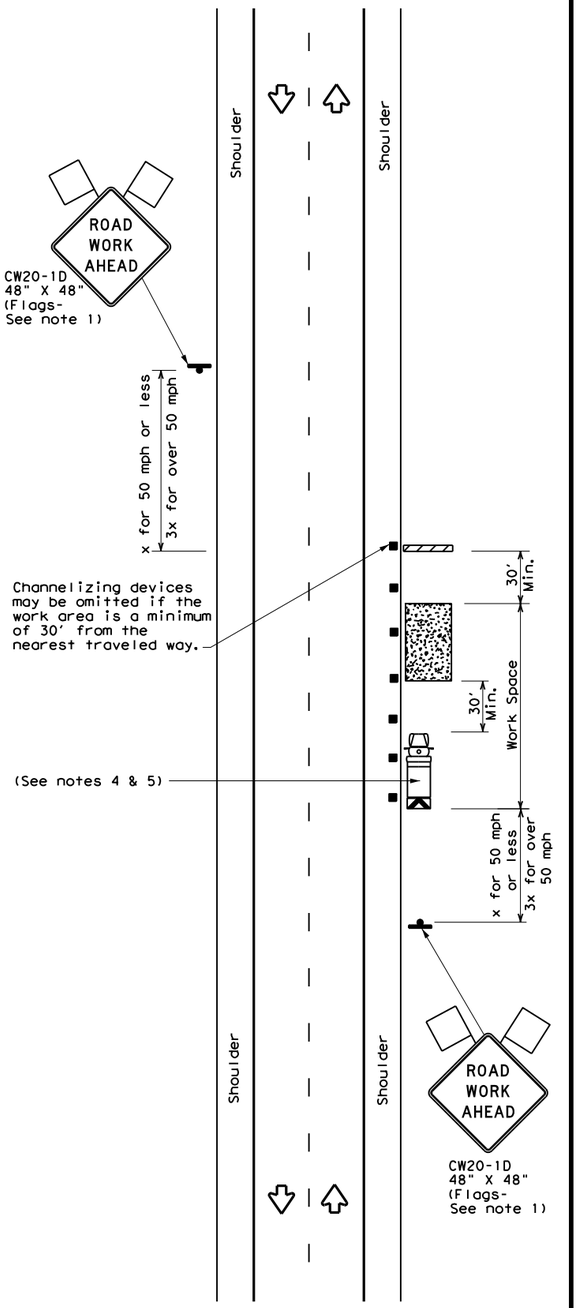
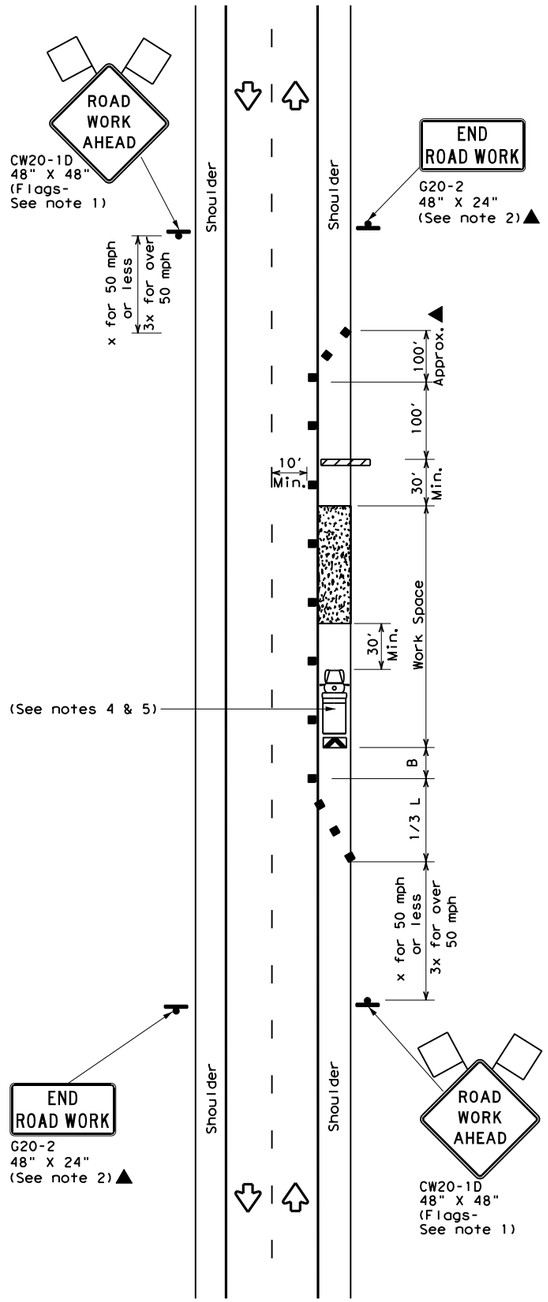


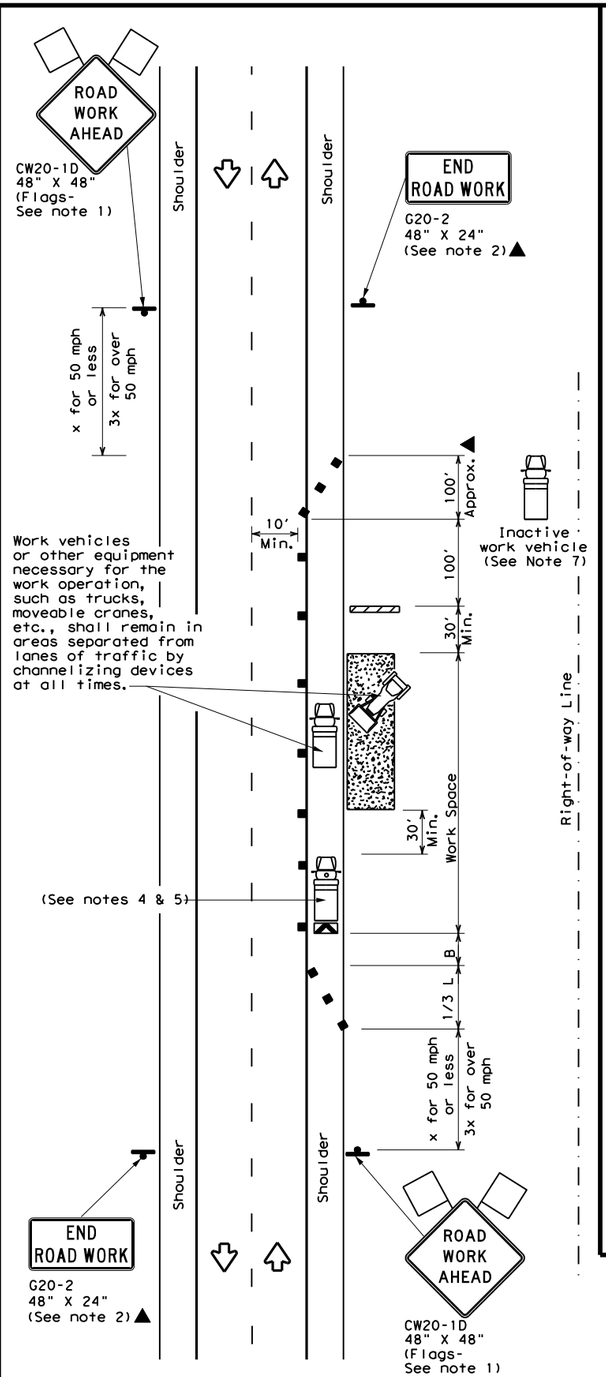
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

LEGEND			
	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

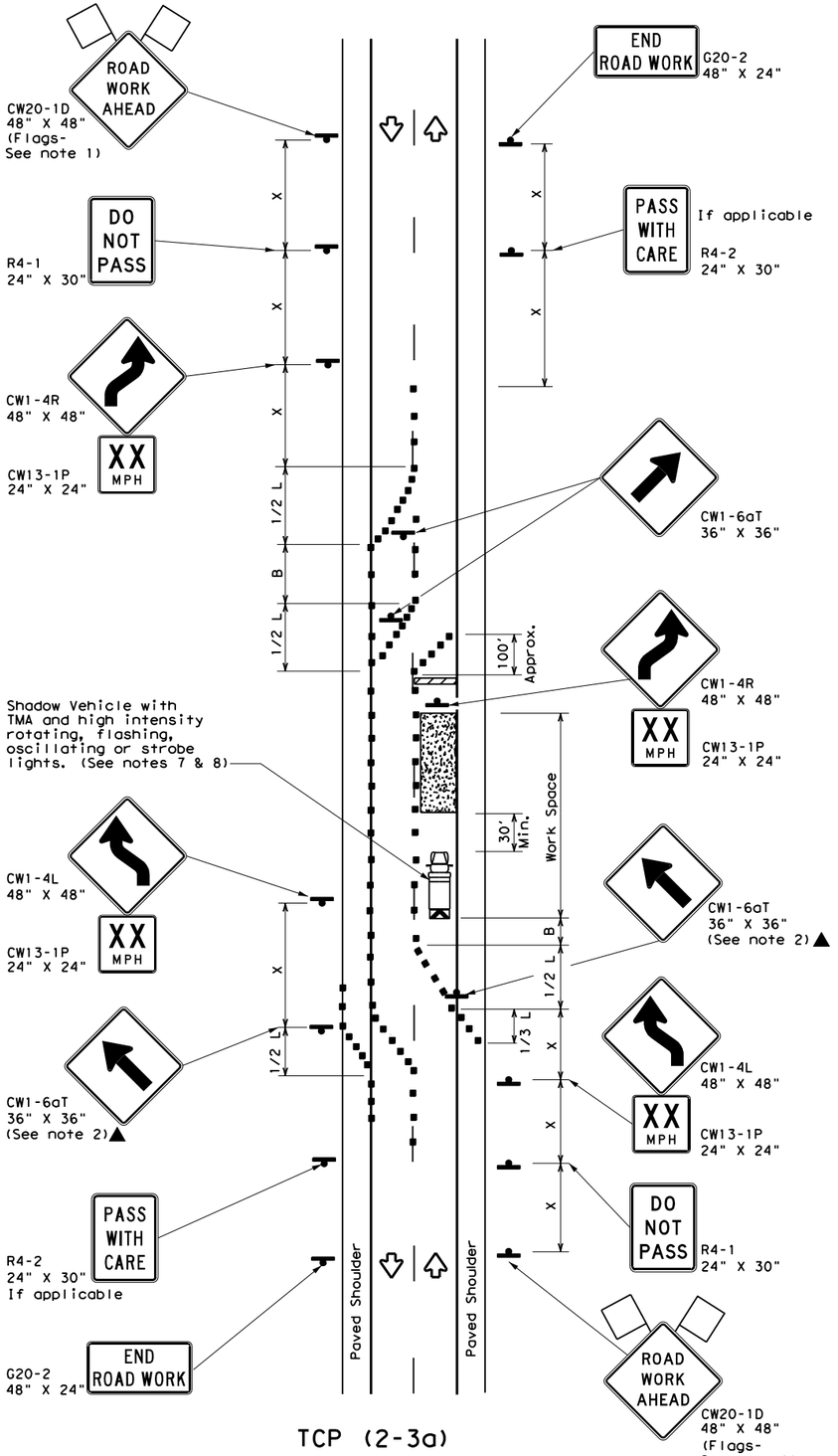
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

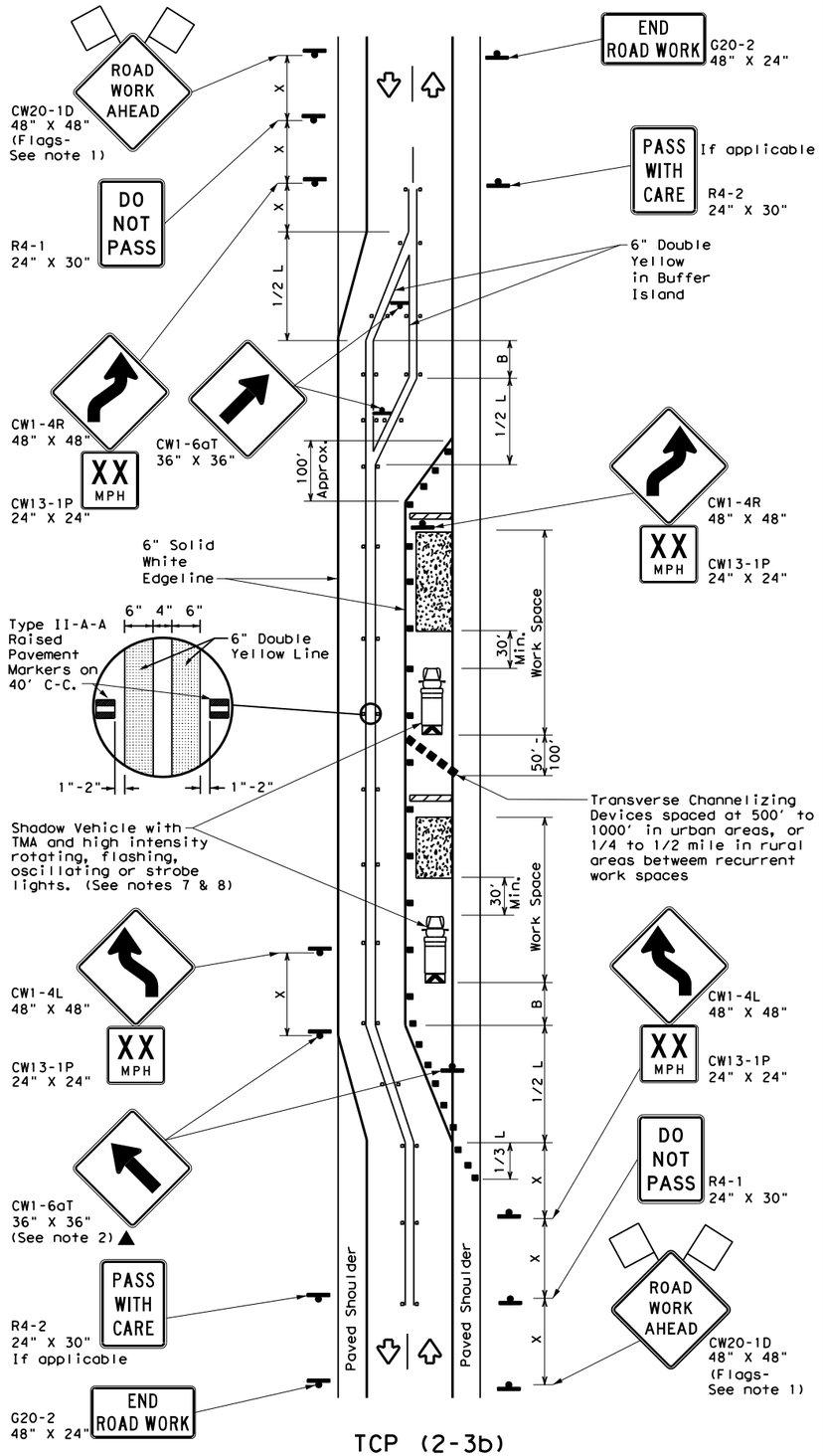
FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	AMA	GRAY		56
1-97 2-18				

DATE:
FILE:



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

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



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

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 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
				TCP(2-3b)ONLY
			✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted.
8. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-3a)

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

Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-23

FILE: tcp(2-3)-23.dgn	DN:	CK:	DW:	CK:
© TxDOT April 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-85 4-98 2-18 8-95 3-03 4-23 1-97 2-12	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		57

DATE: 2/21/2024 11:48:27 AM
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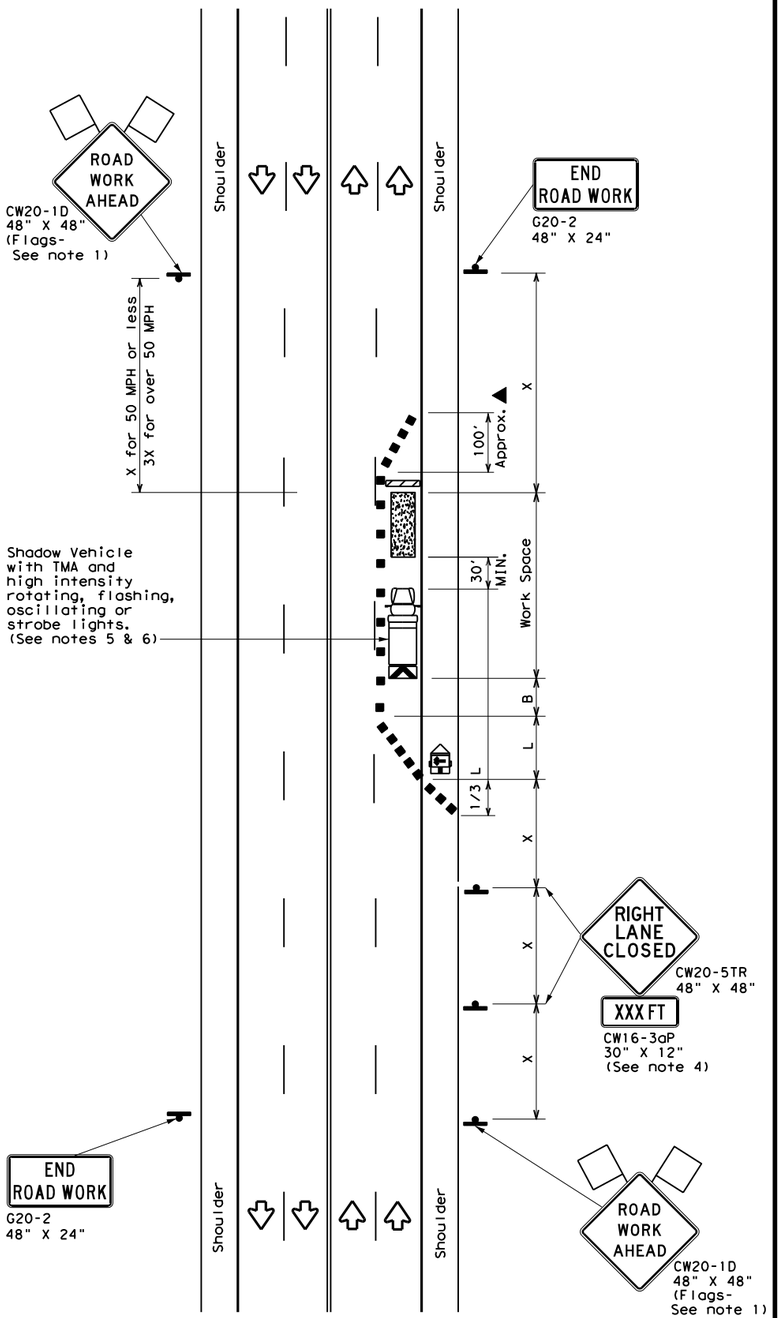
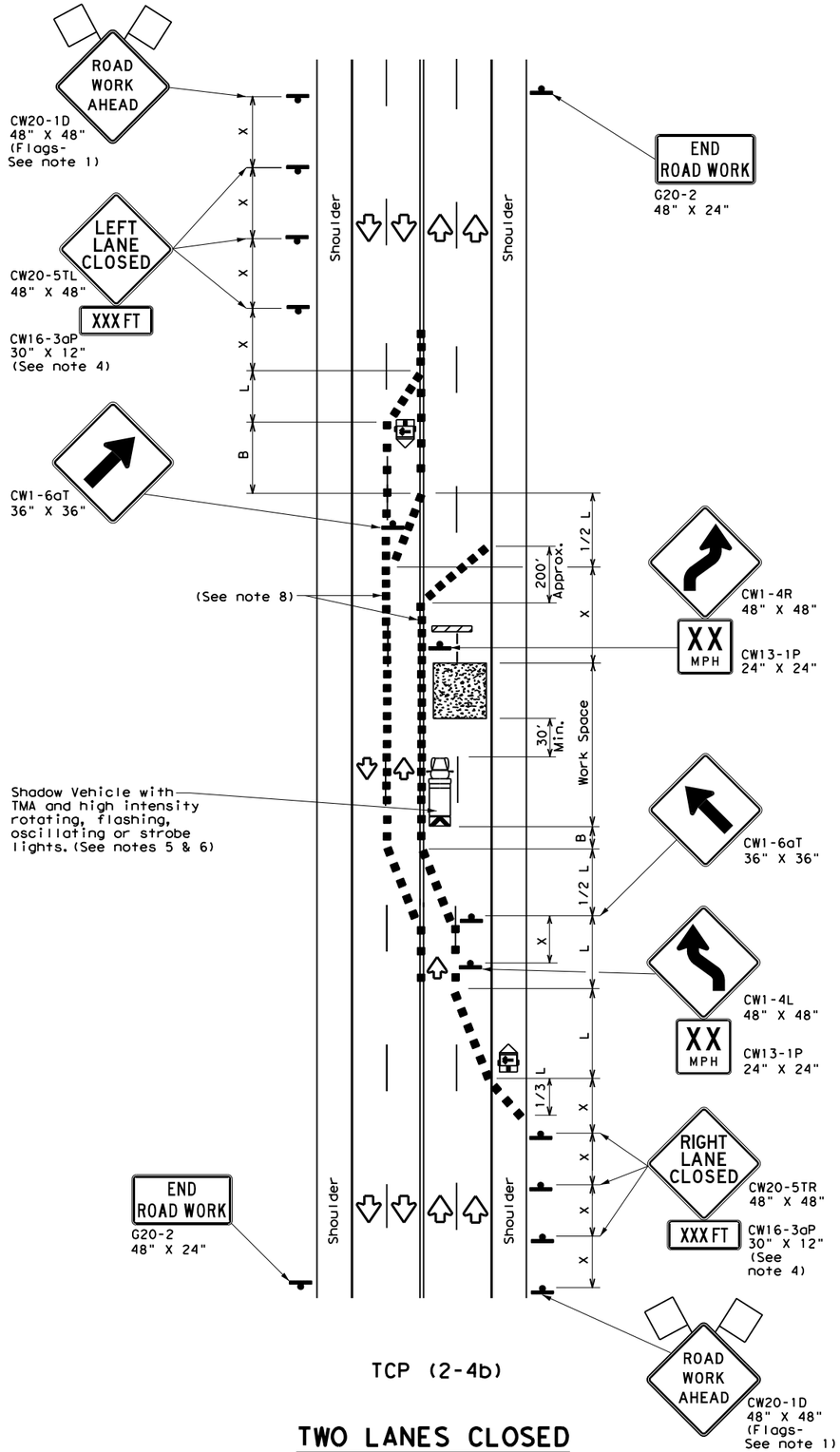


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

TCP (2-4a)

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

TCP (2-4b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0455	03	038	SH 152
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	AMA	GRAY		58

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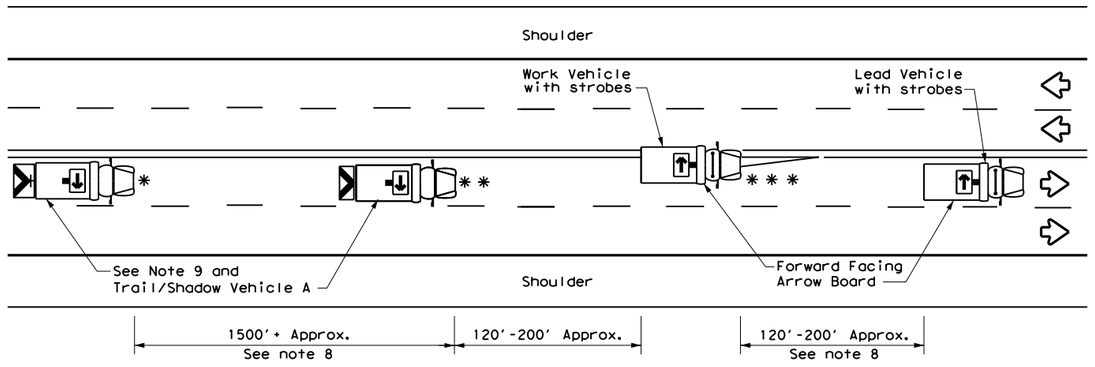
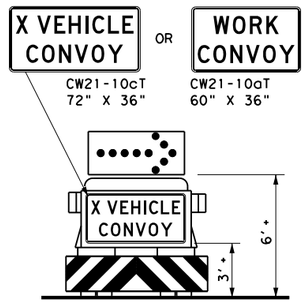


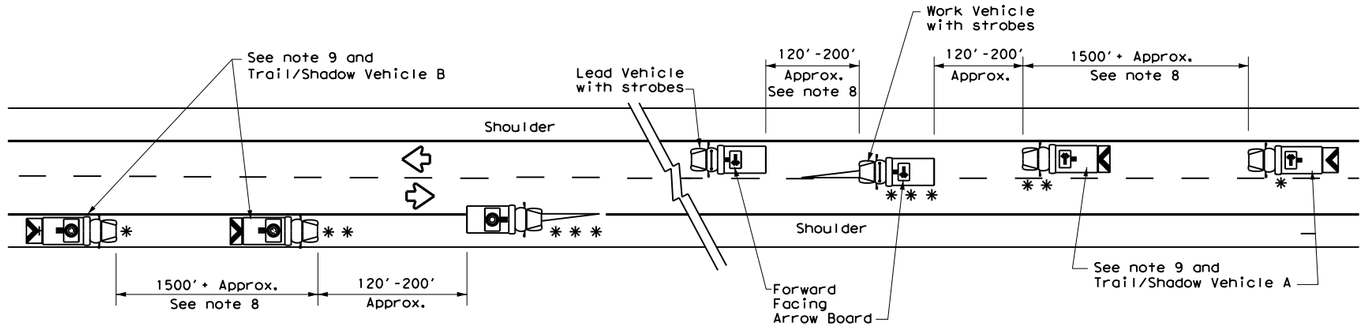
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

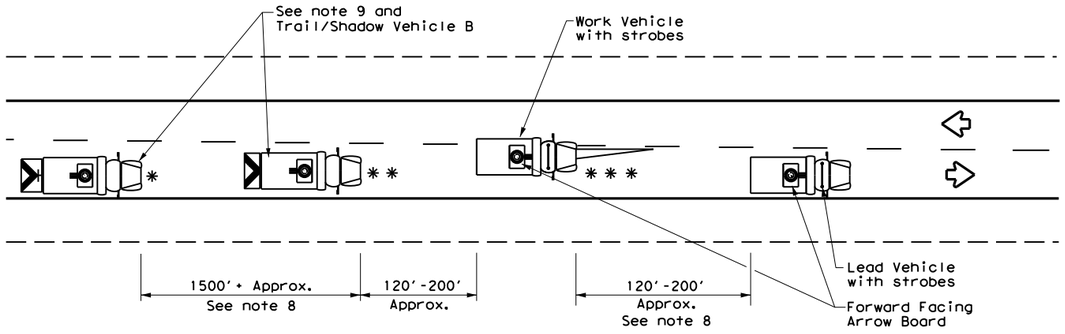


WORK ON SHOULDER

WORK ON TRAVEL LANE

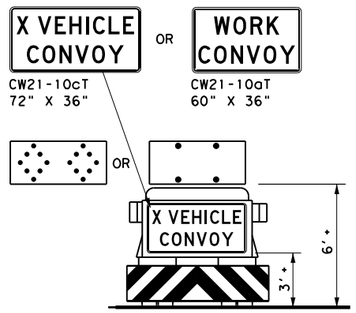
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

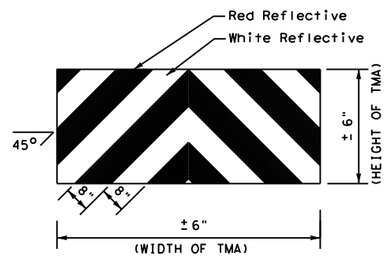
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		59

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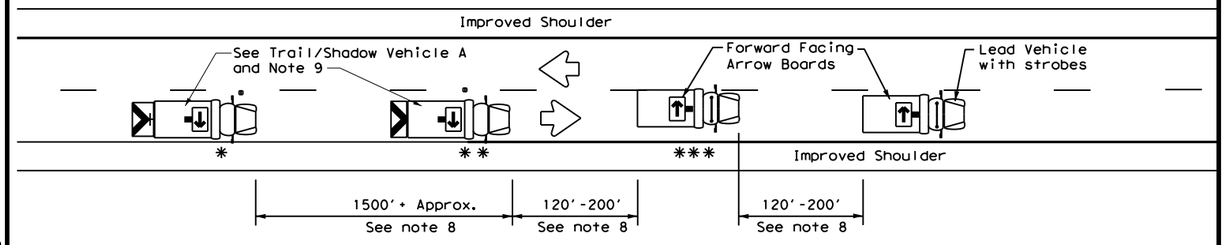
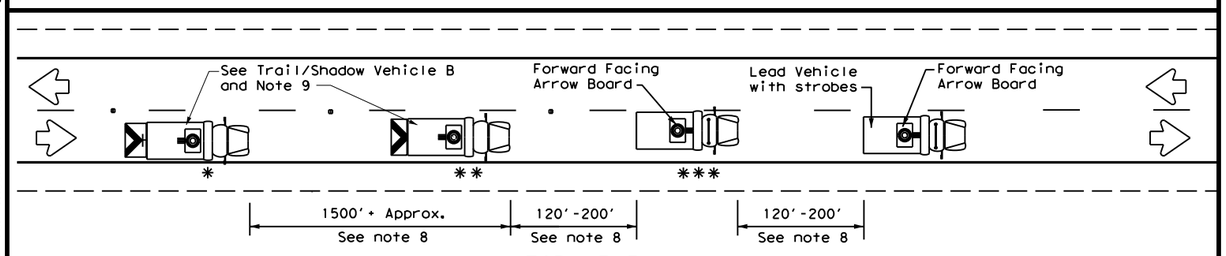


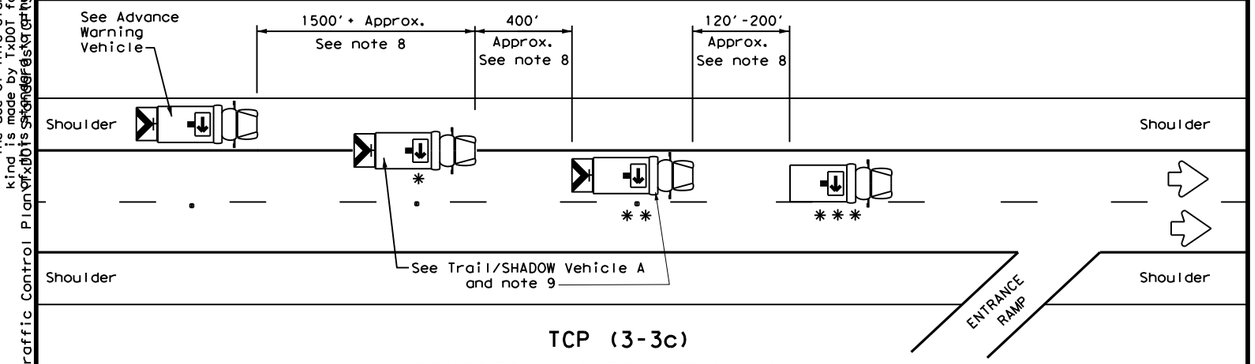
TCP (3-3a)

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



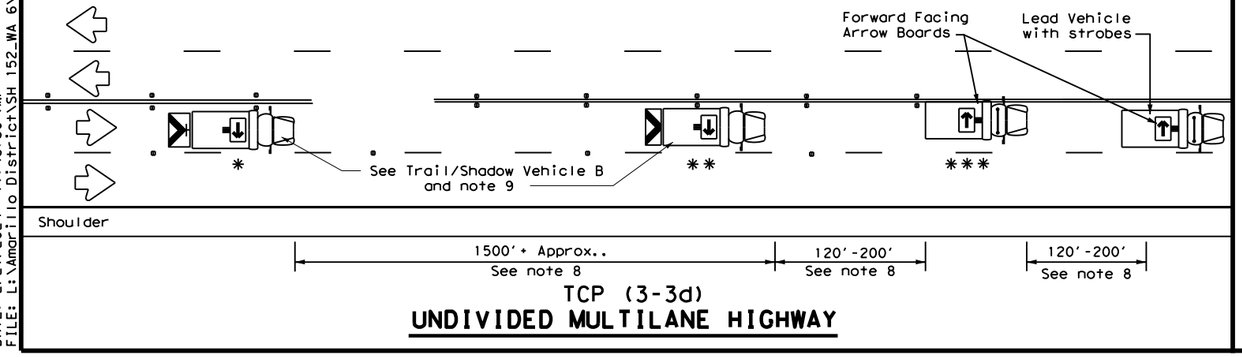
TCP (3-3b)

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



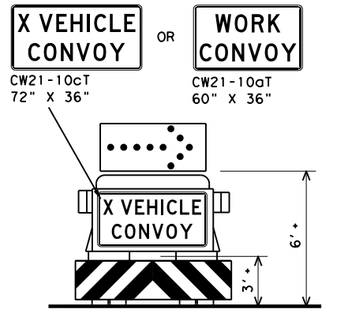
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



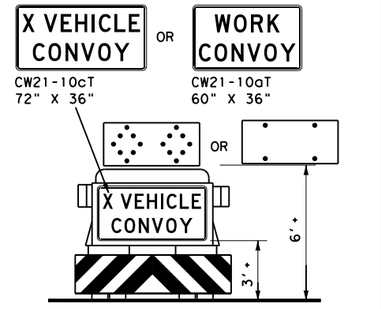
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



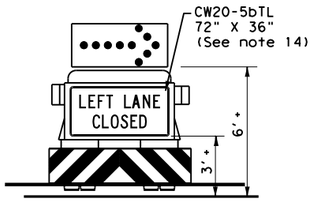
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

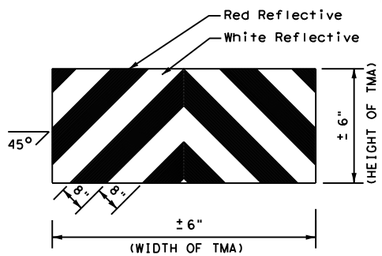


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

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

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	AMA	GRAY		60
1-97 7-14				

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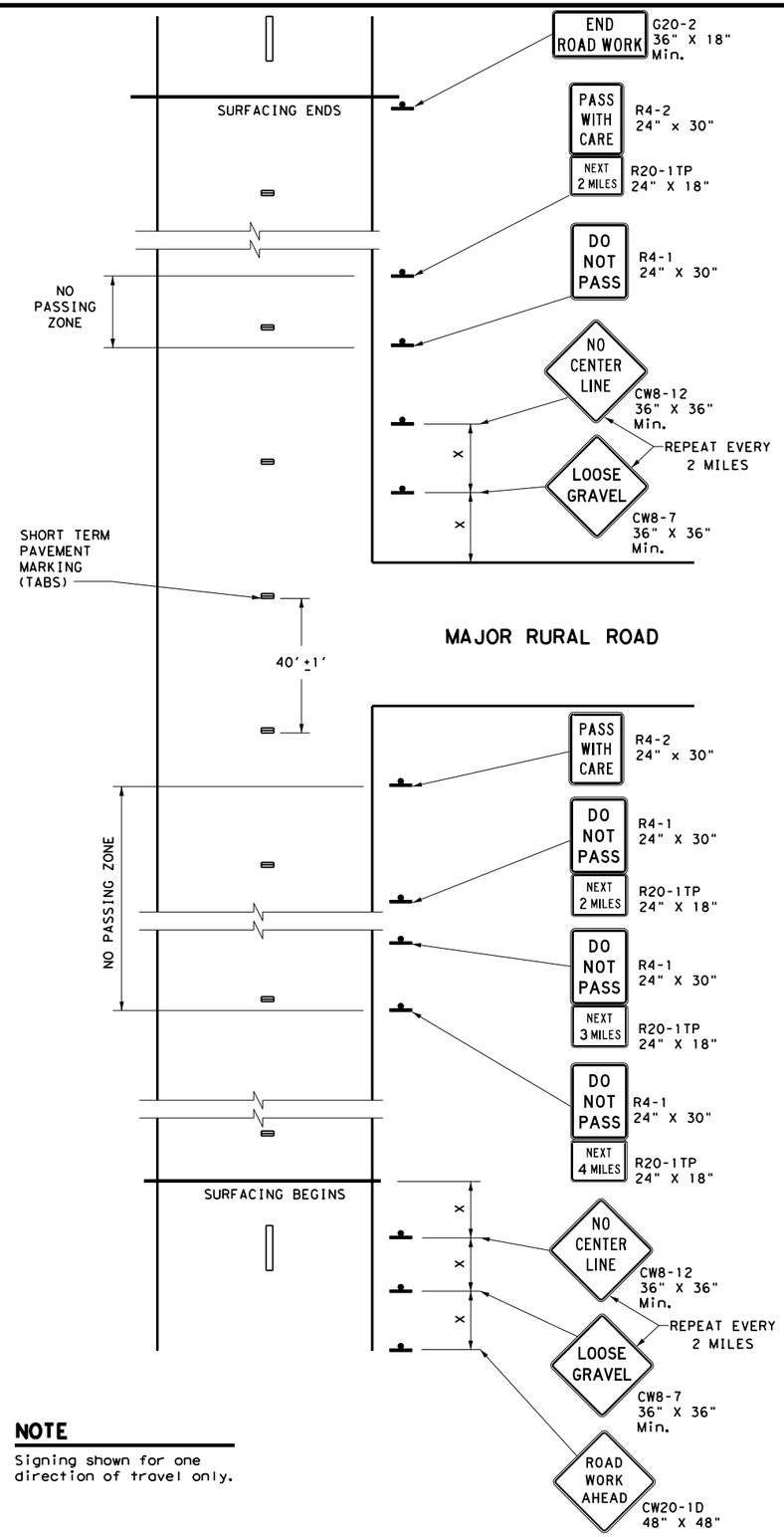
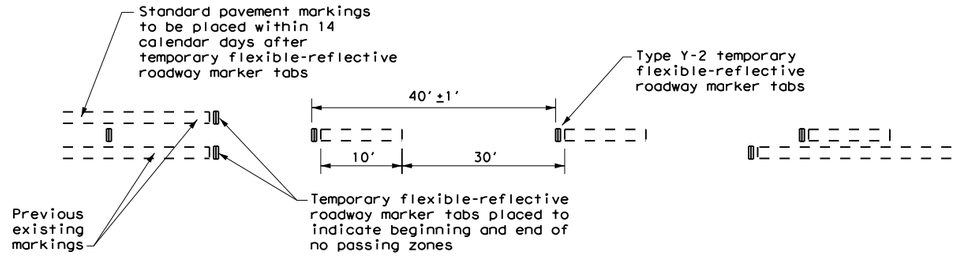


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

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

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

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

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

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

"NO CENTER LINE" SIGN (CW8-12)

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

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

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

"LOOSE GRAVEL" SIGN (CW8-7)

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

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

PAVEMENT MARKINGS

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

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

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

COORDINATION OF SIGN LOCATIONS

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

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

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

* Conventional Roads Only

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

GENERAL NOTES

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

Texas Department of Transportation

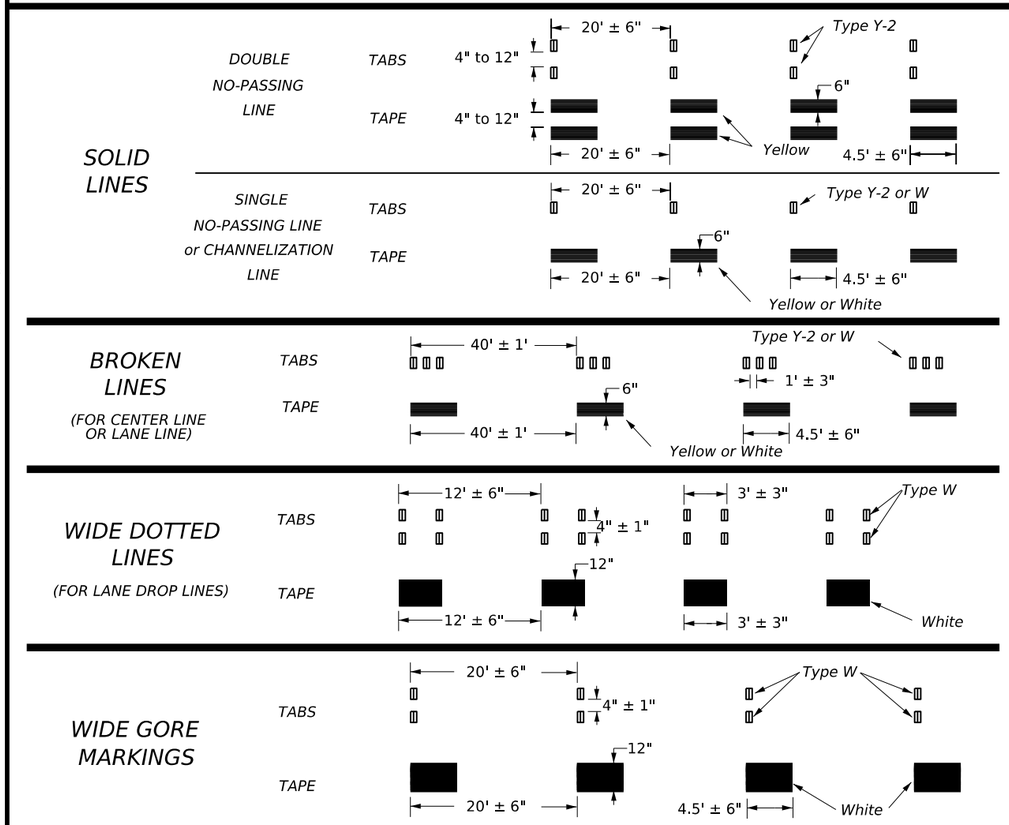
Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	AMA	GRAY		61

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



NOTES:

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

TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

DATE:
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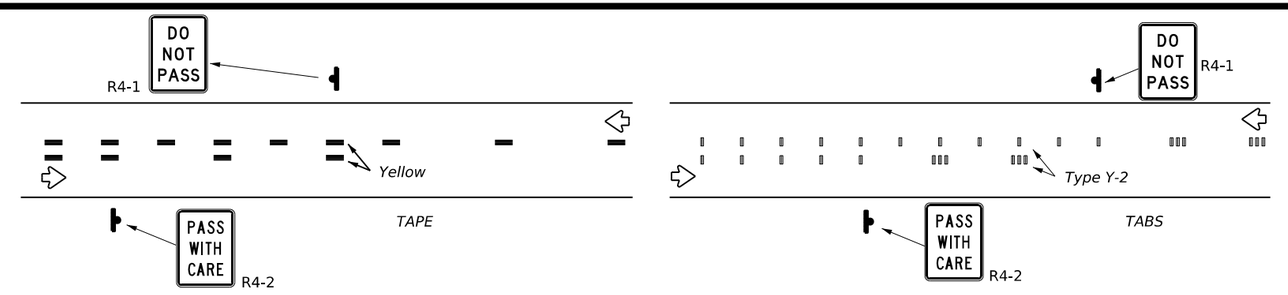
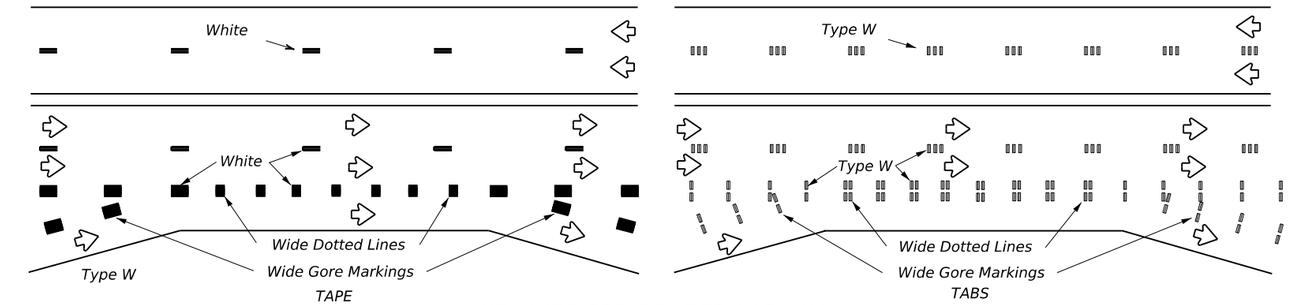
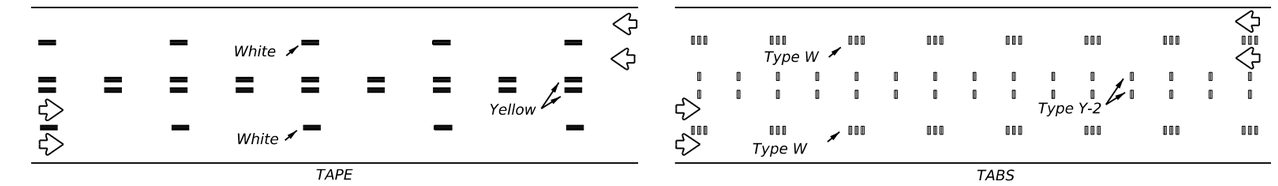
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



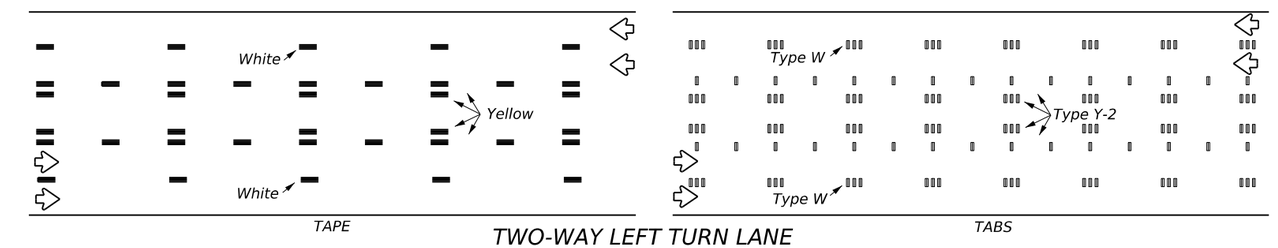
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



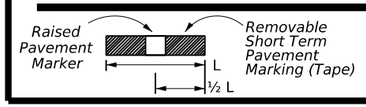
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

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©TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
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3-03				

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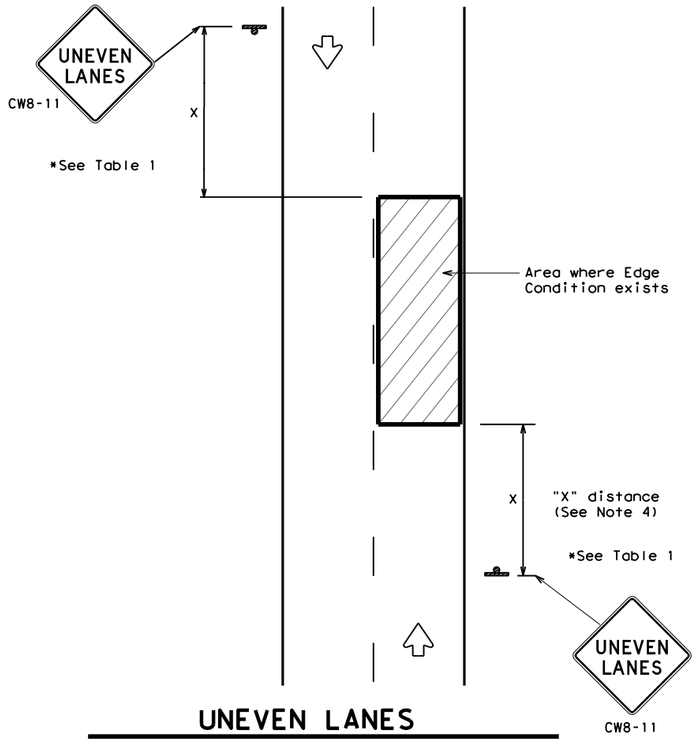
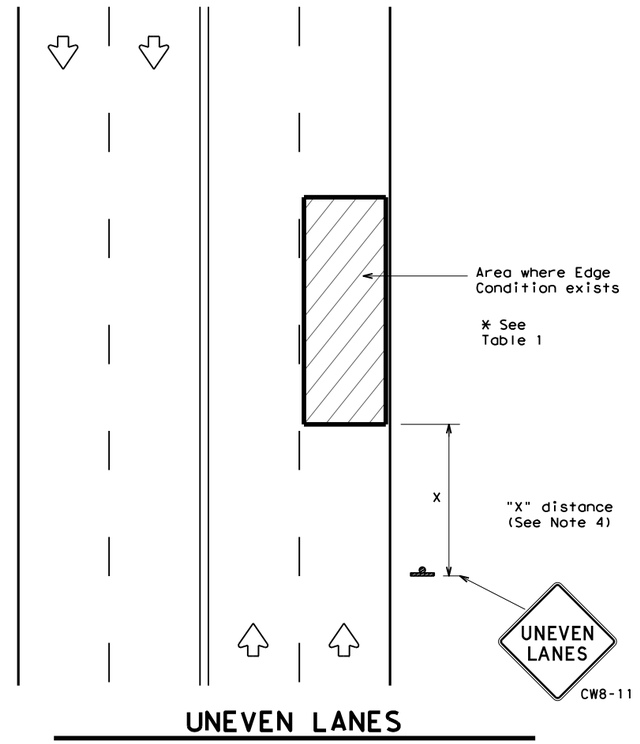
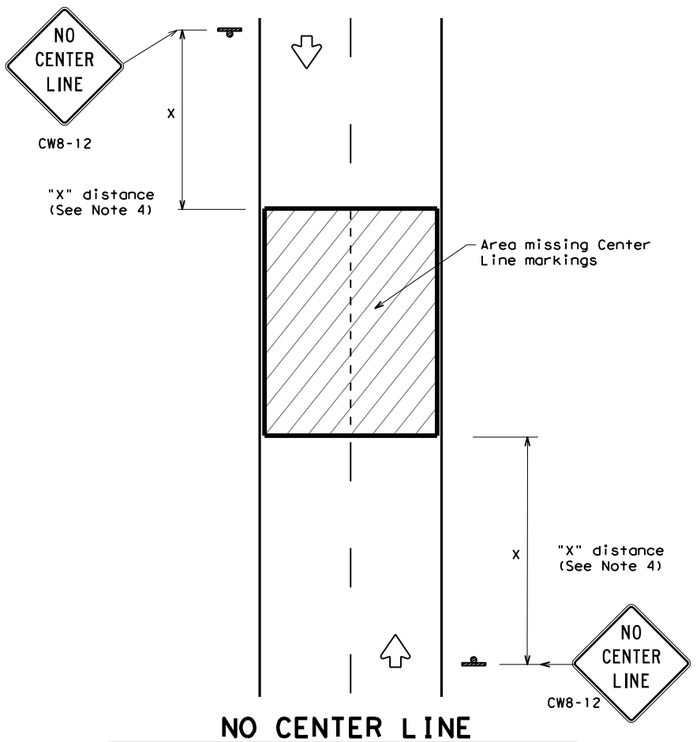


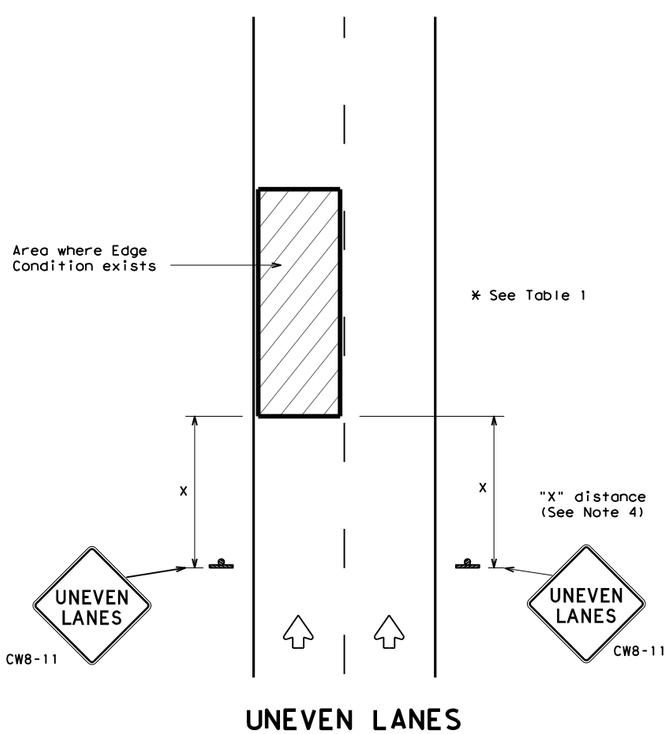
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

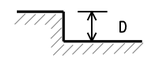
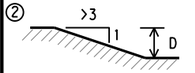
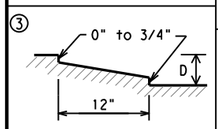
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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1-97 3-03	AMA	GRAY		63

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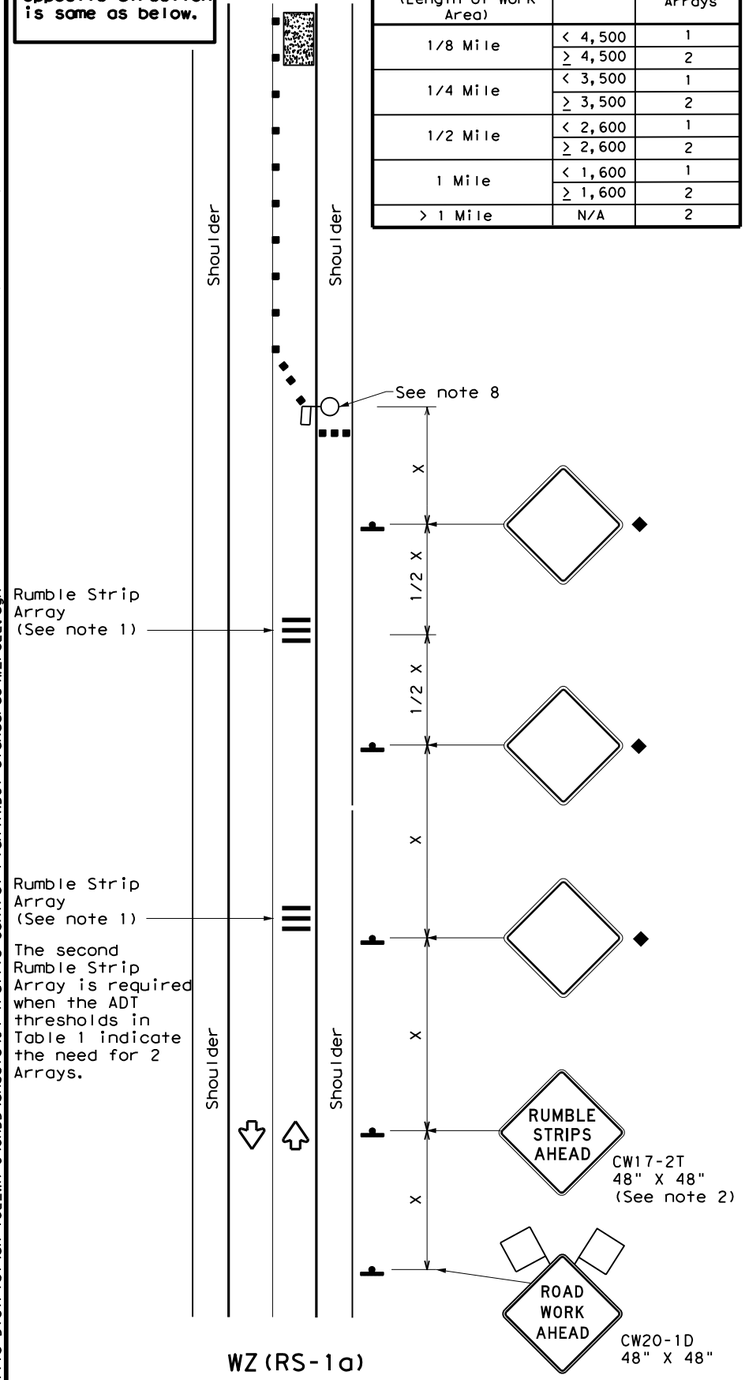
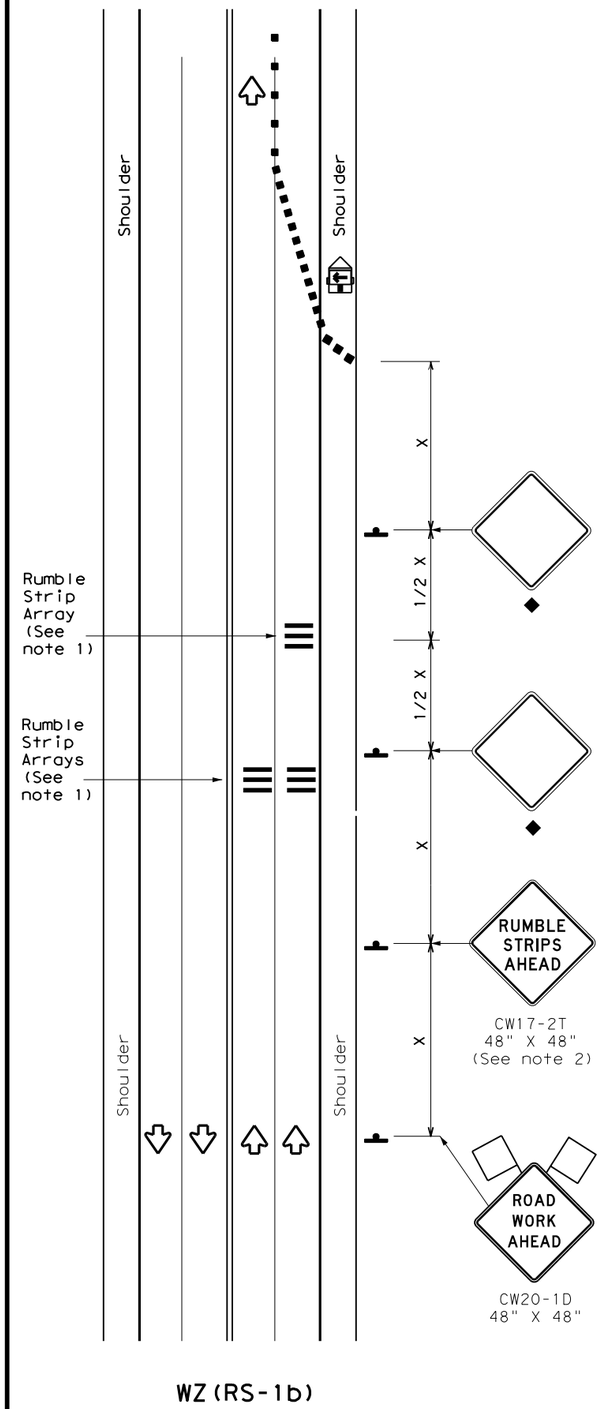
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

TABLE 2	
Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35' +

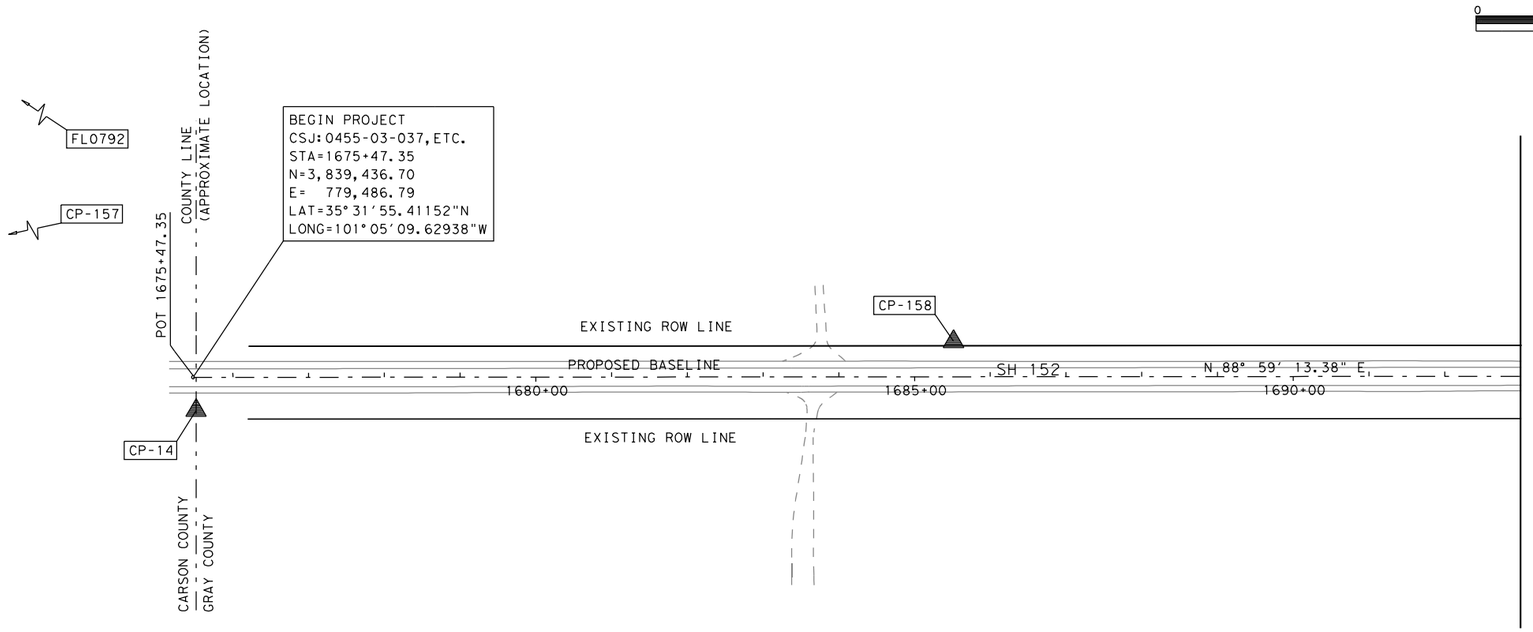
Texas Department of Transportation

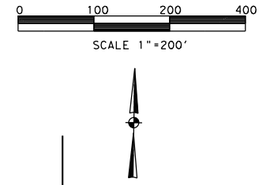
Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

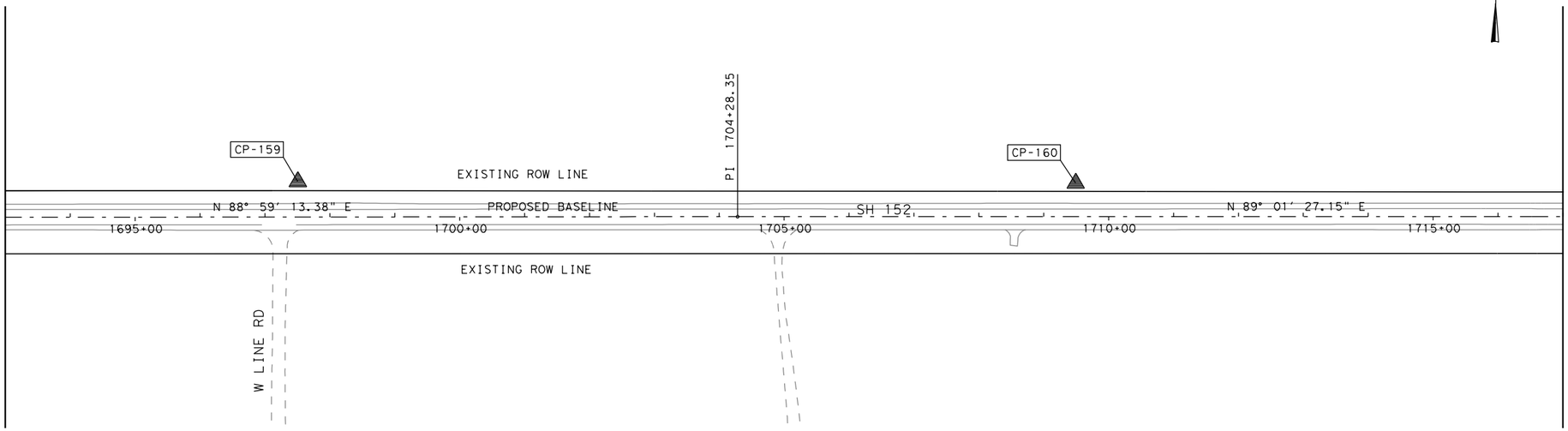
FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		64

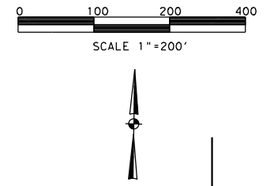




Point	North	East	Elevation	Station	Offset	Description
FL0792	3,855,849.11	754,426.53	3,280.83'	Off Chain	Off Chain	FND DISK IN CONC SLAB (K 228 1934)
CP-157	3,839,486.56	778,667.46	3,291.93'	Off Chain	Off Chain	SET 5/8" IR W/RODS CAP
CP-14	3,839,393.03	779,491.60	3,284.47'	1675+51.38	43.75' RT	SET 5/8" IR W/TXDOT ALUM DISK IN CONC (14)
CP-158	3,839,500.94	780,490.02	3,273.97'	1685+51.55	46.49' LT	SET 5/8" IR W/RODS CAP

From	To	Direction	Distance
CP-157	CP-14	S 83° 31' 33" E	829.42'
CP-14	CP-158	N 83° 49' 54" E	1,004.24'
CP-158	CP-159	N 88° 36' 46" E	1,199.28'





Point	North	East	Elevation	Station	Offset	Description
CP-159	3,839,529.97	781,688.94	3,277.94'	1697+50.80	54.32' LT	SET 5/8" IR W/RODS CAP
CP-160	3,839,548.00	782,887.50	3,278.83'	1709+49.46	51.50' LT	SET 5/8" IR W/RODS CAP

From	To	Direction	Distance
CP-158	CP-159	N 88° 36' 46" E	1,199.28'
CP-159	CP-160	N 89° 08' 17" E	1,198.69'
CP-160	CP-161	S 84° 38' 56" E	942.93'

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, NORTH ZONE (4201), NORTH AMERICAN DATUM OF 1983 (NAD83) (2011 ADJ.; EPOCH 2010.00).

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

STATE OF TEXAS
REGISTERED
JIMMY D. WALTON
5889
PROFESSIONAL
LAND SURVEYOR

2-21-2024

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

2/21/2024

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SPRING, TEXAS 77379
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Control
Infrastructure
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Texas Department of Transportation

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

HORIZONTAL & VERTICAL CONTROL INDEX

(SH 152)

SHEET 1 OF 8

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	65
CONTROL	SECTION	JOB	
0455	03	038	

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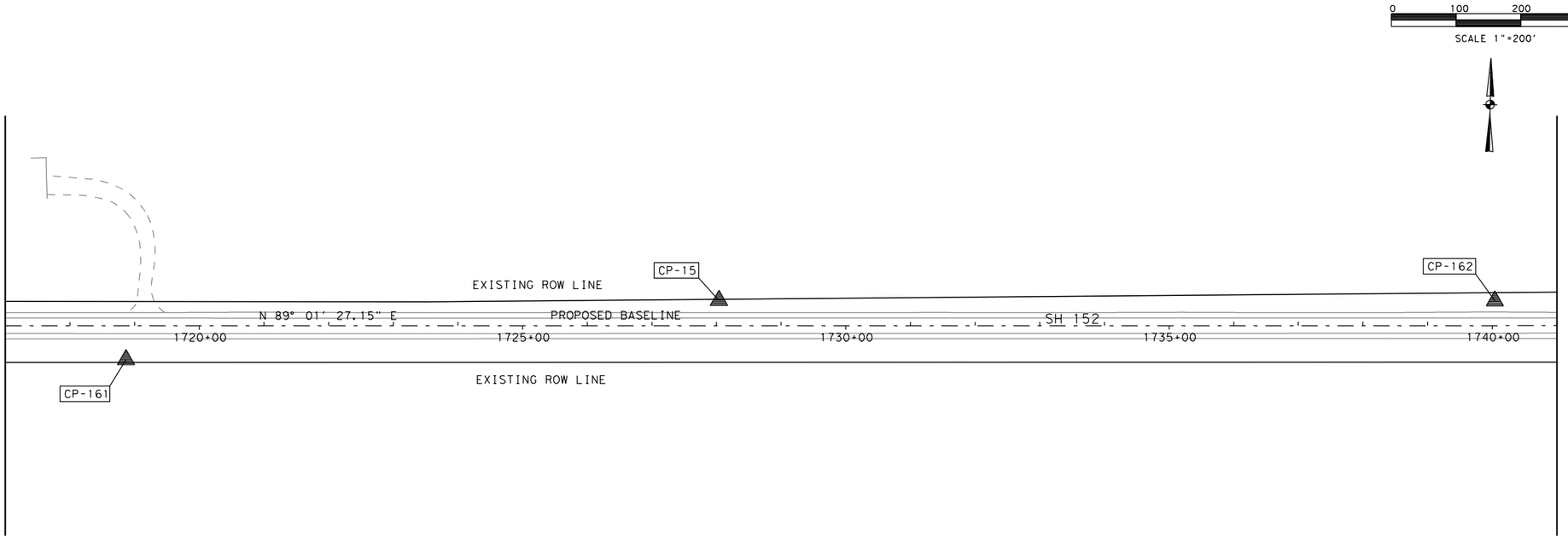
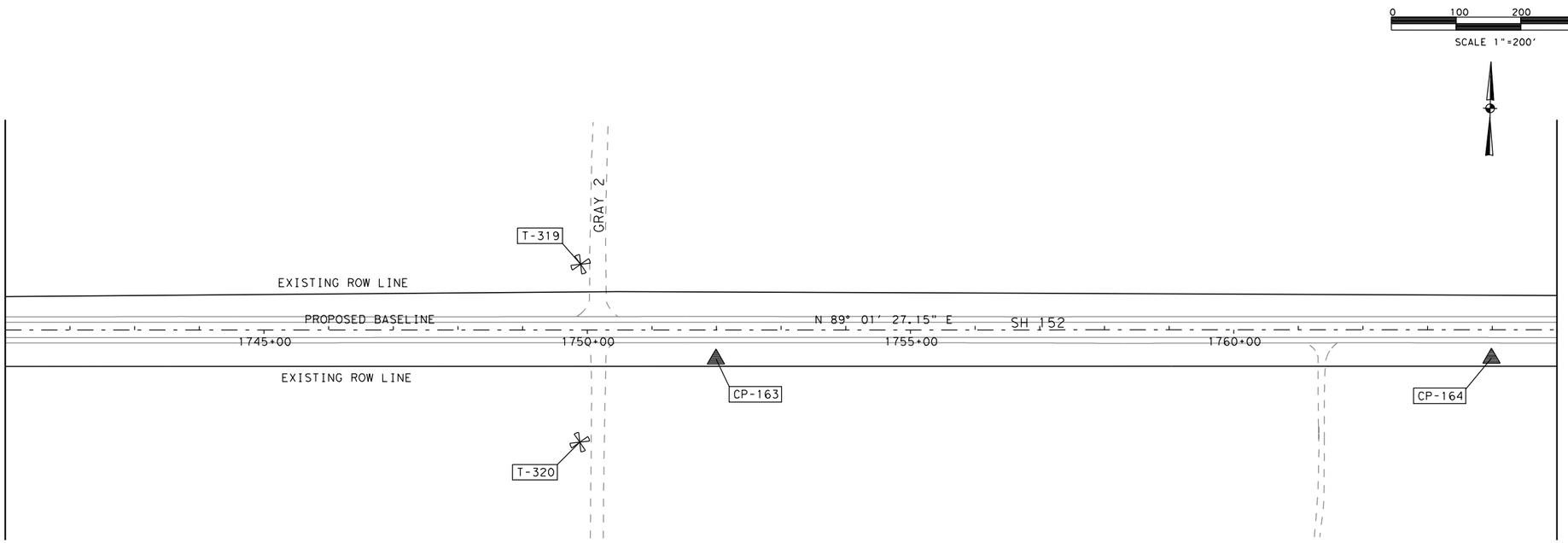
DRAWING DATE: 2/21/2024



Point	North	East	Elevation	Station	Offset	Description
CP-161	3,839,460.07	783,826.33	3,277.53′	1718+86.65	52.41′ RT	SET 5/8" IR W/RODS CAP
CP-15	3,839,567.22	784,741.91	3,275.76′	1728+03.92	39.14′ LT	SET 5/8" IR W/TXDOT ALUM DISK IN CONC (15)
CP-162	3,839,586.82	785,941.77	3,276.12′	1740+03.94	38.30′ LT	SET 5/8" IR W/RODS CAP

From	To	Direction	Distance
CP-160	CP-161	S 84° 38′ 56" E	942.93′
CP-161	CP-15	N 83° 19′ 29" E	921.83′
CP-15	CP-162	N 89° 03′ 50" E	1,200.02′
CP-162	CP-163	S 86° 59′ 06" E	1,198.17′



Point	North	East	Elevation	Station	Offset	Description
T-320	3,839,391.75	786,929.84	3,279.95′	1749+88.55	173.57′ RT	SET 5/8" IR W/RODS CAP
T-319	3,839,666.79	786,926.48	3,279.25′	1749+89.87	101.49′ LT	SET 5/8" IR W/RODS CAP
CP-163	3,839,523.80	787,138.28	3,280.78′	1751+99.21	45.08′ RT	SET 5/8" IR W/RODS CAP
CP-164	3,839,545.27	788,337.52	3,289.76′	1763+98.64	44.04′ RT	SET 5/8" IR W/RODS CAP

From	To	Direction	Distance
CP-162	CP-163	S 86° 59′ 06" E	1,198.17′
CP-163	CP-164	N 88° 58′ 28" E	1,199.44′
CP-164	CP-165	N 89° 02′ 32" E	858.29′

NOTES:
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JIMMY D. WALTON
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LAND SURVEYOR

2-21-2024

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85191
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2/21/2024

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Control
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HORIZONTAL & VERTICAL CONTROL INDEX

(SH 152)

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	66
CONTROL	SECTION	JOB	
0455	03	038	

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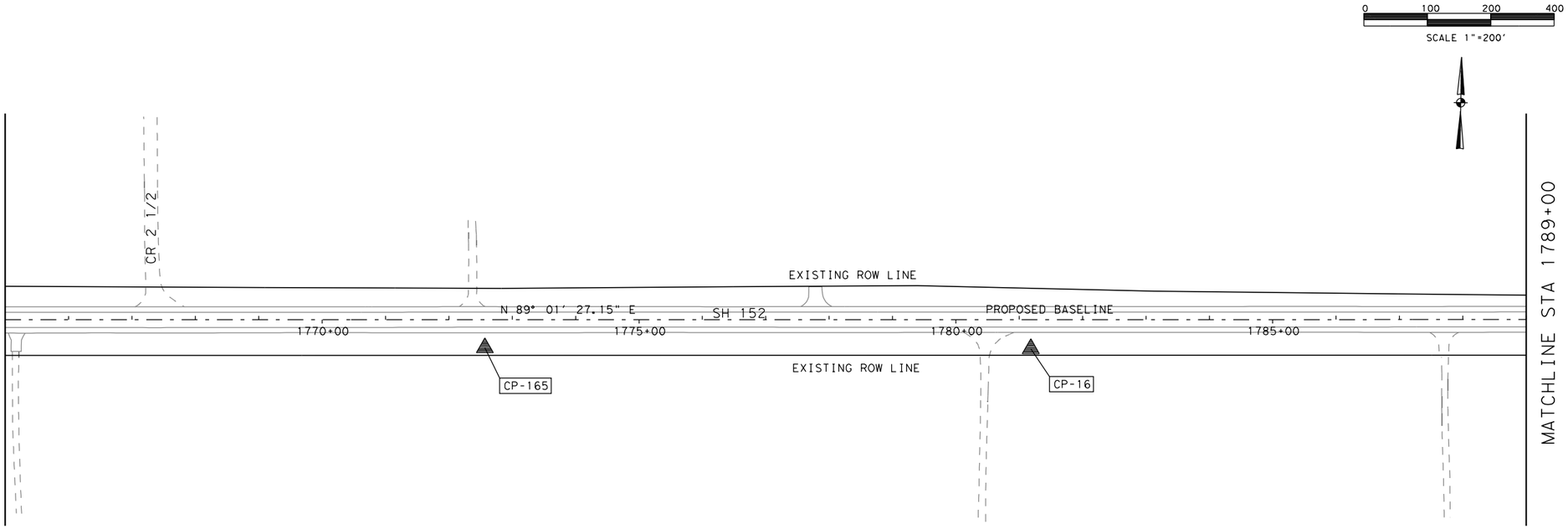
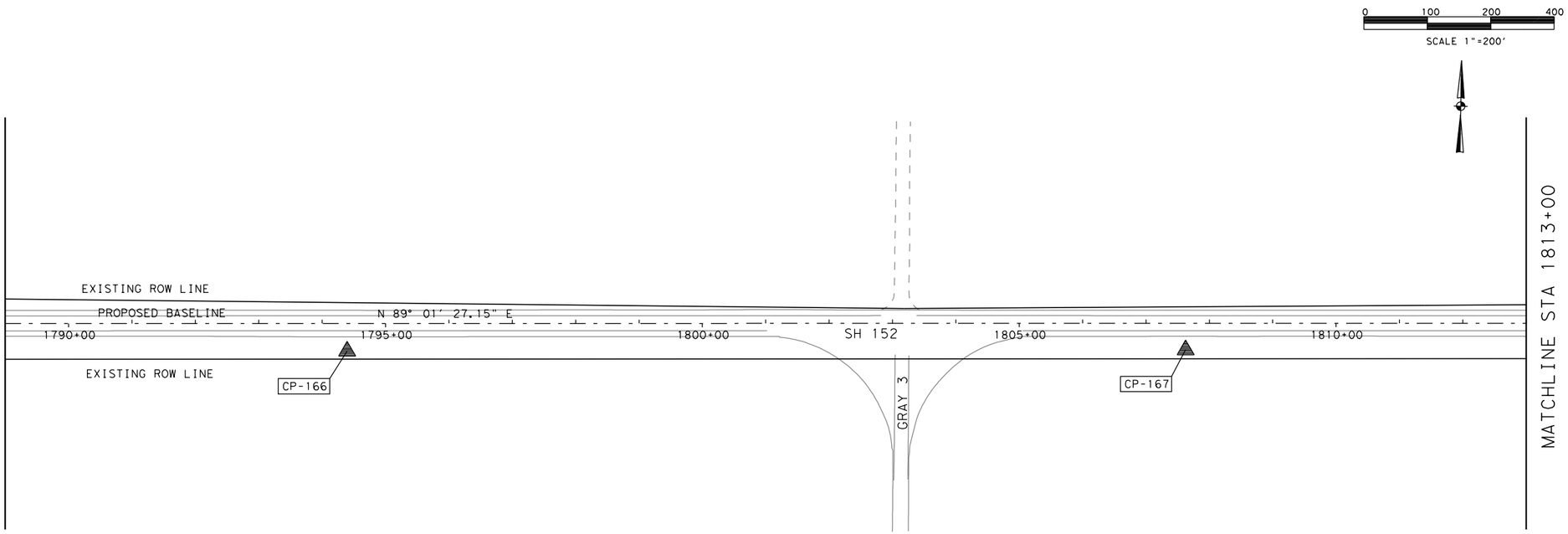


Point	North	East	Elevation	Station	Offset	Description
CP-165	3,839,559.62	789,195.69	3,291.49'	1772+56.93	44.31' RT	SET 5/8" IR W/RODS CAP
CP-16	3,839,572.67	790,056.95	3,289.67'	1781+18.29	45.93' RT	SET 5/8" IR W/TXDOT ALUM CAP IN CONC (16)

From	To	Direction	Distance
CP-164	CP-165	N 89° 02' 32" E	858.29'
CP-165	CP-16	N 89° 07' 54" E	861.36'
CP-16	CP-166	N 88° 55' 45" E	1,321.21'



Point	North	East	Elevation	Station	Offset	Description
CP-166	3,839,597.37	791,377.93	3,287.01'	1794+39.50	43.73' RT	SET 5/8" IR W/RODS CAP
CP-167	3,839,621.88	792,700.85	3,281.17'	1807+62.65	41.75' RT	SET 5/8" IR W/RODS CAP

From	To	Direction	Distance
CP-16	CP-166	N 88° 55' 45" E	1,321.21'
CP-166	CP-167	N 88° 56' 18" E	1,323.15'
CP-167	CP-168	N 89° 07' 17" E	1,322.46'

NOTES:
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HORIZONTAL & VERTICAL CONTROL INDEX

(SH 152)

SHEET 3 OF 8

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	67
CONTROL	SECTION	JOB	
0455	03	038	

FILENAME: N:\I.S. Engineers 528\21942005\CAD\H&V Control\GRAY COUNTY\H&V Index Sheet 3.dgn
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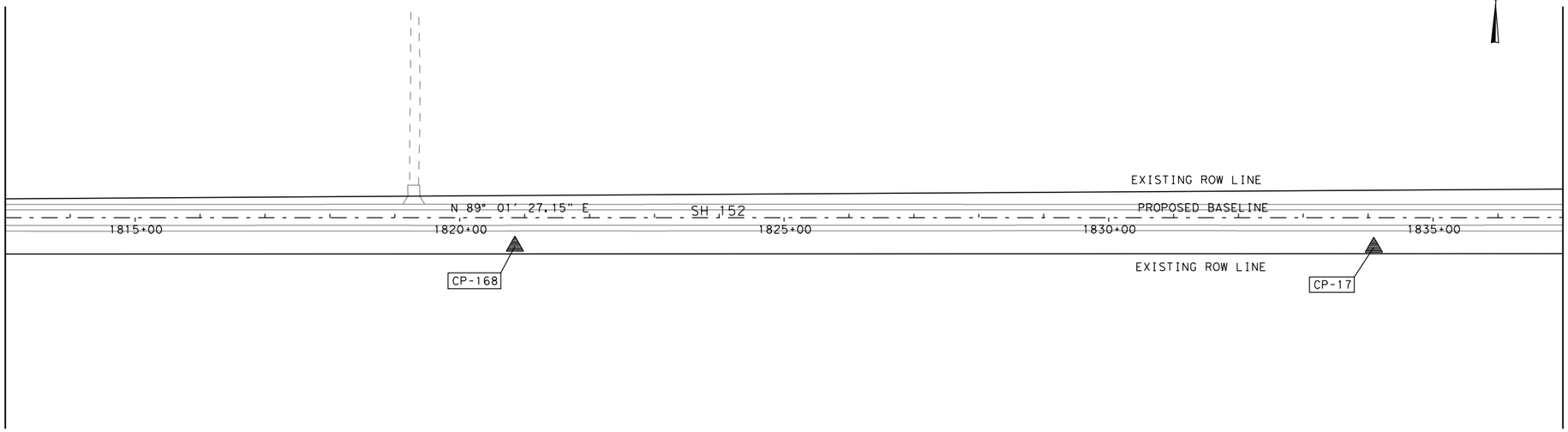

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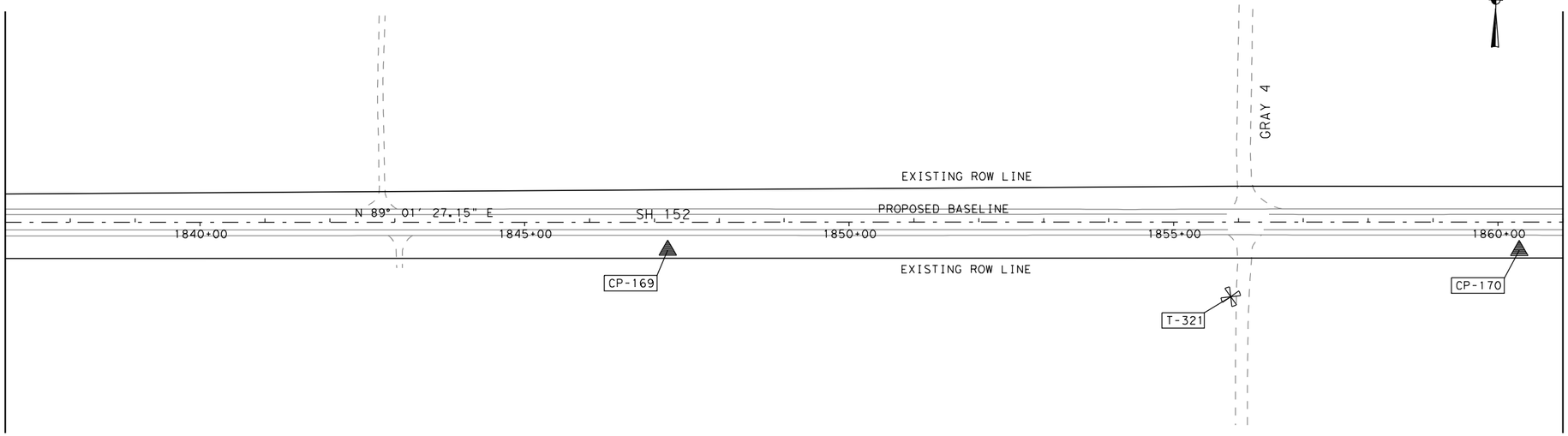
SCALE 1"=200'

Point	North	East	Elevation	Station	Offset	Description
CP-168	3,839,642.16	794,023.16	3,279.25'	1820+85.11	43.99' RT	SET 5/8" IR W/RODS CAP
CP-17	3,839,662.76	795,346.46	3,279.92'	1834+08.57	45.94' RT	SET 5/8" IR W/TXDOT ALUM CAP IN CONC (17)

From	To	Direction	Distance
CP-167	CP-168	N 89° 07' 17" E	1,322.46'
CP-168	CP-17	N 89° 06' 30" E	1,323.46'
CP-17	CP-169	N 88° 53' 57" E	1,312.17'



0 100 200 400
SCALE 1"=200'

Point	North	East	Elevation	Station	Offset	Description
CP-169	3,839,687.96	796,658.39	3,273.69'	1847+20.73	43.07' RT	SET 5/8" IR W/RODS CAP
T-321	3,839,630.98	797,526.91	3,270.46'	1855+88.16	114.84' RT	SET 5/8" IR W/RODS CAP
CP-170	3,839,709.71	797,970.31	3,272.96'	1860+32.84	43.68' RT	SET 5/8" IR W/RODS CAP

From	To	Direction	Distance
CP-17	CP-169	N 88° 53' 57" E	1,312.17'
CP-169	CP-170	N 89° 03' 02" E	1,312.10'
CP-170	CP-171	N 89° 01' 12" E	1,312.37'

NOTES:
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HORIZONTAL & VERTICAL CONTROL INDEX

(SH 152)

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	68
CONTROL	SECTION	JOB	
0455	03	038	

FILENAME: N:\I.S. Engineers 528\2194200S\CAD\H&V Control\GRAY COUNTY\H&V Index Sheet 4.dgn
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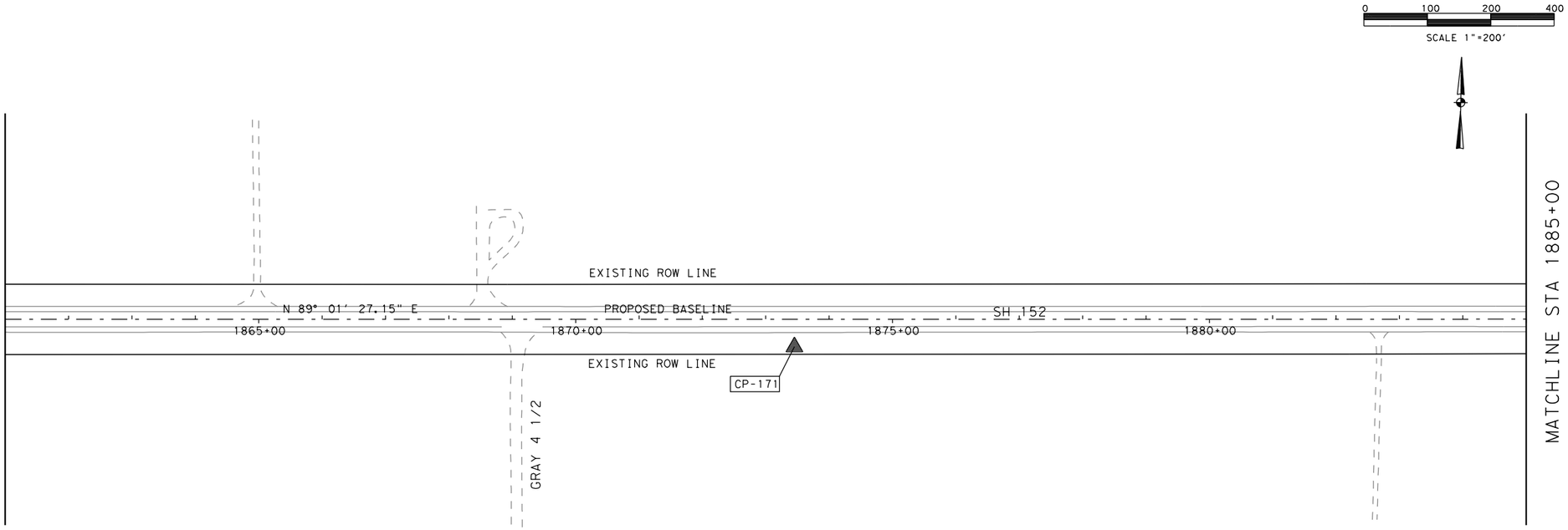
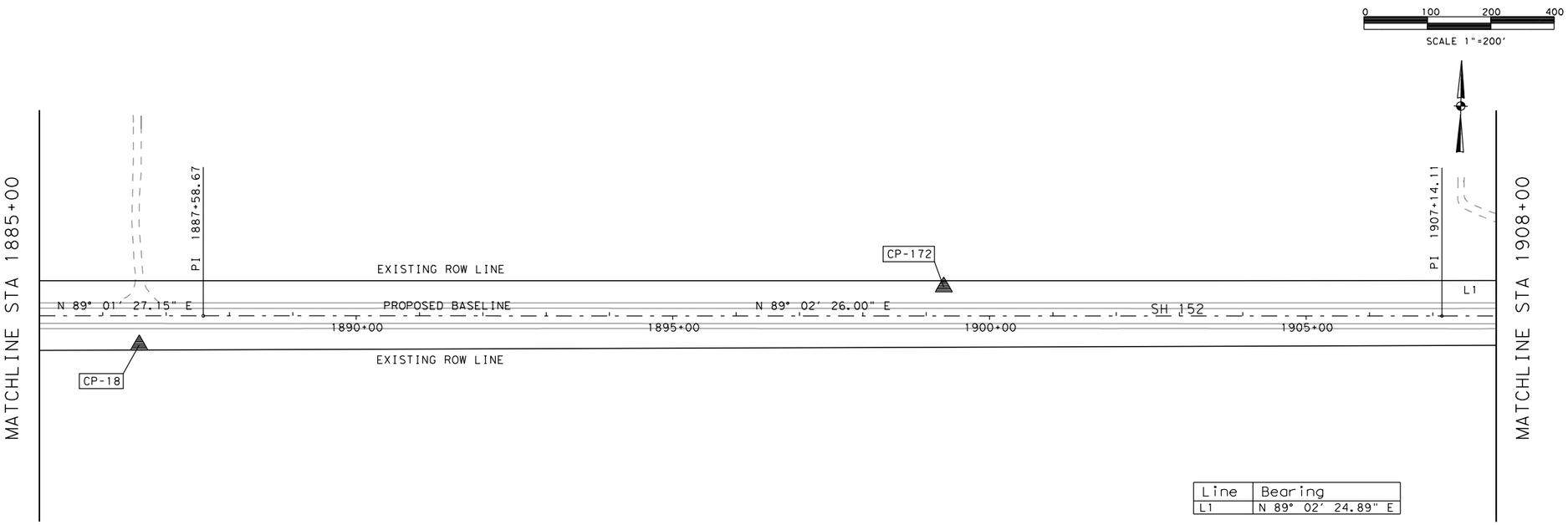


Point	North	East	Elevation	Station	Offset	Description
CP-171	3,839,732.15	799,282.49	3,270.34'	1873+45.20	43.58' RT	SET 5/8" IR W/RODS CAP

From	To	Direction	Distance
CP-170	CP-171	N 89° 01' 12" E	1,312.37'
CP-171	CP-18	N 89° 06' 46" E	1,312.45'



Line	Bearing
L1	N 89° 02' 24.89" E

Point	North	East	Elevation	Station	Offset	Description
CP-18	3,839,752.47	800,594.78	3,266.77'	1886+57.65	45.61' RT	SET 5/8" IR W/TXDOT ALUM CAP IN CONC (18)
CP-172	3,839,865.29	801,863.20	3,263.08'	1899+27.79	45.92' LT	SET 5/8" IR W/RODS CAP

From	To	Direction	Distance
CP-171	CP-18	N 89° 06' 46" E	1,312.45'
CP-18	CP-172	N 84° 55' 02" E	1,273.43'
CP-172	CP-173	S 86° 52' 54" E	1,279.93'

NOTES:
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M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER

2/21/2024

RODS
Surveying, Inc.
6810 LEE ROAD, STE.100
SPRING, TEXAS 77379
TEL (281) 257-4020
FAX (281) 257-4021
TBPELS SURVEYING FIRM REG. No. 10030700

Control
Infrastructure
Transportation
Land Development

Texas Department of Transportation

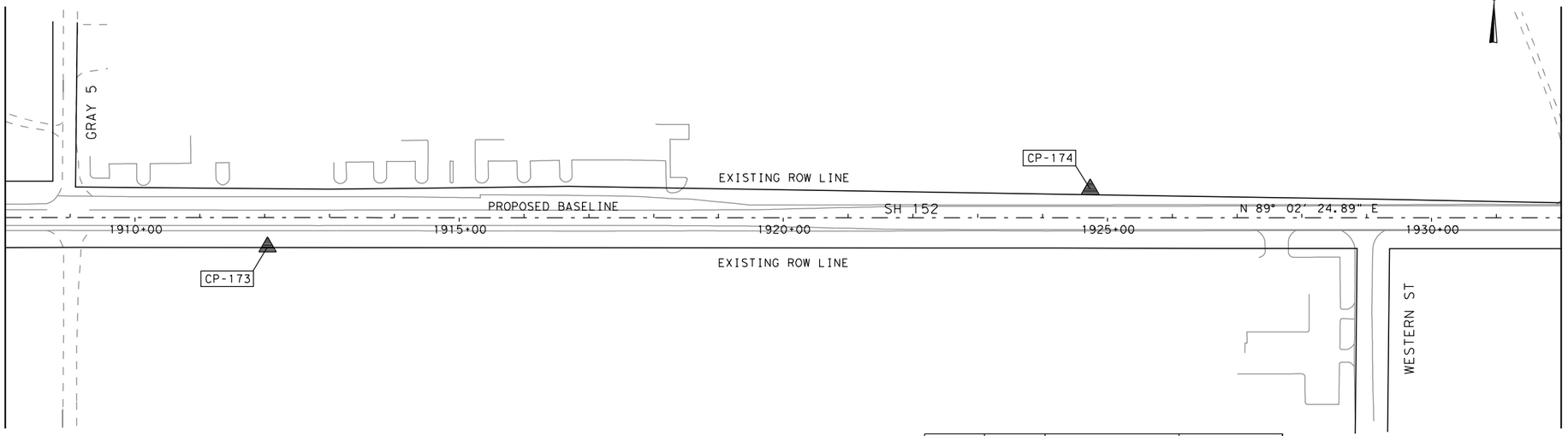
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

HORIZONTAL & VERTICAL CONTROL INDEX

(SH 152)

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	69
CONTROL	SECTION	JOB	
0455	03	038	

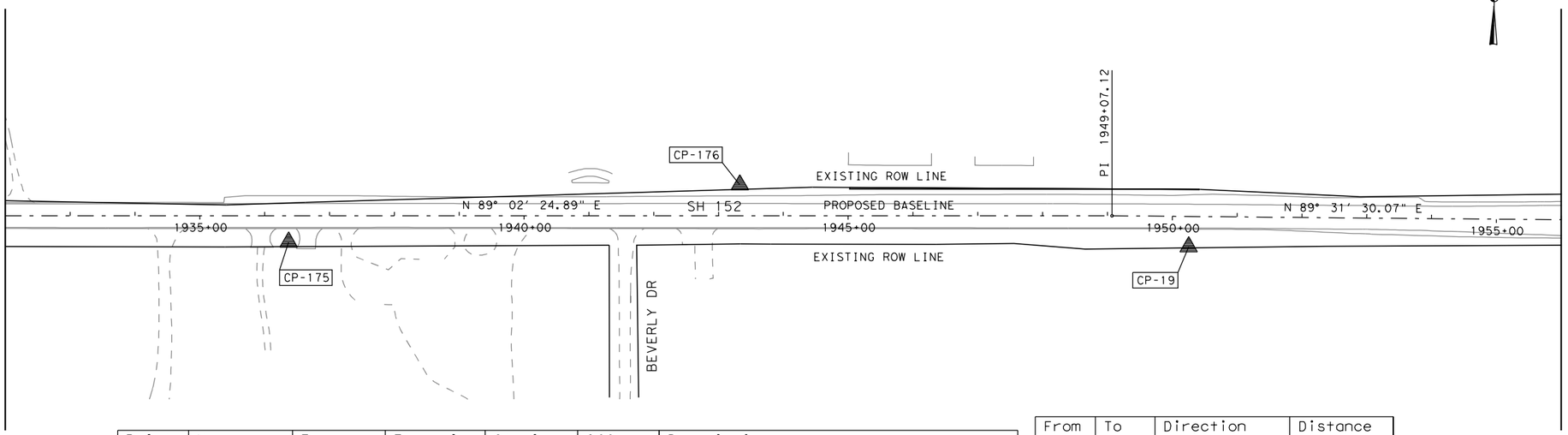
FILENAME: N:\I.S. Engineers 528\21942005\CAD\H&V Control\GRAY COUNTY\H&V Index Sheet 5.dgn
DRAWING DATE: 2/21/2024



0 100 200 400
SCALE 1"=200'

Point	North	East	Elevation	Station	Offset	Description
CP-173	3,839,795.66	803,141.23	3,258.96'	1912+04.48	45.10' RT	SET 5/8" IR W/RODS CAP
CP-174	3,839,906.32	804,408.43	3,250.95'	1924+73.36	44.32' LT	SET 5/8" IR W/RODS CAP

From	To	Direction	Distance
CP-172	CP-173	S 86° 52' 54" E	1,279.93'
CP-173	CP-174	N 85° 00' 33" E	1,272.02'
CP-174	CP-175	S 86° 47' 28" E	1,166.79'



0 100 200 400
SCALE 1"=200'

Point	North	East	Elevation	Station	Offset	Description
CP-175	3,839,841.01	805,573.39	3,244.70'	1936+37.06	40.50' RT	SET 5/8" IR W/RODS CAP
CP-176	3,839,940.98	806,267.71	3,240.69'	1943+32.96	47.83' LT	SET 5/8" IR W/RODS CAP
CP-19	3,839,857.18	806,961.51	3,235.78'	1950+25.65	46.58' RT	SET 5/8" IR W/TXDOT ALUM CAP IN CONC (19)

From	To	Direction	Distance
CP-174	CP-175	S 86° 47' 28" E	1,166.79'
CP-175	CP-176	N 81° 48' 25" E	701.48'
CP-176	CP-19	S 83° 06' 46" E	698.84'
CP-18	CP-177	N 84° 13' 16" E	1,000.67'

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, NORTH ZONE (4201), NORTH AMERICAN DATUM OF 1983 (NAD83) (2011 ADJ.; EPOCH 2010.00).

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4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXPM DURING SEPTEMBER 2022.

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STATE OF TEXAS
REGISTERED
JIMMY D. WALTON
5889
PROFESSIONAL
LAND SURVEYOR

2-21-2024

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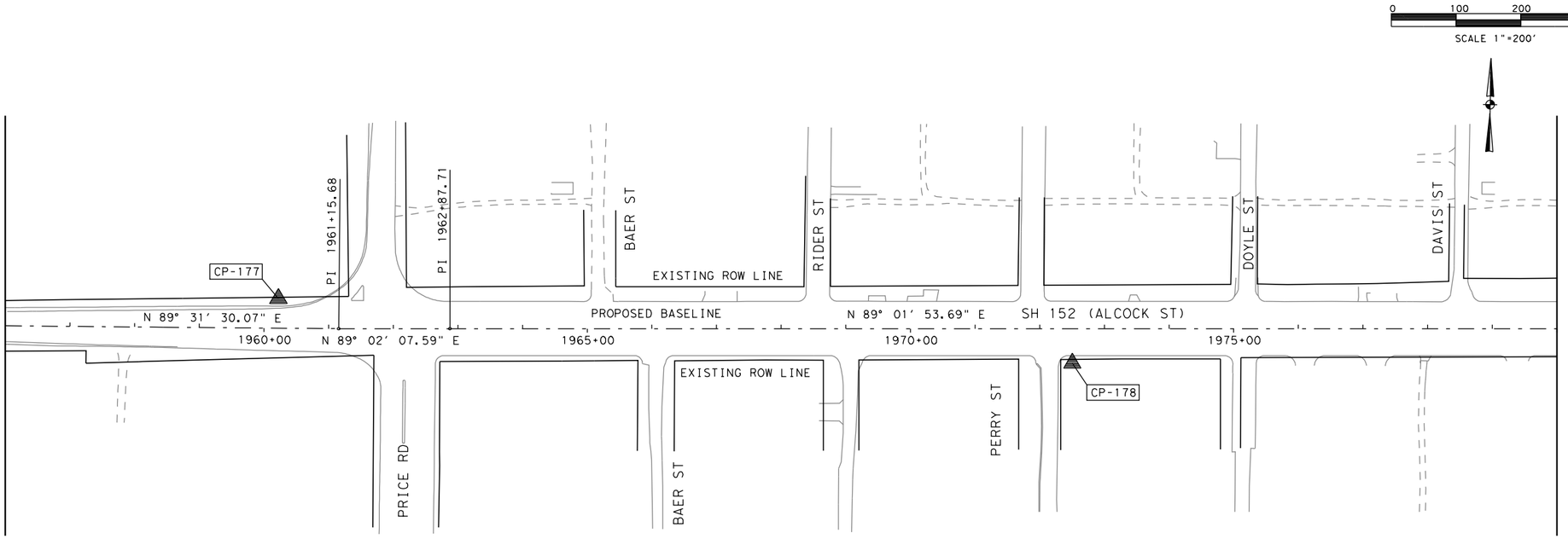
HORIZONTAL & VERTICAL CONTROL INDEX

(SH 152)

SHEET 6 OF 8

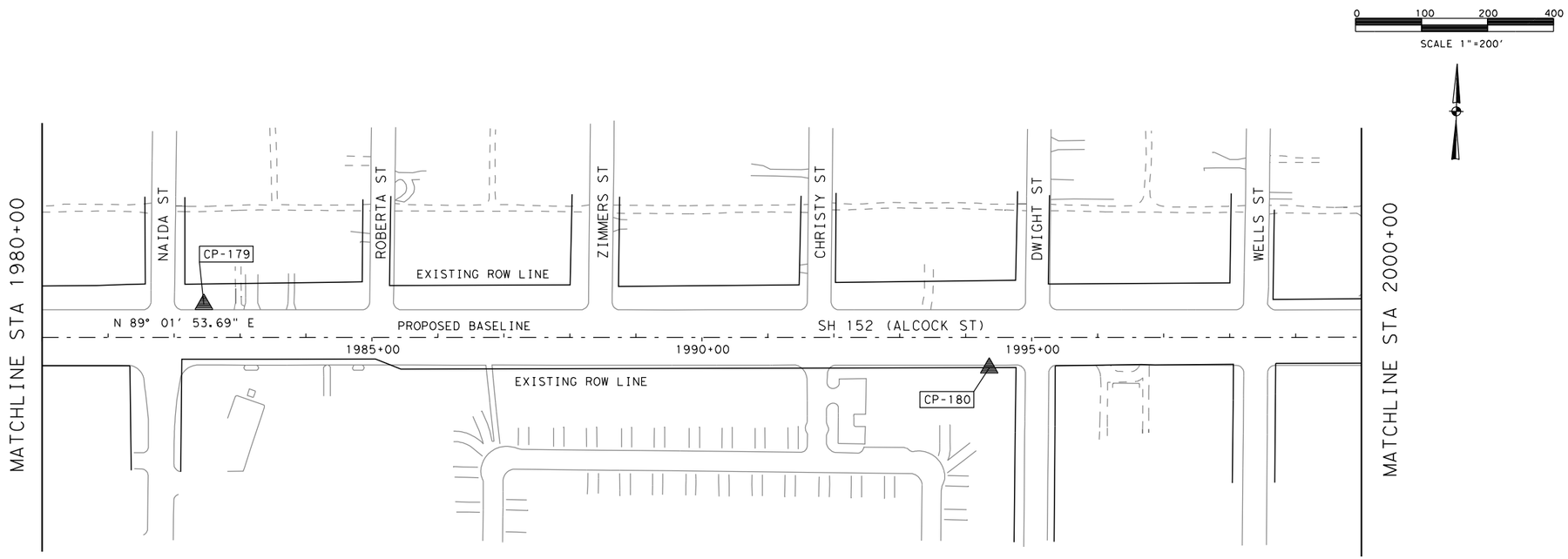
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	70
CONTROL	SECTION	JOB	
0455	03	038	

FILENAME: N:\I.S. Engineers 528\21942005\CAD\H&V Control\GRAY COUNTY\H&V Index Sheet 6.dgn
DRAWING DATE: 2/21/2024



Point	North	East	Elevation	Station	Offset	Description
CP-177	3,839,957.93	807,957.09	3,223.45'	1960+22.04	45.92' LT	SET 5/8" IR W/RODS CAP
CP-178	3,839,878.57	809,186.52	3,236.96'	1972+50.35	53.40' RT	SET MAG-NAIL W/SHINER

From	To	Direction	Distance
CP-18	CP-177	N 84° 13' 16" E	1,000.67'
CP-177	CP-178	S 86° 18' 23" E	1,231.99'
CP-178	CP-179	N 83° 04' 46" E	1,000.38'



Point	North	East	Elevation	Station	Offset	Description
CP-179	3,839,999.11	810,179.62	3,238.06'	1982+45.34	50.34' LT	SET 5/8" IR W/RODS CAP
CP-180	3,839,922.68	811,371.32	3,234.88'	1994+35.58	46.22' RT	SET 5/8" IR W/RODS CAP

From	To	Direction	Distance
CP-178	CP-179	N 83° 04' 46" E	1,000.38'
CP-179	CP-180	S 86° 19' 49" E	1,194.15'
CP-180	CP-181	N 83° 29' 24" E	1,102.93'

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, NORTH ZONE (4201), NORTH AMERICAN DATUM OF 1983 (NAD83) (2011 ADJ.; EPOCH 2010.00).

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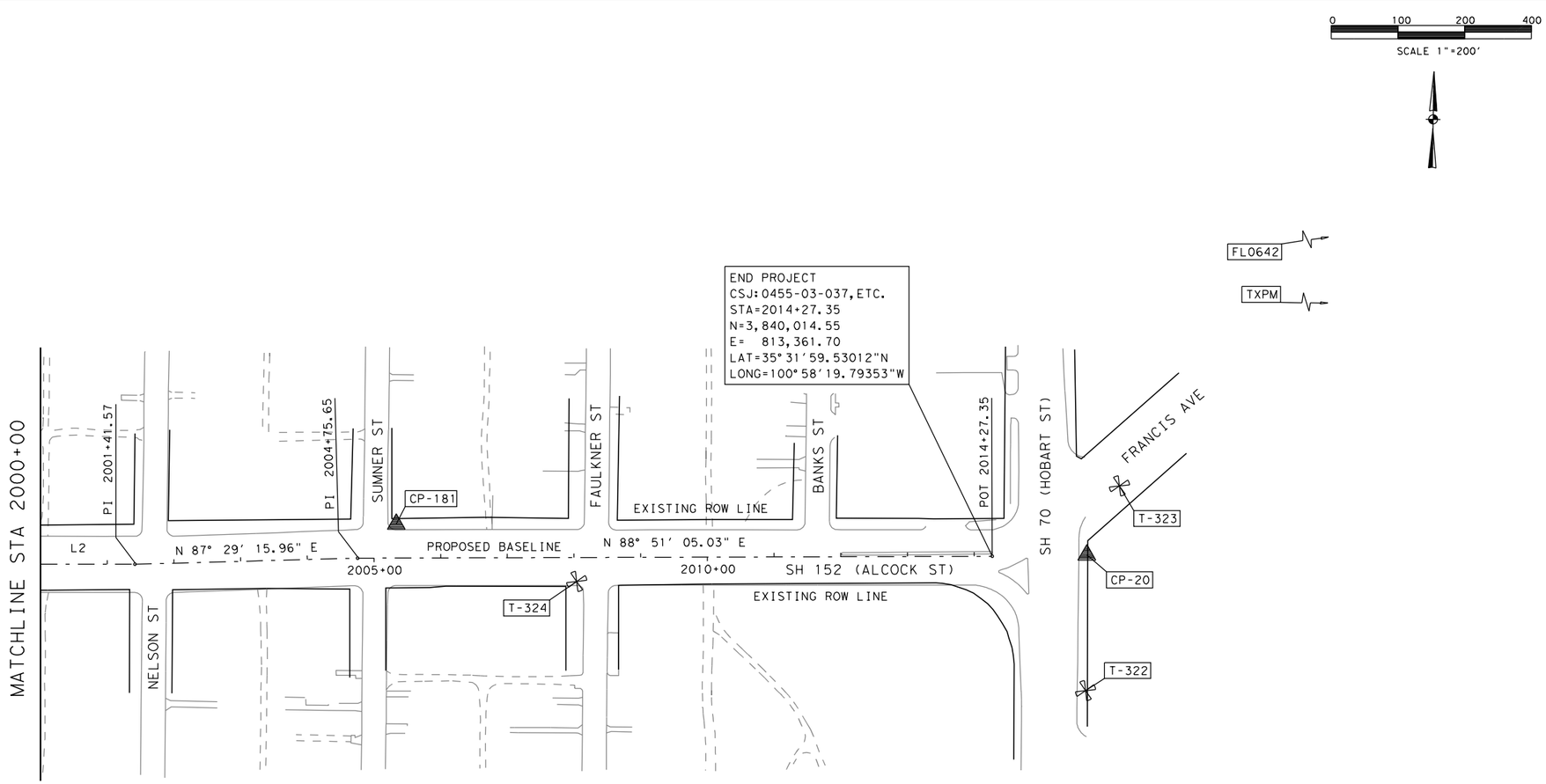
HORIZONTAL & VERTICAL CONTROL INDEX

(SH 152)

SHEET 7 OF 8

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	71
CONTROL	SECTION	JOB	
0455	03	038	

FILENAME: N:\I.S. Engineers 528\21942005\CAD\H&V Control\GRAY COUNTY\H&V Index Sheet 7.dgn
DRAWING DATE: 2/21/2024



Point	North	East	Elevation	Station	Offset	Description
CP-181	3,840,047.72	812,467.14	3,232.74'	2005+33.64	51.10' LT	SET MAG-NAIL W/SHINER
T-324	3,839,966.21	812,739.26	3,232.00'	2008+04.07	35.85' RT	SET MAG-NAIL IN ASPHALT
CP-20	3,840,018.93	813,503.54	3,227.91'	Off Chain	Off Chain	SET 5/8" IR W/TXDOT ALUM CAP IN CONC (20)
T-322	3,839,815.34	813,504.91	3,229.05'	Off Chain	Off Chain	SET MAG-NAIL IN CONC
T-323	3,840,123.27	813,550.53	3,226.70'	Off Chain	Off Chain	SET MAG-NAIL IN ASPHALT
FL0642	3,841,069.62	816,810.84	3,237.93'	Off Chain	Off Chain	FND DISK IN CONC (PAMPA 1934)
TXPM	3,840,398.41	826,302.01	3,236.64'	Off Chain	Off Chain	CORS TXPM

Line	Bearing
L2	N 89° 01' 53.69" E

From	To	Direction	Distance
CP-180	CP-181	N 83° 29' 24" E	1,102.93'
CP-181	CP-20	S 88° 24' 30" E	1,036.80'

Control Name	Published Coordinate Information			Measured Coordinate Information			Residuals (Published - Measured)		
	North	East	Elev.	North	East	Elev.	North	East	Elev.
FL0642	3,841,064	816,810	3,237.90	3,841,069.62	816,810.84	3,237.93	-5.6	-0.8	-0.03
FL0792	3,855,849.5	754,427.3	3,280.84	3,855,849.11	754,426.53	3,280.83	0.4	0.8	0.01

Notes:
1. Measured values are based on redundant GPS VFS observations measured from CORS TXPM and TXBR during September 2022 and an applied surface adjustmentfactor of 1.000190.

2. NGS monument PIDs FL0642 and FL0792 are of second vertical order, class zero; published values are based on NAD83 (1986 adjustment), NAVD88; horizontal coordinates are approximate, orthometric heights (elevations) were established by differential leveling in June 1991.

NOTES:
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HORIZONTAL & VERTICAL CONTROL INDEX

(SH 152)

SHEET 8 OF 8

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	72
CONTROL	SECTION	JOB	
0455	03	038	

FILENAME: N:\I.S. Engineers 528\21942005\CAD\H&V Control\GRAY COUNTY\H&V Index Sheet 8.dgn
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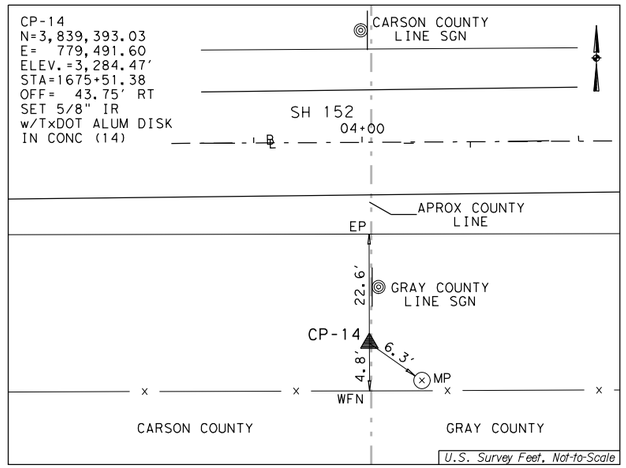
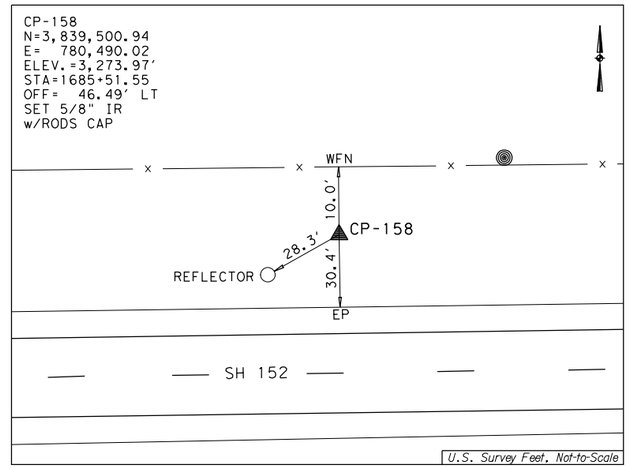


STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 0.59 MILE EAST OF COUNTY RD DD.



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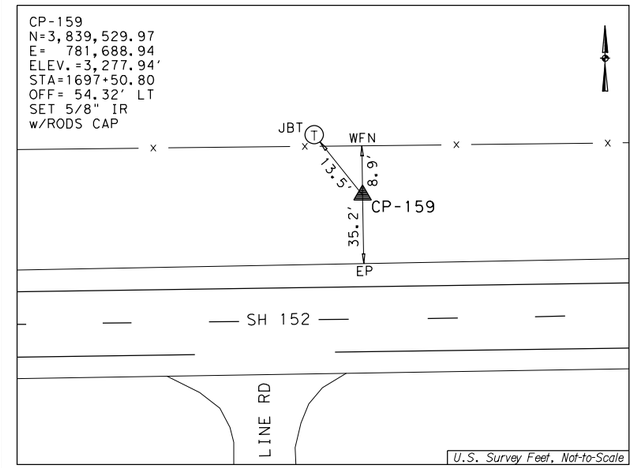

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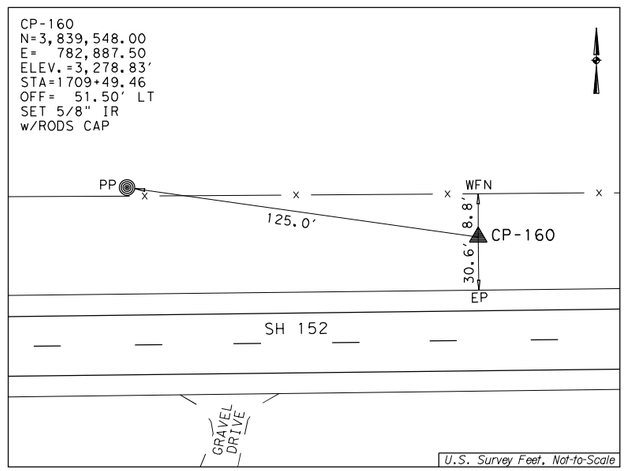

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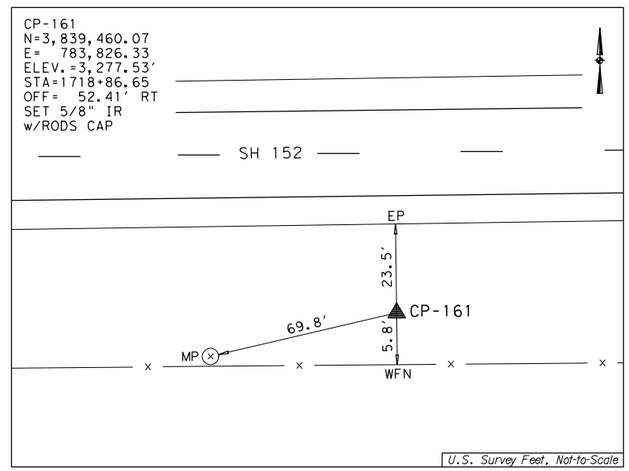
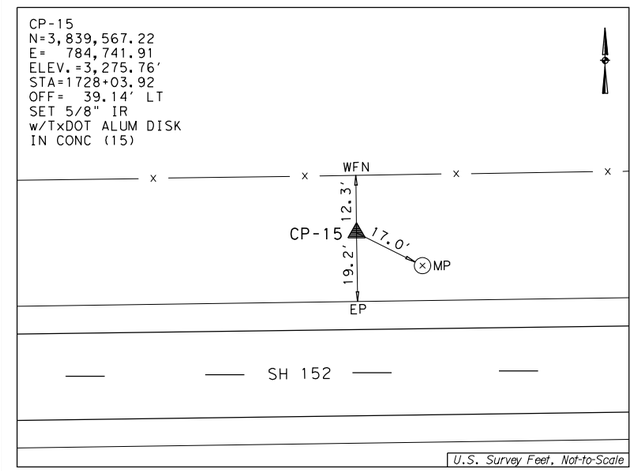


STATION IS LOCATED ON THE SOUTH SIDE OF SH 152 AND LYING 0.41 MILE EAST OF LINE RD.



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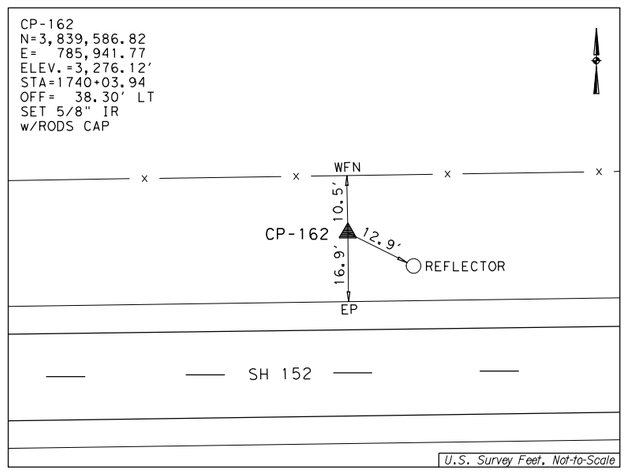

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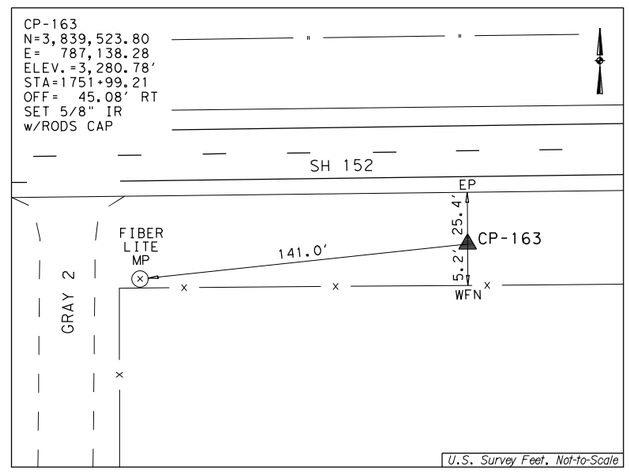
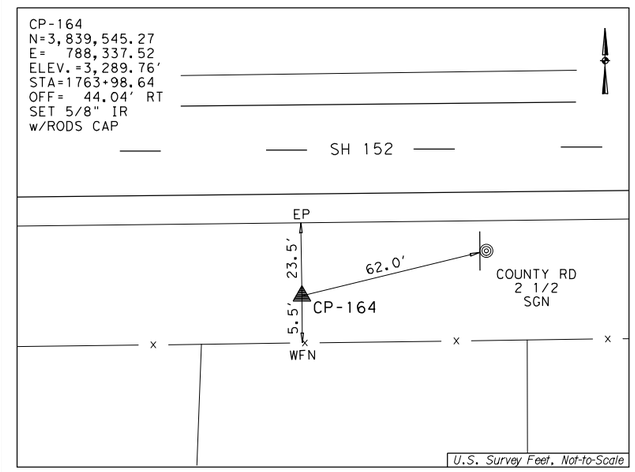


STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 189' EAST OF GRAY 2.



STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 0.26 MILE EAST OF GRAY 2.

NOTES:
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HORIZONTAL & VERTICAL CONTROL SHEET

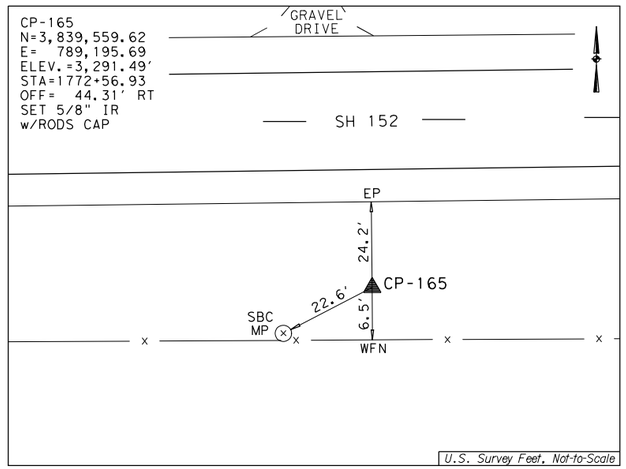
(SH 152)

SHEET 1 OF 4

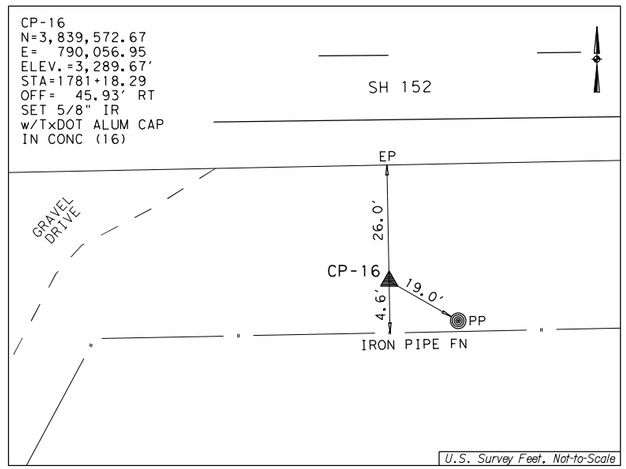
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	73
CONTROL	SECTION	JOB	
0455	03	038	

FILENAME: N:\I.S. Engineers 528\21942005\CAD\H&V Control\GRAY COUNTY\H&V Sketches Gray Cnty.dgn

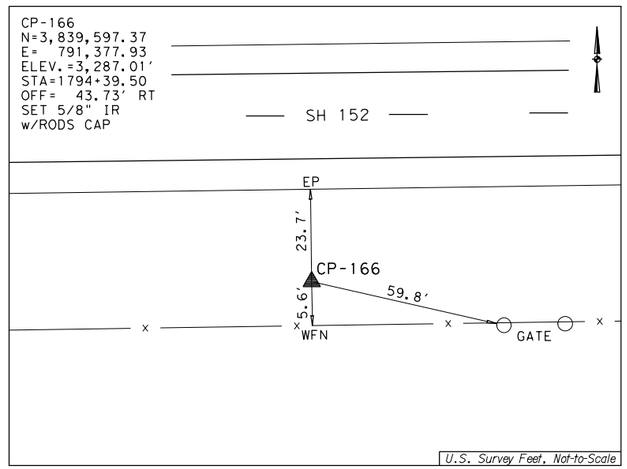
DRAWING DATE: 2/21/2024



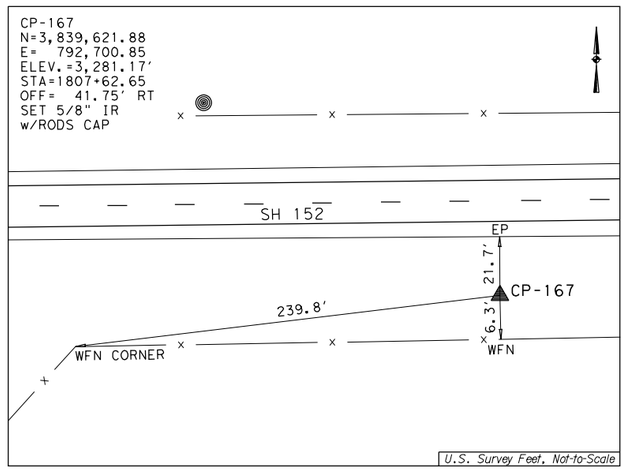
STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 0.10 MILE EAST OF COUNTY RD 2 1/2.



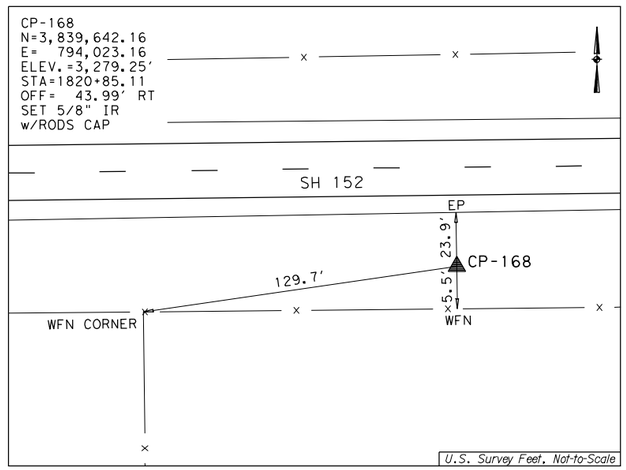
STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 0.26 MILE EAST OF COUNTY RD 2 1/2.



STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 0.51 MILE EAST OF COUNTY RD 2 1/2.



STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 445' EAST OF GRAY 3.



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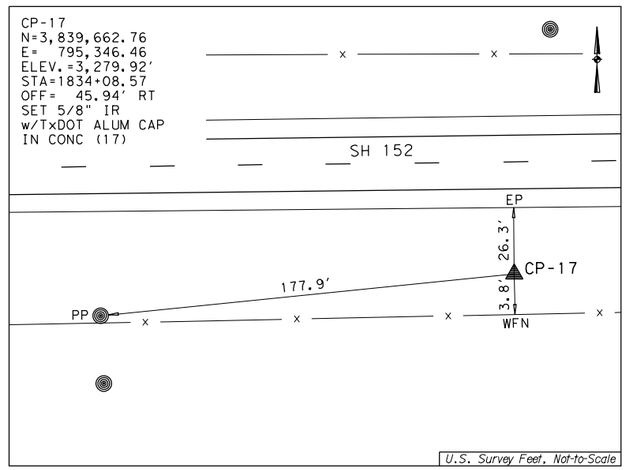

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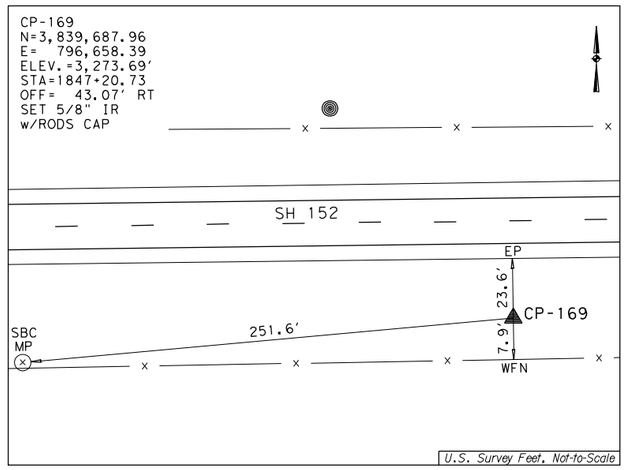
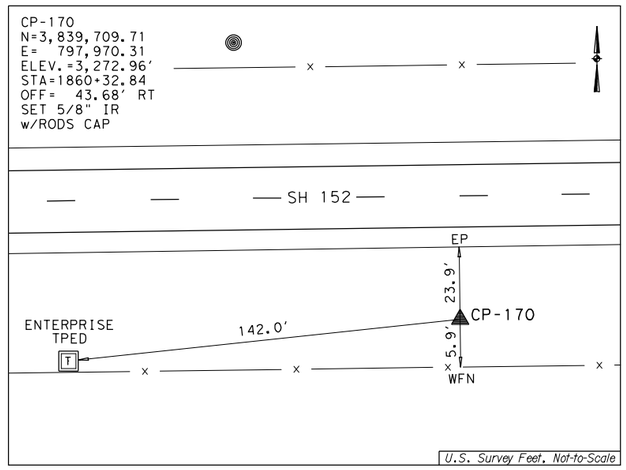
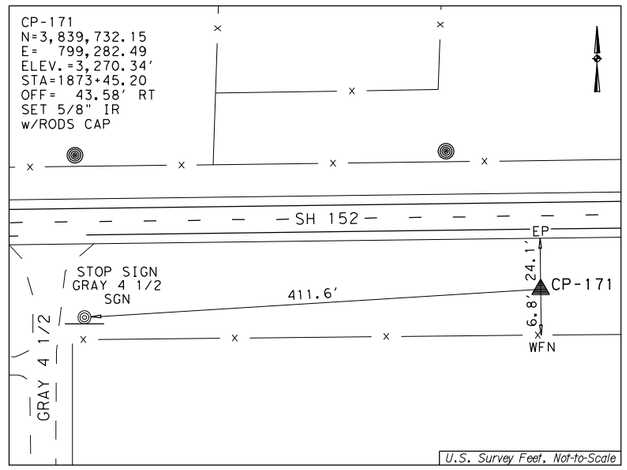


STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 0.84 MILE EAST OF GRAY 3.



STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 428' EAST OF GRAY 4.



STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 444' EAST OF GRAY 4 1/2.

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, NORTH ZONE (4201), NORTH AMERICAN DATUM OF 1983 (NAD83) (2011 ADJ.; EPOCH 2010.00).

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (GEOID MODEL 12B).

3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES, AND MAY BE CONVERTED TO NAD83 (GRID) VALUES BY APPLYING THE SURFACE ADJUSTMENT FACTOR (SAF) FOR CARSON AND GRAY COUNTIES, SAF = 1.000190, USING THE FORMULA: SURFACE /SAF = GRID

4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXPM DURING SEPTEMBER 2022.

5. ELEVATIONS ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS, ADJUSTED WITH DIGITAL LEVELING.

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

STATE OF TEXAS
REGISTERED
JIMMY D. WALTON
5889
PROFESSIONAL
LAND SURVEYOR
2-21-2024

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

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

RODS
Surveying, Inc.
6810 LEE ROAD, STE.100
SPRING, TEXAS 77379
TEL (281) 257-4020
FAX (281) 257-4021
TBPELS SURVEYING FIRM REG. No. 10030700

Control
Infrastructure
Transportation
Land Development

Texas Department of Transportation

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

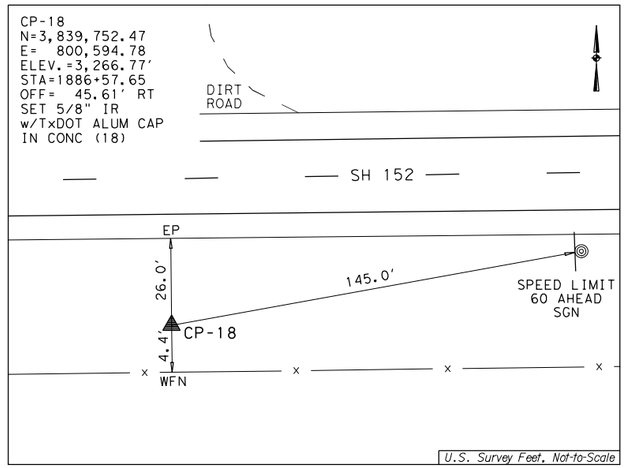
HORIZONTAL & VERTICAL CONTROL SHEET

(SH 152)

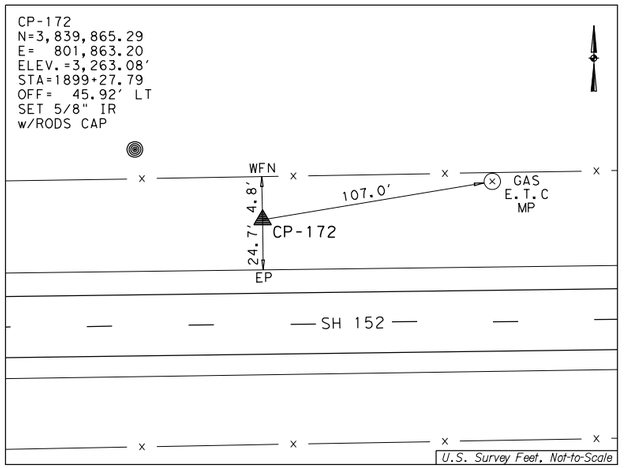
SHEET 2 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	74
CONTROL	SECTION	JOB	
0455	03	038	

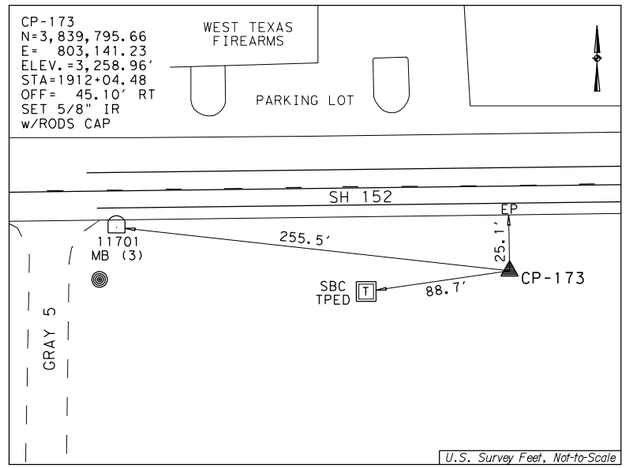
FILENAME: N:\I.S. Engineers 528\2194200S\CAD\H&V Control\GRAY COUNTY\H&V Sketches Gray Cnty.dgn
DRAWING DATE: 2/21/2024



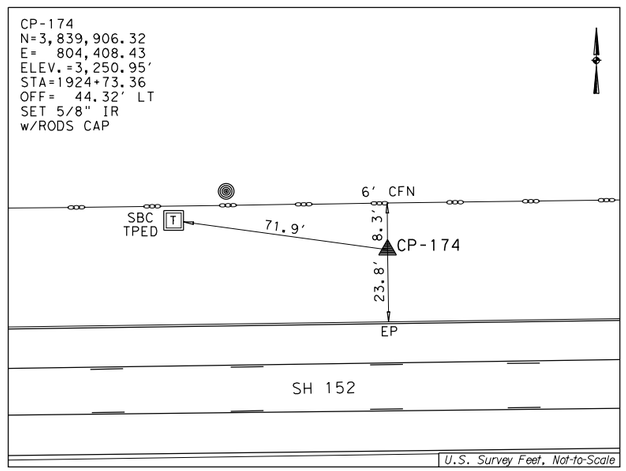
STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 0.33 MILE EAST OF GRAY 4 1/2.



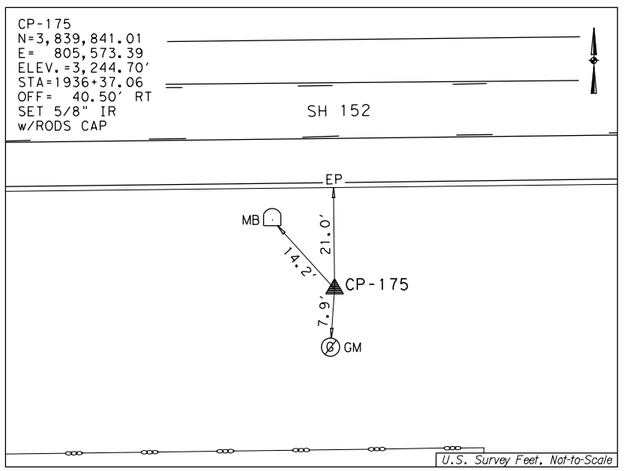
STATION IS LOCATED ON THE NORTH SIDE OF SH 152, AND LYING 0.57 MILE EAST OF GRAY 4 1/2.



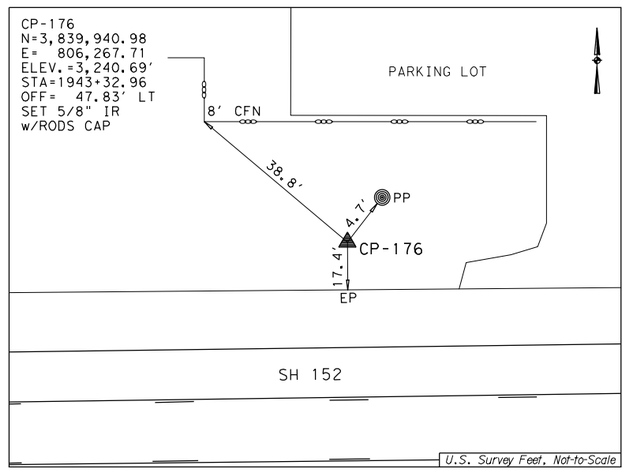
STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 312' EAST OF GRAY 5.



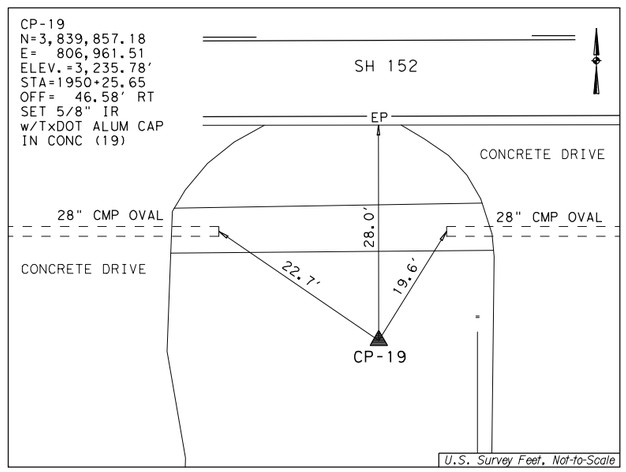
STATION IS LOCATED ON THE NORTH SIDE OF SH 152, AND LYING 0.30 MILE EAST OF GRAY 5.



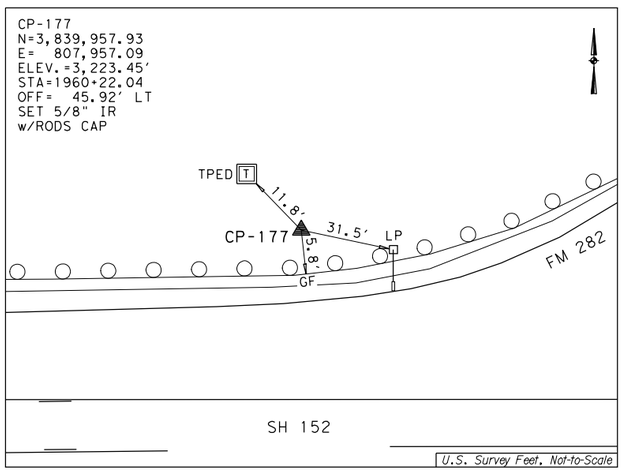
STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 0.14 MILE EAST OF WESTERN ST.



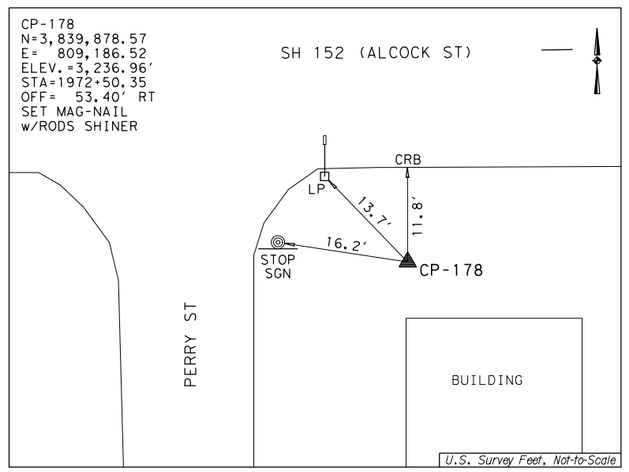
STATION IS LOCATED ON THE NORTH SIDE OF SH 152, AND LYING 183' EAST OF BEVERLY DR.



STATION IS LOCATED ON THE SOUTH SIDE OF SH 152, AND LYING 0.17 MILE EAST OF BEVERLY DR.



STATION IS LOCATED ON THE NORTHWEST CORNER OF THE INTERSECTION OF SH 152 AND FM 282.



STATION IS LOCATED ON THE SOUTHEAST CORNER OF THE INTERSECTION OF SH 152 AND PERRY ST.

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, NORTH ZONE (4201), NORTH AMERICAN DATUM OF 1983 (NAD83) (2011 ADJ.; EPOCH 2010.00).

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (GEOID MODEL 12B).

3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES, AND MAY BE CONVERTED TO NAD83 (GRID) VALUES BY APPLYING THE SURFACE ADJUSTMENT FACTOR (SAF) FOR CARSON AND GRAY COUNTIES, SAF = 1.000190, USING THE FORMULA: SURFACE /SAF = GRID

4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXPM DURING SEPTEMBER 2022.

5. ELEVATIONS ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS, ADJUSTED WITH DIGITAL LEVELING.

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

STATE OF TEXAS REGISTERED JIMMY D. WALTON 5889 PROFESSIONAL LAND SURVEYOR

2-21-2024

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

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

2/21/2024

RODS Surveying, Inc.
6810 LEE ROAD, STE.100
SPRING, TEXAS 77379
TEL (281) 257-4020
FAX (281) 257-4021
TBPELS SURVEYING FIRM REG. No. 10030700

Control Infrastructure Transportation Land Development

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

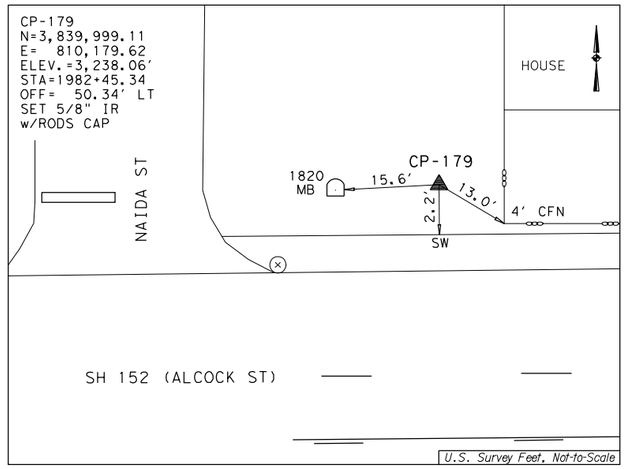
HORIZONTAL & VERTICAL CONTROL SHEET

(SH 152)

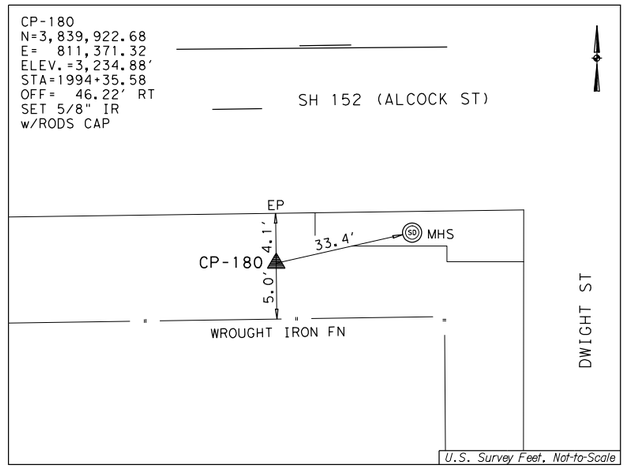
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	75
CONTROL	SECTION	JOB	
0455	03	038	

FILENAME: N:\I.S. Engineers 528\21942005\CAD\H&V Control\GRAY COUNTY\H&V Sketches Gray Cnty.dgn

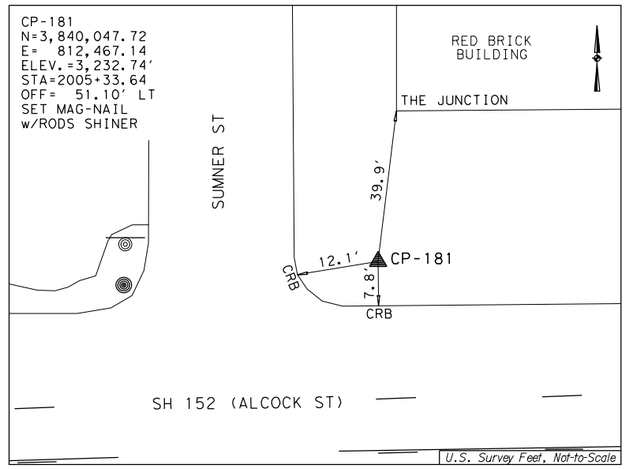
DRAWING DATE: 2/21/2024



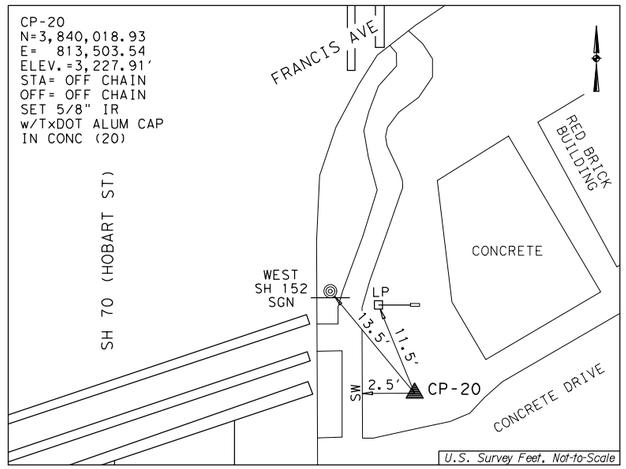
STATION IS LOCATED ON THE NORTHEAST CORNER OF THE INTERSECTION OF SH 152 AND NAIDA ST.



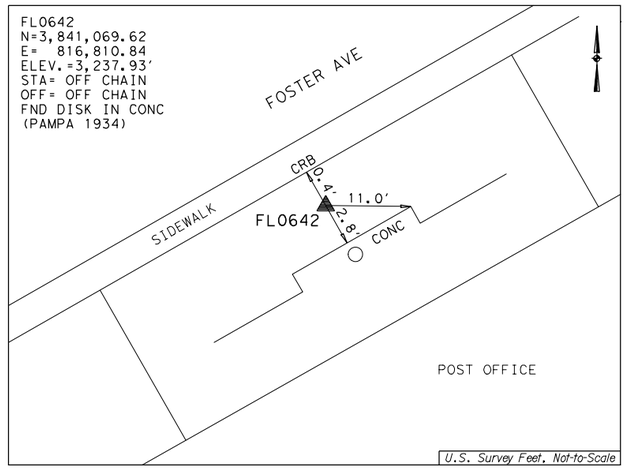
STATION IS LOCATED ON THE SOUTHWEST CORNER OF THE INTERSECTION OF SH 152 AND DWIGHT ST.



STATION IS LOCATED ON THE NORTHEAST CORNER OF THE INTERSECTION OF SH 152 AND SUMNER ST.



STATION IS LOCATED ON THE SOUTHEAST CORNER OF THE INTERSECTION OF SH 70 AND FRANCIS AVE.



STATION IS LOCATED ON THE SOUTH SIDE OF FOSTER AVE, AND LYING 121' WEST OF BALLARD ST.

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, NORTH ZONE (4201), NORTH AMERICAN DATUM OF 1983 (NAD83) (2011 ADJ.; EPOCH 2010.00).

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (GEOID MODEL 12B).

3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES, AND MAY BE CONVERTED TO NAD83 (GRID) VALUES BY APPLYING THE SURFACE ADJUSTMENT FACTOR (SAF) FOR CARSON AND GRAY COUNTIES, SAF = 1.000190, USING THE FORMULA: SURFACE /SAF = GRID

4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXPM DURING SEPTEMBER 2022.

5. ELEVATIONS ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS, ADJUSTED WITH DIGITAL LEVELING.

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STATE OF TEXAS
REGISTERED
JIMMY D. WALTON
5889
PROFESSIONAL
LAND SURVEYOR

2-21-2024

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

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

2/21/2024

RODS
Surveying, Inc.
6810 LEE ROAD, STE.100
SPRING, TEXAS 77379
TEL (281) 257-4020
FAX (281) 257-4021
TBPELS SURVEYING FIRM REG. No. 10030700

Control
Infrastructure
Transportation
Land Development

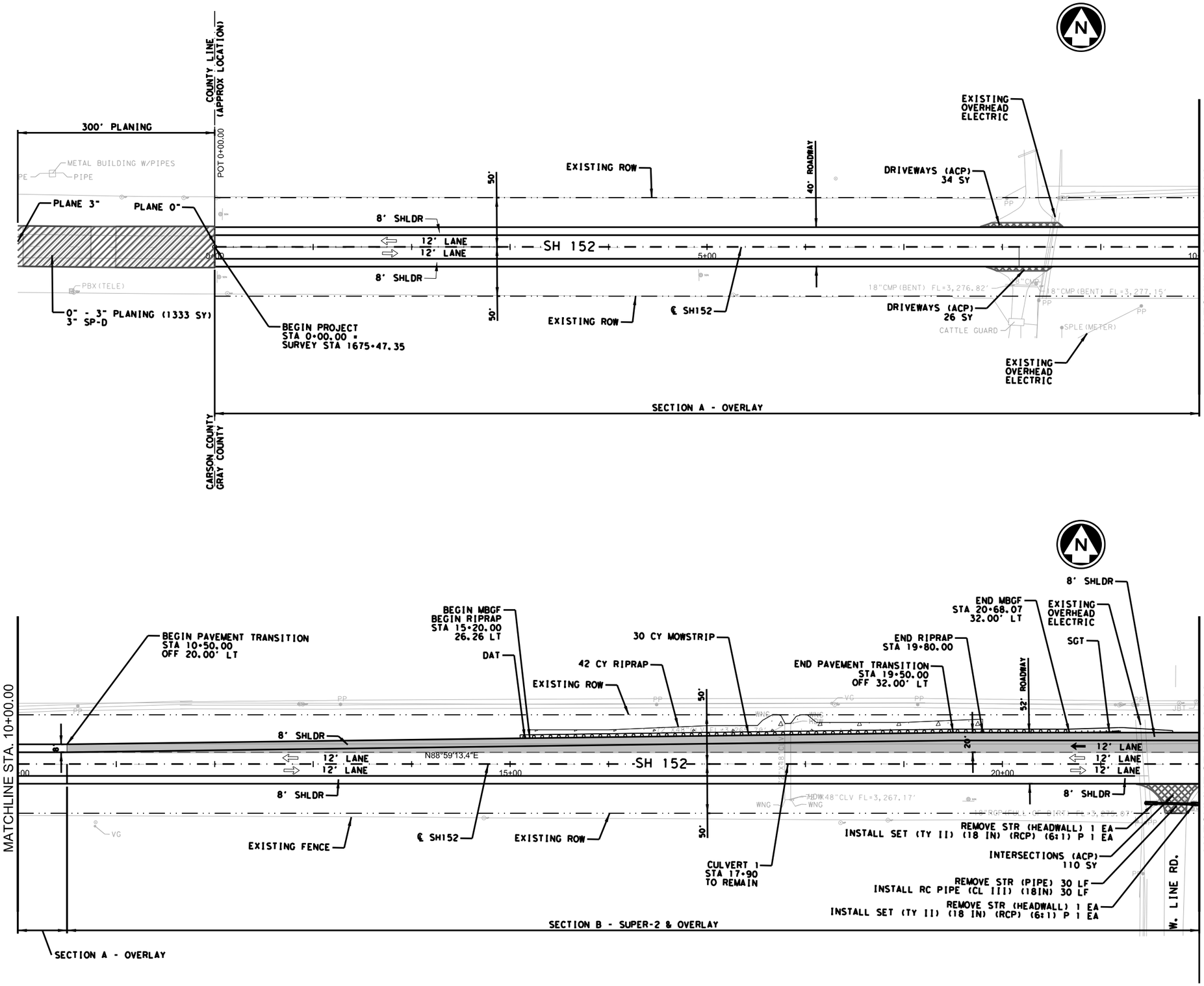
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

HORIZONTAL & VERTICAL CONTROL SHEET

(SH 152)

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	76
CONTROL	SECTION	JOB	
0455	03	038	

FILENAME: N:\I.S. Engineers 528\2194200S\CAD\H&V Control\GRAY COUNTY\H&V Sketches Gray Cnty.dgn
DRAWING DATE: 2/21/2024



0' 50' 100'

SCALE IN FEET

NOTES:

1. HORIZONTAL ALIGNMENT AS WELL AS EXISTING ROW LINE ARE RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. ALL UTILITIES ARE SHOWN ACCORDING TO THEIR APPROXIMATE LOCATIONS AND ARE INTENDED FOR GENERAL INFORMATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITYTO CONTACT ALL UTILITY OWNERS FOR ACTUAL LOCATIONS.
3. SEE "DRIVEWAYS AND INTERSECTIONS DETAIL" SHEETS FOR INTERSECTION AND DRIVEWAY TIE-IN INFORMATION.
4. SAWCUT ALONG A NEAT HORIZONTAL LINE AND FOR A VERTICAL BUTT JOINT. THIS WORK SHALL BE SUBSIDARY TO VARIOUS BID ITEMS.
5. CONTRACTOR TO REGRADE THE ADJACENT DITCHES TO ENSURE POSITIVE DRAINAGE. REFER TO "ROADWAY CROSS SECTION SHEETS" FOR ADDITIONAL INFORMATION.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAYLINE
- PROP WIDENING
- DRIVEWAYS & INTERSECTIONS
- 0" - 3" PLANE, 3" ACP & TACK
- DITCH FLOWLINE

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

2/22/2024

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

Texas Department of Transportation

SH 152

ROADWAY PLAN BEGIN TO STA 22+00

SHEET 1 OF 15

CONT.	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		77

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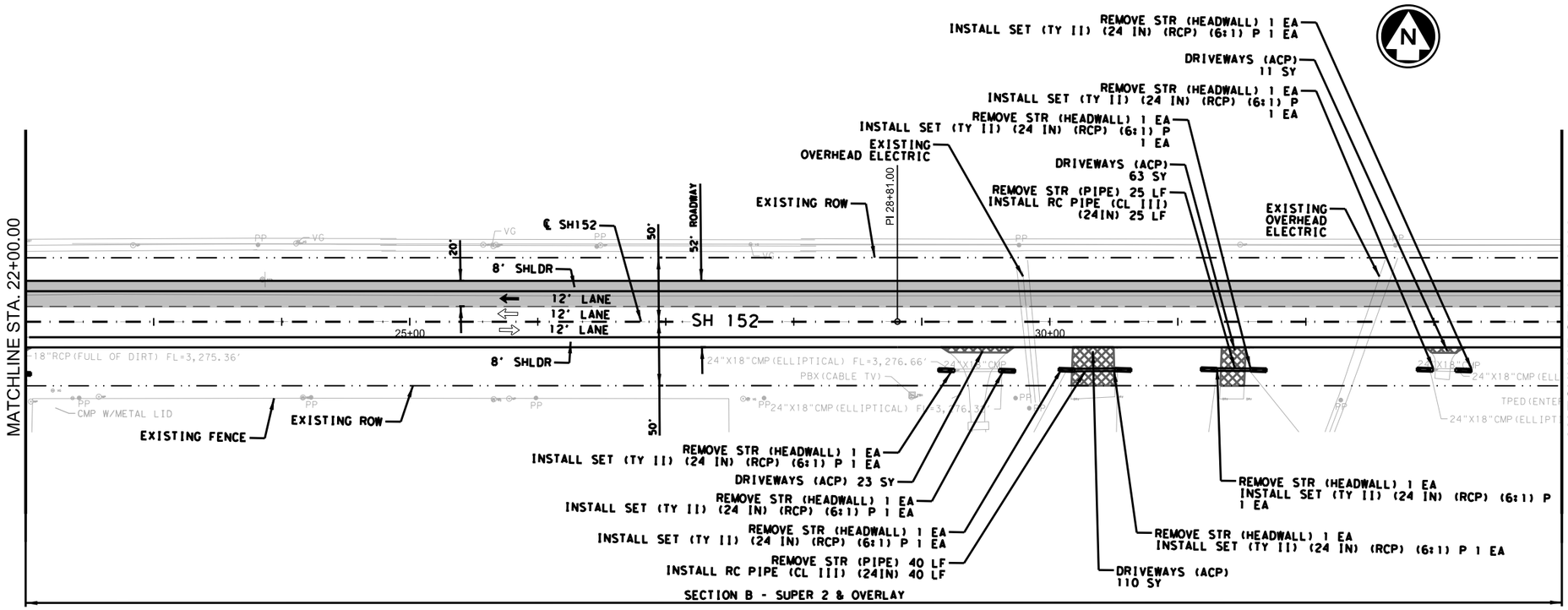

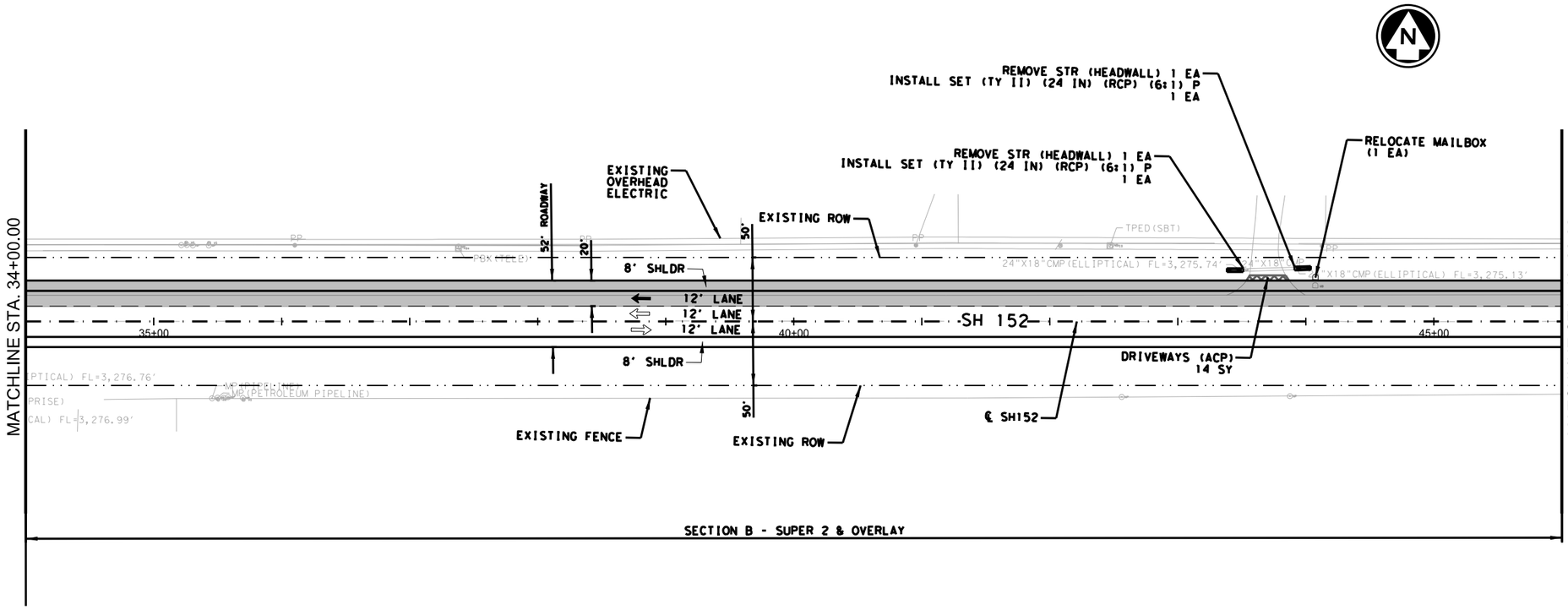

0' 50' 100'

SCALE IN FEET

NOTES:

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3. SEE "DRIVEWAYS AND INTERSECTIONS DETAIL" SHEETS FOR INTERSECTION AND DRIVEWAY TIE-IN INFORMATION.
4. SAWCUT ALONG A NEAT HORIZONTAL LINE AND FOR A VERTICAL BUTT JOINT. THIS WORK SHALL BE SUBSIDARY TO VARIOUS BID ITEMS.
5. CONTRACTOR TO REGRADE THE ADJACENT DITCHES TO ENSURE POSITIVE DRAINAGE. REFER TO "ROADWAY CROSS SECTION SHEETS" FOR ADDITIONAL INFORMATION.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAYLINE
- PROP WIDENING
- DRIVEWAYS & INTERSECTIONS
- 0" - 3" PLANE, 3" ACP & TACK
- DITCH FLOWLINE

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

2/22/2024

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

Texas Department of Transportation

SH 152

ROADWAY PLAN
STA 22+00 TO STA 46+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		78

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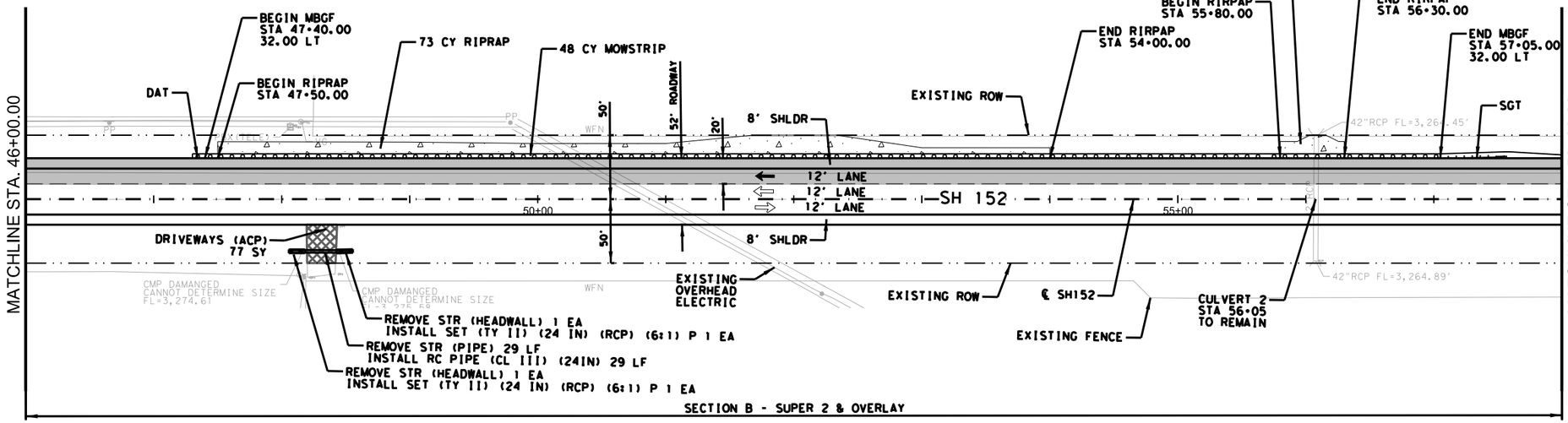

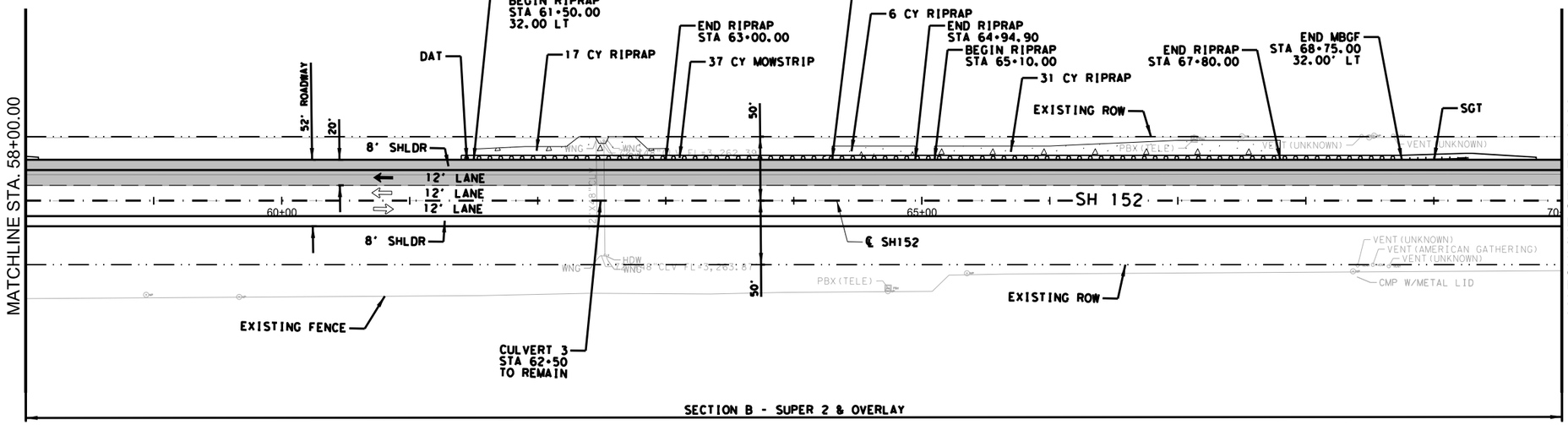

0' 50' 100'

SCALE IN FEET

NOTES:

1. HORIZONTAL ALIGNMENT AS WELL AS EXISTING ROW LINE ARE RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. ALL UTILITIES ARE SHOWN ACCORDING TO THEIR APPROXIMATE LOCATIONS AND ARE INTENDED FOR GENERAL INFORMATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITYTO CONTACT ALL UTILITY OWNERS FOR ACTUAL LOCATIONS.
3. SEE "DRIVEWAYS AND INTERSECTIONS DETAIL" SHEETS FOR INTERSECTION AND DRIVEWAY TIE-IN INFORMATION.
4. SAWCUT ALONG A NEAT HORIZONTAL LINE AND FOR A VERTICAL BUTT JOINT. THIS WORK SHALL BE SUBSIDARY TO VARIOUS BID ITEMS.
5. CONTRACTOR TO REGRADE THE ADJACENT DITCHES TO ENSURE POSITIVE DRAINAGE. REFER TO "ROADWAY CROSS SECTION SHEETS" FOR ADDITIONAL INFORMATION.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAYLINE
- PROP WIDENING
- DRIVEWAYS & INTERSECTIONS
- 0" - 3" PLANE, 3" ACP & TACK
- DITCH FLOWLINE

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

2/22/2024

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

Texas Department of Transportation

SH 152

ROADWAY PLAN
STA 46+00 TO STA 70+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		79

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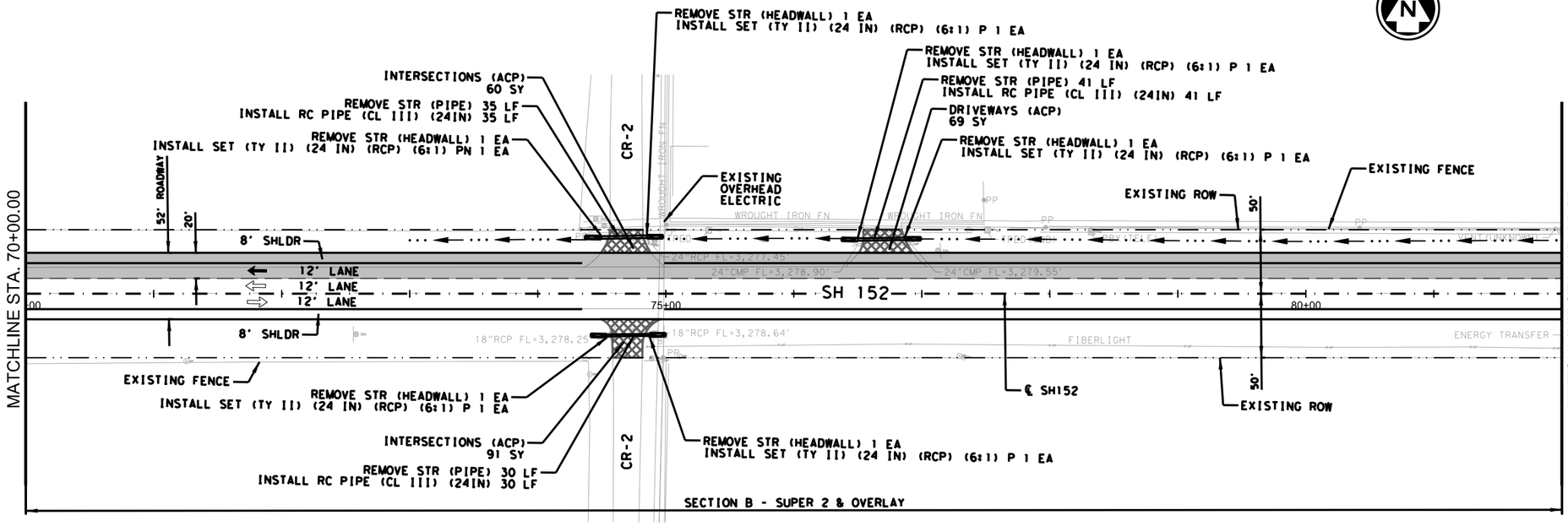

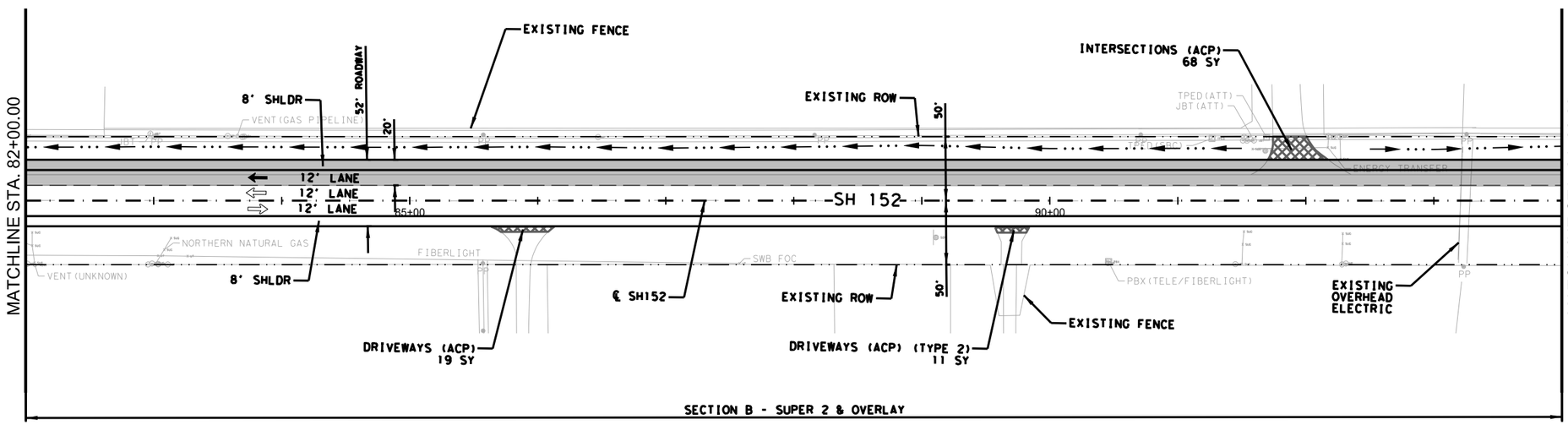

0' 50' 100'

SCALE IN FEET

NOTES:

1. HORIZONTAL ALIGNMENT AS WELL AS EXISTING ROW LINE ARE RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
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3. SEE "DRIVEWAYS AND INTERSECTIONS DETAIL" SHEETS FOR INTERSECTION AND DRIVEWAY TIE-IN INFORMATION.
4. SAWCUT ALONG A NEAT HORIZONTAL LINE AND FOR A VERTICAL BUTT JOINT. THIS WORK SHALL BE SUBSIDARY TO VARIOUS BID ITEMS.
5. CONTRACTOR TO REGRADE THE ADJACENT DITCHES TO ENSURE POSITIVE DRAINAGE. REFER TO "ROADWAY CROSS SECTION SHEETS" FOR ADDITIONAL INFORMATION.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAYLINE
- PROP WIDENING
- DRIVEWAYS & INTERSECTIONS
- 0" - 3" PLANE, 3" ACP & TACK
- DITCH FLOWLINE

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

2/22/2024

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

Texas Department of Transportation

SH 152

ROADWAY PLAN
STA 70+00 TO STA 94+00

CONT.	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		80

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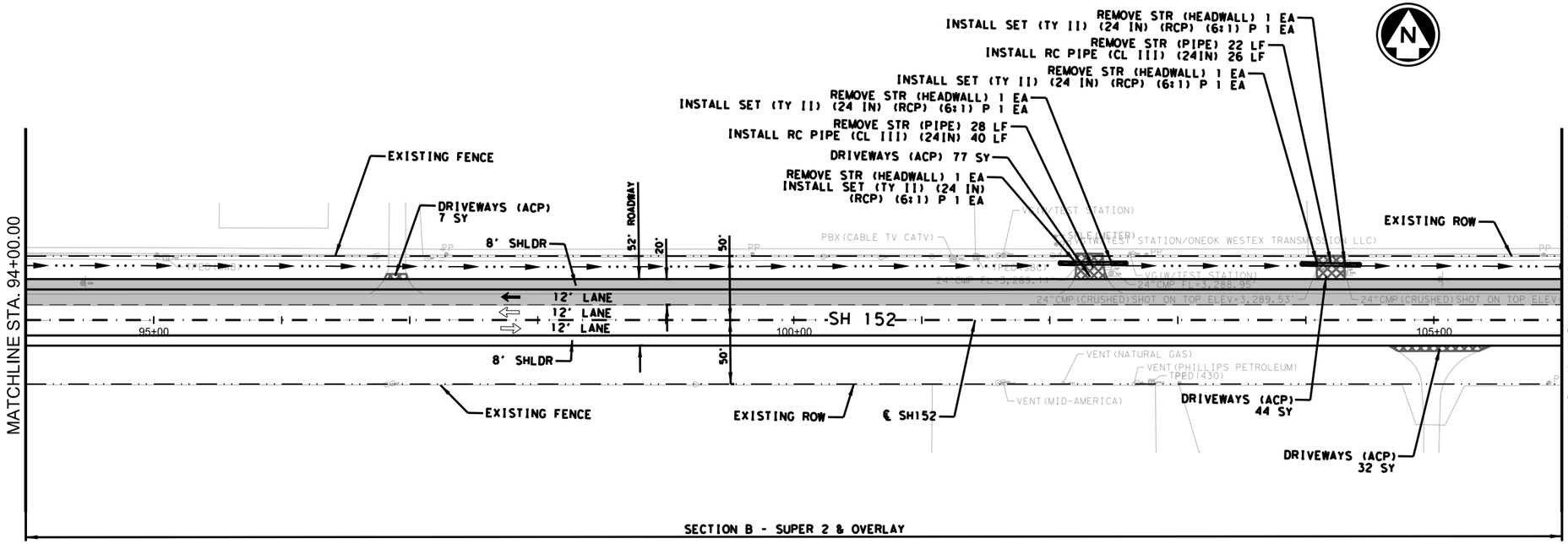

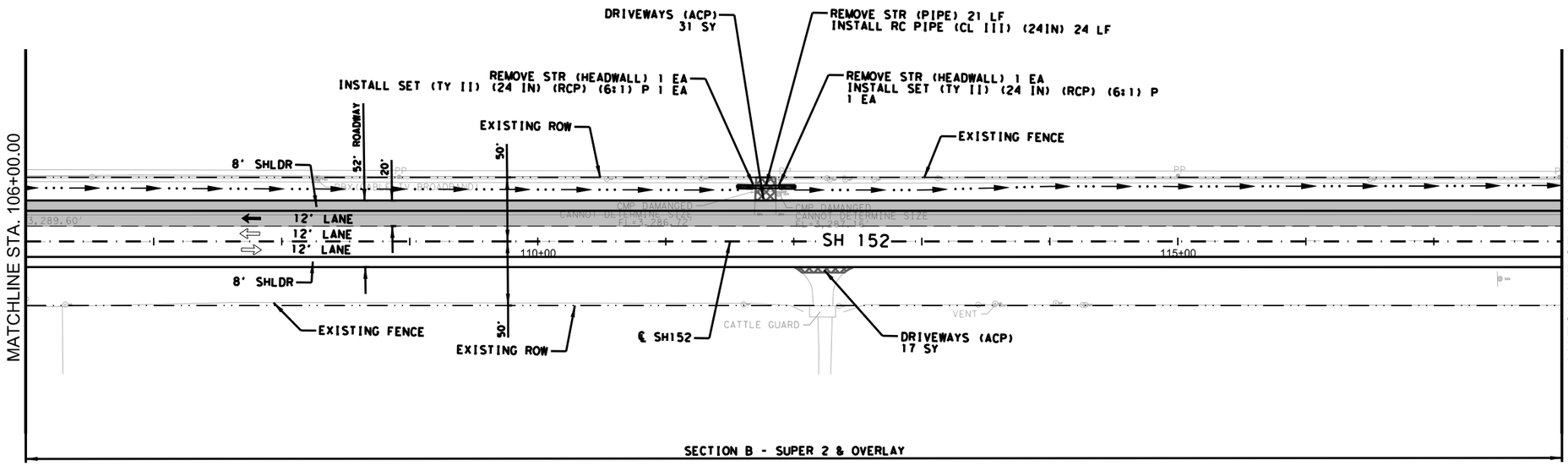

0' 50' 100'

SCALE IN FEET

NOTES:

1. HORIZONTAL ALIGNMENT AS WELL AS EXISTING ROW LINE ARE RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
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3. SEE "DRIVEWAYS AND INTERSECTIONS DETAIL" SHEETS FOR INTERSECTION AND DRIVEWAY TIE-IN INFORMATION.
4. SAWCUT ALONG A NEAT HORIZONTAL LINE AND FOR A VERTICAL BUTT JOINT. THIS WORK SHALL BE SUBSIDARY TO VARIOUS BID ITEMS.
5. CONTRACTOR TO REGRADE THE ADJACENT DITCHES TO ENSURE POSITIVE DRAINAGE. REFER TO "ROADWAY CROSS SECTION SHEETS" FOR ADDITIONAL INFORMATION.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAYLINE
- PROP WIDENING
- DRIVEWAYS & INTERSECTIONS
- 0" - 3" PLANE, 3" ACP & TACK
- DITCH FLOWLINE

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

2/22/2024

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

Texas Department of Transportation

SH 152

ROADWAY
PLAN
STA 94+00 TO STA 118+00

SHEET 5 OF 15

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		81

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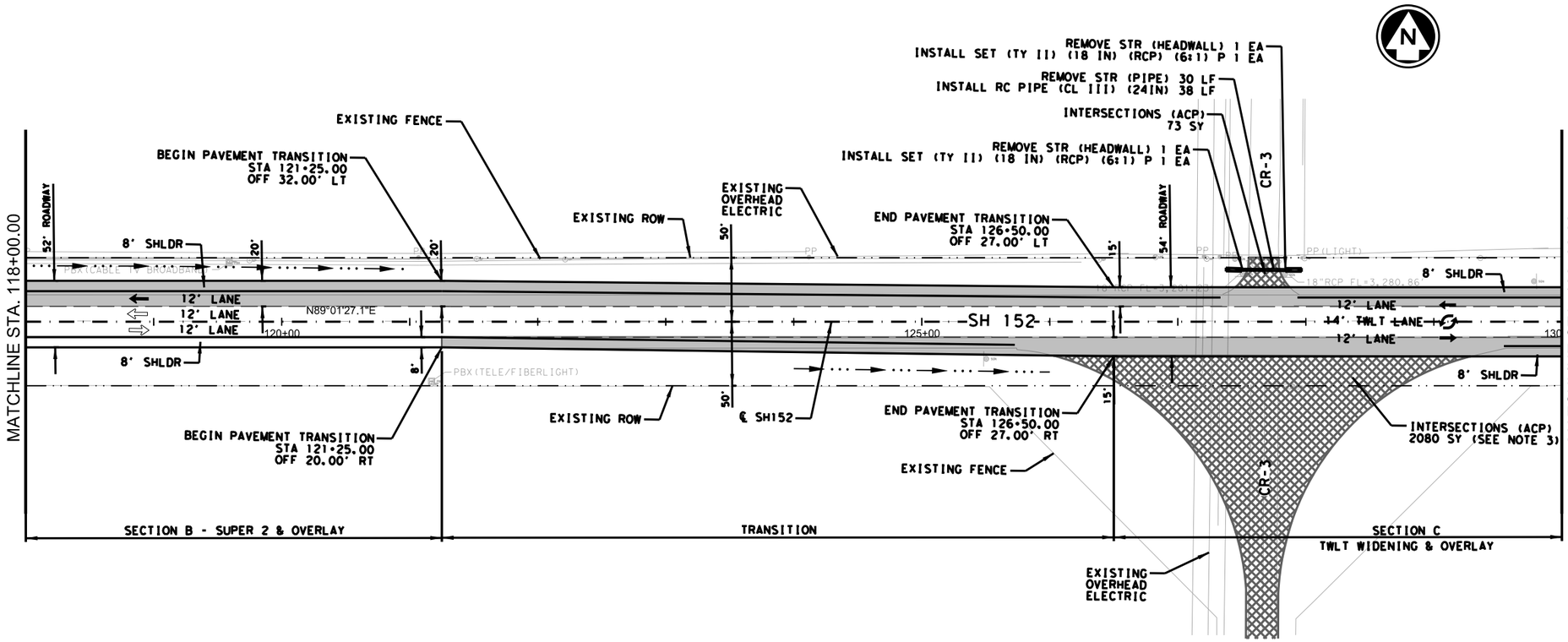

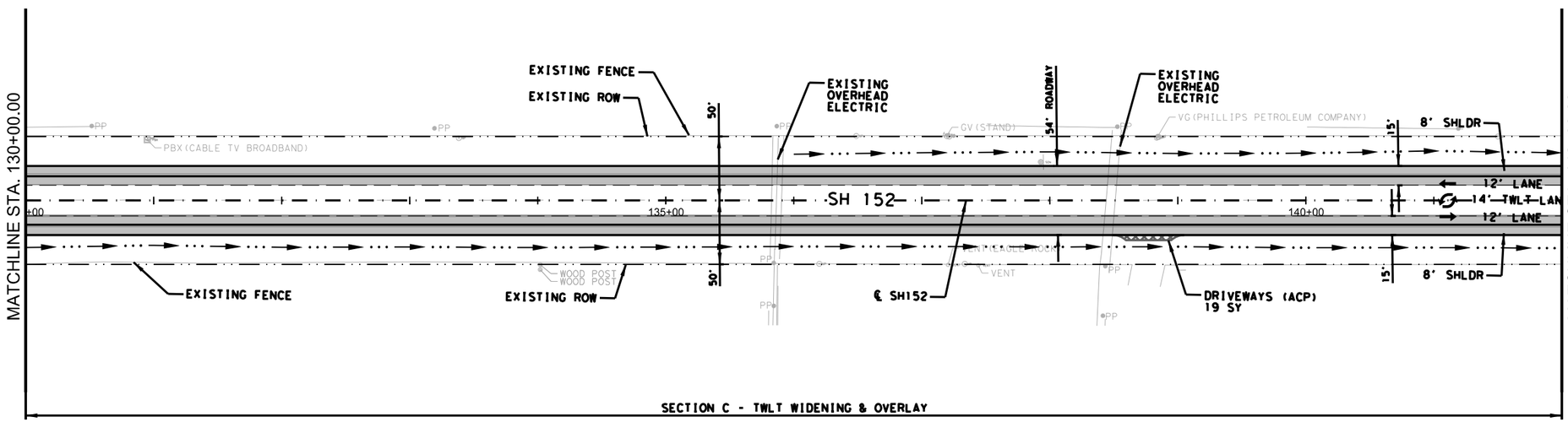

0' 50' 100'

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LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAYLINE
- PROP WIDENING
- DRIVEWAYS & INTERSECTIONS
- 0" - 3" PLANE, 3" ACP & TACK
- DITCH FLOWLINE

STATE OF TEXAS
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2/22/2024

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

Texas Department of Transportation

SH 152

ROADWAY PLAN
STA 118+00 TO STA 142+00

CONT.	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		82

DATE: 2/22/2024 12:59:17 PM
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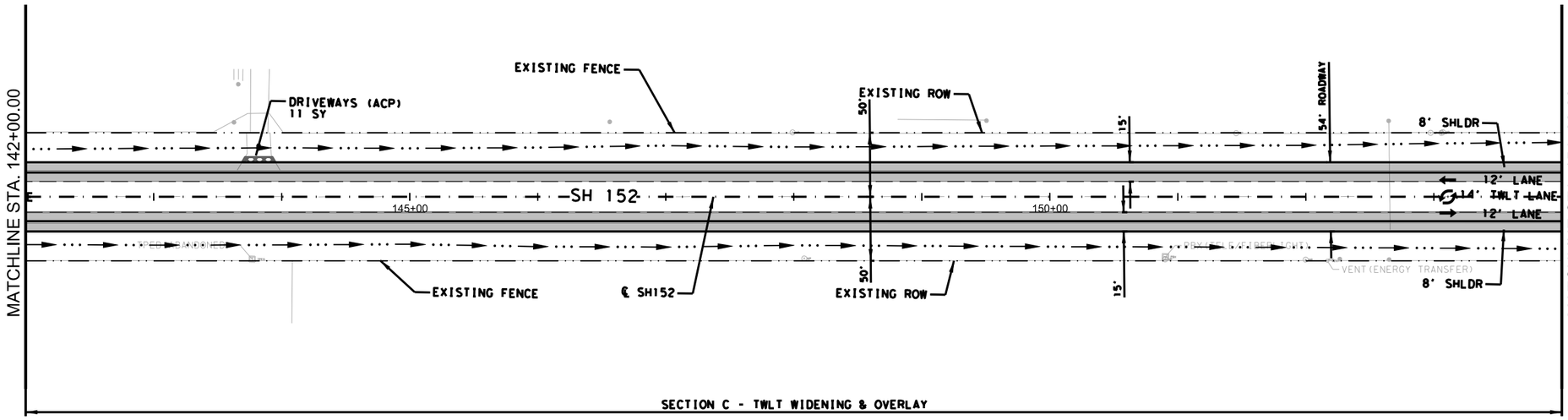
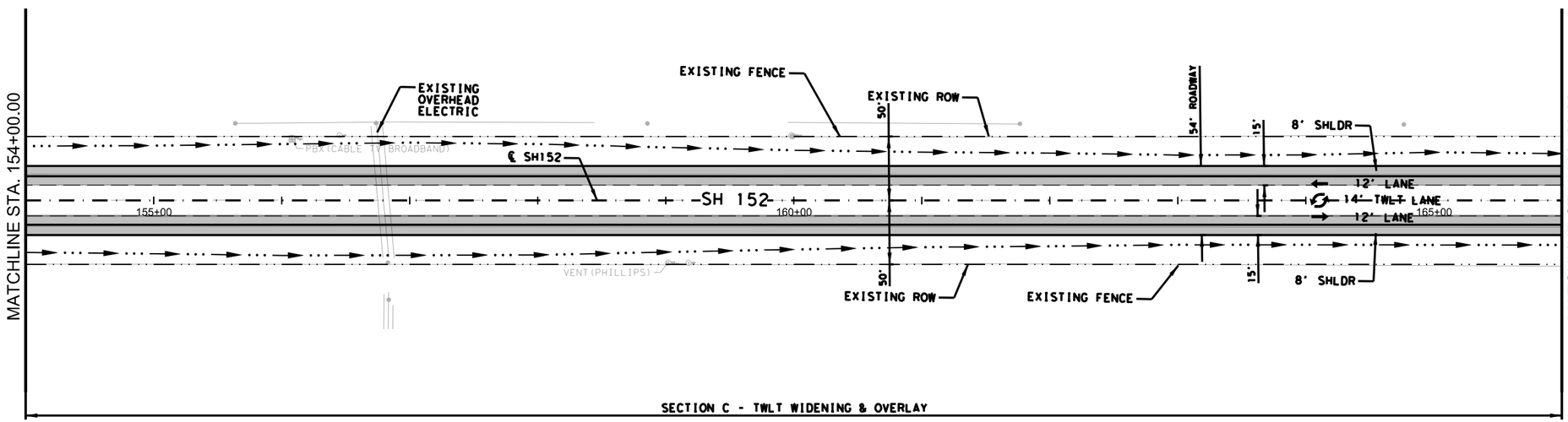


SECTION C - TWLT WIDENING & OVERLAY



SECTION C - TWLT WIDENING & OVERLAY

0' 50' 100'

SCALE IN FEET

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LEGEND:

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- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAYLINE
- PROP WIDENING
- DRIVEWAYS & INTERSECTIONS
- 0" - 3" PLANE, 3" ACP & TACK
- DITCH FLOWLINE

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2/22/2024

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TBPE REG. # F-11657

Texas Department of Transportation

SH 152

ROADWAY
PLAN
STA 142+00 TO STA 166+00

CONT.	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		83

DATE: 2/22/2024 12:59:17 PM
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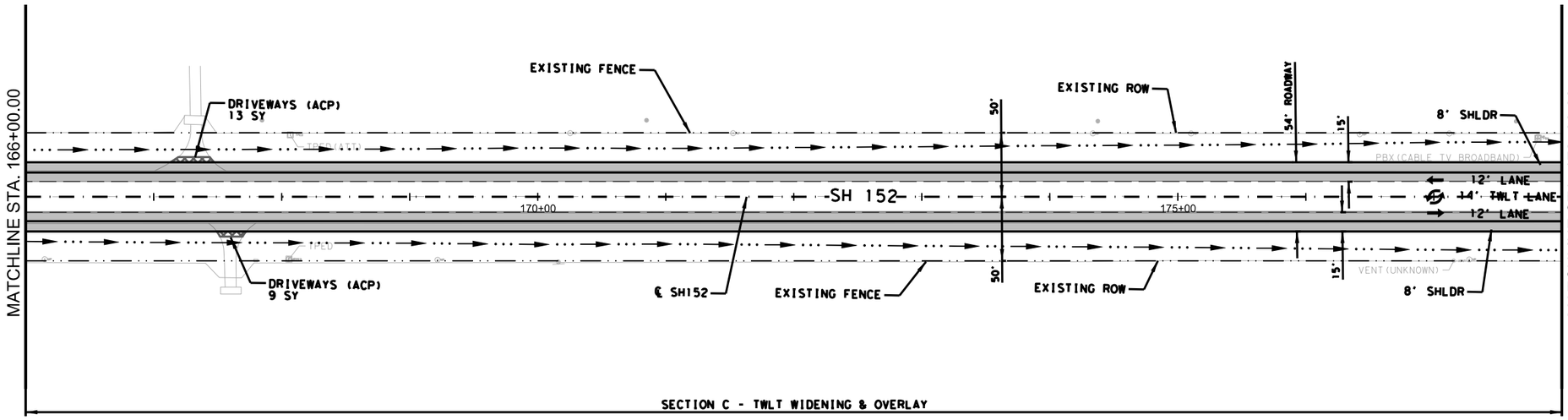

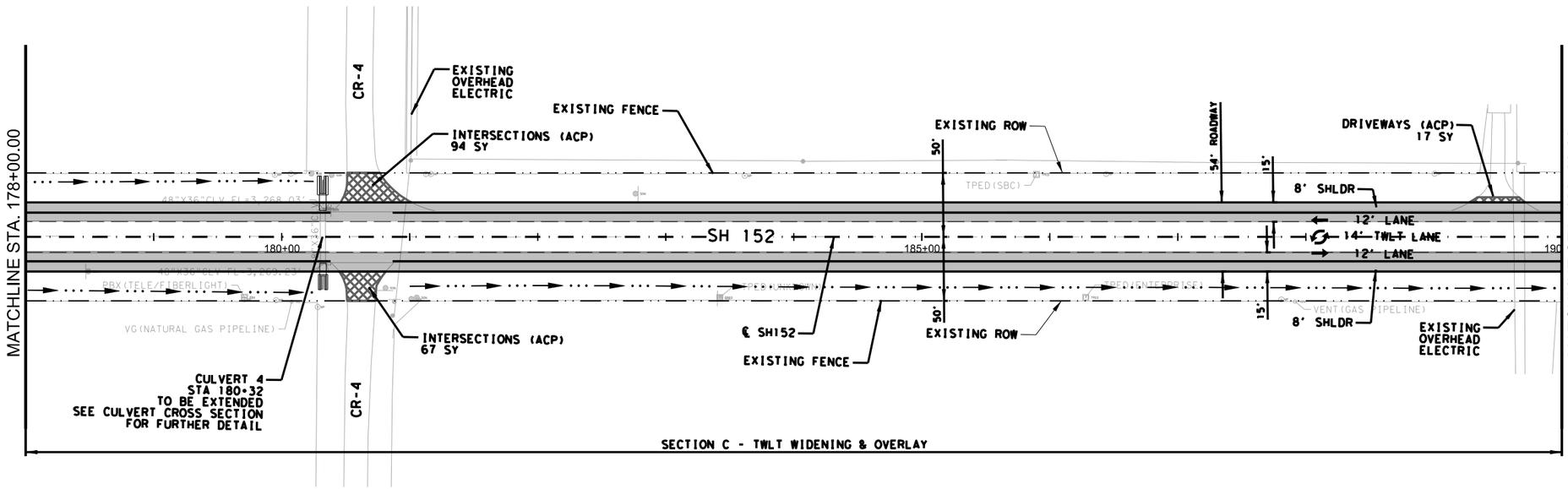

0' 50' 100'

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LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAYLINE
- PROP WIDENING
- DRIVEWAYS & INTERSECTIONS
- 0" - 3" PLANE, 3" ACP & TACK
- DITCH FLOWLINE

STATE OF TEXAS
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2/22/2024

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

Texas Department of Transportation

SH 152

ROADWAY PLAN
STA 166+00 TO STA 190+00

CONT.	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		84

DATE: 2/22/2024 12:59:18 PM
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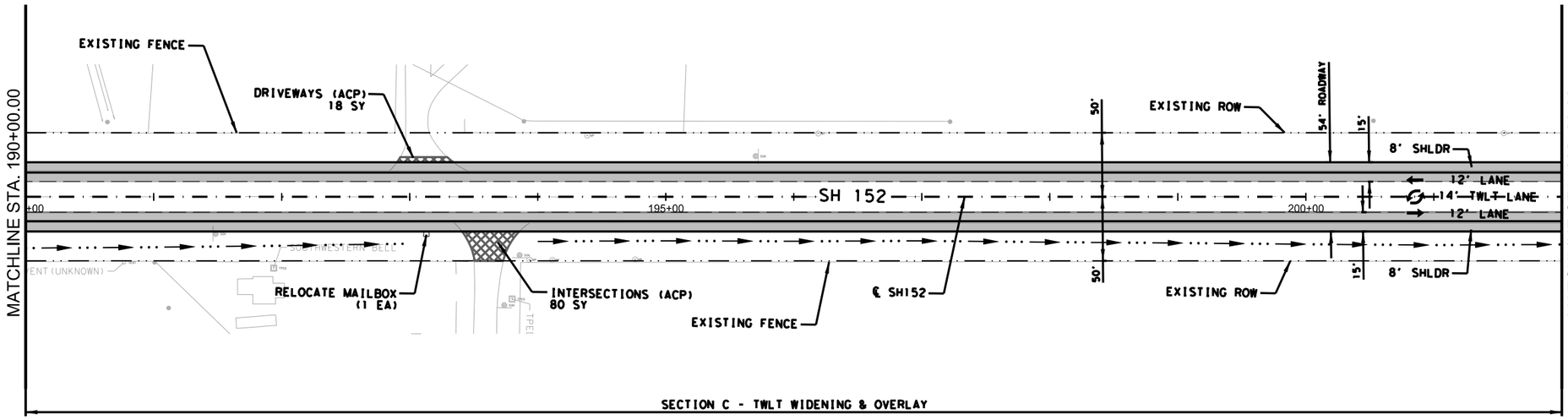

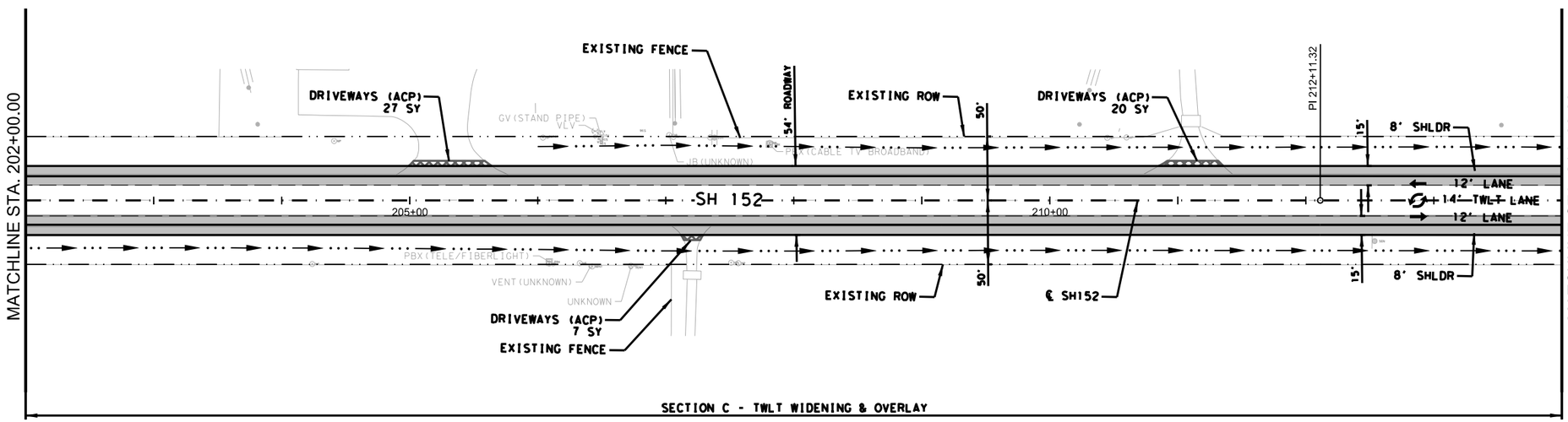

0′ 50′ 100′

SCALE IN FEET

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LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAYLINE
- PROP WIDENING
- DRIVEWAYS & INTERSECTIONS
- 0" - 3" PLANE, 3" ACP & TACK
- DITCH FLOWLINE

STATE OF TEXAS
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2/22/2024

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

Texas Department of Transportation

SH 152

ROADWAY PLAN
STA 190+00 TO STA 214+00

CONT.	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		85

DATE: 2/22/2024 12:59:19 PM
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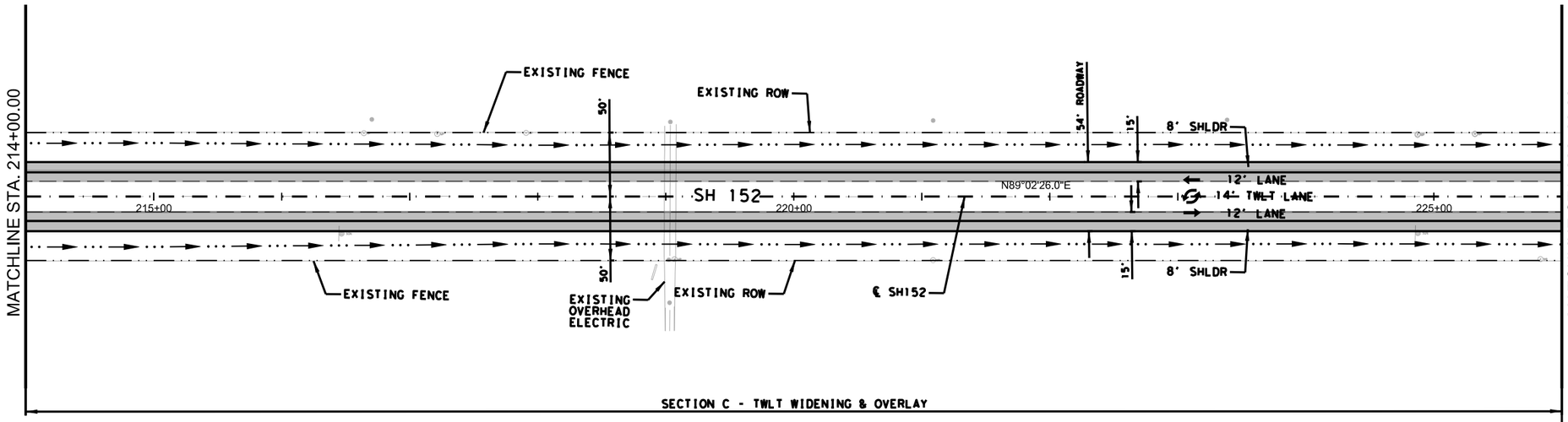

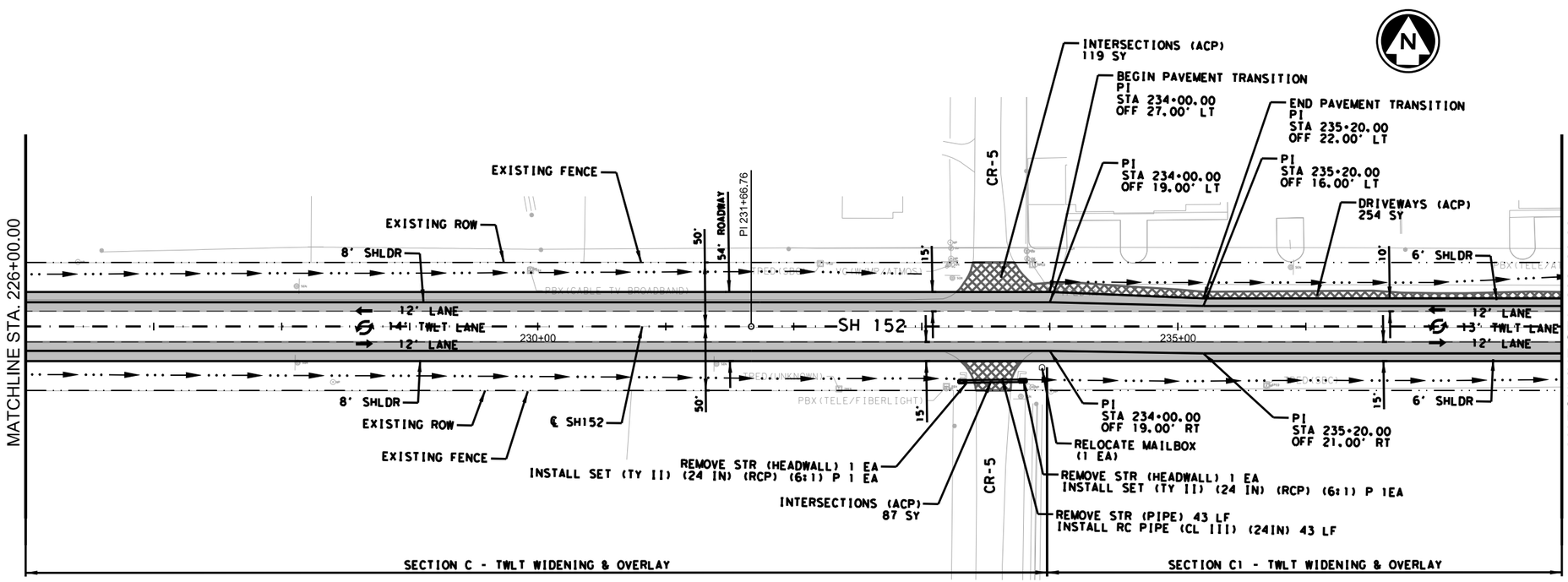

0' 50' 100'

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- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAYLINE
- PROP WIDENING
- DRIVEWAYS & INTERSECTIONS
- 0" - 3" PLANE, 3" ACP & TACK
- DITCH FLOWLINE

STATE OF TEXAS
M. N. MOZAFFAR
85191
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PROFESSIONAL ENGINEER

2/22/2024

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

Texas Department of Transportation

SH 152

ROADWAY
PLAN
STA 214+00 TO STA 238+00

SHEET 10 OF 15

CONT.	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		86

DATE: 2/22/2024 12:59:19 PM
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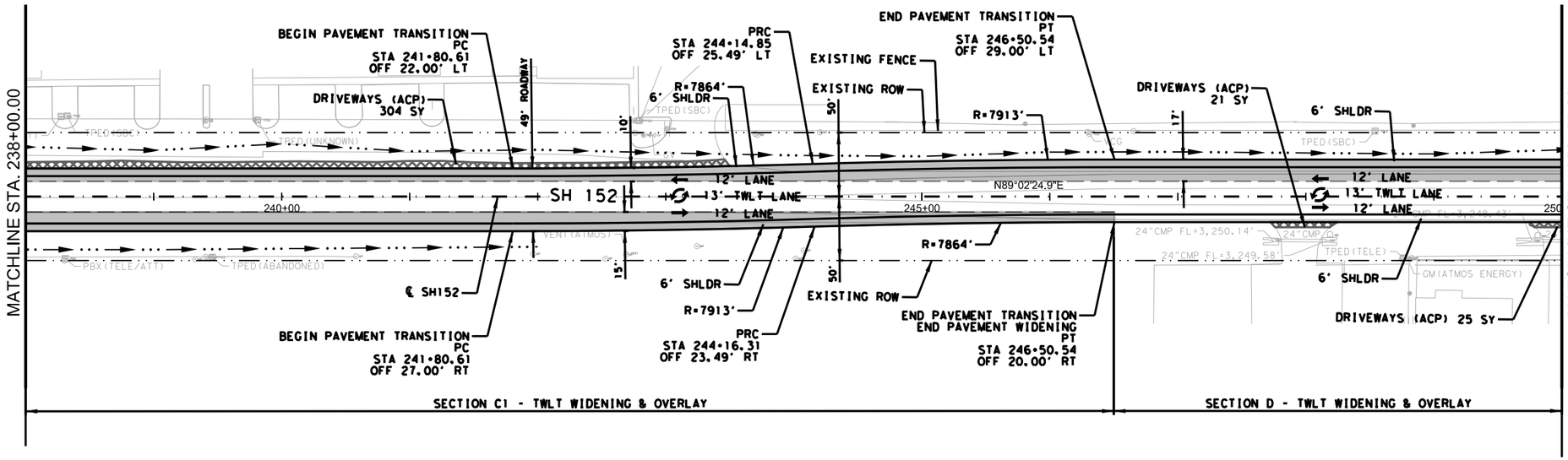

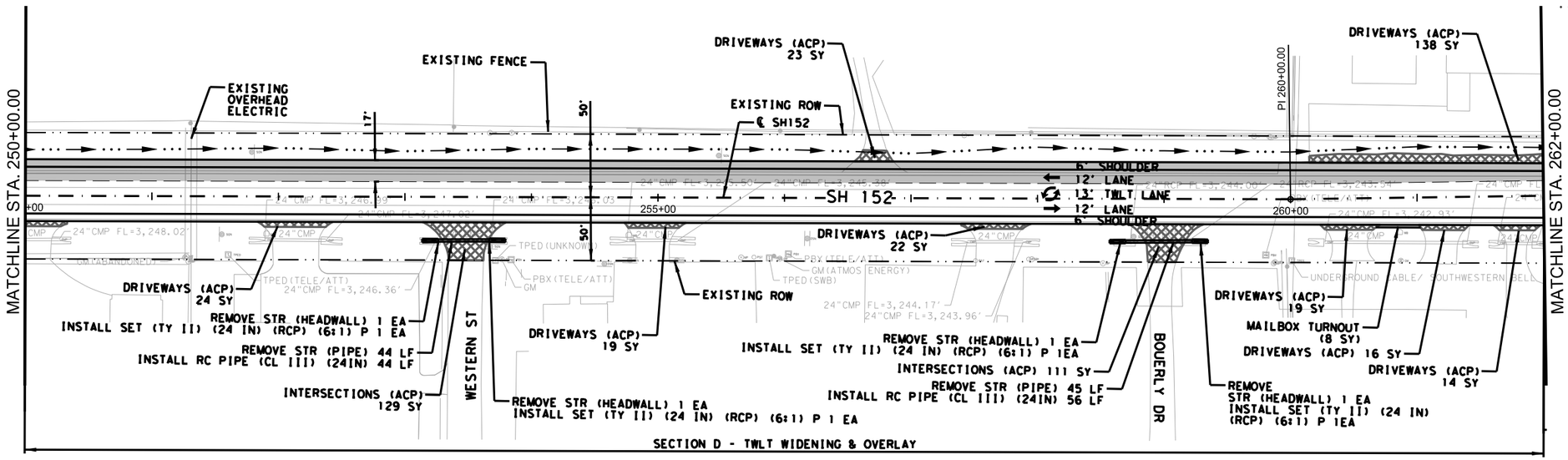

0′ 50′ 100′

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STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
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2/22/2024

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

Texas Department of Transportation

SH 152

ROADWAY PLAN
STA 238+00 TO STA 262+00

SHEET 11 OF 15

CONT.	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		87

DATE: 2/22/2024 12:59:20 PM
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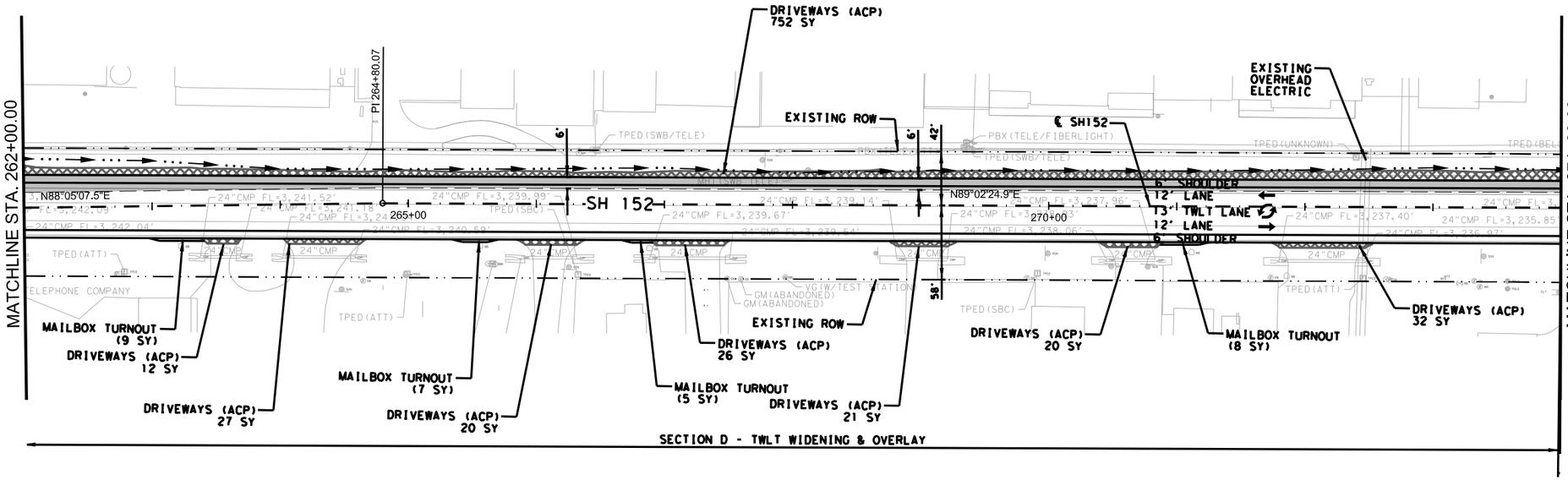

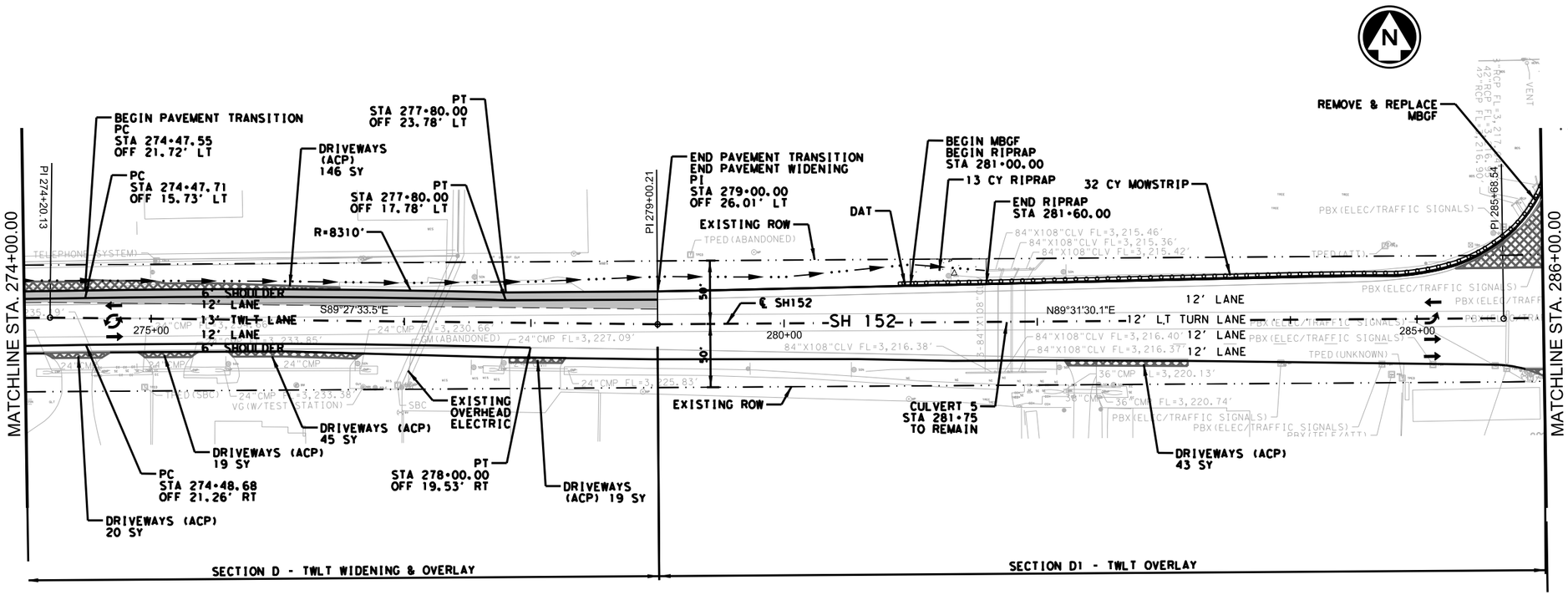

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- DRIVEWAYS & INTERSECTIONS
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- DITCH FLOWLINE

STATE OF TEXAS
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2/22/2024

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

Texas Department of Transportation

SH 152

ROADWAY PLAN
STA 262+00 TO STA 286+00

CONT.	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		88

DATE: 2/22/2024 12:59:21 PM
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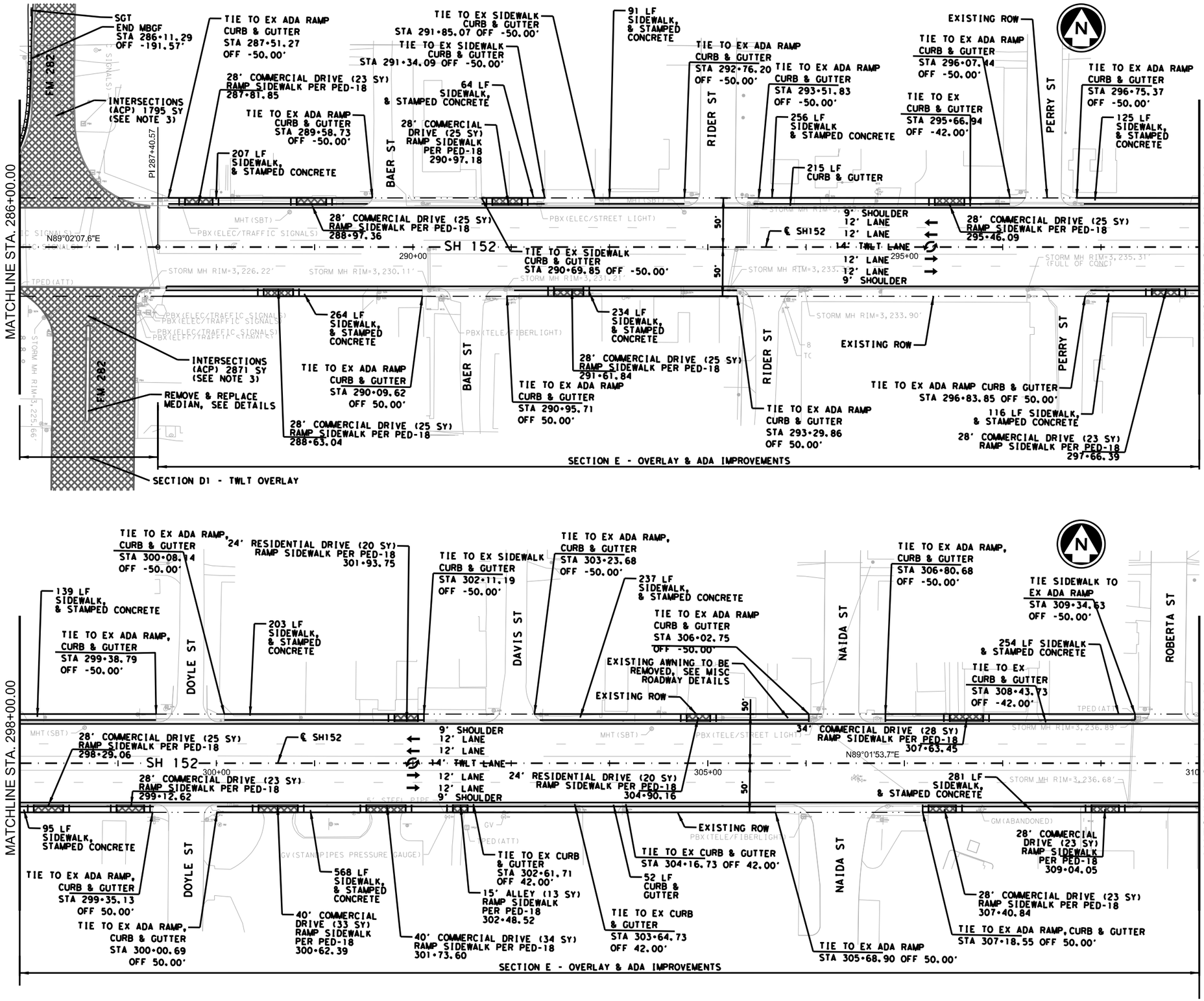

0' 50' 100'

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6. EXISTING MANHOLES SHALL BE ADJUSTED AS SHOWN ON MISC ROADWAY DETAILS.
7. REPLACE CURB & GUTTER AS DIRECTED BY THE ENGINEER.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAYLINE
- PROP WIDENING
- DRIVEWAYS & INTERSECTIONS
- 0" - 3" PLANE, 3" ACP & TACK
- DITCH FLOWLINE

STATE OF TEXAS
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2/22/2024

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

Texas Department of Transportation

SH 152

ROADWAY PLAN
STA 286+00 TO STA 310+00

SHEET 13 OF 15

CONT.	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		89

DATE: 2/22/2024 12:59:21 PM
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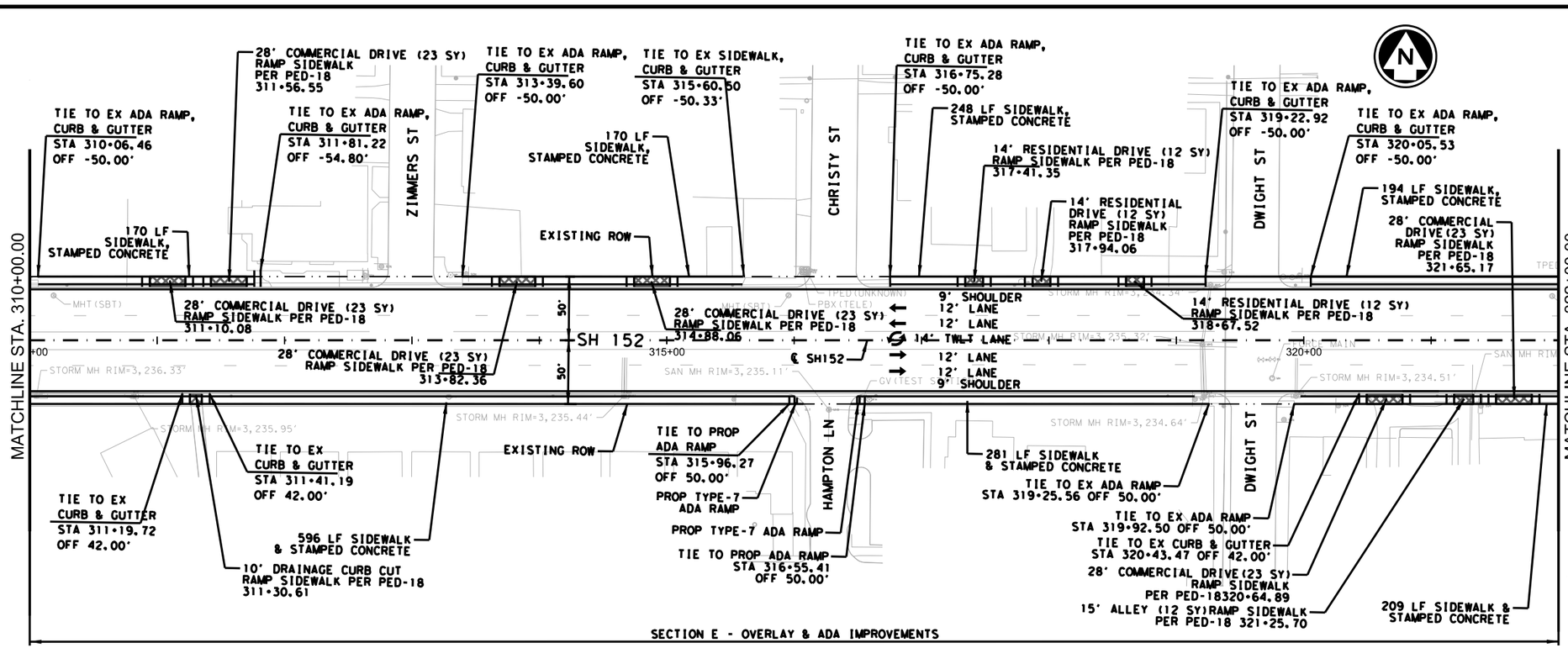

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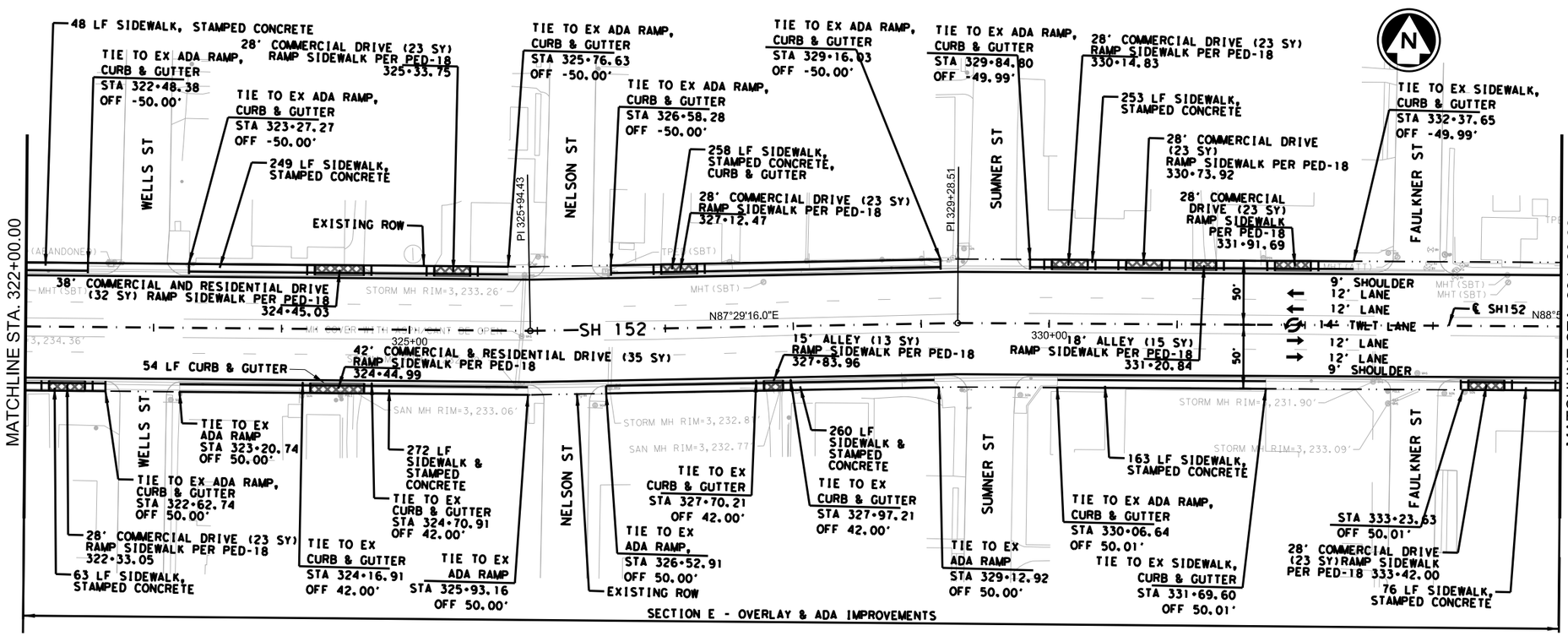
LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAYLINE
- PROP WIDENING
- DRIVEWAYS & INTERSECTIONS
- 0" - 3" PLANE, 3" ACP & TACK
- DITCH FLOWLINE



STATE OF TEXAS
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Texas Department of Transportation

SH 152

ROADWAY PLAN
STA 310+00 TO STA 334+00

CONT.	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		90

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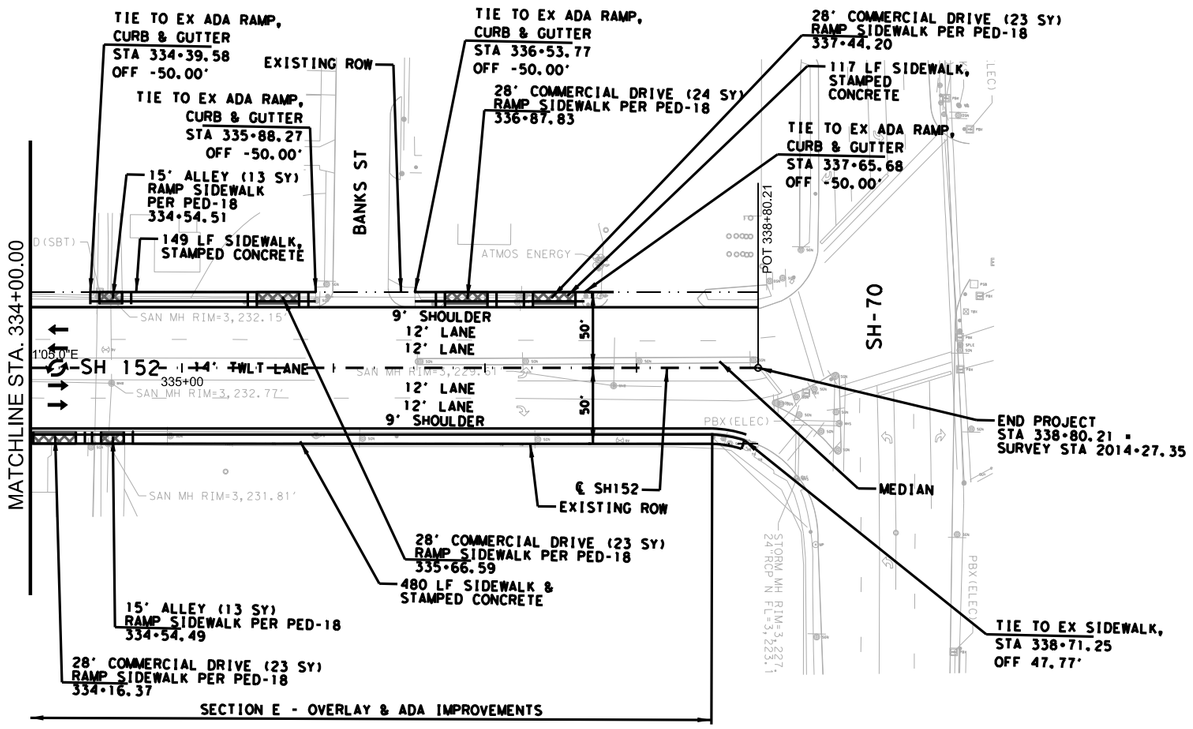

0' 50' 100'

SCALE IN FEET

NOTES:

1. HORIZONTAL ALIGNMENT AS WELL AS EXISTING ROW LINE ARE RECREATED FROM THE AVAILABLE AS-BUILT INFORMATION. NO ROW SURVEY HAS BEEN PERFORMED FOR THIS PROJECT.
2. ALL UTILITIES ARE SHOWN ACCORDING TO THEIR APPROXIMATE LOCATIONS AND ARE INTENDED FOR GENERAL INFORMATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITYTO CONTACT ALL UTILITY OWNERS FOR ACTUAL LOCATIONS.
3. SEE "DRIVEWAYS AND INTERSECTIONS DETAIL" SHEETS FOR INTERSECTION AND DRIVEWAY TIE-IN INFORMATION.
4. SAWCUT ALONG A NEAT HORIZONTAL LINE AND FOR A VERTICAL BUTT JOINT. THIS WORK SHALL BE SUBSIDARY TO VARIOUS BID ITEMS.
5. CONTRACTOR TO REGRADE THE ADJACENT DITCHES TO ENSURE POSITIVE DRAINAGE. REFER TO "ROADWAY CROSS SECTION SHEETS" FOR ADDITIONAL INFORMATION.
6. EXISTING MANHOLES SHALL BE ADJUSTED AS SHOWN ON MISC ROADWAY DETAILS.
7. REPLACE CURB & GUTTER AS DIRECTED BY THE ENGINEER.

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAYLINE
- PROP WIDENING
- DRIVEWAYS & INTERSECTIONS
- 0" - 3" PLANE, 3" ACP & TACK
- DITCH FLOWLINE

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

2/22/2024

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

Texas Department of Transportation

SH 152

ROADWAY
PLAN
STA 334+00 TO END

SHEET 15 OF 15

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		91

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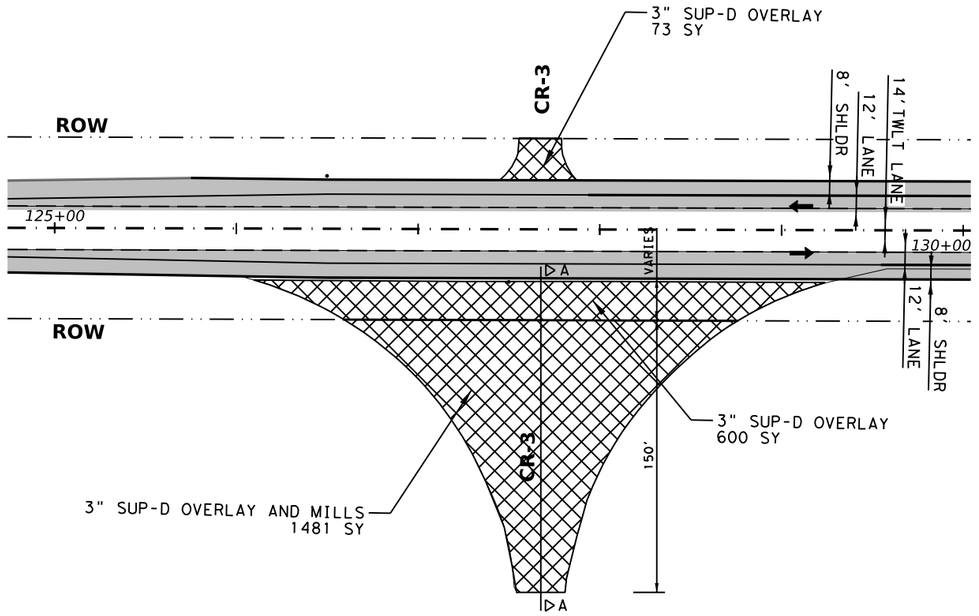

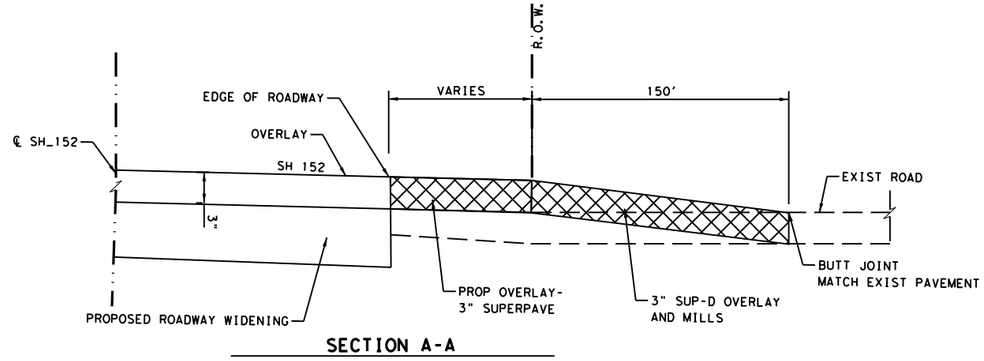

SECTION A-A

LEGEND:

3" SP MIXES SP-D SAC-A PG70-28
(AVG 330 LB/SY) AND
TACK COAT (0.13 GAL/SY)

NOTES:

1. DRIVEWAY AND INTERSECTION INFORMATION PROVIDED IN THESE PLANS IS APPROXIMATE. EXACT LOACTATIONS AND DIMENSIONS SHALL BE ESTABLISHED DURING CONSTRUCTION BY THE FIELD ENGINEER AS REQUIRED.
2. ADDITIONAL AREAS FOR INTERSECTION TIE-IN ARE CALCULATED GRAPHICALLY.
3. THE CONTRACTOR SHALL OBTAIN PERMISSION FROM THE RESPECTIVE PROPERTY OWNERS 24 HOURS PRIOR TO THE CONTRACTOR CONSTRUCTING PROPOSED DRIVEWAYS.

FM ROADS INTERSECTION ITEMS

STATION	LT/RT	ROADNAME	L	354	530	3077 (1)	3077 (1)
				6022	6002	6058	6075
				PLANE ASPH CONC PAV (0" TO 3")	INTERSECTIONS	SP MIXES SP-D SAC-A PG70-28	TACK COAT
						(330 LBS/SY)	0.13 GAL/SY
				SY	SY	TON	GAL
127+70	LT/RT	CR-3	VAR	1554	2154	356	280

1. FOR CONTRACTOR'S INFORMATION ONLY. ALL ITEM LISTED AS "FOR CONTRACTOR'S INFORMATION ONLY WILL BE COMPLETED IN ACCORDANCE WITH THE APPLICABLE TXDOT STANDARD SPECIFICATIONS, AND ARE CONSIDERED SUBSIDIARY TO ITEM 530 INTERSECTIONS (ACP).

DETAIL FOR INTERSECTION CR-3 AND SH 152 OVERLAY

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

SCALE: N/A

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

Texas Department of Transportation

SH 152

DRIVEWAYS
& INTERSECTIONS DETAILS

2024 SHEET 1 OF 6

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		92

DATE: 2/21/2024 3:02:50 PM
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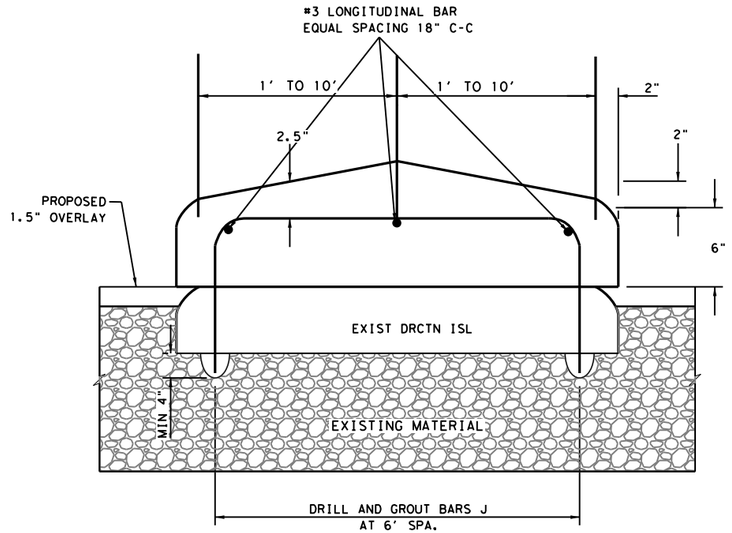
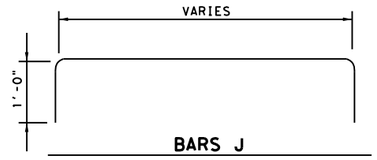
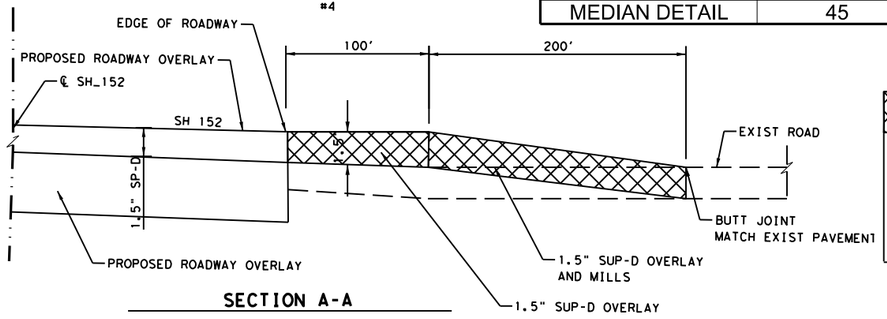


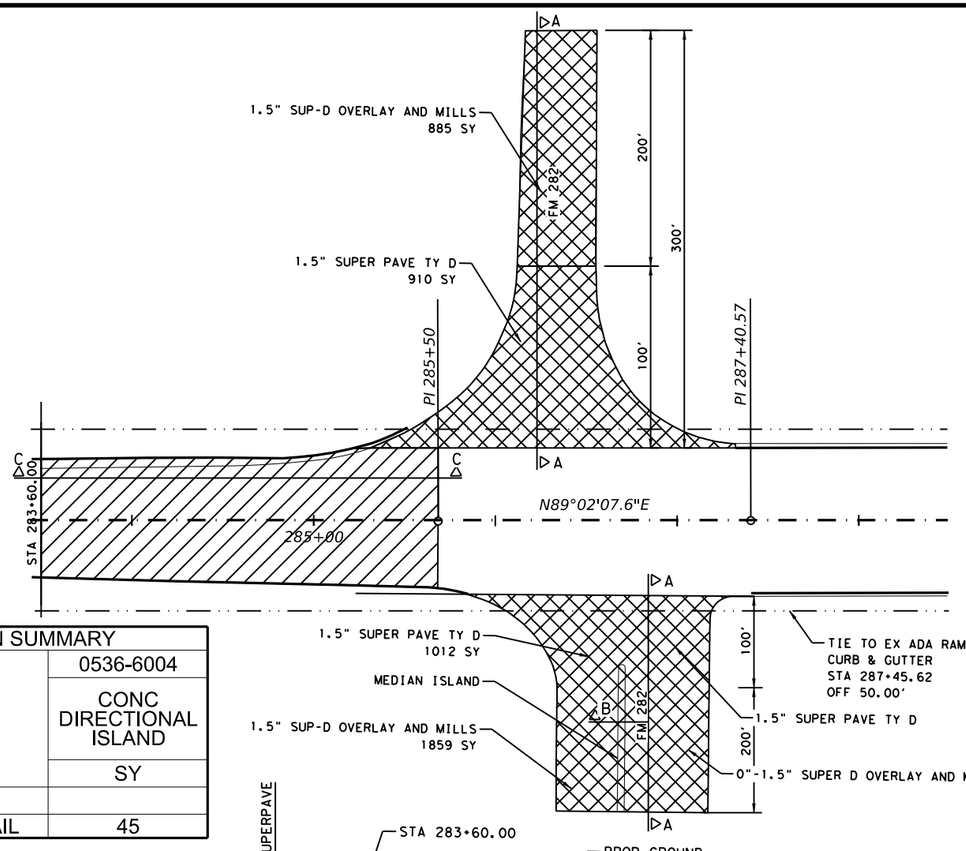
DETAIL B

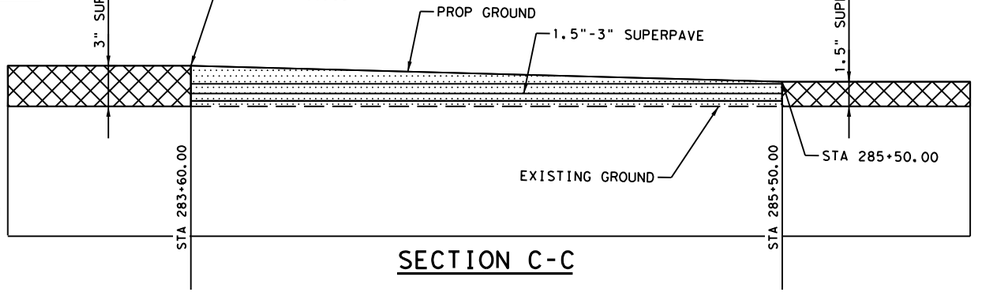


MEDIAN SUMMARY	
	0536-6004
	CONC DIRECTIONAL ISLAND
	SY
MEDIAN DETAIL	45



SECTION A-A





SECTION C-C

LEGEND:

1.5" SP MIXES SP-D SAC-A PG70-28
(AVG 165 LB/SY) AND
TACK COAT (0.13 GAL/SY)

NOTES:

1. DRIVEWAY AND INTERSECTION INFORMATION PROVIDED IN THESE PLANS IS APPROXIMATE. EXACT LOACTATIONS AND DIMENSIONS SHALL BE ESTABLISHED DURING CONSTRUCTION BY THE FIELD ENGINEER AS REQUIRED.
2. ADDITIONAL AREAS FOR INTERSECTION TIE-IN ARE CALCULATED GRAPHICALLY.
3. THE CONTRACTOR SHALL OBTAIN PERMISSION FROM THE RESPECTIVE PROPERTY OWNERS 24 HOURS PRIOR TO THE CONTRACTOR CONSTRUCTING PROPOSED DRIVEWAYS.
4. DIRECTIONAL ISLAND REINFORCING:
   PROVIDE UNCOATED GRADE 60 REINFORCING STEEL.
   SEE DETAILS FOR REINFORCING BAR SIZE.
   USE TYPE III, CLASS C,D,E, OR F ANCHOR ADHESIVE.
5. PLACE TRANSVERSE TOOL JOINTS EVERY 25' IN CONCRETE MEDIAN OR AS DIRECTED BY THE ENGINEER.
6. DRILL AND GROUT BARS SHOWN AS PER ITEM 420.4.7.10, 6" EMBEDMENT, MINIMUM ON CONC.
7. INSTALL A 2 INCH DRAINAGE OPENNING AT 10 FT C-C WHEN CURB/ISLAND IS NOT ON TOP OF CROSS SECTION. (LOCATED ON A 2 OR 3 PERCENT TRANSVERSE GRADE, OR SUPERELEVATION.)

FM ROADS INTERSECTION ITEMS							
STATION	LT/RT	ROADNAME	L	354	530	3077 (1)	3077 (1)
				6051	6002	6058	6075
				PLANE ASPH CONC PAV (0" TO 1.5")	INTERSECTIONS	SP MIXES SP-D SAC-A PG70-28	TACK COAT
						(165 LBS/SY)	0.13 GAL/SY
				SY	SY	TON	GAL
285+30-287+19	LT/RT	FM 282	600	2744	4666	385	607

1. FOR CONTRACTOR'S INFORMATION ONLY. ALL ITEM LISTED AS "FOR CONTRACTOR'S INFORMATION ONLY WILL BE COMPLETED IN ACCORDANCE WITH THE APPLICABLE TXDOT STANDARD SPECIFICATIONS, AND ARE CONSIDERED SUBSIDIARY TO ITEM 530 INTERSECTIONS (ACP).

DETAIL FOR INTERSECTION FM 282 & SH 152 OVERLAY

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

SCALE: N/A

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

Texas Department of Transportation

SH 152

DRIVEWAYS
& INTERSECTIONS DETAILS

2024 SHEET 2 OF 6

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		93

DATE: 2/21/2024 3:02:51 PM
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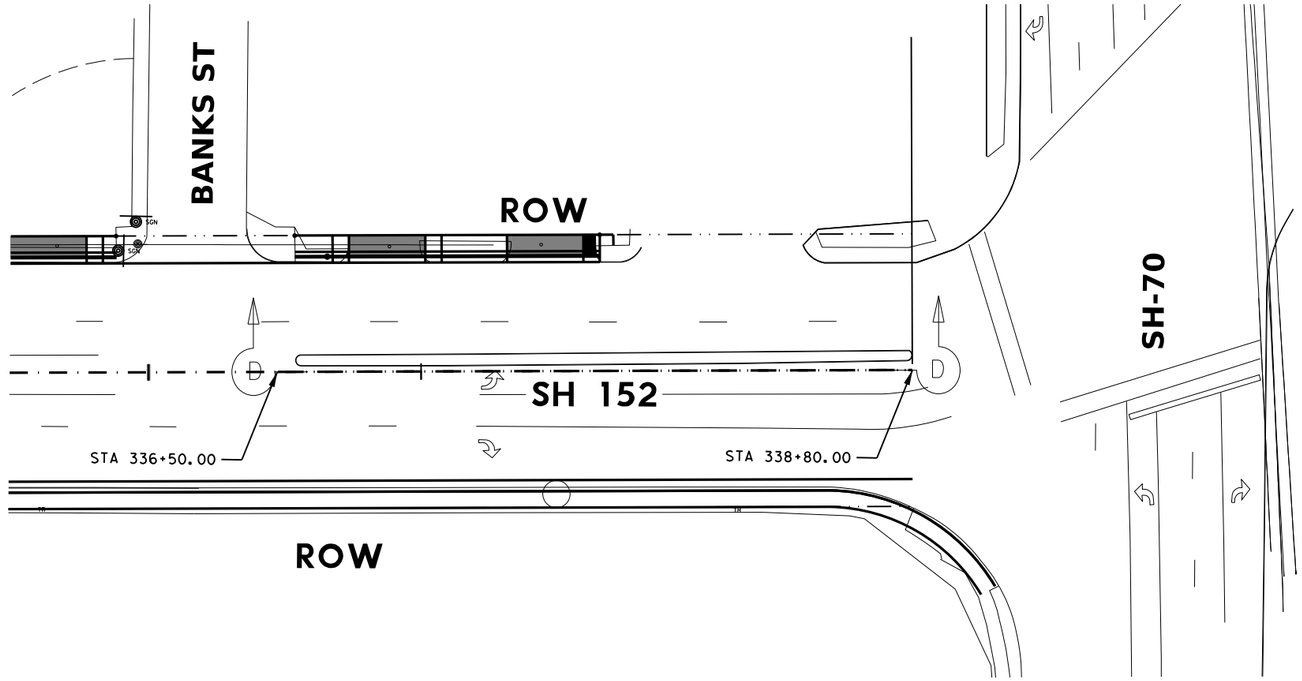


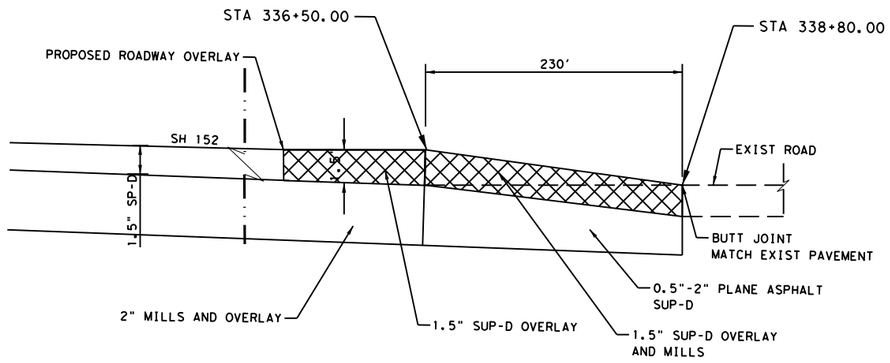
LEGEND:

1.5" - 0" PLANE SP MIXES SP-D SAC-A PG70-28(AVG 85 LB/SY) TACK COAT (0.13 GAL/SY)

NOTES:

1. DRIVEWAY AND INTERSECTION INFORMATION PROVIDED IN THESE PLANS IS APPROXIMATE. EXACT LOACTATIONS AND DIMENSIONS SHALL BE ESTABLISHED DURING CONSTRUCTION BY THE FIELD ENGINEER AS REQUIRED.
2. ADDITIONAL AREAS FOR INTERSECTION TIE-IN ARE CALCULATED GRAPHICALLY.
3. THE CONTRACTOR SHALL OBTAIN PERMISSION FROM THE RESPECTIVE PROPERTY OWNERS 24 HOURS PRIOR TO THE CONTRACTOR CONSTRUCTING PROPOSED DRIVEWAYS.

DETAIL FOR END OF PROJECT: INTERSECTION SH152 AND SH70



SECTION D-D

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

2/21/2024

SCALE: N/A

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

Texas Department of Transportation

SH 152

DRIVEWAYS & INTERSECTIONS DETAILS

2024 SHEET 3 OF 6

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		94

DATE: 2/21/2024 3:02:51 PM
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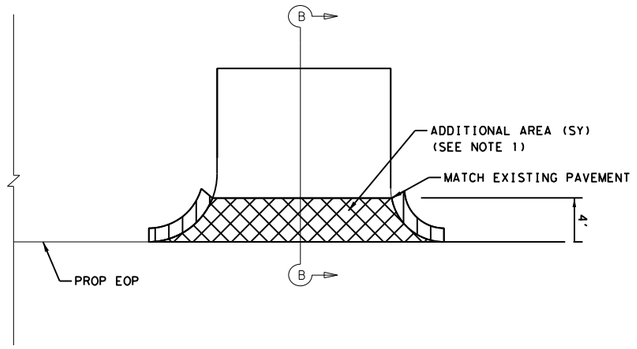
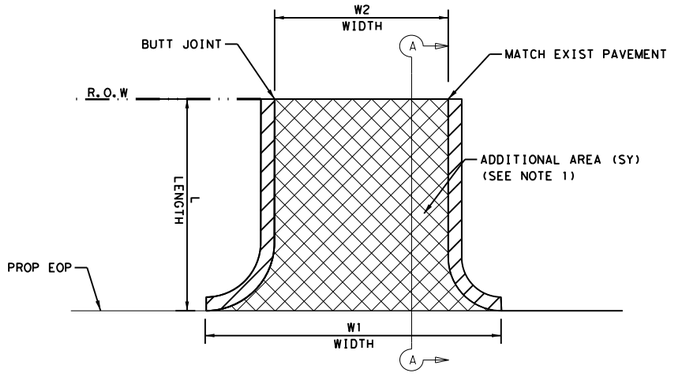




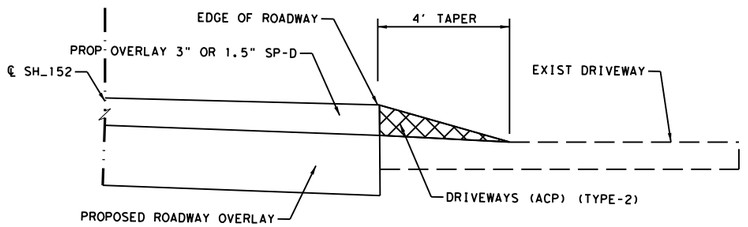
LEGEND:

1.5" OR 3" SP MIXES SP-D SAC-A PG70-28 (AVG 165 OR 330 LB/SY) AND TACK COAT (0.13 GAL/SY)

BACKFILL

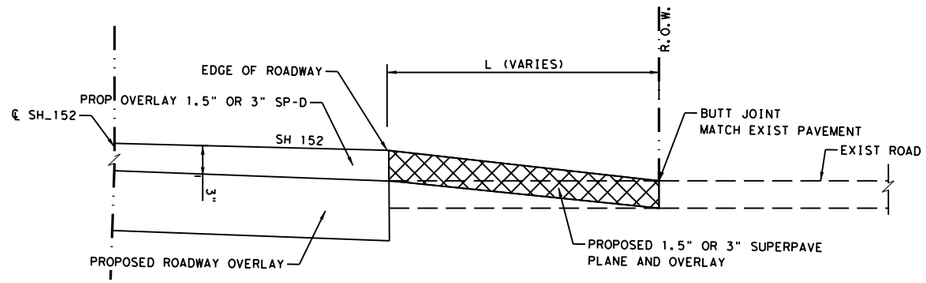
NOTES:

1. DRIVEWAY AND INTERSECTION INFORMATION PROVIDED IN THESE PLANS IS APPROXIMATE. EXACT LOACTATIONS AND DIMENSIONS SHALL BE ESTABLISHED DURING CONSTRUCTION BY THE FIELD ENGINEER AS REQUIRED.
2. ADDITIONAL AREAS FOR INTERSECTION TIE-IN ARE CALCULATED GRAPHICALLY.
3. THE CONTRACTOR SHALL OBTAIN PERMISSION FROM THE RESPECTIVE PROPERTY OWNERS 24 HOURS PRIOR TO THE CONTRACTOR CONSTRUCTING PROPOSED DRIVEWAYS.



SECTION B-B

TYPICAL DRIVEWAY TIE-IN DETAIL



SECTION A-A

TYPICAL ROADWAY INTERSECTION TIE-IN DETAIL

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

2/21/2024

SCALE: N/A

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

Texas Department of Transportation

SH 152

DRIVEWAYS
& INTERSECTIONS DETAILS

2024 SHEET 4 OF 6

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		95

DATE: 2/21/2024 3:02:52 PM
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DRIVEWAY ITEM							
STATION	LT/RT	AREA	354 6051 PLANE ASPH CONC PAV (0" TO 1.5")	354 6022 PLANE ASPH CONC PAV (0" TO 3")	3077 6058 SP MIXES SP-D SAC-A PG70-28 *	3077 6075 TACK COAT *	354 6022 DRIVEWAYS (ACP) TYPE 2
		A			(330 LB/SY)	0.13 GAL/SY	
		SY	SY	SY	TON	GAL	SY
8+22.87	LT	34			6	4	34
8+16.96	RT	26			4	3	26
29+44.21	RT	23			4	3	23
30+34.17	RT	110		110	18	14	110
31+43.70	RT	63		63	10	8	63
33+08.21	RT	11		11	2	1	11
43+69.63	LT	14			2	2	14
48+31.57	RT	77		77	13	10	77
76+71.23	LT	69		69	11	9	69
85+88.80	RT	19			3	2	19
89+70.71	RT	11			2	1	11
96+89.49	LT	7		7	1	1	7
102+32.79	LT	77		77	13	10	77
104+18.96	LT	44		44	7	6	44
105+03.84	RT	32			5	4	32
111+77.75	LT	31		31	5	4	31
112+24.29	RT	17			3	2	17
138+77.54	RT	19			3	2	19
143+81.75	LT	11			2	1	11
167+31.14	LT	13			2	2	13
167+60.97	RT	9			1	1	9
189+49.79	LT	17			3	2	17
193+10.75	LT	18			3	2	18
205+30.65	LT	27			4	4	27
207+20.89	RT	7			1	1	7
211+11.27	LT	20			3	3	20
236+00.00	LT	254			42	33	254
240+00.00	LT	304			50	40	304
247+95.97	RT	21			3	3	21
250+03.58	RT	25			4	3	25
252+13.80	RT	24			4	3	24
254+95.72	RT	19			3	2	19
256+70.62	LT	9			1	1	9
257+66.66	RT	22			4	3	22
260+46.93	RT	19			3	2	19
261+22.00	RT	16			3	2	16
261+79.52	RT	14			2	2	14
262+00.00	LT	138			23	18	138
268+00.00	LT	752			124	98	752
275+00.00	LT	146			24	19	146
263+55.75	RT	12			2	2	12
264+34.67	RT	27			4	4	27
266+11.96	RT	20			3	3	20
267+20.30	RT	26			4	3	26

DRIVEWAY ITEM							
STATION	LT/RT	AREA	354 6051 PLANE ASPH CONC PAV (0" TO 1.5")	354 6022 PLANE ASPH CONC PAV (0" TO 3")	3077 6058 SP MIXES SP-D SAC-A PG70-28 *	3077 6075 TACK COAT *	354 6022 DRIVEWAYS (ACP) TYPE 2
		A			(330 LB/SY)	0.13 GAL/SY	
		SY	SY	SY	TON	GAL	SY
269+01.90	RT	21			3	3	21
270+65.18	RT	20			3	3	20
272+14.09	RT	32			5	4	32
274+41.34	RT	20			3	3	20
275+13.23	RT	19			3	2	19
276+13.94	RT	45			7	6	45
278+05.01	RT	19			3	2	19
282+63.86	RT	43			7	6	43
287+81.85	LT	23	23		4	3	23
288+63.04	RT	25	25		4	3	25
288+97.36	LT	25	25		4	3	25
290+97.18	LT	25	25		4	3	25
291+61.84	RT	25	25		4	3	25
295+46.09	LT	25	25		4	3	25
297+66.39	RT	23	23		4	3	23
298+29.06	RT	25	25		4	3	25
299+12.62	RT	23	23		4	3	23
300+62.39	RT	33	33		5	4	33
301+73.60	RT	34	34		6	4	34
301+93.75	LT	20	20		3	3	20
302+48.52	RT	13	13		2	2	13
304+90.16	LT	20	20		3	3	20
307+40.84	RT	23	23		4	3	23
307+63.45	LT	28	28		5	4	28
309+04.05	RT	23	23		4	3	23
311+10.08	LT	23	23		4	3	23
311+56.55	LT	23	23		4	3	23
313+82.36	LT	23	23		4	3	23
314+88.06	LT	23	23		4	3	23
317+41.35	LT	12	12		2	2	12
317+94.06	LT	12	12		2	2	12
318+67.52	LT	12	12		2	2	12
320+64.89	RT	23	23		4	3	23
321+25.70	RT	12	12		2	2	12
321+65.17	RT	23	23		4	3	23
322+33.05	RT	23	23		4	3	23
324+44.99	RT	35	35		6	5	35
324+45.03	LT	32	32		5	4	32
325+33.75	LT	23	23		4	3	23
327+12.47	LT	23	23		4	3	23
327+83.96	RT	13	13		2	2	13
330+14.83	LT	23	23		4	3	23
330+73.92	LT	23	23		4	3	23
331+20.84	LT	15	15		2	2	15

NOTES:

* FOR CONTRACTOR'S INFORMATION ONLY: ALL ITEMS LISTED AS "FOR CONTRACTOR'S INFORMATION ONLY" WILL BE COMPLETED IN ACCORDANCE WITH THE APPLICABLE TXDOT STANDARD SPECIFICATIONS, AND ARE CONSIDERED SUBSIDIARY TO ITEM 530.

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

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

Texas Department of Transportation

SH 152

DRIVEWAYS & INTERSECTIONS DETAILS

2024 SHEET 5 OF 6

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		96

DATE: 2/21/2024 3:02:52 PM
FILE: L:\DESIGN PROJECTS\ WorkSets\AMA 0455-03-038\4 - Design\Plan Set\3. Roadway\Additional Areas\SH1 52 ADD AREAS 05.dgn

CK DW CK DW

DRIVEWAY ITEM							
STATION	LT/RT	AREA	354 6051 PLANE ASPH CONC PAV (0" TO 1.5")	354 6022 PLANE ASPH CONC PAV (0" TO 3")	3077 6058 SP MIXES SP-D SAC-A PG70-28 *	3077 6075 TACK COAT *	354 6022 DRIVEWAYS (ACP) TYPE 2
		A			(330 LB/SY)	0.13 GAL/SY	
		SY	SY	SY	TON	GAL	SY
331+91.69	LT	23	23		4	3	23
333+42.00	RT	23	23		4	3	23
334+54.51	LT	13	13		2	2	13
334+16.37	RT	23	23		4	3	23
334+54.49	RT	13	13		2	2	13
335+66.59	LT	23	23		4	3	23
336+87.83	LT	23	23		4	3	23
337+44.20	LT	23	23		4	3	23
PROJECT TOTALS		3846	973	489	635	500	3846

INTERSECTION ITEM							
STATION	LT/RT	AREA	354 6051 PLANE ASPH CONC PAV (0" TO 1.5")	354 6022 PLANE ASPH CONC PAV (0" TO 3")	3077 6058 SP MIXES SP-D SAC-A PG70-28 *	3077 6075 TACK COAT *	530 6002 INTERSECTIONS
		A			(330 LB/SY)	0.13 GAL/SY	
		SY	SY	SY	TON	GAL	SY
21+74.87	RT	110		110	18	14	110
74+68.14	LT	60		60	10	8	60
74+71.36	RT	91		91	15	12	91
91+90.85	LT	68		68	11	9	68
127+66.85 (CR 3)	LT	73		73	12	9	73
127+67.88 (CR 3)	RT	2081		1481	343	271	2081
180+63.06	RT	67		67	11	9	67
180+70.82	LT	94		94	16	12	94
193+64.41	RT	80		80	13	10	80
233+56.10	LT	119		119	20	15	119
233+56.10	RT	87		87	14	11	87
253+49.33	RT	129		129	21	17	129
259+01.25	RT	111		111	18	14	111
286+34.62 (FM 282)	LT	1795	885		296	233	1795
286+63.42 (FM 282)	RT	2871	1859		474	373	2871
PROJECT TOTALS		7836	2744	2570	1293	1019	7836

NOTES:

* FOR CONTRACTOR'S INFORMATION ONLY: ALL ITEMS LISTED AS "FOR CONTRACTOR'S INFORMATION ONLY" WILL BE COMPLETED IN ACCORDANCE WITH THE APPLICABLE TXDOT STANDARD SPECIFICATIONS, AND ARE CONSIDERED SUBSIDIARY TO ITEM 530.

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

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

Texas Department of Transportation

SH 152

DRIVEWAYS & INTERSECTIONS DETAILS

2024 SHEET 6 OF 6

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		97

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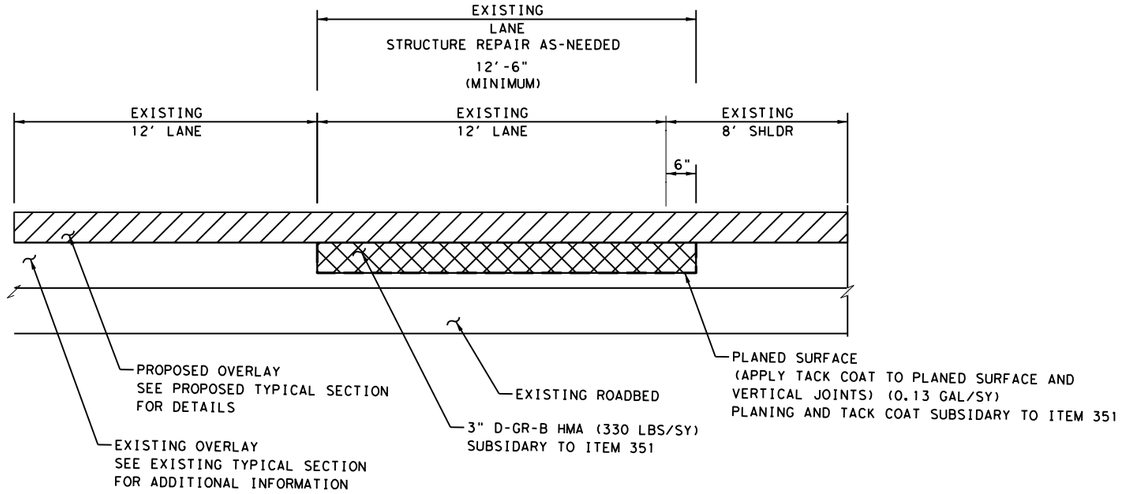

LEGEND:

3" D-GR-B HMA
(AVG 330 LB/SY),
TACK COAT (0.13 GAL/SY)

PROPOSED OVERLAY

NOTES:

SEE PROPOSED TYPICAL SECTION FOR DETAILS

PAVEMENT REPAIR NOTES:

1. QUANTITIES ARE CARRIED OVER TO "SUMMARY OF QUANTITIES". ALL QUANTITIES ARE BASED ON 20% PAVEMENT REPAIR OF THE TRAVEL LANES FOR THE STATION LIMITS.
2. FOR CONTRACTOR'S INFORMATION ONLY. ALL ITEMS LISTED AS "FOR CONTRACTOR'S INFORMATION ONLY" WILL BE COMPLETED IN ACCORDANCE WITH THE APPLICABLE TXDOT STANDARD SPECIFICATIONS, AND ARE CONSIDERED SUBSIDIARY TO ITEM 351. FLEXIBLE PAVEMENT STRUCTURE REPAIR.
3. CONTACTOR WILL NOT REMOVE MORE MATERIAL THAN CAN BE REPLACED IN A SINGLE WORK DAY.
4. LOCATIONS OF PAVEMENT REPAIR TO VARY AS DIRECTED BY THE ENGINEER.
5. PAVEMENT REPAIR AREA WILL BE A MINIMUM 20'-0" IN LENGTH.
6. EXTEND REPAIR WIDTH TO INCLUDE INTERIOR EXISTING PAVEMENT JOINTS, WHERE INSTRUCTED BY THE ENGINEER. PAVEMENT REPAIR ON OUTSIDE EDGE OF TRAVEL LANE WILL INCLUDE AN OVERLAP OF 6" ONTO SHOULDER.
7. HOT MIX TO BE USED FOR FLEXIBLE PAVEMENT REPAIR WILL BE D-GR HMA OR APPROVED ALTERNATIVE, BY THE ENGINEER.
8. TRACKLESS TACK COAT WILL BE USED FOR ALL REPAIR AREAS.

PAVEMENT REPAIR DETAIL

PAVEMENT REPAIR ITEMS				
ITEM	351 (2)	354 (1)	3076 (1)	3077 (1)
	6019	6022	6005	6075
	FLEXIBLE PAVEMENT STRUCTURE REPAIR (3")	PLANE ASPH CONC PAVEMENT(0"-3")	D-GR HMA TY-B PG64-28	TACK COAT
			(330 LBS/SY)	0.13 GAL/SY
	SY	SY	TON	GAL
PROJECT TOTALS	15814	15814	2610	2056

1. FOR CONTRACTOR'S INFORMATION ONLY. ALL ITEM LISTED AS "FOR CONTRACTOR'S INFORMATION ONLY WILL BE COMPLETED IN ACCORDANCE WITH THE APPLICABLE TXDOT STANDARD SPECIFICATIONS, AND ARE CONSIDERED SUBSIDIARY TO ITEM 351 FLEXIBLE PAVEMENT STRUCTURE REPAIR.
2. BASED ON 20% PAVEMENT REPAIR OF THE EXISTING DRIVING LANES, NEEDED ALONG NEEDED ALONG THE CENTERLINE AFTER THE TRAFFIC CONTROL SHIFT.

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2/21/2024

I.S. ENGINEERS, LLC
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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

Texas Department of Transportation

SH 152

PAVEMENT REPAIR DETAIL

2024

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		98

DATE: 2/21/2024 3:02:53 PM
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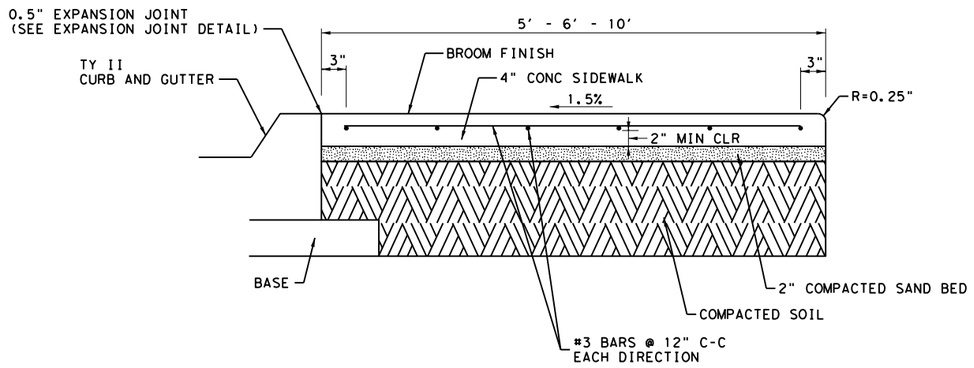
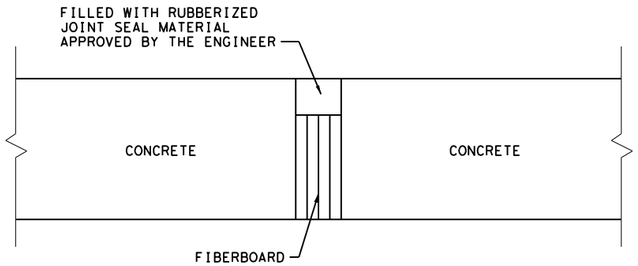


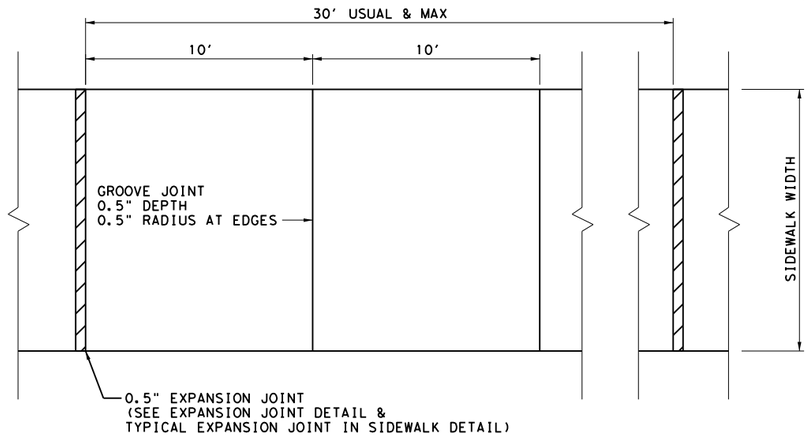
TYPICAL SIDEWALK DETAIL
NTS

NOTE:

1. 2" SAND BED IS SUBSIDIARY TO CONCRETE SIDEWALK
2. EXPANSION JOINT IS SUBSIDIARY TO CONCRETE SIDEWALK



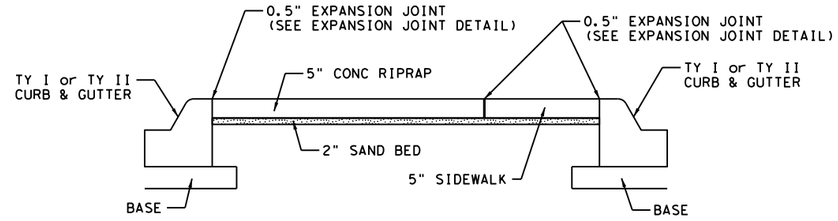
EXPANSION JOINT DETAIL
NTS



TYPICAL SIDEWALK PLAN
NTS

NOTE:

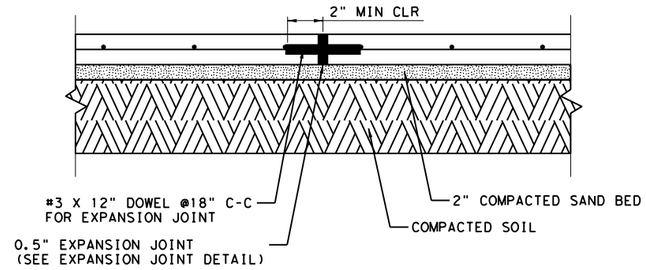
EXPANSION JOINT IS SUBSIDIARY TO CONCRETE SIDEWALK



CONCRETE MEDIAN DETAIL
CONCRETE RIPRAP DETAIL
NTS

NOTE:

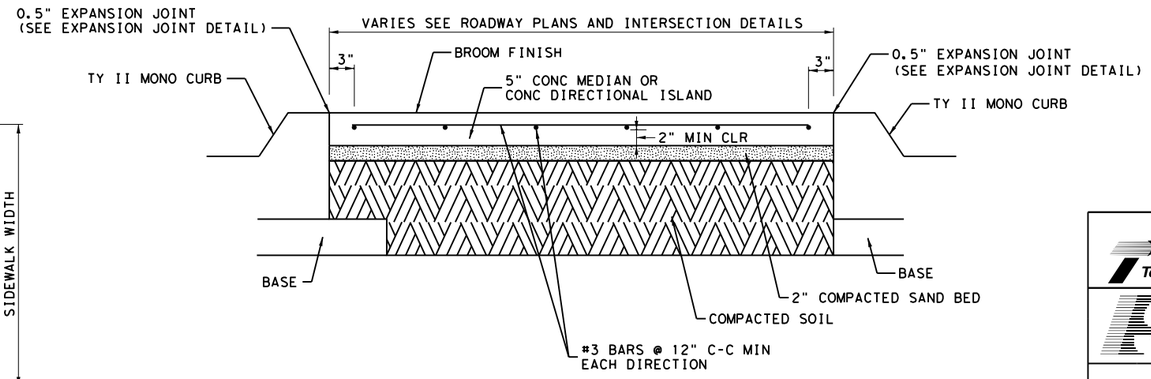
1. 2" SAND BED IS SUBSIDIARY TO CONCRETE MEDIAN OR CONCRETE RIPRAP
2. EXPANSION JOINT IS SUBSIDIARY TO CONCRETE MEDIAN OR CONCRETE RIPRAP



TYPICAL EXPANSION JOINT IN SIDEWALK
NTS

NOTE:

1. 2" SAND BED IS SUBSIDIARY TO CONCRETE SIDEWALK
2. EXPANSION JOINT IS SUBSIDIARY TO CONCRETE SIDEWALK



TYPICAL CONCRETE MEDIAN DETAIL
TYPICAL DIRECTIONAL ISLAND DETAIL
NTS

NOTE:

1. 2" SAND BED IS SUBSIDIARY TO CONCRETE MEDIAN OR CONCRETE DIRECTIONAL ISLAND
2. EXPANSION JOINT IS SUBSIDIARY TO CONCRETE MEDIAN OR CONCRETE DIRECTIONAL ISLAND

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

SH 152

SIDE WALK JOINT DETAIL

SCALE: N. T. S. SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	99
CONTROL	SECTION	JOB	
0455	03	038	

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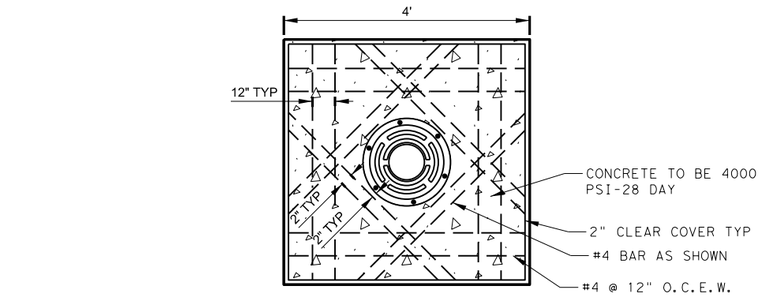
CHK:
DWN:
CRC:
DN:

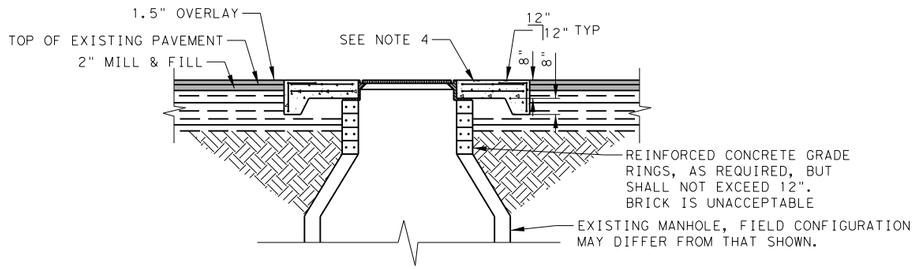
NTS

AWNING REMOVAL DETAIL NAIDA STREET

(A) REMOVE AWNING (44 LF)

(B) REMOVE AWNING POLES (4 POLES)





MANHOLE SKIRTING DETAIL

NOTE:

1. AWNING STRUCTURE REMOVAL TO BE PAID FOR UNDER ITEM 496 6057 REMOVE STR (PIPE SUPPORT STRUCTURE).
2. SEE TYPICAL SECTIONS FOR EXISTING AND PROPOSED PAVEMENT TYPES AND DEPTHS.
3. CONTRACTOR IS RESPONSIBLE FOR CLOSING ANY OPENING LEFT BY THE REMOVAL OF THE AWNING. WHEN ATTACHING TO THE EXISTING BUILDING FRAME, MINIMUM 1/2" PLYWOOD WITH 4" FRAMING SCREWS SPACED AT 12" MAXIMUM IS REQUIRED.
4. REMOVAL OF EXISTING MATERIAL IS SUBSIDIARY TO MANHOLE SKIRT.

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

Texas Department of Transportation

SH 152

MISCELLANEOUS ROADWAY DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		100

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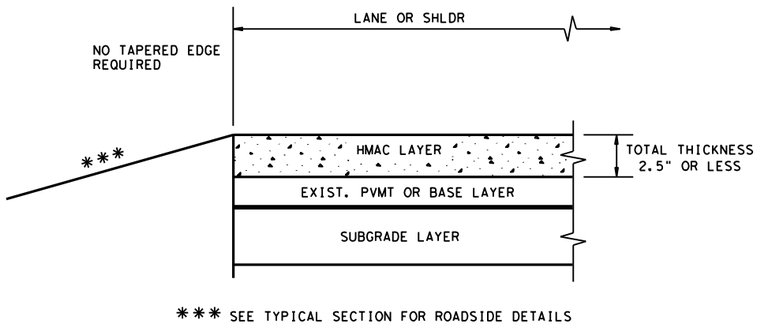
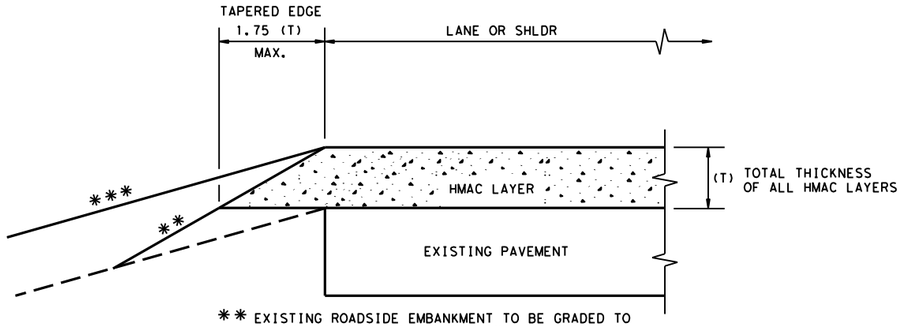


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

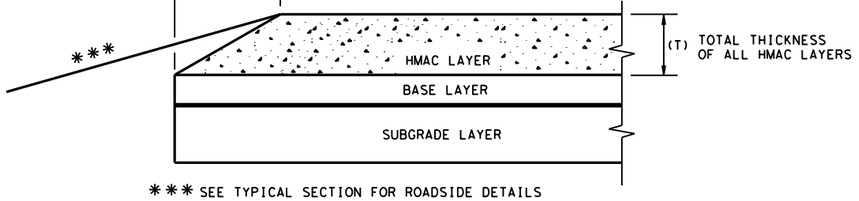
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



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

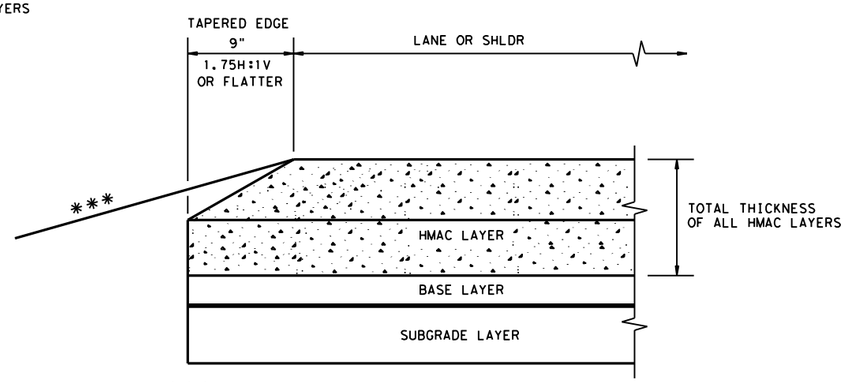
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2
OVERLAY OF EXISTING PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

GENERAL NOTES

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

Texas Department of Transportation | Design Division Standard

TAPERED EDGE DETAILS
HMAC PAVEMENT

TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
©TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		101

DATE: 2/21/2024
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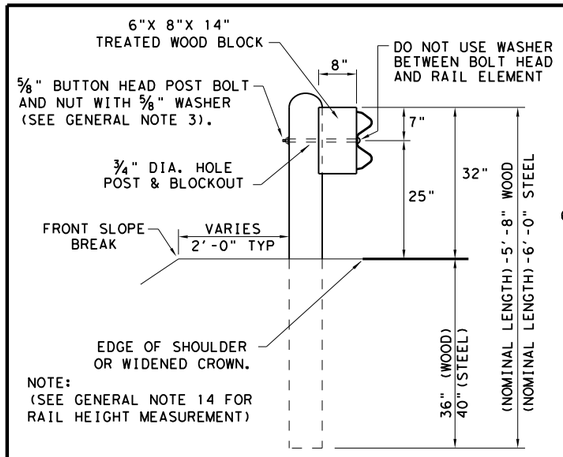
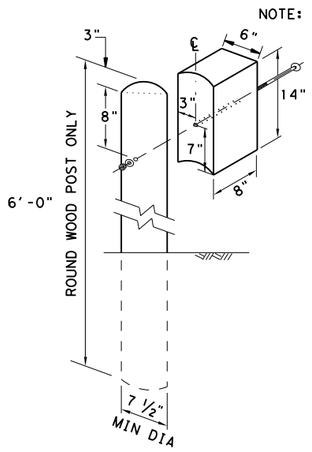
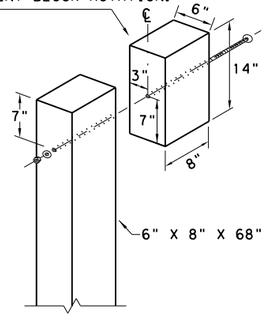


TYPICAL POST PLACEMENT

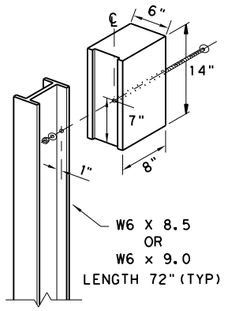


WOOD BLOCK TO ROUND WOOD POST

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

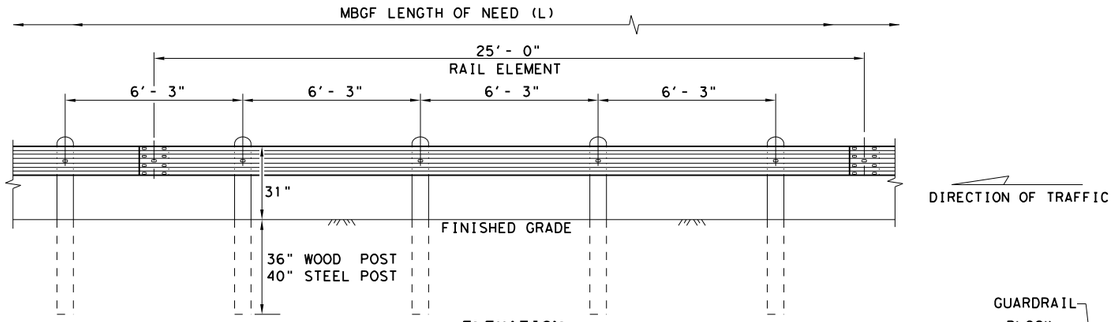


WOOD BLOCK TO RECTANGULAR WOOD POST



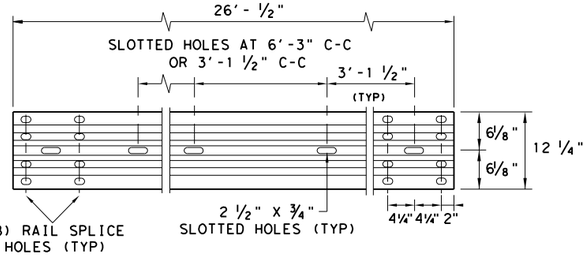
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

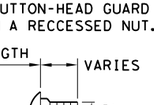
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

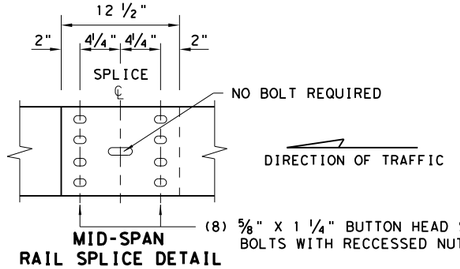
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



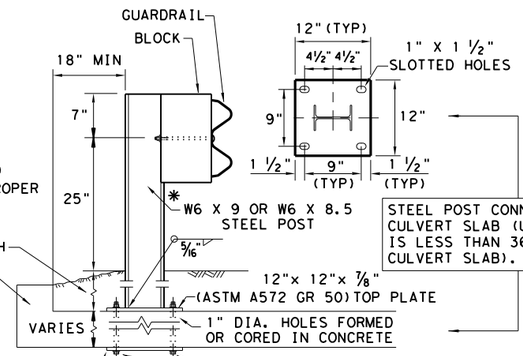
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

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

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

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210,"COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		102

DATE: 2/21/2024
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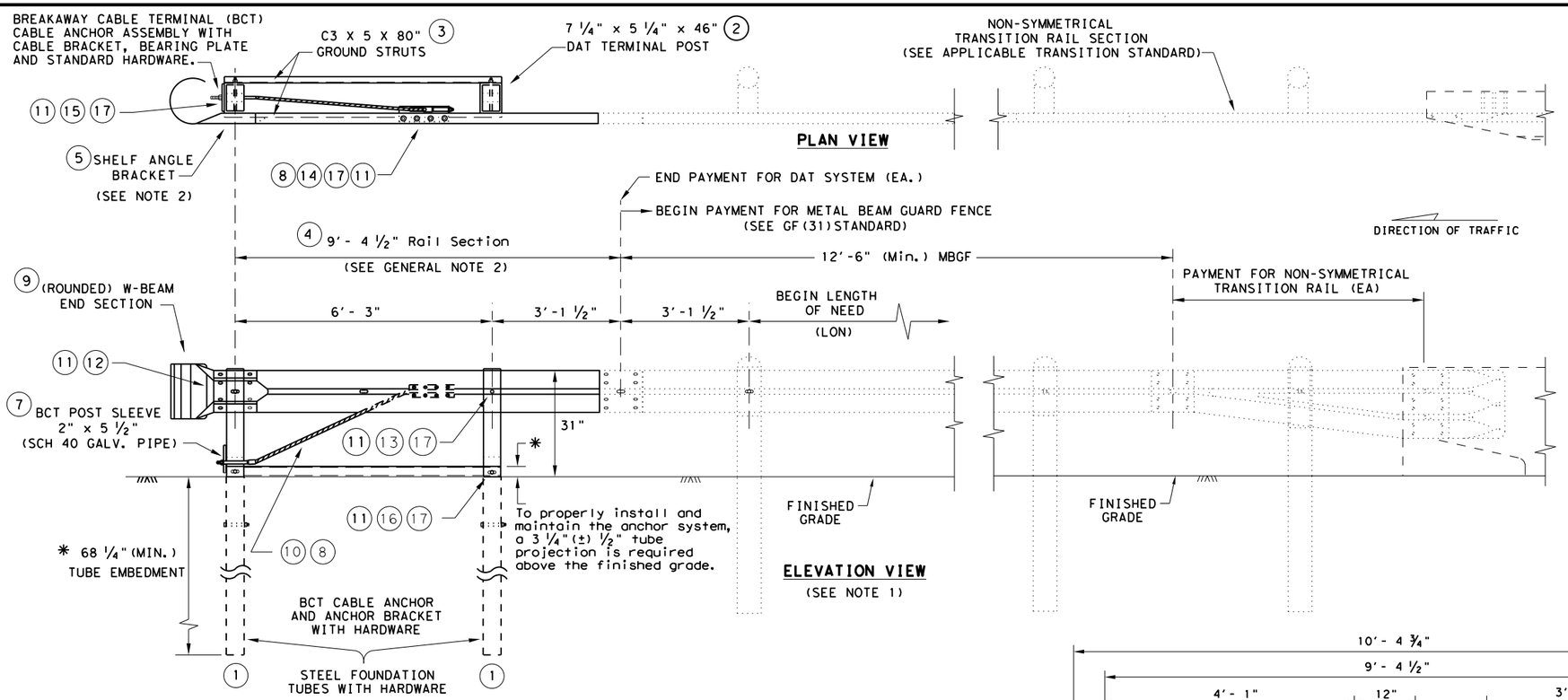


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

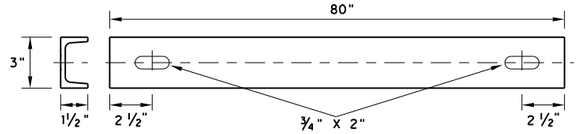
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

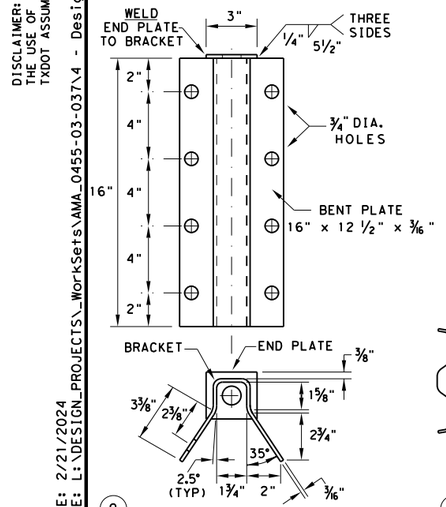
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

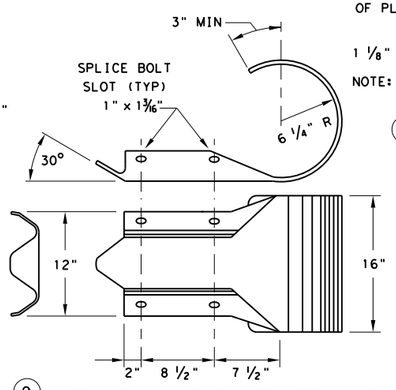
(4) TERMINAL RAIL ELEMENT FOR DAT



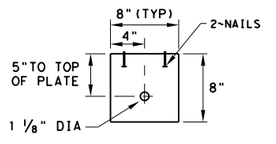
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

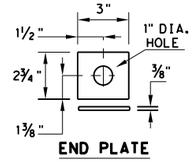


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

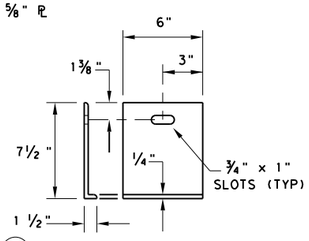


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

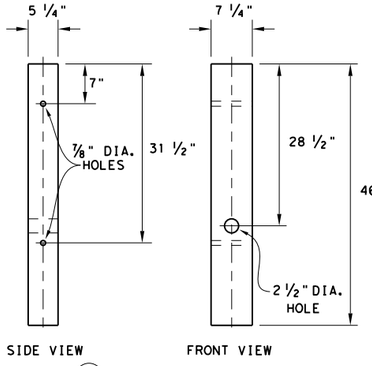
(6) BEARING PLATE
8"x 8"x 5/8" PL



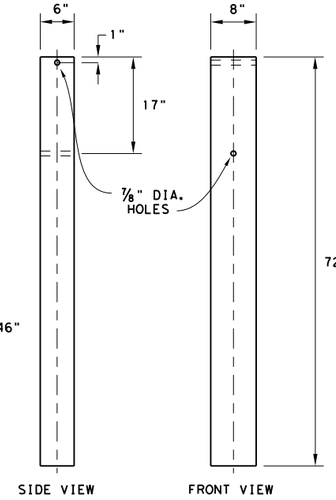
END PLATE



(5) SHELF ANGLE BRACKET



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



(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0455	03	038	SH 152	
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	AMA	GRAY		103	

DATE: 2/21/2024
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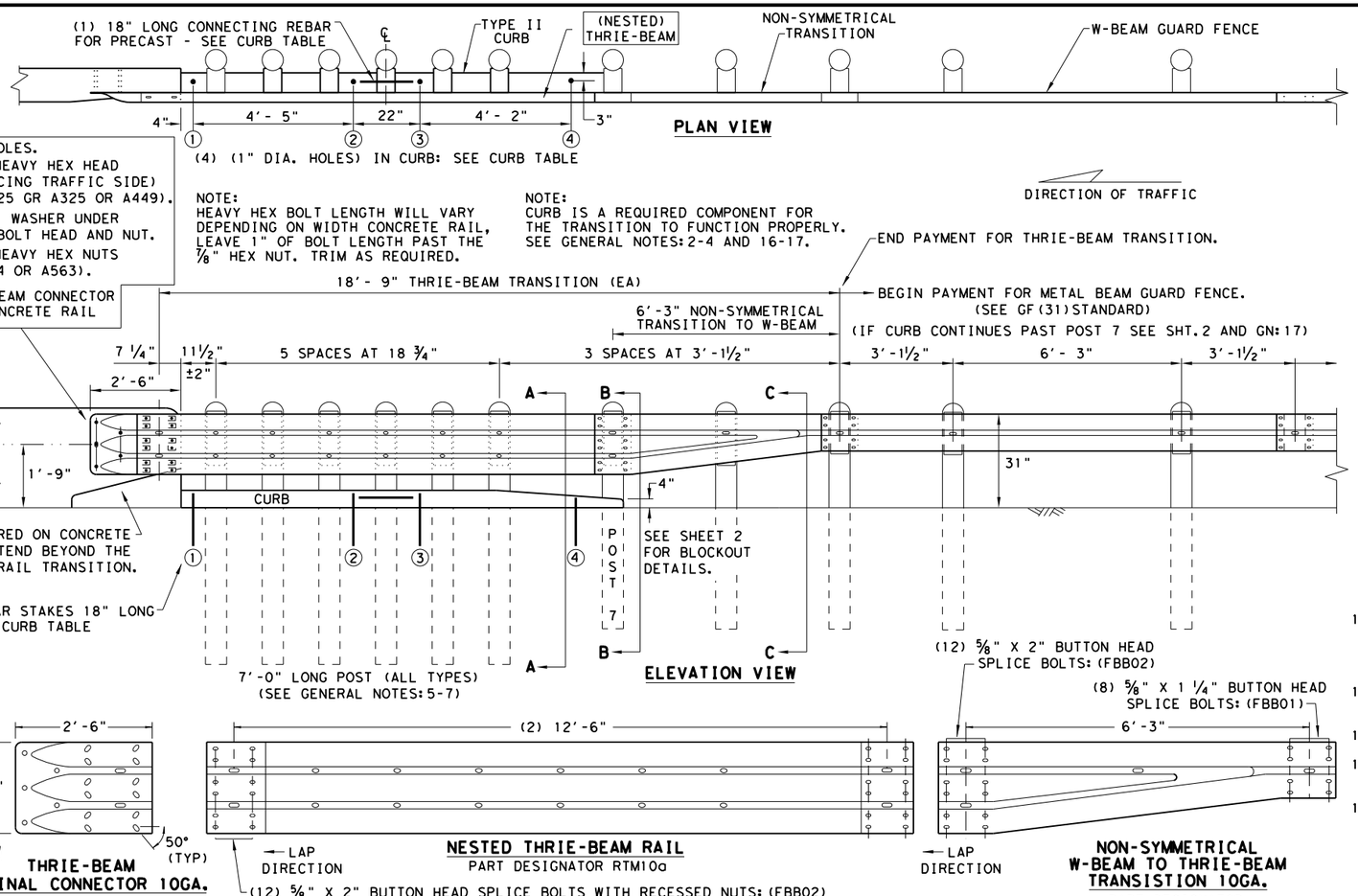


GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- ¾" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST ⅝" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

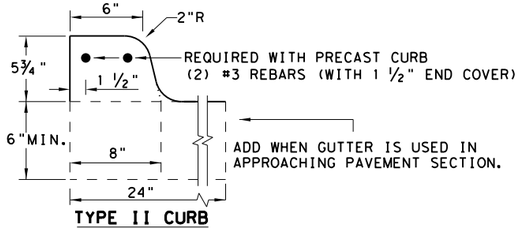
THRIE-BEAM TERMINAL - CURB TABLE

PRECAST CURB FULL LENGTH EQUALS 12'- 2"
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7

CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.

SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

NOTE: OPTIONS FOR TYPE II CURB:
1. PRECAST
2. CAST-IN-PLACE

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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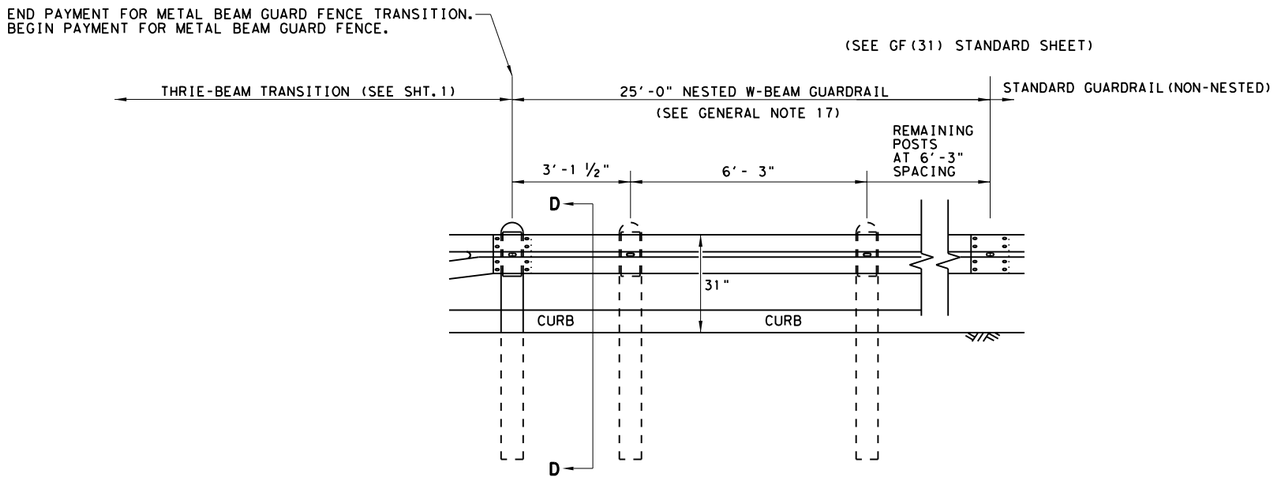
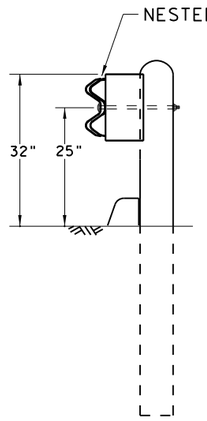
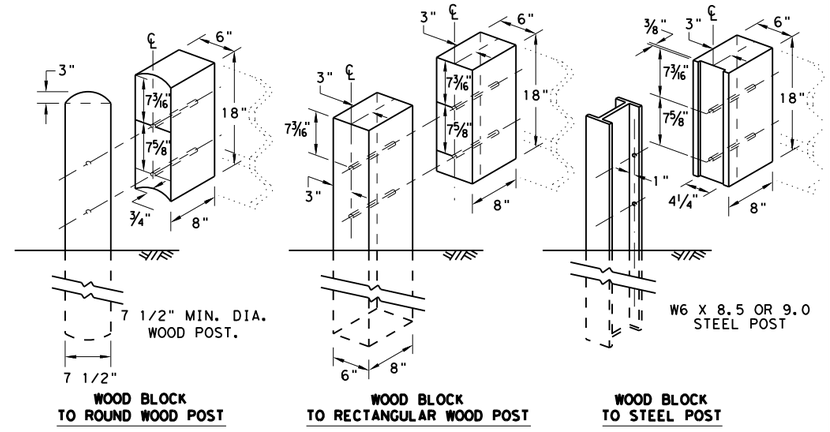
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0455	03	038	SH 152	
	DIST	COUNTY		SHEET NO.	
	AMA	GRAY		105	

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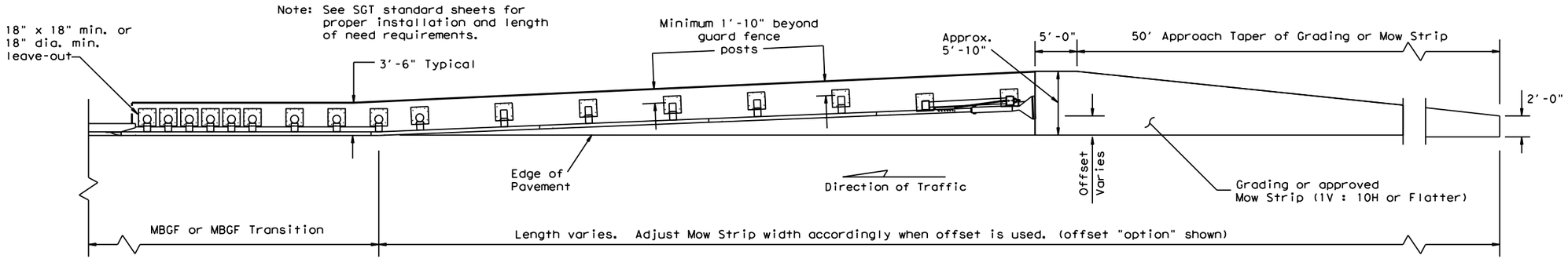
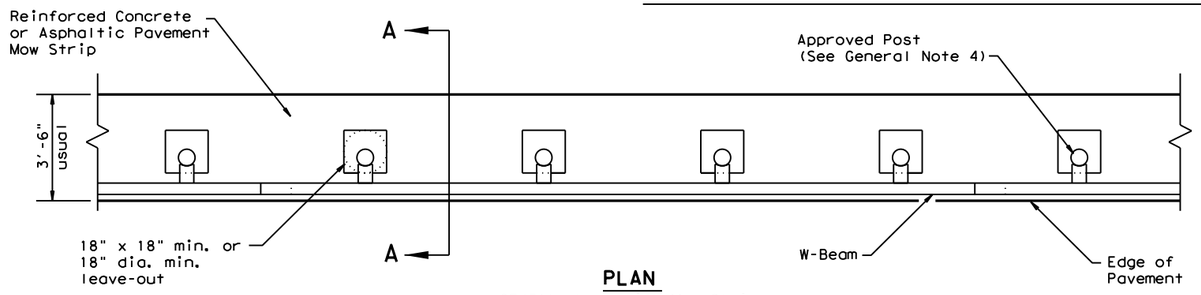


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



PLAN

GF(31) shown with Mow Strip
(See GF(31) standard sheet for proper installation)

SECTION A-A

Typical

MOW STRIP DETAIL

Reinforced Concrete Mow Strip with 18" x 18" Square or 18" Dia. minimum leave-out.

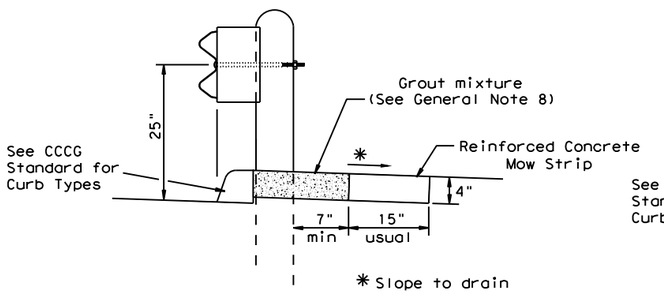
Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

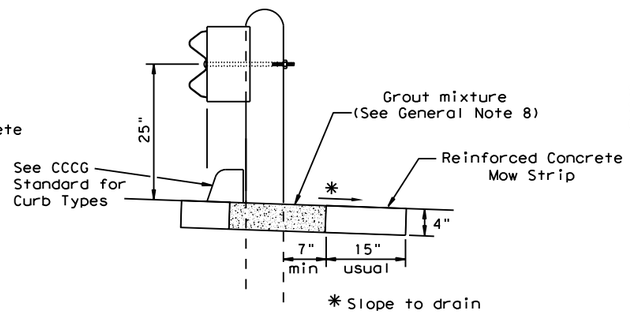
GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.



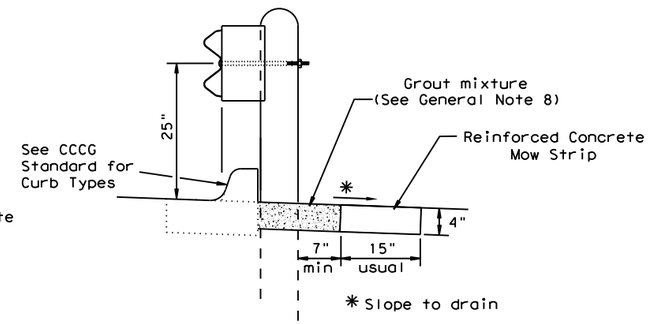
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

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	AMA	GRAY		106

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NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN: 533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN: 4076B
AT (POSTS 2 THRU 8)

⅝" X 10" HGR BOLT PN: 3500G
⅝" HGR NUT PN: 3340G

LINE AT THE BACK OF POST #2 THRU #8

FROM THE CENTERLINE OF POST(1) & POST(0)

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) POST(1) POST(0)

PLAN VIEW

MASH TEST LEVEL 3 (TL-3) LENGTH OF SoftStop TERMINAL (50'-9 ½")

BEGIN LENGTH OF NEED

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

TRAFFIC FLOW

50'-9 ½" STANDARD INSTALLATION LENGTH (MASH TL-3 SoftStop)

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

ANCHOR RAIL WITH SLOTS - (THREADED THRU HEAD)
SEE SoftStop MANUAL FOR COMPLETE DETAILS

MIDDLE SLOT CUTOUT (1) 1 ¾" X 6'-10 ¼"

OUTSIDE SLOTS CUTOUT (2) 1½" X 6'-9 ⅝"

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

25'-0" DOWNSTREAM W-BEAM GUARDRAIL PN: 61G

SoftStop ANCHOR RAIL (12GA) PN: 15215G

SoftStop FACE SEE GN(3) & NOTE: B

3'-1 ½"(+/-) 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 5'-8" 4'-7"

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

SEE NOTE: C

POST 32" HEIGHT

31" RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

(8) ⅝"x 1- ¼" GR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

POST 40" DEPTH (TYP 1-8)

(8) ⅝"x 1- ¼" HGR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

6'-1⅜"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) 6'-0" (SYTP) PN: 15000G POST(1) 4'-9 ½" SYTP PN: 15203G POST(0) 6'-5 ⅜" PN: 15205A

ELEVATION VIEW

HARDWARE FOR POST(2) THRU POST(8)
(1) ⅝"x 10" HGR BOLT PN: 3500G
(1) ⅝" HGR HEX NUT PN: 3340G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

4" X 7 ½" X 14" BLOCKOUT COMPOSITE PN: 6777B

6" X 8" X 14" BLOCKOUT WOOD PN: 4076B

NOTE: DO NOT BOLT ANCHOR RAIL TO POST(2)

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" X 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

(1) ⅝" X 1- ½" HEX HD BOLT-GR-5 PN: 105286

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

(2) ⅝" X 2 ½" HEX HD BOLT GR-5 PN: 105285G

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR. DH PN: 3245G

1" NUT PN: 3908G SHALL BE SECURELY TIGHTENED AFTER FINAL ASSEMBLY, BUT NOT DEFORMING THE KEEPER PLATE.

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

(2) ¾" X 2 ½" HEX BOLT (TYP) PN: 3717G

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

6'-5 ⅜" (W6 X 15) I-BEAM POST PN: 15205A

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

LINE POST (3, 4, 5, 6, 7 & 8)

SECTION VIEW B-B

6'-0" (W6 X 8.5) I-BEAM POST PN: 533G

6" X 8" X 14" BLOCKOUT WOOD

W-BEAM RAIL 25'-0"

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

POST(2)

SECTION VIEW A-A

6'-0" (W6 X 8.5) (SYTP) I-BEAM POST PN: 15000G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

POST 17"- ½" HEIGHT

4'-9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

4'-9 ½" (W6 X 8.5) (SYTP) I-BEAM POST PN: 15203G

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX. RAIL OFFSET

APPROACH GRADING (1V:10H OR FLATTER) SEE PRODUCT ASSEMBLY MANUAL FOR ADDITIONAL GUIDANCE.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

GENERAL NOTES

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

NOTE: A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE: C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅞")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR. DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR. DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR. DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0455	03	038	SH 152	
	DIST	COUNTY		SHEET NO.	
	AMA	GRAY		107	

DATE:
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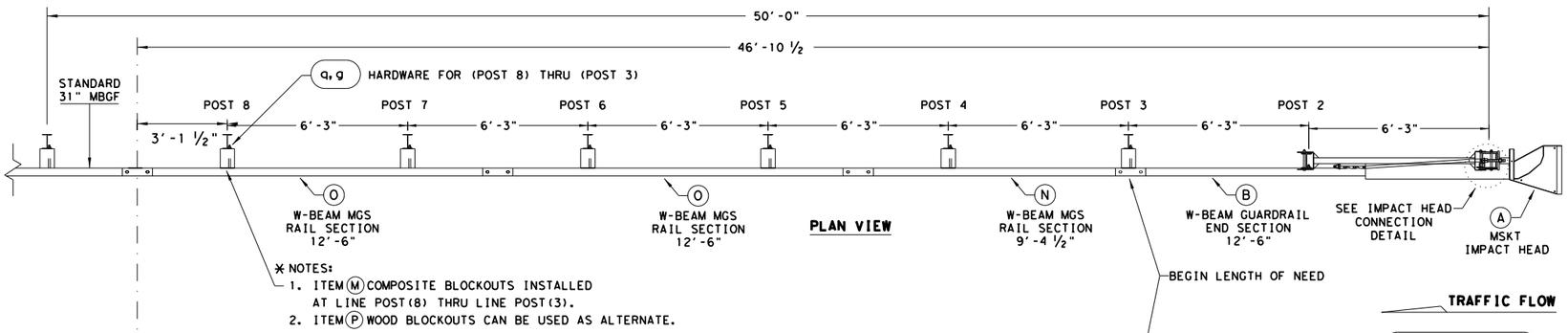
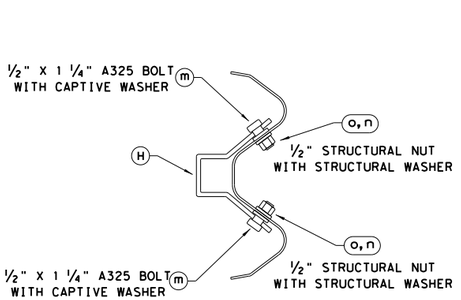
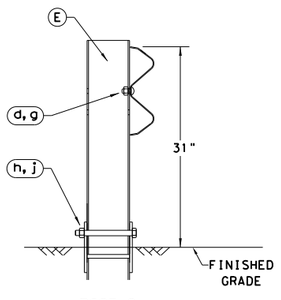
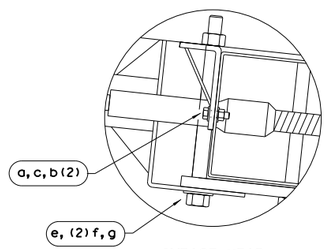
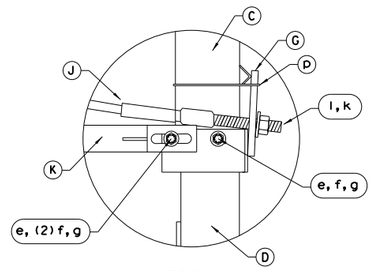


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.









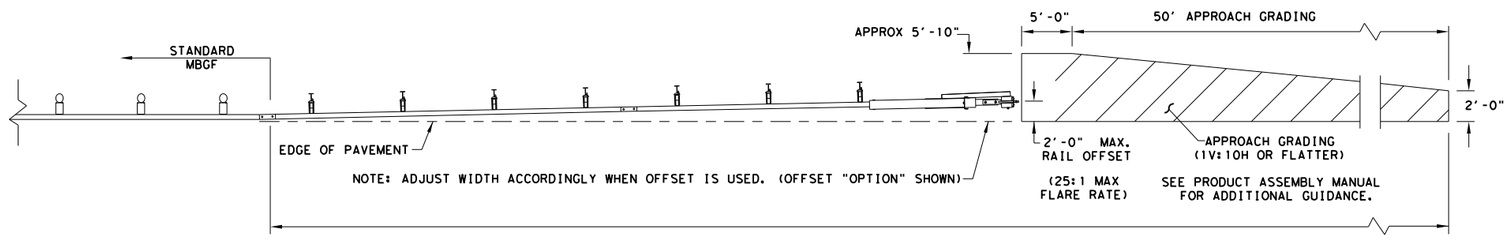
GENERAL NOTES

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	5/16" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/16" WASHER	W0516
c	2	5/16" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 3/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

SEE NOTES: *

ALTERNATIVE ITEMS NOT SHOWN. **
* ITEM(P) 8" WOOD-BLOCKOUT
** ITEM(Q) 25'GUARD FENCE PANEL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0455	03	038	SH 152	
	DIST	COUNTY		SHEET NO.	
	AMA	GRAY		108	

DATE:
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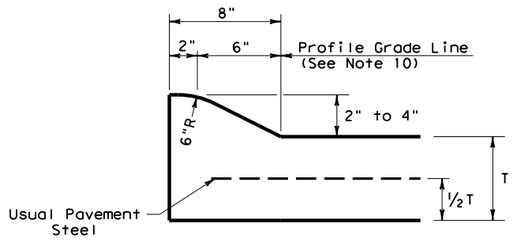

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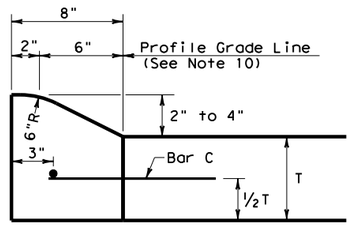

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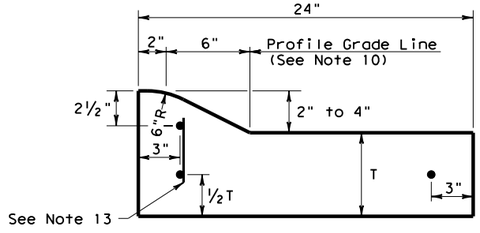
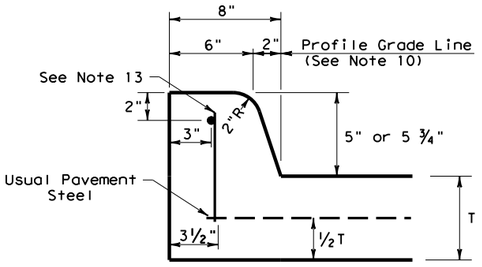


TYPE I CURB AND GUTTER
2" - 4" HEIGHT



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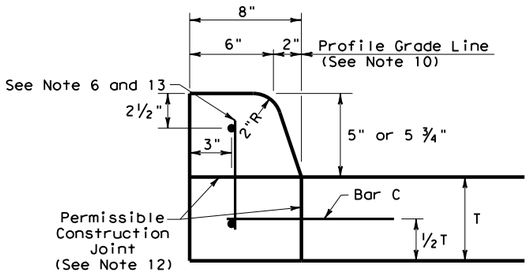

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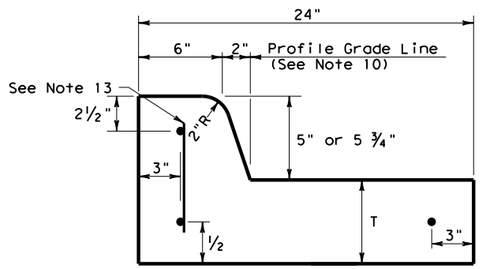
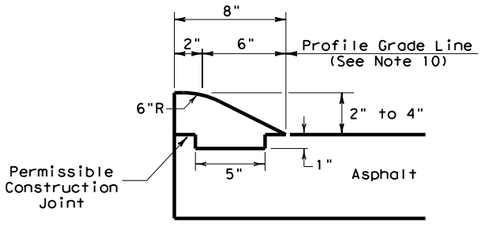


TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



TYPE III CURB (KEYED)
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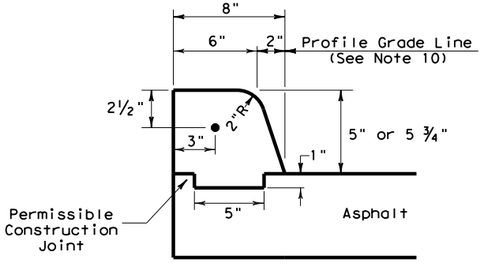

TYPE IV CURB (KEYED)
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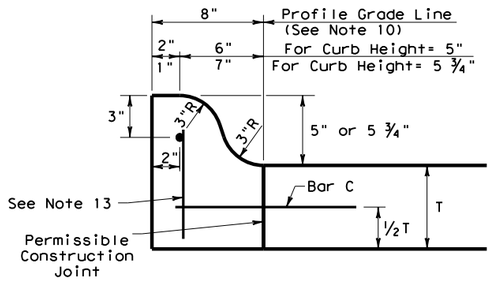
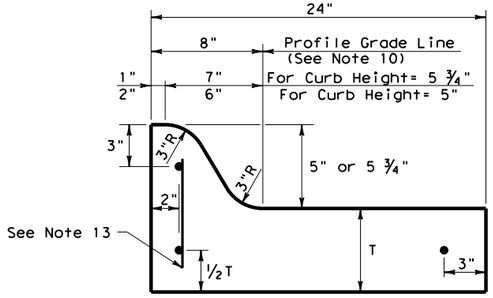
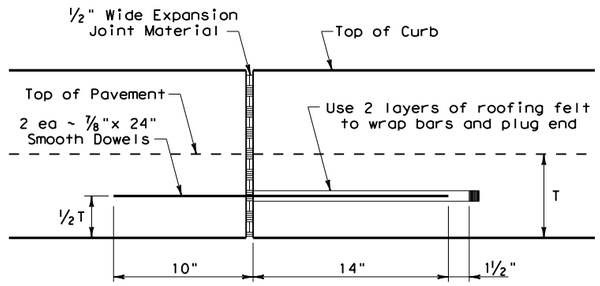


TYPE IIa CURB
5" - 5 ¾" HEIGHT

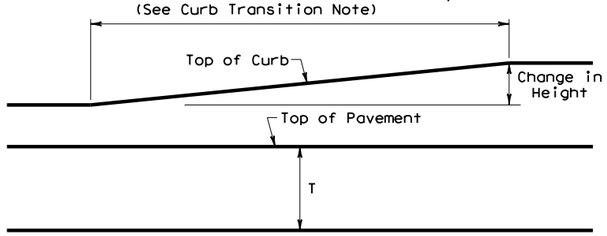


TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

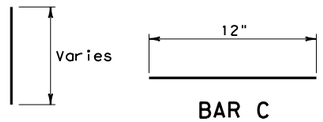
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



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 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 placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.



BAR B

BAR C

Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-22

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: CS	CK: KM
© TxDOT: JUNE 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		109

DATE: 2/21/2024
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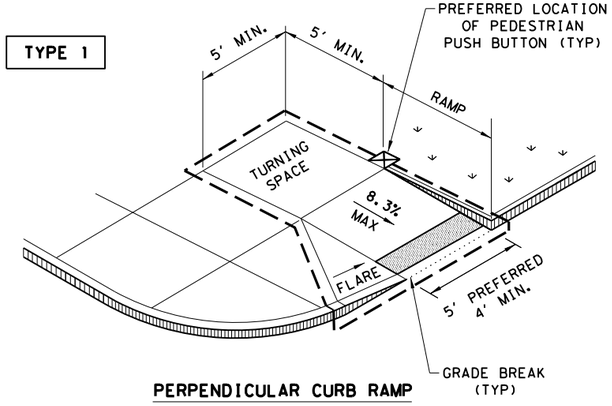

PERPENDICULAR CURB RAMP

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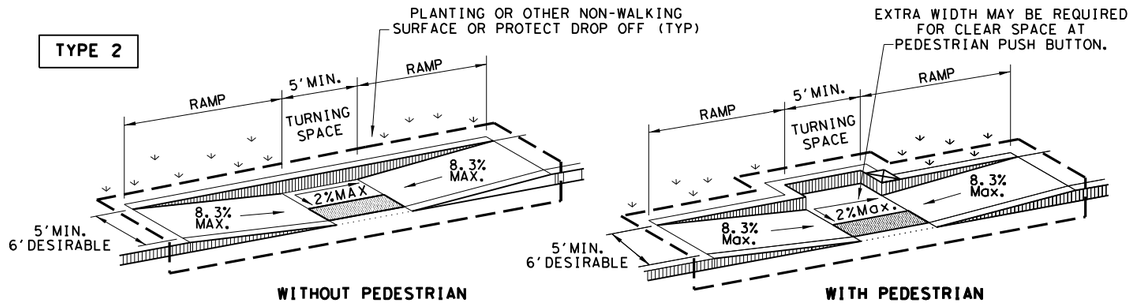
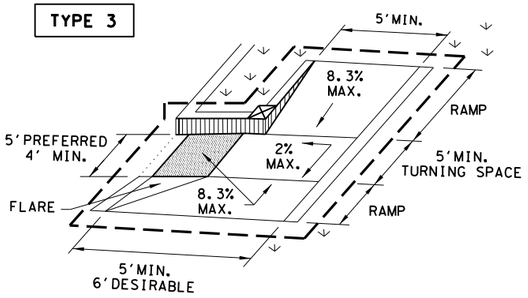


WITHOUT PEDESTRIAN PUSH BUTTON

WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3



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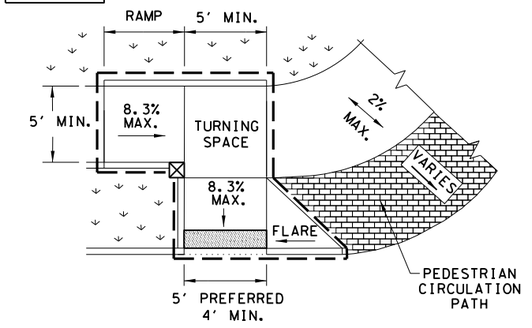
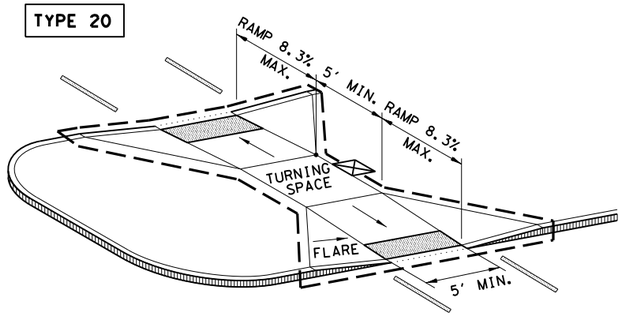


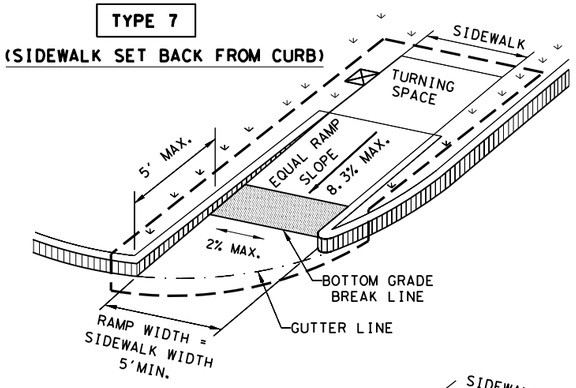
COMBINATION CURB RAMPS

TYPE 20

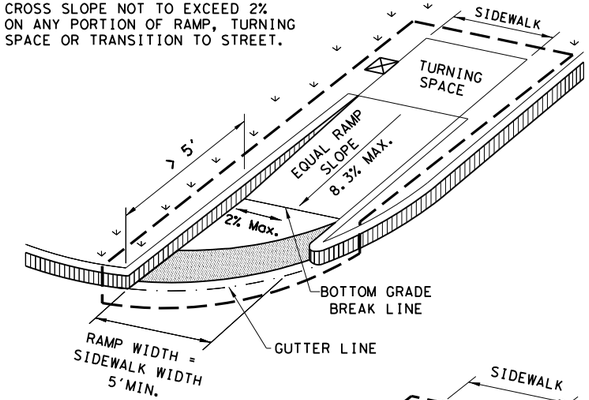


CURB RAMPS AT MEDIAN ISLANDS

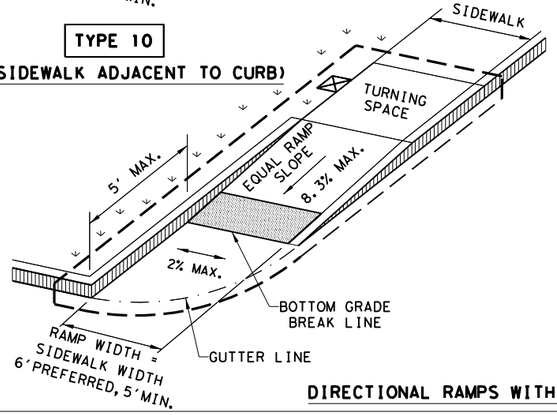
TYPE 7
(SIDEWALK SET BACK FROM CURB)



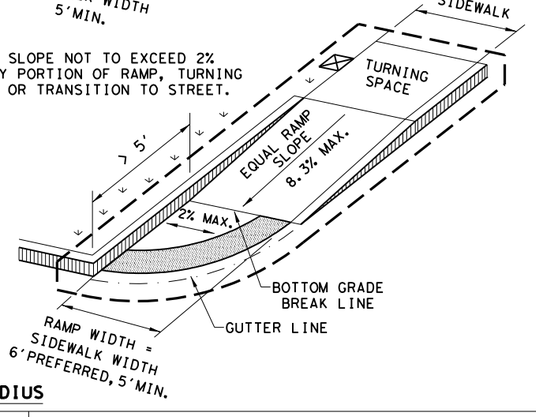
CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



TYPE 10
(SIDEWALK ADJACENT TO CURB)

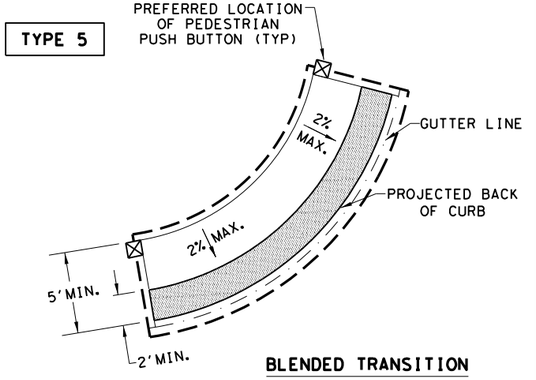


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

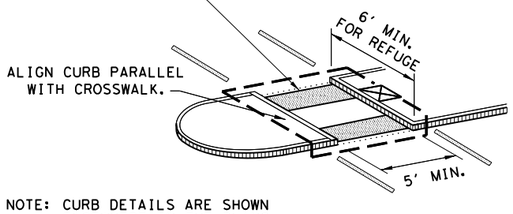
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

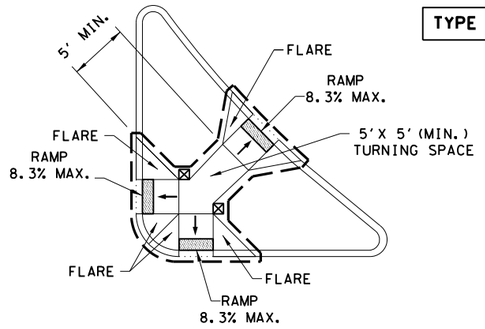
TYPE 21

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.



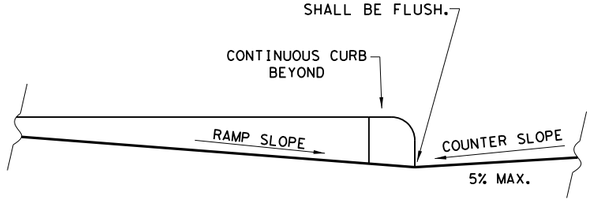
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

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
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0455	03	038		SH 152
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	AMA	GRAY			110

DATE: 2/21/2024
FILE: L:\DESIGN_PROJECTS_WorkSets\AMA_0455-03-037\4 - Design\Plan Set\3. Roadway\TxDOT Standards\ped18.dgn

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

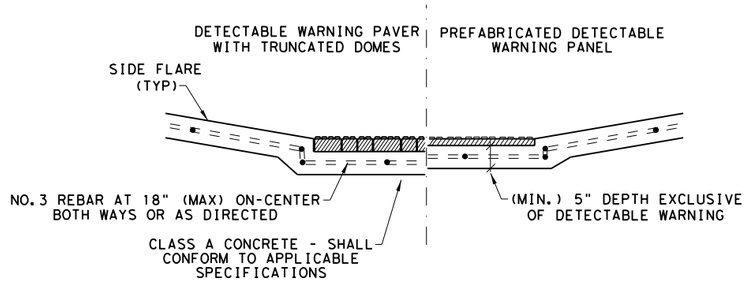
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

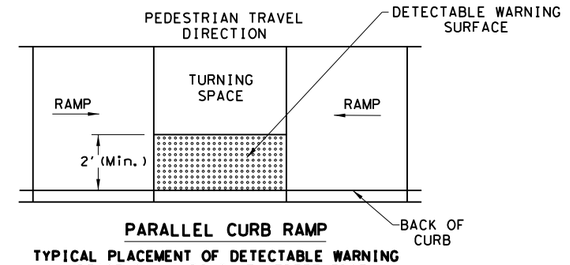
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.

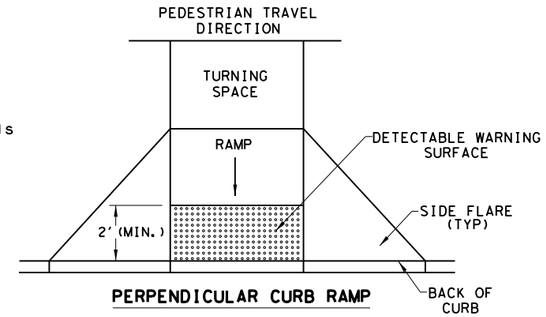


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

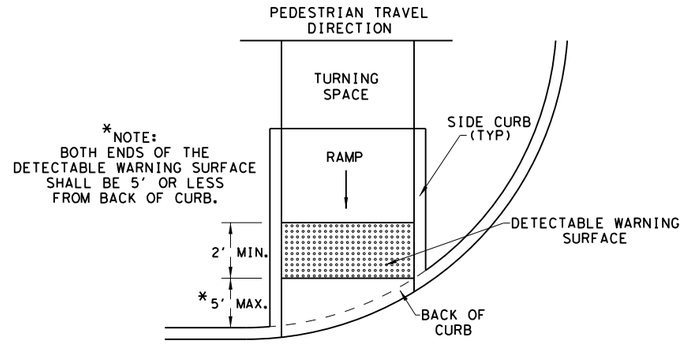
DETECTABLE WARNING SURFACE DETAILS



PARALLEL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation | Design Division Standard

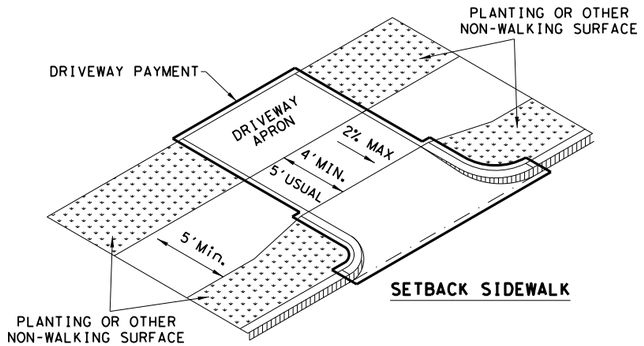
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

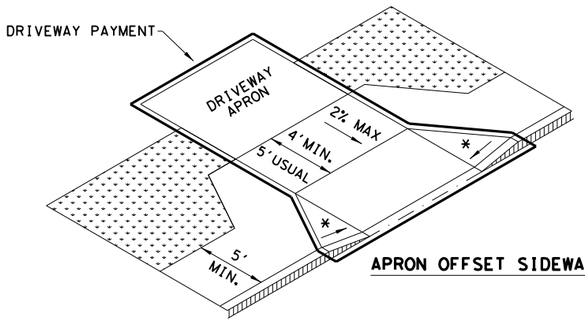
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0455	03	038		SH 152
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	AMA	GRAY			111

DATE: 2/21/2024
FILE: L:\DESIGN_PROJECTS_WorkSets\AMA_0455-03-037\4 - Design\Plan Set\3. Roadway\TxDOT Standards\ped18.dgn

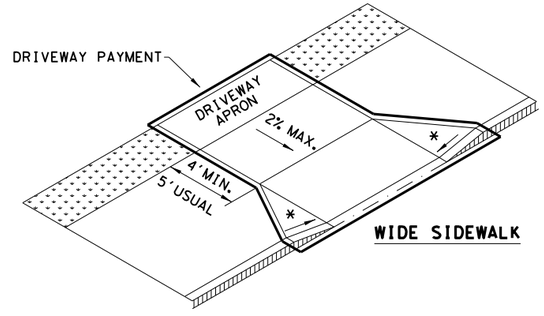
SIDEWALK TREATMENT AT DRIVEWAYS



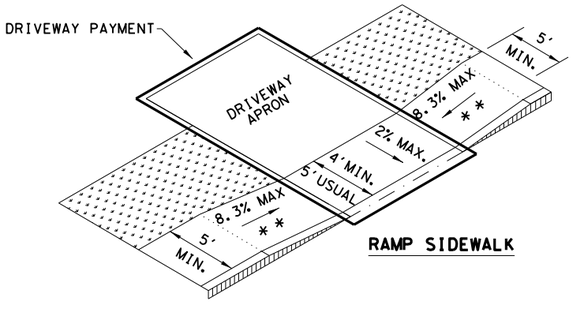
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

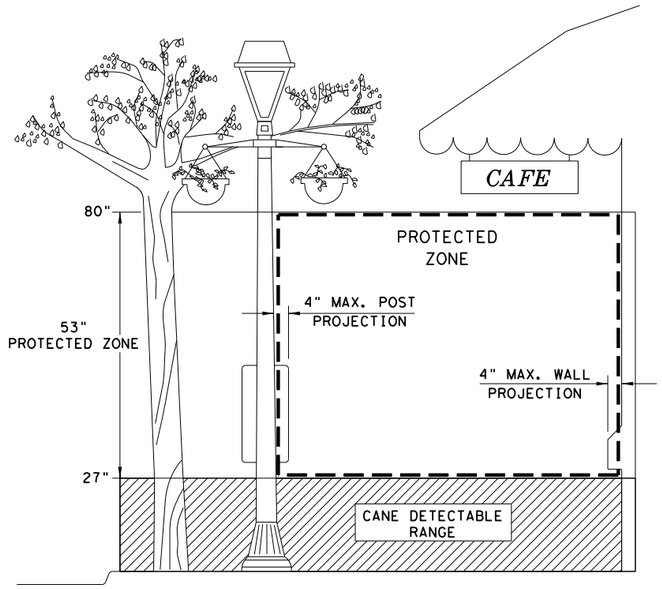


RAMP SIDEWALK

NOTES:

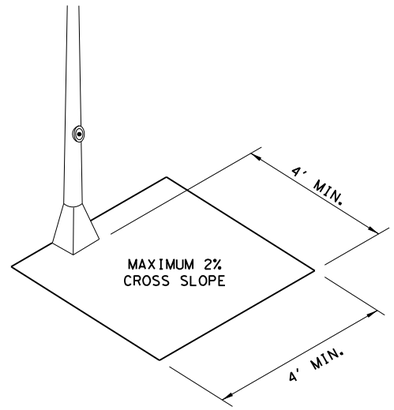
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

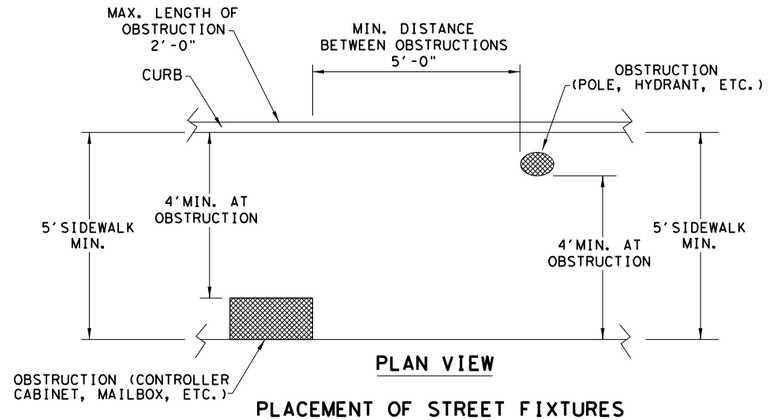


PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



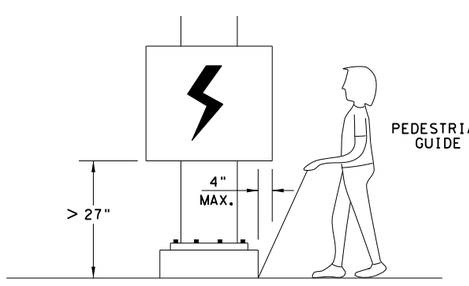
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



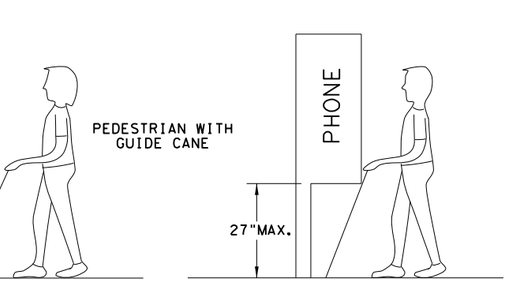
PLAN VIEW

PLACEMENT OF STREET FIXTURES

NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.



PROTRUDING OBJECTS OF A HEIGHT ≤ 27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

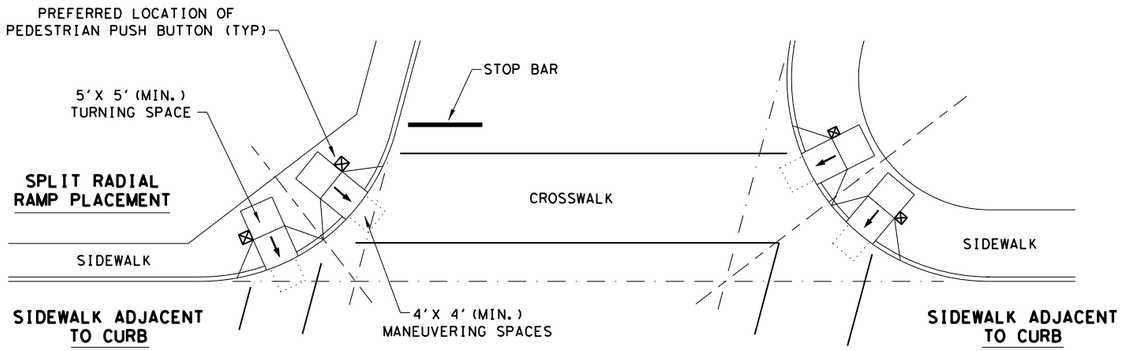
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0455	03	038	SH 152	
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.	
	AMA	GRAY		112	

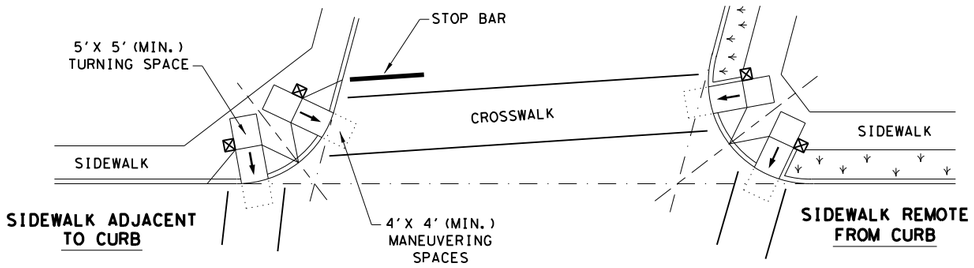
DATE: 2/21/2024
FILE: L:\DESIGN_PROJECTS_WorkSets\AMA_0455-03-037\4 - Design\Plan Set\3. Roadway\TxDOT Standards\ped18.dgn

TYPICAL CROSSING LAYOUTS

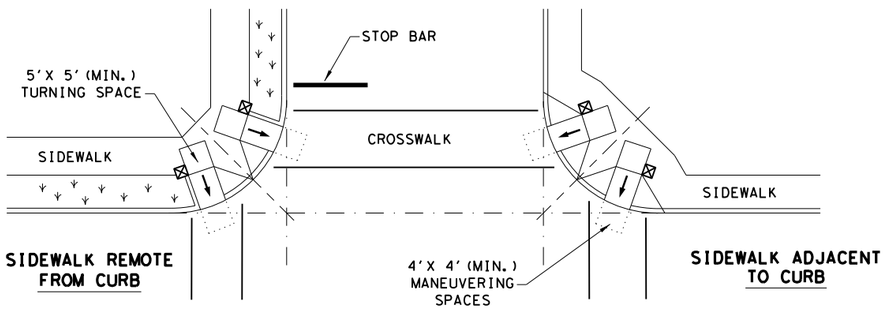
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



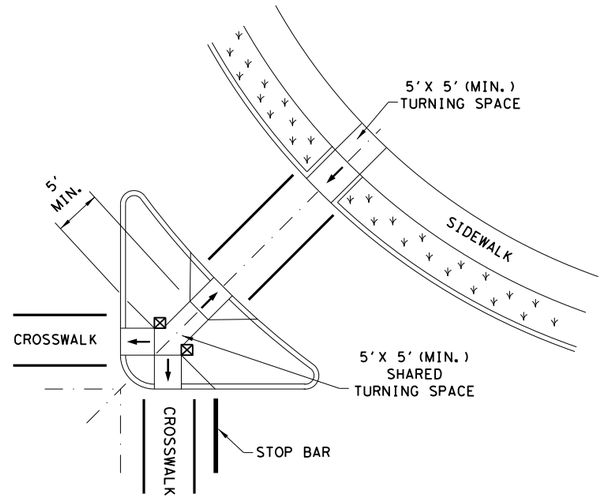
SKEWED INTERSECTION WITH "LARGE" RADIUS



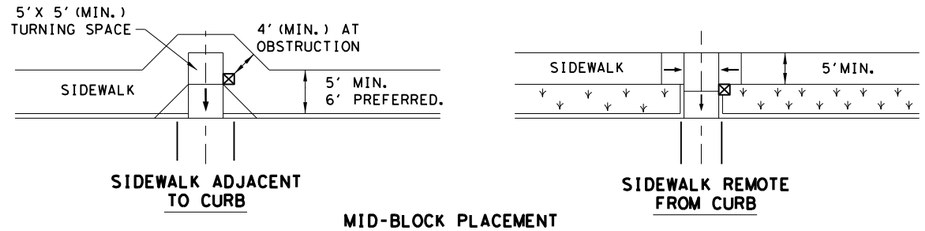
SKEWED INTERSECTION WITH "SMALL" RADIUS



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
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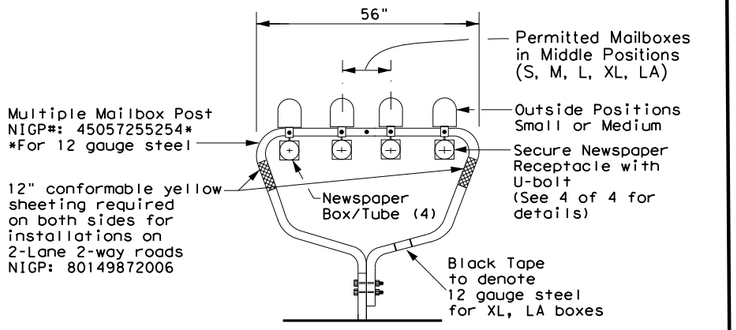
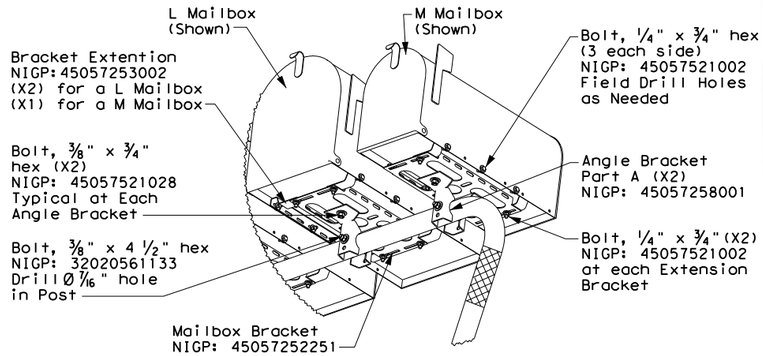
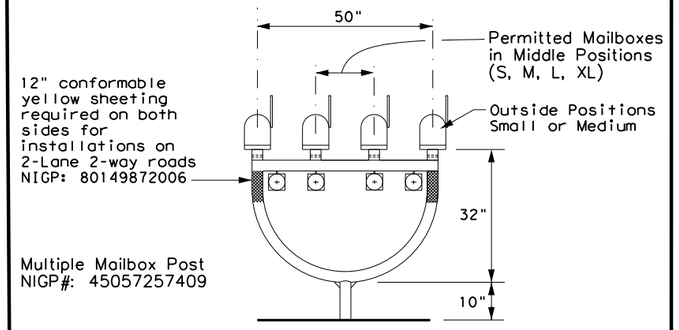
REVISIONS	0455	03	038	SH 152
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.
	AMA	GRAY		113

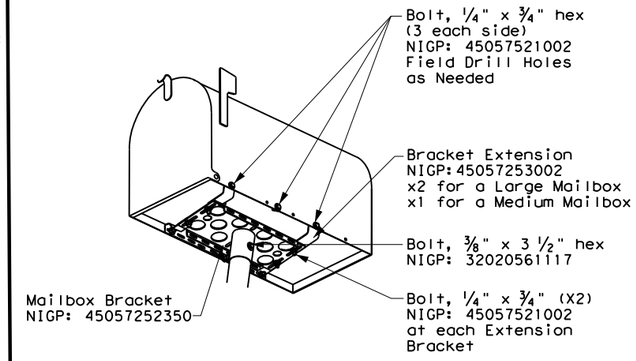
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

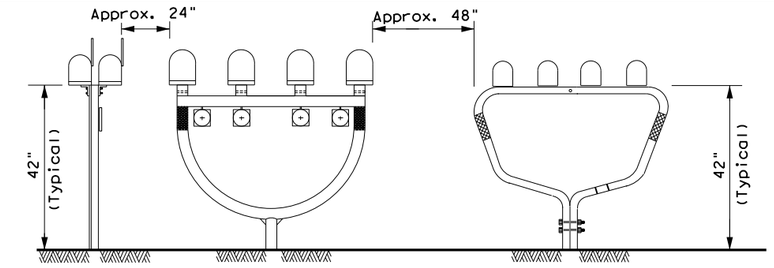
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

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

GENERAL NOTES:

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

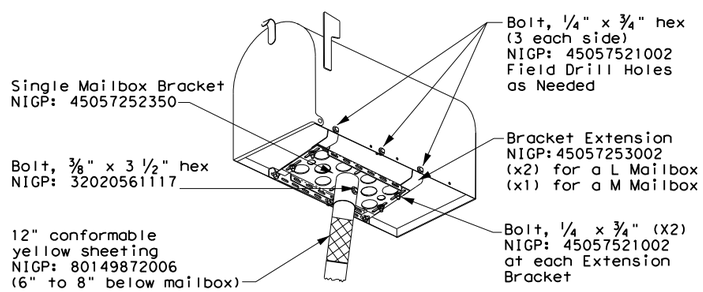
TYPICAL INSTALLATION MEASUREMENTS

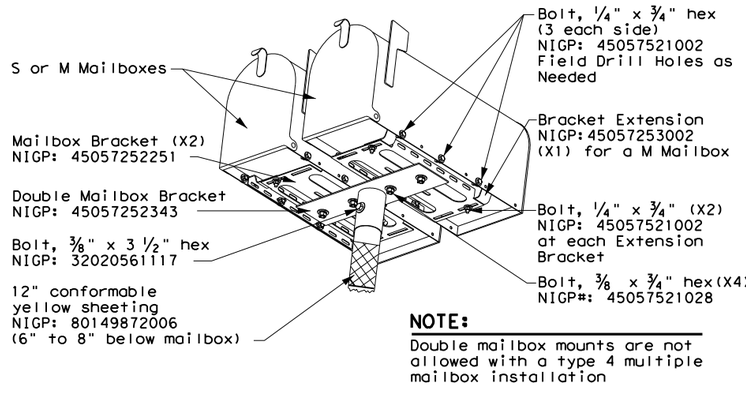


NOTE:

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

TYPE 2 and 4 - SINGLE/DOUBLE

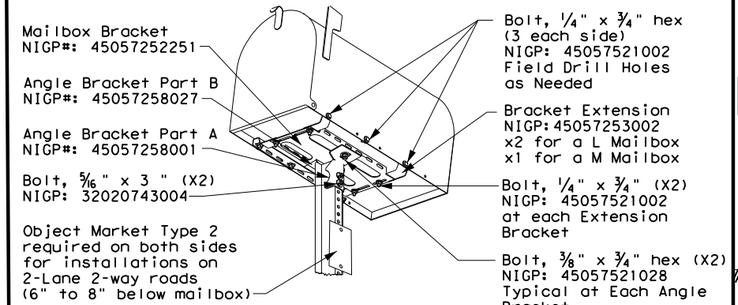


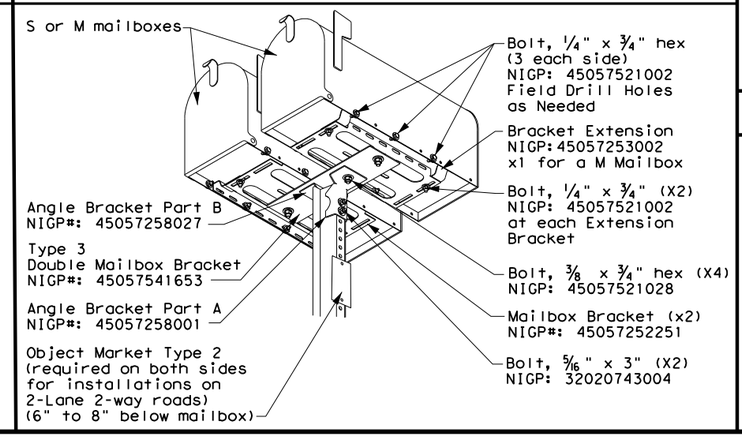


NOTE:

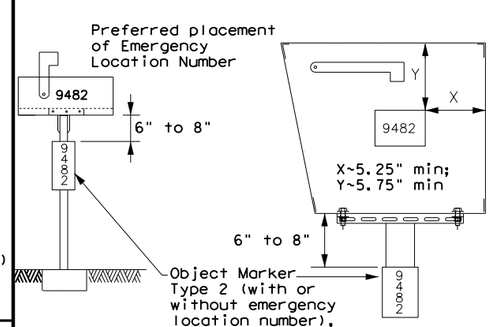
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

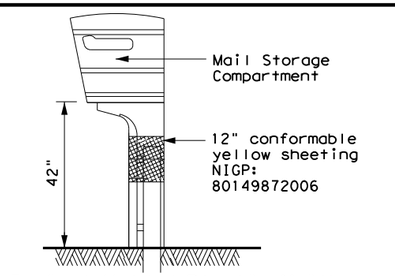


NOTES:

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

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation — Maintenance Division Standard

MAILBOX MOUNTING AND ASSEMBLY

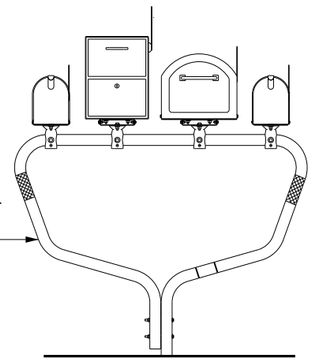
MB(1)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		114

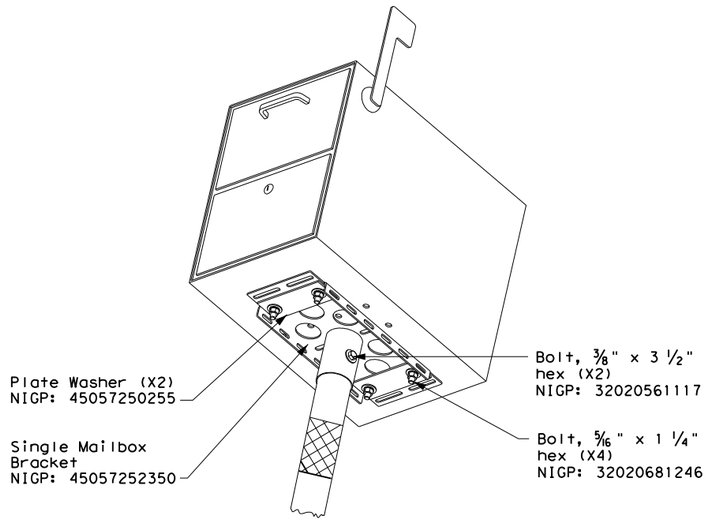
DATE: DATE TIME
FILE: DOCUMENT NAME

DATE: DATE TIME
FILE: DOCUMENT NAME

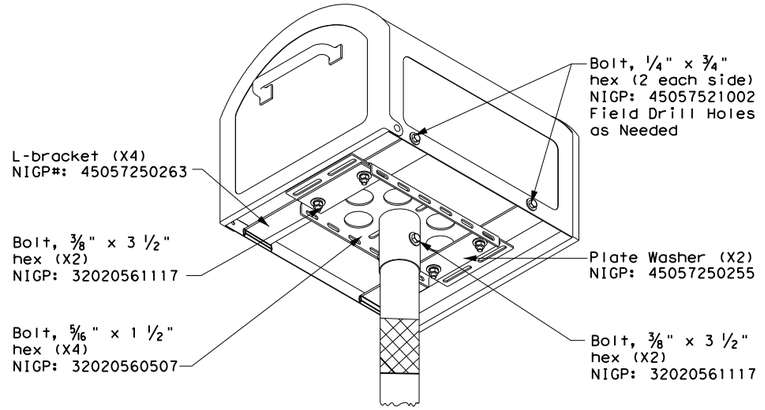
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

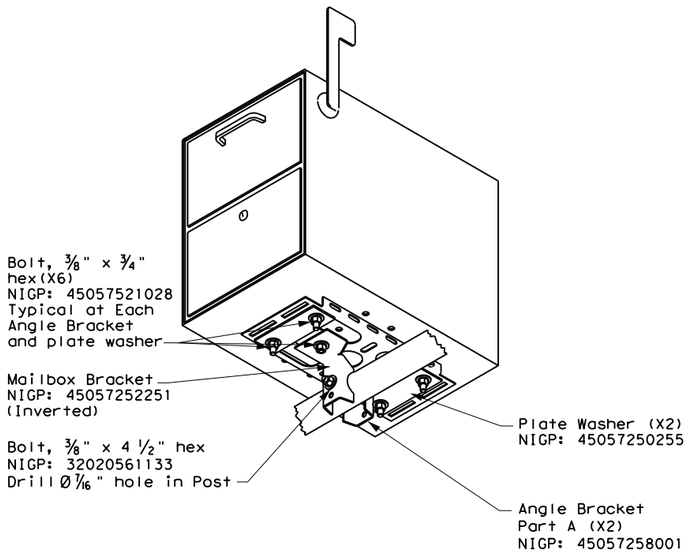


TYPE 2/4 - SINGLE XL MAILBOX

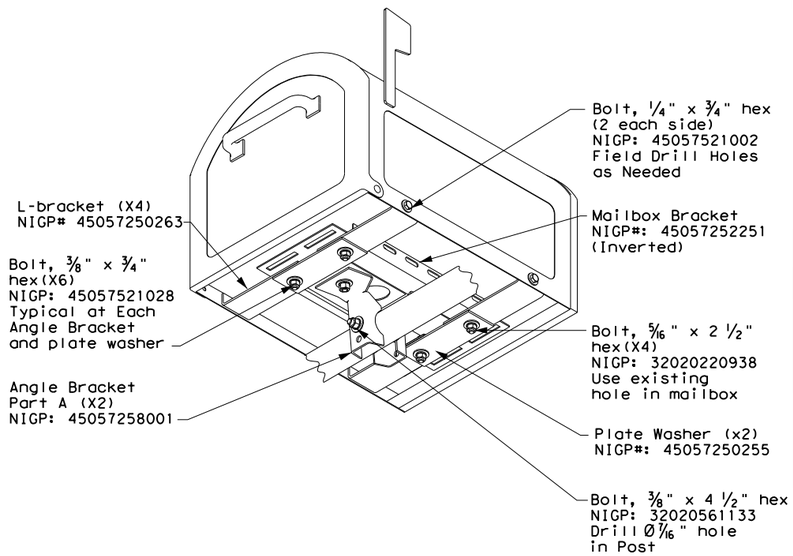


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

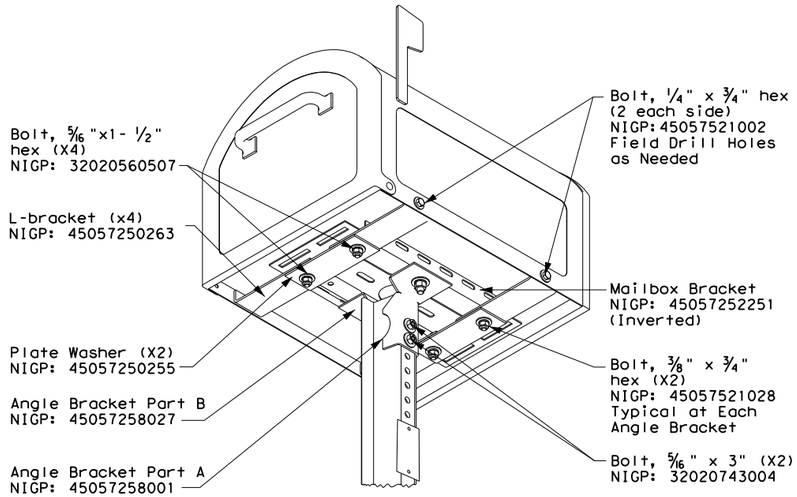
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation — Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

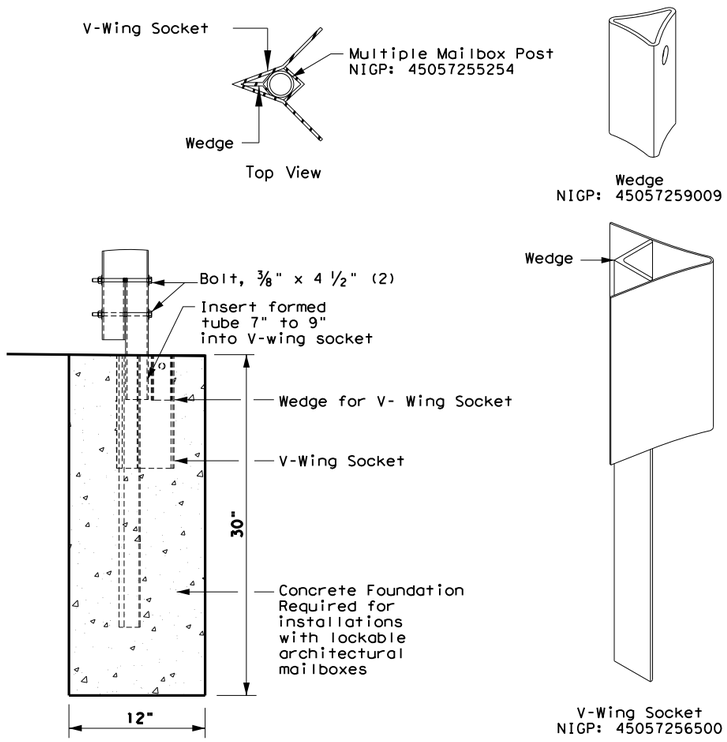
MB(2)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		115

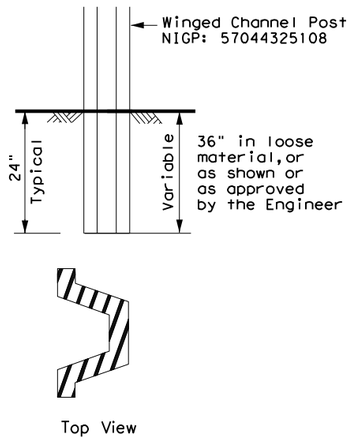
DATE: 2/21/2024 11:51:03 AM
FILE: L:\DESIGN_PROJECTS_WorkSets\AMA_0455-03-037\4 - Design\Plan Set\3. Roadway Standards\mb21.dgn

TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



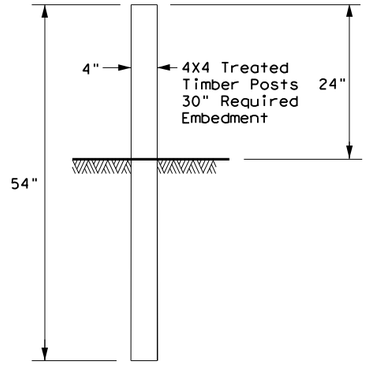
TYPE 3 - SUPPORT/FOUNDATION



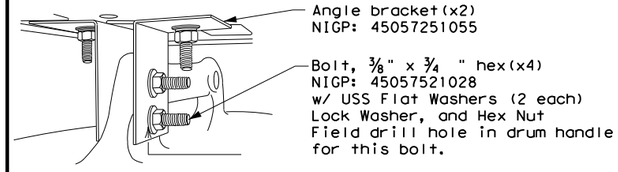
NOTES:

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

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT



Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

NOTES:

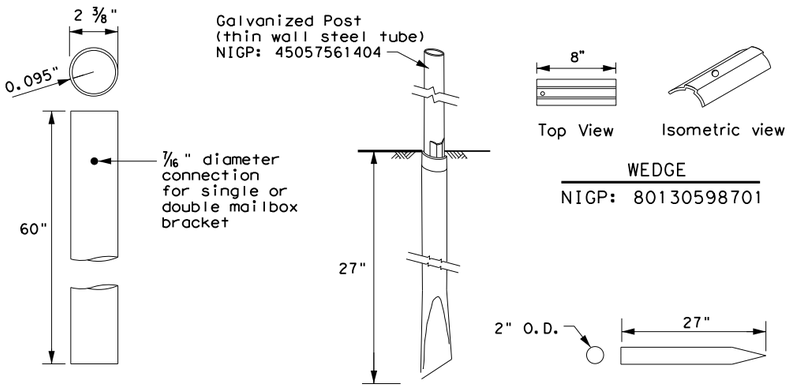
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

GENERAL NOTES:

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

TYPE 2 - SUPPORT/FOUNDATION

Thin Wall Steel Tube w/Wedge Anchor System

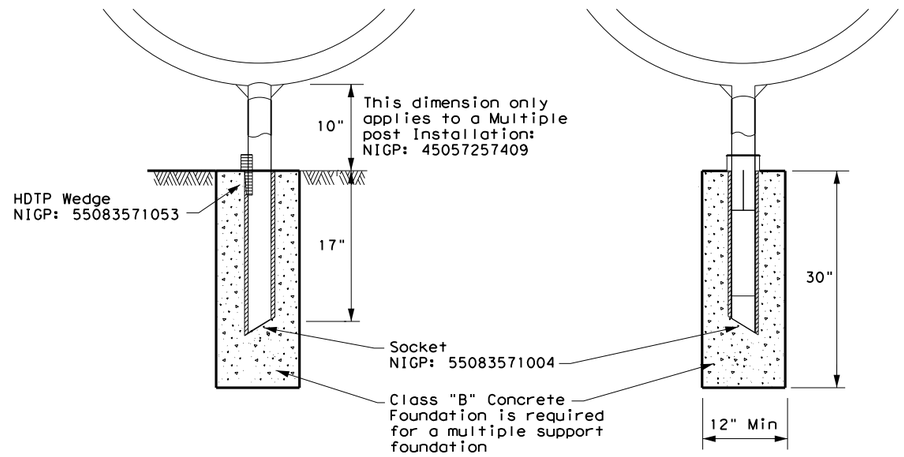


MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

TYPE 4 - SUPPORT/FOUNDATION

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



SHEET 3 OF 4

Texas Department of Transportation

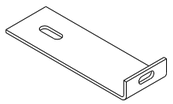
Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

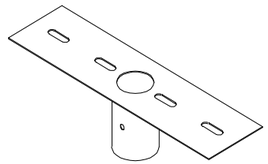
MB(3)-21

FILE: MB-21.dgn	DN:	CK:	DW:	CK:
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		116

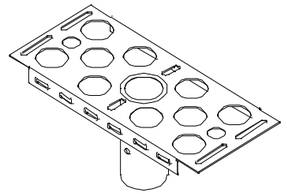
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: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



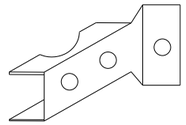
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



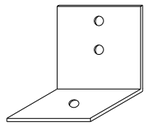
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



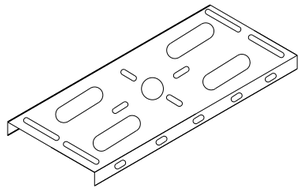
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



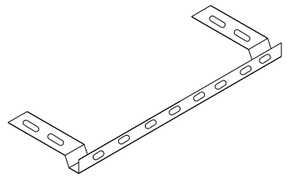
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



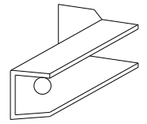
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



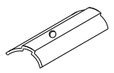
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



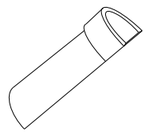
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



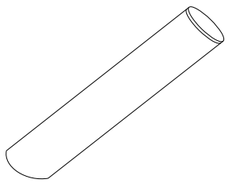
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

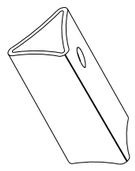


NIGP: 55083571053
Type 4 Mailbox Wedge

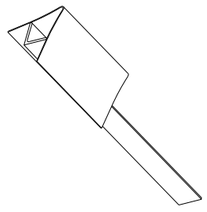


NIGP: 55083571004
Type 4 Mailbox Socket

NIGP: 80130238407
Type 2 Wedge Anchor



NIGP: 45057259009
Wedge for Type 1 V-wing Socket



NIGP: 45057256500
V-wing Socket for
Type 1 Foundation

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

NOTES:

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

BID CODES FOR CONTRACTS

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

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded Plastic

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

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

SHEET 4 OF 4

Texas Department of Transportation — Maintenance Division Standard

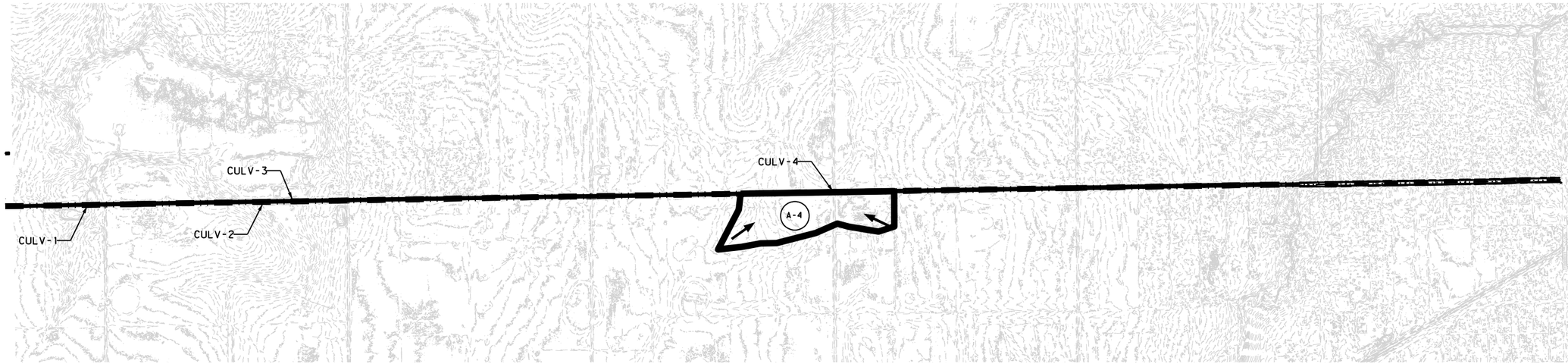
NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		117

DATE: 2/21/2024 11:51:04 AM
FILE: L:\DESIGN_PROJECTS_WorkSets\AMA_0455-03-037\4 - Design\Plan Set\3. Roadway Standards\MB21.dgn

Culvert Summary Table						
Culvert No.	Station	Number of Barrels	Sizes	Exist. Length ft	Type (shape & material)	Description of Work
1	17+82	1	6'x4'	78	Conc Box	LT: To Remain RT: To Remain Clean existing culvert
2	56+08	1	42"	98	Conc Pipe	LT: To Remain RT: To Remain Clean existing culvert
3	62+49	1	6'x4'	89	Conc Box	LT: To Remain RT: To Remain Clean existing culvert
4	180+32	1	4'x3'	42	Conc Box	LT: Extend and install straight wingwalls RT: Extend and install straight wingwalls Clean existing culvert
5	281+75	3	9'x7'	83	Conc Box	LT: To Remain RT: To Remain Clean existing culvert



HORZ 0' 1250' 2500'

LEGEND:

DRAINAGE AREA BOUNDARY

DIRECTION OF FLOW

NOTES:

1. CONTOURS DISPLAYED REFLECT 2018 USGS DEM.
2. CALCULATIONS ARE BASED ON TXDOT HYDRAULIC MANUAL (SEPTEMBER 2019).
3. PEAK FLOWS ARE DETERMINED USING NRCS METHOD.

Existing Culvert Summary Table												
SH 152 STA	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
180+32	10 year	28.80	28.80	3271.18	1.95	0.125	0.58	1.17	0.68	0.76	10.59	3.09
	100 year	102.10	101.69	3274.42	5.19	3.572	1.39	2.72	1.82	1.53	13.96	4.57

Proposed Culvert Summary Table												
SH 152 STA	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
180+32	10 year	29.20	29.20	3271.66	1.97	0.000	0.59	1.18	0.63	0.77	11.54	3.1
	100 year	102.80	98.79	3274.71	5.02	2.691	1.36	2.67	1.63	1.54	15.13	4.58

	Name	Area (acre)	Area (sqmi)	Curve Number	Time of Concentration (min)	Lag Time (min)	Runoff (cfs)					
							Q-50%	Q-20%	Q-10%	Q-4%	Q-2%	Q-1%
Exist	A-4	75.6	0.12	58.45	58.10	34.86	5.1	15.6	28.8	53.0	75.6	102.1
Prop	A-4	75.6	0.12	58.45	57.91	34.75	5.3	16.0	29.2	53.6	76.2	102.8

STATE OF TEXAS
APEKSHA BISTA
137870
LICENSED PROFESSIONAL ENGINEER
2/21/2024
Apeksha

Texas Department of Transportation

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

SH 152

DRAINAGE AREA MAP

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	118
CONTROL	SECTION	JOB	
0455	03	038	

DRAWING DATE: 2/21/2024 FILENAME: L:\Amarillo District\SH 152+WA 6\CADD\Sheets\Gray County\Plan Set\Drainage\SH152+DAM1.dgn

10-YEAR FREQUENCY																			
DITCH ID	BEGINNING STATION	END STATION	BEGINNING FL (FT)	END FL (FT)	CHANNEL SLOPE (FT/FT)	FLAT BOTTOM OR V-DITCH	AVERAGE BOTTOM WIDTH (FT)	AVERAGE FORE SLOPE (H:V)	AVERAGE BACK SLOPE (H:V)	DITCH LINING	FREQUENCY (YR)	FLOW Q (CFS)	DITCH FLOW DEPTH (FT)	DITCH FLOW VEL (FPS)	CAPACITY DEPTH (FT)	n VALUE	CAPACITY (CFS)	CAPACITY CHECK	FREEBOARD (FT)
D-1-1_DCH	73+00	74+00	3277.00	3277.50	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	0.30	0.15	0.73	1.43	0.035	31.24	SUFFICIENT	1.28
D-1-2_DCH	74+00	75+00	3277.50	3278.00	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	0.61	0.22	0.90	1.03	0.035	14.46	SUFFICIENT	0.81
D-1-3_DCH	75+00	76+00	3278.00	3278.50	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	0.91	0.28	1.01	0.86	0.035	9.49	SUFFICIENT	0.58
D-1-4_DCH	76+00	77+00	3278.50	3279.00	0.0050	FLAT-BOTTOM	1.0	6.0	3.0	EARTHEN	10 YR	1.21	0.39	1.13	1.36	0.035	22.97	SUFFICIENT	0.97
D-1-5_DCH	77+00	78+00	3279.00	3279.80	0.0080	V-DITCH	0.0	6.0	3.0	EARTHEN	10 YR	1.51	0.48	1.45	1.87	0.035	55.71	SUFFICIENT	1.38
D-1-6_DCH	78+00	79+00	3279.80	3280.80	0.0100	V-DITCH	0.0	6.0	3.0	EARTHEN	10 YR	1.82	0.50	1.64	2.44	0.035	127.64	SUFFICIENT	1.94
D-1-7_DCH	79+00	80+00	3280.80	3281.80	0.0100	V-DITCH	0.0	6.0	3.0	EARTHEN	10 YR	2.12	0.52	1.71	2.38	0.035	118.76	SUFFICIENT	1.85
D-1-8_DCH	80+00	81+00	3281.80	3282.80	0.0100	FLAT-BOTTOM	1.0	6.0	3.0	EARTHEN	10 YR	2.42	0.45	1.75	2.13	0.035	100.78	SUFFICIENT	1.67
D-1-9_DCH	81+00	82+00	3282.80	3284.30	0.0150	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.72	0.36	2.05	1.65	0.035	75.97	SUFFICIENT	1.29
D-1-10_DCH	82+00	83+00	3284.30	3285.00	0.0070	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.03	0.46	1.60	1.22	0.035	25.27	SUFFICIENT	0.76
D-1-11_DCH	83+00	84+00	3285.00	3285.70	0.0070	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.33	0.49	1.64	1.57	0.035	45.41	SUFFICIENT	1.08
D-1-12_DCH	84+00	85+00	3285.70	3286.40	0.0070	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.63	0.51	1.68	1.48	0.035	39.45	SUFFICIENT	0.97
D-1-13_DCH	85+00	86+00	3286.40	3287.10	0.0070	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.93	0.53	1.71	1.29	0.035	28.78	SUFFICIENT	0.76
D-1-14_DCH	86+00	87+00	3287.10	3288.09	0.0099	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.24	0.50	1.98	0.75	0.035	9.99	SUFFICIENT	0.25
D-1-15_DCH	87+00	88+00	3288.09	3288.80	0.0071	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.54	0.56	1.79	0.80	0.035	9.76	SUFFICIENT	0.24
D-1-16_DCH	88+00	89+00	3288.80	3289.30	0.0050	FLAT-BOTTOM	1.0	6.0	3.0	EARTHEN	10 YR	4.84	0.71	1.62	1.38	0.035	24.04	SUFFICIENT	0.67
D-1-17_DCH	89+00	90+00	3289.30	3289.70	0.0040	V-DITCH	0.0	6.0	3.0	EARTHEN	10 YR	5.15	0.87	1.51	1.27	0.035	14.12	SUFFICIENT	0.40
D-1-18_DCH	90+00	91+00	3289.70	3290.10	0.0040	V-DITCH	0.0	4.0	3.0	EARTHEN	10 YR	5.45	0.98	1.62	1.34	0.035	12.44	SUFFICIENT	0.36
D-1-19_DCH	91+00	92+00	3290.10	3290.50	0.0040	V-DITCH	0.0	4.0	3.0	EARTHEN	10 YR	5.75	1.00	1.65	1.32	0.035	12.07	SUFFICIENT	0.32
D-1-20_DCH	92+00	94+00	3290.50	3290.90	0.0040	V-DITCH	0.0	4.0	3.0	EARTHEN	10 YR	6.05	1.02	1.67	1.24	0.035	10.32	SUFFICIENT	0.23
D-2-1_DCH	94+00	95+00	3290.50	3290.30	0.0020	V-DITCH	0.0	4.0	3.0	EARTHEN	10 YR	0.24	0.35	0.57	2.16	0.035	31.98	SUFFICIENT	1.82
D-2-2_DCH	95+00	96+00	3290.30	3290.10	0.0020	FLAT-BOTTOM	1.0	4.0	3.0	EARTHEN	10 YR	0.48	0.33	0.67	2.04	0.035	32.71	SUFFICIENT	1.71
D-2-3_DCH	96+00	97+00	3290.10	3289.90	0.0020	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	0.72	0.32	0.72	1.68	0.035	23.94	SUFFICIENT	1.36
D-2-4_DCH	97+00	98+00	3289.90	3289.70	0.0020	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	0.96	0.37	0.78	1.63	0.035	22.31	SUFFICIENT	1.26
D-2-5_DCH	98+00	99+00	3289.70	3289.50	0.0020	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	1.20	0.42	0.83	1.54	0.035	19.69	SUFFICIENT	1.13
D-2-6_DCH	99+00	100+00	3289.50	3289.35	0.0015	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	1.44	0.49	0.78	1.47	0.035	15.32	SUFFICIENT	0.98
D-2-7_DCH	100+00	101+00	3289.35	3289.20	0.0015	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	1.68	0.53	0.82	1.62	0.035	19.04	SUFFICIENT	1.09
D-2-8_DCH	101+00	102+00	3289.20	3289.05	0.0015	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	1.92	0.57	0.85	1.37	0.035	12.93	SUFFICIENT	0.80
D-2-9_DCH	102+00	103+00	3289.05	3288.90	0.0015	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	2.16	0.60	0.87	1.51	0.035	16.17	SUFFICIENT	0.91
D-2-10_DCH	103+00	104+00	3288.90	3288.75	0.0015	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	2.40	0.63	0.90	1.78	0.035	23.74	SUFFICIENT	1.15
D-2-11_DCH	104+00	105+00	3288.75	3288.60	0.0015	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	2.65	0.66	0.92	1.59	0.035	18.10	SUFFICIENT	0.92
D-2-12_DCH	105+00	106+00	3288.60	3288.45	0.0015	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	2.89	0.69	0.94	1.86	0.035	26.34	SUFFICIENT	1.17
D-2-13_DCH	106+00	107+00	3288.45	3288.30	0.0015	FLAT-BOTTOM	1.0	4.0	3.0	EARTHEN	10 YR	3.13	0.82	0.98	2.38	0.035	41.29	SUFFICIENT	1.55
D-2-14_DCH	107+00	108+00	3288.30	3288.15	0.0015	FLAT-BOTTOM	1.0	4.0	3.0	EARTHEN	10 YR	3.37	0.85	0.99	1.91	0.035	24.04	SUFFICIENT	1.06
D-2-15_DCH	108+00	109+00	3288.15	3288.00	0.0015	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	3.61	0.77	1.00	1.49	0.035	15.80	SUFFICIENT	0.73
D-2-16_DCH	109+00	110+00	3288.00	3287.85	0.0015	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	3.85	0.79	1.02	1.66	0.035	20.30	SUFFICIENT	0.87
D-2-17_DCH	110+00	111+00	3287.85	3287.70	0.0015	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	4.09	0.82	1.03	1.71	0.035	21.61	SUFFICIENT	0.89
D-2-18_DCH	111+00	112+00	3287.70	3287.45	0.0025	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	4.33	0.74	1.27	1.95	0.035	37.80	SUFFICIENT	1.20
D-2-19_DCH	112+00	113+00	3287.45	3287.20	0.0025	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	4.57	0.76	1.28	1.97	0.035	38.73	SUFFICIENT	1.20
D-2-20_DCH	113+00	114+00	3287.20	3286.95	0.0025	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	4.81	0.78	1.30	1.82	0.035	32.51	SUFFICIENT	1.04
D-2-21_DCH	114+00	115+00	3286.95	3286.70	0.0025	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.05	0.75	1.25	1.72	0.035	33.78	SUFFICIENT	0.96
D-2-22_DCH	115+00	116+00	3286.70	3286.40	0.0030	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.29	0.74	1.35	1.59	0.035	30.64	SUFFICIENT	0.85
D-2-23_DCH	116+00	117+00	3286.40	3286.10	0.0030	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.53	0.75	1.37	1.56	0.035	29.28	SUFFICIENT	0.80
D-2-24_DCH	117+00	118+00	3286.10	3285.80	0.0030	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.77	0.77	1.38	1.53	0.035	27.95	SUFFICIENT	0.76
D-2-25_DCH	118+00	119+00	3285.80	3285.50	0.0030	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.01	0.78	1.40	1.48	0.035	25.83	SUFFICIENT	0.70
D-2-26_DCH	119+00	120+00	3285.50	3285.20	0.0030	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.25	0.79	1.41	1.49	0.035	26.24	SUFFICIENT	0.69
D-2-27_DCH	120+00	121+00	3285.20	3284.80	0.0040	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.49	0.76	1.59	1.46	0.035	28.88	SUFFICIENT	0.70
D-2-28_DCH	121+00	122+00	3284.80	3284.40	0.0040	FLAT-BOTTOM	1.0	6.0	3.0	EARTHEN	10 YR	6.73	0.86	1.62	1.77	0.035	40.11	SUFFICIENT	0.91
D-3-1_DCH	136+00	137+00	3280.00	3279.90	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	0.16	0.12	0.30	0.88	0.035	6.43	SUFFICIENT	0.76
D-3-2_DCH	137+00	138+00	3279.90	3279.80	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	0.33	0.18	0.38	1.15	0.035	11.38	SUFFICIENT	0.97
D-3-3_DCH	138+00	139+00	3279.80	3279.70	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	0.49	0.22	0.44	1.24	0.035	13.48	SUFFICIENT	1.02
D-3-4_DCH	139+00	140+00	3279.70	3279.60	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	0.65	0.26	0.48	1.30	0.035	14.92	SUFFICIENT	1.04

STATE OF TEXAS
JAIME VILLENA-MORALES
90341
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

Texas Department of Transportation

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

SH 152

DITCH HYDRAULIC COMPUTATION

SHEET 1 OF 6

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	119
CONTROL	SECTION	JOB	
0455	03	038	

DRAWING DATE: 2/21/2024 FILENAME: L:\Amarillo District\SH 152+WA 6\CADD\Sheets\Gray County\Plan Set\Drainage\SH152+DITCH+COMP+038+1.dgn

10-YEAR FREQUENCY																			
DITCH ID	BEGINNING STATION	END STATION	BEGINNING FL (FT)	END FL (FT)	CHANNEL SLOPE (FT/FT)	FLAT BOTTOM OR V-DITCH	AVERAGE BOTTOM WIDTH (FT)	AVERAGE FORE SLOPE (H:V)	AVERAGE BACK SLOPE (H:V)	DITCH LINING	FREQUENCY (YR)	FLOW Q (CFS)	DITCH FLOW DEPTH (FT)	DITCH FLOW VEL (FPS)	CAPACITY DEPTH (FT)	n VALUE	CAPACITY (CFS)	CAPACITY CHECK	FREEBOARD (FT)
D-3-5_DCH	140+00	141+00	3279.60	3279.50	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	0.82	0.30	0.51	1.30	0.035	14.92	SUFFICIENT	1.01
D-3-6_DCH	141+00	142+00	3279.50	3279.40	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	0.98	0.33	0.54	1.33	0.035	15.67	SUFFICIENT	1.01
D-3-7_DCH	142+00	143+00	3279.40	3279.30	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	1.14	0.36	0.57	1.21	0.035	12.68	SUFFICIENT	0.85
D-3-8_DCH	143+00	144+00	3279.30	3279.20	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	1.31	0.39	0.59	0.87	0.035	6.36	SUFFICIENT	0.48
D-3-9_DCH	144+00	145+00	3279.20	3279.10	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	1.47	0.41	0.61	0.75	0.035	4.70	SUFFICIENT	0.34
D-3-10_DCH	145+00	146+00	3279.10	3278.95	0.0015	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	1.63	0.39	0.73	0.66	0.035	4.47	SUFFICIENT	0.27
D-3-11_DCH	146+00	147+00	3278.95	3278.81	0.0014	FLAT-BOTTOM	3.0	6.0	9.0	EARTHEN	10 YR	1.79	0.43	0.68	0.60	0.035	3.76	SUFFICIENT	0.18
D-3-12_DCH	147+00	148+00	3278.81	3278.66	0.0015	FLAT-BOTTOM	2.0	6.0	9.0	EARTHEN	10 YR	1.96	0.48	0.72	0.77	0.035	5.58	SUFFICIENT	0.28
D-3-13_DCH	148+00	149+00	3278.66	3278.51	0.0015	FLAT-BOTTOM	2.0	6.0	6.0	EARTHEN	10 YR	2.12	0.53	0.78	0.91	0.035	7.29	SUFFICIENT	0.39
D-3-14_DCH	149+00	150+00	3278.51	3278.36	0.0015	FLAT-BOTTOM	2.0	6.0	6.0	EARTHEN	10 YR	2.28	0.55	0.79	0.83	0.035	5.74	SUFFICIENT	0.28
D-3-15_DCH	150+00	151+00	3278.36	3278.22	0.0014	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.45	0.61	0.84	0.65	0.035	2.75	SUFFICIENT	0.04
D-3-16_DCH	151+00	152+00	3278.22	3278.07	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.61	0.62	0.87	0.73	0.035	3.67	SUFFICIENT	0.11
D-3-17_DCH	152+00	153+00	3278.07	3277.92	0.0015	FLAT-BOTTOM	2.5	6.0	3.0	EARTHEN	10 YR	2.77	0.60	0.88	0.74	0.035	4.23	SUFFICIENT	0.14
D-3-18_DCH	153+00	154+00	3277.92	3277.77	0.0015	FLAT-BOTTOM	3.0	6.0	3.0	EARTHEN	10 YR	2.94	0.59	0.88	0.64	0.035	3.47	SUFFICIENT	0.05
D-3-19_DCH	154+00	155+00	3277.77	3277.62	0.0015	FLAT-BOTTOM	2.5	6.0	3.0	EARTHEN	10 YR	3.10	0.64	0.90	0.70	0.035	3.70	SUFFICIENT	0.06
D-3-20_DCH	155+00	156+00	3277.62	3277.47	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.26	0.69	0.92	0.96	0.035	6.67	SUFFICIENT	0.26
D-3-21_DCH	156+00	157+00	3277.47	3277.32	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.43	0.71	0.94	1.12	0.035	9.60	SUFFICIENT	0.41
D-3-22_DCH	157+00	158+00	3277.32	3277.17	0.0015	FLAT-BOTTOM	1.0	6.0	3.0	EARTHEN	10 YR	3.59	0.81	0.96	1.65	0.035	20.43	SUFFICIENT	0.84
D-3-23_DCH	158+00	159+00	3277.17	3277.02	0.0015	V-DITCH	0.0	6.0	3.0	EARTHEN	10 YR	3.75	0.93	0.97	2.13	0.035	34.39	SUFFICIENT	1.20
D-3-24_DCH	159+00	160+00	3277.02	3276.87	0.0015	V-DITCH	0.0	6.0	3.0	EARTHEN	10 YR	3.92	0.94	0.98	2.55	0.035	55.61	SUFFICIENT	1.61
D-3-25_DCH	160+00	161+00	3276.87	3276.72	0.0015	V-DITCH	0.0	6.0	3.0	EARTHEN	10 YR	4.08	0.96	0.99	3.14	0.035	96.53	SUFFICIENT	2.18
D-3-26_DCH	161+00	162+00	3276.72	3276.57	0.0015	FLAT-BOTTOM	1.0	6.0	3.0	EARTHEN	10 YR	4.24	0.87	1.00	3.46	0.035	136.02	SUFFICIENT	2.59
D-3-27_DCH	162+00	163+00	3276.57	3276.42	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.41	0.79	1.00	3.08	0.035	109.74	SUFFICIENT	2.28
D-3-28_DCH	163+00	164+00	3276.42	3275.92	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.57	0.61	1.57	1.87	0.035	58.47	SUFFICIENT	1.25
D-3-29_DCH	164+00	165+00	3275.92	3275.42	0.0050	FLAT-BOTTOM	3.0	6.0	3.0	EARTHEN	10 YR	4.73	0.55	1.56	1.28	0.035	27.66	SUFFICIENT	0.72
D-3-30_DCH	165+00	166+00	3275.42	3274.92	0.0050	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	4.90	0.51	1.54	1.30	0.035	33.09	SUFFICIENT	0.79
D-3-31_DCH	166+00	167+00	3274.92	3274.42	0.0050	FLAT-BOTTOM	3.5	6.0	3.0	EARTHEN	10 YR	5.06	0.54	1.57	0.89	0.035	13.59	SUFFICIENT	0.34
D-3-32_DCH	167+00	168+00	3274.42	3273.92	0.0050	FLAT-BOTTOM	3.0	6.0	3.0	EARTHEN	10 YR	5.22	0.58	1.60	0.66	0.035	6.75	SUFFICIENT	0.08
D-3-33_DCH	168+00	169+00	3273.92	3273.42	0.0050	FLAT-BOTTOM	2.5	6.0	3.0	EARTHEN	10 YR	5.38	0.62	1.63	0.68	0.035	6.35	SUFFICIENT	0.05
D-3-34_DCH	169+00	170+00	3273.42	3272.92	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.55	0.67	1.66	0.85	0.035	9.37	SUFFICIENT	0.18
D-3-35_DCH	170+00	171+00	3272.92	3272.77	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.71	0.89	1.07	1.26	0.035	12.61	SUFFICIENT	0.37
D-3-36_DCH	171+00	172+00	3272.77	3272.62	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.87	0.90	1.08	1.34	0.035	14.44	SUFFICIENT	0.43
D-3-37_DCH	172+00	173+00	3272.62	3272.47	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.04	0.91	1.08	1.42	0.035	16.69	SUFFICIENT	0.51
D-3-38_DCH	173+00	174+00	3272.47	3272.32	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.20	0.92	1.09	1.29	0.035	13.20	SUFFICIENT	0.36
D-3-39_DCH	174+00	175+00	3272.32	3272.17	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.36	0.93	1.10	1.06	0.035	8.37	SUFFICIENT	0.12
D-3-40_DCH	175+00	176+00	3272.17	3272.02	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.53	0.95	1.10	1.12	0.035	9.60	SUFFICIENT	0.17
D-3-41_DCH	176+00	177+00	3272.02	3271.87	0.0015	FLAT-BOTTOM	2.5	6.0	3.0	EARTHEN	10 YR	6.69	0.91	1.11	1.15	0.035	11.01	SUFFICIENT	0.23
D-3-42_DCH	177+00	178+00	3271.87	3271.72	0.0015	FLAT-BOTTOM	3.0	6.0	3.0	EARTHEN	10 YR	6.85	0.89	1.11	0.96	0.035	8.04	SUFFICIENT	0.07
D-3-43_DCH	178+00	179+00	3271.72	3271.57	0.0015	FLAT-BOTTOM	3.0	6.0	3.0	EARTHEN	10 YR	7.02	0.90	1.11	0.91	0.035	7.16	SUFFICIENT	0.01
D-3-44_DCH	179+00	180+00	3271.57	3271.42	0.0015	FLAT-BOTTOM	3.0	6.0	3.0	EARTHEN	10 YR	7.18	0.91	1.12	1.03	0.035	9.47	SUFFICIENT	0.12
D-3-45_DCH	180+00	180+25	3271.42	3271.38	0.0015	FLAT-BOTTOM	3.0	6.0	3.0	EARTHEN	10 YR	7.34	0.91	1.13	1.05	0.035	9.85	SUFFICIENT	0.13
D-10-1_DCH	206+00	207+00	3266.00	3265.80	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	0.26	0.18	0.51	1.26	0.035	14.70	SUFFICIENT	1.08
D-10-2_DCH	207+00	208+00	3265.80	3265.60	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	0.53	0.26	0.63	1.36	0.035	17.41	SUFFICIENT	1.10
D-10-3_DCH	208+00	209+00	3265.60	3265.40	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	0.79	0.33	0.70	0.81	0.035	5.32	SUFFICIENT	0.48
D-10-4_DCH	209+00	210+00	3265.40	3265.20	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	1.06	0.38	0.76	0.86	0.035	6.08	SUFFICIENT	0.48
D-10-5_DCH	210+00	211+00	3265.20	3265.00	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	1.32	0.42	0.81	1.77	0.035	32.82	SUFFICIENT	1.35
D-10-6_DCH	211+00	212+00	3265.00	3264.80	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	1.59	0.46	0.85	1.98	0.035	42.75	SUFFICIENT	1.52
D-10-7_DCH	212+00	213+00	3264.80	3264.60	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	1.85	0.49	0.88	2.04	0.035	45.97	SUFFICIENT	1.55
D-10-8_DCH	213+00	214+00	3264.60	3264.40	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.11	0.53	0.92	1.93	0.035	40.18	SUFFICIENT	1.40
D-10-9_DCH	214+00	215+00	3264.40	3264.20	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.38	0.56	0.95	1.99	0.035	43.54	SUFFICIENT	1.44
D-10-10_DCH	215+00	216+00	3264.20	3264.00	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.64	0.59	0.97	1.91	0.035	39.43	SUFFICIENT	1.33
D-10-11_DCH	216+00	217+00	3264.00	3263.80	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.91	0.61	1.00	1.64	0.035	27.14	SUFFICIENT	1.03
D-10-12_DCH	217+00	218+00	3263.80	3263.60	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.17	0.64	1.02	1.76	0.035	32.16	SUFFICIENT	1.12
D-10-13_DCH	218+00	219+00	3263.60	3263.25	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.44	0.58	1.28	1.89	0.035	50.52	SUFFICIENT	1.31
D-10-14_DCH	219+00	220+00	3263.25	3262.90	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.70	0.60	1.31	1.76	0.035	42.83	SUFFICIENT	1.16
D-10-15_DCH	220+00	221+00	3262.90	3262.55	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.96	0.62	1.33	1.84	0.035	47.66	SUFFICIENT	1.22
D-10-16_DCH	221+00	222+00	3262.55	3262.20	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.23	0.64	1.35	1.85	0.035	48.29	SUFFICIENT	1.21
D-10-17_DCH	222+00	223+00	3262.20	3261.85	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.49	0.66	1.37	1.69	0.035	38.59	SUFFICIENT	1.03
D-10-18_DCH	223+00	224+00	3261.85	3261.50	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.76	0.68	1.39	1.64	0.035	35.91	SUFFICIENT	0.96
D-10-19_DCH	224+00	225+00	3261.50	3261.15	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.02	0.69	1.41	1.78	0.035	44.01	SUFFICIENT	1.09
D-10-20_DCH	225+00	226+00	3261.15	3260.80	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.29	0.71	1.43	1.82	0.035	46.12	SUFFICIENT	1.11
D-10-21_DCH	226+00	227+00	3260.80	3260.45	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.55	0.73	1.45	1.77	0.035	43.42	SUFFICIENT	1.05
D-10-22_DCH	227+00	228+00	3260.45	3260.10	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.81	0.74	1.47	1.78	0.035	43.71	SUFFICIENT	1.04

FILENAME: L:\Amarillo District\SH 152*WA 6\CADD\Sheets\Gray County\Plan Set\Drainage\SH152*DITCH*COMP*038*2.dgn

DRAWING DATE: 2/21/2024

STATE OF TEXAS
JAIME VILLENA-MORALES
90341
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

Texas Department of Transportation

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

SH 152

DITCH HYDRAULIC COMPUTATION

SHEET 2 OF 6

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	120
CONTROL	SECTION	JOB	
0455	03	038	

10-YEAR FREQUENCY																			
DITCH ID	BEGINNING STATION	END STATION	BEGINNING FL (FT)	END FL (FT)	CHANNEL SLOPE (FT/FT)	FLAT BOTTOM OR V-DITCH	AVERAGE BOTTOM WIDTH (FT)	AVERAGE FORE SLOPE (H:V)	AVERAGE BACK SLOPE (H:V)	DITCH LINING	FREQUENCY (YR)	FLOW Q (CFS)	DITCH FLOW DEPTH (FT)	DITCH FLOW VEL (FPS)	CAPACITY DEPTH (FT)	n VALUE	CAPACITY (CFS)	CAPACITY CHECK	FREEBOARD (FT)
D-10-23_DCH	228+00	229+00	3260.10	3259.75	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.08	0.76	1.49	1.72	0.035	40.53	SUFFICIENT	0.97
D-10-24_DCH	229+00	230+00	3259.75	3259.40	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.34	0.77	1.50	1.84	0.035	47.66	SUFFICIENT	1.07
D-10-25_DCH	230+00	231+00	3259.40	3259.05	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.61	0.79	1.52	1.94	0.035	53.82	SUFFICIENT	1.15
D-10-26_DCH	231+00	232+00	3259.05	3258.70	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.87	0.80	1.53	2.08	0.035	64.14	SUFFICIENT	1.28
D-10-27_DCH	232+00	233+00	3258.70	3258.55	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	7.13	0.98	1.13	2.33	0.035	55.41	SUFFICIENT	1.35
D-4-1_DCH	234+00	235+00	3259.81	3259.31	0.0050	V-DITCH	0.0	6.0	19.0	PAVEMENT	10 YR	0.26	0.13	1.21	0.45	0.014	6.97	SUFFICIENT	0.32
D-4-2_DCH	235+00	236+00	3259.31	3258.79	0.0052	V-DITCH	0.0	6.0	50.0	PAVEMENT	10 YR	0.52	0.12	1.20	0.51	0.014	22.29	SUFFICIENT	0.39
D-4-3_DCH	236+00	237+00	3258.79	3258.28	0.0051	V-DITCH	0.0	6.0	22.0	PAVEMENT	10 YR	0.77	0.19	1.56	0.56	0.014	14.15	SUFFICIENT	0.37
D-4-4_DCH	237+00	238+00	3258.28	3257.43	0.0085	V-DITCH	0.0	6.0	38.0	PAVEMENT	10 YR	1.03	0.16	1.82	0.33	0.014	6.72	SUFFICIENT	0.16
D-4-5_DCH	238+00	239+00	3257.43	3256.92	0.0051	V-DITCH	0.0	6.0	46.0	PAVEMENT	10 YR	1.29	0.18	1.52	0.23	0.014	2.59	SUFFICIENT	0.05
D-4-6_DCH	239+00	240+00	3256.92	3256.31	0.0061	FLAT-BOTTOM	3.1	6.0	60.0	PAVEMENT	10 YR	1.55	0.13	1.58	0.29	0.014	8.74	SUFFICIENT	0.15
D-4-7_DCH	240+00	241+00	3256.31	3255.74	0.0057	FLAT-BOTTOM	3.1	6.0	25.0	PAVEMENT	10 YR	1.81	0.17	1.89	0.24	0.014	3.76	SUFFICIENT	0.07
D-4-8_DCH	241+00	242+00	3255.74	3255.38	0.0036	V-DITCH	0.0	6.0	104.0	PAVEMENT	10 YR	2.06	0.17	1.25	0.26	0.014	6.35	SUFFICIENT	0.09
D-4-9_DCH	242+00	243+00	3255.38	3255.00	0.0038	V-DITCH	0.0	6.0	34.0	PAVEMENT	10 YR	2.32	0.26	1.69	0.41	0.014	7.85	SUFFICIENT	0.15
D-4-10_DCH	243+00	244+00	3255.00	3254.55	0.0045	FLAT-BOTTOM	3.6	6.0	26.0	PAVEMENT	10 YR	2.58	0.20	1.88	0.64	0.014	32.86	SUFFICIENT	0.44
D-4-11_DCH	244+00	245+00	3254.55	3253.88	0.0067	FLAT-BOTTOM	7.5	6.0	6.0	EARTHEN	10 YR	2.84	0.21	1.56	0.69	0.025	24.62	SUFFICIENT	0.48
D-4-12_DCH	245+00	246+00	3253.88	3252.90	0.0098	FLAT-BOTTOM	4.8	6.0	10.0	EARTHEN	10 YR	3.10	0.24	1.92	0.51	0.025	13.45	SUFFICIENT	0.28
D-4-13_DCH	246+00	247+00	3252.90	3252.17	0.0073	FLAT-BOTTOM	3.2	6.0	18.0	EARTHEN	10 YR	3.35	0.29	1.69	0.37	0.025	5.30	SUFFICIENT	0.07
D-4-14_DCH	247+00	248+00	3252.17	3251.39	0.0078	FLAT-BOTTOM	2.2	6.0	56.0	EARTHEN	10 YR	3.61	0.25	1.43	0.37	0.025	9.10	SUFFICIENT	0.12
D-4-15_DCH	248+00	249+00	3251.39	3250.79	0.0060	FLAT-BOTTOM	4.0	6.0	31.0	EARTHEN	10 YR	3.87	0.28	1.47	0.54	0.025	15.95	SUFFICIENT	0.26
D-4-16_DCH	249+00	250+00	3250.79	3249.89	0.0090	FLAT-BOTTOM	5.7	6.0	5.0	EARTHEN	10 YR	4.13	0.27	2.09	0.54	0.025	14.26	SUFFICIENT	0.27
D-4-17_DCH	250+00	251+00	3249.89	3249.21	0.0068	FLAT-BOTTOM	5.8	6.0	14.0	EARTHEN	10 YR	4.39	0.29	1.76	0.49	0.025	12.57	SUFFICIENT	0.21
D-4-18_DCH	251+00	252+00	3249.21	3248.41	0.0080	FLAT-BOTTOM	5.7	6.0	9.0	EARTHEN	10 YR	4.64	0.30	1.99	0.44	0.025	9.76	SUFFICIENT	0.14
D-4-19_DCH	252+00	253+00	3248.41	3247.91	0.0050	FLAT-BOTTOM	5.4	6.0	21.0	EARTHEN	10 YR	4.90	0.32	1.55	0.45	0.025	9.32	SUFFICIENT	0.12
D-4-20_DCH	253+00	254+00	3247.91	3247.08	0.0083	FLAT-BOTTOM	3.8	6.0	13.0	EARTHEN	10 YR	5.16	0.35	2.08	0.62	0.025	16.78	SUFFICIENT	0.27
D-4-21_DCH	254+00	255+00	3247.08	3246.38	0.0070	V-DITCH	0.0	6.0	16.0	EARTHEN	10 YR	5.42	0.50	1.97	0.72	0.025	13.99	SUFFICIENT	0.21
D-4-22_DCH	255+00	256+00	3246.38	3245.88	0.0050	V-DITCH	0.0	6.0	17.0	EARTHEN	10 YR	5.68	0.53	1.74	0.72	0.025	12.83	SUFFICIENT	0.19
D-4-23_DCH	256+00	257+00	3245.88	3245.30	0.0058	V-DITCH	0.0	6.0	12.0	EARTHEN	10 YR	5.94	0.58	1.97	0.72	0.025	10.60	SUFFICIENT	0.14
D-4-24_DCH	257+00	258+00	3245.30	3244.91	0.0039	FLAT-BOTTOM	2.2	6.0	23.0	EARTHEN	10 YR	6.19	0.46	1.52	0.60	0.025	11.63	SUFFICIENT	0.14
D-4-25_DCH	258+00	259+00	3244.91	3244.76	0.0015	FLAT-BOTTOM	4.1	6.0	14.0	EARTHEN	10 YR	6.45	0.57	1.16	0.59	0.025	6.84	SUFFICIENT	0.02
D-4-26_DCH	259+00	260+00	3244.76	3244.44	0.0032	FLAT-BOTTOM	3.4	6.0	11.0	EARTHEN	10 YR	6.71	0.53	1.62	0.57	0.025	7.91	SUFFICIENT	0.04
D-4-27_DCH	260+00	261+00	3244.44	3243.44	0.0100	FLAT-BOTTOM	2.6	6.0	17.0	PAVEMENT	10 YR	6.97	0.31	3.60	0.40	0.014	11.82	SUFFICIENT	0.09
D-4-28_DCH	261+00	262+00	3243.44	3243.01	0.0043	FLAT-BOTTOM	1.1	6.0	25.0	PAVEMENT	10 YR	7.23	0.40	2.50	0.28	0.014	3.03	NOT SUFFICIENT	-0.12
D-4-29_DCH	262+00	263+00	3243.01	3242.79	0.0022	FLAT-BOTTOM	2.5	6.0	54.0	PAVEMENT	10 YR	7.48	0.35	1.66	0.16	0.014	1.22	NOT SUFFICIENT	-0.19
D-4-30_DCH	263+00	264+00	3242.79	3242.45	0.0034	FLAT-BOTTOM	2.5	6.0	145.0	PAVEMENT	10 YR	7.74	0.24	1.58	0.06	0.014	0.32	NOT SUFFICIENT	-0.18
D-4-31_DCH	264+00	265+00	3242.45	3241.90	0.0055	V-DITCH	0.0	6.0	295.0	PAVEMENT	10 YR	8.00	0.18	1.59	0.25	0.014	18.79	SUFFICIENT	0.07
D-4-32_DCH	265+00	266+00	3241.90	3241.39	0.0051	V-DITCH	0.0	6.0	21.0	PAVEMENT	10 YR	8.26	0.46	2.85	0.45	0.014	7.84	NOT SUFFICIENT	-0.01
D-4-33_DCH	266+00	267+00	3241.39	3240.96	0.0043	V-DITCH	0.0	6.0	17.0	PAVEMENT	10 YR	8.52	0.51	2.80	0.36	0.014	3.28	NOT SUFFICIENT	-0.15
D-4-34_DCH	267+00	268+00	3240.96	3240.61	0.0035	V-DITCH	0.0	6.0	52.0	PAVEMENT	10 YR	8.77	0.38	2.08	0.16	0.014	0.93	NOT SUFFICIENT	-0.22
D-4-35_DCH	268+00	269+00	3240.61	3240.13	0.0048	V-DITCH	0.0	6.0	215.0	PAVEMENT	10 YR	9.03	0.22	1.69	0.13	0.014	1.98	NOT SUFFICIENT	-0.10
D-4-36_DCH	269+00	270+00	3240.13	3239.67	0.0046	V-DITCH	0.0	6.0	83.0	PAVEMENT	10 YR	9.29	0.32	2.10	0.24	0.014	4.45	NOT SUFFICIENT	-0.08
D-4-37_DCH	270+00	271+00	3239.67	3239.18	0.0049	V-DITCH	0.0	6.0	48.0	PAVEMENT	10 YR	9.55	0.38	2.45	0.26	0.014	3.45	NOT SUFFICIENT	-0.12
D-4-38_DCH	271+00	272+00	3239.18	3238.40	0.0078	FLAT-BOTTOM	3.8	6.0	66.0	PAVEMENT	10 YR	9.81	0.27	2.72	0.19	0.014	4.44	NOT SUFFICIENT	-0.08
D-4-39_DCH	272+00	273+00	3238.40	3237.45	0.0095	FLAT-BOTTOM	6.0	6.0	41.0	PAVEMENT	10 YR	10.06	0.26	3.20	0.25	0.014	9.26	NOT SUFFICIENT	-0.01
D-4-40_DCH	273+00	274+00	3237.45	3236.94	0.0051	FLAT-BOTTOM	2.3	6.0	19.0	PAVEMENT	10 YR	10.32	0.44	3.05	0.38	0.014	7.22	NOT SUFFICIENT	-0.06
D-4-41_DCH	274+00	275+00	3236.94	3236.31	0.0063	FLAT-BOTTOM	4.3	6.0	31.0	PAVEMENT	10 YR	10.58	0.34	2.99	0.46	0.014	20.84	SUFFICIENT	0.12
D-4-42_DCH	275+00	276+00	3236.31	3234.46	0.0185	FLAT-BOTTOM	4.3	6.0	10.0	PAVEMENT	10 YR	10.84	0.31	5.30	0.55	0.014	35.46	SUFFICIENT	0.25
D-4-43_DCH	276+00	277+00	3234.46	3231.92	0.0254	FLAT-BOTTOM	2.2	6.0	23.0	PAVEMENT	10 YR	11.10	0.31	5.45	0.54	0.014	42.05	SUFFICIENT	0.24
D-4-44_DCH	277+00	278+00	3231.92	3228.46	0.0346	FLAT-BOTTOM	2.2	6.0	8.0	PAVEMENT	10 YR	11.35	0.34	7.25	0.80	0.014	73.46	SUFFICIENT	0.46
D-4-45_DCH	278+00	279+00	3228.46	3226.02	0.0244	V-DITCH	0.0	6.0	8.0	EARTHEN	10 YR	11.61	0.63	4.25	0.93	0.025	33.42	SUFFICIENT	0.30
D-4-46_DCH	279+00	280+00	3226.02	3224.90	0.0112	FLAT-BOTTOM	5.0	6.0	8.0	EARTHEN	10 YR	11.87	0.47	3.04	0.64	0.025	21.40	SUFFICIENT	0.16
D-4-47_DCH	280+00	281+00	3224.90	3223.00	0.0190	FLAT-BOTTOM	7.0	6.0	6.0	EARTHEN	10 YR	12.13	0.36	3.62	0.59	0.025	28.86	SUFFICIENT	0.22
D-4-48_DCH	281+00	281+60	3223.00	3221.00	0.0333	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	12.39	0.53	5.27	1.14	0.025	66.64	SUFFICIENT	0.61

NOTE:

FROM STATION 261+00 TO 264+00 AND FROM 265+00 TO 274+00 THE DITCH DOES NOT MEET THE 10-YR DESIGN CRITERIA DUE TO DESIGN CONSTRAINTS DERIVED MAINLY FROM A DIRECTIVE TO NOT GRADE BELOW THE EXISTING FLOW LINES AT THESE LOCATIONS.

STATE OF TEXAS
JAIME VILLENA-MORALES
90341
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

Texas Department of Transportation

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

SH 152

DITCH HYDRAULIC COMPUTATION

SHEET 3 OF 6

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	121
CONTROL	SECTION	JOB	
0455	03	038	

FILENAME: L:\Amarillo District\SH 152\WA 6\CADD\Sheets\Gray County\Plan Set\Drainage\SH152+DITCH+COMP+038+3.dgn

DRAWING DATE: 2/21/2024

10-YEAR FREQUENCY																			
DITCH ID	BEGINNING STATION	END STATION	BEGINNING FL (FT)	END FL (FT)	CHANNEL SLOPE (FT/FT)	FLAT BOTTOM OR V-DITCH	BOTTOM WIDTH (FT)	AVERAGE FORE SLOPE (H:V)	AVERAGE BACK SLOPE (H:V)	DITCH LINING	FREQUENCY (YR)	FLOW Q (CFS)	DITCH FLOW DEPTH (FT)	DITCH FLOW VEL (FPS)	CAPACITY DEPTH (FT)	n VALUE	CAPACITY (CFS)	CAPACITY CHECK	FREEBOARD (FT)
D-5-1_DCH	124+00	124+00	3282.75	3282.43	0.0032	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.47	0.60	1.24	2.06	0.035	59.55	SUFFICIENT	1.46
D-5-2_DCH	125+00	126+00	3282.43	3281.90	0.0053	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.94	0.73	1.79	1.85	0.035	58.65	SUFFICIENT	1.11
D-6-1_DCH	130+00	131+00	3281.50	3281.35	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	0.13	0.13	0.37	0.79	0.035	4.36	SUFFICIENT	0.66
D-6-2_DCH	131+00	132+00	3281.35	3280.87	0.0048	FLAT-BOTTOM	3.0	6.0	3.0	EARTHEN	10 YR	0.26	0.12	0.63	1.08	0.035	18.59	SUFFICIENT	0.96
D-6-3_DCH	132+00	133+00	3280.87	3280.67	0.0020	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	0.39	0.16	0.51	1.50	0.035	28.58	SUFFICIENT	1.34
D-6-4_DCH	133+00	134+00	3280.67	3280.27	0.0040	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	0.52	0.16	0.71	1.50	0.035	40.42	SUFFICIENT	1.34
D-6-5_DCH	134+00	135+00	3280.27	3280.02	0.0025	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	0.65	0.20	0.65	1.50	0.035	31.96	SUFFICIENT	1.30
D-6-6_DCH	135+00	136+00	3280.02	3279.92	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	0.78	0.29	0.51	1.50	0.035	20.21	SUFFICIENT	1.21
D-6-7_DCH	136+00	137+00	3279.92	3279.82	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	0.91	0.32	0.53	1.50	0.035	20.21	SUFFICIENT	1.18
D-6-8_DCH	137+00	138+00	3279.82	3279.72	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	1.04	0.34	0.55	1.50	0.035	20.21	SUFFICIENT	1.16
D-6-9_DCH	138+00	139+00	3279.72	3279.62	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	1.17	0.36	0.57	1.50	0.035	20.21	SUFFICIENT	1.14
D-6-10_DCH	139+00	140+00	3279.62	3279.52	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	1.30	0.38	0.59	1.50	0.035	20.21	SUFFICIENT	1.12
D-6-11_DCH	140+00	141+00	3279.52	3279.42	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	1.43	0.40	0.61	1.50	0.035	20.21	SUFFICIENT	1.10
D-6-12_DCH	141+00	142+00	3279.42	3279.32	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	1.56	0.42	0.62	1.50	0.035	20.21	SUFFICIENT	1.08
D-6-13_DCH	142+00	143+00	3279.32	3279.22	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	1.69	0.44	0.64	1.50	0.035	20.21	SUFFICIENT	1.06
D-6-14_DCH	143+00	144+00	3279.22	3279.12	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	1.82	0.46	0.65	1.50	0.035	20.21	SUFFICIENT	1.04
D-6-15_DCH	144+00	145+00	3279.12	3279.02	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	1.95	0.48	0.66	1.50	0.035	20.21	SUFFICIENT	1.02
D-6-16_DCH	145+00	146+00	3279.02	3278.92	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	2.08	0.49	0.68	1.50	0.035	20.21	SUFFICIENT	1.01
D-6-17_DCH	146+00	147+00	3278.92	3278.82	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	2.21	0.51	0.69	1.50	0.035	20.21	SUFFICIENT	0.99
D-6-18_DCH	147+00	148+00	3278.82	3278.72	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	2.34	0.52	0.70	1.50	0.035	20.21	SUFFICIENT	0.98
D-6-19_DCH	148+00	149+00	3278.72	3278.62	0.0010	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	2.47	0.54	0.71	1.50	0.035	20.21	SUFFICIENT	0.96
D-6-20_DCH	149+00	150+00	3278.62	3278.50	0.0012	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	2.60	0.53	0.77	1.00	0.035	9.29	SUFFICIENT	0.47
D-6-21_DCH	150+00	151+00	3278.50	3278.35	0.0015	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	2.73	0.51	0.85	0.57	0.035	3.41	SUFFICIENT	0.06
D-6-22_DCH	151+00	152+00	3278.35	3278.20	0.0015	FLAT-BOTTOM	3.0	6.0	3.0	EARTHEN	10 YR	2.86	0.58	0.88	0.71	0.035	4.30	SUFFICIENT	0.13
D-6-23_DCH	152+00	153+00	3278.20	3278.05	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.99	0.66	0.90	0.77	0.035	4.18	SUFFICIENT	0.11
D-6-24_DCH	153+00	154+00	3278.05	3277.90	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.12	0.68	0.91	0.90	0.035	5.83	SUFFICIENT	0.22
D-6-25_DCH	154+00	155+00	3277.90	3277.75	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.25	0.69	0.92	1.14	0.035	9.90	SUFFICIENT	0.45
D-6-26_DCH	155+00	156+00	3277.75	3277.60	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.38	0.70	0.93	1.46	0.035	17.83	SUFFICIENT	0.76
D-6-27_DCH	156+00	157+00	3277.60	3277.45	0.0015	FLAT-BOTTOM	1.0	6.0	3.0	EARTHEN	10 YR	3.51	0.80	0.95	1.83	0.035	26.72	SUFFICIENT	1.03
D-6-28_DCH	157+00	158+00	3277.45	3277.30	0.0015	V-DITCH	0.0	6.0	3.0	EARTHEN	10 YR	3.64	0.92	0.96	2.30	0.035	42.22	SUFFICIENT	1.38
D-6-29_DCH	158+00	159+00	3277.30	3277.15	0.0015	V-DITCH	0.0	6.0	3.0	EARTHEN	10 YR	3.77	0.93	0.97	2.95	0.035	82.06	SUFFICIENT	2.02
D-6-30_DCH	159+00	160+00	3277.15	3277.00	0.0015	V-DITCH	0.0	6.0	3.0	EARTHEN	10 YR	3.90	0.94	0.98	3.60	0.035	139.65	SUFFICIENT	2.66
D-6-31_DCH	160+00	161+00	3277.00	3276.85	0.0015	V-DITCH	0.0	6.0	3.0	EARTHEN	10 YR	4.03	0.95	0.99	3.93	0.035	176.49	SUFFICIENT	2.98
D-6-32_DCH	161+00	162+00	3276.85	3276.70	0.0015	FLAT-BOTTOM	1.0	6.0	3.0	EARTHEN	10 YR	4.16	0.86	0.99	3.71	0.035	163.02	SUFFICIENT	2.84
D-6-33_DCH	162+00	163+00	3276.70	3276.55	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.29	0.78	0.99	2.97	0.035	100.61	SUFFICIENT	2.19
D-6-34_DCH	163+00	164+00	3276.55	3276.05	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.42	0.60	1.56	1.84	0.035	56.22	SUFFICIENT	1.23
D-6-35_DCH	164+00	165+00	3276.05	3275.55	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.55	0.61	1.57	0.82	0.035	8.65	SUFFICIENT	0.21
D-6-36_DCH	165+00	166+00	3275.55	3275.05	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.68	0.62	1.58	0.98	0.035	12.76	SUFFICIENT	0.36
D-6-37_DCH	166+00	167+00	3275.05	3274.55	0.0050	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	4.81	0.50	1.53	1.23	0.035	29.12	SUFFICIENT	0.72
D-6-38_DCH	167+00	168+00	3274.55	3274.05	0.0050	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	4.94	0.51	1.54	1.20	0.035	27.86	SUFFICIENT	0.69
D-6-39_DCH	168+00	169+00	3274.05	3273.55	0.0050	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	5.07	0.52	1.55	1.05	0.035	21.00	SUFFICIENT	0.53
D-6-40_DCH	169+00	170+00	3273.55	3273.05	0.0050	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	5.20	0.52	1.56	0.82	0.035	12.44	SUFFICIENT	0.29
D-6-41_DCH	170+00	171+00	3273.05	3272.90	0.0015	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	5.33	0.72	1.02	1.14	0.035	13.68	SUFFICIENT	0.42
D-6-42_DCH	171+00	172+00	3272.90	3272.75	0.0015	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	5.46	0.73	1.03	1.06	0.035	11.62	SUFFICIENT	0.33
D-6-43_DCH	172+00	173+00	3272.75	3272.60	0.0015	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	5.59	0.74	1.03	0.89	0.035	8.16	SUFFICIENT	0.15
D-6-44_DCH	173+00	174+00	3272.60	3272.45	0.0015	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	5.72	0.75	1.04	1.01	0.035	10.60	SUFFICIENT	0.26
D-6-45_DCH	174+00	175+00	3272.45	3272.30	0.0015	FLAT-BOTTOM	4.0	6.0	3.0	EARTHEN	10 YR	5.85	0.75	1.05	1.08	0.035	12.08	SUFFICIENT	0.32
D-6-46_DCH	175+00	176+00	3272.30	3272.15	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.98	0.91	1.08	1.18	0.035	10.83	SUFFICIENT	0.27
D-6-47_DCH	176+00	177+00	3272.15	3272.00	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.11	0.92	1.09	1.40	0.035	16.01	SUFFICIENT	0.48
D-6-48_DCH	177+00	178+00	3272.00	3271.85	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.24	0.93	1.09	1.49	0.035	18.56	SUFFICIENT	0.56

STATE OF TEXAS
JAIME VILLENA-MORALES
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2/21/2024

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TBPE REG. # F-11657

SH 152

DITCH HYDRAULIC COMPUTATION

SHEET 4 OF 6

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	122
CONTROL	SECTION	JOB	
0455	03	038	

DRAWING DATE: 2/21/2024 FILENAME: L:\Amarillo District\SH 152*WA 6\CADD\Sheets\Gray County\Plan Set\Drainage\SH152*DITCH*COMP*038*4.dgn

10-YEAR FREQUENCY																			
DITCH ID	BEGINNING STATION	END STATION	BEGINNING FL (FT)	END FL (FT)	CHANNEL SLOPE (FT/FT)	FLAT BOTTOM OR V-DITCH	BOTTOM WIDTH (FT)	AVERAGE FORE SLOPE (H:V)	AVERAGE BACK SLOPE (H:V)	DITCH LINING	FREQUENCY (YR)	FLOW Q (CFS)	DITCH FLOW DEPTH (FT)	DITCH FLOW VEL (FPS)	CAPACITY DEPTH (FT)	n VALUE	CAPACITY (CFS)	CAPACITY CHECK	FREEBOARD (FT)
D-6-49_DCH	178+00	179+00	3271.85	3271.70	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.37	0.93	1.10	1.53	0.035	19.92	SUFFICIENT	0.60
D-6-50_DCH	179+00	180+00	3271.70	3271.55	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.50	0.94	1.10	1.33	0.035	14.18	SUFFICIENT	0.38
D-6-51_DCH	180+00	180+25	3271.55	3271.51	0.0015	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.63	0.95	1.11	1.01	0.035	7.55	SUFFICIENT	0.06
D-8-1_DCH	181+00	182+00	3272.30	3272.20	0.0010	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	0.33	0.25	0.43	0.77	0.035	3.37	SUFFICIENT	0.52
D-8-2_DCH	182+00	183+00	3272.20	3272.10	0.0010	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	0.67	0.35	0.52	0.67	0.035	2.48	SUFFICIENT	0.32
D-8-3_DCH	183+00	184+00	3272.10	3272.00	0.0010	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	1.00	0.43	0.58	0.73	0.035	3.04	SUFFICIENT	0.30
D-8-4_DCH	184+00	185+00	3272.00	3271.90	0.0010	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	1.33	0.50	0.63	1.07	0.035	7.05	SUFFICIENT	0.57
D-8-5_DCH	185+00	186+00	3271.90	3271.80	0.0010	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	1.66	0.55	0.67	1.13	0.035	8.08	SUFFICIENT	0.58
D-8-6_DCH	186+00	187+00	3271.80	3271.70	0.0010	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.00	0.60	0.70	1.27	0.035	10.49	SUFFICIENT	0.67
D-8-7_DCH	187+00	188+00	3271.70	3271.60	0.0010	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.33	0.65	0.73	1.70	0.035	20.92	SUFFICIENT	1.05
D-8-8_DCH	188+00	189+00	3271.60	3271.50	0.0010	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.66	0.69	0.75	2.04	0.035	32.51	SUFFICIENT	1.35
D-8-9_DCH	189+00	190+00	3271.50	3271.40	0.0010	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.99	0.73	0.78	2.36	0.035	46.69	SUFFICIENT	1.64
D-8-10_DCH	190+00	191+00	3271.40	3271.30	0.0010	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.33	0.77	0.80	2.14	0.035	36.74	SUFFICIENT	1.38
D-8-11_DCH	191+00	192+00	3271.30	3271.20	0.0010	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.66	0.80	0.82	1.78	0.035	23.36	SUFFICIENT	0.98
D-8-12_DCH	192+00	193+00	3271.20	3271.10	0.0010	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.99	0.83	0.84	1.57	0.035	17.30	SUFFICIENT	0.74
D-9-1_DCH	194+00	195+00	3271.00	3270.60	0.0040	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	0.21	0.13	0.61	0.79	0.035	7.12	SUFFICIENT	0.66
D-9-2_DCH	195+00	196+00	3270.60	3270.20	0.0040	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	0.42	0.20	0.75	0.30	0.035	0.95	SUFFICIENT	0.10
D-9-3_DCH	196+00	197+00	3270.20	3269.80	0.0040	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	0.63	0.24	0.85	0.85	0.035	8.38	SUFFICIENT	0.61
D-9-4_DCH	197+00	198+00	3269.80	3269.40	0.0040	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	0.85	0.28	0.92	0.94	0.035	10.38	SUFFICIENT	0.65
D-9-5_DCH	198+00	199+00	3269.40	3269.00	0.0040	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	1.06	0.32	0.98	0.58	0.035	3.64	SUFFICIENT	0.26
D-9-6_DCH	199+00	200+00	3269.00	3268.60	0.0040	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	1.27	0.35	1.03	0.97	0.035	11.28	SUFFICIENT	0.62
D-9-7_DCH	200+00	201+00	3268.60	3268.20	0.0040	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	1.48	0.37	1.07	1.15	0.035	16.66	SUFFICIENT	0.78
D-9-8_DCH	201+00	202+00	3268.20	3267.90	0.0030	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	1.69	0.43	1.00	0.98	0.035	10.00	SUFFICIENT	0.55
D-9-9_DCH	202+00	203+00	3267.90	3267.60	0.0030	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	1.90	0.45	1.03	1.10	0.035	12.88	SUFFICIENT	0.64
D-9-10_DCH	203+00	204+00	3267.60	3267.30	0.0030	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.12	0.48	1.06	1.49	0.035	26.24	SUFFICIENT	1.01
D-9-11_DCH	204+00	205+00	3267.30	3267.00	0.0030	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.33	0.50	1.09	1.56	0.035	29.28	SUFFICIENT	1.05
D-9-12_DCH	205+00	206+00	3267.00	3266.70	0.0030	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.54	0.52	1.12	1.61	0.035	31.81	SUFFICIENT	1.09
D-9-13_DCH	206+00	207+00	3266.70	3266.40	0.0030	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.75	0.54	1.14	1.38	0.035	21.88	SUFFICIENT	0.83
D-9-14_DCH	207+00	208+00	3266.40	3266.10	0.0030	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	2.96	0.56	1.16	1.14	0.035	14.14	SUFFICIENT	0.58
D-9-15_DCH	208+00	209+00	3266.10	3265.90	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.17	0.64	1.02	1.41	0.035	18.96	SUFFICIENT	0.77
D-9-16_DCH	209+00	210+00	3265.90	3265.70	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.39	0.66	1.04	1.57	0.035	24.46	SUFFICIENT	0.91
D-9-17_DCH	210+00	211+00	3265.70	3265.50	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.60	0.68	1.05	1.68	0.035	28.55	SUFFICIENT	1.00
D-9-18_DCH	211+00	212+00	3265.50	3265.30	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	3.81	0.69	1.07	1.86	0.035	36.50	SUFFICIENT	1.16
D-9-19_DCH	212+00	213+00	3265.30	3265.10	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.02	0.71	1.08	1.93	0.035	40.18	SUFFICIENT	1.22
D-9-20_DCH	213+00	214+00	3265.10	3264.90	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.23	0.73	1.10	2.01	0.035	44.08	SUFFICIENT	1.28
D-9-21_DCH	214+00	215+00	3264.90	3264.70	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.44	0.75	1.11	1.97	0.035	42.23	SUFFICIENT	1.22
D-9-22_DCH	215+00	216+00	3264.70	3264.50	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.66	0.76	1.13	1.80	0.035	33.94	SUFFICIENT	1.04
D-9-23_DCH	216+00	217+00	3264.50	3264.30	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	4.87	0.78	1.14	1.71	0.035	30.00	SUFFICIENT	0.93
D-9-24_DCH	217+00	218+00	3264.30	3264.10	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.08	0.79	1.15	1.49	0.035	21.60	SUFFICIENT	0.70
D-9-25_DCH	218+00	219+00	3264.10	3263.75	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.29	0.71	1.43	1.46	0.035	27.23	SUFFICIENT	0.75
D-9-26_DCH	219+00	220+00	3263.75	3263.40	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.50	0.72	1.45	1.45	0.035	27.01	SUFFICIENT	0.73
D-9-27_DCH	220+00	221+00	3263.40	3263.05	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.71	0.74	1.46	1.28	0.035	20.17	SUFFICIENT	0.55
D-9-28_DCH	221+00	222+00	3263.05	3262.70	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	5.93	0.75	1.48	1.22	0.035	17.87	SUFFICIENT	0.47
D-9-29_DCH	222+00	223+00	3262.70	3262.35	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.14	0.76	1.49	1.12	0.035	14.81	SUFFICIENT	0.36
D-9-30_DCH	223+00	224+00	3262.35	3262.00	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.35	0.77	1.50	1.07	0.035	13.34	SUFFICIENT	0.30
D-9-31_DCH	224+00	225+00	3262.00	3261.65	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.56	0.78	1.52	1.16	0.035	15.90	SUFFICIENT	0.38
D-9-32_DCH	225+00	226+00	3261.65	3261.30	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.77	0.79	1.53	1.34	0.035	22.25	SUFFICIENT	0.55
D-9-33_DCH	226+00	227+00	3261.30	3260.95	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	6.98	0.81	1.54	1.41	0.035	25.29	SUFFICIENT	0.61
D-9-34_DCH	227+00	228+00	3260.95	3260.60	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	7.20	0.82	1.55	1.55	0.035	31.63	SUFFICIENT	0.74
D-9-35_DCH	228+00	229+00	3260.60	3260.25	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	7.41	0.83	1.56	1.67	0.035	37.77	SUFFICIENT	0.85

Texas Department of Transportation

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

SH 152

DITCH HYDRAULIC COMPUTATION

SHEET 5 OF 6

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	123
CONTROL	SECTION	JOB	
0455	03	038	

10-YEAR FREQUENCY																			
DITCH ID	BEGINNING STATION	END STATION	BEGINNING FL (FT)	END FL (FT)	CHANNEL SLOPE (FT/FT)	FLAT BOTTOM OR V-DITCH	BOTTOM WIDTH (FT)	AVERAGE FORE SLOPE (H:V)	AVERAGE BACK SLOPE (H:V)	DITCH LINING	FREQUENCY (YR)	FLOW Q (CFS)	DITCH FLOW DEPTH (FT)	DITCH FLOW VEL (FPS)	CAPACITY DEPTH (FT)	n VALUE	CAPACITY (CFS)	CAPACITY CHECK	FREEBOARD (FT)
D-9-36_DCH	229+00	230+00	3260.25	3259.90	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	7.62	0.84	1.57	1.65	0.035	36.70	SUFFICIENT	0.82
D-9-37_DCH	230+00	231+00	3259.90	3259.55	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	7.83	0.85	1.59	1.57	0.035	32.36	SUFFICIENT	0.72
D-9-38_DCH	231+00	232+00	3259.55	3259.20	0.0035	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	8.04	0.86	1.60	1.58	0.035	32.85	SUFFICIENT	0.72
D-9-39_DCH	232+00	233+00	3259.20	3259.00	0.0020	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	8.25	0.98	1.31	1.84	0.035	36.03	SUFFICIENT	0.86
D-9-40_DCH	233+00	234+00	3259.00	3258.55	0.0045	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	8.47	0.83	1.78	2.20	0.035	82.93	SUFFICIENT	1.37
D-9-41_DCH	234+00	235+00	3258.55	3258.10	0.0045	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	8.68	0.84	1.79	2.43	0.035	106.42	SUFFICIENT	1.60
D-9-42_DCH	235+00	236+00	3258.10	3257.60	0.0050	FLAT-BOTTOM	2.0	4.0	3.0	EARTHEN	10 YR	8.89	0.88	1.97	2.28	0.035	78.58	SUFFICIENT	1.40
D-9-43_DCH	236+00	237+00	3257.60	3257.10	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	9.10	0.84	1.88	1.88	0.035	59.23	SUFFICIENT	1.04
D-9-44_DCH	237+00	238+00	3257.10	3256.60	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	9.31	0.85	1.89	1.73	0.035	49.12	SUFFICIENT	0.89
D-9-45_DCH	238+00	239+00	3256.60	3256.10	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	9.52	0.86	1.90	1.75	0.035	50.15	SUFFICIENT	0.89
D-9-46_DCH	239+00	240+00	3256.10	3255.60	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	9.74	0.86	1.91	1.73	0.035	48.78	SUFFICIENT	0.87
D-9-47_DCH	240+00	241+00	3255.60	3255.10	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	9.95	0.87	1.93	1.59	0.035	40.16	SUFFICIENT	0.72
D-9-48_DCH	241+00	242+00	3255.10	3254.60	0.0050	FLAT-BOTTOM	2.0	6.0	3.0	EARTHEN	10 YR	10.16	0.88	1.94	1.52	0.035	35.81	SUFFICIENT	0.64

Texas Department of Transportation

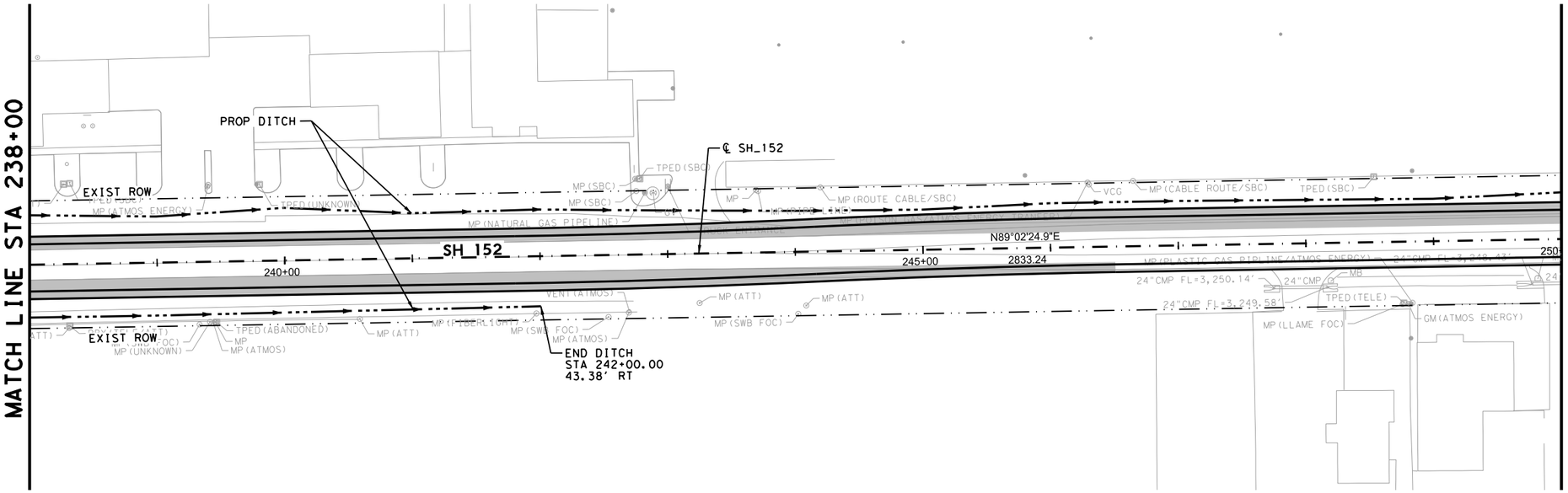
I. S. ENGINEERS, LLC
7670 WOODWAY DRIVE, SUITE 320
HOUSTON, TEXAS 77063
TBPE REG. # F-11657

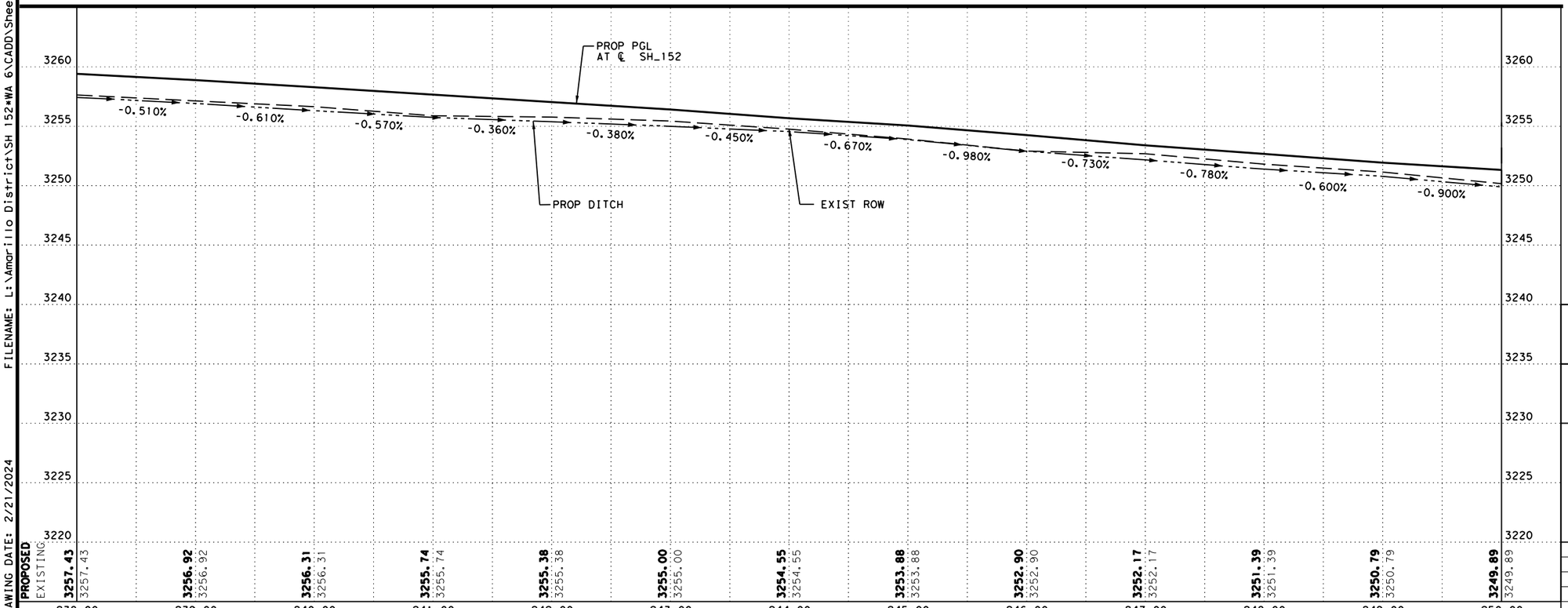
SH 152

DITCH HYDRAULIC COMPUTATION

SHEET 6 OF 6

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	124
CONTROL	SECTION	JOB	
0455	03	038	





HORZ 0' 50' 100'
VERT 0' 5' 10'

NOTES:

1. THE MATERIAL BEING REMOVED FROM THE DITCH IS INCLUDED IN THE QUANTITIES FOR EXCAVATION SHOWN IN THE SUMMARY OF QUANTITIES SHEETS.
2. ON NORTH DITCH MATCH ALL PROPOSED FLOWLINES TO EXISTING (NO DITCH REGRADING).

STATE OF TEXAS
JAIME VILLENA-MORALES
90341
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

Texas Department of Transportation

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

SH 152

DITCH PLAN & PROFILE NORTH

SHEET 1 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	125
CONTROL	SECTION	JOB	
0455	03	038	

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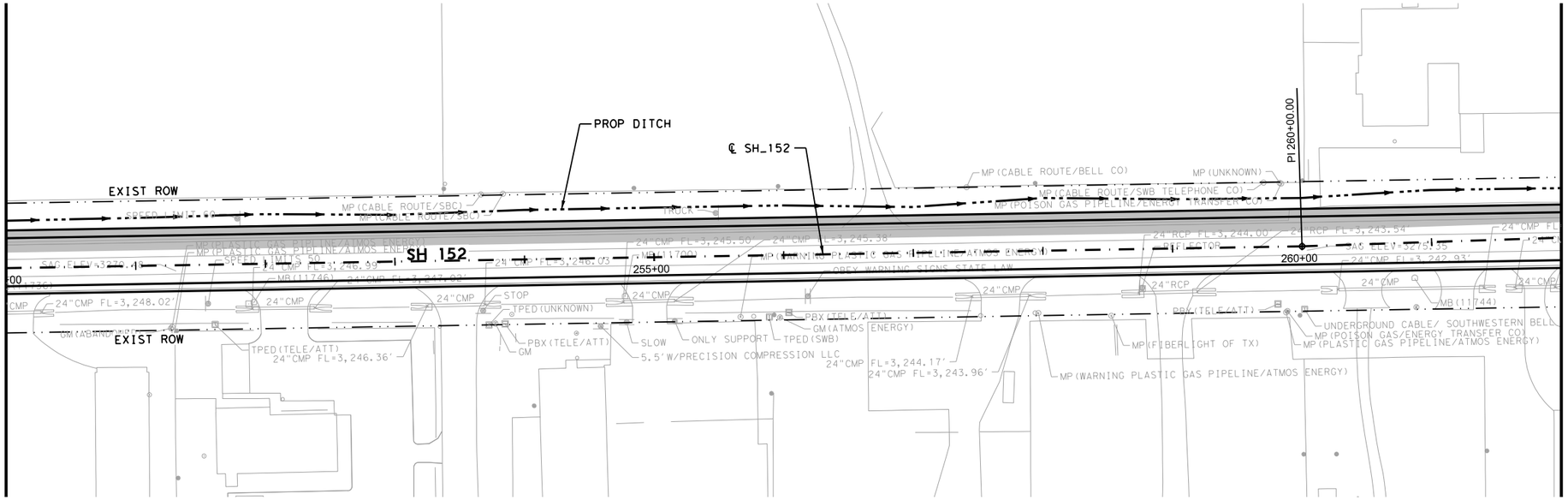
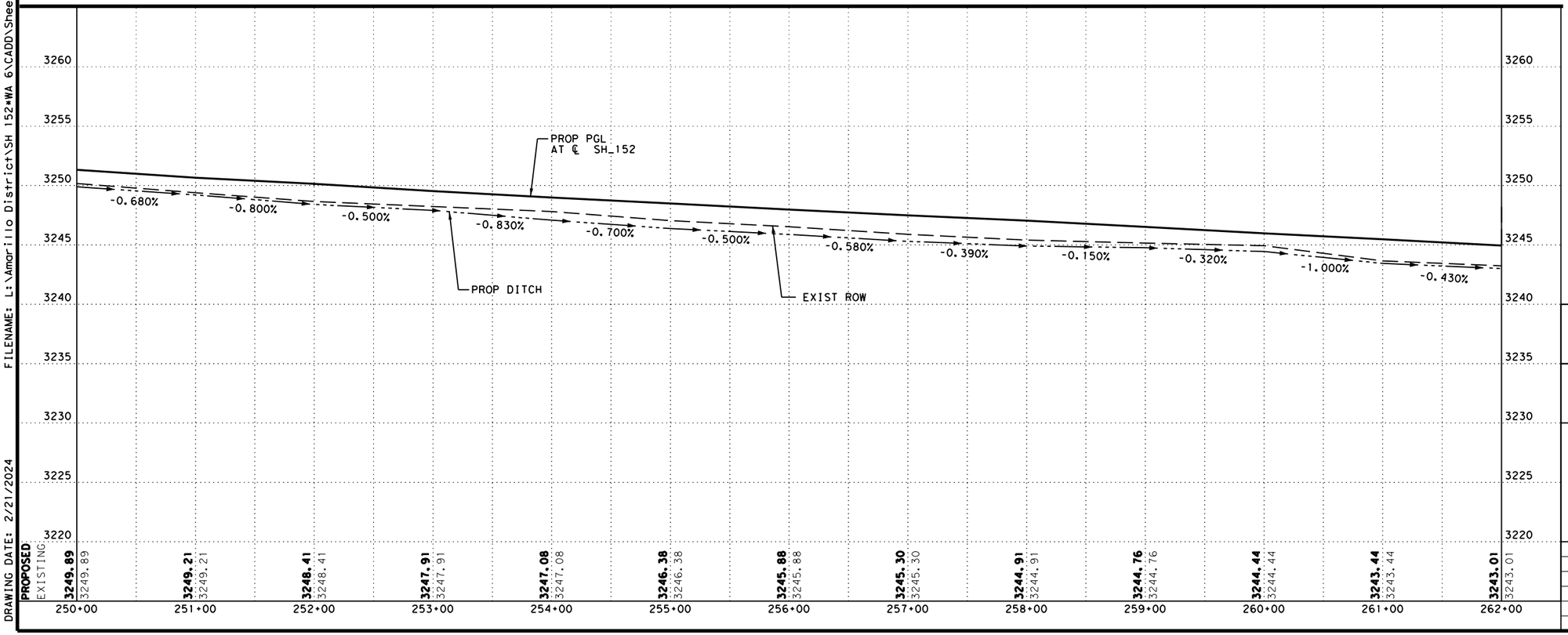
DRAWING DATE: 2/21/2024





HORZ 0' 50' 100'
VERT 0' 5' 10'

NOTES:

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STATE OF TEXAS
JAIME VILLENA-MORALES
90341
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

Texas Department of Transportation

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

SH 152

DITCH PLAN & PROFILE NORTH

SHEET 2 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	126
CONTROL	SECTION	JOB	
0455	03	038	

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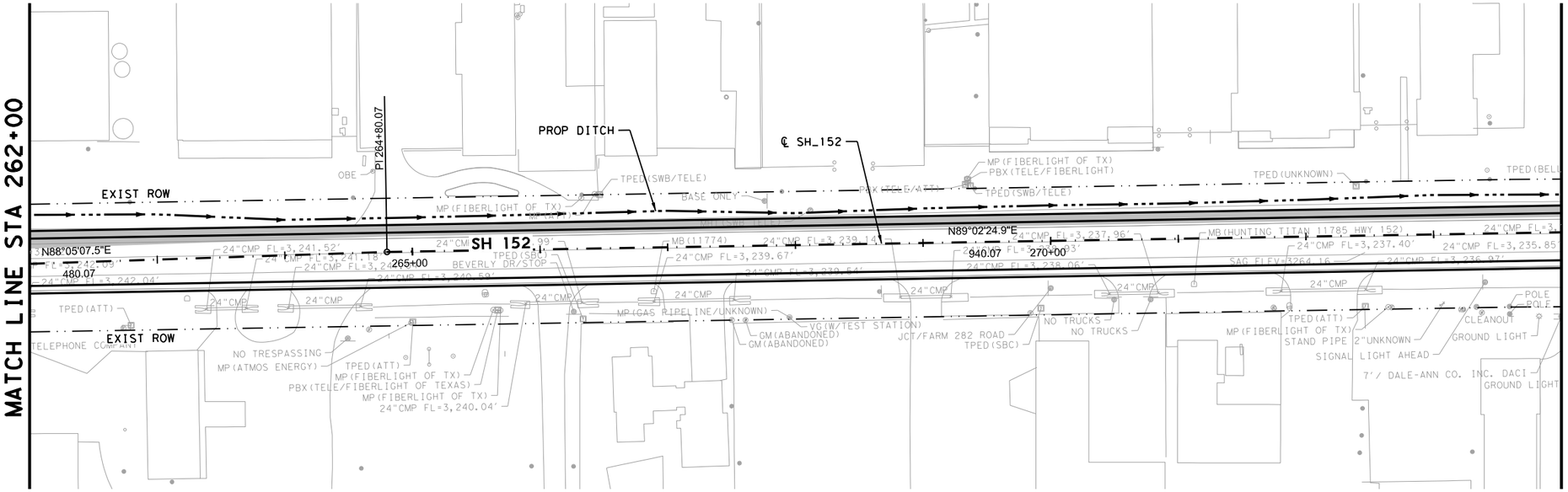
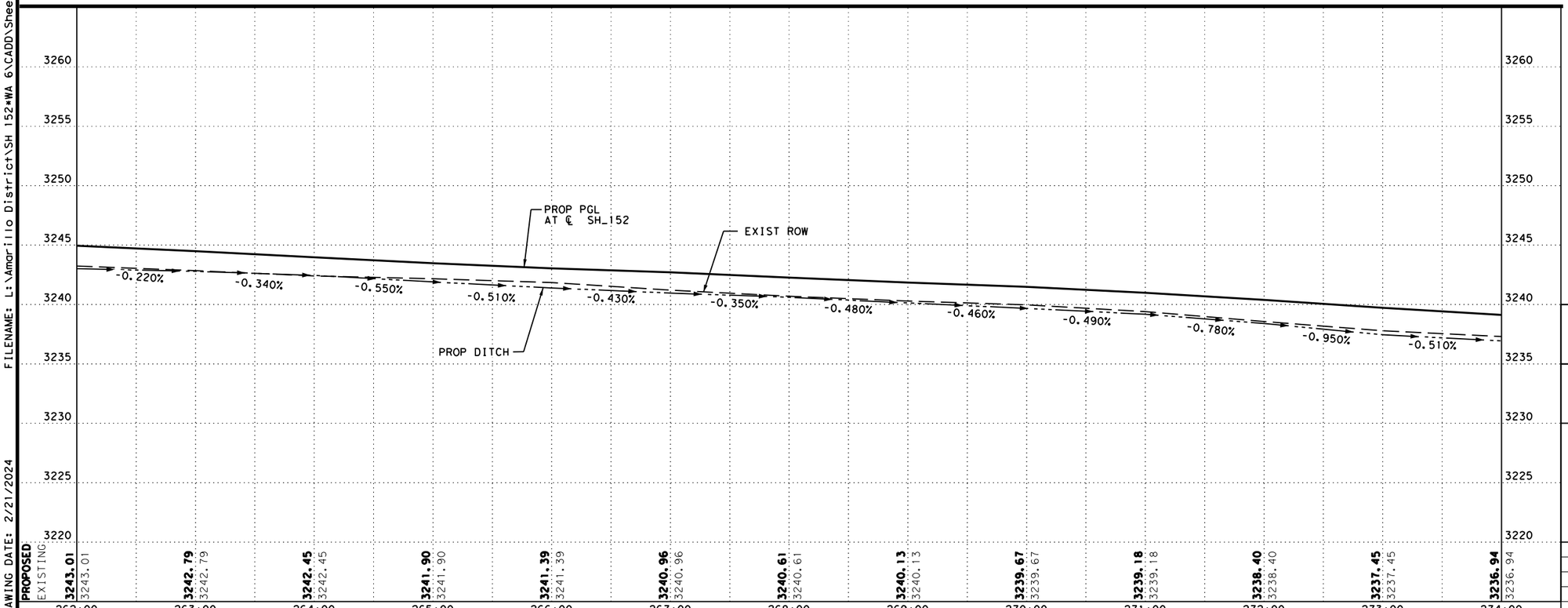
DRAWING DATE: 2/21/2024





NOTES:

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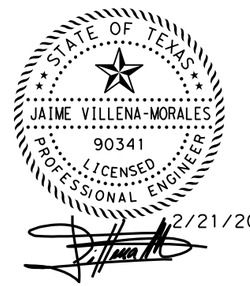
2. ON NORTH DITCH MATCH ALL PROPOSED FLOWLINES TO EXISTING (NO DITCH REGRADING).



Texas Department of Transportation

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

SH 152

DITCH PLAN & PROFILE NORTH

SHEET 3 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	127
CONTROL	SECTION	JOB	
0455	03	038	

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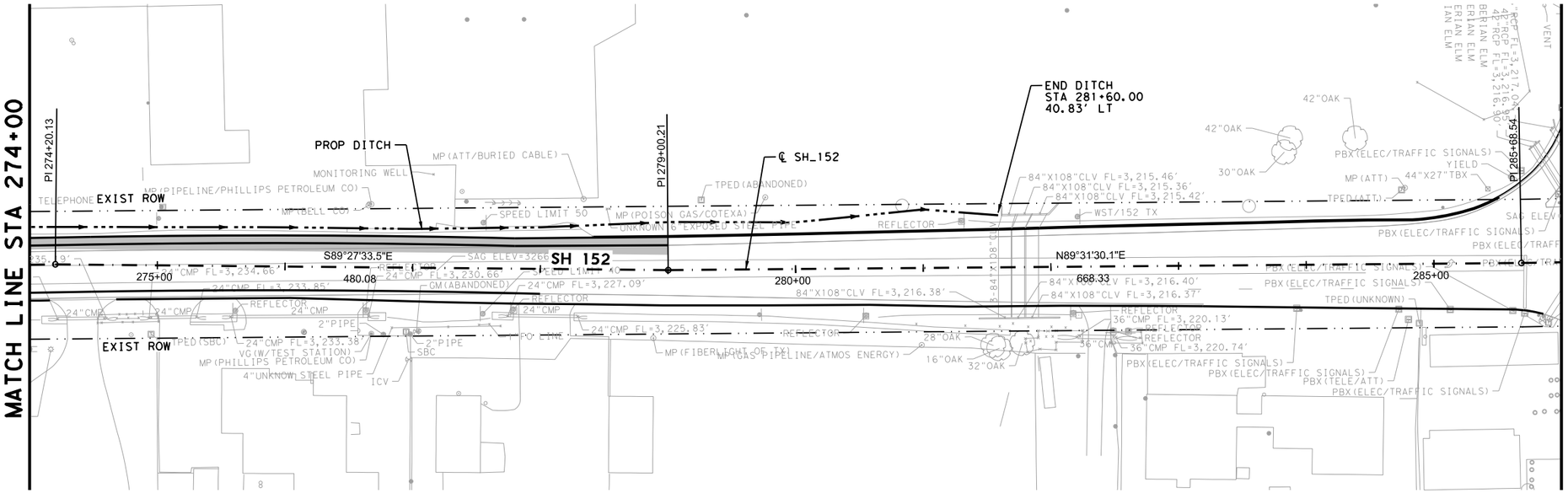
DRAWING DATE: 2/21/2024

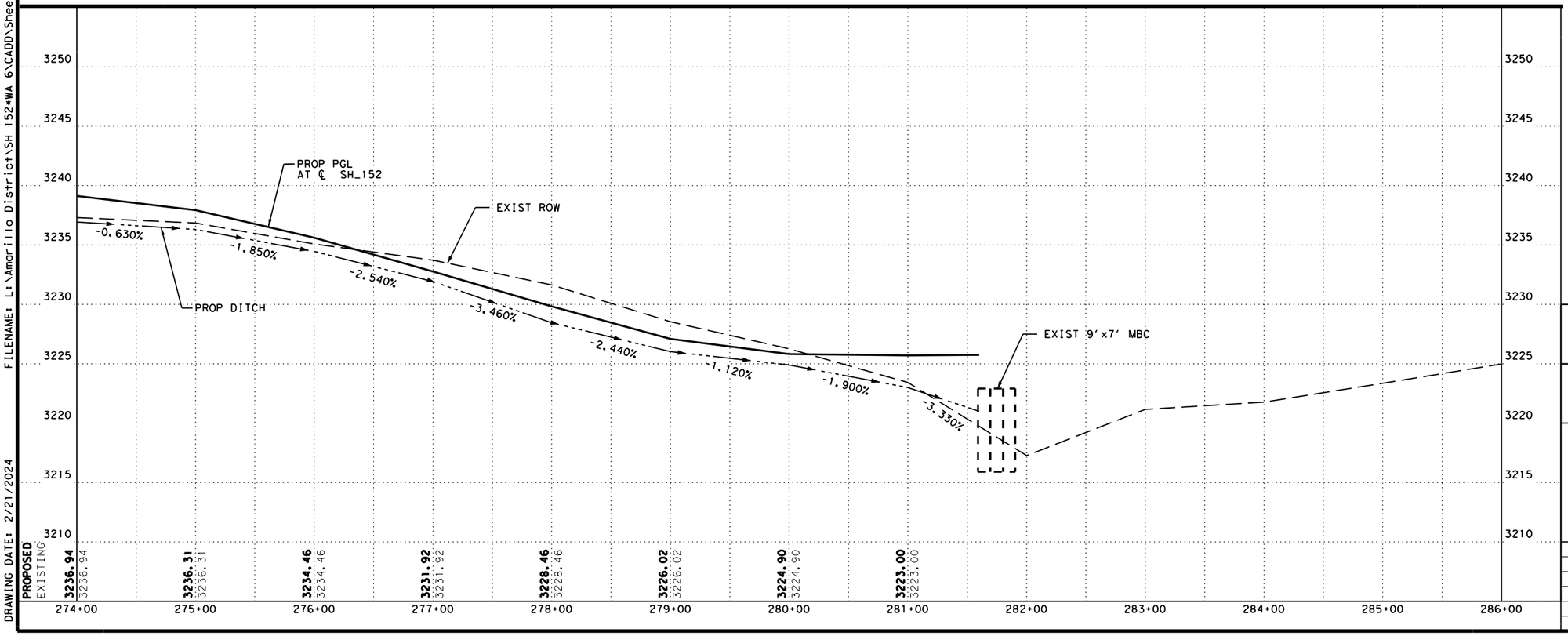


HORZ 0′ 50′ 100′

VERT 0′ 5′ 10′

NOTES:

1. THE MATERIAL BEING REMOVED FROM THE DITCH IS INCLUDED IN THE QUANTITIES FOR EXCAVATION SHOWN IN THE SUMMARY OF QUANTITIES SHEETS.
2. ON NORTH DITCH MATCH ALL PROPOSED FLOWLINES TO EXISTING (NO DITCH REGRADING).



STATE OF TEXAS
JAIME VILLENA-MORALES
90341
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

Texas Department of Transportation

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

SH 152

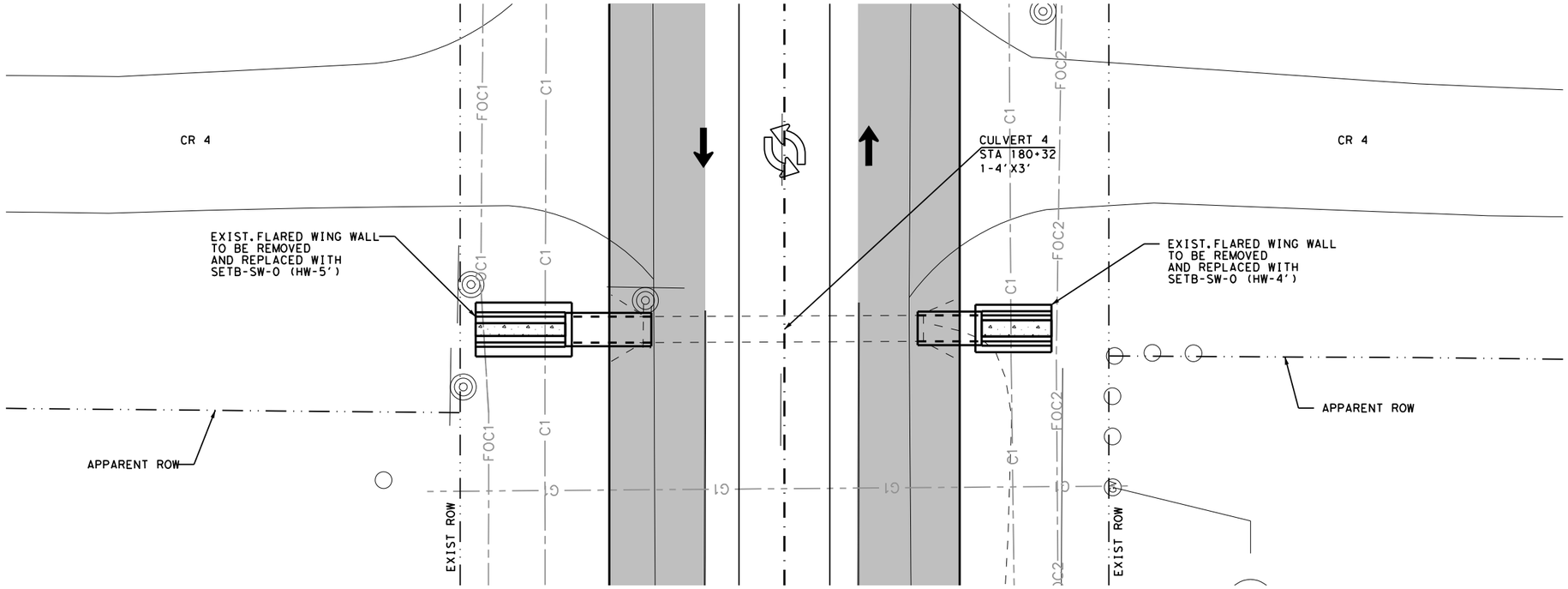
DITCH PLAN & PROFILE NORTH

SHEET 4 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	128
CONTROL	SECTION	JOB	
0455	03	038	

FILENAME: L:\Amarillo District\SH 152*WA 6\CADD\Sheets\Gray County\Plan Set\Drainage\AMA*0455-03-038\SH152*DITCH*4.dgn

DRAWING DATE: 2/21/2024



HORZ 0' 10' 20'
VERT 0' 5' 10'

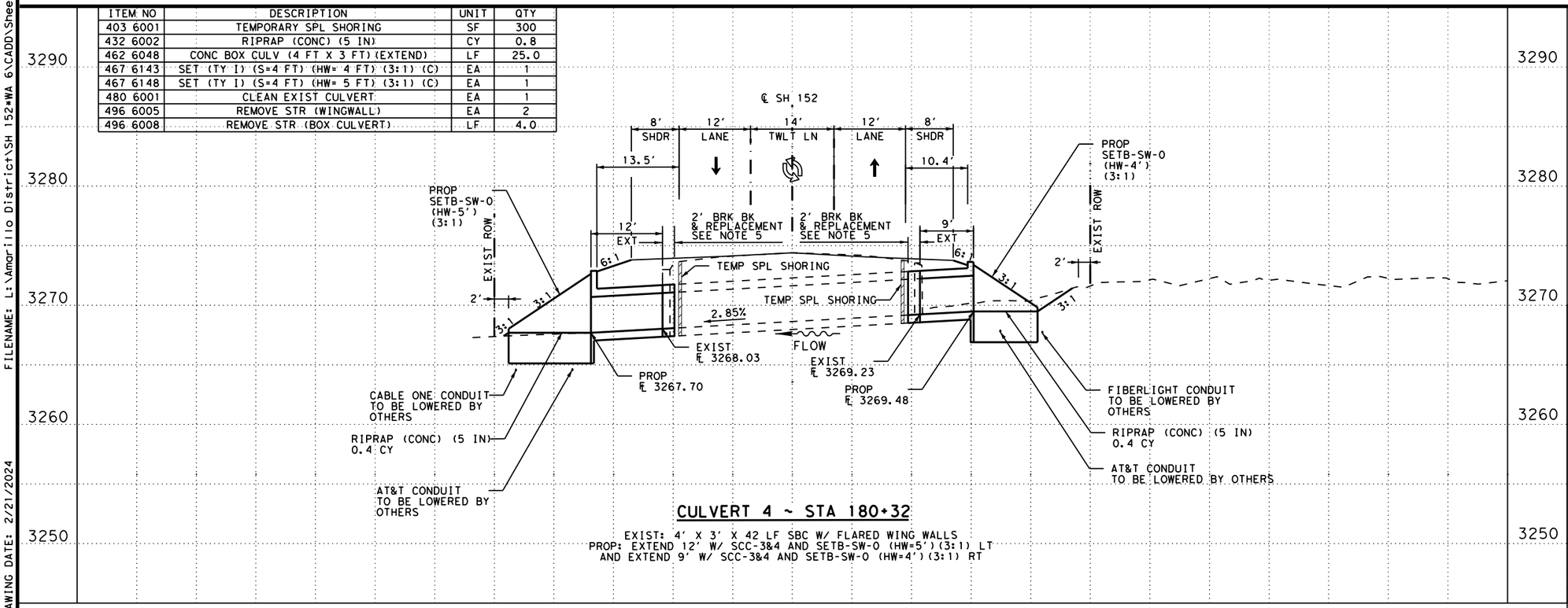
UTILITY LEGEND

- C1 — AT&T
- FOC1 — CABLE ONE
- FOC2 — FIBERLIGHT
- G1 — GAS

NOTES:

1. REGRADE PARALLEL DITCHES TO FLOW TO PROPOSED CULVERT END ELEVATIONS AS NECESSARY.
2. REGRADE DITCH FLOWLINES TO ENSURE EXISTING DRAINAGE PATTERN IS MAINTAINED
3. REFER TO DRAINAGE AREA MAP SHEETS FOR HYDROLOGIC DATA.
4. REFER CULVERT HYDRAULIC DATA SHEET FOR HYDRAULIC DATA.
5. BREAK BACK DISTANCE SHALL APPLY TO ENTIRE PERIMETER OF PIPE. REPLACEMENT OF 2' BREAK BACK QUANTIFIED WITH ITEM 496.
6. BASED ON THE HORIZONTAL LOCATION OF THIS UTILITY, IT WAS DETERMINED THAT THERE IS A POTENTIAL CONFLICT. POTHOLING TO DETERMINE THE SIZE AND DEPTH MAY NEED TO BE PERFORMED.

ITEM NO	DESCRIPTION	UNIT	QTY
403 6001	TEMPORARY SPL SHORING	SF	300
432 6002	RIPRAP (CONC) (5 IN)	CY	0.8
462 6048	CONC BOX CULV (4 FT X 3 FT)(EXTEND)	LF	25.0
467 6143	SET (TY I) (S=4 FT) (HW= 4 FT) (3:1) (C)	EA	1
467 6148	SET (TY I) (S=4 FT) (HW= 5 FT) (3:1) (C)	EA	1
480 6001	CLEAN EXIST CULVERT	EA	1
496 6005	REMOVE STR (WINGWALL)	EA	2
496 6008	REMOVE STR (BOX CULVERT)	LF	4.0



CULVERT 4 ~ STA 180+32

EXIST: 4' X 3' X 42 LF SBC W/ FLARED WING WALLS
PROP: EXTEND 12' W/ SCC-3&4 AND SETB-SW-0 (HW=5')(3:1) LT
AND EXTEND 9' W/ SCC-3&4 AND SETB-SW-0 (HW=4')(3:1) RT

STATE OF TEXAS
APEKSHA BISTA
137870
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

Texas Department of Transportation

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

SH 152
CULVERT PLAN AND PROFILE
CULVERT 4
STA 180+32

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		SH 152
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AMA	GRAY	129
CONTROL	SECTION	JOB	
0455	03	038	

FILENAME: L:\Amarillo District\SH 152*WA 6\CADD\Sheets\Gray County\Plan Set\Drainage\SH152*CULV*P&P1.dgn
DRAWING DATE: 2/21/2024

DATE:
FILE:

Culvert Station and/or Creek Name	Description of Box Culert No.Spans ~ Span X Height	Max Fill Height (ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0^{o},15^{o}, 30^{o} or 45^{o})	Side Slope or Channel Slope (SL:1)	T Culvert Top Slab Thick's (in)	U Culvert Wall Thick's (in)	C Estimated Curb Height (ft)	Hw Height of Wing (ft) (1)	A Curb to End of Wingwall (ft)	B Offset of End of Wingwall (ft)	Lw Length of Longest Wingwall (ft)	Ltw Culvert Toewall Length (ft)	Atw Anchor Toewall Length (ft)	Riprap Apron (C.Y.)	Class "C" Conc. (Curb) (CY) (2)	Class "C" Conc. (Wing.) (CY) (3)	Total Wingwall Area (SF)
CULVERT 4 (Lt)	1 ~ 4' X 3'	2.7'	SCC-3&4	SETB-SW-0	0	3:1	8"	7"	1.500	4.917	N/A	N/A	13.750	N/A	4.000	0.4	0.3	4.9	N/A
CULVERT 4 (Rt)	1 ~ 4' X 3'	2.7'	SCC-3&4	SETB-SW-0	0	3:1	8"	7"	0.521	3.938	N/A	N/A	10.813	N/A	4.000	0.4	0.1	3.3	N/A

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment

SL:1 = Horizontal : 1 Vertical
- Side slope at culvert for flared or straight wingwalls.
- Channel slope for parallel wingwalls.
- Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.
U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.
C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall
A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)
B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)
Lw = Length of longest wingwall.
Ltw = Length of culvert toewall (not applicable when using riprap apron)
Atw = Length of anchor toewall (applicable to safety end treatment only)

Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

STATE OF TEXAS
APEKSHA BISTA
137870
LICENSED
PROFESSIONAL ENGINEER
2/20/2024

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		130

DATE: 2/20/2024 6:50:54 PM
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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for One Structure End)

Dimensions					Variable Reinforcing				Estimated Quantities (3) per ft of wing length (Two~Wings)	
					Bars J1		Bars J2			
Maximum Wingwall Height Hw (9)	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'- 8"	1'- 9"	1'- 3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'- 2"	2'- 0"	1'- 6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'- 8"	2'- 3"	1'- 9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'- 2"	2'- 6"	2'- 0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'- 8"	2'- 9"	2'- 3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'- 2"	3'- 0"	2'- 6"	9"	#7	6"	#5	6"	162.29	0.721

TABLE OF WINGWALL REINFORCING (Two~Wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

TABLE OF ESTIMATED ANCHOR TOEWALL QUANTITIES

Bar	Size	No.	Spa
K	#4	~	1'-0"
N	#5	6	~
OL	#4	6	~
Reinf (Lb/Ft)			9.82
Conc (CY/Ft)			0.074

(1) Extend Bars P 3'-0" Min into bottom slab of box culvert.

(2) Adjust to fit as necessary to maintain 1 1#2" clear cover and 4" Min between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings multiply the tabulated values by Lw.

(4) Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, extend construction joints or grooved joints, oriented in the direction of flow, across the full distance of the riprap, at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B is not required.

(6) At Contractor's option, end the culvert toewall flush with wingwall toewall. Adjust reinforcing as needed.

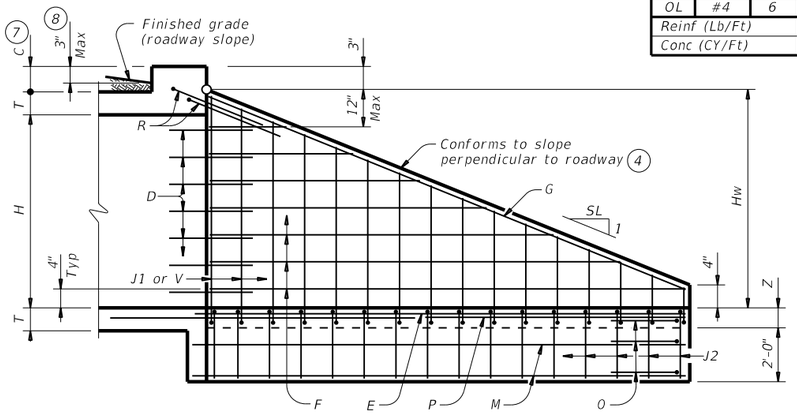
(7) 3" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to Extended Curb Details (ECD) standard sheet.

(8) For vehicle safety, reduce curbs height, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.

(9) See Table of Maximum Wing Heights for various slopes. Height is limited based on a 33'-6" maximum safety pipe runner length.

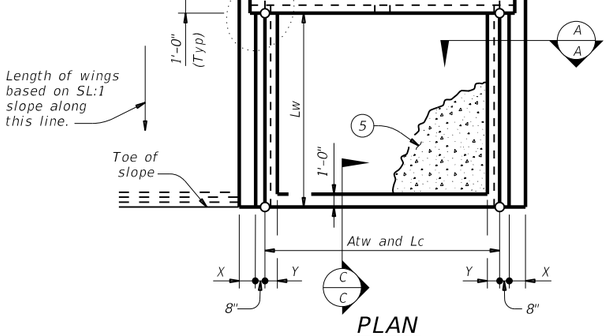
TABLE OF MAXIMUM WING HEIGHTS (9)

Side Slope	Hw Max
3:1	11'- 5"
4:1	8'-10"
6:1	6'- 1"



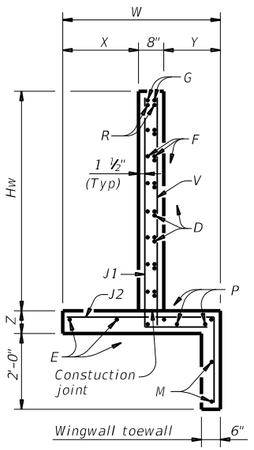
INSIDE ELEVATION OF WINGWALL

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

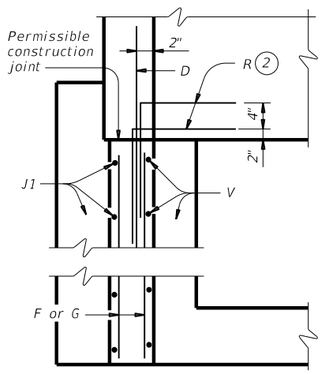


PLAN

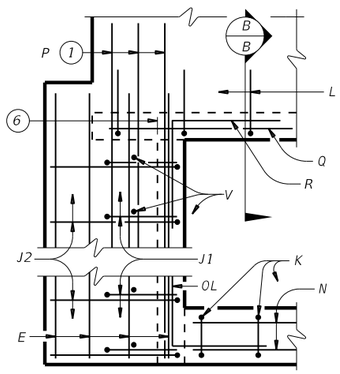
(Showing dimensions.)



SECTION A-A



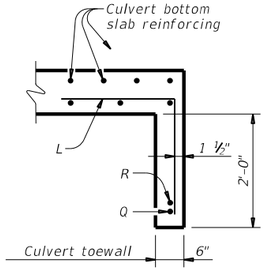
WINGWALL



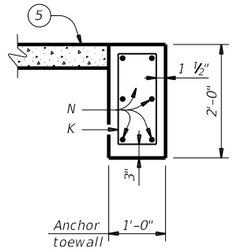
FOOTING AND TOEWALL

CORNER DETAILS

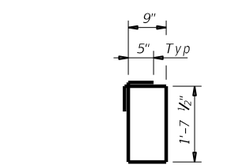
(Culvert and culvert toewall reinforcing not shown for clarity.)



SECTION B-B (5)

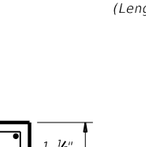


SECTION C-C

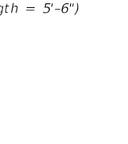


BARS J1

BARS V



BARS L and OL



BARS J2

BARS R

BARS D

BARS K
(Length = 5'-6")

WING DIMENSION CALCULATIONS:

Hw = H + T + C - 0.250' (9)
Lw = (Hw - 0.333') (SL)

For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)

For precast culverts:
Ltw = (N) (2U + S) + (N - 1) (0.500')

Lc = (Ltw) - (2U)
Atw = Lc
Total Wingwall Area (two wings ~ SF)
= (Hw + 0.333') (Lw)

Hw = Height of wingwall (feet)
SL:1= Side slope ratio (horizontal : 1 vertical)
Lw = Length of wingwall (feet)
Ltw = Culvert toewall length (feet)
Lc = Culvert curb between wings (feet)
Atw = Anchor toewall length (feet)
N = Number of culvert spans

See applicable box culvert standard for H, S, T, and U values. See Table of Maximum Wall Heights for limits on Hw.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Provide Class "C" concrete (f`c = 3,600 psi).
Adjust reinforcing as necessary to provide a minimum clear cover of 1 ½".
Provide pipe runners and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts and nuts.
Provide ASTM A36 steel plates.
Galvanize all steel components, except reinforcing unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing".
For optional adhesive anchors, install epoxy adhesive anchorages in accordance with the manufacturer's instructions including hole size, drilling equipment and method, hole cleaning equipment and method, mixing and dispensing adhesive, and anchor insertion. Do not alter the manufacturer's mixing nozzle or dispenser. Provide anchorage rods that are clean and free of grease, oil, or any other foreign material. Demonstrate hole cleaning method to the Engineer for approval and continue the approved process for all anchorage locations. Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
All bolts, nuts, washers, brackets, angles, and pipe runners are considered parts of the safety end treatment for payment.
The quantities for pipe runners, reinforcing steel, and concrete, resulting from the formulas given herein are for Contractor's information only.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH STRAIGHT WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-SW-O

FILE: setbs0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		131

DATE: 2/20/2024 6:50:55 PM
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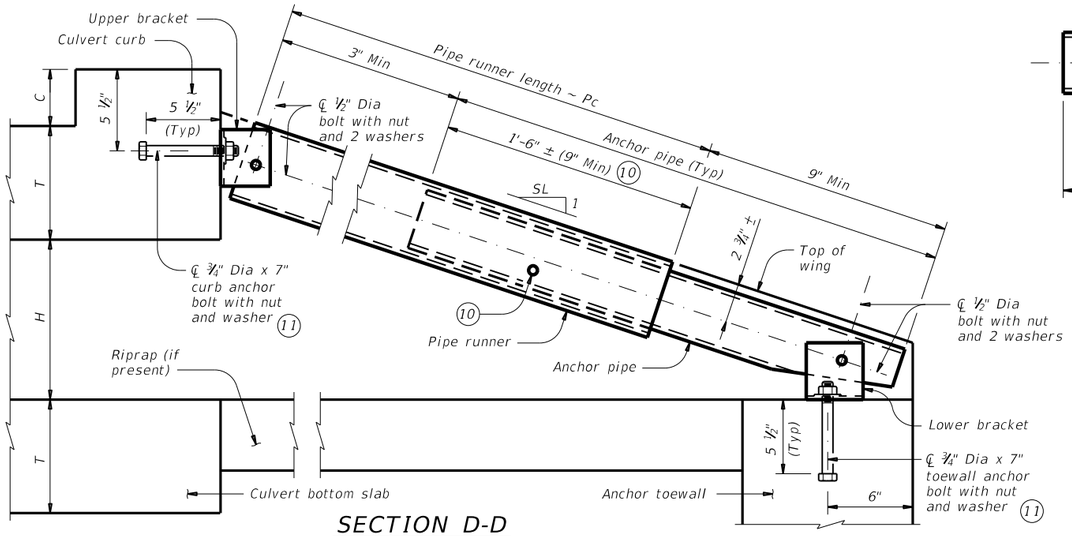
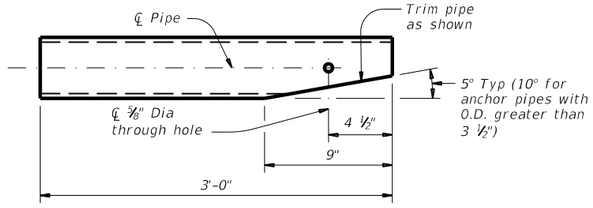
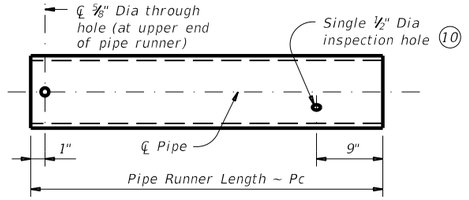


SECTION D-D

(Showing curb pipe runner.)



ANCHOR PIPE DETAILS



PIPE RUNNER DETAILS

MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES						
Maximum Pipe Runner Length (Pc)	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
9'-4"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'-0"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
33'-6"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"

(10) After installation of pipe runner, use the ½" inspection hole to ensure that the lap of the anchor pipe with the pipe runner is adequate.

(11) At Contractor's option, an adhesive anchor may be used. Provide ¾" Dia adhesive anchors that meet the requirements of ASTM A307. Gr A fully threaded rods. Embed threaded rods into curb, wingwalls, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 5 ½". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

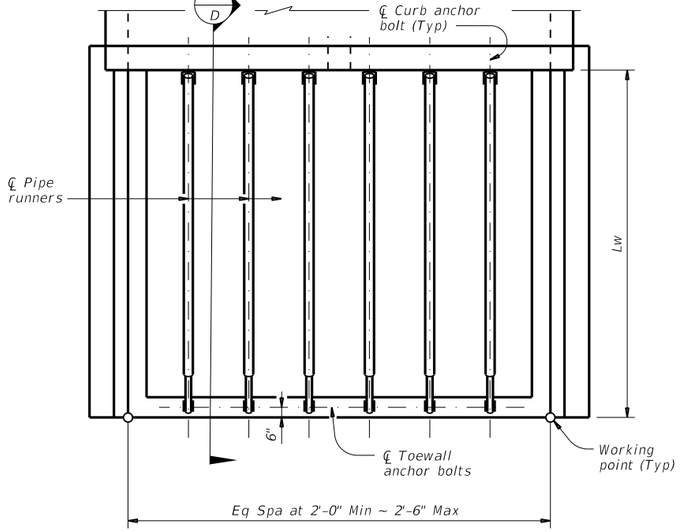
PIPE RUNNER DIMENSION CALCULATIONS:

Pc = (Lw) (K) - (1.688)

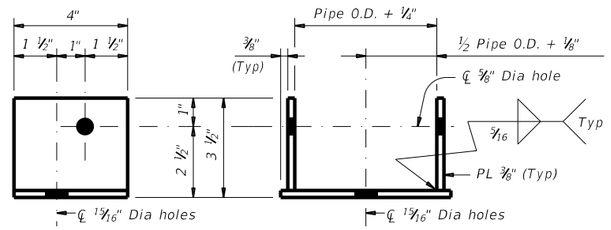
Pc = Pipe runner length (feet)

K = Constant values for use in formulas

Slope SL:1		K
3:1	~	1.054
4:1	~	1.031
6:1	~	1.014



PIPE RUNNER PLAN



SIDE VIEW ELEVATION

Note: Upper and lower brackets match the required pipe diameters as shown in the table.

UPPER AND LOWER BRACKET DETAILS

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH STRAIGHT WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-SW-O

FILE: setbs0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
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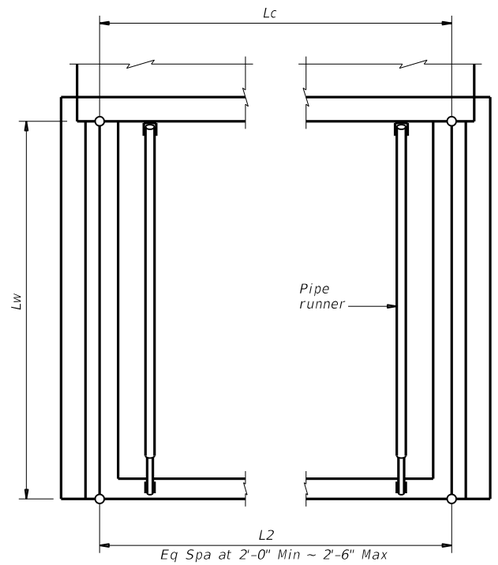
REVISIONS	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		132

Culvert Station and/or Creek name followed by applicable end (Lt, Rt or Both) (12)	Lc (Ft)	L2 No. Spa	L2 Spa at (Ft)	L2 Overall Length (Ft)	Pipe Runner (Pc) No.	Pipe Runner (Pc) Length (Ft)	Pipe Runner (Pc) Size (3",4" or 5")	Pipe Runner (Pc) Total Length (Ft) (12)	3'-0" Anchor Pipe Size (2",3" or 4")	3'-0" Anchor Pipe Total Length (Ft) (12)
CULVERT 4 (Lt)	4.000	2	2.000	4.000	1	12.813	4"	12.813	3"	3.000
CULVERT 4 (Rt)	4.000	2	2.000	4.000	1	9.708	4"	9.708	3"	3.000



PIPE RUNNER LAYOUT

(12) Quantities shown are for one structure end if Lt or Rt. Quantities shown are for two structure ends if Both.

SPECIAL NOTE:

This tabular sheet is to be filled out by the culvert specifier and provides information for the construction details and quantities of pipe runners.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

Note that the tabular quantities are given for estimating purposes only. It is likely that these quantities will change due to field conditions. Therefore, all dimensions must be verified by the Contractor in the field prior to fabrication of the safety end treatment components.

STATE OF TEXAS
APEKSHA BISTA
137870
LICENSED
PROFESSIONAL ENGINEER
2/23/2024

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH STRAIGHT WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-SW-O

FILE: setbs0se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		133

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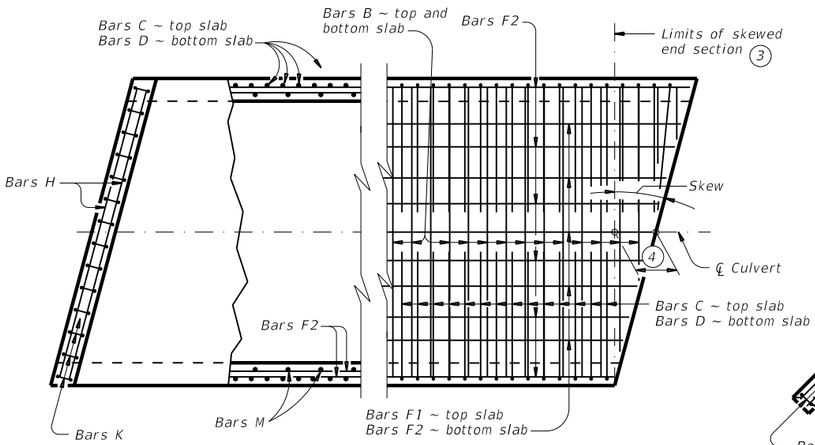
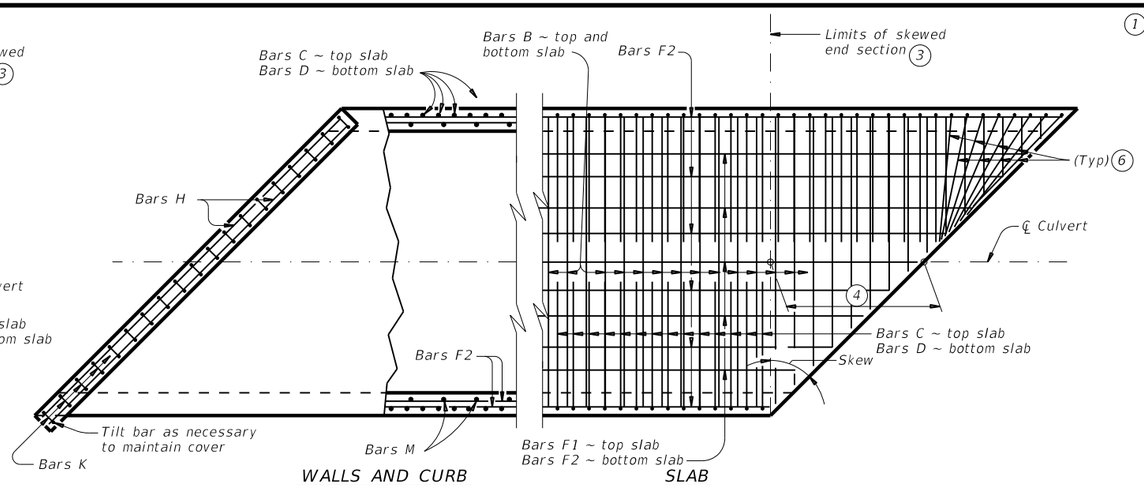
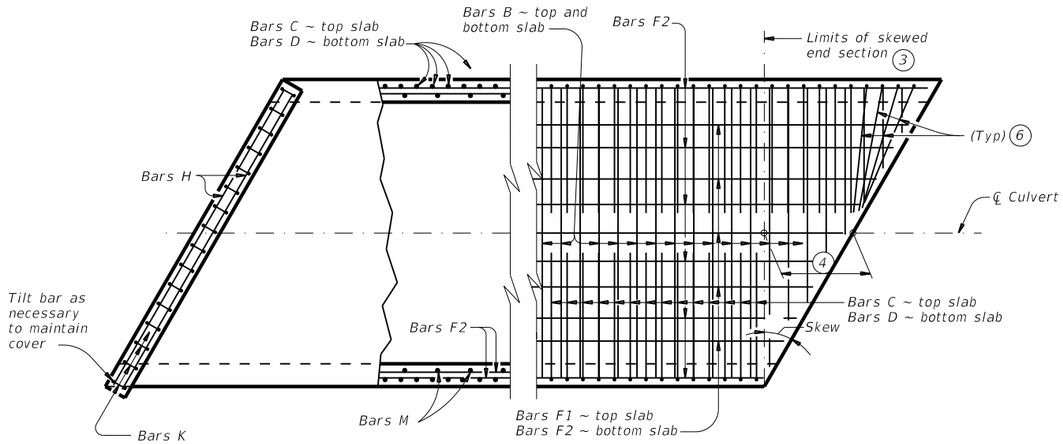


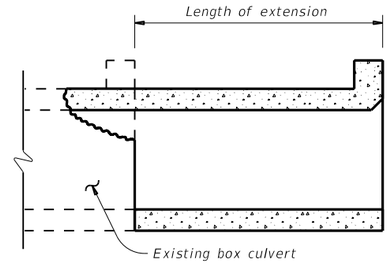
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



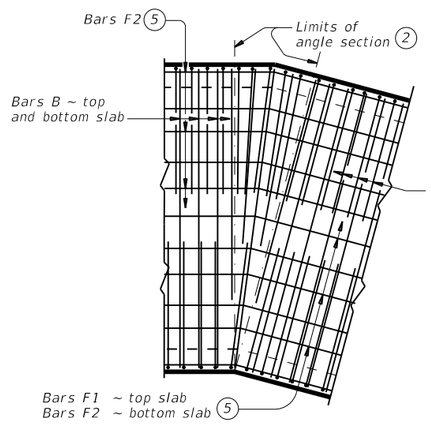
PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



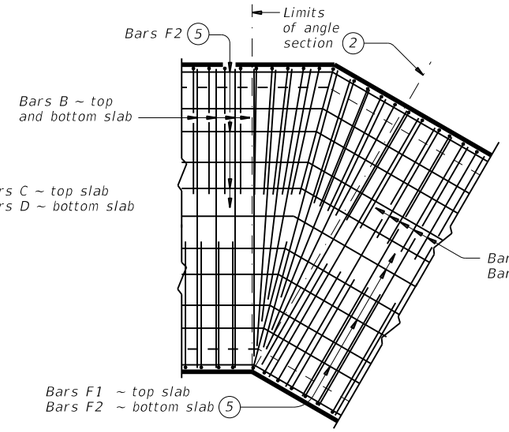
PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



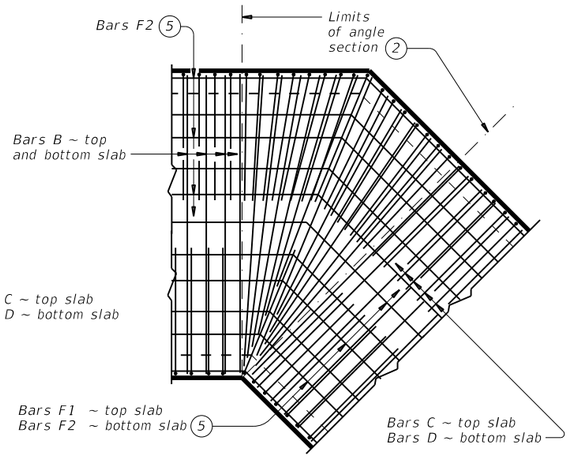
LENGTHENING DETAIL (1)



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°

(1) For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension.

For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, C, D , E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.

(2) When the spacing between Bars B becomes less than half of the normal spacing, cut bars to avoid conflict.

(3) The length of Bars B vary in the skewed end sections.

(4) [One half of overall width] x [tangent of the skew angle]

(5) Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.

(6) When necessary to avoid conflict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.

(7) At the Contractor's option, for skews of 15° or less, place Bars B, C, and D parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B shown on the Single Box Culverts Cast-In-Place (SCC) standards sheets to accommodate the skew.

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) with these exceptions:
provide Class S concrete (f'c = 4,000 psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Refer to Single Box Culverts Cast-in-Place (SCC) standard sheets for details of straight sections of culvert.

For skewed sections and angle sections, refer to Single Box Culverts Cast-in-Place (SCC) standard sheets for slab and wall dimensions, bar spacing, and any other details not shown.

For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the culvert Single Box Culverts Cast-In-Place (SCC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

SCC-MD

FILE: sccmdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		134

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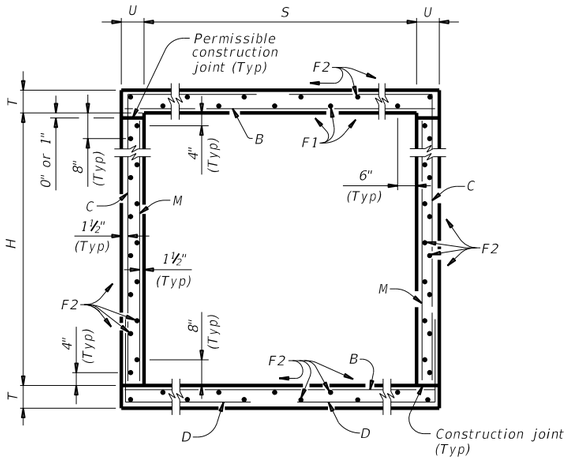
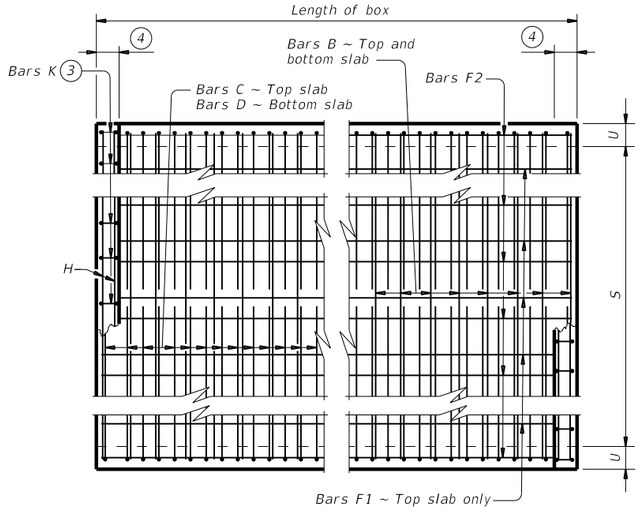
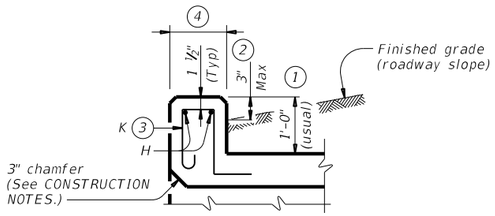


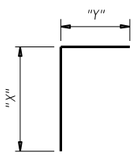
TYPICAL SECTION



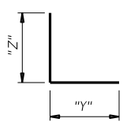
PLAN OF REINF STEEL



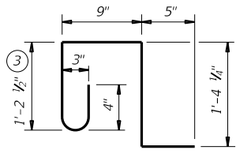
SECTION THRU CURB



BARS C



BARS D



BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR.
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.

Chamfer the bottom edge of the top slab 3" at the entrance.

Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galvanized reinforcing steel if required elsewhere in the plans.

Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:

- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:

- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.

See the Single Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-3 & 4

FILE: scc34ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
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REVISIONS	0455	03	038	SH 152
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	AMA	GRAY		135

SECTION DIMENSIONS				FILL HEIGHT (5)	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																										QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
3' – 0"	2' – 0"	8"	7"	30'	108	#5	9"	3' – 11"	441	108	#4	9"	5' – 4"	385	2' – 6"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	19	39' – 9"	505	3' – 11"	10	10	28	0.292	48.1	0.3	38	12.0	1,960
3' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	3' – 11"	441	108	#4	9"	6' – 4"	457	3' – 6"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	23	39' – 9"	611	3' – 11"	10	10	28	0.335	54.3	0.3	38	13.7	2,210
4' – 0"	2' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	5' – 8"	613	2' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	21	39' – 9"	558	4' – 11"	13	12	33	0.342	63.4	0.4	46	14.1	2,581
4' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	6' – 8"	721	3' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.385	70.5	0.4	46	15.8	2,867
4' – 0"	4' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	7' – 8"	830	4' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	4' – 0"	289	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.428	75.1	0.4	46	17.5	3,049

(5) For direct traffic culverts (fill height ≤ 2 ft.), identify the required box size and select the option with the minimum fill height.

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HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-3 & 4

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REVISIONS	0455	03	038	SH 152
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
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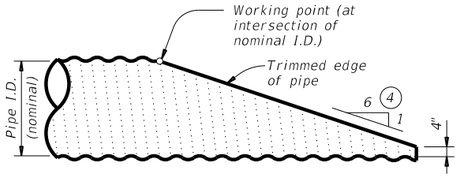
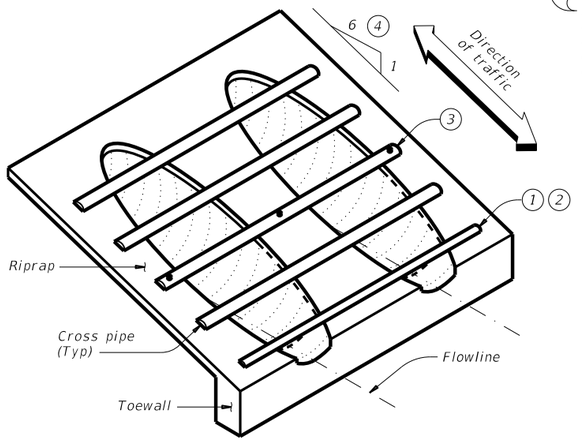


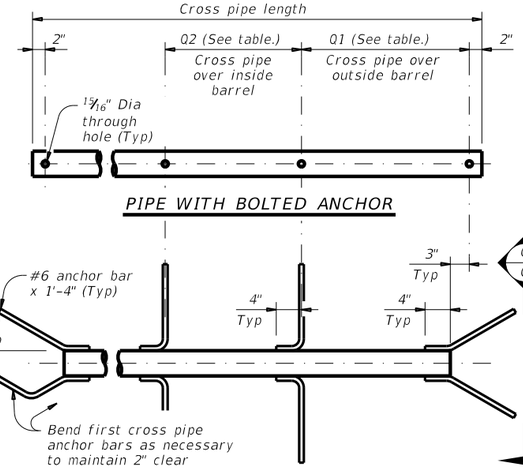
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)

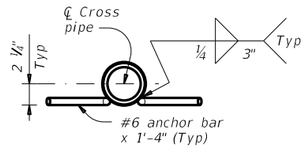


ISOMETRIC VIEW OF TYPICAL INSTALLATION



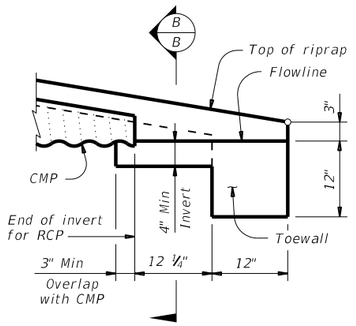
PIPE WITH BOLTED ANCHOR

PIPE WITH ANCHOR BARS



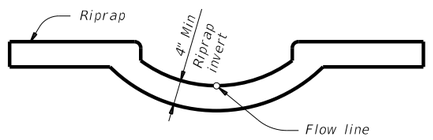
SECTION C-C

CROSS PIPE DETAILS



DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)



SECTION B-B

(Cross pipes not shown for clarity.)

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' – 9"	N/A	2' – 1"	1' – 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' – 11"	N/A	2' – 5"	2' – 2"		
18"	0.8	1' – 2"	N/A	2' – 10"	2' – 8"		
21"	0.9	1' – 4"	N/A	3' – 2"	3' – 1"		
24"	0.9	1' – 7"	N/A	3' – 6"	3' – 7"		
27"	1.0	1' – 8"	N/A	3' – 10"	3' – 11"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
30"	1.1	1' – 10"	N/A	4' – 2"	4' – 4"	2 or more pipe culverts	
33"	1.2	1' – 11"	4' – 2"	4' – 5"	4' – 8"	All pipe culverts	
36"	1.3	2' – 1"	4' – 5"	4' – 9"	5' – 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' – 4"	4' – 11"	5' – 5"	5' – 10"		
48"	1.7	2' – 7"	5' – 5"	6' – 0"	6' – 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' – 0"	5' – 11"	6' – 9"	7' – 6"		
60"	2.2	3' – 3"	6' – 5"	7' – 4"	8' – 3"		
66"	2.4	3' – 3"	6' – 11"	7' – 10"	8' – 9"		
72"	2.7	3' – 4"	7' – 5"	8' – 5"	9' – 4"		

(1) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

(5) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

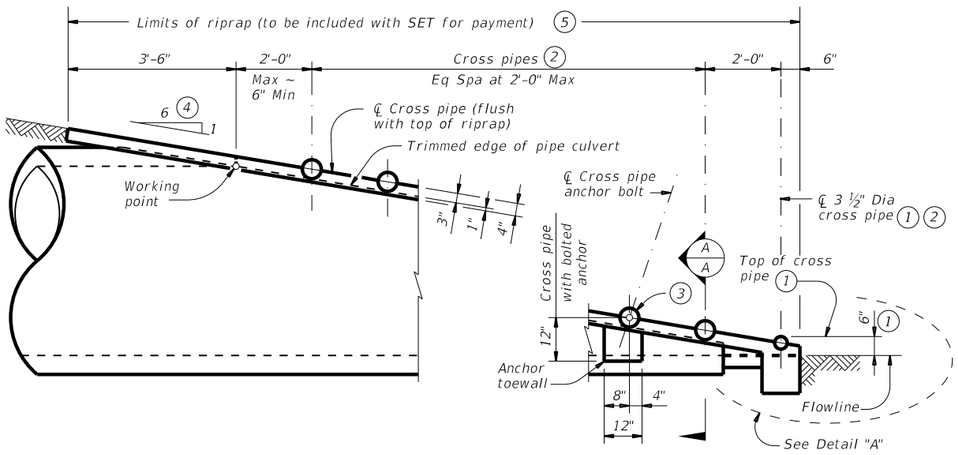
GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

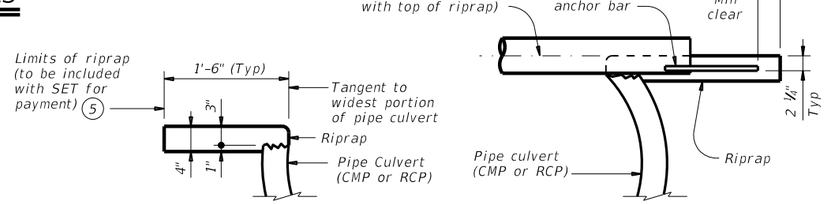
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



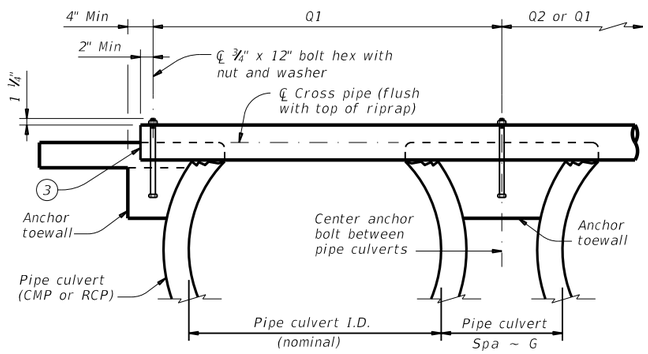
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



SHOWING CROSS PIPE WITH ANCHOR BAR

SHOWING TYPICAL PIPE CULVERT AND RIPRAP



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE

SETP-PD

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	DIST	COUNTY		SHEET NO.
	AMA	GRAY		137

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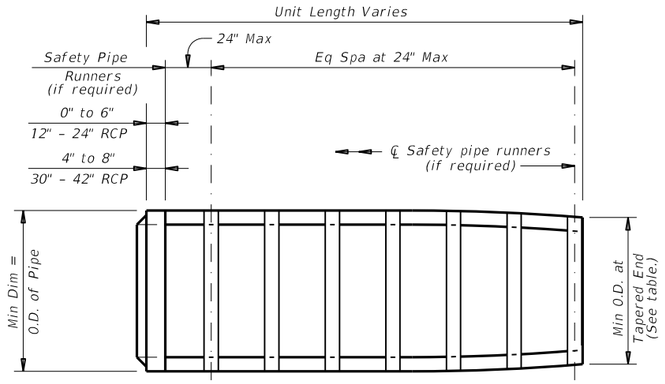
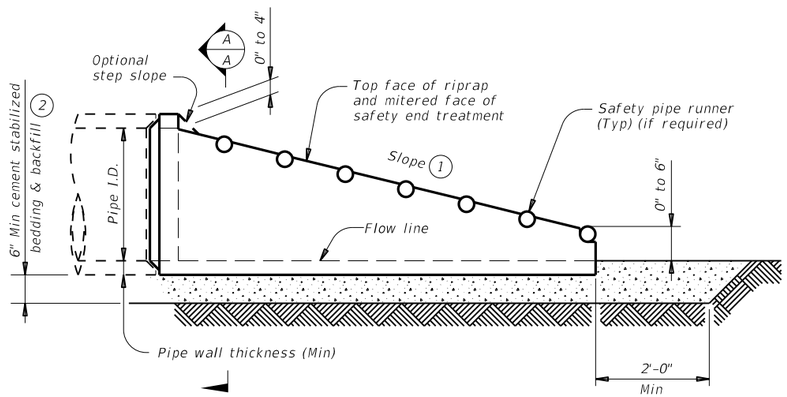


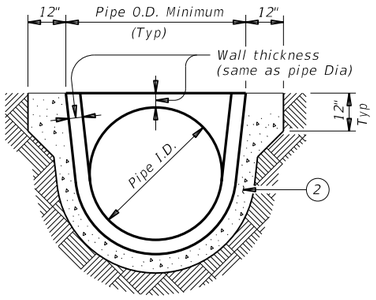
PLAN VIEW – 12" THRU 24"

(Showing spigot end connection.)

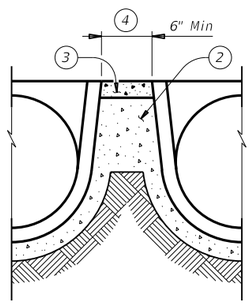


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)



SECTION A-A



MULTIPLE PIPE INSTALLATION

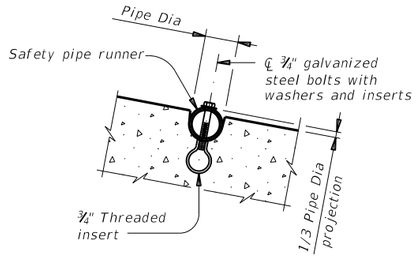
(1) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(3) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

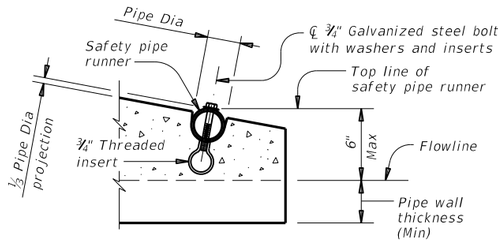
(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(5) Safety pipe runners are required for multiple pipe culverts with more than two pipes.

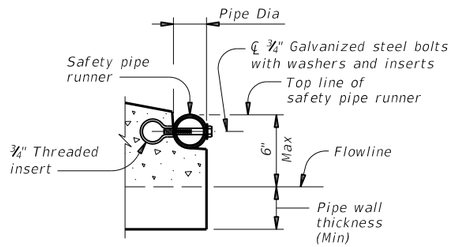


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. per ft. of Pipe)	Max Slope	Min Length of Unit	Pipe Runner Requirements		Required Pipe Runner Sizes		
							Single Pipe	Multiple Pipe	Nominal Dia	O.D.	I.D.
12"	2"	16"	16"	0.07 Circ.	6:1	4'–0"	No	(5)	3" STD	3.500"	3.068"
15"	2 ¼"	19 ½"	19"	0.07 Circ.	6:1	5'–8"	No	(5)	3" STD	3.500"	3.068"
18"	2 ½"	23"	21 ½"	0.07 Circ.	6:1	7'–3"	No	(5)	3" STD	3.500"	3.068"
24"	3"	30"	27"	0.07 Circ.	6:1	10'–6"	No	(5)	3" STD	3.500"	3.068"
30"	3 ½"	37"	31"	0.18 Circ.	6:1	12'–1"	No	Yes	4" STD	4.500"	4.026"
36"	4"	44"	36"	0.19 Ellip.	6:1	15'–4"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	51"	41 ½"	0.23 Ellip.	6:1	18'–7"	Yes	Yes	4" STD	4.500"	4.026"

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Galvanize steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.

Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.

Methods of lifting shall be provided by the manufacturer for ease of loading, unloading and installation.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-RP

FILE: psetrpss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		138

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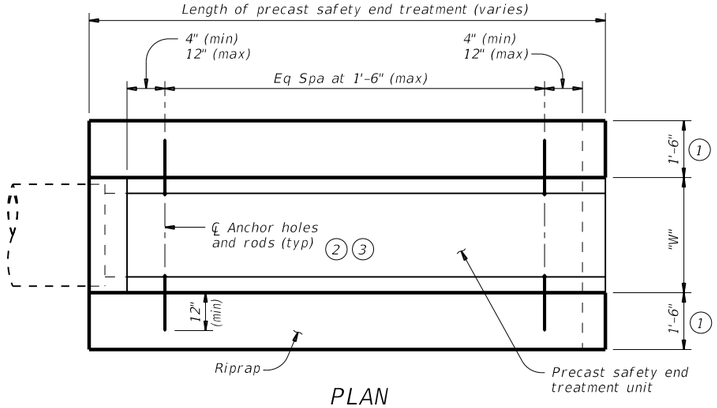

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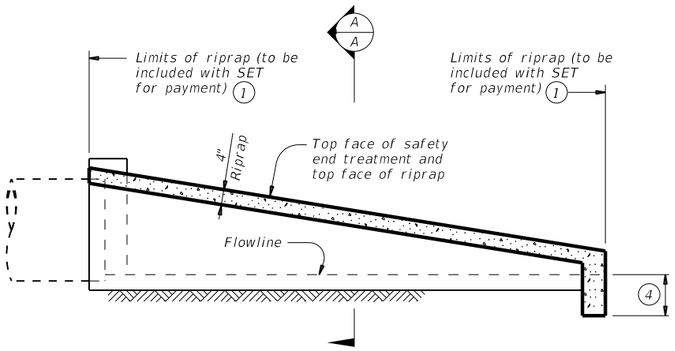
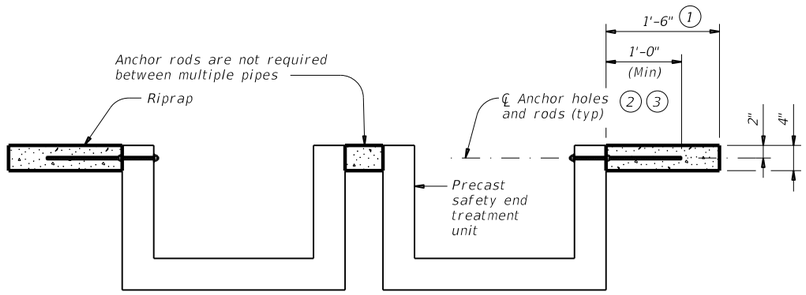
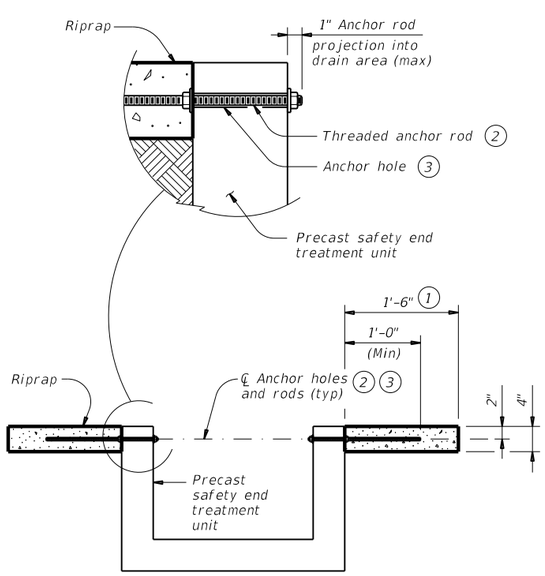


LONGITUDINAL ELEVATION



MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) 5

Nominal Culvert (Pipe) I.D.	PSET-SC and PSET-SP Standards				PSET-RC and PSET-RP Standards			
	Unit Width "W"	Side Slope			Unit Width "W"	Side Slope		
		3:1	4:1	6:1		3:1	4:1	6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

(1) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap". When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.

(2) 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing". Repair galvanizing that is damaged during transport or construction in accordance with the specifications.

(3) 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.

(4) Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.

(5) Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Saftey End Treatment (SET) standard sheets.

MATERIAL NOTES:

Provide Class "B" riprap in accordance with Item 432, "Riprap".
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. The anchor rods shown are always required.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".
Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown.
For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.
Payment for riprap and toewalls is included in the price bid for each safety end treatment.

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.

Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II
RIPRAP DETAILS

PSET-RR

FILE: psetrrse-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		139

DATE: 2/20/2024 6:51:09 PM
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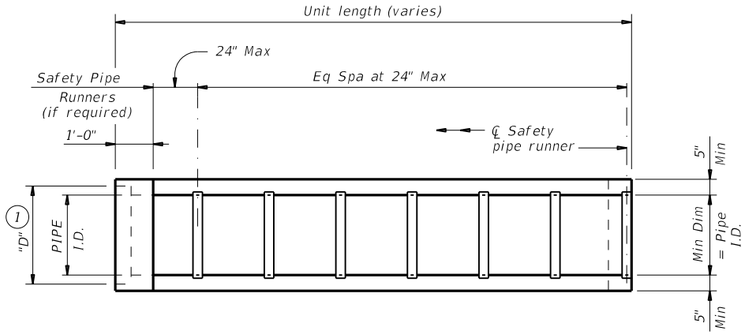
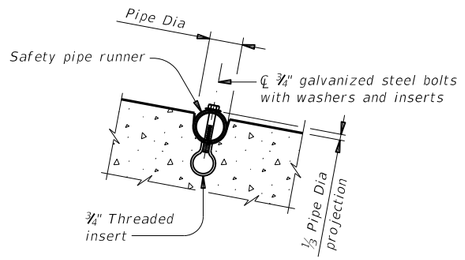


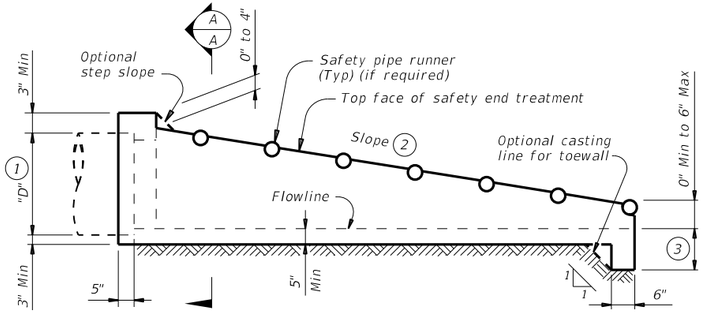
PLAN

(Showing bell end connection.)



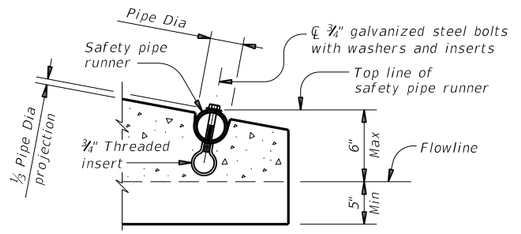
INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

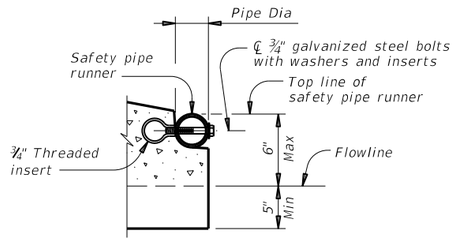


LONGITUDINAL ELEVATION

(Showing bell end connection.)



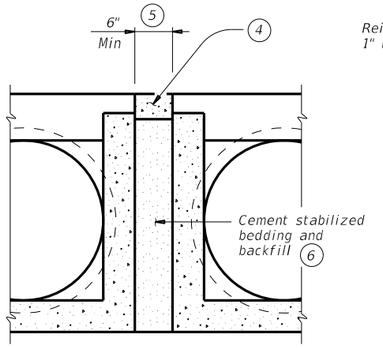
OPTION A



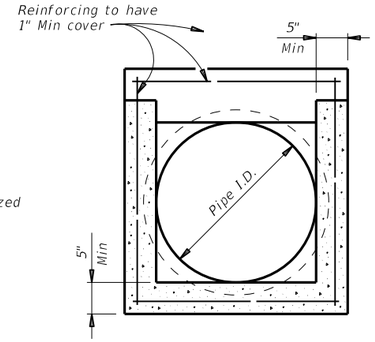
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

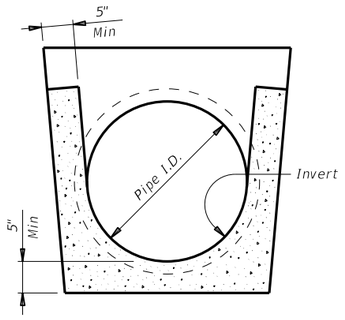
(If required)



MULTIPLE PIPE INSTALLATION

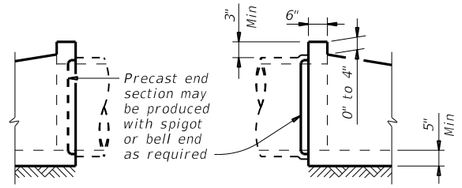


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' – 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' – 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	N/A	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe". Connect TP by grouting. See PBGC standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

FILE: psetspss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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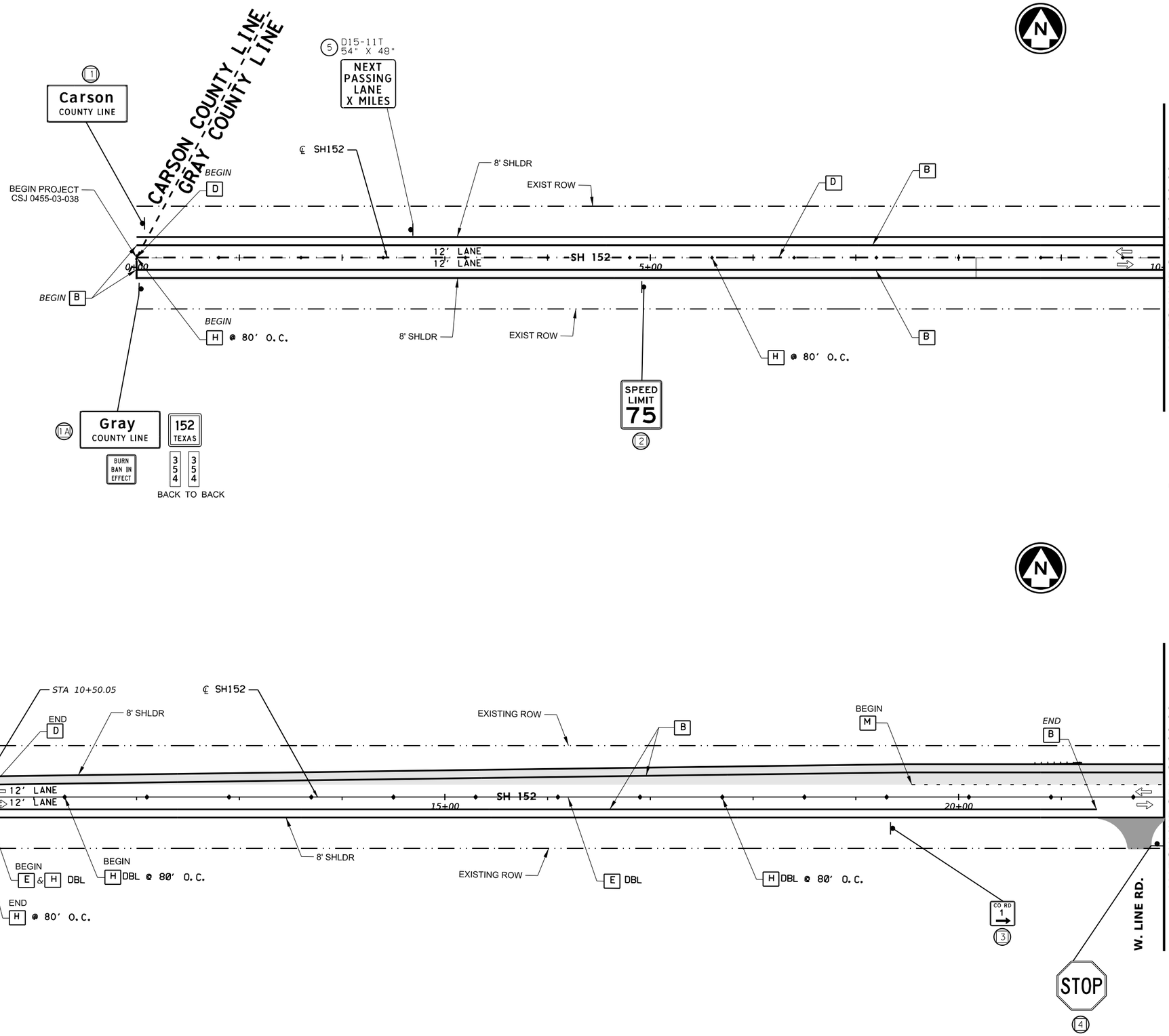
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		140



NOTES:

1. ALL SIGNING AND PAVEMENT MARKINGS MUST COMPLY WITH THE TXDOT STANDARDS AND TMUTCD, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
2. ALL SMALL SIGN LOCATIONS ARE APPROXIMATE UNLESS OTHERWISE NOTED. FIELD ADJUSTMENT MAY BE NECESSARY TO COMPLY WITH TXDOT STADARDS.
3. REFER TO TYPICAL SECTIONS FOR LANE WIDTH.

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

2/21/2024

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

Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 0+00 TO STA 22+00

SHEET 1 OF 15

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		141

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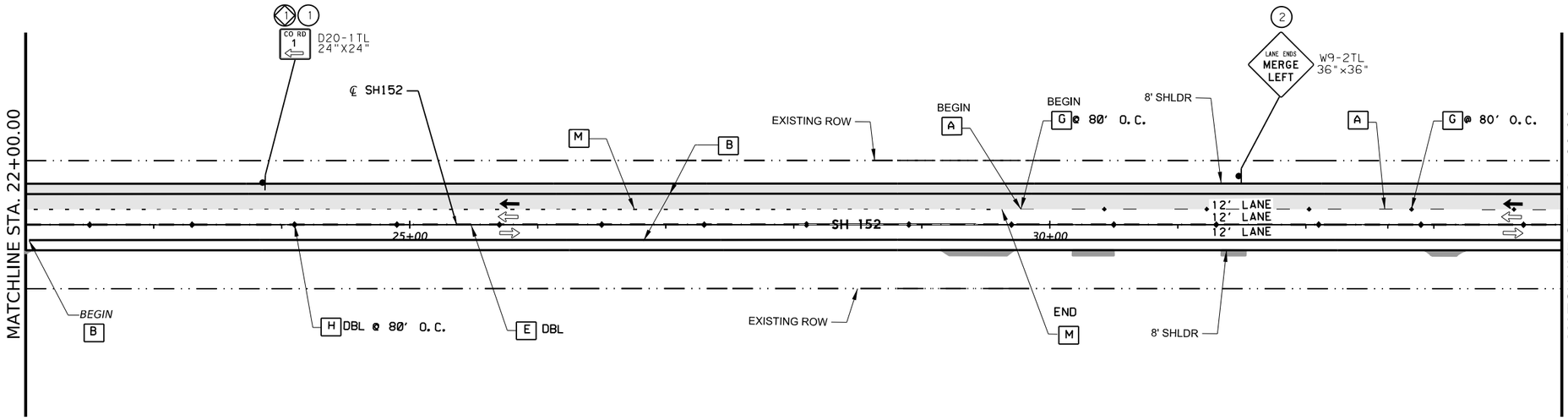

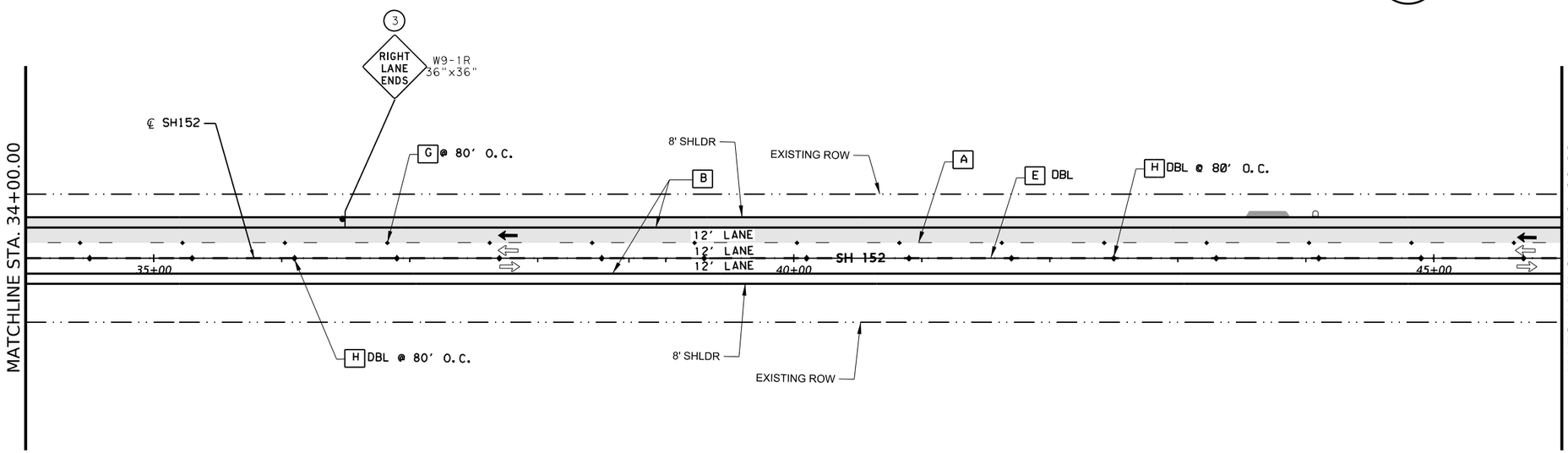

0' 50' 100'
SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAY LINE
- A HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
- B HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
- C REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
- D HPPM W/RET REQ TY I (Y) 6" (BRK) (090 MIL)
- E HPPM W/RET REQ TY I (Y) 6" (SLD) (090 MIL)
- F REFL PAV MRK TY I (W) (LNDP ARW) (090 MIL)
- G REF PAV MRKR TY I-C
- H REF PAV MRK TY II-A-A
- I GROUND MOUNT DELINEATOR (FLEX)
- J SURFACE MOUNT DELINEATOR (FLEX)
- L REFL PAV MRK TY I (W) (WORD) (090 MIL)
- M REFL PAV MRK TY I (W) 6'' (DOT) (090 MIL)
- N REFL PAV MRK TY I (W) 8'' (DOT) (090 MIL)
- O REFL PAV MRK TY I (W) 8'' (SLD) (090 MIL)
- P REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
- Q REFL PAV MRK TY I 36" (YLD TRI)
- S OM ASSM (OM-2)
- SIGN TO BE INSTALLED
- SIGN TO REMAIN IN PLACE
- SIGN TO BE RELOCATED
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (SYMBOL) (100MIL)
- REFL PAV MRK TY I (W) (WORD) (090 MIL)

NOTES:

1. ALL SIGNING AND PAVEMENT MARKINGS MUST COMPLY WITH THE TXDOT STANDARDS AND TMUTCD, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
2. ALL SMALL SIGN LOCATIONS ARE APPROXIMATE UNLESS OTHERWISE NOTED. FIELD ADJUSTMENT MAY BE NECESSARY TO COMPLY WITH TXDOT STADARDS.
3. REFER TO TYPICAL SECTIONS FOR LANE WIDTH.

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

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

Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 22+00 TO STA 46+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		142

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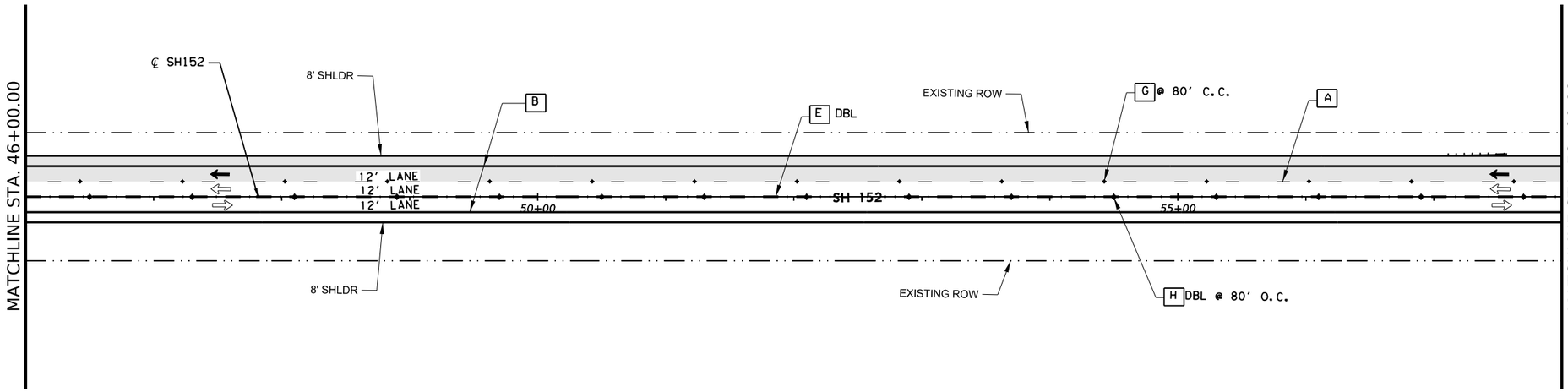

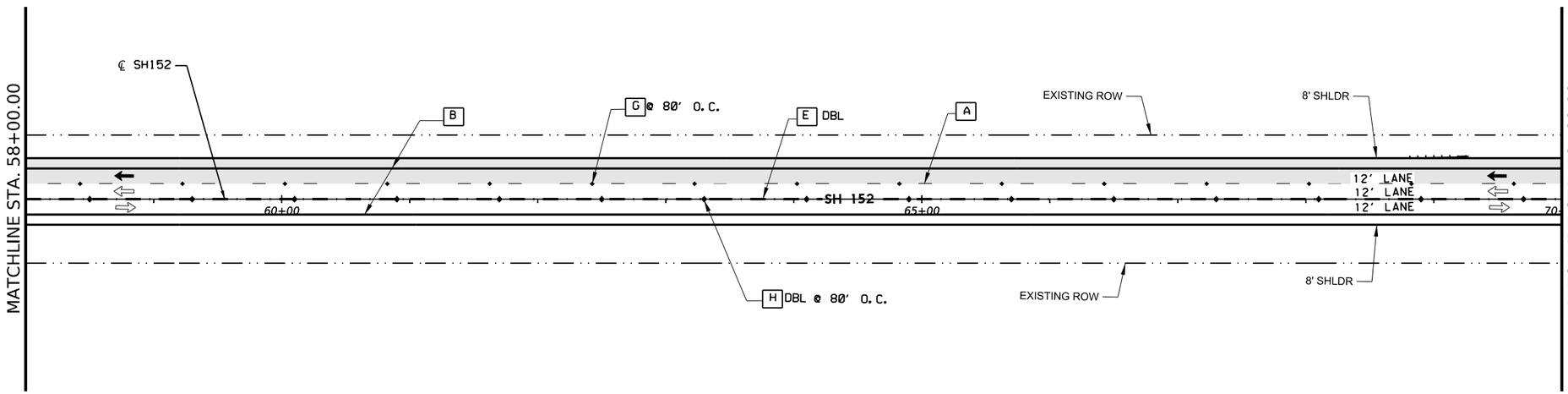

0' 50' 100'
SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAY LINE
- A HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
- B HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
- C REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
- D HPPM W/RET REQ TY I (Y) 6" (BRK)(090 MIL)
- E HPPM W/RET REQ TY I (Y) 6" (SLD)(090 MIL)
- F REFL PAV MRK TY I (W) (LNDP ARW) (090 MIL)
- G REF PAV MRKR TY I-C
- H REF PAV MRK TY II-A-A
- I GROUND MOUNT DELINEATOR (FLEX)
- J SURFACE MOUNT DELINEATOR (FLEX)
- L REFL PAV MRK TY I (W) (WORD) (090 MIL)
- M REFL PAV MRK TY I (W) 6'' (DOT) (090 MIL)
- N REFL PAV MRK TY I (W) 8'' (DOT) (090 MIL)
- O REFL PAV MRK TY I (W) 8'' (SLD) (090 MIL)
- P REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
- Q REFL PAV MRK TY I 36" (YLD TRI)
- S OM ASSM (OM-2)
- SIGN TO BE INSTALLED
- SIGN TO REMAIN IN PLACE
- SIGN TO BE RELOCATED
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (SYMBOL) (100MIL)
- REFL PAV MRK TY I (W) (WORD) (090 MIL)

NOTES:

1. ALL SIGNING AND PAVEMENT MARKINGS MUST COMPLY WITH THE TXDOT STANDARDS AND TMUTCD, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
2. ALL SMALL SIGN LOCATIONS ARE APPROXIMATE UNLESS OTHERWISE NOTED. FIELD ADJUSTMENT MAY BE NECESSARY TO COMPLY WITH TXDOT STADARDS.
3. REFER TO TYPICAL SECTIONS FOR LANE WIDTH.

STATE OF TEXAS
M. N. MOZAFFAR
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LICENSED
PROFESSIONAL ENGINEER
2/21/2024

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

Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 46+00 TO STA 70+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		143

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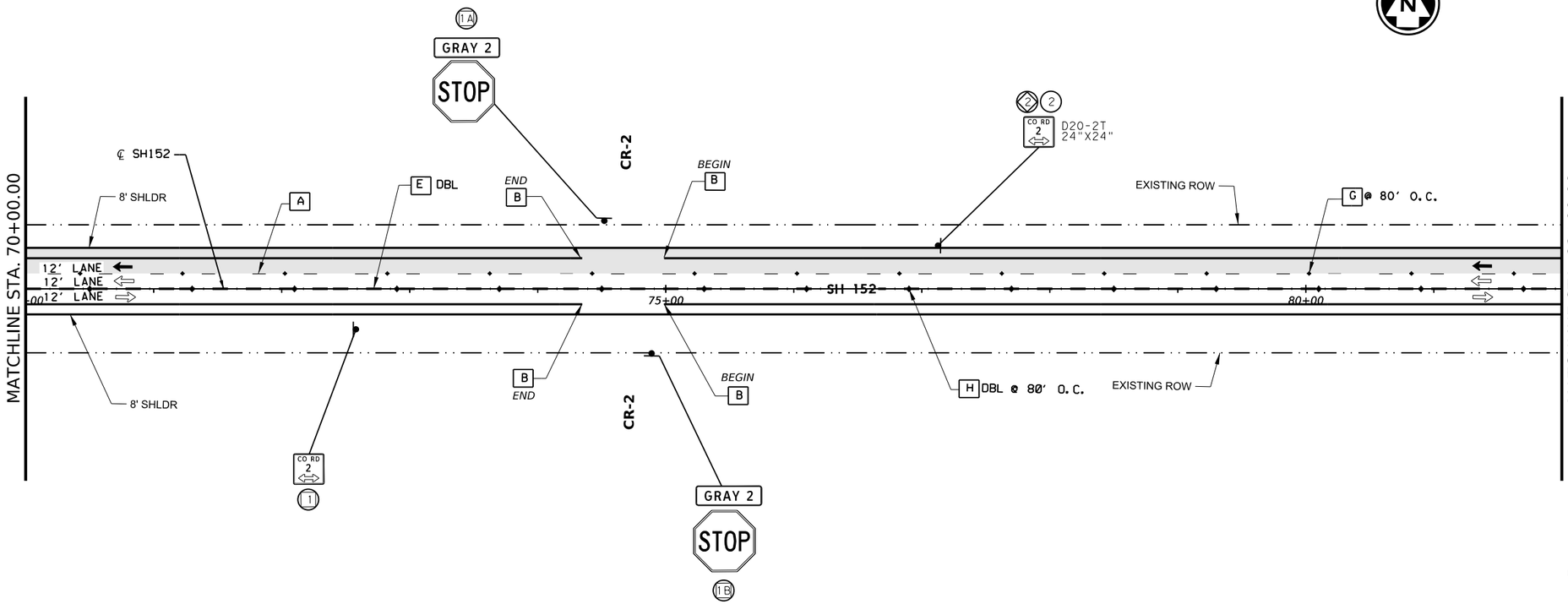

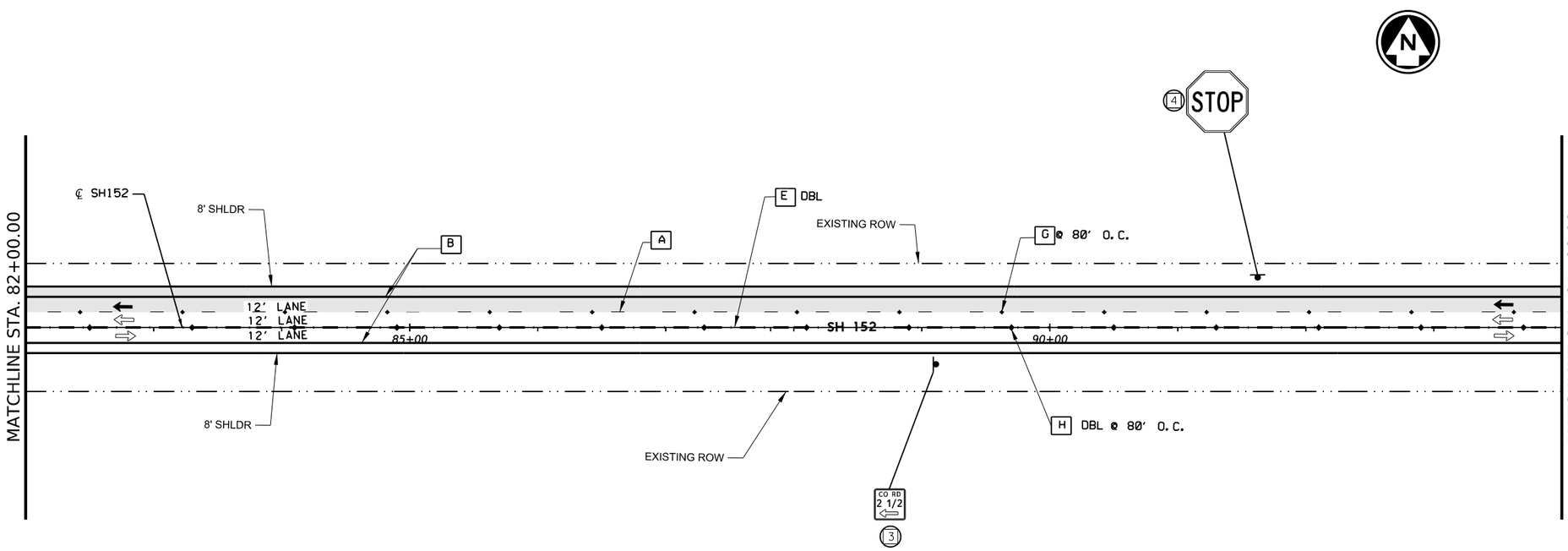

0' 50' 100'
SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAY LINE
- A HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
- B HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
- C REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
- D HPPM W/RET REQ TY I (Y) 6" (BRK)(090 MIL)
- E HPPM W/RET REQ TY I (Y) 6" (SLD)(090 MIL)
- F REFL PAV MRK TY I (W) (LNDP ARW) (090 MIL)
- G REF PAV MRKR TY I-C
- H REF PAV MRK TY II-A-A
- I GROUND MOUNT DELINEATOR (FLEX)
- J SURFACE MOUNT DELINEATOR (FLEX)
- L REFL PAV MRK TY I (W) (WORD) (090 MIL)
- M REFL PAV MRK TY I (W) 6'' (DOT) (090 MIL)
- N REFL PAV MRK TY I (W) 8'' (DOT) (090 MIL)
- O REFL PAV MRK TY I (W) 8'' (SLD) (090 MIL)
- P REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
- Q REFL PAV MRK TY I 36" (YLD TRI)
- S OM ASSM (OM-2)
- SIGN TO BE INSTALLED
- SIGN TO REMAIN IN PLACE
- SIGN TO BE RELOCATED
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (SYMBOL) (100MIL)
- REFL PAV MRK TY I (W) (WORD) (090 MIL)

NOTES:

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 70+00 TO STA 94+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		144

DATE: 2/21/2024 9:28:55 AM
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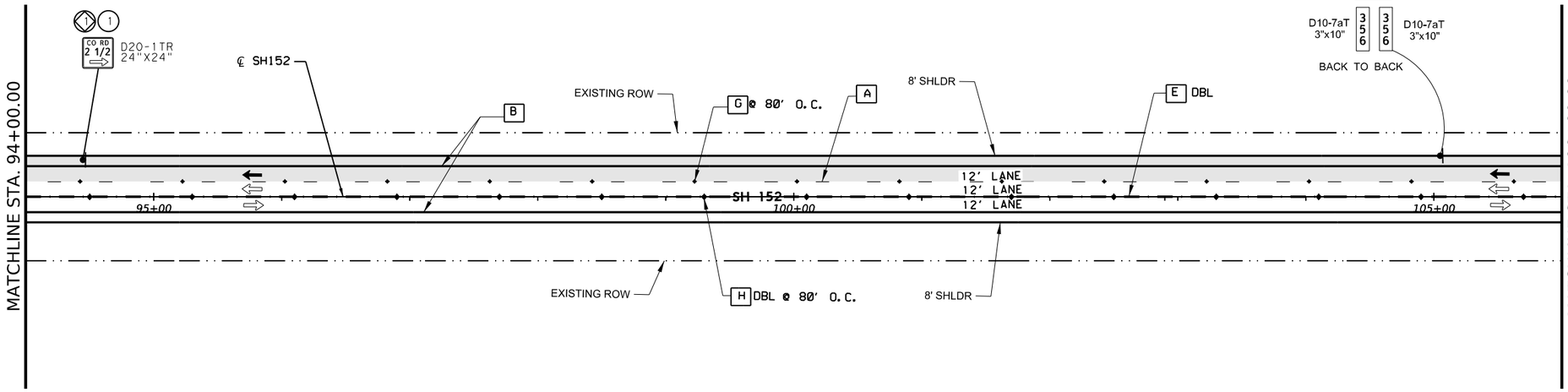

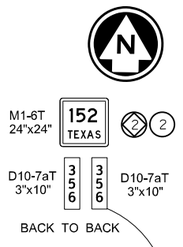

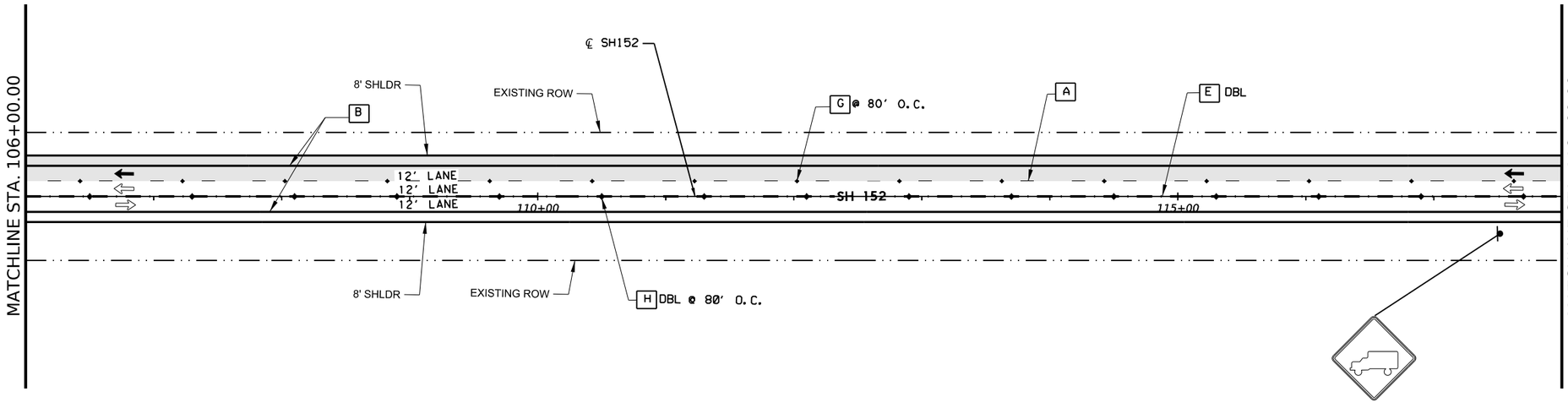

0' 50' 100'
SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAY LINE
- A HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
- B HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
- C REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
- D HPPM W/RET REQ TY I (Y) 6" (BRK) (090 MIL)
- E HPPM W/RET REQ TY I (Y) 6" (SLD) (090 MIL)
- F REFL PAV MRK TY I (W) (LNDP ARW) (090 MIL)
- G REF PAV MRKR TY I-C
- H REF PAV MRK TY II-A-A
- I GROUND MOUNT DELINEATOR (FLEX)
- J SURFACE MOUNT DELINEATOR (FLEX)
- L REFL PAV MRK TY I (W) (WORD) (090 MIL)
- M REFL PAV MRK TY I (W) 6'' (DOT) (090 MIL)
- N REFL PAV MRK TY I (W) 8'' (DOT) (090 MIL)
- O REFL PAV MRK TY I (W) 8'' (SLD) (090 MIL)
- P REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
- Q REFL PAV MRK TY I 36" (YLD TRI)
- S OM ASSM (OM-2)
- # SIGN TO BE INSTALLED
- * SIGN TO REMAIN IN PLACE
- # # SIGN TO BE RELOCATED
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (SYMBOL) (100MIL)
- REFL PAV MRK TY I (W) (WORD) (090 MIL)

NOTES:

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3. REFER TO TYPICAL SECTIONS FOR LANE WIDTH.

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2/21/2024

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

Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 94+00 TO STA 118+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		145

DATE: 2/21/2024 9:29:02 AM
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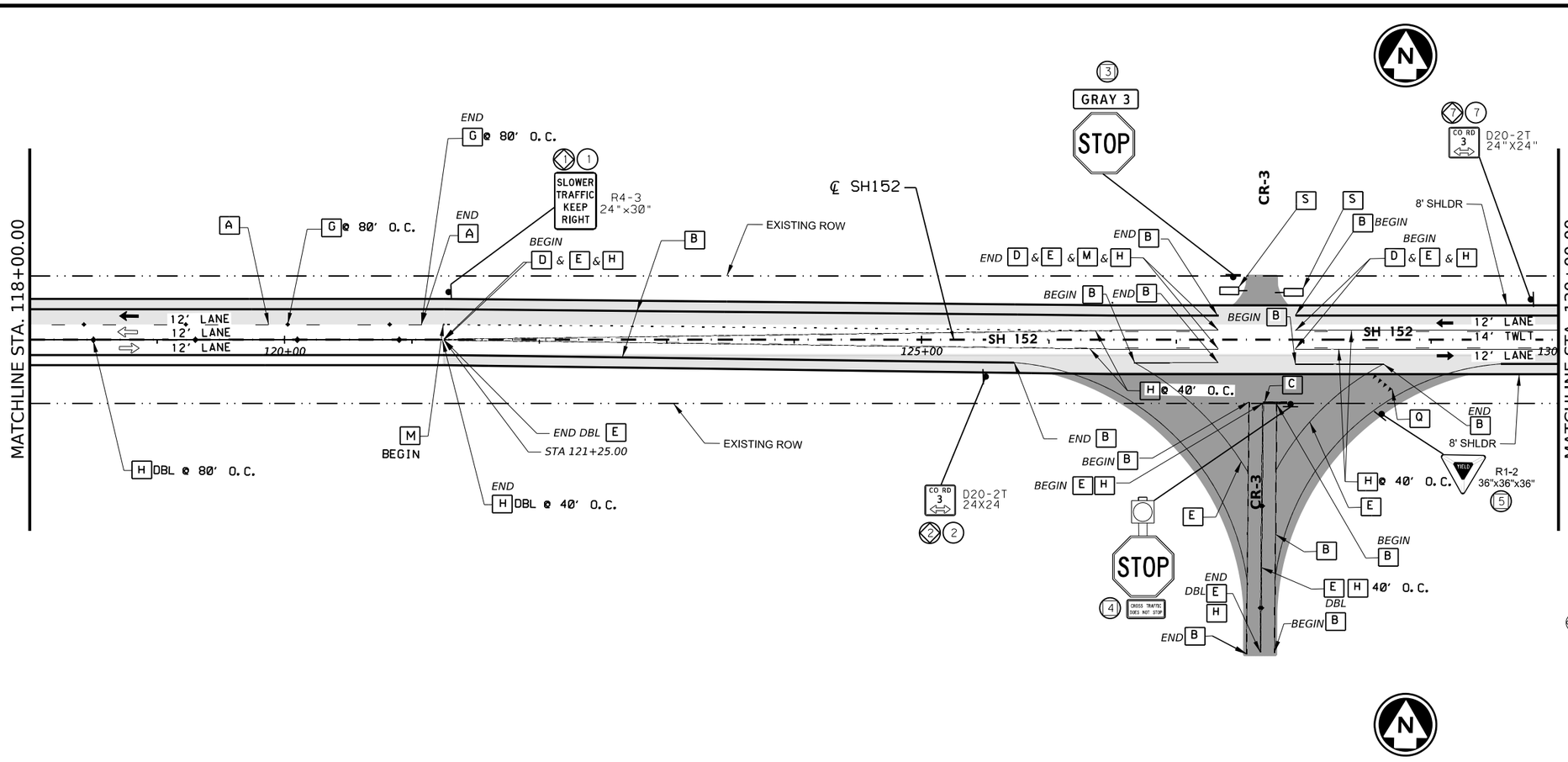

0' 50' 100'
SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAY LINE
- A HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
- B HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
- C REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
- D HPPM W/RET REQ TY I (Y) 6" (BRK)(090 MIL)
- E HPPM W/RET REQ TY I (Y) 6" (SLD)(090 MIL)
- F REFL PAV MRK TY I (W) (LNDP ARW) (090 MIL)
- G REF PAV MRKR TY I-C
- H REF PAV MRK TY II-A-A
- I GROUND MOUNT DELINEATOR (FLEX)
- J SURFACE MOUNT DELINEATOR (FLEX)
- L REFL PAV MRK TY I (W) (WORD) (090 MIL)
- M REFL PAV MRK TY I (W) 6'' (DOT) (090 MIL)
- N REFL PAV MRK TY I (W) 8'' (DOT) (090 MIL)
- O REFL PAV MRK TY I (W) 8'' (SLD) (090 MIL)
- P REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
- Q REFL PAV MRK TY I 36" (YLD TRI)
- S OM ASSM (OM-2)
- SIGN TO BE INSTALLED
- SIGN TO REMAIN IN PLACE
- SIGN TO BE RELOCATED
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (SYMBOL) (100MIL)
- REFL PAV MRK TY I (W) (WORD) (090 MIL)

NOTES:

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3. REFER TO TYPICAL SECTIONS FOR LANE WIDTH.

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

Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 118+00 TO STA 142+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		146

DATE: 2/21/2024 9:29:16 AM
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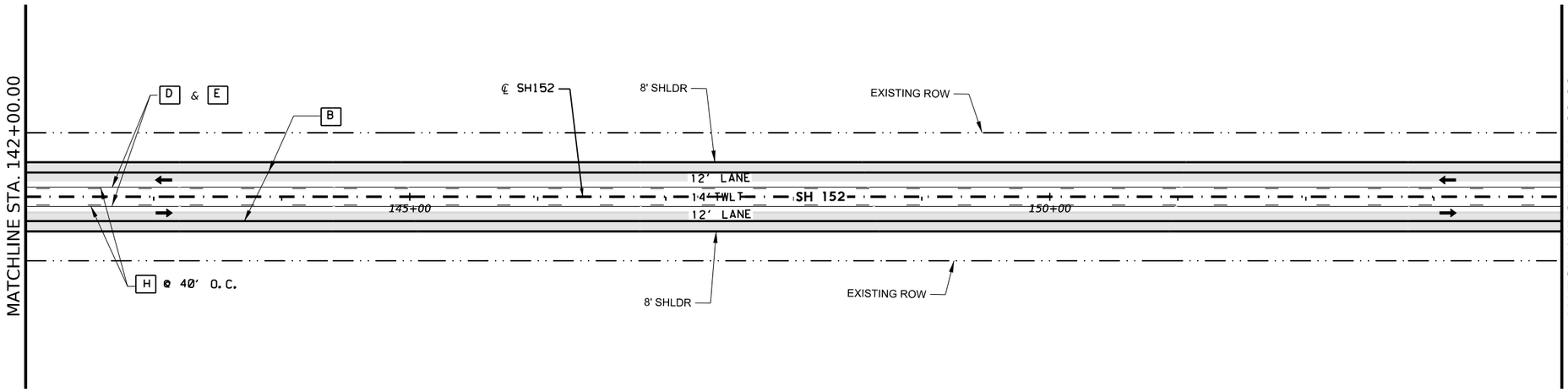

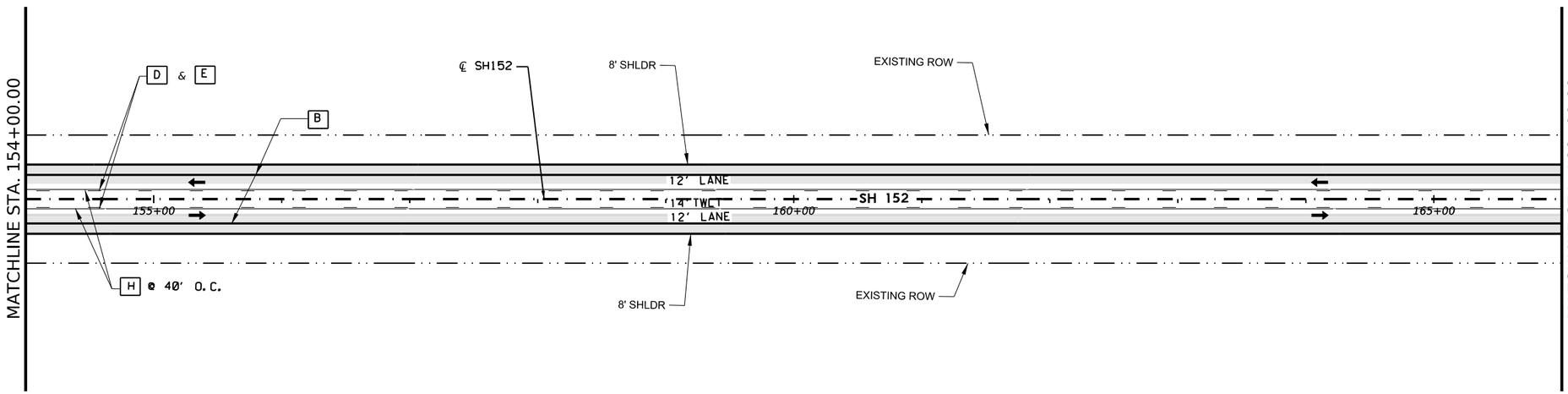

0' 50' 100'
SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAY LINE
- A HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
- B HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
- C REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
- D HPPM W/RET REQ TY I (Y) 6" (BRK)(090 MIL)
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- G REF PAV MRKR TY I-C
- H REF PAV MRK TY II-A-A
- I GROUND MOUNT DELINEATOR (FLEX)
- J SURFACE MOUNT DELINEATOR (FLEX)
- L REFL PAV MRK TY I (W) (WORD) (090 MIL)
- M REFL PAV MRK TY I (W) 6'' (DOT) (090 MIL)
- N REFL PAV MRK TY I (W) 8'' (DOT) (090 MIL)
- O REFL PAV MRK TY I (W) 8'' (SLD) (090 MIL)
- P REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
- Q REFL PAV MRK TY I 36" (YLD TRI)
- S OM ASSM (OM-2)
- SIGN TO BE INSTALLED
- SIGN TO REMAIN IN PLACE
- SIGN TO BE RELOCATED
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (SYMBOL) (100MIL)
- REFL PAV MRK TY I (W) (WORD) (090 MIL)

NOTES:

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STATE OF TEXAS
M. N. MOZAFFAR
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LICENSED
PROFESSIONAL ENGINEER
2/21/2024

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HOUSTON, TEXAS 77063
TBPE REG. # F-11657

Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 142+00 TO STA 166+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		147

DATE: 2/21/2024 9:29:27 AM
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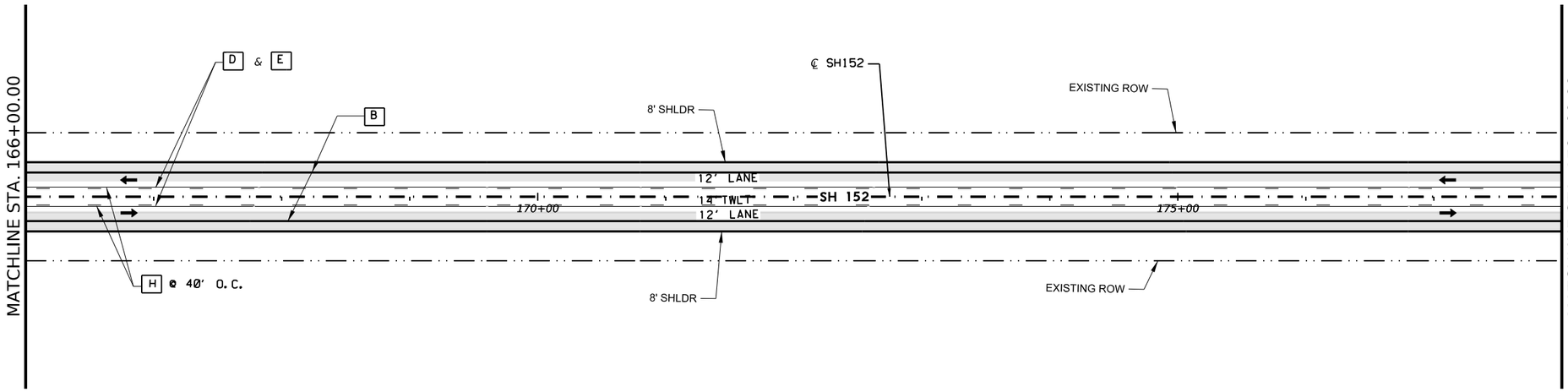

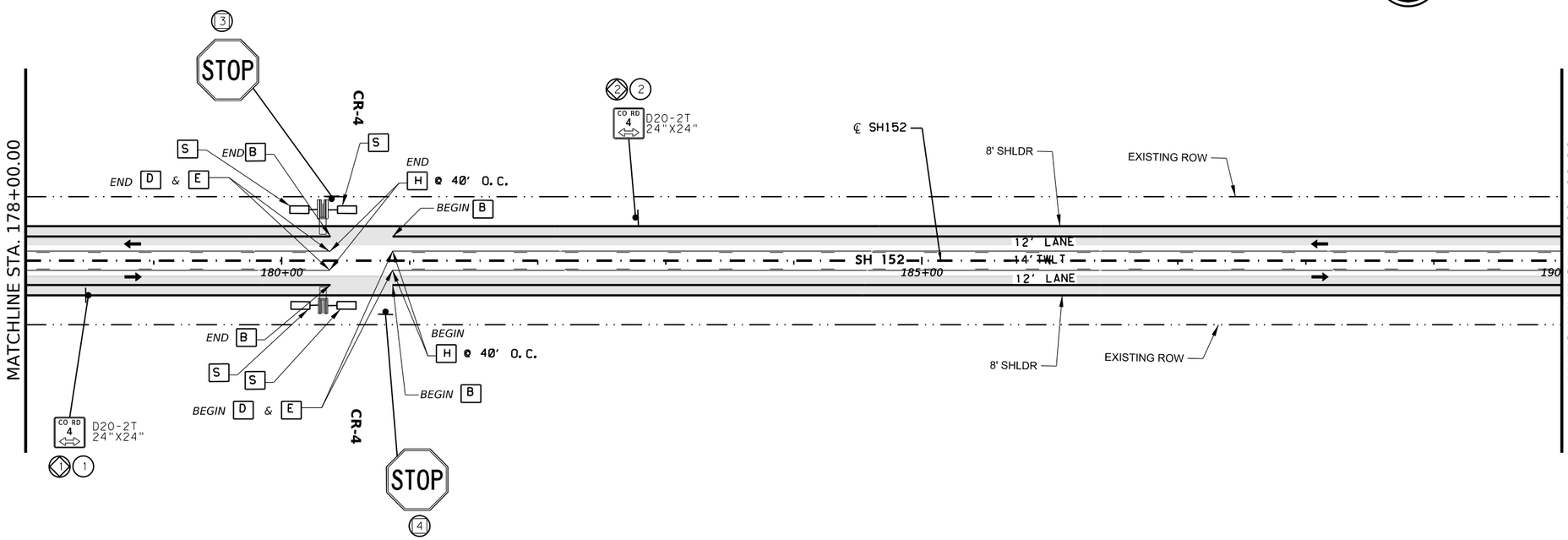

0' 50' 100'
SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAY LINE
- A HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
- B HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
- C REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
- D HPPM W/RET REQ TY I (Y) 6" (BRK)(090 MIL)
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- F REFL PAV MRK TY I (W) (LNDP ARW) (090 MIL)
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- I GROUND MOUNT DELINEATOR (FLEX)
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- L REFL PAV MRK TY I (W) (WORD) (090 MIL)
- M REFL PAV MRK TY I (W) 6'' (DOT) (090 MIL)
- N REFL PAV MRK TY I (W) 8'' (DOT) (090 MIL)
- O REFL PAV MRK TY I (W) 8'' (SLD) (090 MIL)
- P REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
- Q REFL PAV MRK TY I 36" (YLD TRI)
- S OM ASSM (OM-2)
- SIGN TO BE INSTALLED
- SIGN TO REMAIN IN PLACE
- SIGN TO BE RELOCATED
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
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Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 166+00 TO STA 190+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		148

DATE: 2/21/2024 9:29:39 AM
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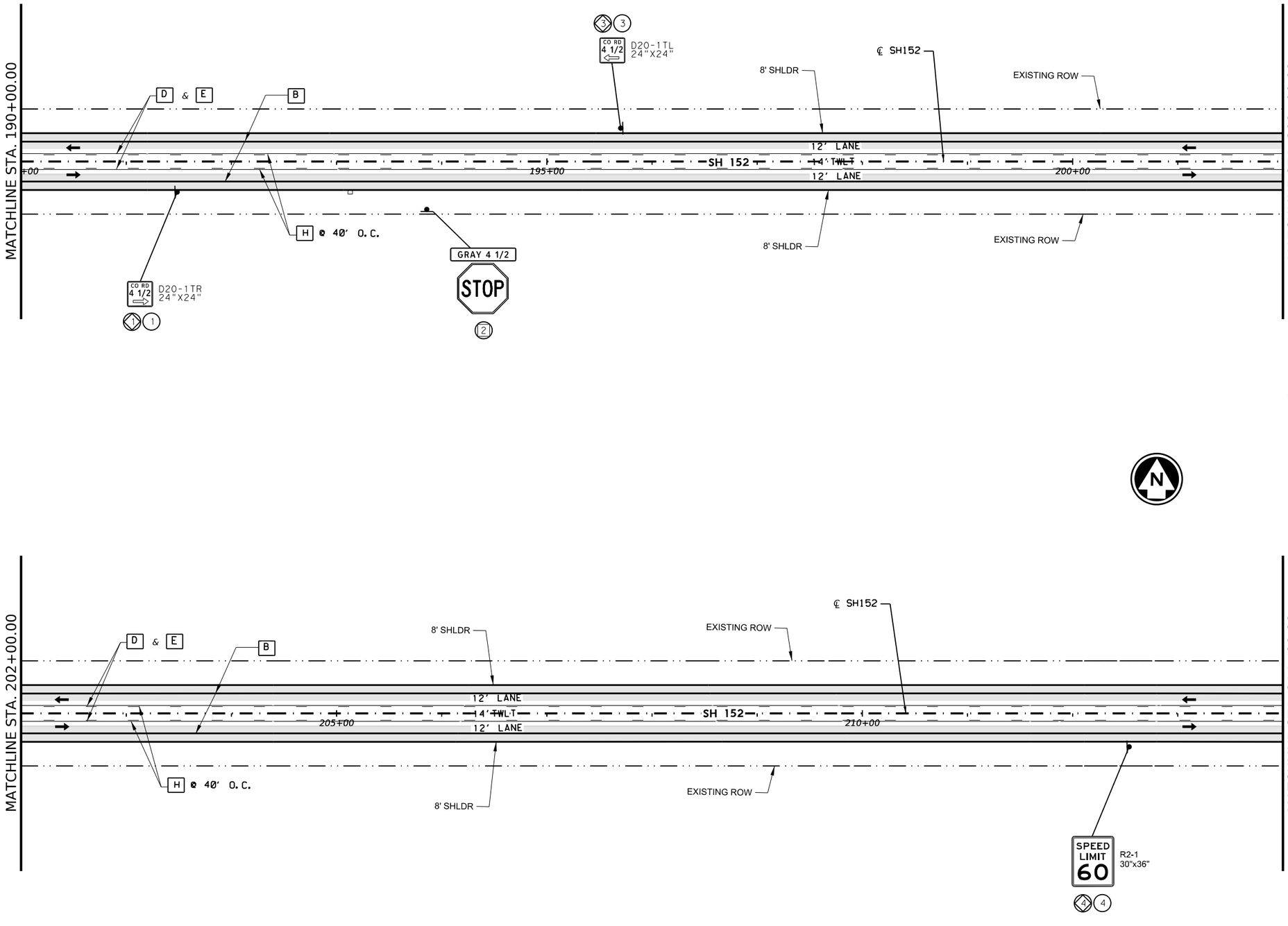

0' 50' 100'
SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAY LINE
- A HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
- B HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
- C REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
- D HPPM W/RET REQ TY I (Y) 6" (BRK)(090 MIL)
- E HPPM W/RET REQ TY I (Y) 6" (SLD)(090 MIL)
- F REFL PAV MRK TY I (W) (LNDP ARW) (090 MIL)
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- J SURFACE MOUNT DELINEATOR (FLEX)
- L REFL PAV MRK TY I (W) (WORD) (090 MIL)
- M REFL PAV MRK TY I (W) 6'' (DOT) (090 MIL)
- N REFL PAV MRK TY I (W) 8'' (DOT) (090 MIL)
- O REFL PAV MRK TY I (W) 8'' (SLD) (090 MIL)
- P REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
- Q REFL PAV MRK TY I 36" (YLD TRI)
- S OM ASSM (OM-2)
- SIGN TO BE INSTALLED
- SIGN TO REMAIN IN PLACE
- SIGN TO BE RELOCATED
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (SYMBOL) (100MIL)
- REFL PAV MRK TY I (W) (WORD) (090 MIL)

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Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 190+00 TO STA 214+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		149

DATE: 2/21/2024 9:29:50 AM
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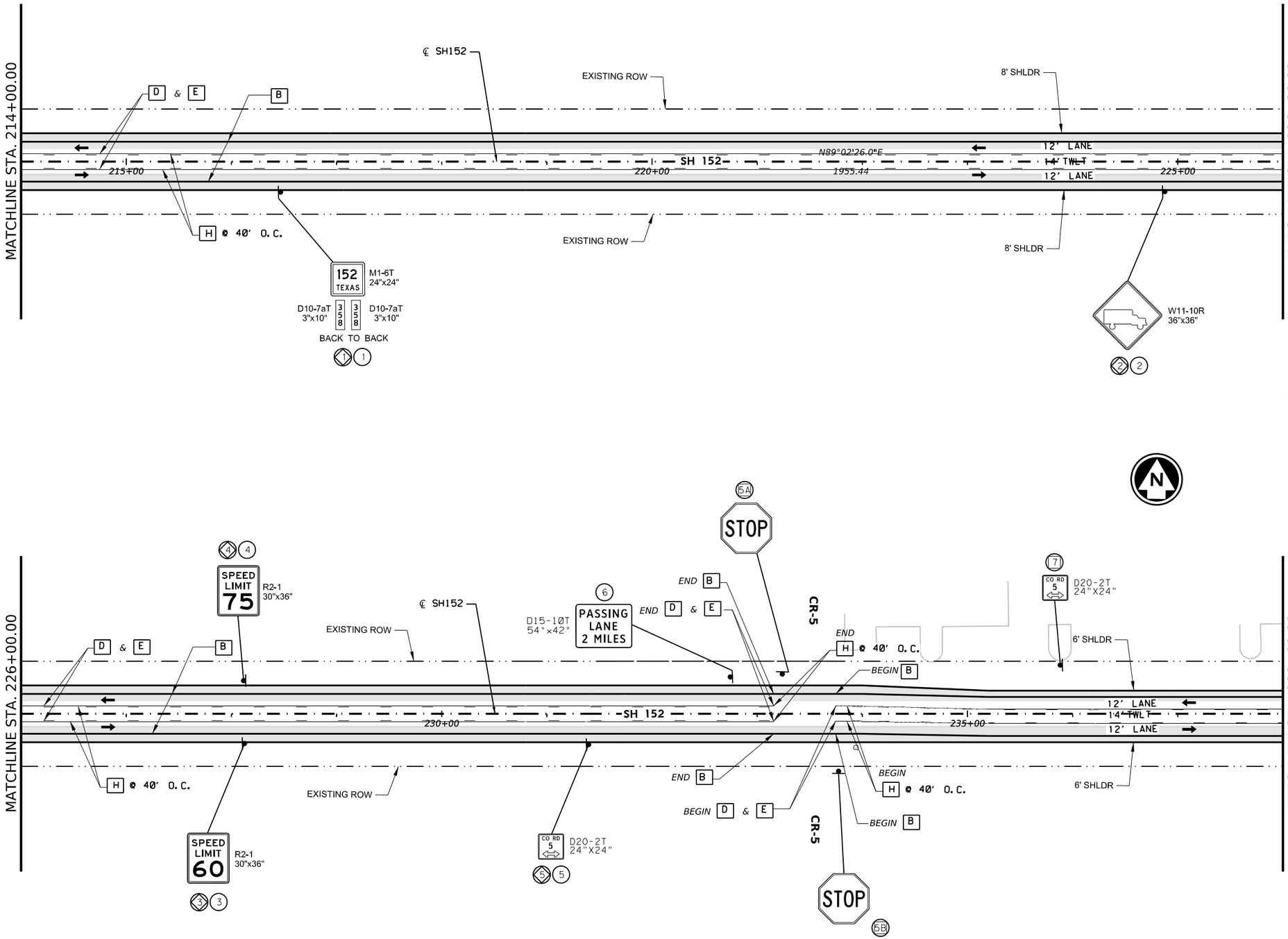

0' 50' 100'
SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAY LINE
- A HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
- B HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
- C REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
- D HPPM W/RET REQ TY I (Y) 6" (BRK)(090 MIL)
- E HPPM W/RET REQ TY I (Y) 6" (SLD)(090 MIL)
- F REFL PAV MRK TY I (W) (LNDP ARW) (090 MIL)
- G REF PAV MRKR TY I-C
- H REF PAV MRK TY II-A-A
- I GROUND MOUNT DELINEATOR (FLEX)
- J SURFACE MOUNT DELINEATOR (FLEX)
- L REFL PAV MRK TY I (W) (WORD) (090 MIL)
- M REFL PAV MRK TY I (W) 6'' (DOT) (090 MIL)
- N REFL PAV MRK TY I (W) 8'' (DOT) (090 MIL)
- O REFL PAV MRK TY I (W) 8'' (SLD) (090 MIL)
- P REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
- Q REFL PAV MRK TY I 36" (YLD TRI)
- S OM ASSM (OM-2)
- # SIGN TO BE INSTALLED
- * SIGN TO REMAIN IN PLACE
- #/# SIGN TO BE RELOCATED
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (SYMBOL) (100MIL)
- REFL PAV MRK TY I (W) (WORD) (090 MIL)

NOTES:

1. ALL SIGNING AND PAVEMENT MARKINGS MUST COMPLY WITH THE TXDOT STANDARDS AND TMUTCD, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
2. ALL SMALL SIGN LOCATIONS ARE APPROXIMATE UNLESS OTHERWISE NOTED. FIELD ADJUSTMENT MAY BE NECESSARY TO COMPLY WITH TXDOT STADARDS.
3. REFER TO TYPICAL SECTIONS FOR LANE WIDTH.

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

2/21/2024

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

Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 214+00 TO STA 238+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		150

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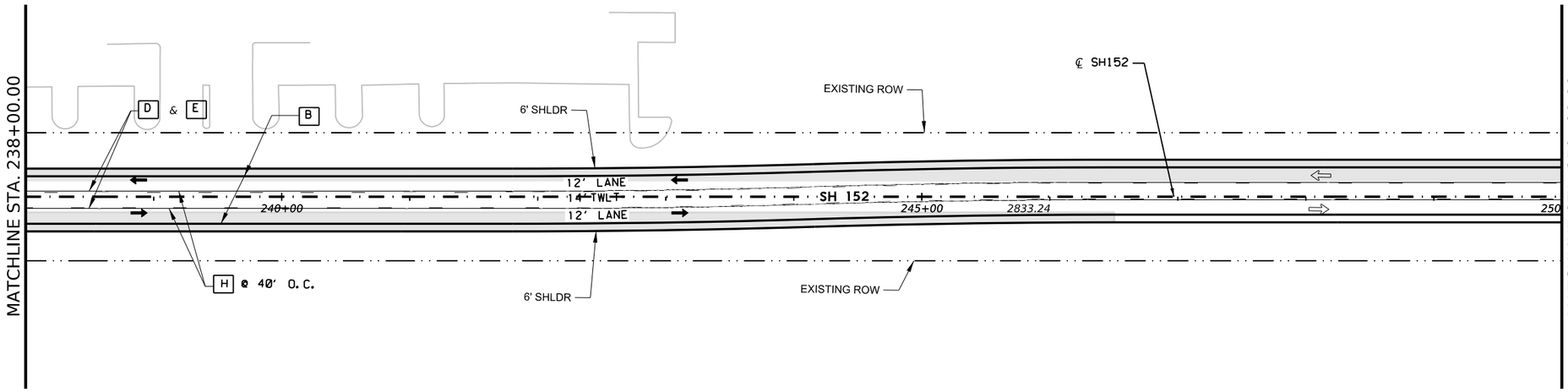

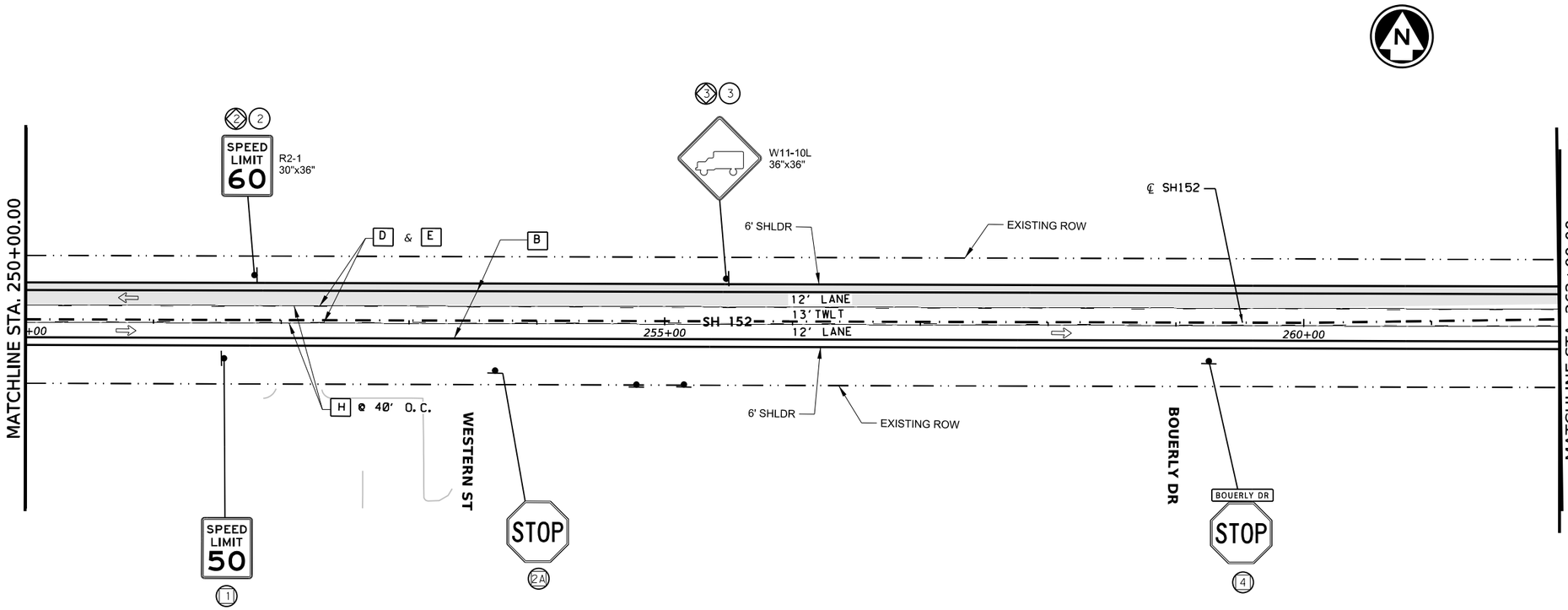

0' 50' 100'
SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAY LINE
- A HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
- B HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
- C REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
- D HPPM W/RET REQ TY I (Y) 6" (BRK)(090 MIL)
- E HPPM W/RET REQ TY I (Y) 6" (SLD)(090 MIL)
- F REFL PAV MRK TY I (W) (LNDP ARW) (090 MIL)
- G REF PAV MRKR TY I-C
- H REF PAV MRK TY II-A-A
- I GROUND MOUNT DELINEATOR (FLEX)
- J SURFACE MOUNT DELINEATOR (FLEX)
- L REFL PAV MRK TY I (W) (WORD) (090 MIL)
- M REFL PAV MRK TY I (W) 6'' (DOT) (090 MIL)
- N REFL PAV MRK TY I (W) 8'' (DOT) (090 MIL)
- O REFL PAV MRK TY I (W) 8'' (SLD) (090 MIL)
- P REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
- Q REFL PAV MRK TY I 36" (YLD TRI)
- S OM ASSM (OM-2)
- SIGN TO BE INSTALLED
- SIGN TO REMAIN IN PLACE
- SIGN TO BE RELOCATED
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (SYMBOL) (100MIL)
- REFL PAV MRK TY I (W) (WORD) (090 MIL)

NOTES:

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3. REFER TO TYPICAL SECTIONS FOR LANE WIDTH.

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

2/21/2024

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

Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 238+00 TO STA 262+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		151

DATE: 2/21/2024 9:30:05 AM
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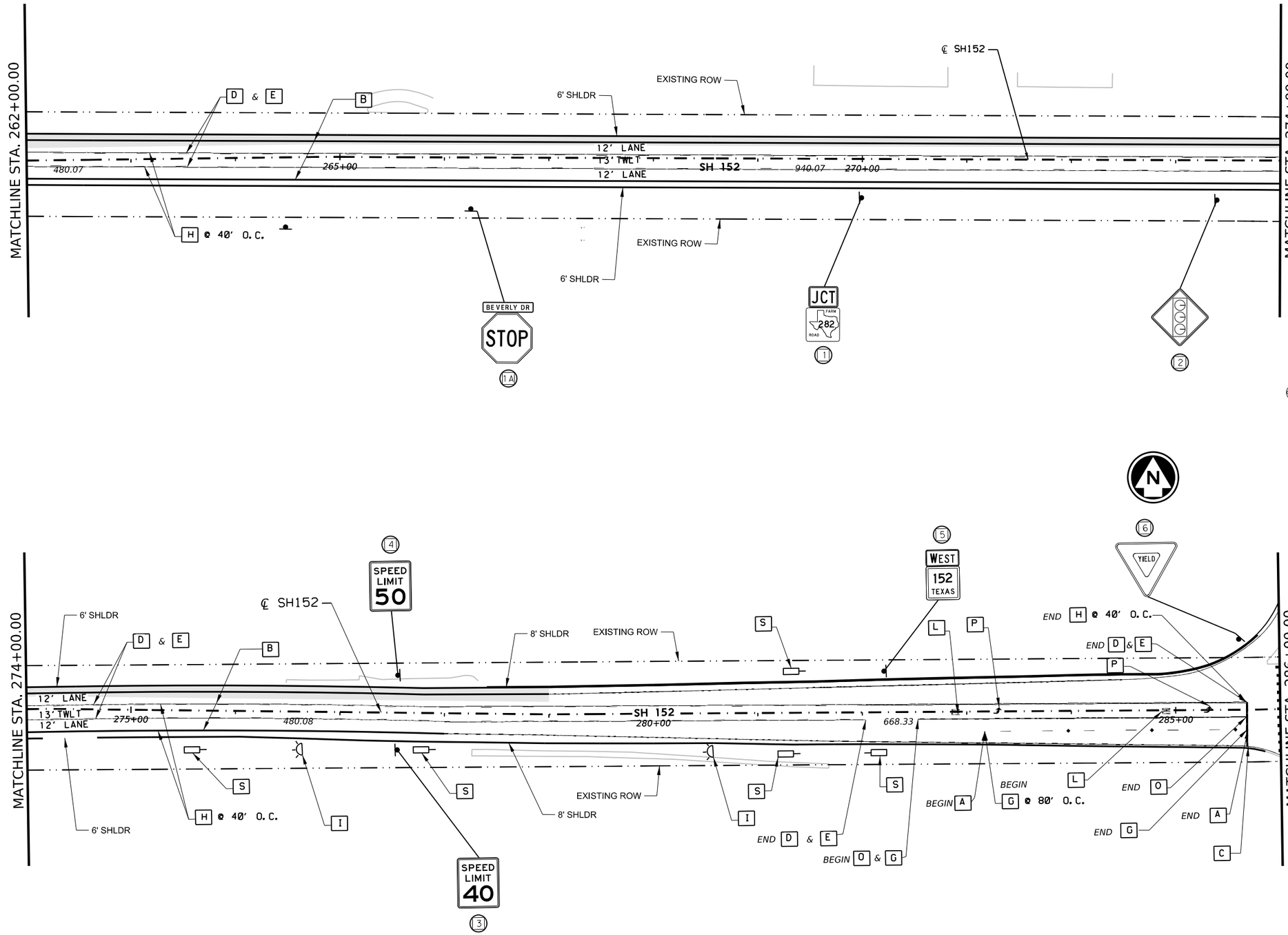

0' 50' 100'
SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAY LINE
- A HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
- B HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
- C REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
- D HPPM W/RET REQ TY I (Y) 6" (BRK)(090 MIL)
- E HPPM W/RET REQ TY I (Y) 6" (SLD)(090 MIL)
- F REFL PAV MRK TY I (W) (LNDP ARW) (090 MIL)
- G REF PAV MRKR TY I-C
- H REF PAV MRK TY II-A-A
- I GROUND MOUNT DELINEATOR (FLEX)
- J SURFACE MOUNT DELINEATOR (FLEX)
- L REFL PAV MRK TY I (W) (WORD) (090 MIL)
- M REFL PAV MRK TY I (W) 6'' (DOT) (090 MIL)
- N REFL PAV MRK TY I (W) 8'' (DOT) (090 MIL)
- O REFL PAV MRK TY I (W) 8'' (SLD) (090 MIL)
- P REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
- Q REFL PAV MRK TY I 36" (YLD TRI)
- S OM ASSM (OM-2)
- (#) SIGN TO BE INSTALLED
- (*) SIGN TO REMAIN IN PLACE
- (#)(#) SIGN TO BE RELOCATED
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (SYMBOL) (100MIL)
- REFL PAV MRK TY I (W) (WORD) (090 MIL)

NOTES:

1. ALL SIGNING AND PAVEMENT MARKINGS MUST COMPLY WITH THE TXDOT STANDARDS AND TMUTCD, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
2. ALL SMALL SIGN LOCATIONS ARE APPROXIMATE UNLESS OTHERWISE NOTED. FIELD ADJUSTMENT MAY BE NECESSARY TO COMPLY WITH TXDOT STADARDS.
3. REFER TO TYPICAL SECTIONS FOR LANE WIDTH.

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

2/21/2024

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

Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 262+00 TO STA 286+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		152

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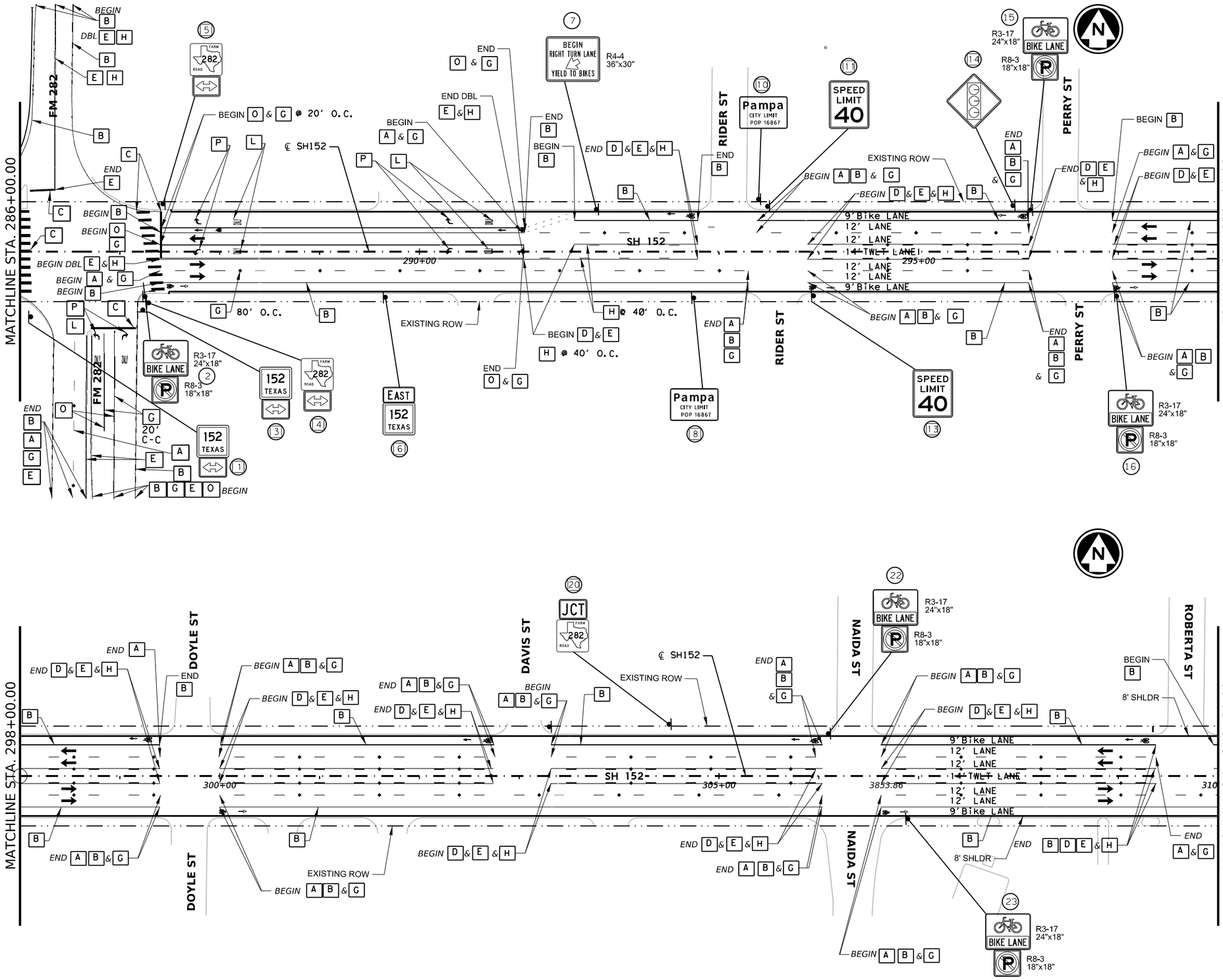

0' 50' 100'

SCALE IN FEET

LEGEND:

- ← PROPOSED TRAFFIC
- ⇦ EXISTING TRAFFIC
- —·—·— EXISTING RIGHT-OF-WAY LINE

A	HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
B	HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
C	REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
D	HPPM W/RET REQ TY I (Y) 6" (BRK)(090 MIL)
E	HPPM W/RET REQ TY I (Y) 6" (SLD)(090 MIL)
F	REFL PAV MRK TY I (W) (LNDP ARW) (090 MIL)
G	REF PAV MRKR TY I-C
H	REF PAV MRK TY II-A-A
I	GROUND MOUNT DELINEATOR (FLEX)
J	SURFACE MOUNT DELINEATOR (FLEX)
L	REFL PAV MRK TY I (W) (WORD) (090 MIL)
M	REFL PAV MRK TY I (W) 6'' (DOT) (090 MIL)
N	REFL PAV MRK TY I (W) 8'' (DOT) (090 MIL)
O	REFL PAV MRK TY I (W) 8'' (SLD) (090 MIL)
P	REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
Q	REFL PAV MRK TY I 36" (YLD TRI)
S	OM ASSM (OM-2)
●	SIGN TO BE INSTALLED
●	SIGN TO REMAIN IN PLACE
●●	SIGN TO BE RELOCATED
↰	REFL PAV MRK TY I (W) (ARROW) (090MIL)
←	REFL PAV MRK TY I (W) (ARROW) (090MIL)
●	REFL PAV MRK TY I (W) (SYMBOL) (100MIL)
▤	REFL PAV MRK TY I (W) (WORD) (090 MIL)

NOTES:

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3. REFER TO TYPICAL SECTIONS FOR LANE WIDTH.

M. N. MOZAFFAR
85191
LICENSED PROFESSIONAL ENGINEER
M.N.M
2/21/2024

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

Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 286+00 TO STA 310+00

SHEET 13 OF 15

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152

DIST	COUNTY	SHEET NO.
AMA	GRAY	153

DATE: 2/21/2024 9:30:20 AM
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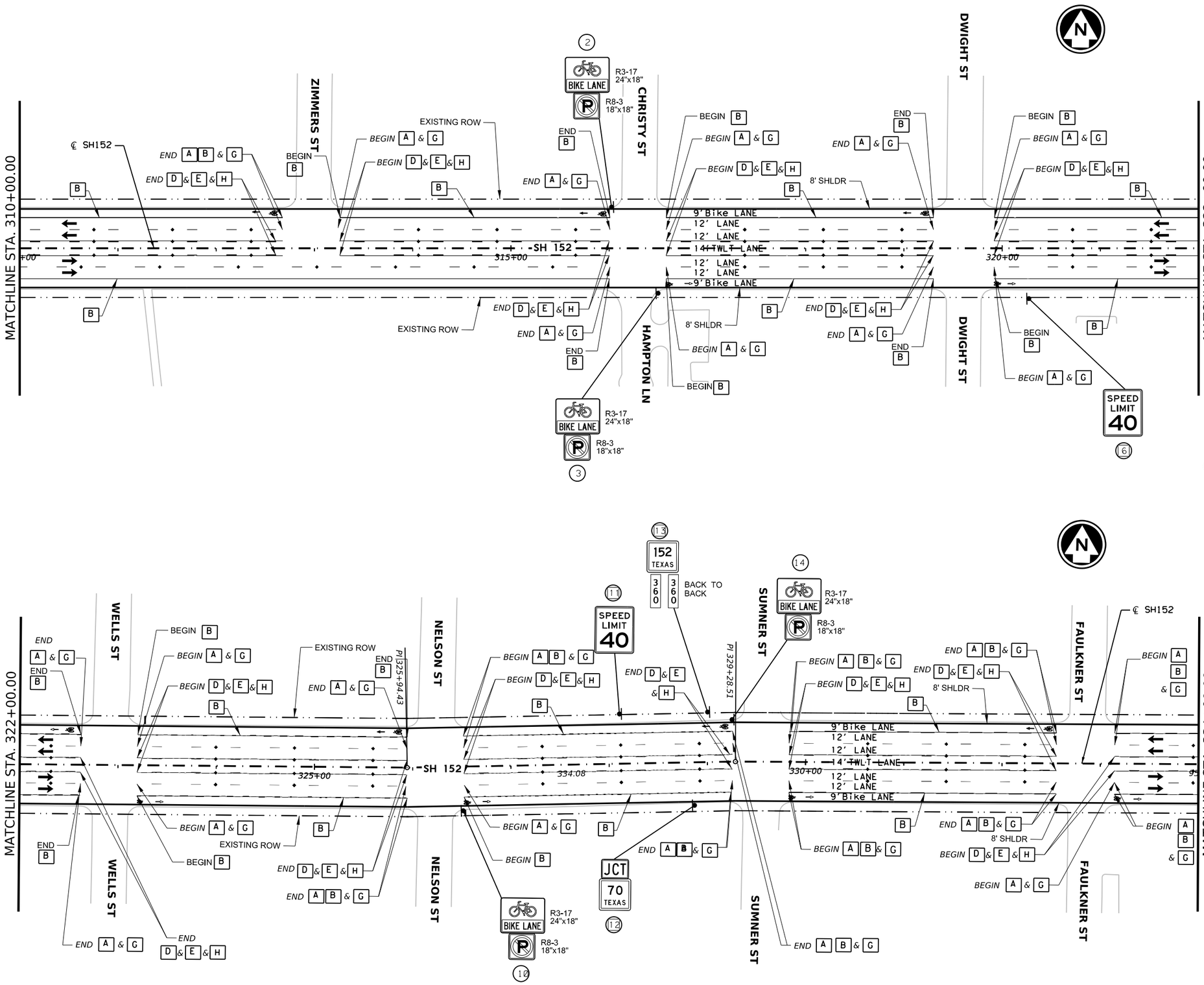

0′ 50′ 100′
SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAY LINE
- A HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
- B HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
- C REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
- D HPPM W/RET REQ TY I (Y) 6" (BRK)(090 MIL)
- E HPPM W/RET REQ TY I (Y) 6" (SLD)(090 MIL)
- F REFL PAV MRK TY I (W) (LNDP ARW) (090 MIL)
- G REF PAV MRKR TY I-C
- H REF PAV MRK TY II-A-A
- I GROUND MOUNT DELINEATOR (FLEX)
- J SURFACE MOUNT DELINEATOR (FLEX)
- L REFL PAV MRK TY I (W) (WORD) (090 MIL)
- M REFL PAV MRK TY I (W) 6′′ (DOT) (090 MIL)
- N REFL PAV MRK TY I (W) 8′′ (DOT) (090 MIL)
- O REFL PAV MRK TY I (W) 8′′ (SLD) (090 MIL)
- P REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
- Q REFL PAV MRK TY I 36" (YLD TRI)
- S OM ASSM (OM-2)
- SIGN TO BE INSTALLED
- SIGN TO REMAIN IN PLACE
- SIGN TO BE RELOCATED
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (SYMBOL) (100MIL)
- REFL PAV MRK TY I (W) (WORD) (090 MIL)

NOTES:

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3. REFER TO TYPICAL SECTIONS FOR LANE WIDTH.

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

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

Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 310+00 TO STA 334+00

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		154

DATE: 2/21/2024 9:30:28 AM
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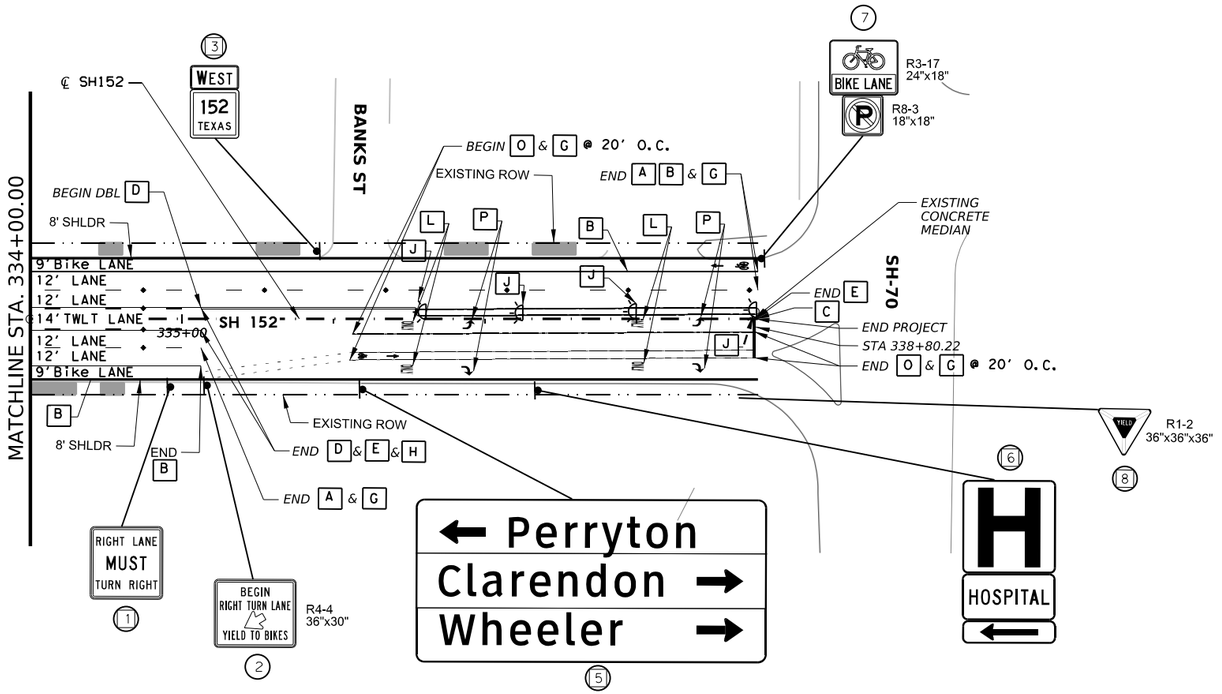

0' 50' 100'

SCALE IN FEET

LEGEND:

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING RIGHT-OF-WAY LINE
- A HPPM W/RET REQ TY I (W) 6" (BRK) (090 MIL)
- B HPPM W/RET REQ TY I (W) 6" (SLD) (090 MIL)
- C REFL PAV MRK TY I (W) 24" (SLD) (090 MIL)
- D HPPM W/RET REQ TY I (Y) 6" (BRK)(090 MIL)
- E HPPM W/RET REQ TY I (Y) 6" (SLD)(090 MIL)
- F REFL PAV MRK TY I (W) (LNDP ARW) (090 MIL)
- G REF PAV MRKR TY I-C
- H REF PAV MRK TY II-A-A
- I GROUND MOUNT DELINEATOR (FLEX)
- J SURFACE MOUNT DELINEATOR (FLEX)
- L REFL PAV MRK TY I (W) (WORD) (090 MIL)
- M REFL PAV MRK TY I (W) 6'' (DOT) (090 MIL)
- N REFL PAV MRK TY I (W) 8'' (DOT) (090 MIL)
- O REFL PAV MRK TY I (W) 8'' (SLD) (090 MIL)
- P REFAB PAV MRK TY I B (W) (ARROW) (090 MIL)
- Q REFL PAV MRK TY I 36" (YLD TRI)
- S OM ASSM (OM-2)
- # SIGN TO BE INSTALLED
- (*) SIGN TO REMAIN IN PLACE
- (#) (#) SIGN TO BE RELOCATED
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (ARROW) (090MIL)
- REFL PAV MRK TY I (W) (SYMBOL) (100MIL)
- REFL PAV MRK TY I (W) (WORD) (090 MIL)

NOTES:

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3. REFER TO TYPICAL SECTIONS FOR LANE WIDTH.

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

2/21/2024

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

Texas Department of Transportation

SH 152

SIGNING & PAVEMENT MARKINGS

STA 334+00 TO END

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		155

DATE: 2/21/2024 9:30:32 AM
FILE: L:\DESIGN PROJECTS\ WorkSets\AMA 0455-03-038\4 - Design\Master Design Files\Sheet Boundary Containers\SH152 CONTAINMENT SPM PKG4.dgn

DN: CK: DW: CK:

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"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
1	(5)	D15-11T	NEXT PASSING LANE X MILES	54 x 48	A		S80	1	SA	T		
2	(1)(1)	D20-1TL	COUNTY ROAD 1	24 x 24			10 BWG	1	SA	P	BM	
2	(2)	W9-2TL	LANE ENDS MERGE LEFT	36 x 36	A		10 BWG	1	SA	T		
2	(3)	W9-1R	RIGHT LANE ENDS	36 x 36	A		10 BWG	1	SA	T		
4	(2)(2)	D20-2T	COUNTY ROAD 2	24 x 24			10 BWG	1	SA	P	BM	
5	(1)(1)	D20-1TR	COUNTY ROAD 2 1/2	24 x 24			10 BWG	1	SA	P	BM	
5	(2)(2)	M1-6T	152 TEXAS	24 x 24 3 x 10 3 x 10			10 BWG	1	SA	P	BM	
6	(1)(1)	R4-3	SLOWER TRAFFIC KEEP RIGHT	24 x 30			10 BWG	1	SA	P	BM	
6	(2)(2)	D20-2T	COUNTY ROAD 3	24 x 24			10 BWG	1	SA	P	BM	
6	(5)	R1-2	YIELD SIGN	36X36X36	A		10BWG	1	SA	T		
6	(7)(7)	D20-2T	COUNTY ROAD 3	24 x 24			10 BWG	1	SA	P	BM	
6	(8)(8)	W11-10R	BOL - BE ALERT FOR TRUCKS ENTERING	36 x 36			10BWG	1	SA	P	BM	

LEGENDS:

(■) SIGN TO BE INSTALLED

(■)(■) SIGN TO BE RELOCATED

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.100"
7.5 or Greater	0.125"

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

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

DATE:
FILE:

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 1 OF 3

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
4-16	DIST	COUNTY		SHEET NO.
8-16	AMA	GRAY		156

TB

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
8	(1)(1)	D20-2T	COUNTY ROAD 4	24 x 24			10 BWG	1	SA	P	BM	
8	(2)(2)	D20-2T	COUNTY ROAD 4	24 x 24			10 BWG	1	SA	P	BM	
9	(1)(1)	D20-1TR	COUNTY ROAD 4 1/2	24 x 24			10 BWG	1	SA	P	BM	
9	(3)(3)	D20-1TL	COUNTY ROAD 4 1/2	24 x 24			10 BWG	1	SA	P	BM	
9	(4)(4)	R2-1	SPEED LIMIT 60 MPH	30 x 36			10 BWG	1	SA	P	BM	
10	(1)(1)	M1-6T	152 TEXAS	24 x 24 3 x 10 3 x 10			10 BWG	1	SA	P	BM	
10	(2)(2)	W11-10R	BOL - BE ALERT FOR TRUCKS ENTERING	36 x 36			10BWG	1	SA	P	BM	
10	(3)(3)	R2-1	SPEED LIMIT 60 MPH	30 x 36			10 BWG	1	SA	P	BM	
10	(4)(4)	R2-1	SPEED LIMIT 75 MPH	30 x 36			10 BWG	1	SA	P	BM	
10	(5)(5)	D20-2T	COUNTY ROAD 5	24 x 24			10 BWG	1	SA	P	BM	
10	(6)	D15-10T	PASSING LANE 2 MILES	54 x 42	A		10 BWG	1	SA	U		
11	(2)(2)	R2-1	SPEED LIMIT 60 MPH	30 x 36			10 BWG	1	SA	P	BM	
11	(3)(3)	W11-10L	BOL - BE ALERT FOR TRUCKS ENTERING	36 x 36			10BWG	1	SA	P	BM	

LEGENDS:

(■) SIGN TO BE INSTALLED

(■)(■) SIGN TO BE RELOCATED

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.100"
7.5 or Greater	0.125"

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

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

DATE:
FILE:

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 2 OF 3

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
4-16	DIST	COUNTY		SHEET NO.
8-16	AMA	GRAY		157

TB

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
13	2	R3-17	BIKE LANE	24 x 18	A		10BWG	1	SA	P		
		R8-3	PARKING PROHIBITED	18 x 18								
13	7	R4-4	BEGIN RIGHT TURN LANE- YEILD TO BIKES	36 x 30	A		10BWG	1	SA	T		
13	15	R3-17	BIKE LANE	24 x 18	A		10BWG	1	SA	P		
		R8-3	PARKING PROHIBITED	18 x 18								
13	16	R3-17	BIKE LANE	24 x 18	A		10BWG	1	SA	P		
		R8-3	PARKING PROHIBITED	18 x 18								
13	22	R3-17	BIKE LANE	24 x 18	A		10BWG	1	SA	P		
		R8-3	PARKING PROHIBITED	18 x 18								
13	23	R3-17	BIKE LANE	24 x 18	A		10BWG	1	SA	P		
		R8-3	PARKING PROHIBITED	18 x 18								
14	2	R3-17	BIKE LANE	24 x 18	A		10BWG	1	SA	P		
		R8-3	PARKING PROHIBITED	18 x 18								
14	3	R3-17	BIKE LANE	24 x 18	A		10BWG	1	SA	P		
		R8-3	PARKING PROHIBITED	18 x 18								
14	10	R3-17	BIKE LANE	24 x 18	A		10BWG	1	SA	P		
		R8-3	PARKING PROHIBITED	18 x 18								
14	14	R3-17	BIKE LANE	24 x 18	A		10BWG	1	SA	P		
		R8-3	PARKING PROHIBITED	18 x 18								
15	2	R4-4	BEGIN RIGHT TURN LANE- YEILD TO BIKES	36 x 30	A		10BWG	1	SA	T		
15	7	R3-17	BIKE LANE	24 x 18	A		10BWG	1	SA	P		
		R8-3	PARKING PROHIBITED	18 x 18								

LEGENDS:

- ⊙ SIGN TO BE INSTALLED
- ⊙■ SIGN TO BE RELOCATED

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.100"
7.5 or Greater	0.125"

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

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 3 OF 3

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS		0455	03	038	SH 152
4-16		DIST	COUNTY		SHEET NO.
8-16		AMA	GRAY		158

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DATE:
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18

DATE: 2/21/2024 9:30:39 AM
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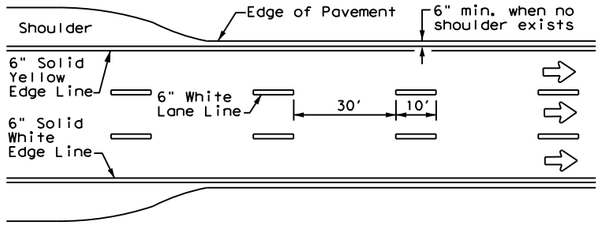
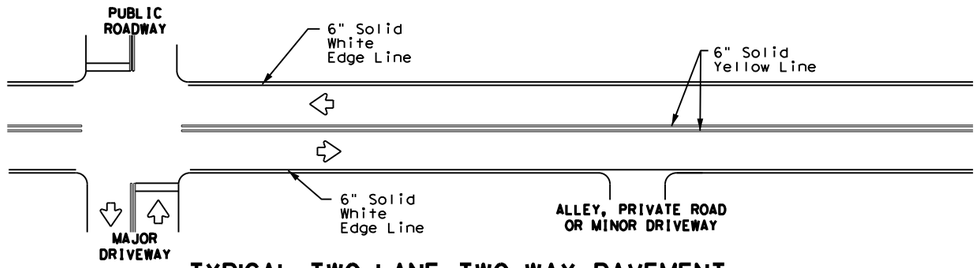
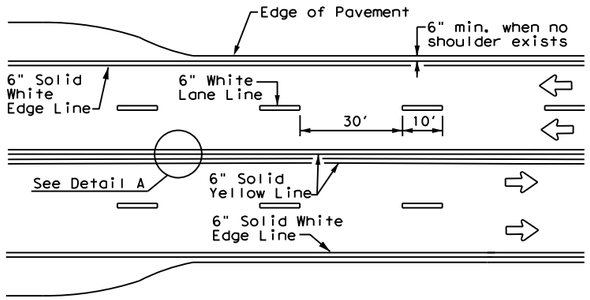
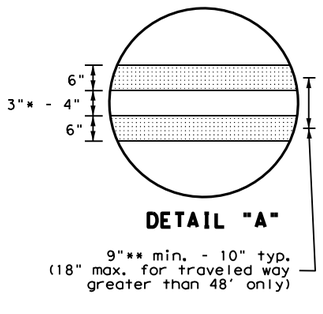


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





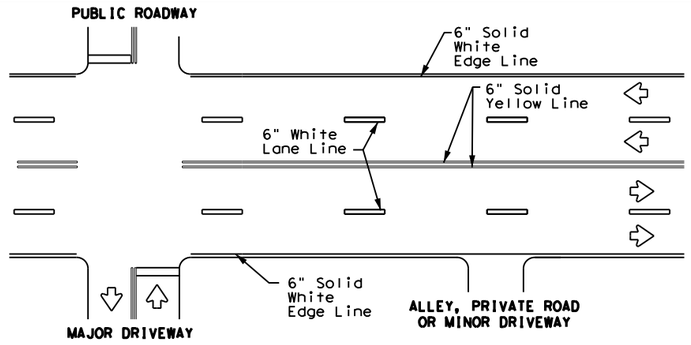
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

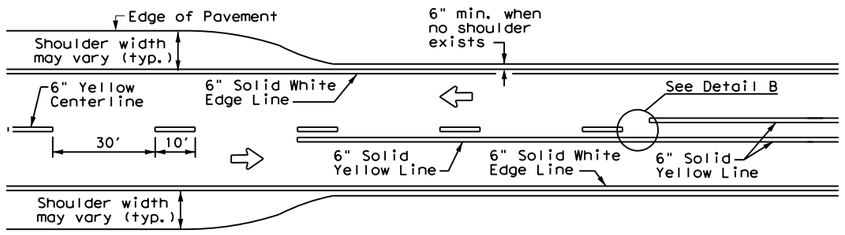
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

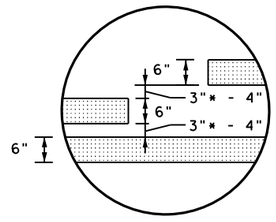
** 8" minimum for restripe projects when approved by the Engineer.



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

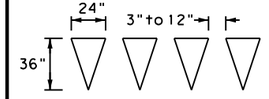


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



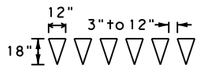
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

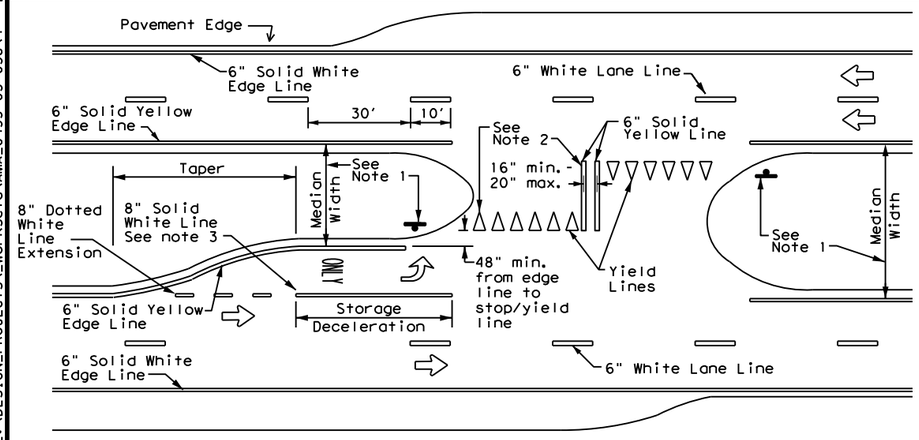


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



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



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

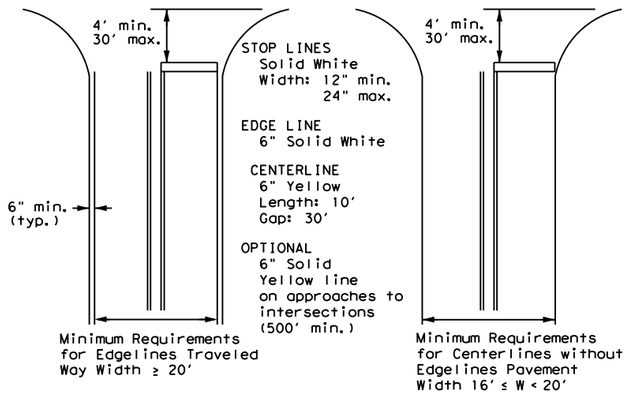
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

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

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



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
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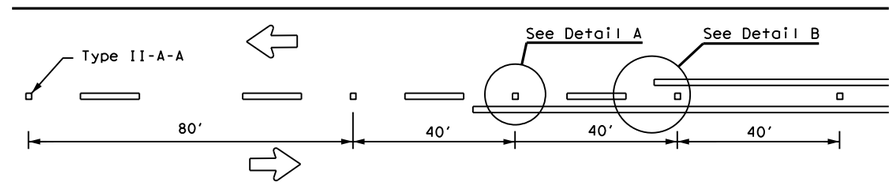
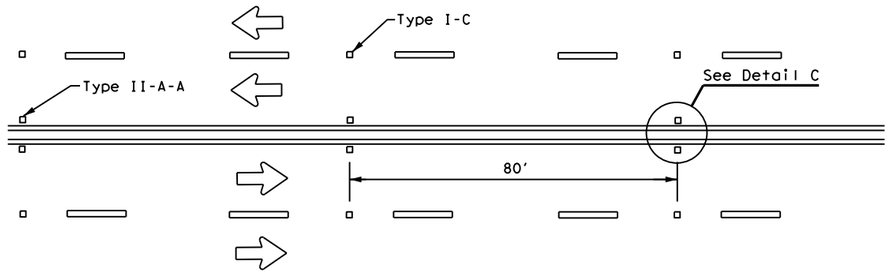
REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		159

22A

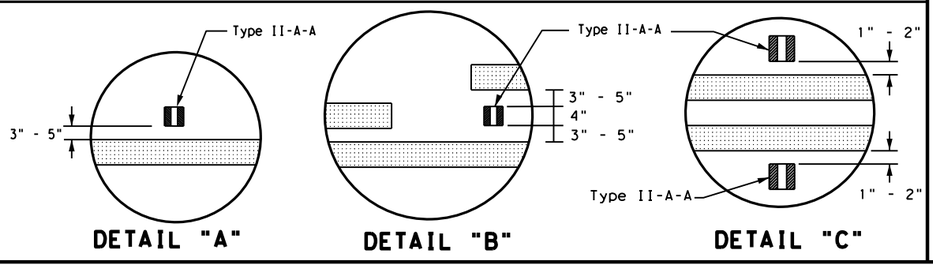
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

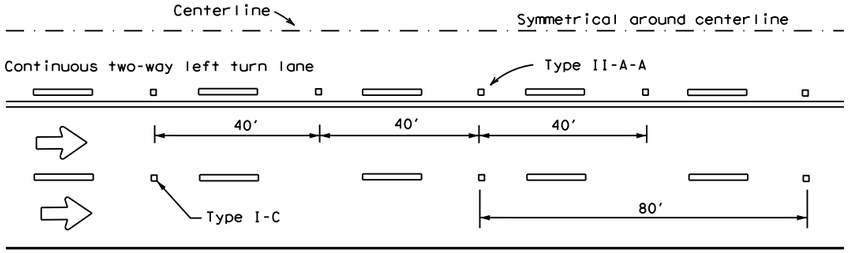


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

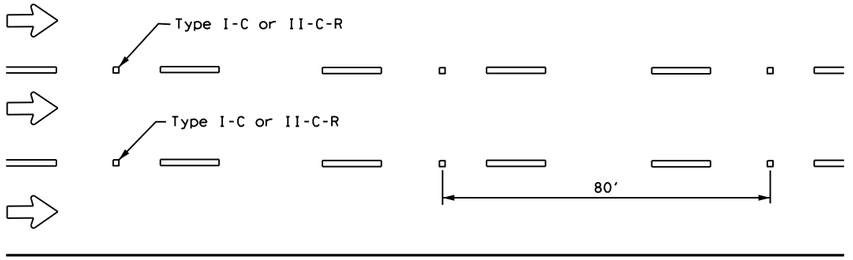


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



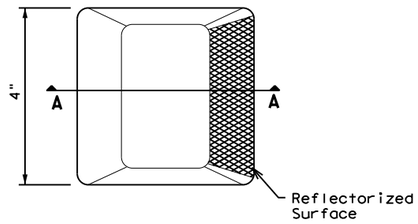
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

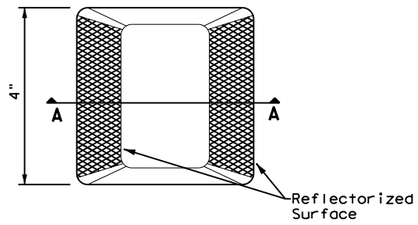
See Note 3.

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

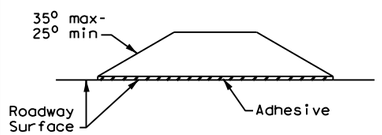
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

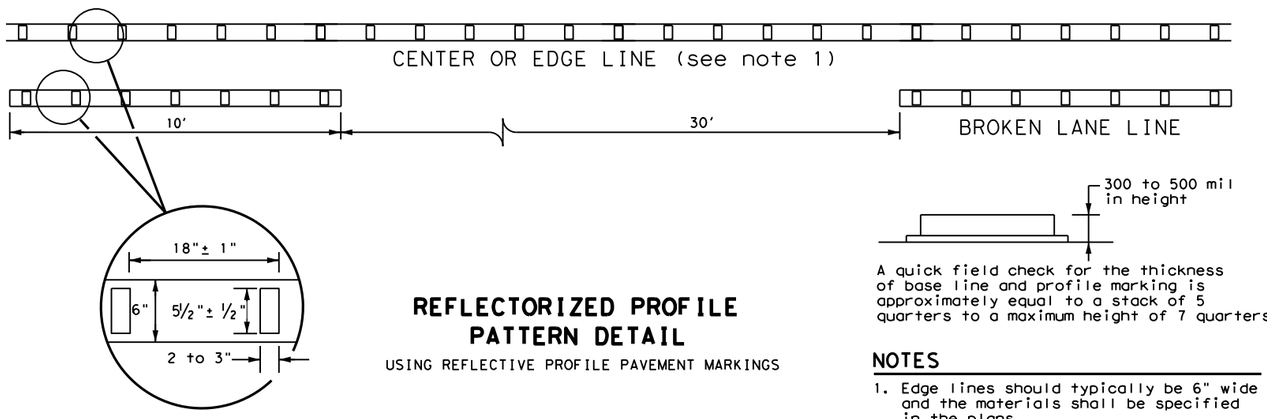


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
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REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		160

22B

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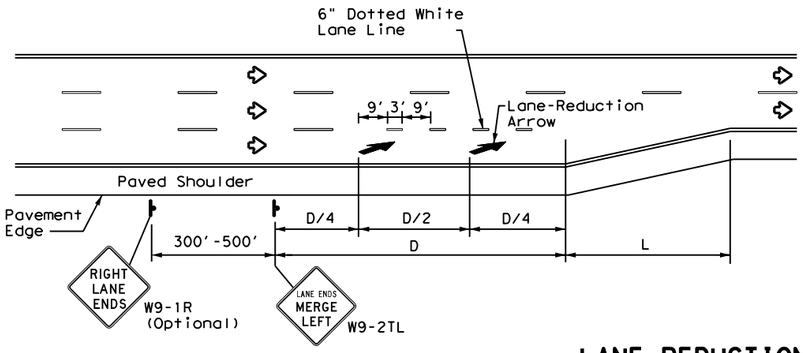
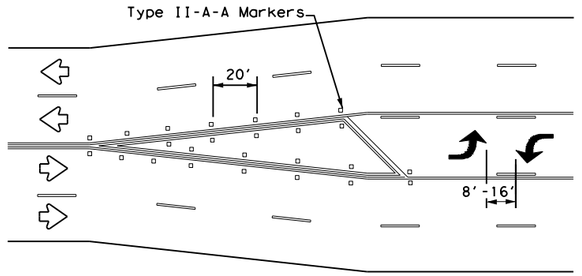


LANE REDUCTION

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



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.

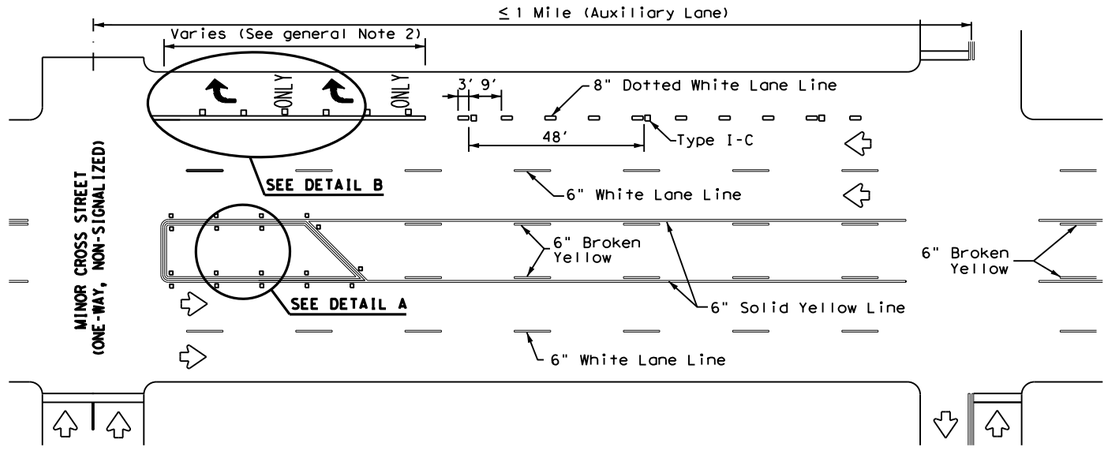
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

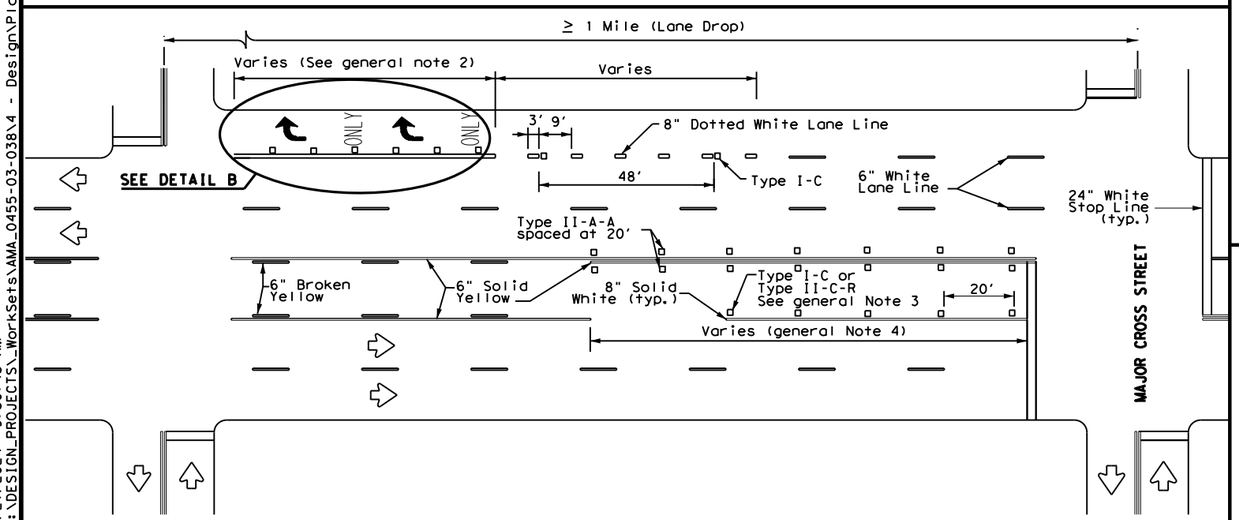
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn 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. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

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

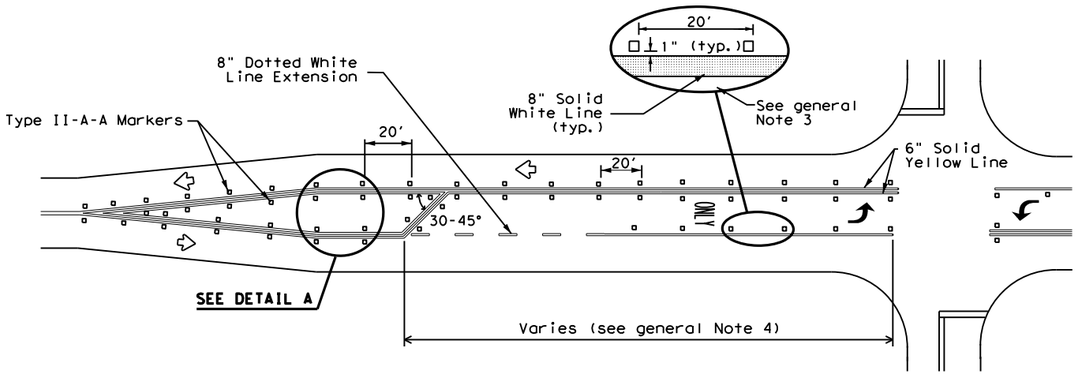
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



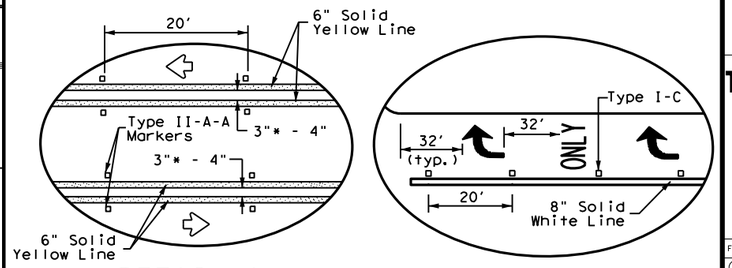
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



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



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

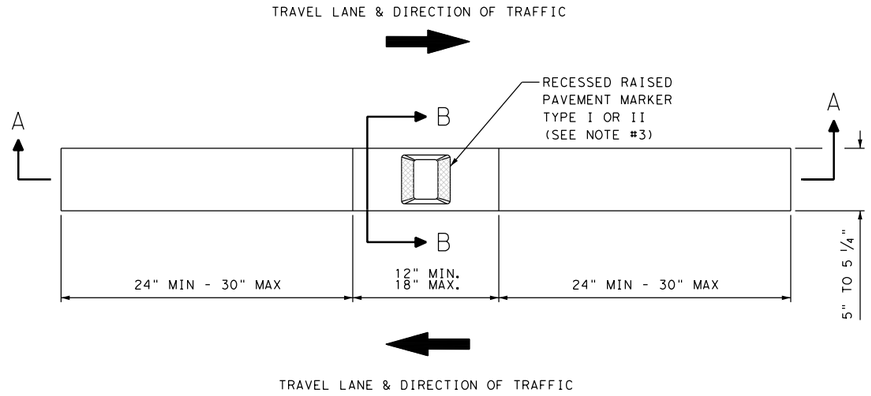
TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

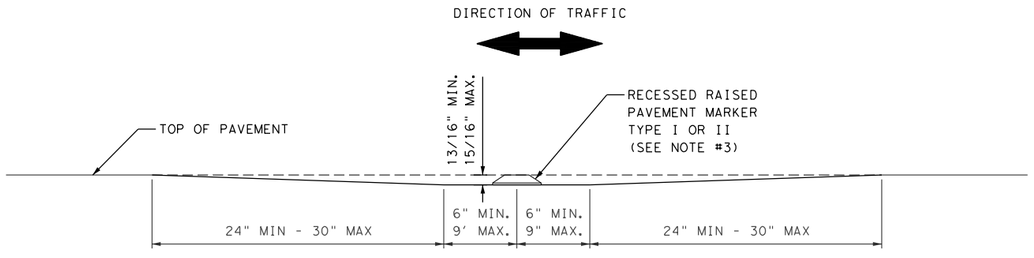
FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20, 5-00 2-10 12-22, 8-00 2-12	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		161

22C

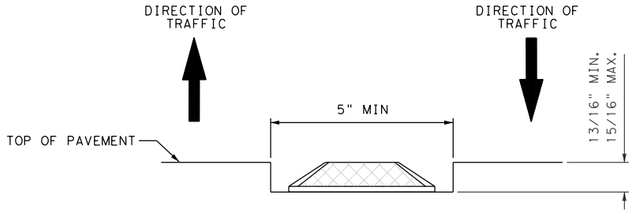
RECESSED RAISED PAVEMENT MARKER DETAIL FOR TWO LANE TWO-WAY HIGHWAY OR MULTILANE UNDIVIDED HIGHWAY



PLAN VIEW



SECTION A-A



SECTION B-B

LEGEND

BI-DIRECTIONAL RAISED PAVEMENT MARKER TYPE II (SEE NOTE #3).

MONO-DIRECTIONAL RAISED PAVEMENT MARKER TYPE I.

NOTES

1. DEPTH AND WIDTH OF GROOVE MAY BE ADJUSTED SLIGHTLY TO FIT PHYSICAL DIMENSIONS OF MARKER SELECTED IF APPROVED IN ADVANCE BY THE ENGINEER.
2. ALL PAVEMENT MARKING MATERIALS WILL MEET THE REQUIRED DEPARTMENTAL MATERIAL SPECIAL SPECIFICATIONS FOR 6362.
3. SEE ELSEWHERE IN PLANS FOR SPECIFIED TYPE AND REFLECTORIZED SURFACE LIGHT COLOR.

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

2/21/2024

AMARILLO DISTRICT
RECESSED RAISED PAVEMENT MARKER DETAIL FOR TWO LANE TWO-WAY HIGHWAYS OR MULTILANE UNDIVIDED HIGHWAYS

SCALE: N.T.S.

2021 Texas Department of Transportation

SHEET 1 OF 1

DSN	CK	CONT	SECT	JOB	HIGHWAY
		0455	03	038	SH 152
DRWN	CK	DIST	COUNTY		SHEET NO.
		AMA	GRAY		162

DATE: 7-20-2021 9:45 AM
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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

Anchor Type

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

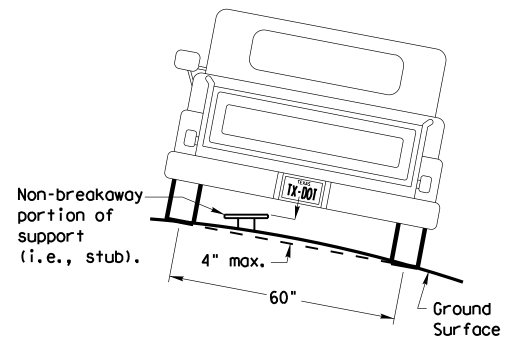
Sign Mounting Designation

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

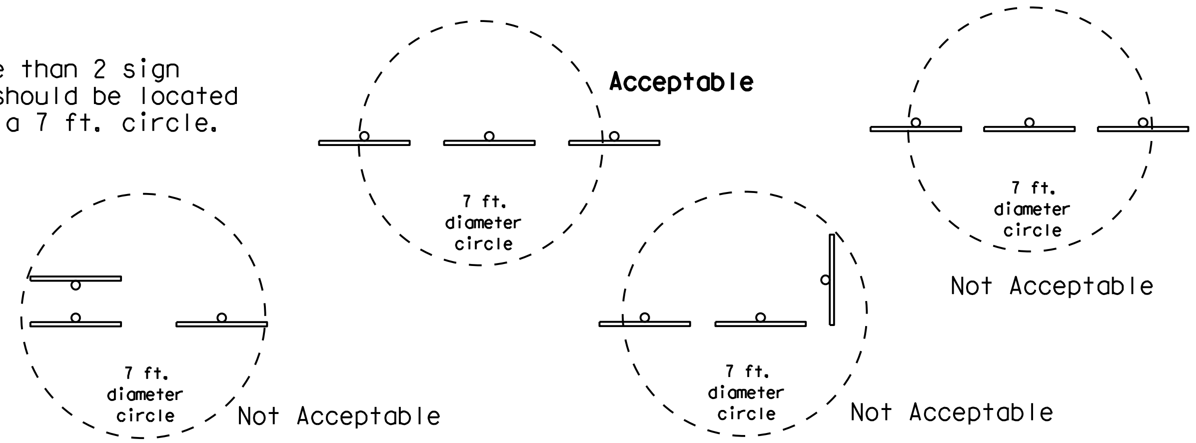
IF REQUIRED

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

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT

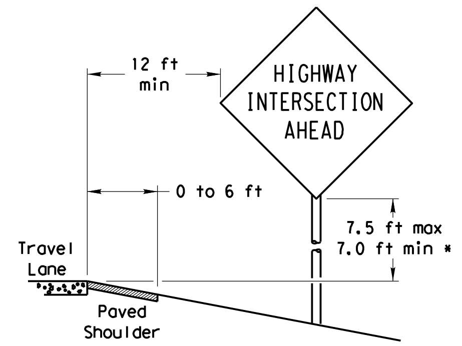


To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).



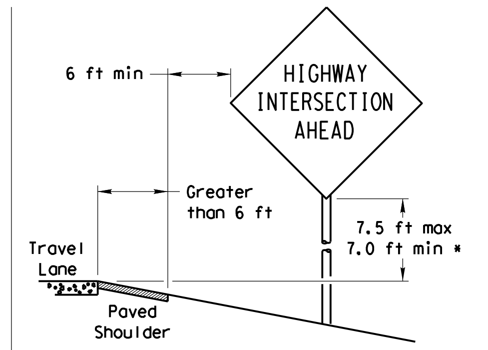
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

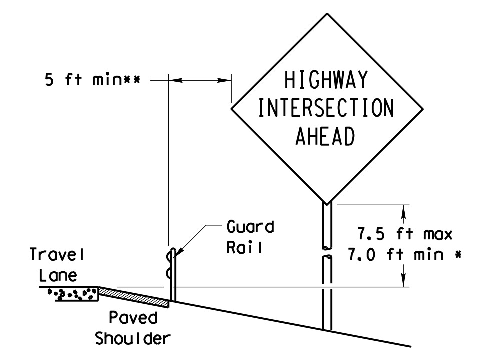
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



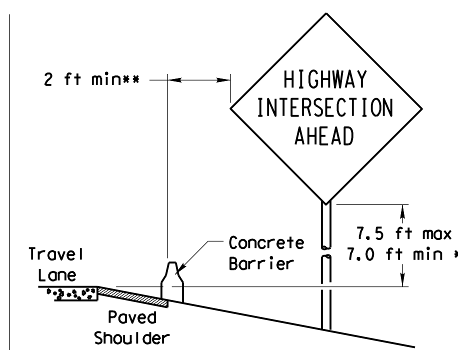
GREATER THAN 6 FT. WIDE

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

BEHIND BARRIER



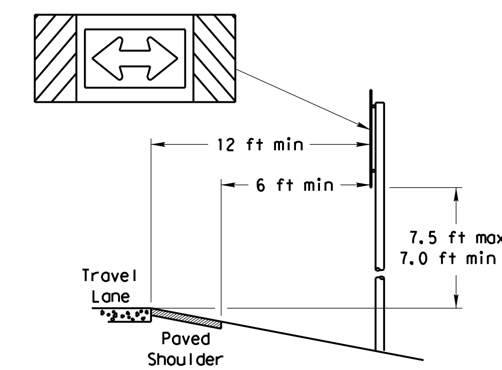
BEHIND GUARDRAIL



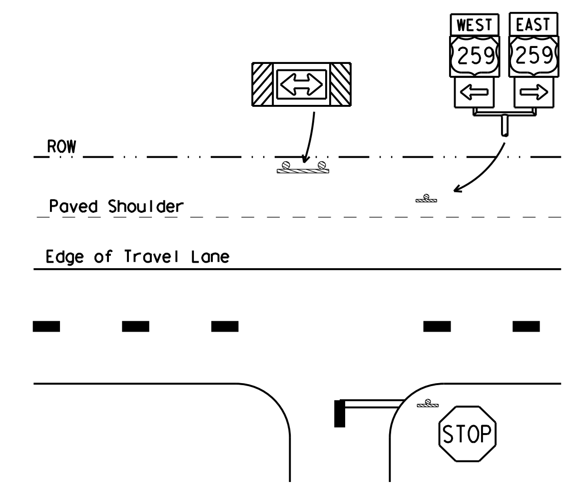
BEHIND CONCRETE BARRIER

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

T-INTERSECTION



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



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

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

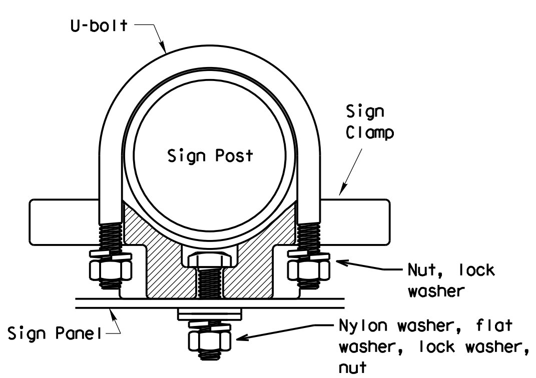
The maximum values may be increased when directed by the Engineer.

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

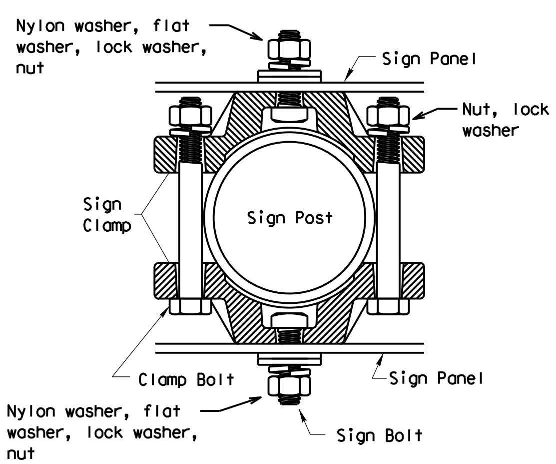
The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



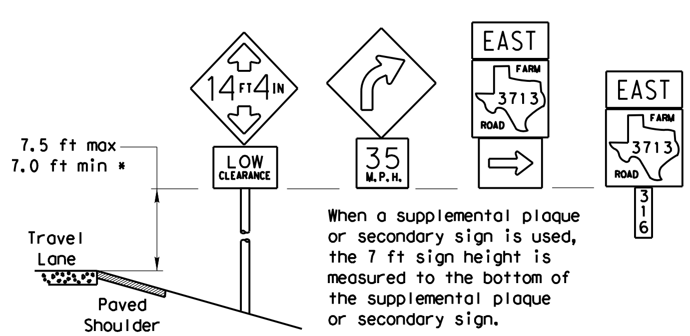
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

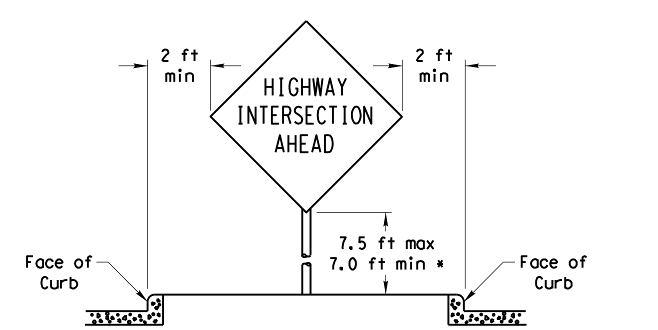
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



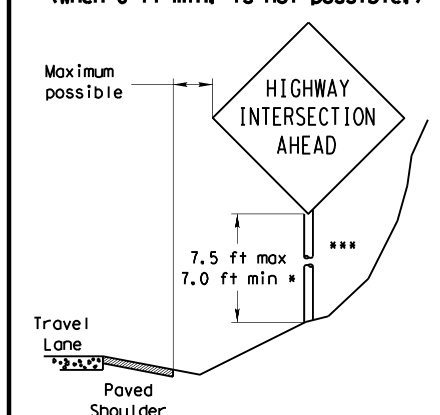
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT	
9-08	CONT	SECT	JOB	HIGHWAY	
	0455	03	038	SH 152	
	DIST		COUNTY	SHEET NO.	
	AMA		GRAY	163	

26A

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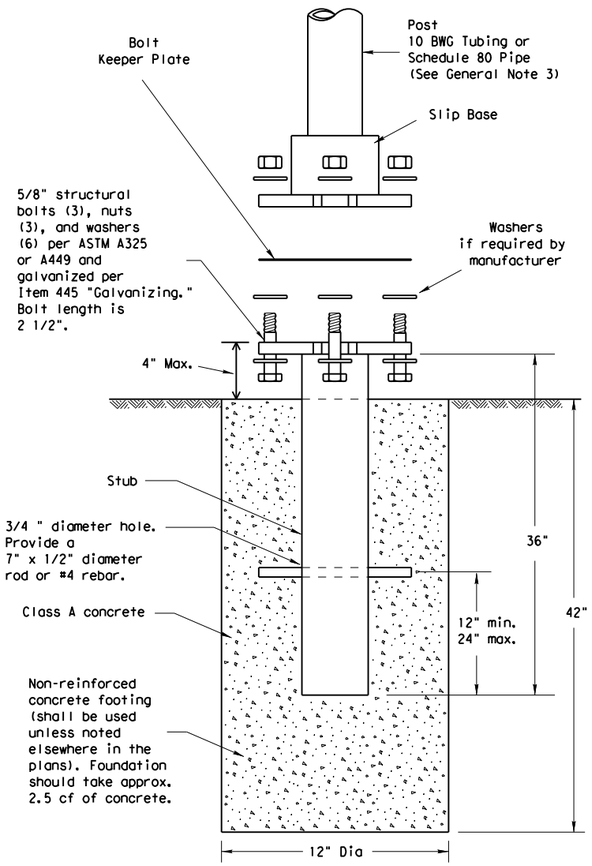
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

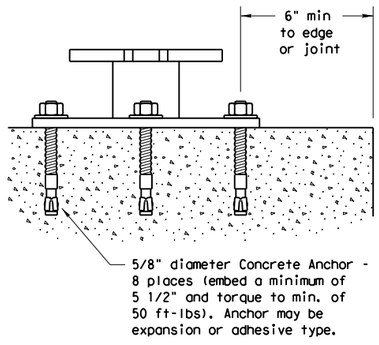
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

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

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

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152

DIST	COUNTY	SHEET NO.
AMA	GRAY	164

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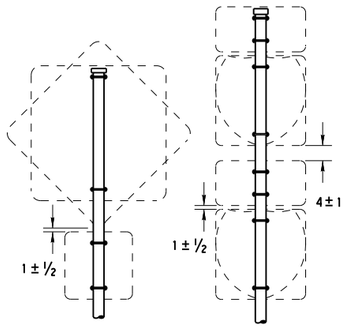
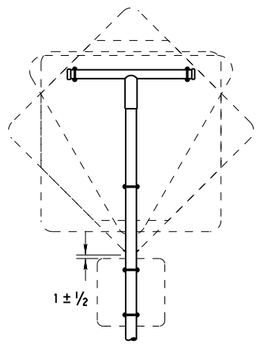


SM RD SGN ASSM TY XXXXX(1)XX(P)



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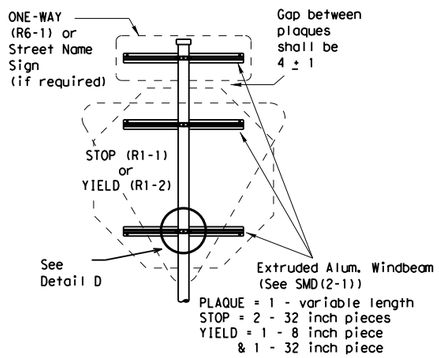

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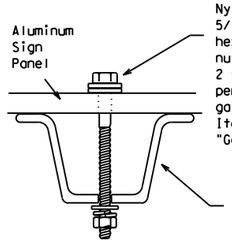
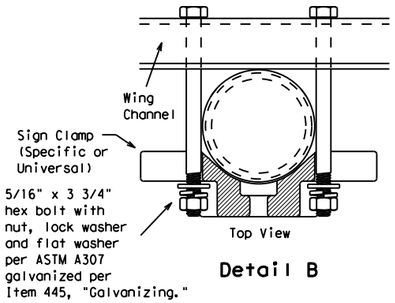
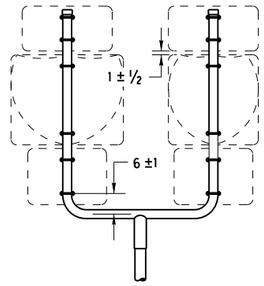


Detail A



Detail B



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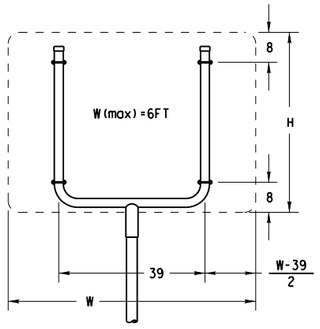

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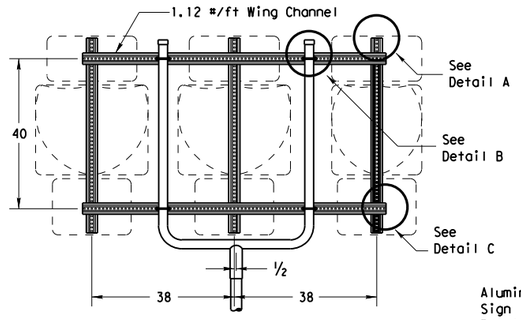
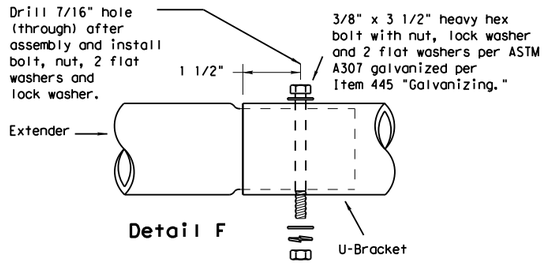
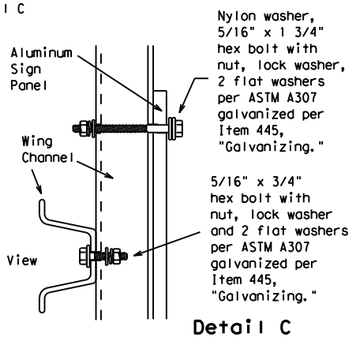


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

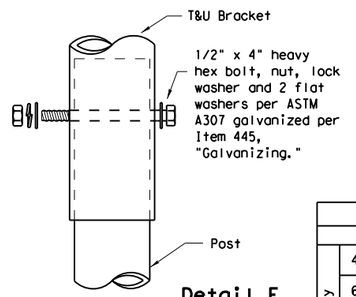


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



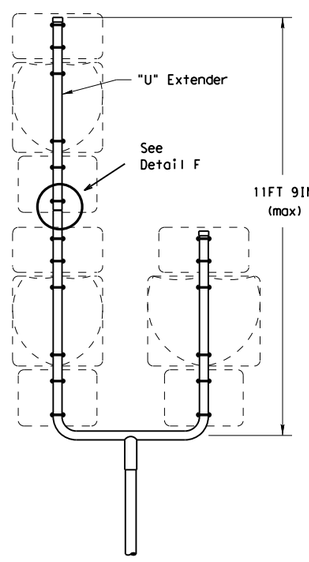
Detail E

GENERAL NOTES:

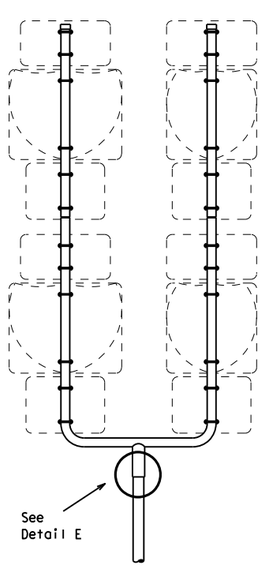
1.

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

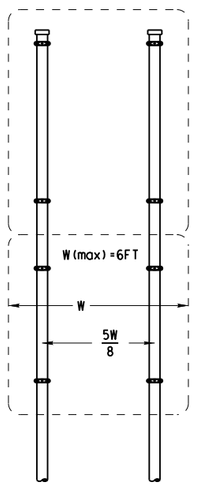
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



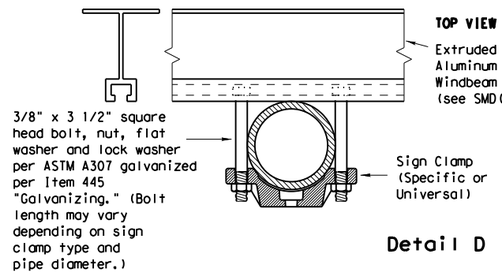
SM RD SGN ASSM TY S80(1)XX(U-1EXT)



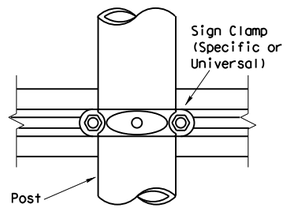
SM RD SGN ASSM TY S80(1)XX(U-2EXT)



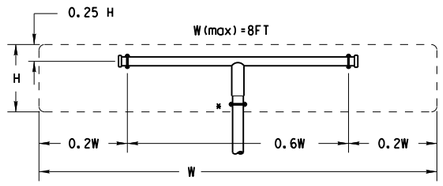
SM RD SGN ASSYM TY XXXXX(2)XX(P)



Detail D



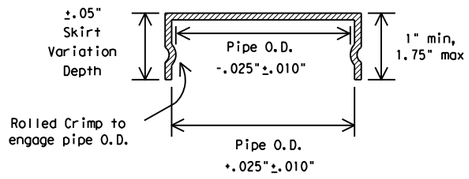
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)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



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.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		165

9-08 REVISIONS

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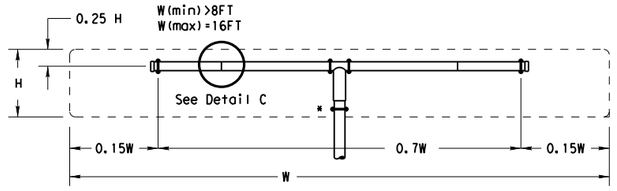
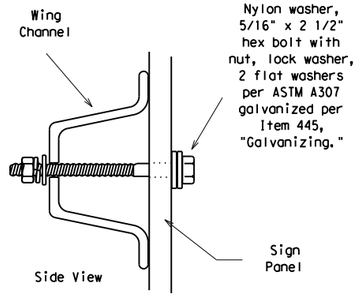
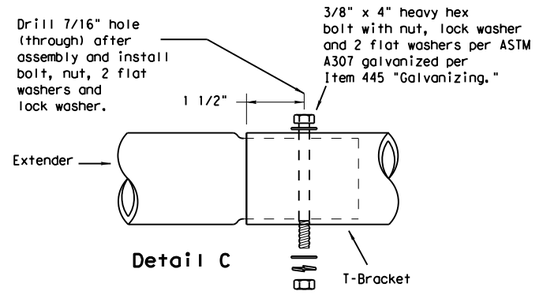


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



Detail B



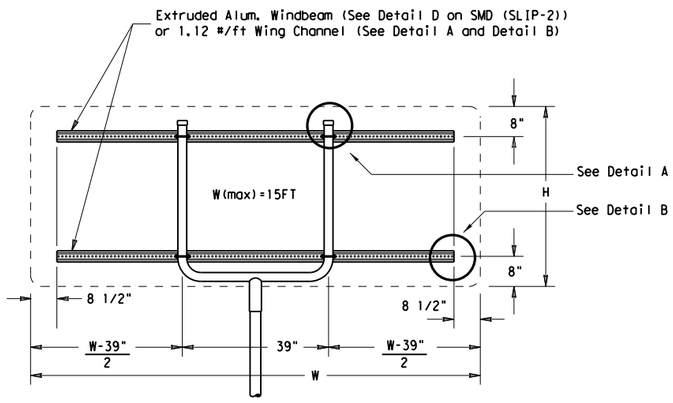
Detail C

Splices shall only be allowed behind the sign substrate.

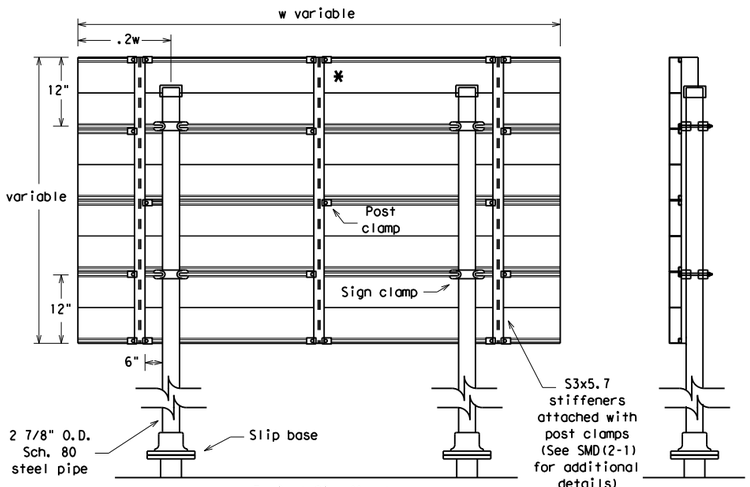
GENERAL NOTES:

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

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



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

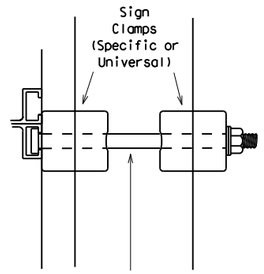


Typical Sign Mount

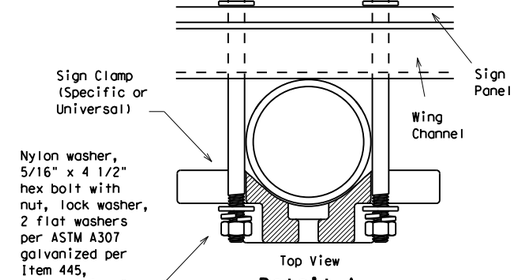
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

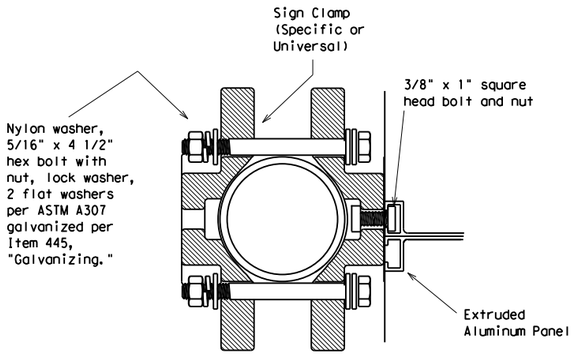
See Detail E
for clamp installation



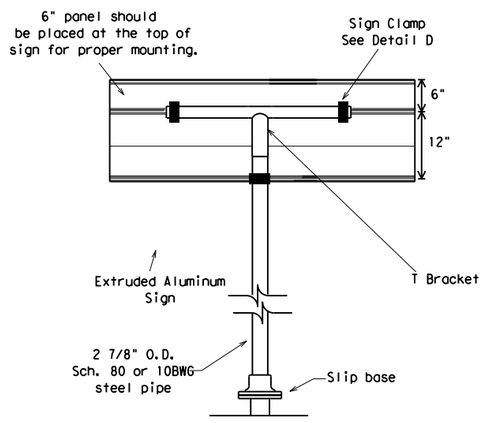
Detail E



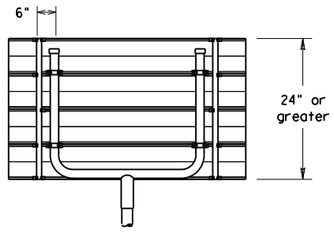
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		166

DATE: 2/21/2024 9:30:51 AM
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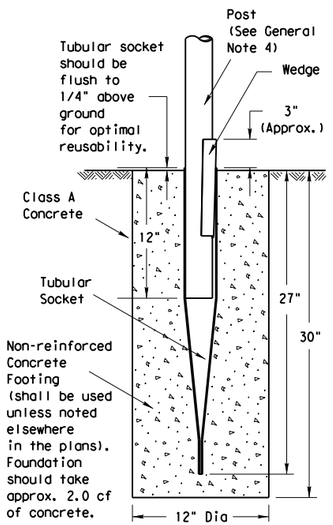
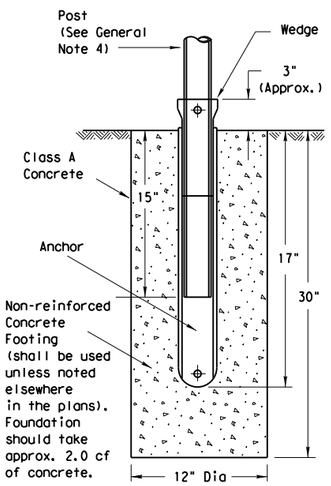
Wedge Anchor Steel System



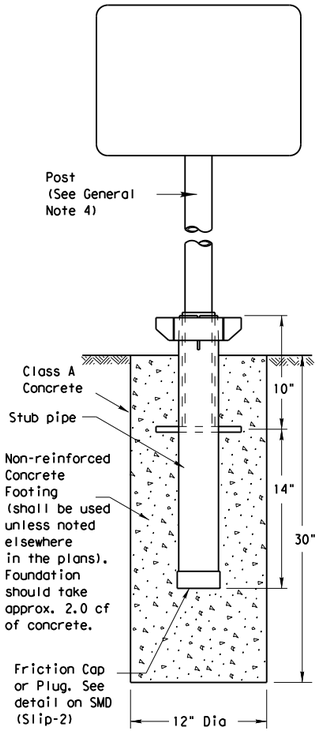
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

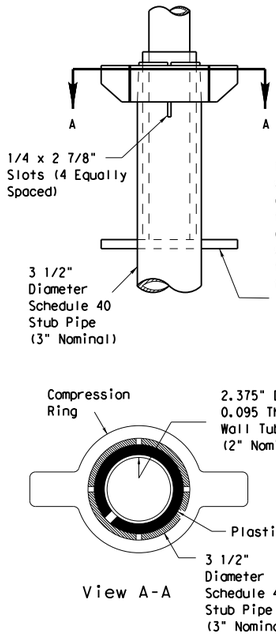


SMD RD SGN ASSM TY TWT(X)WP(X)

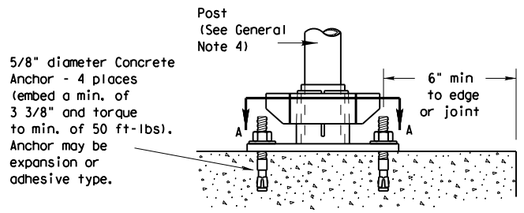
Universal Anchor System with Thin-Walled Tubing Post



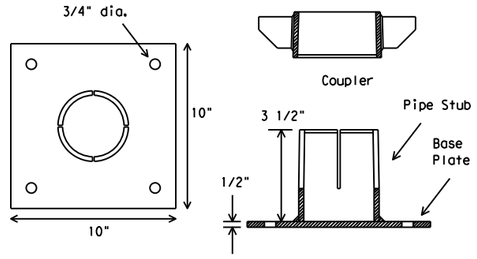
SM RD SGN ASSM TY TWT(X)UA(P)



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.

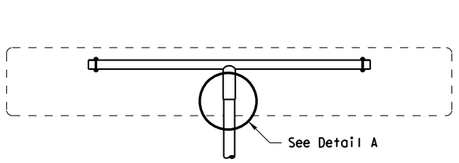


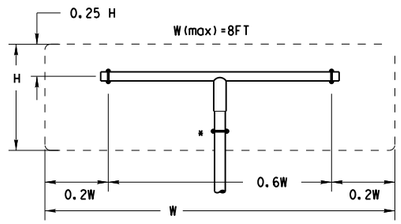
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized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



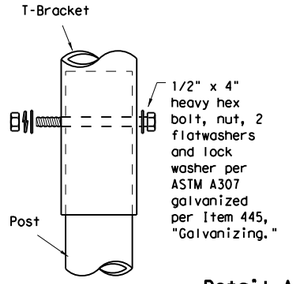
SM RD SGN ASSM TY TWT(X)UB(P)

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

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152

DIST	COUNTY	SHEET NO.
AMA	GRAY	167

26E

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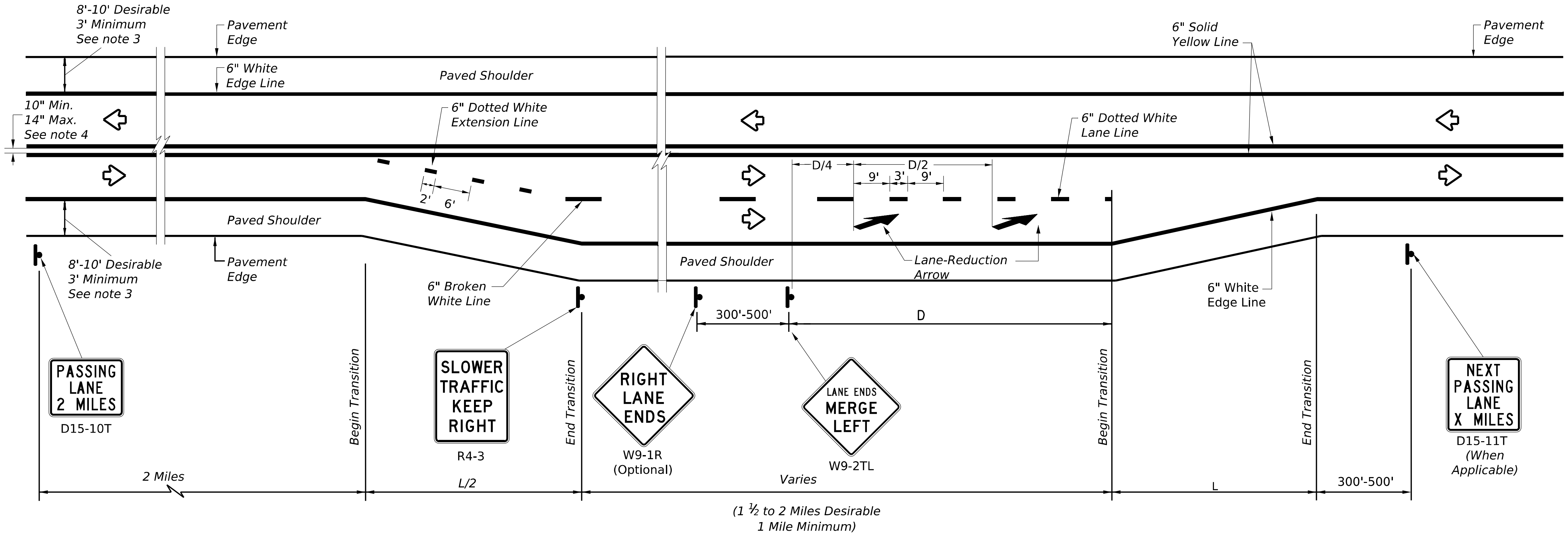

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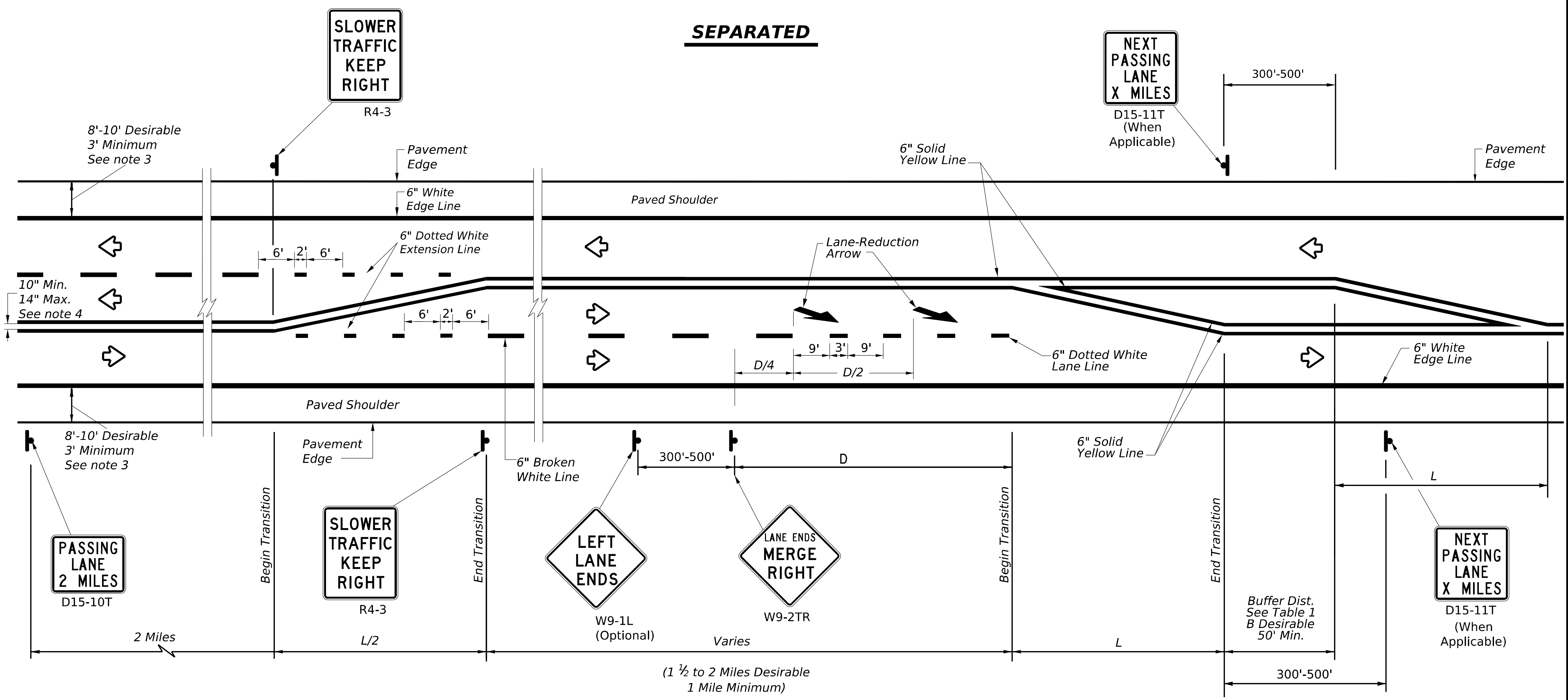

ALTERNATING

LEGEND

(symbol)	Sign
(symbol)	Traffic Flow

TYPICAL TAPER LENGTH (L)

Formula *	L = WS

* Transition length should be rounded up to nearest 5 foot increment.

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

EXAMPLE

A 12 foot lane is added on a 70 mph roadway. The length of the transition should be:

L=12x70=840 ft

TABLE 1
ADVANCE WARNING SIGN DISTANCE (D) AND BUFFER DISTANCE (B)

Posted Speed	D (FT)	B (FT)
40	670	305
45	775	360
50	885	425
55	990	495
60	1100	570
65	1200	645
70	1250	730
75	1350	820

GENERAL NOTES

1. For minimum and desirable design details, see the Roadway Design Manual, Chapter 4, Section 6, Super 2 Highways.
2. For Raised Pavement Markers (RPM) details, see Pavement Markings Standard sheet, PM(2) - Centerline for All Two Lane Two-Way Roadways. Note that RPMs are not recommended on the 6" dotted white extension lines.
3. For rumble strip options available for the designed shoulder width, see Rumble Strip Standard sheet RS(2).
4. For pavement marking details, see Pavement Marking Standard sheet PM(1).

Texas Department of Transportation

Traffic Safety Division Standard

TEXAS SUPER 2 PASSING LANES

TS2(PL-1)-23

FILE: ts2-1-23.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 5-10 3-18 2-12 2-23 3-12	0455	03	038	SH 152
	DIST		COUNTY	SHEET NO.
	AMA		GRAY	168

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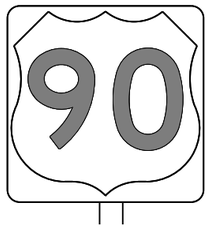
REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

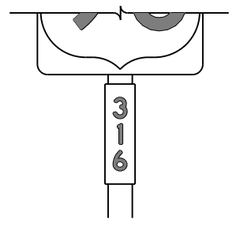
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING

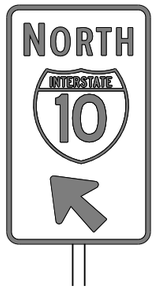


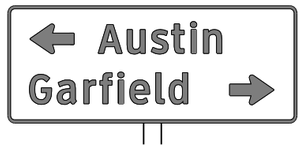
TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING







TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).
4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.
6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

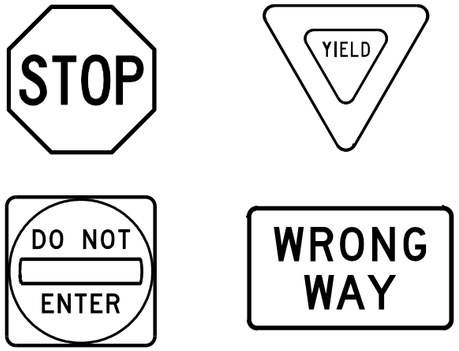
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	AMA	GRAY		169

DATE: 2/21/2024 9:30:56 AM
FILE: L:\DESIGN_PROJECTS_WorkSets\AMA_0455-03-038\4 - Design\Plan Set\8. Roadway\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

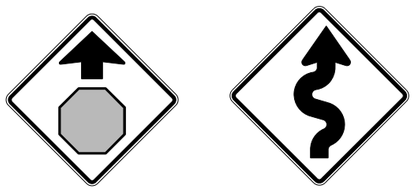
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

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

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

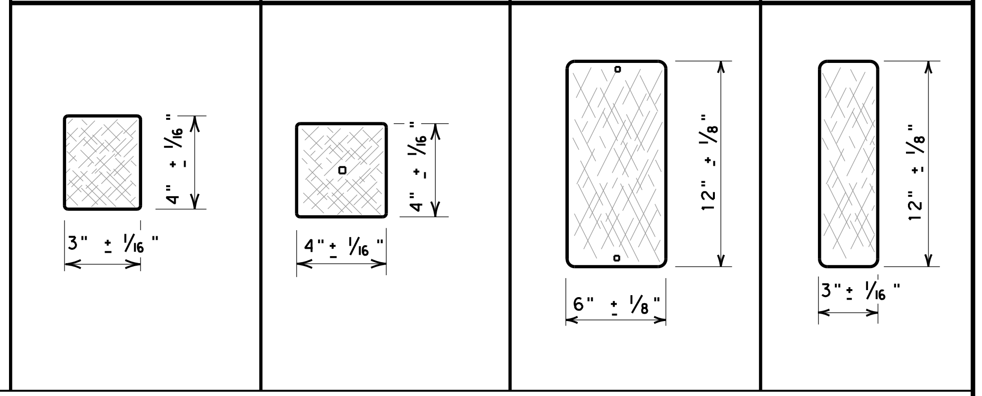
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

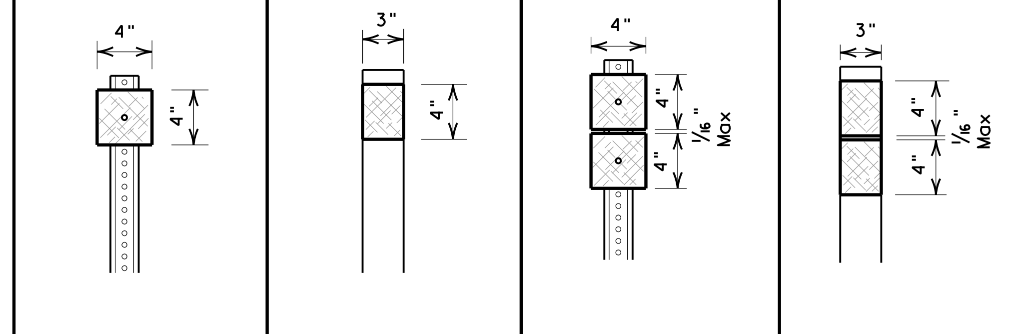
FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	AMA	GRAY		170

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)

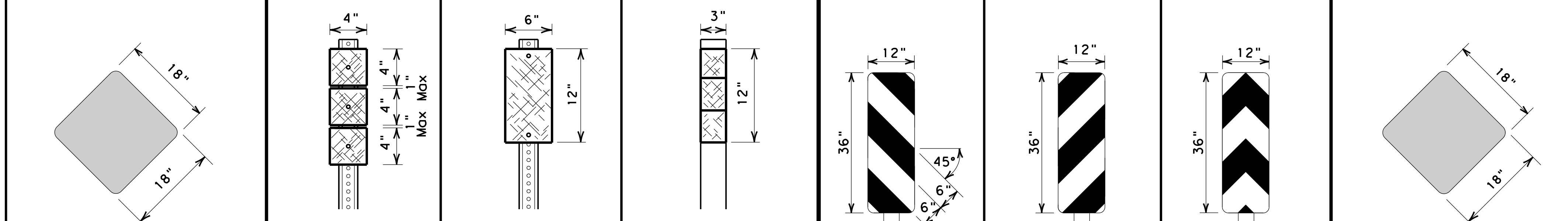
TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

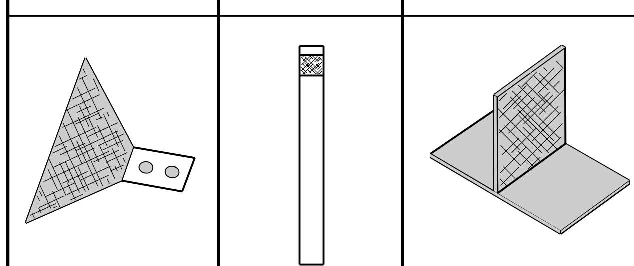
DEPARTMENTAL MATERIAL SPECIFICATIONS	
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

OBJECT MARKERS



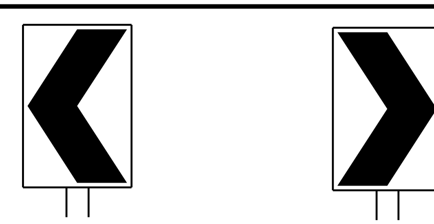
	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating 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)



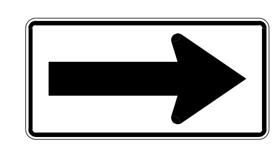
	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches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

ONE DIRECTION LARGE ARROW



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

NOTE

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

NOTE:

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

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-09 3-15 4-10 7-20	0455	03	038	SH 152
	DIST		COUNTY	SHEET NO.
	AMA		GRAY	171

20A

DATE: 2/21/2024 9:30:58 AM
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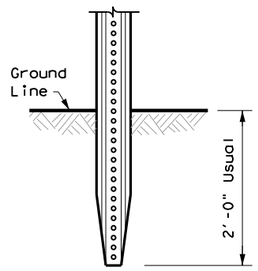
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

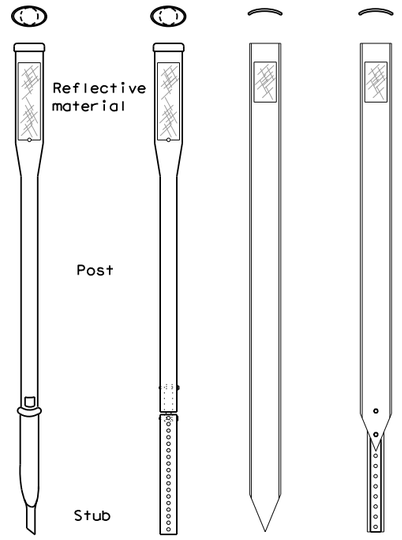


NOTES

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.

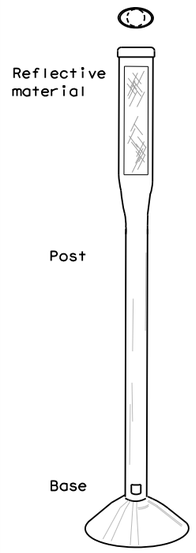
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



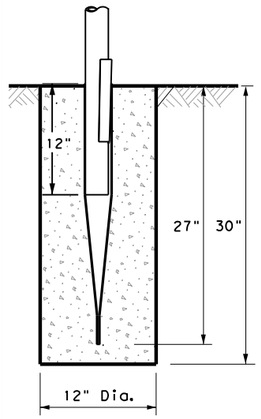
SURFACE MOUNT

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.

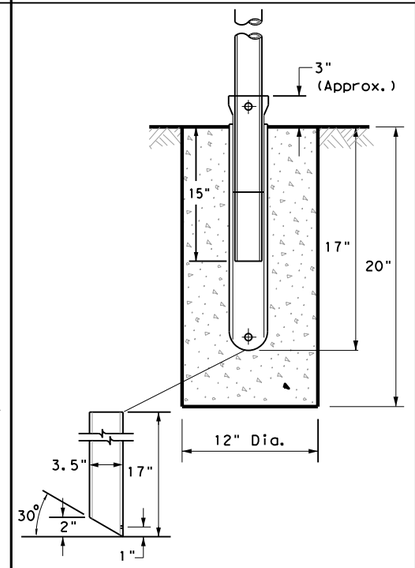
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

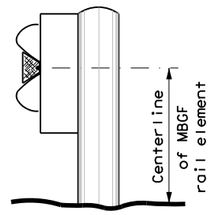
NOTE

1. Install per manufacturer's recommendations.

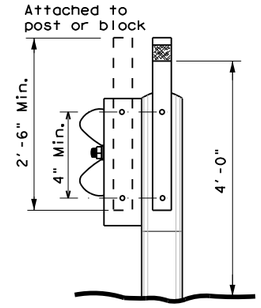
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

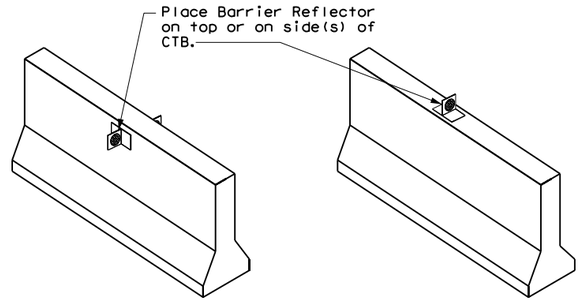
GF1



GF2



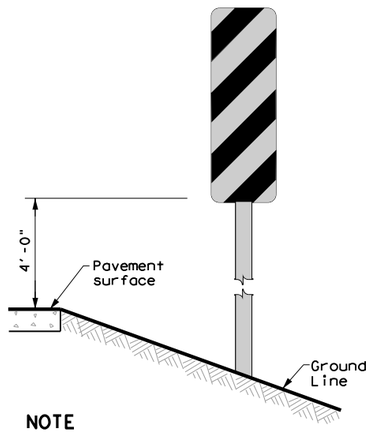
CONCRETE TRAFFIC BARRIER (CTB)



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.

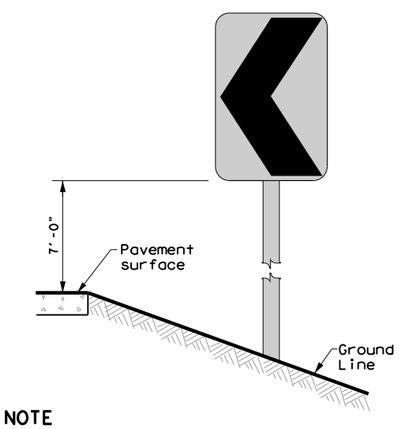
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

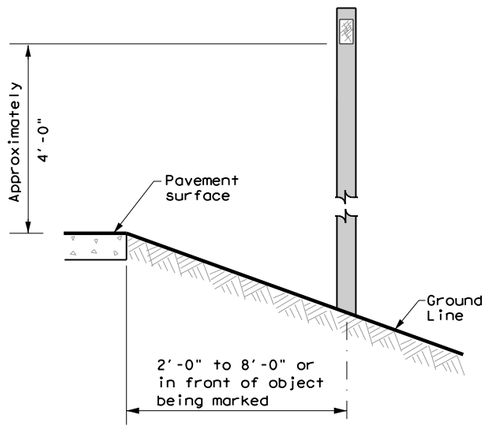
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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	0455	03	038	SH 152
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	AMA	GRAY		172

20B

DATE: 2/21/2024 9:31:01 AM
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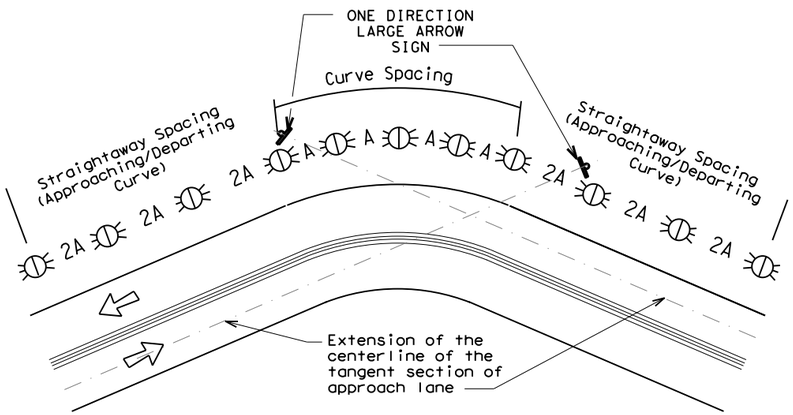
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

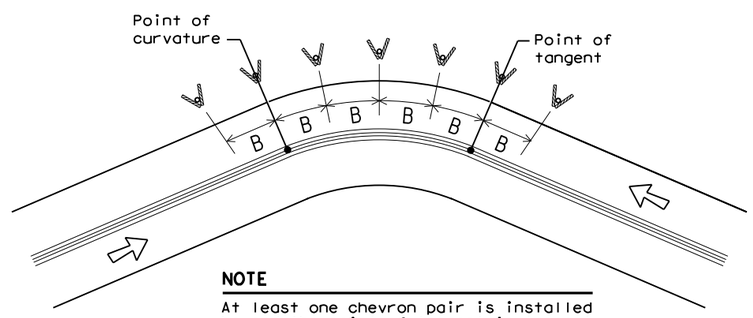
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS	0455	03	038	SH 152
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	AMA	GRAY		173

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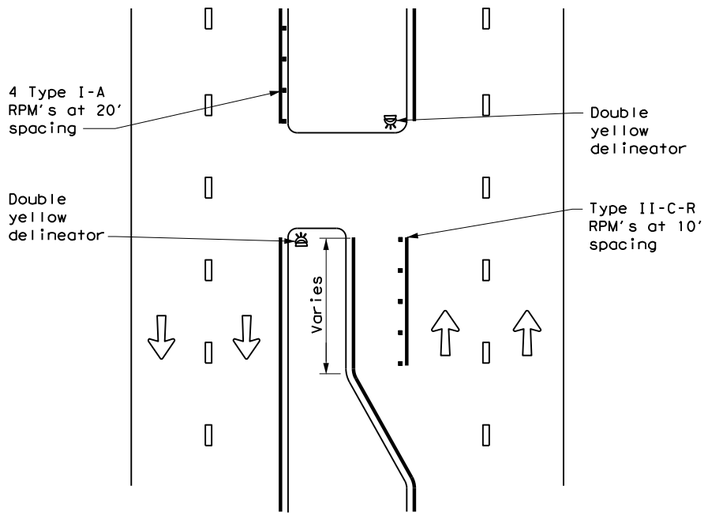
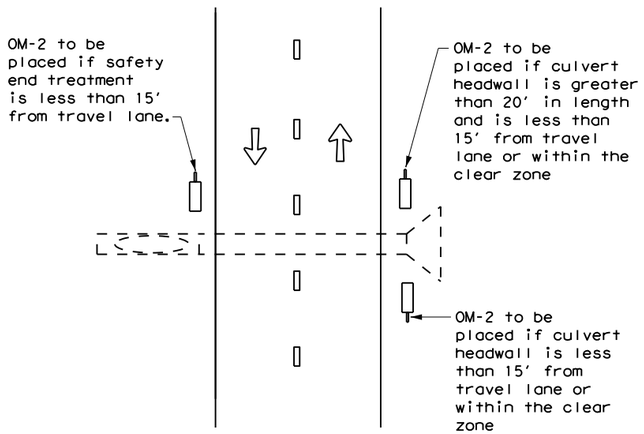
CROSSOVERS



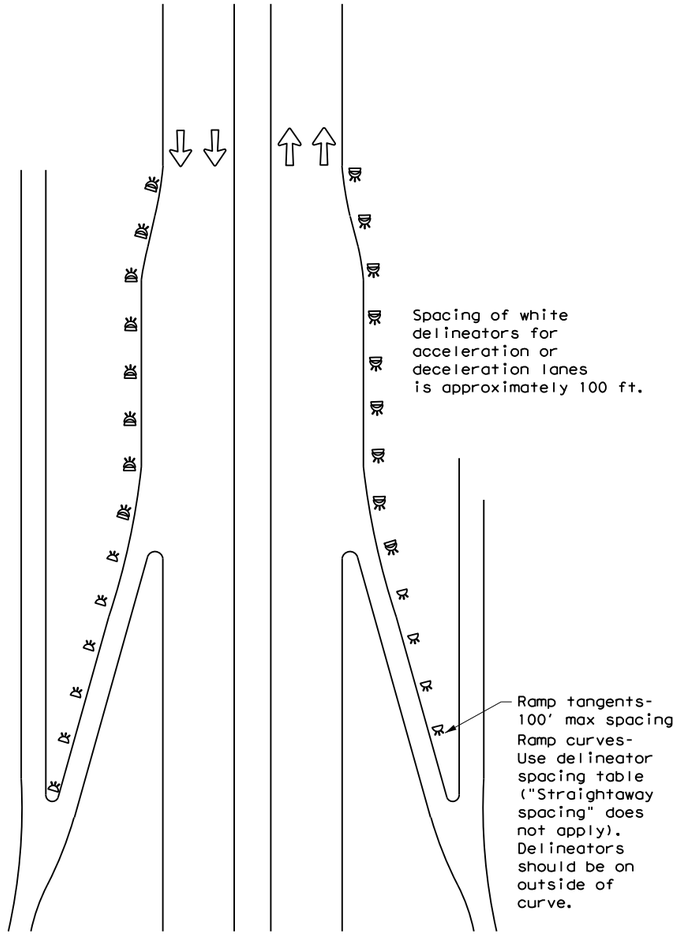
DETAIL 1

FOR CULVERTS WITHOUT MBGF



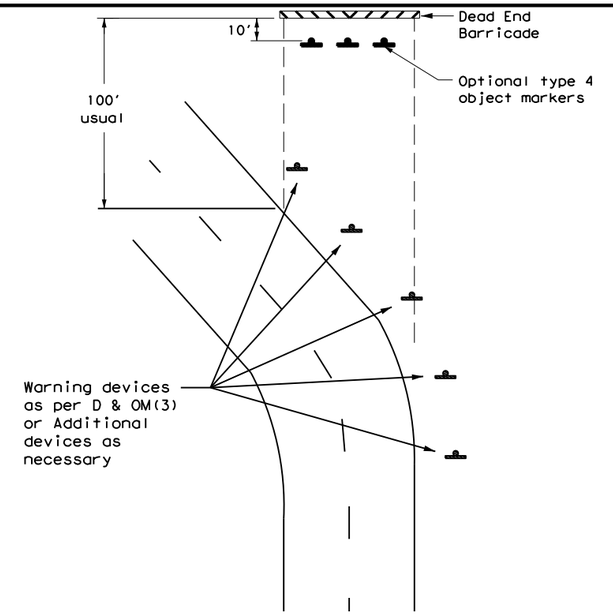
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



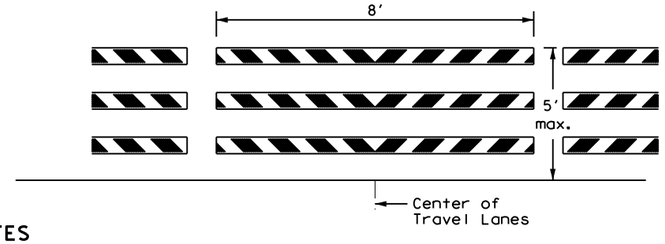
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

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

DETAIL 5

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

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7-20	AMA	GRAY		174

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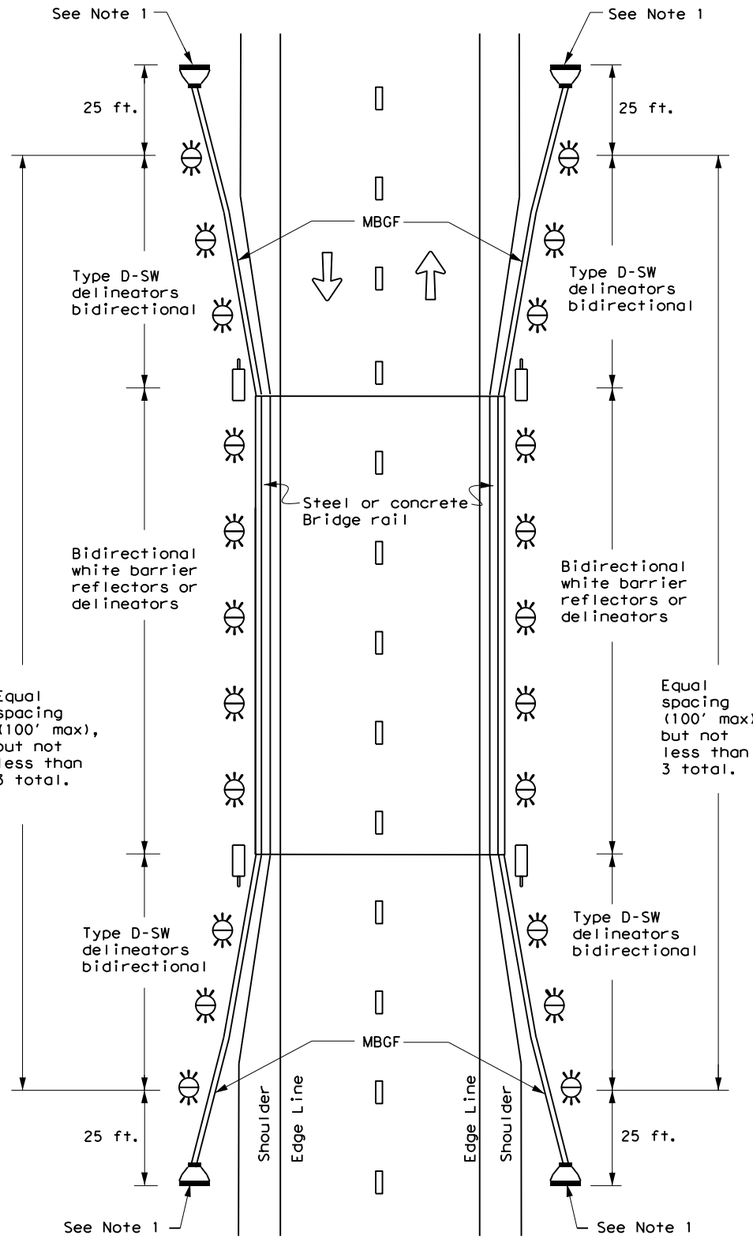
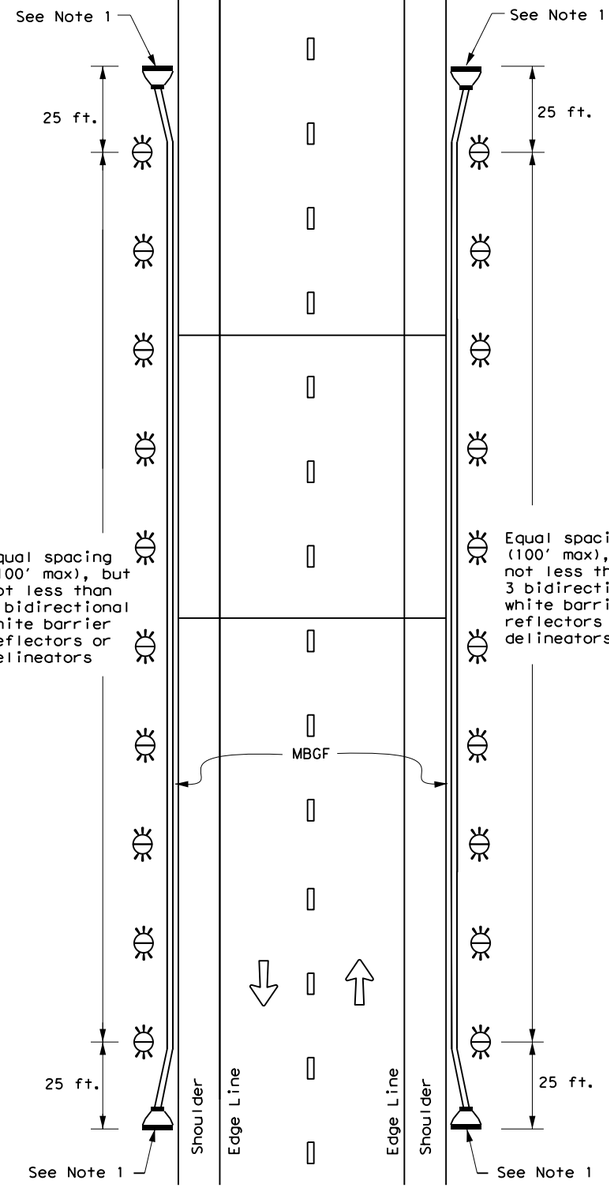
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

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

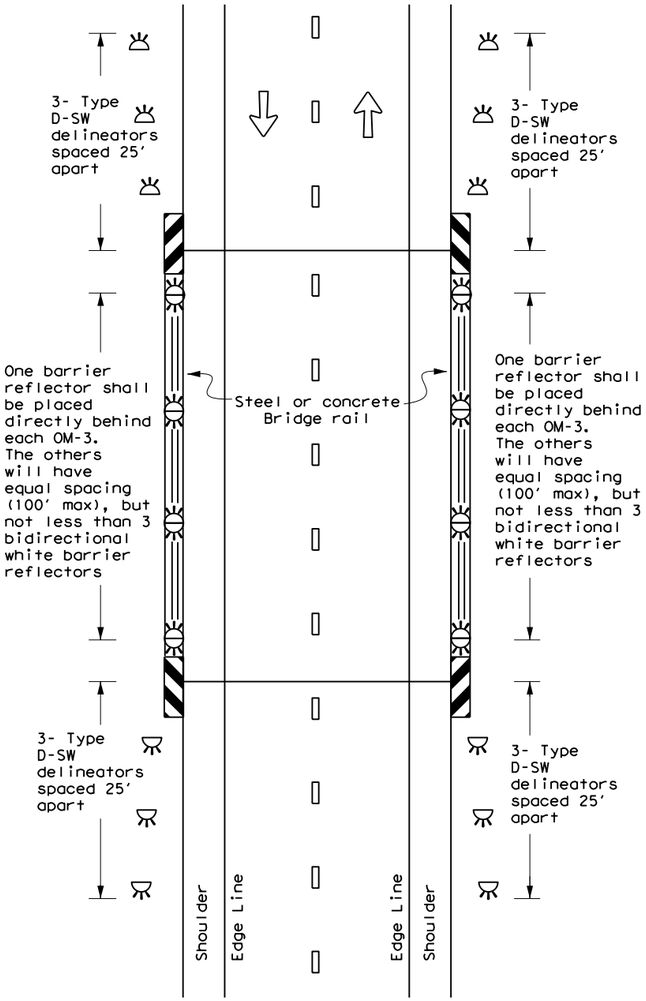
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

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

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



LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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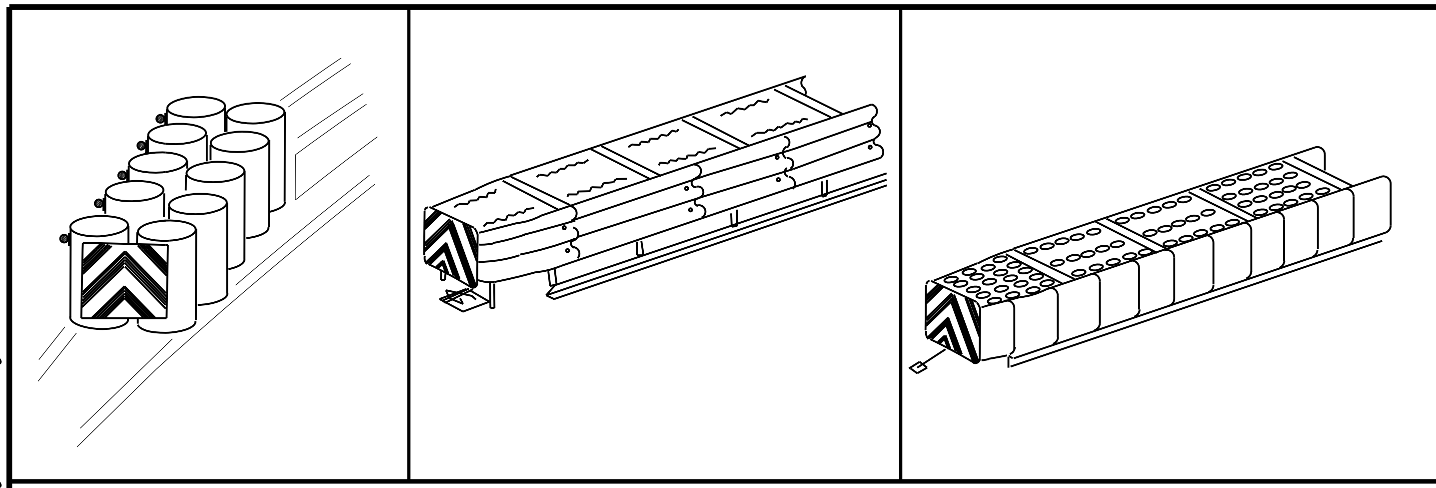
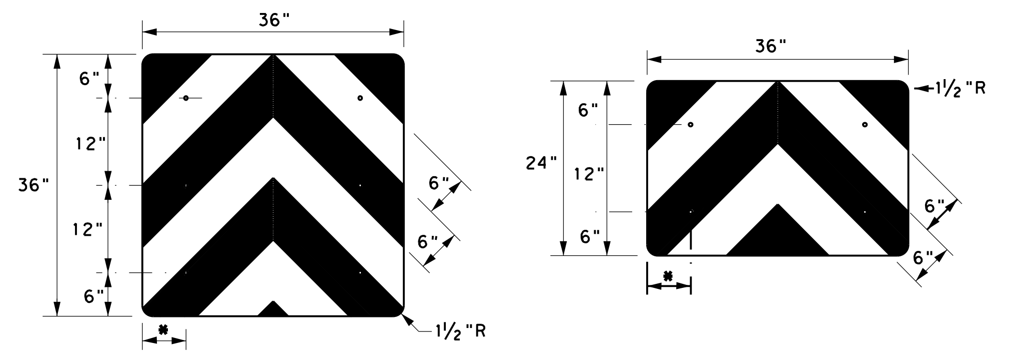
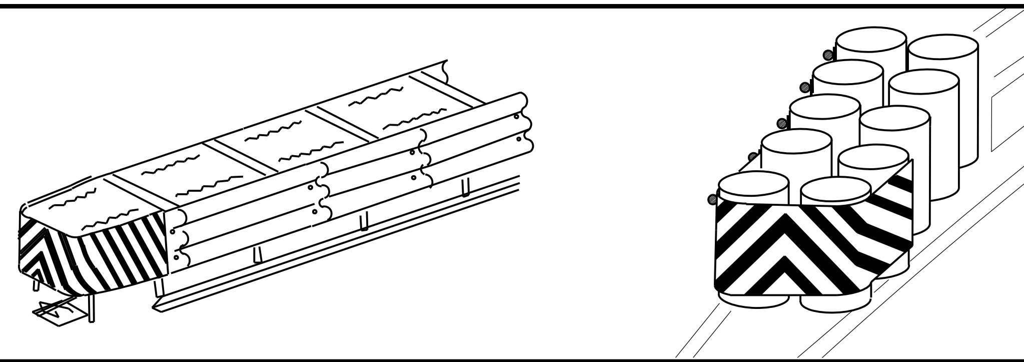
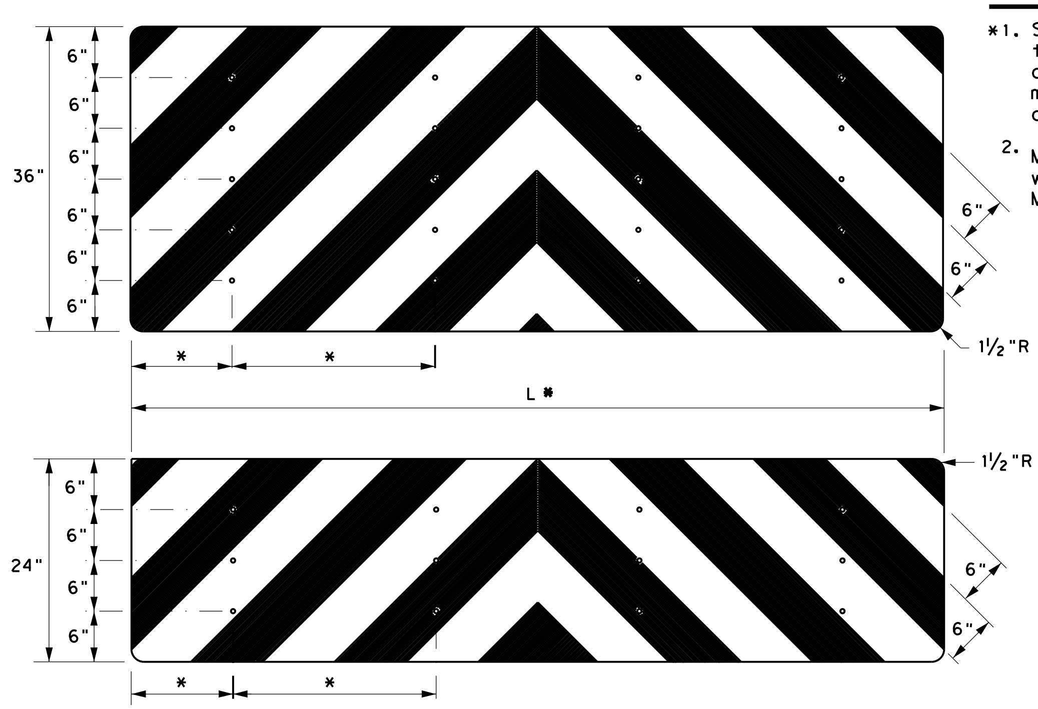




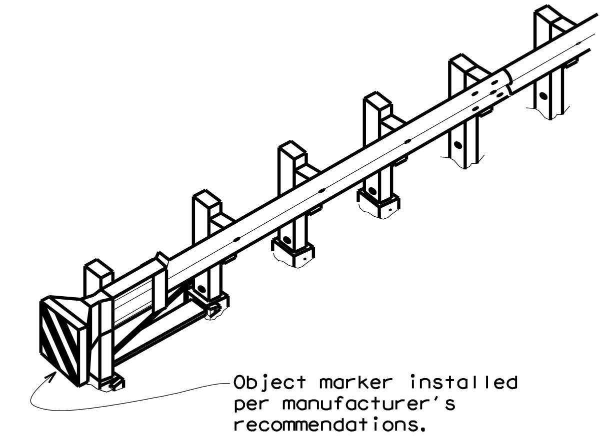


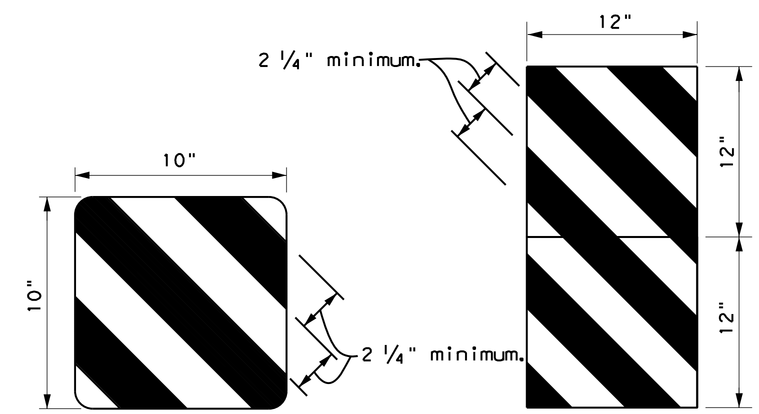


NOTES

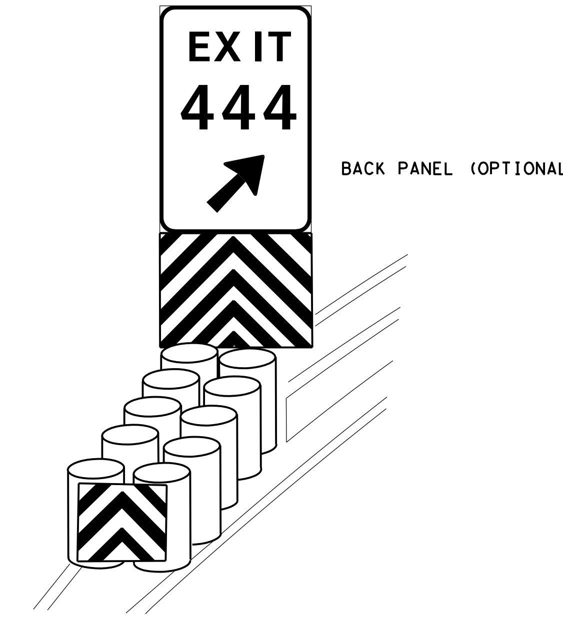
*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

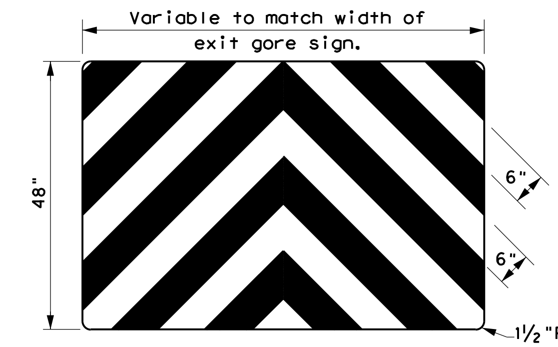
2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".





OBJECT MARKERS SMALLER THAN 3 FT^2





NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

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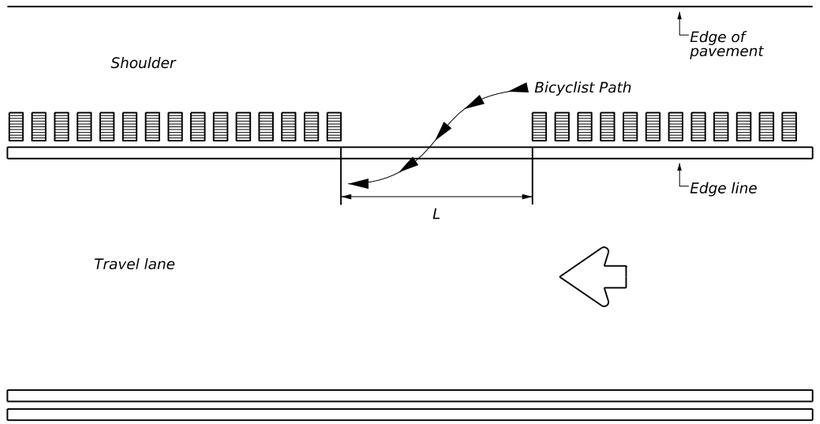


RUMBLE STRIP GAP SPACING

GAP LENGTH TABLE (L)	
BICYCLISTS OPERATING <= 20 MPH	>= 15 FEET
BICYCLISTS OPERATING > 20 MPH	>= 20 FEET*

* Or the rumble strips should be located on the right side of the shoulder to allow bicyclists to avoid them if they encounter a need to enter the travel lane (e.g. a downhill location).

GENERAL NOTES

1. The Engineer must consider accomodating bicycles during the planning and implementation of all construction and rehabilitation projects. See the TxDOT Roadway Design Manual (RDM) Bicycle Facilities section for applicable policies, references, and guidance; including additional detail regarding rumble strip gap and horizontal placement, as well as explanation of desirable, minimum, and constrained values.

2. For non-freeway facilities with bike lanes, buffered bike lanes, or bike-accessible shoulders, the Engineer shall place rumble strips considering the safety of and crash risk for bicyclists. The Engineer shall include a detail of rumble strip gap spacing, horizontal spacing from the edge line, and material / installation method in the plans.

3. See RS(5) General Note 8 regarding bicycle safety with transverse (in-line rumble strips.

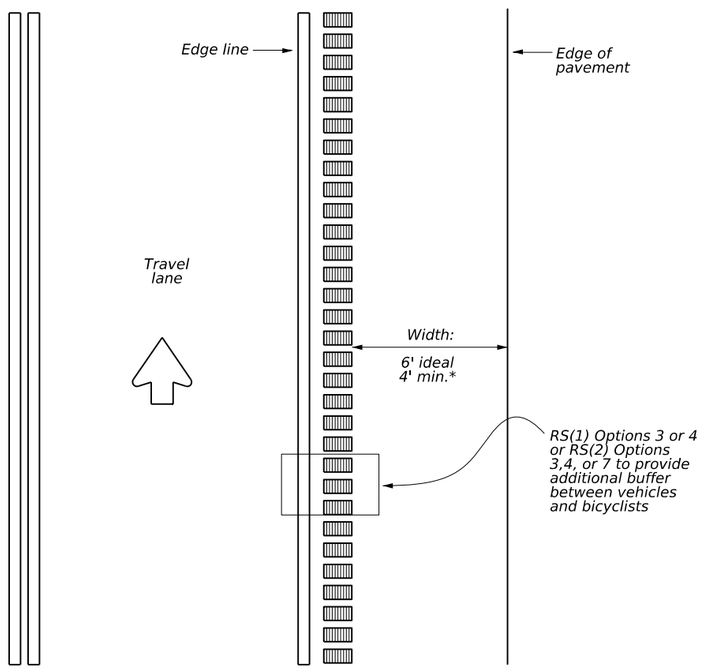
GAPS

4. Rumble strip gaps to allow bicyclists to safely enter or exit a shoulder, as needed. In addition to gaps provided for vehicles (e.g. at cross-streets), the Engineer shall ensure gaps are available every 40 to 60 feet. See Gap Spacing detail. The Engineer should consider significant grades as they affect bicycle speeds in applying the Gap Length Table, for example downhill versus uphill bicycle speeds.

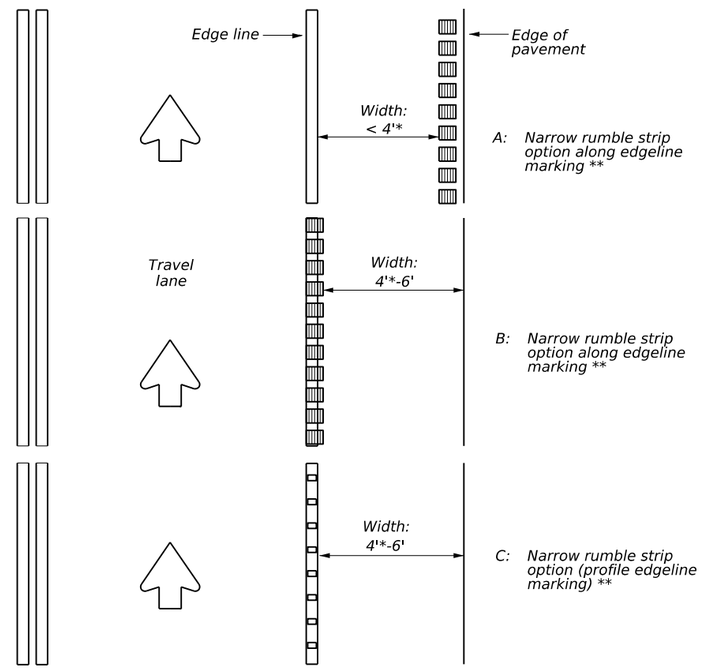
HORIZONTAL SPACING

5. Rumble strip horizontal spacing considerations affect bicyclist safety and mobility. The Engineer shall consider desirable, minimum, and constrained widths, as shown in the horizonal placement detail. The Engineer shall apply engineering judgment to choose placement and material options in the Shoulder Width Tables on each RS sheet to optimize safety for all users. Horizontal width for bikes does not include standard drainage inlets, rumble strips, or raised pavement markers (RPMs).

IDEAL



CONSTRAINED**



* 5' minimum if adjacent to curb, guardrail, vertical element, or obstacle.
** Options A-C for consideration of horizontal placement using engineering judgment. See RS(1) and RS(2) for rumble strip device options. Care should be taken to consider bicycles in applying the tables by shoulder width. Narrow rumble strip options include RS(1) Options 1, 2, and 6 and RS(2) Options 1, 2, 6, and 8.

RUMBLE STRIP HORIZONTAL PLACEMENT

Texas Department of Transportation

Traffic Safety Division Standard

RUMBLE STRIP BICYCLE CONSIDERATIONS FOR NON-FREEWAY FACILITIES RS(6)-23

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94A

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DATE:
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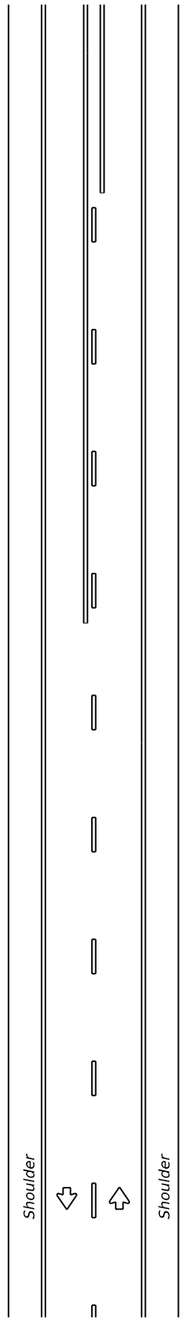
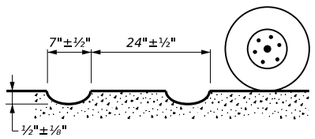
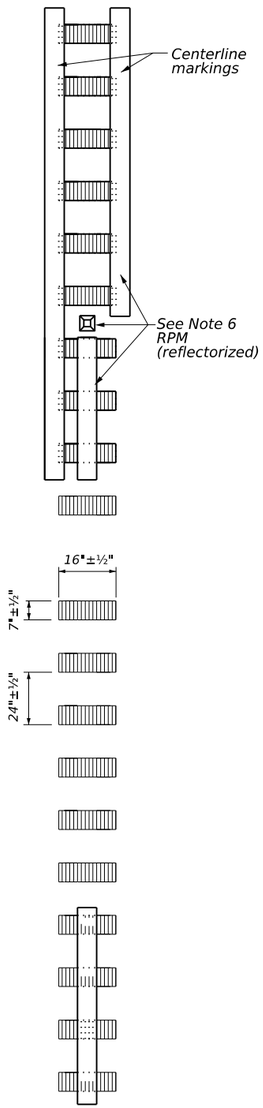
CENTERLINE RUMBLE STRIPS



TWO LANE TWO-WAY HIGHWAYS

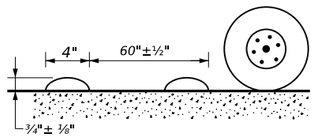


PROFILE VIEW

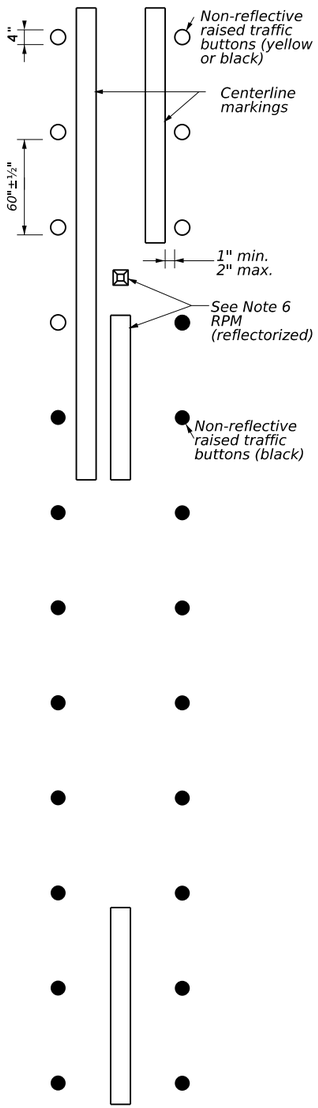


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

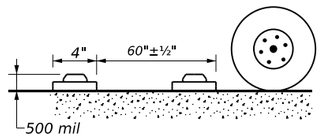


PROFILE VIEW

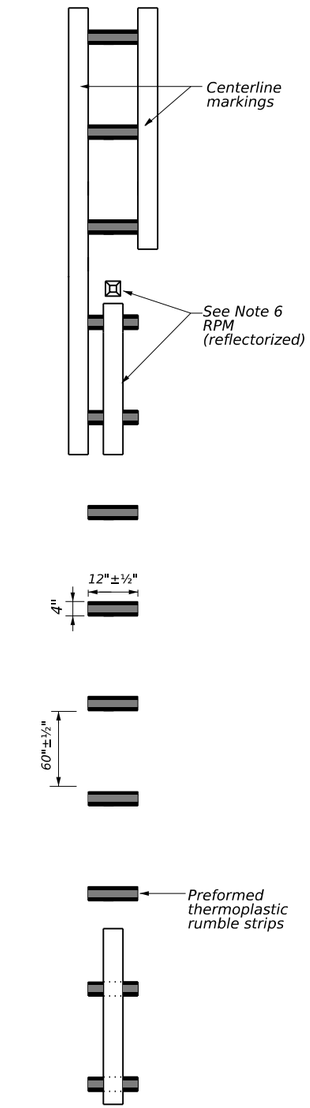


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

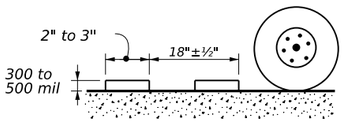


PROFILE VIEW

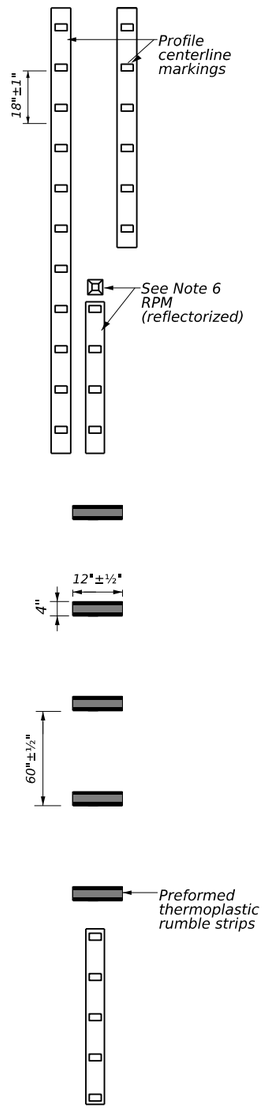


PLAN VIEW
OPTION 3

PREFORMED THERMOPLASTIC RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC RUMBLE STRIPS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
2. Centerline and edge line rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections or driveways with high usage of large trucks.
6. Use standard sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. The color of the button should be yellow for a continuous no passing roadway. Black buttons should be used in areas where passing is allowed.
12. Consideration shall be given to bicyclists. See RS(6).

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

13. See standard sheet RS(2).

Texas Department of Transportation

Traffic Safety Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS RS(4)-23

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10-13 1-23	DIST	COUNTY		SHEET NO.
	AMA	GRAY		178

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0455-03-037

1.2 PROJECT LIMITS:
From: Gray County Line

To: SH 70 IN PAMPA

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 35° 31' 55.55" N ,(Long) 101° 05' 09.53" W

END: (Lat) 35° 31' 55.93" N ,(Long) 100° 58' 19.34" W

1.4 TOTAL PROJECT AREA (Acres): 77.85

1.5 TOTAL AREA TO BE DISTURBED (Acres): 60.21

1.6 NATURE OF CONSTRUCTION ACTIVITY:
Construction of TWLTL Extension widening, pavement repair, ACP overlay, and safety end treatement upgrades.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Pullman clay loam	0-3% slopes, 0-5" clay loam, 5-33" silty clay loam
Estacado clay loam	1-3% slopes, 0-5" clay loam, 5-18" clay loam
Randall clay	0-1% slopes, 0-12" clay, 12-37" clay

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- ☐ PSLs determined during preconstruction meeting
- ☐ PSLs determined during construction
- ☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

- ☐ Mobilization
- ☐ Install sediment and erosion controls
- ☐ Blade existing topsoil into windrows, prep ROW, clear and grub
- ☐ Remove existing pavement
- ☐ Grading operations, excavation, and embankment
- ☐ Excavate and prepare subgrade for proposed pavement widening
- ☐ Remove existing culverts, safety end treatments (SETs)
- ☐ Remove existing metal beam guard fence (MBGF), bridge rail
- ☐ Install proposed pavement per plans
- ☐ Install culverts, culvert extensions, SETs
- ☐ Install mow strip, MBGF, bridge rail
- ☐ Place flex base
- ☐ Rework slopes, grade ditches
- ☐ Blade windrowed material back across slopes
- ☐ Revegetation of unpaved areas
- ☐ Achieve site stabilization and remove sediment and erosion control measures
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- ☐ Sediment laden stormwater from stormwater conveyance over disturbed area
- ☐ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- ☐ Solvents, paints, adhesives, etc. from various construction activities
- ☐ Transported soils from offsite vehicle tracking
- ☐ Construction debris and waste from various construction activities
- ☐ Contaminated water from excavation or dewatering pump-out water
- ☐ Sanitary waste from onsite restroom facilities
- ☐ Trash from various construction activities/receptacles
- ☐ Long-term stockpiles of material and waste
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
Red Deer Creek	Intermittent Stream
Playa Lakes	Non-jurisdictional

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- X Development of plans and specifications
- X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- X Post Construction Site Notice
- X Submit NOI/CSN to local MS4
- X Perform SWP3 inspections
- X Maintain SWP3 records and update to reflect daily operations
- X Complete and submit Notice of Termination to TCEQ
- X Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- X Day To Day Operational Control
- X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- X Post Construction Site Notice
- X Submit NOI/CSN to local MS4
- X Maintain schedule of major construction activities
- X Install, maintain and modify BMPs
- X Complete and submit Notice of Termination to TCEQ
- X Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity
NOT APPLICABLE

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			179
STATE	STATE DIST.	COUNTY	
TEXAS	AMA	GRAY	
CONT.	SECT.	JOB	HIGHWAY NO.
0455	03	038	SH 152

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- [X] [ ] Protection of Existing Vegetation
- [ ] [ ] Vegetated Buffer Zones
- [ ] [X] Soil Retention Blankets
- [ ] [ ] Geotextiles
- [ ] [ ] Mulching/ Hydromulching
- [ ] [ ] Soil Surface Treatments
- [X] [ ] Temporary Seeding
- [ ] [X] Permanent Planting, Sodding or Seeding
- [ ] [ ] Biodegradable Erosion Control Logs
- [ ] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Vertical Tracking
- [ ] [ ] Interceptor Swale
- [ ] [ ] Riprap
- [ ] [ ] Diversion Dike
- [ ] [ ] Temporary Pipe Slope Drain
- [ ] [ ] Embankment for Erosion Control
- [ ] [ ] Paved Flumes
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- [X] [ ] Biodegradable Erosion Control Logs
- [ ] [ ] Dewatering Controls
- [ ] [ ] Inlet Protection
- [ ] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Sandbag Berms
- [ ] [ ] Sediment Control Fence
- [ ] [ ] Stabilized Construction Exit
- [ ] [ ] Floating Turbidity Barrier
- [ ] [ ] Vegetated Buffer Zones
- [ ] [ ] Vegetated Filter Strips
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- [ ] [ ] Sediment Trap
  - [ ] Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - [ ] 3,600 cubic feet of storage per acre drained
- [ ] [ ] Sedimentation Basin
  - [ ] Not required (<10 acres disturbed)
  - [ ] Required (>10 acres) and implemented.
    - [ ] Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - [ ] 3,600 cubic feet of storage per acre drained
  - [ ] Required (>10 acres), but not feasible due to:
    - [ ] Available area/Site geometry
    - [ ] Site slope/Drainage patterns
    - [ ] Site soils/Geotechnical factors
    - [ ] Public safety
    - [ ] Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- [ ] Excess dirt/mud on road removed daily
- [ ] Haul roads dampened for dust control
- [ ] Loaded haul trucks to be covered with tarpaulin
- [ ] Stabilized construction exit
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- [ ] Chemical Management
- [ ] Concrete and Materials Waste Management
- [ ] Debris and Trash Management
- [ ] Dust Control
- [ ] Sanitary Facilities
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- [X] Fire hydrant flushings
- [X] Irrigation drainage
- [X] Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- [X] Potable water sources
- [X] Springs
- [X] Uncontaminated groundwater
- [X] Water used to wash vehicles or control dust
- [X] Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

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

2/21/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			180
STATE	STATE DIST.	COUNTY	
TEXAS	AMA	GRAY	
CONT.	SECT.	JOB	HIGHWAY NO.
0455	03	038	SH 152

DATE: 2/21/2024
FILE: L:\DESIGN_PROJECTS_WorkSets\AMA_0455-03-037\4 - Design\Plan Set\9. Environmental\epic.dgn

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. N/A

☒ No Action Required ☐ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 1500000
2. Comply with the Construction General Permit and implement SW3P's, revise when necessary to control pollution or reqired by the Engineer.
3. Post a large Construction Site Notice (CSN) and NOIs for both TxDOT and the Contractor on the SW3P Boards provided by TxDOT. The CSN and the NOI are required to be placed in the binder. The NOI in the binder requires a signature.
4. Submit NOI to TCEQ.

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. TRIBUTARIES OF SPRING CREEK
2. TRIBUTARIES OF WHITE DEER CREEK

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. In the event that unanticipated archeological deposits are encountered during construction, work in the immediate area will cease and TxDOT archeological staff will be contacted to initiate post-review discovery procedures.

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. Comply with Executive Order 13112 on Invasive Species and the intent of the Executive Order Memorandum on Beneficial Landscapes for re-vegetating the project area. The proposed seed mixture (both grasses and forbs) would be in accordance with Item 164, Seeding for Erosion Control in TxDOT's Standard Specifications for the construction of Highways, Streets, and Bridges.

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. If any species on the Carson County T&E List is sighted in the project area during construction, stop construction and notify the Area Engineer.
2. Eastern Spotted Skunk, Swift Fox: Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered, and to avoid unnecessary impacts to dens.
3. Texas Horned Lizard, Western Box Turtle, Western Hognose Snake, Prairie Rattlesnake, Western Massasauga, Woodhouse's Toad:

   a) Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered. If reptiles are found on project site, contractors are to allow them to leave the project site safely.

   b) For the Texas Horned Lizard, avoidance should include avoiding harvester ant beds in the selection of Project Specific Locations (PSL's).

   c) If erosion control blankets or soil retention blankets are needed, the product should not contain netting, but should only contain loosely woven natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic netting should be avoided.
4. Bird BMP's: a) Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season: b) avoid the removal of unoccupied, inactive nests, as practicable: c) do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.
5. The Migratory Bird Treaty Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, egg in part or in whole, without a Federal permit issued in accordance within the Act's policies and regulations. In the event that migratory birds are encountered on-site during project construction, adverse impacts on protected birds, active nests, eggs, and/or young would be avoided.

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	SW3P:	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: Points, 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

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☐ No Action Required ☒ Required Action

Action No.

1. Avoid direct impacts to playa lakes and perennial and intermittent streams adjacent to the ROW during construction including selection of and access to project specific locations (PSLs). Ensure sediment and erosion controls near the playa lakes and streams are adequate to prevent additional sedimentation into these water features.

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED PROFESSIONAL ENGINEER
2/21/2024

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

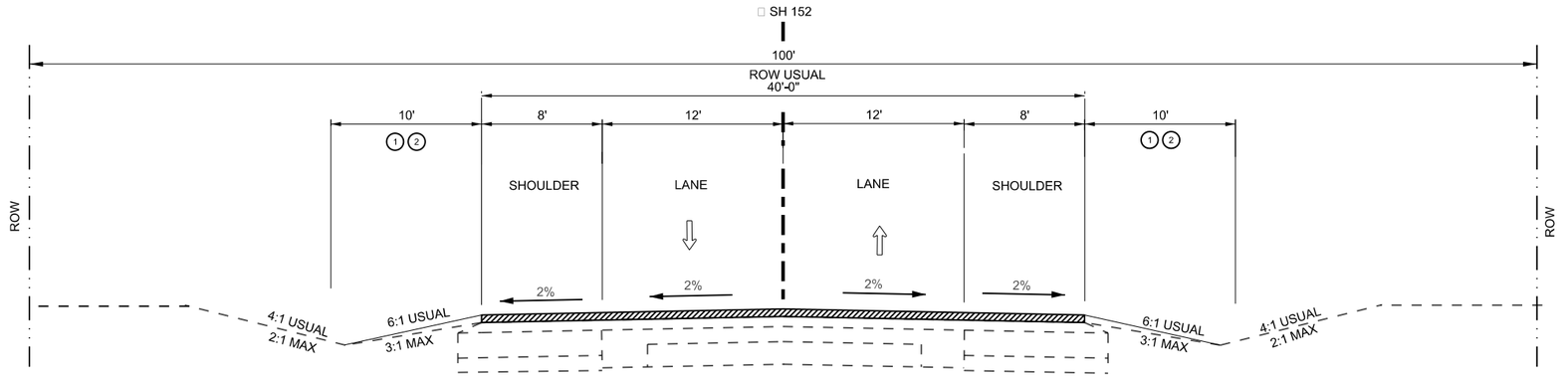
EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.	AMA	GRAY		181
01-23-2015 SECTION I CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				

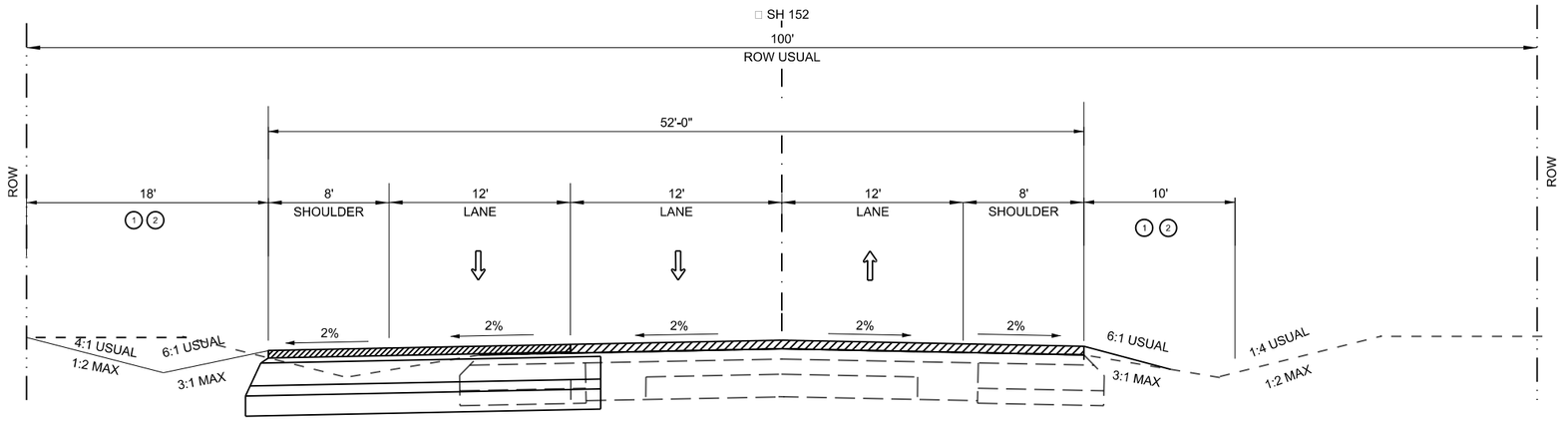
HORZ 0' 5' 10'
VERT 0' 2.5' 5'
SCALE IN FEET

LEGEND:

① DRILL SEEDING (TEMP) (WARM OR COOL)
② DRILL SEEDING (PERM) (RURAL) (CLAY)



PROPOSED TYPICAL SECTION A
STA 000+00.00 TO STA 10+50.00



PROPOSED TYPICAL SECTION B
STA 10+50.00 TO STA 19+50.00 LT TRANSITION (40' TO 52') (AVG 46')
STA 19+50.00 TO STA 121+25.00

STATE OF TEXAS
M. N. MOZAFFAR
85191
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2/21/2024

Texas Department of Transportation

SH 152

EROSION CONTROL LAYOUT

2024 SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		182

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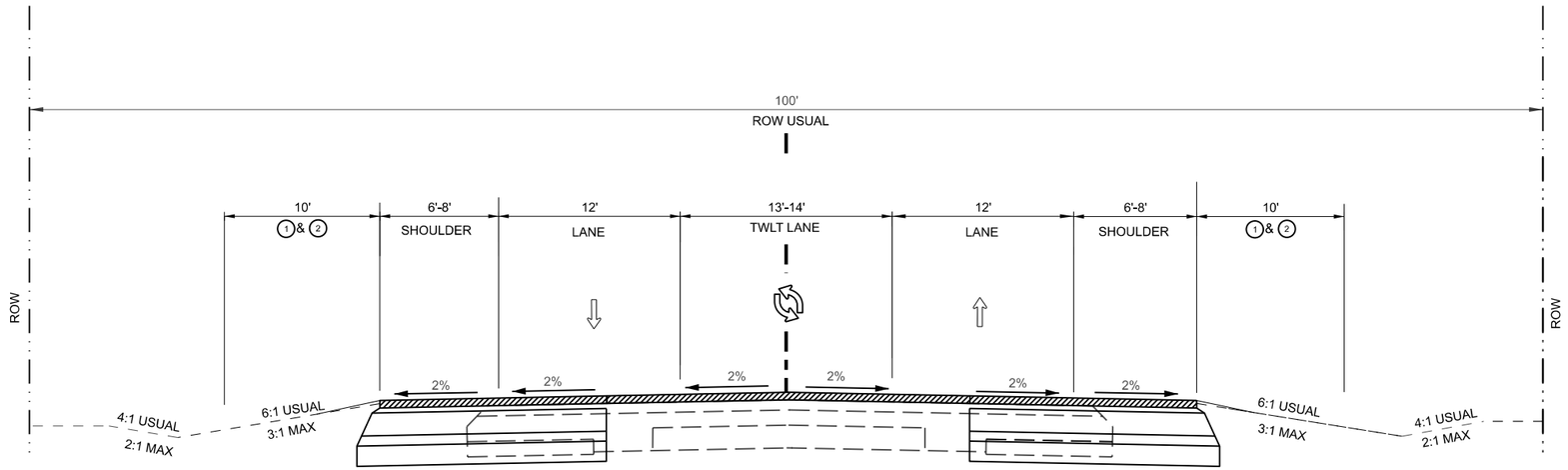
HORZ 0' 5' 10'
VERT 0' 2.5' 5'
SCALE IN FEET

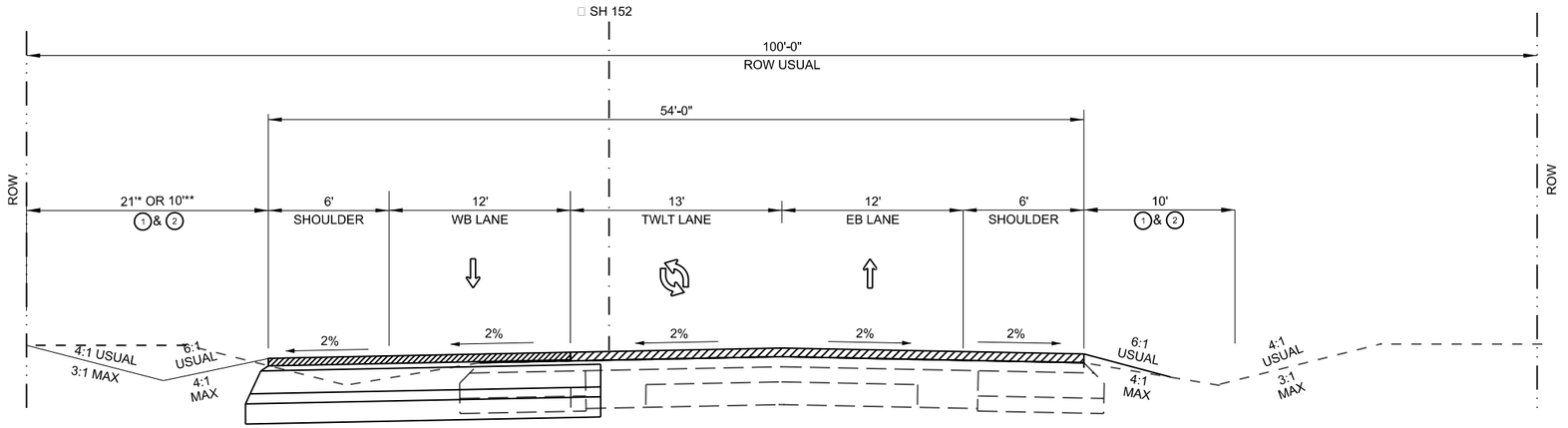
LEGEND:

① DRILL SEEDING (TEMP) (WARM OR COOL)

② DRILL SEEDING (PERM) (RURAL) (CLAY)



PROPOSED TYPICAL SECTION B
STA 121+25.00 TO STA 246+50.00



PROPOSED TYPICAL SECTION C
*STA 246+50.00 TO STA 279+00.00
**FROM STATION 279+00 TO STATION 285+50

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M. N. MOZAFFAR
85191
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2/21/2024

Texas Department of Transportation

SH 152

EROSION CONTROL LAYOUT

2024 SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		183

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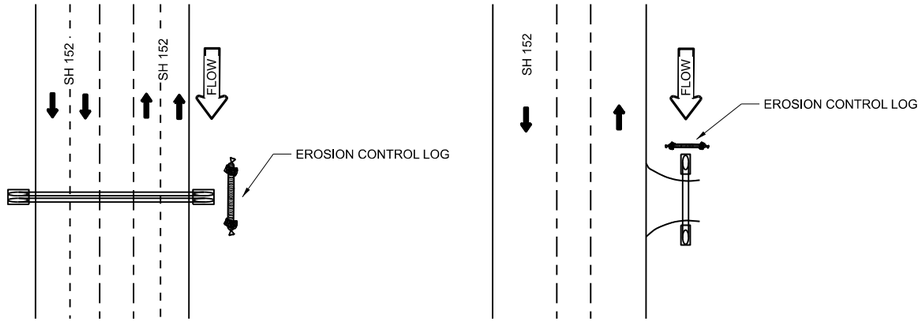

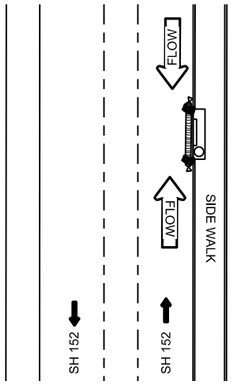

TYPICAL EROSION CONTROL LOG LAYOUT
*APPLIES ONLY TO UPSTREAM END WHERE WORK IS BEING PERFORMED

BMP'S RECORD LOG					
STATION	BMP #	LENGTH (FT)		INSTALL DATE	REMOVAL DATE
08+21.64	1	15	SOUTH BOUND		
17+90.00	2	30	SOUTH BOUND		
21+77.66	3	15	SOUTH BOUND		
29+44.21	4	15	SOUTH BOUND		
30+34.17	5	15	SOUTH BOUND		
31+43.70	6	15	SOUTH BOUND		
33+08.21	7	15	SOUTH BOUND		
43+69.63	8	15	NORTH BOUND		
48+31.57	9	15	SOUTH BOUND		
56+05.00	10	30	SOUTH BOUND		
62+49.00	11	30	SOUTH BOUND		
74+68.14	12	15	NORTH BOUND		
74+71.36	13	15	SOUTH BOUND		
76+71.23	14	15	NORTH BOUND		
102+32.79	15	15	NORTH BOUND		
104+18.96	16	15	NORTH BOUND		
111+77.75	17	15	NORTH BOUND		
127+66.85	18	15	NORTH BOUND		
180+32.00	19	30	SOUTH BOUND		
233+55.29	20	15	SOUTH BOUND		
247+95.47	21	15	SOUTH BOUND		
250+01.77	22	15	SOUTH BOUND		
252+13.57	23	15	SOUTH BOUND		
253+46.64	24	15	SOUTH BOUND		
254+95.75	25	15	SOUTH BOUND		
257+66.83	26	15	SOUTH BOUND		
258+95.99	27	15	SOUTH BOUND		
260+83.54	28	15	SOUTH BOUND		
261+79.26	29	15	SOUTH BOUND		
263+53.29	30	15	SOUTH BOUND		
264+30.19	31	15	SOUTH BOUND		
266+09.91	32	15	SOUTH BOUND		
267+19.70	33	15	SOUTH BOUND		
269+01.18	34	15	SOUTH BOUND		
270+64.29	35	15	SOUTH BOUND		
272+12.81	36	15	SOUTH BOUND		
274+40.79	37	15	SOUTH BOUND		
275+12.02	38	15	SOUTH BOUND		
276+11.45	39	15	SOUTH BOUND		
278+01.79	40	15	SOUTH BOUND		
281+75.00	41	60	NORTH BOUND		
286+10.50	42	25	SOUTH BOUND		
287+42.60	43	25	SOUTH BOUND		
290+01.50	44	15	NORTH BOUND		
290+15.20	45	15	SOUTH BOUND		
291+00.00	46	15	SOUTH BOUND		
293+20.34	47	15	SOUTH BOUND		
293+50.63	48	15	NORTH BOUND		
294+00.00	49	20	SOUTH BOUND		
296+00.00	50	15	NORTH BOUND		
296+30.64	51	15	SOUTH BOUND		
309+20.00	52	15	SOUTH BOUND		
309+21.71	53	15	NORTH BOUND		
310+00.50	54	15	SOUTH BOUND		
312+70.63	55	15	NORTH BOUND		
312+70.80	56	15	SOUTH BOUND		
313+50.30	57	15	SOUTH BOUND		
314+00.50	58	15	SOUTH BOUND		
314+70.60	59	15	SOUTH BOUND		
319+30.43	60	15	NORTH BOUND		
325+95.00	61	15	NORTH BOUND		
332+50.60	62	15	SOUTH BOUND		
TOTAL		**1060**			

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

Texas Department of Transportation

SH 152

EROSION CONTROL LAYOUT

2024 SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0455	03	038	SH 152
DIST	COUNTY		SHEET NO.
AMA	GRAY		184

DATE: 2/21/2024 1:06:34 PM
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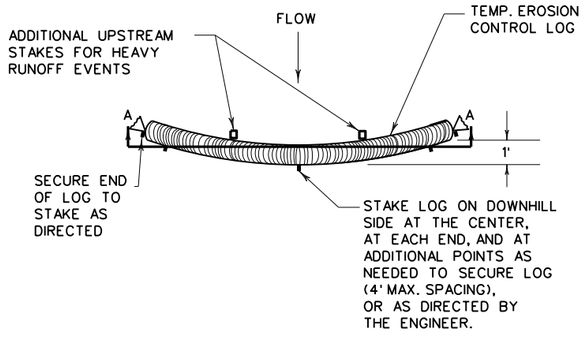
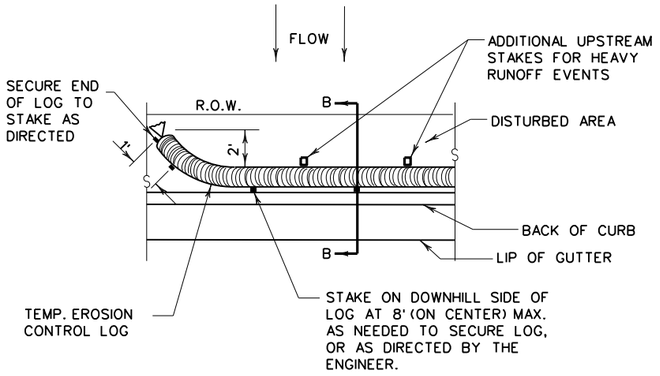
DATE: 2/21/2024
FILE: L:\DESIGN_PROJECTS_WorkSets\AMA_0455-03-037\4 - Design\Plan Set\9. Environmental\EC(9)-16.dgn



PLAN VIEW



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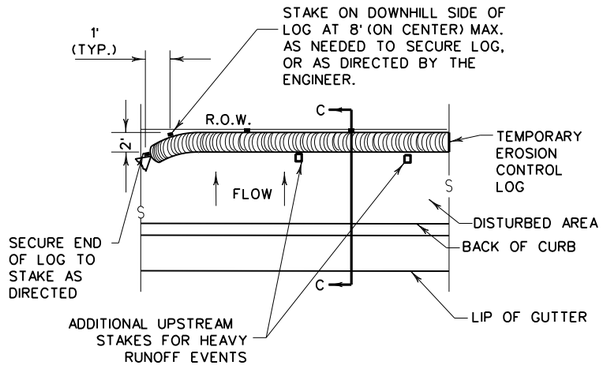

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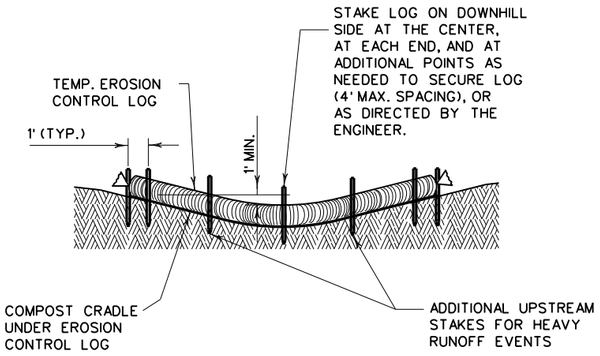
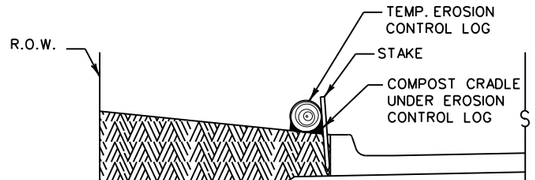


SECTION A-A

EROSION CONTROL LOG DAM

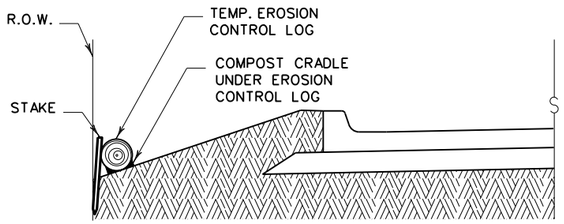
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

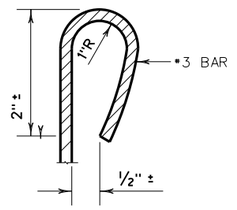
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

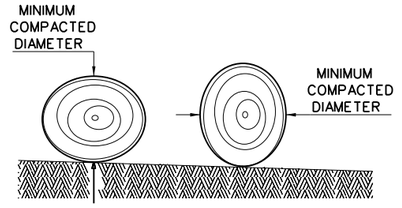
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SHEET 1 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		185

DATE: 2/21/2024
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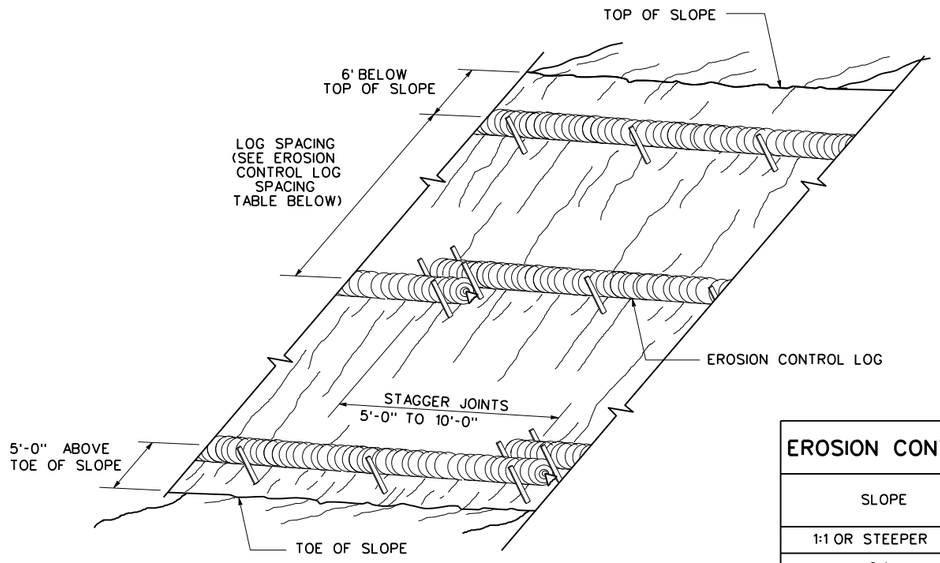
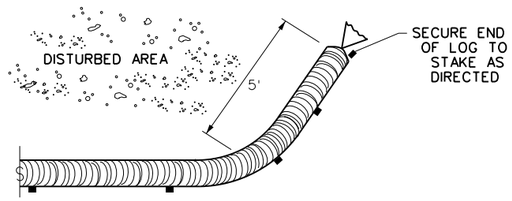


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

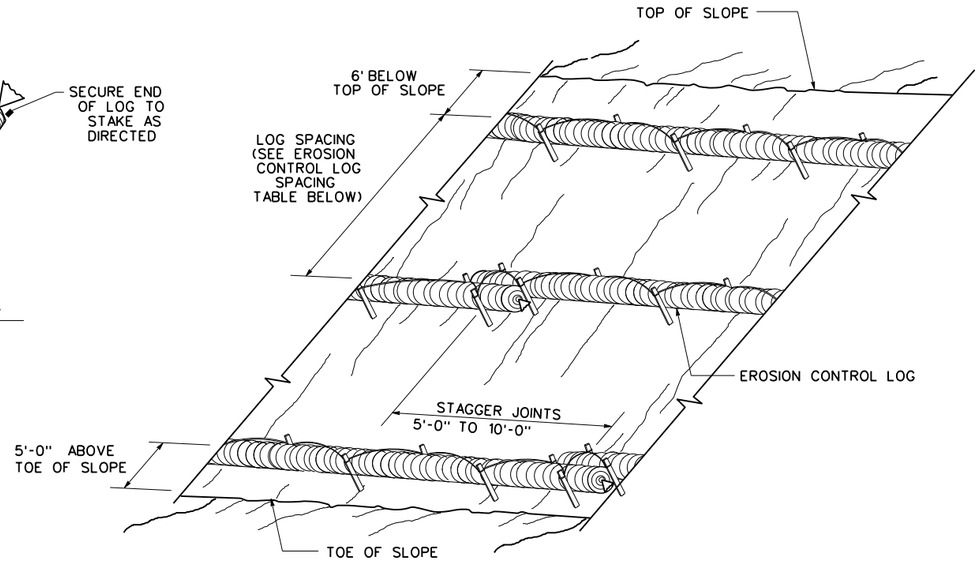
CL-SST



END SECTION RAP DETAIL

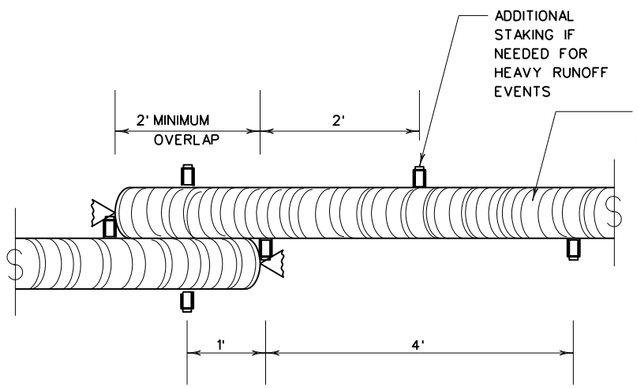
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

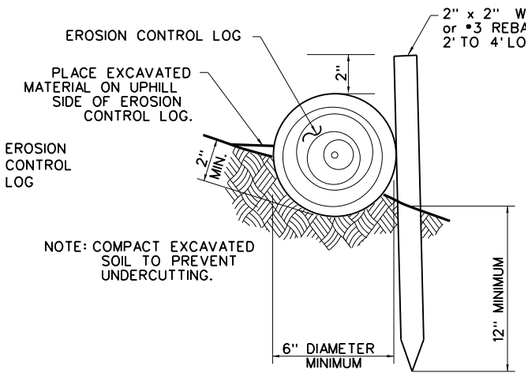
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

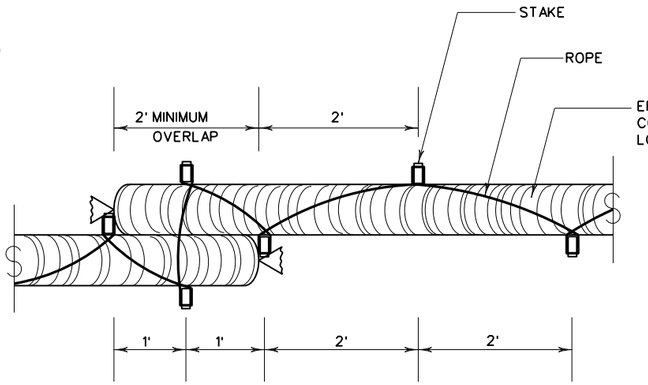


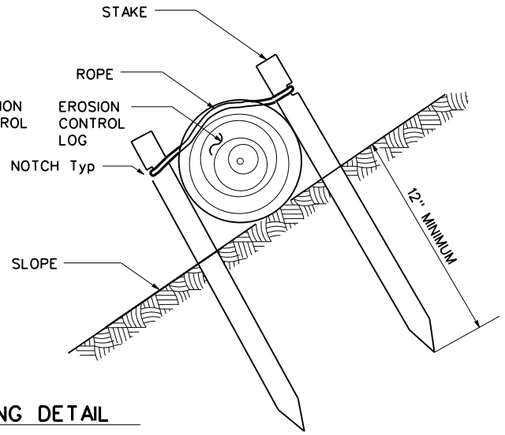


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

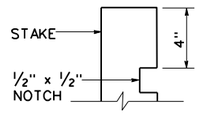
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
	DIST	COUNTY		SHEET NO.
	AMA	GRAY		186

DATE: 2/21/2024
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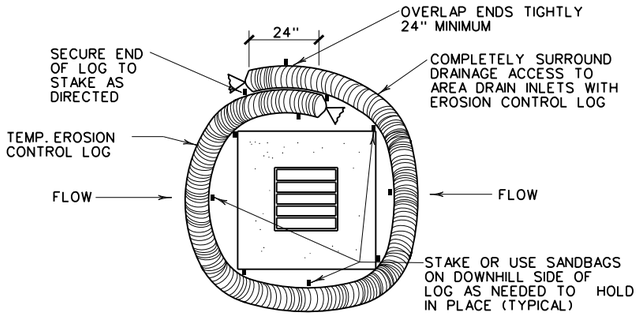
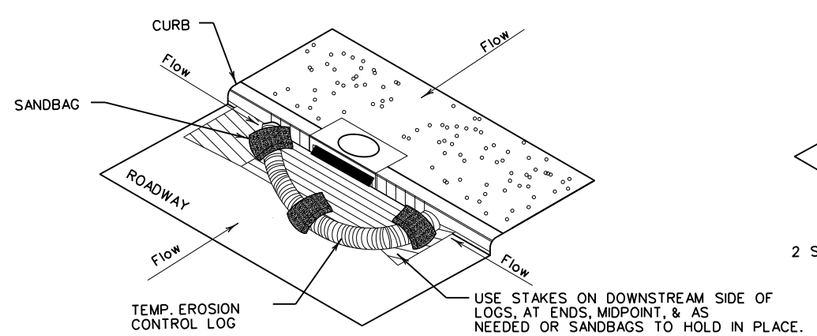


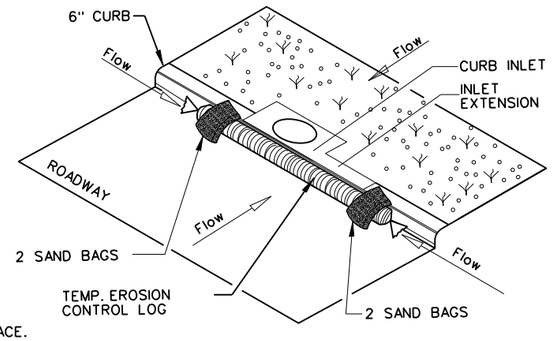
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

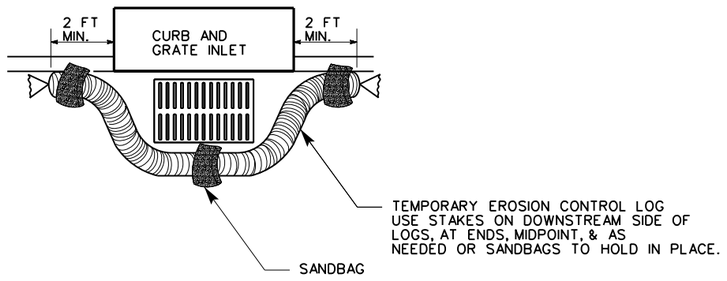
CL-CI



EROSION CONTROL LOG AT CURB INLET

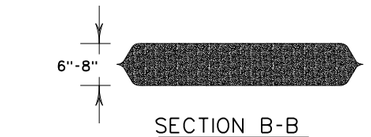
CL-CI

NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.

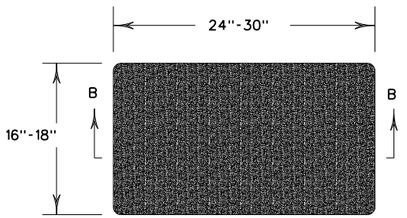


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0455	03	038		SH 152		
	DIST	COUNTY			SHEET NO.		
	AMA	GRAY			187		

DATE: 2/21/2024
FILE: L:\DESIGN_PROJECTS_WorkSets\AMA_0455-03-037\4 - Design\Plan Set\9.Environmental\AMARILLO DISTRICT GRASS SEEDING SPECIFICATION.dgn

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (PERM) (RURAL or URBAN) (SAND or CLAY)

"WARM SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH
PERMANENT: EARLY SPRING SEED FROM FEBRUARY 15th THROUGH May 15th. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP SEED: TYPE: BUFFALO GRASS (Texoka) "Fluffy" WESTERN WHEATGRASS (ARRIBA) "Hard" BERMUDA GRASS (BLACK JACK) "Hard Tiny Seed" 100% "Unhulled"	3.0 LBS PLS / ACRE 6.0 LBS PLS / ACRE 5.0 LBS PLS / ACRE @ ¼"-½" SOIL DEPTH
PERMANENT and TEMP. LATE SPRING SEED FROM MAY 15th THROUGH AUGUST 1st AS AREAS OF THE ROW THAT ARE LAID BY BUT DETERMINED TO BE OUT OF SEASON FOR PERMANENT DRILL SEEDING.	TYPE: MILLET (BROWN TOP) "Hard Shell, "Small Seed" - Nurse crop BERMUDA GRASS (BLACK JACK) "Hard Tiny Seed" 100% "Unhulled"	30. LBS PLS / ACRE @ ¼" SOIL DEPTH 5.0 LBS PLS / ACRE
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER.		

NOTES:

1. ALL SEED MIXTURE TYPES SHALL BE PURCHASED IN PRE- MIXED BAGS, "BY TYPE" BLENDED BY THE GROWER SHIPPER.
2. SOILS THAT ARE COMPACTED, HAVE CLODS, SHALL BE REWORKED UNTIL READY FOR SEEDING. AS DIRECTED.
3. ALL SOIL SURFACES SHALL BE LEVEL WITH NATURAL FLOWING SMOOTH GRADES. NO TIRE RUTS OR FURTHER TRAFFIC ALLOWED.
4. SOIL SURFACE SHALL BE FIRM BUT NOT COMPACTED, ALLOWING 1/4" DEPRESSION UNDER NORMAL FOOT TRAFFIC.
5. SEED 100% OF THE BED AREA. NO SKIPS OR VOID AREAS ALLOWED. EXAMPLE:AREAS AROUND SIGN POSTS AND INLETS.
6. SEED UP TO THE FIRST 6" OF THE EDGE OF PAVEMENT. AS DIRECTED, HAND RAKE ISOLATED SEEDED AREAS.
7. WEIGH ALL CALIBRATED SEED SAMPLES FOR ACCURACY AND PRESENT DOCUMENTATION TO ENGINEER.

FOR DRILL SEEDING

1. USE ONLY PROFESSIONAL NATIVE GRASS OR TURF GRASS (MULTI- 3 BIN) DRILL SEEDERS.
2. CALIBRATE DRILL SEEDER FOR SPECIFIED (PLS) PER ACRE BEFORE DRILL SEEDING.
3. DRILL SEEDER MUST BE EQUIPPED WITH THE LARGE FRONT CUTTING COULTERS DURING THE INSPECTION OF DRILL SEEDER.

FOR BROADCAST SEEDING

1. USE ONLY COMMERCIAL TYPE CYCLONE TYPE SPREADERS.
2. CALIBRATE CYCLONE SPREADER FOR 1000 Sq. Ft. (PLS) PER ACRE BEFORE SEEDING.
3. TO PREVENT SEED SEPARATION IN SPREADERS, SPREAD ALL SEED TYPES INDEPENDENTLY IN A SEPARATE APPLICATION.
4. IMMEDIATELY AFTER SEEDING, IN ONE OR TWO OPERATIONS, CULTI-PACK THE SEEDED SOILS AND FIRM SEED INTO SURFACE.
5. DISCONTINUE SEEDING IF WIND EXCEEDS 10 MPH.

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (TEMPORARY) COOL SEASON SEEDING

"COOL SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH
TEMPORARY: EARLY FALL SEED FROM AUGUST 1st THROUGH DECEMBER 1st. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP SEED: TYPE: WESTERN WHEATGRASS "Hard Shell" RED WINTER WHEAT, VAR:TAM III "Hard Shell"	6.0 LBS PLS / ACRE 34. LBS PLS / ACRE @ 1" SOIL DEPTH
TEMPORARY: LATE FALL SEED FROM DECEMBER 1st THROUGH DECEMBER 31ST. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP SEED: TYPE: RED WINTER WHEAT, VAR:TAM III "Hard Shell"	34. LBS ACRE / PLS @ 1" SOIL DEPTH
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER.		

ITEM 314 EMULSIFIED ASPHALT TREATMENT

TIME SCHEDULE:

IMMEDIATELY AFTER SOIL PREPARATION OR WITHIN 24 HOURS AFTER SEEDING, APPLY THE TACK COAT TO DESIGNATED SOIL SURFACES.

FUNCTIONAL USE:
SOIL EROSION CONTROL, OR MOISTURE RETENTION BARRIER.

NOTES:

1. ALL TRUCK APPLICATIONS SHALL BE COMPLETED IN ONE PASS OF THE DISTRIBUTOR. ALL TOUCH UP WORK WILL BE FINISHED BY HAND AND HOSE PROCEDURES. APPLY FROM EDGE OF PAVEMENT THROUGH THE FULL SPECIFIED AREAS.
2. ENGINEER WILL INSPECT FOR ACCURACY THE OVERALL DEPTH OF THE APPLIED TACK COAT MATERIALS.
3. FURTHER VEHICULAR TRAFFIC IS NOT ALLOWED ON LAID BY TACK COAT SURFACES. AT THE CONTRACTORS EXPENSE ALL DAMAGES TO TACK COAT SURFACES WILL BE RE -SHOT AS DIRECTED BY THE ENGINEER.

ITEM 166 FERTILIZER

TIME SCHEDULE:

AFTER TOPSOIL PLOWING PEPARATIONS ARE COMPLETED. FERTILIZE R.O.W. SOIL SURFACES AND HARROW 2" TO 4" DEEP INTO PLACE.

FUNCTIONAL USE:
PLANT NUTRIENTS FOR PLANT AND ROOT DEVELOPMENT.

FERTILIZER SHALL BE EVENLY DISTRIBUTED AT A RATE OF 28 LBS OF NITROGEN PER ACRE.
THE BREAK DOWN OF THE NITROGEN ELEMENT SHALL BE IN A 50% SLOW RELEASE FORM.
ANALYSIS OF THE (NPK) IS: 1-5-0 A HIGH PHOSPHATE BLEND.
AS DIRECTED BY THE VEGETATION MANAGER.

ITEM 166 NOTES:

1. BROADCAST SPECIFIED FERTILIZER FROM THE EDGE OF PAVEMENT, THROUGH THE ENTIRE ROW SEED BED AREA. APPLICATIONS FOR EDGE OF PAVEMENT, CULVERTS, SIGN POST AREAS, GUARD RAILS AND ISOLATED AREAS SHALL BE APPLIED BY WALK BEHIND SPREADERS AND BY HAND. NO FERTILIZER ALLOWED ON PAVEMENT SURFACES.
2. ALL SPREADERS SHALL BE CALIBRATED BY THE CONTRACTOR AND THE ENGINEER FOR ACCURACY AND PERFORMANCE. SHALL USE UNOPENED 50# BAGS OF SPECIFIED FERTILIZER FOR DAILY CALIBRATIONS. APPLICATION SHALL BE AN EVEN DISTRIBUTION OF PRODUCT ON DESIGNATED SOIL SURFACES.
3. FERTILIZER SHALL BE DELIVERED IN 50# BAGS UNLESS OTHERWISE SPECIFIED OR APPROVED PRIOR TO DELIVERY. BAGS SHALL BE CLEARLY LABELED SHOWING CONTENTS. IF BULK FERTILIZER IS APPROVED, DOCUMENTATION WILL BE REQUIRED FOR EACH LOAD OF MATERIAL DELIVERED VERIFYING AUTHENTICITY OF THE MATERIAL. CULTURAL PROCEDURES ARE UNDER THE DIRECTION OF THE TXDOT VEGETATION MANAGER.

STATE OF TEXAS
M. N. MOZAFFAR
85191
LICENSED
PROFESSIONAL ENGINEER
2/21/2024

Texas Department of Transportation

AMARILLO DISTRICT STANDARD

VEGETATION SPECIFICATION SHEET

FEDERAL AID PROJECT	DN: ADD	CK: ADD	DW: ADD	CK: ADD
See Title Sheet	CONT	SECT	JOB	HIGHWAY
REVISIONS	0455	03	038	SH 152
03/27/20	DIST	COUNTY		SHEET NO.
	AMA	GRAY		188