STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

FEDERAL AID PROJECT NO.			
STP 2025(153)HES			
CONT	SECT	JOB	HIGHWAY
1378	01	050	RM 1431
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		1

DESIGN SPEED = 50 MPH*

18928 VPD (2022)
26499 VPD (2042)

* FOR HSIP ELEMENTS ONLY

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

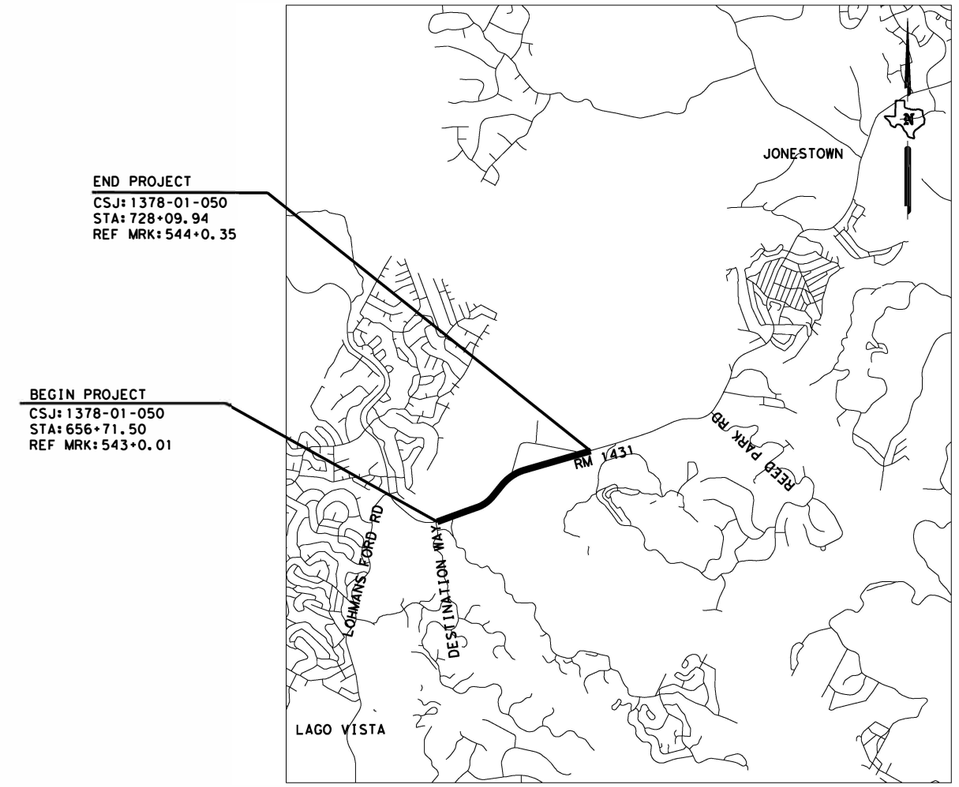
FEDERAL AID PROJECT NUMBER
STP 2025(153)HES
CSJ 1378-01-050

RM 1431
TRAVIS COUNTY

NET LENGTH OF PROJECT = 7,138.44 FEET = 1.352 MILES
- ROADWAY = 7,138.44 FEET = 1.352 MILES
- BRIDGE = 0.00 FEET = 0.000 MILES

FROM: DESTINATION WAY
TO: 0.103 MI E OF OLD FM 1431(E)

FOR THE CONSTRUCTION OF SAFETY IMPROVEMENT PROJECT
CONSISTING OF INSTALL CONTINUOUS TURN LANE.



LOCATION MAP NOT TO SCALE
EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

I CERTIFY THAT THIS PROJECT WAS CONSTRUCTED IN SUBSTANTIAL COMPLIANCE WITH THE FINAL AS-BUILT PLANS AND SPECIFICATIONS.

_____ P.E. _____
AREA ENGINEER — DATE

FINAL PLANS

DATE OF LETTING: _____

DATE WORK BEGAN: _____

DATE WORK COMPLETED AND ACCEPTED: _____

FINAL CONTRACT COST: $_____

CONTRACTOR: _____

LIST OF APPROVED CHANGE ORDERS: _____

SUBMITTED FOR LETTING: _____
CONSULTING ENG. (TBPE FIRM REG. F-312)

RECOMMENDED FOR LETTING: 10/2/2024
DocuSigned by: Susana Ceballos P.E.
DISTRICT DESIGN ENGINEER

SUBMITTED FOR LETTING: 10/2/2024
DocuSigned by: Myles P Russell, P.E.
AREA ENGINEER

APPROVED FOR LETTING: 10/2/2024
DocuSigned by:
DISTRICT DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, SEPTEMBER 1, 2024 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 23,2023)

Texas Department of Transportation

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13620 BRIARWICK DRIVE, STE 100
AUSTIN, TX 78729
(512)777-4600
TBPELS FIRM #F-312

DATE: 8/19/2024 4:43:36 PM
FILE: pw://halff-pw.bentley.com:halff-pw-01/Documents/37547.003 RM 1431 Widening/500 CADD/4 - Design/Plan Set/1. General/050/RM1431_TITLE_SHEET_050.dgn

SHEET		DESCRIPTION
		GENERAL
1		TITLE SHEET
2		INDEX OF SHEETS
3 - 5		PROJECT LAYOUT
6 - 8		EXISTING TYPICAL SECTIONS
9 - 10		PROPOSED TYPICAL SECTIONS
11 - 11L		GENERAL NOTES
12 - 12C		ESTIMATE & QUANTITY
		QUANTITY SUMMARY SHEETS
13		SUMMARY OF EARTHWORK QUANTITIES
14		SUMMARY OF ROADWAY QUANTITIES
15		SUMMARY OF REMOVAL QUANTITIES
16		SUMMARY OF DRAINAGE QUANTITIES
17		SUMMARY OF TCP QUANTITIES
18		SIGNING AND STRIPING SUMMARY
19 - 22		SUMMARY OF SMALL SIGNS
23		SUMMARY OF SIGNING
24		SUMMARY OF SWP3 QUANTITIES
		TRAFFIC CONTROL PLAN
25		SEQUENCE OF CONSTRUCTION
26-27		TCP TYPICAL SECTIONS
28		TRAFFIC CONTROL PLAN
		TRAFFIC CONTROL PLAN STANDARDS
29	*	BC(1)-21
30	*	BC(2)-21
31	*	BC(3)-21
32	*	BC(4)-21
33	*	BC(5)-21
34	*	BC(6)-21
35	*	BC(7)-21
36	*	BC(8)-21
37	*	BC(9)-21
38	*	BC(10)-21
39	*	BC(11)-21
40	*	BC(12)-21
41	*	TCP(2-2)-18
42	*	TCP(2-4)-18
43	*	TCP(3-1)-13
44	*	TCP(3-3)-14
45	*	WZ(BRK)-13
46	*	WZ(BTS-1)-13
47	*	WZ(BTS-2)-13
48	*	WZ(RCD)-13
49	*	WZ(RS)-22
50	*	WZ(STPM)-23
51	*	WZ(TD)-17
52	*	WZ(UL)-13
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64 - 67		PLAN AND PROFILE - SIDE STREETS
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76	*	FLEXPAVE(2)-22(AUS)
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80	*	GF(31)MS-19
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90		INTERNAL HYDROLOGY DITCH DATA
91 - 94		CULVERT HYDRAULIC DATA
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99		BOX CULVERT SUPPLEMENT WINGS AND END TREATMENTS
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STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED PROFESSIONAL ENGINEER

JOHN CONQUEST, P.E. — P.E. — 11/09/2023 DATE

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

STATE OF TEXAS
LINDA L. BARLOW
63878
LICENSED PROFESSIONAL ENGINEER

LINDA L. BARLOW, P.E. — P.E. — 11/09/2023 DATE

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

STATE OF TEXAS
D.R. DAYANANDA
89303
LICENSED PROFESSIONAL ENGINEER

D.R. DAYANANDA — P.E. — 11/14/2023 DATE

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11/16/2023	

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Austin District

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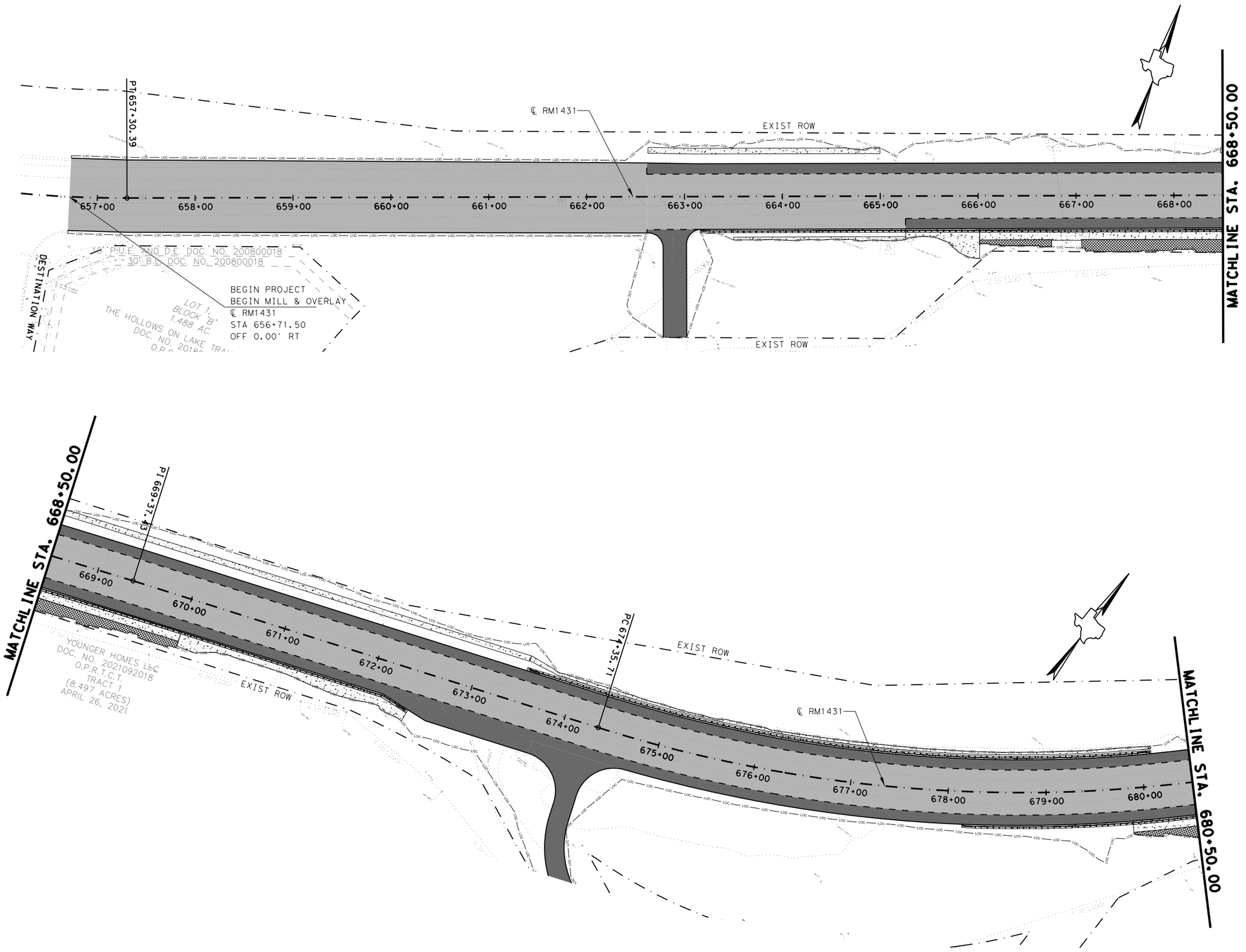
RM 1431
INDEX OF SHEETS

SHEET 01 OF 01

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	2



LEGEND

- WIDENING
- 2" MILL & OVERLAY
- CONC RIPRAP
- RSS WALL
- LOC — LIMITS OF CONSTRUCTION

HORIZONTAL
0 50 100 200 FT

STATE OF TEXAS
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RM 1431
PROJECT LAYOUT
BEGIN TO STA 680+50

SHEET 01 OF 03

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	3

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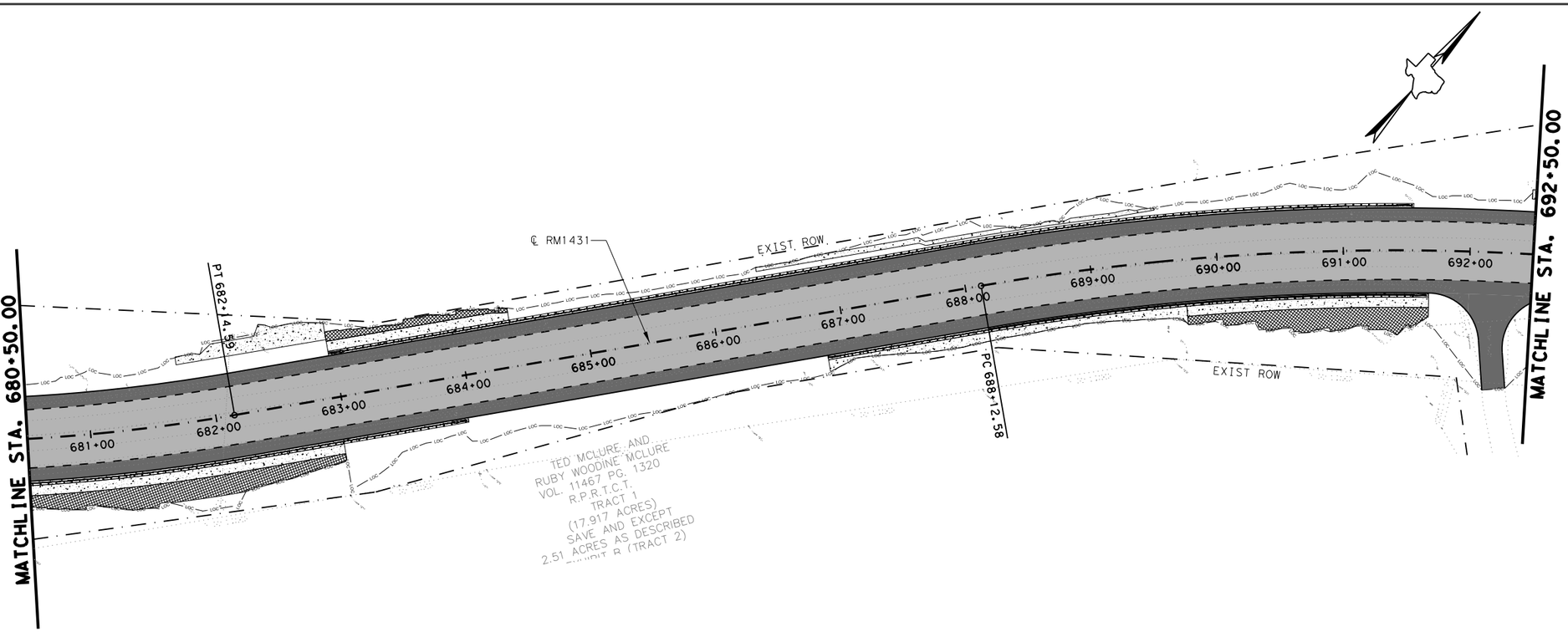

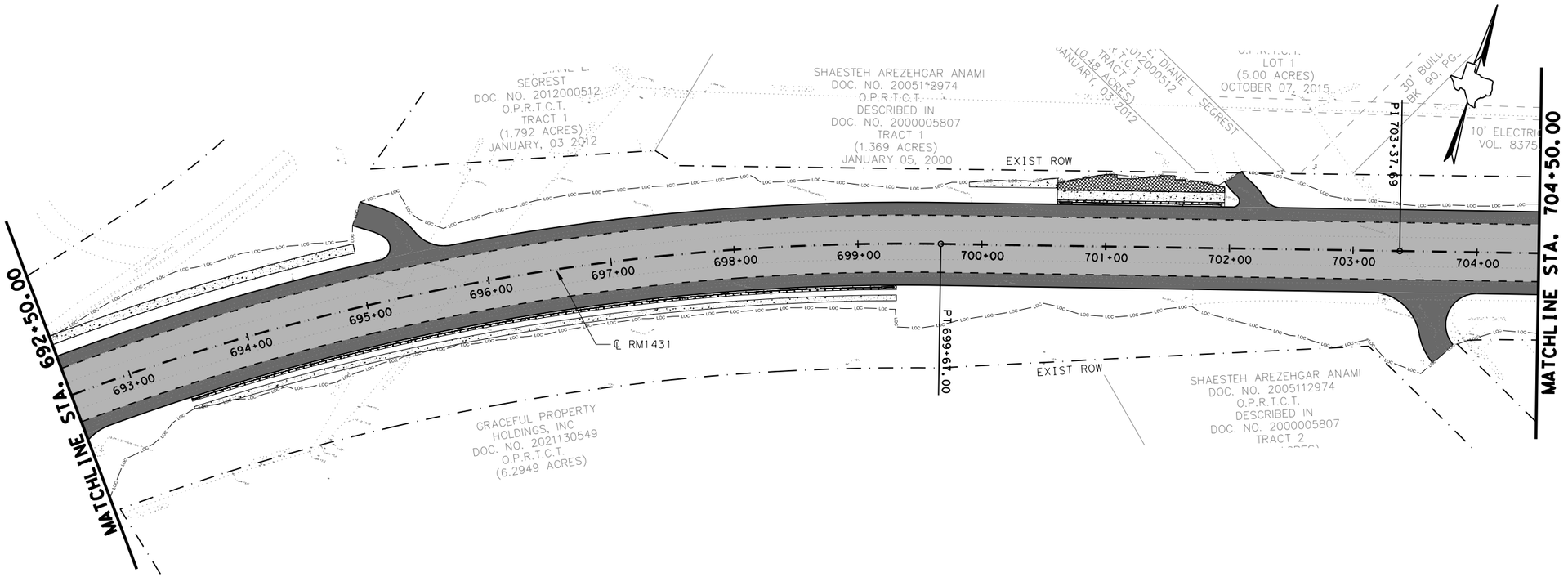

LEGEND

- WIDENING
- 2" MILL & OVERLAY
- CONC RIPRAP
- RSS WALL
- LOC — LIMITS OF CONSTRUCTION

HORIZONTAL
0 50 100 200 FT

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RM 1431
PROJECT LAYOUT
STA 680+50 TO STA 704+50

SHEET 02 OF 03

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 4

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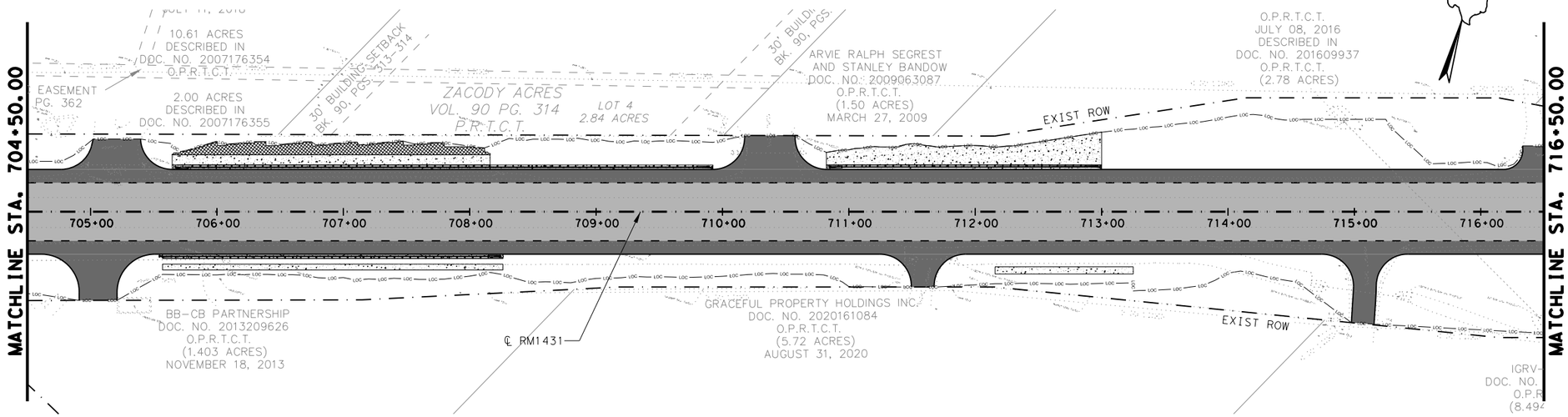

LEGEND

- WIDENING
- 2" MILL & OVERLAY
- CONC RIPRAP
- RSS WALL
- LOC — LIMITS OF CONSTRUCTION

HORIZONTAL
0 50 100 200 FT

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RM 1431
PROJECT LAYOUT
STA 704+50 TO END

SHEET 03 OF 03

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 5

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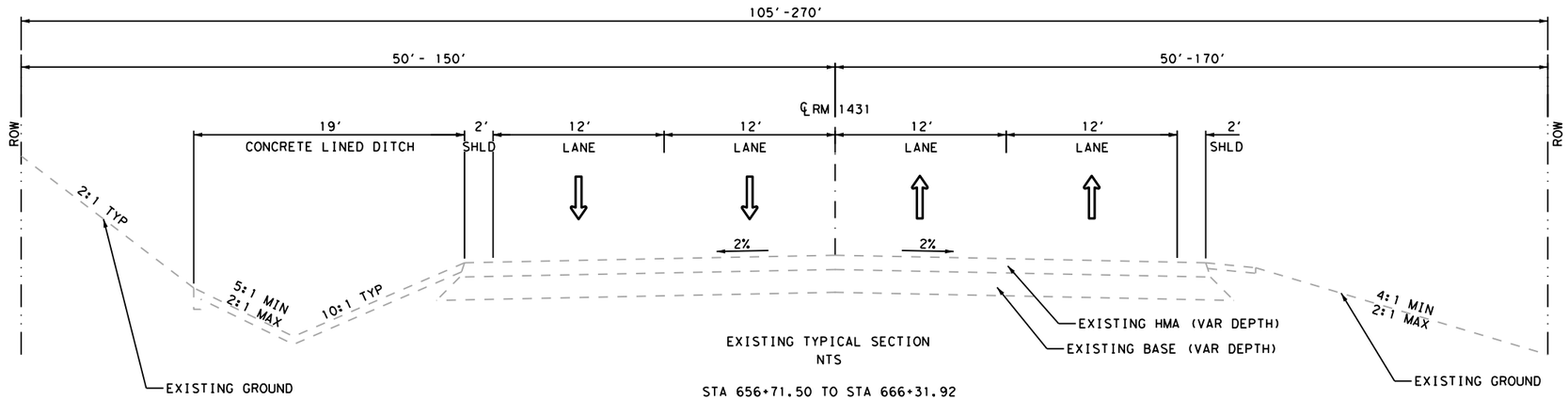
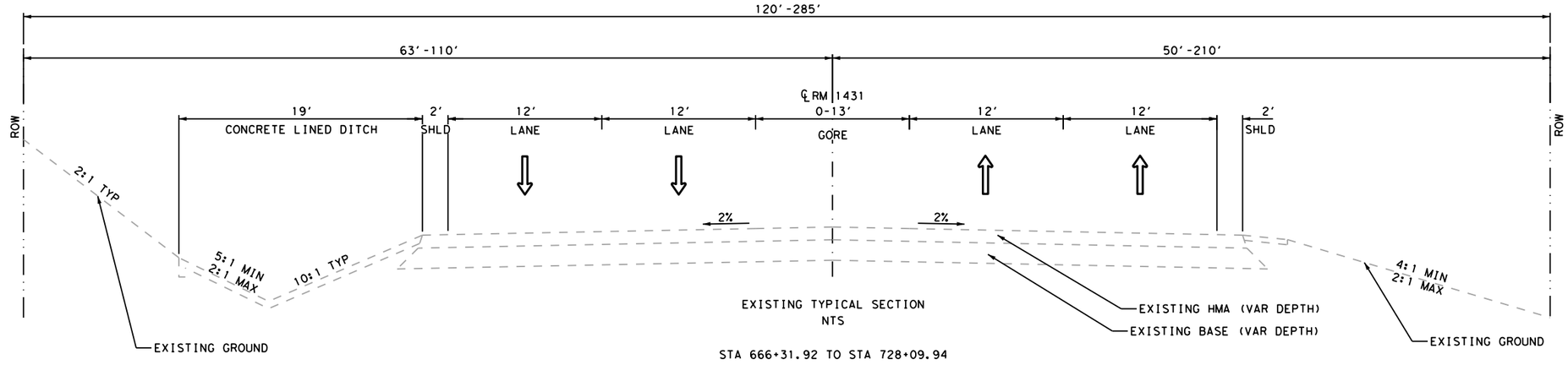


EXISTING TYPICAL SECTION
NTS

STA 656+71.50 TO STA 666+31.92

STA 662+85.22 TO STA 664+84.14
STA 668+01.05 TO STA 670+86.02
STA 676+15.82 TO STA 680+42.42

STA 656+71.50 TO STA 663+09.17
STA 665+57.19 TO STA 683+50.00
STA 686+63.41 TO STA 692+84.85
STA 714+67.06 TO STA 719+78.24
STA 722+21.78 TO STA 728+09.94



EXISTING TYPICAL SECTION
NTS

STA 666+31.92 TO STA 728+09.94

STA 662+85.22 TO STA 664+84.14
STA 668+01.05 TO STA 670+86.02
STA 676+15.82 TO STA 680+42.42

STA 656+71.50 TO STA 663+09.17
STA 665+57.19 TO STA 683+50.00
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EXIST TYPICAL SECTIONS
STA 656+71.50 TO STA 728+09.94

SHEET 01 OF 03

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 6

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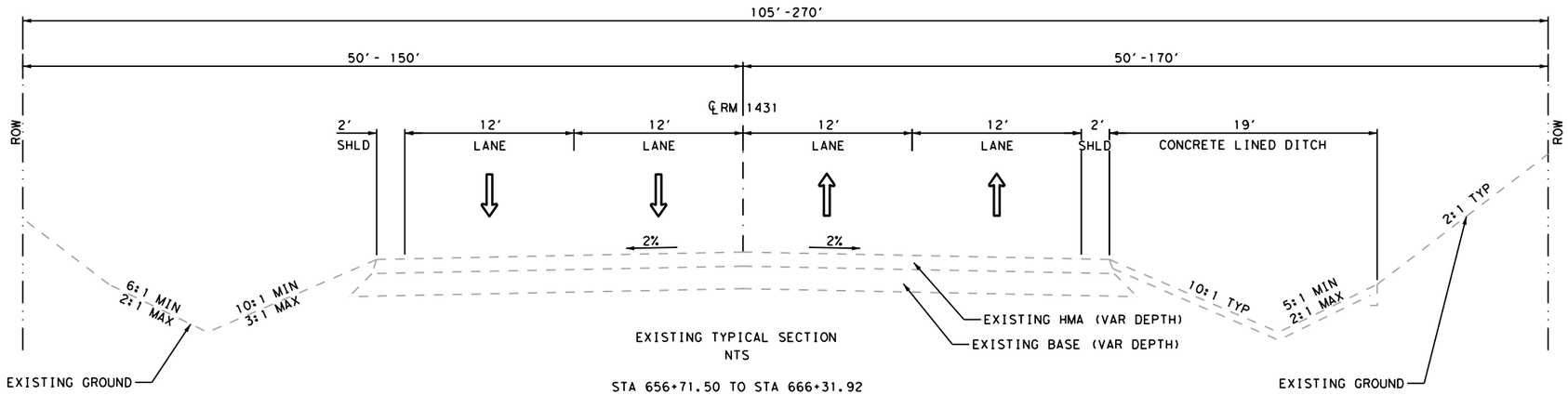
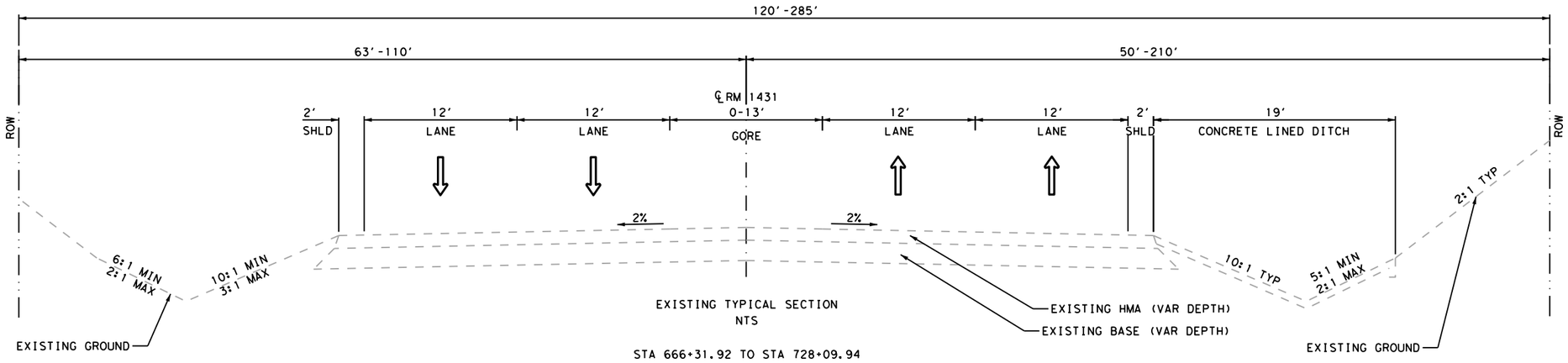


EXISTING TYPICAL SECTION
NTS

STA 656+71.50 TO STA 666+31.92

STA 656+71.50 TO STA 662+85.22
STA 664+84.14 TO STA 668+01.05
STA 670+86.02 TO STA 676+15.82
STA 684+12.47 TO STA 690+89.01
STA 692+40.93 TO STA 695+13.23
STA 703+56.28 TO STA 712+80.51
STA 716+63.56 TO STA 728+89.94

STA 701+70.82 TO STA 703+20.79
STA 706+10.09 TO STA 714+67.06



EXISTING TYPICAL SECTION
NTS

STA 666+31.92 TO STA 728+09.94

STA 656+71.50 TO STA 662+85.22
STA 664+84.14 TO STA 668+01.05
STA 670+86.02 TO STA 676+15.82
STA 684+12.47 TO STA 690+89.01
STA 692+40.93 TO STA 695+13.23
STA 703+56.28 TO STA 712+80.51
STA 716+63.56 TO STA 728+89.94

STA 701+70.82 TO STA 703+20.79
STA 706+10.09 TO STA 714+67.06

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LICENSED
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11/09/2023

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RM 1431
EXIST TYPICAL SECTIONS
STA 656+71.50 TO STA 728+09.94

SHEET 02 OF 03

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 7

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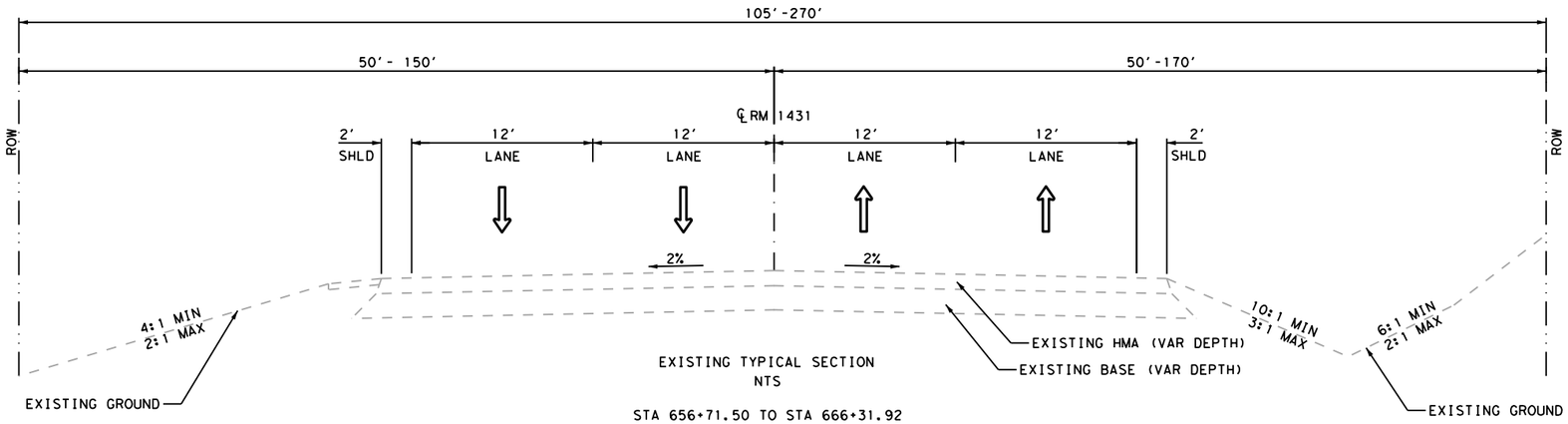
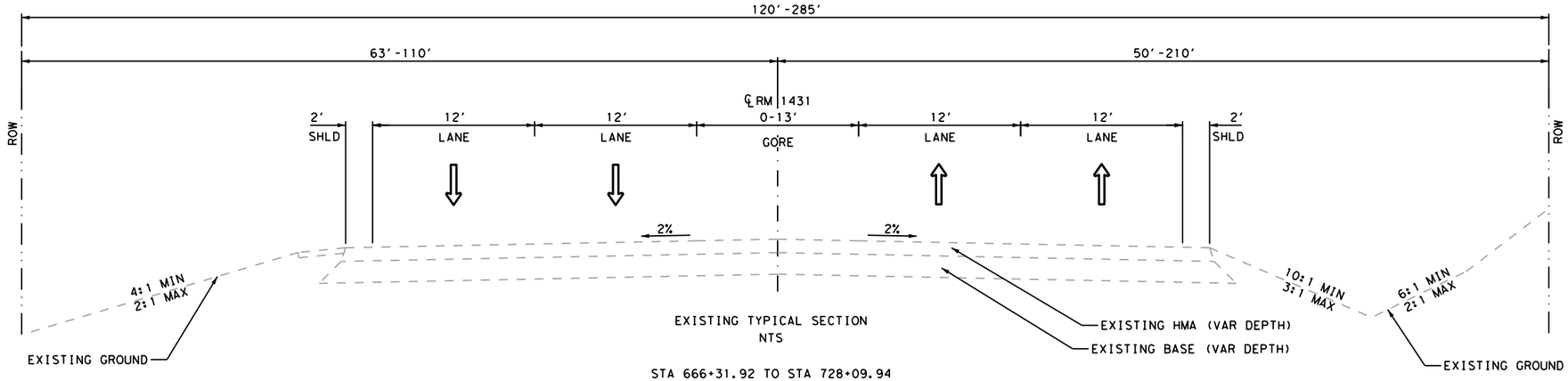


EXISTING TYPICAL SECTION
NTS

STA 656+71.50 TO STA 666+31.92

STA 680+42.42 TO STA 684+12.47
STA 690+89.01 TO STA 692+40.93
STA 695+13.23 TO STA 703+56.28
STA 712+80.51 TO STA 716+63.56

STA 663+09.17 TO STA 665+57.19
STA 683+50.00 TO STA 686+63.41
STA 692+84.85 TO STA 701+70.82
STA 703+20.79 TO STA 706+10.09
STA 719+78.24 TO STA 722+21.78



EXISTING TYPICAL SECTION
NTS

STA 666+31.92 TO STA 728+09.94

STA 680+42.42 TO STA 684+12.47
STA 690+89.01 TO STA 692+40.93
STA 695+13.23 TO STA 703+56.28
STA 712+80.51 TO STA 716+63.56

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STATE OF TEXAS
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11/09/2023

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RM 1431
EXIST TYPICAL SECTIONS

STA 656+71.50 TO STA 728+09.94

SHEET 03 OF 03

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 8

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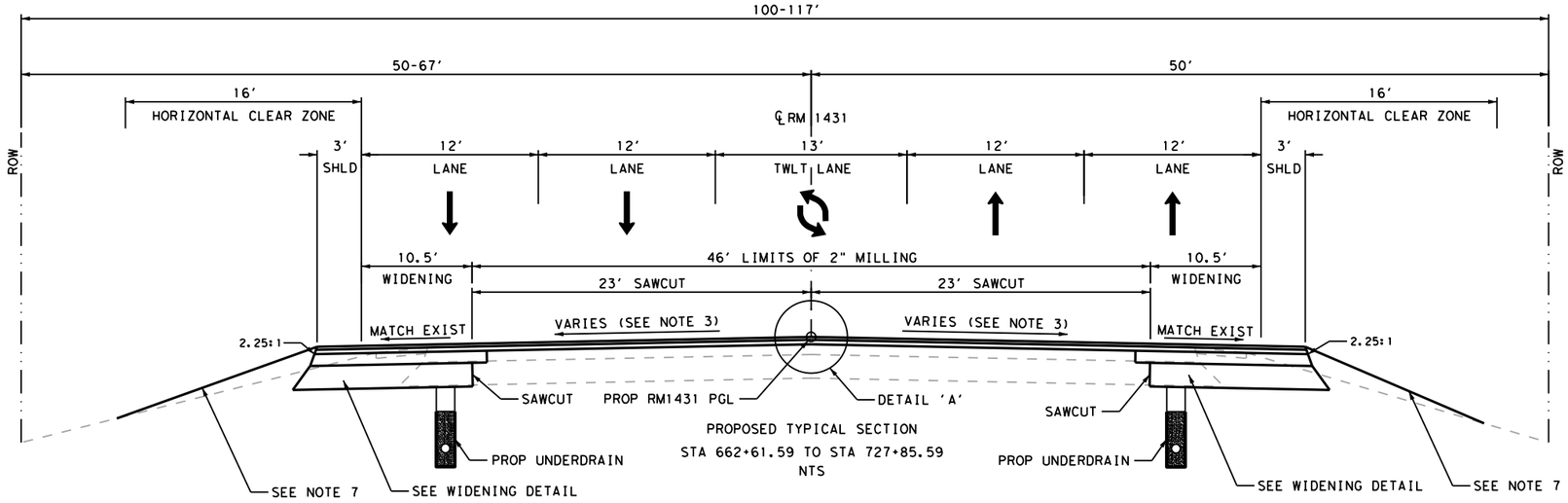
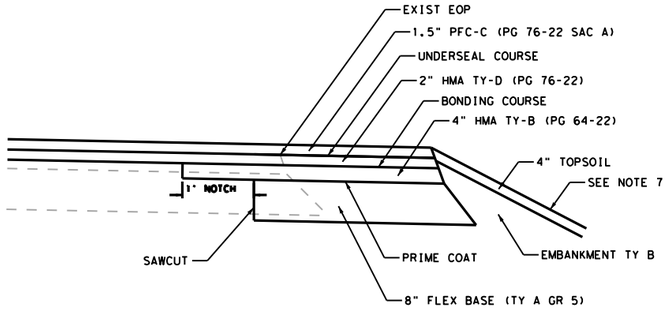


PROPOSED TYPICAL SECTION
STA 662+61.59 TO STA 727+85.59
NTS



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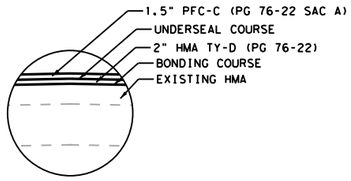

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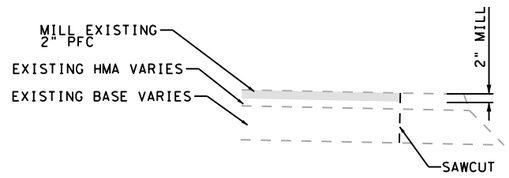


MILLING DETAIL

NOTES

1. MILL EXISTING 2" PFC.
2. MATCH EXISTING ELEVATION AT SAWCUT.
3. MATCH EXISTING CROSS SLOPE OR COURSE CORRECT UP TO 2% USING LEVEL UP TO PROP PGL.
4. PROPOSED TYPICALS MAY VARY WHEN TRANSITIONING TO/FROM EXISTING SECTIONS OF PAVEMENT TO ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL DETAILS.
5. REFER TO THE PAVEMENT MARKING LAYOUT SHEETS FOR LANE TRANSITIONS AT INTERSECTIONS.
6. SUBSTITUTE PG BINDER IS NOT ALLOWED FOR SURFACE MIXTURE.
7. SEE END CONDITIONS TABLE ON NEXT SHEET.
8. TYPICAL SECTIONS ARE TAKEN FROM AVAILABLE AS-BUILTS. FIELD CONDITIONS MAY VARY.

STATE OF TEXAS
JOHN CONQUEST
89243
PROFESSIONAL LICENSED ENGINEER

02/02/2024

PRINT DATE	REVISION DATE
2/2/2024	

Texas Department of Transportation
Austin District

halff
13620 BRIARWICK DRIVE, STE 100
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

RM 1431
PROP TYPICAL SECTIONS

STA 656+71.50 TO STA 728+09.94

SHEET 01 OF 02

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	9

DATE: 2/2/2024 11:13:29 AM
FILE: pw://halff-pw.bentley.com:halff-pw-01/Documents/37547.003 RM 1431 Widening/500 CADD/4 - Design/Plan Set/1. General/050/RM1431_TYP_PROP_050.dgn

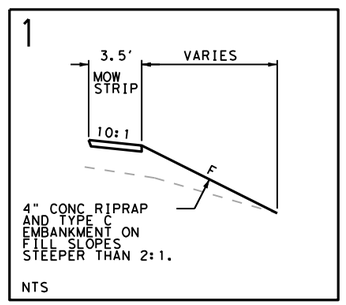
END CONDITIONS TABLE

WESTBOUND (LEFT)				
STA	END CONDITION	L	F	B
662+63.01 TO 664+99.81	6	13	6 TO 1	1.3 TO 1
664+99.82 TO 666+12.59	7	VARIES	4 TO 1	
666+12.60 TO 666+61.54	7	VARIES	3 TO 1	
666+61.55 TO 666+91.42	6	13	6 TO 1	1.3 TO 1
666+91.43 TO 668+47.58	2	3.5	3 TO 1	1.3 TO 1
668+47+59 TO 673+48.59	6	VARIES	6 TO 1	1.3 TO 1
673+48.60 TO 680+10.63	2	3.5	3 TO 1	1.3 TO 1
680+10.64 TO 681+74.68	7	VARIES	4 TO 1	
681+74.69 TO 682+95.83	9	13	4 TO 1	2 TO 1
682+95.84 TO 684+40.83	4	8	MAX 2 TO 1; MIN 10 TO 1	1 TO 1
684+40.83 TO 686+40.49	1	N/A	3 TO 1	
686+40.50 TO 689+54.33	2	3.5	3 TO 1	1.3 TO 1
689+54.34 TO 691+55.50	1	N/A	3 TO 1	
691+55.51 TO 692+46.86	7	VARIES	4 TO 1	
692+46.87 TO 694+99.97	5	13	6 TO 1	3 TO 1
695+57.42 TO 697+28.29	7	VARIES	4 TO 1	
697+17.86 TO 698+17.86	7	VARIES	4 TO 1	
698+17.87 TO 699+89.21	7	VARIES	3 TO 1	
699+89+22 TO 700+61.35	9	13	4 TO 1	2 TO 1
700+59.58 TO 701+95.59	4	8	MAX 2 TO 1; MIN 10 TO 1	1 TO 1
702+40+93 TO 704+76.59	7	VARIES	4 TO 1	
705+64.51 TO 708+16.08	4	8	MAX 2 TO 1; MIN 10 TO 1	1 TO 1
708+16.09 TO 709+92.49	2	3.5	2.5 TO 1	3 TO 1
710+82.23 TO 713+00.00	1	N/A	2 TO 1	
713+00.01 TO 714+55.28	7	VARIES	3 TO 1	
714+55.28 TO 716+18.14	7	VARIES	3 TO 1	
717+00.00 TO 719+90.34	7	VARIES	4 TO 1	
719+90.35 TO 721+63.64	5	13	6 TO 1	MAX 2 TO 1; MIN 3 TO 1
722+98.91 TO 726+54.22	6	13	6 TO 1	1.3 TO 1
726+54.23 TO 728+09.96	5	13	6 TO 1	2 TO 1

EASTBOUND (RIGHT)				
STA	END CONDITION	L	F	B
663+17.01 TO 663+50.14	1	N/A	3 TO 1	
663+50.15 TO 665+25.80	2	2.5	3 TO 1	3 TO 1
665+25.81 TO 666+01.42	1	N/A	3 TO 1	
666+01.43 TO 670+00.01	4	8	MAX 2 TO 1; MIN 10 TO 1	1 TO 1
670+00.01 TO 672+41.68	1	N/A	2 TO 1	
672+41.69 TO 673+74.89	7	VARIES	3 TO 1	
674+73.33 TO 678+15.13	7	VARIES	4 TO 1	
678+15.14 TO 679+86.34	1	N/A	3 TO 1	
679+86.35 TO 682+96.10	4	8	MAX 2 TO 1; MIN 10 TO 1	1 TO 1
682+96.11 TO 683+96.11	7	VARIES	3 TO 1	
683+96.12 TO 686+83.96	5	13	6 TO 1	MAX 2 TO 1; MIN 3 TO 1
686+83.97 TO 689+73.09	1	N/A	2 TO 1	
689+73.10 TO 691+67.77	4	8	MAX 2 TO 1; MIN 10 TO 1	1 TO 1
692+69.96 TO 693+41.57	7	VARIES	4 TO 1	
693+41.58 TO 699+31.00	2	3.5	3 TO 1	1.3 TO 1
699+31.01 TO 700+43.25	5	VARIES	6 TO 1	2 TO 1
700+43.25 TO 701+76.38	7	VARIES	6 TO 1	
701+76.39 TO 702+85.83	5	13	6 TO 1	2.5 TO 1
704+20.00 TO 704+61.00	5	13	6 TO 1	3 TO 1
705+56.85 TO 708+26.39	2	3.5	6 TO 1	3 TO 1
708+26.10 TO 710+99.80	5	13	6 TO 1	MAX 2 TO 1; MIN 3 TO 1
712+15.72 TO 713+25.11	6	13	6 TO 1	1.3 TO 1
713+25.12 TO 714+08.20	5	13	6 TO 1	2 TO 1
714+08.21 TO 714+74.27	7	VARIES	4 TO 1	
715+42.29 TO 722+36.38	7	VARIES	3 TO 1	
723+05.30 TO 725+60.89	7	VARIES	6 TO 1	
725+60.90 TO 728+09.96	1	N/A	3 TO 1	

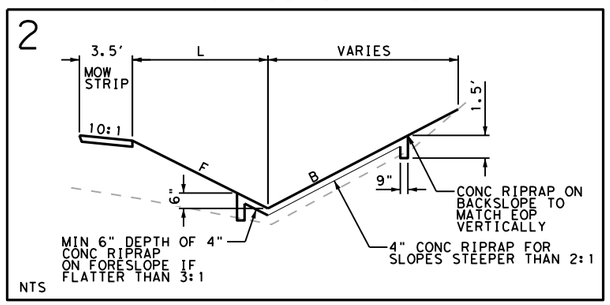
MBGF RUNOFF

1



MBGF CONC DITCH

2



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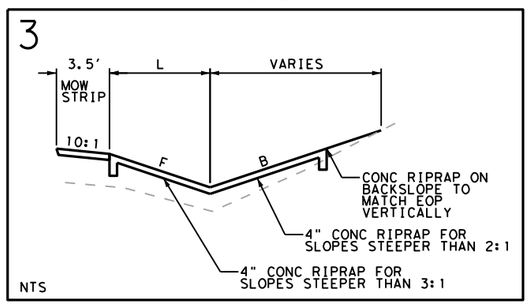
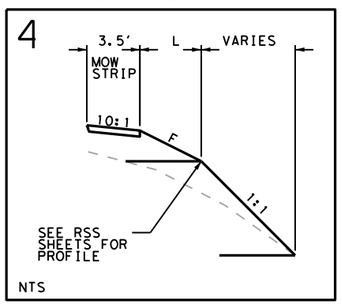


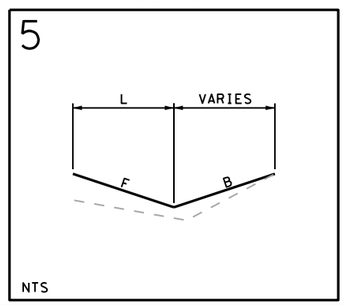
MBGF RSS WALL

4



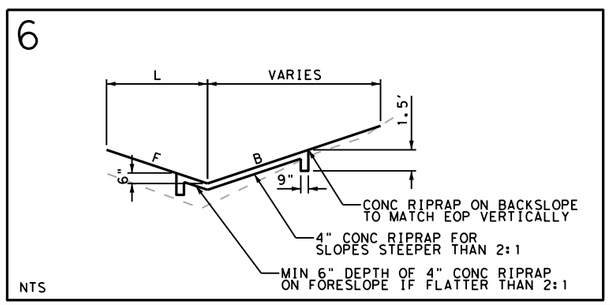
DITCH

5



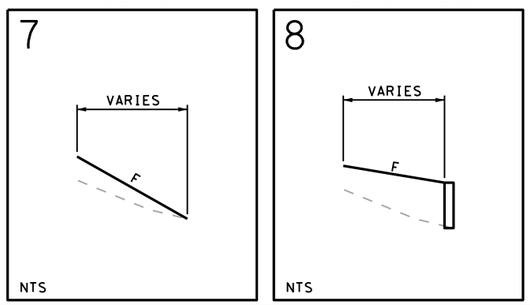
CONC BACKSLOPE DITCH

6



TIE IN

7

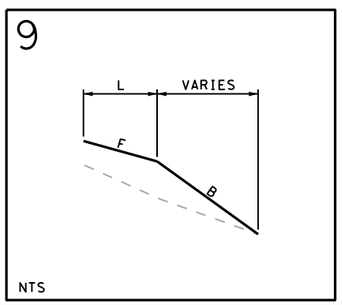


HEADWALL

8

TIE IN

9



02/02/2024

PRINT DATE	REVISION DATE
2/2/2024	

Texas Department of Transportation
Austin District

halff
13620 BRIARWICK
DRIVE, STE 100
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

RM 1431
PROP TYPICAL SECTIONS

END CONDITIONS TABLE

SHEET 02 OF 02

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 10

GENERAL NOTES: Version: August 1, 2024

Item	Description	**Rate
**204	**Sprinkling**	
	(Dust)	30 GAL/CY
	(Item 132)	30 GAL/CY
	(Item 247)	30 GAL/CY
**210	**Rolling (Flat Wheel)**	
	(Item 247)	1 HR/200 TON
	(Item 316)	1 HR/6000 SY
**210	**Rolling (Tamping and Heavy Tamping)**	1 HR/200 CY
**210	**Rolling (Lt Pneumatic Tire)**	
	(Item 132)	1 HR/500 CY
	(Item 247)	1 HR/200 TON
	(Item 316 - Seal Coat)	1 HR/6000 SY
	(Item 316 - Two Course)	1 HR/3000 SY
247	**Flexible Base (CMP IN PLC)**	132 LB/CF
310	**Prime Coat**	0.20 GAL/SY
341, 344	**Dense-Graded Hot-Mix Asphalt and Superpave**	110 LB/SY/IN
342	**Permeable Friction Course (PFC)**	90.0 LB/SY/IN
3006	**Underseal Course**	0.20 GAL/SY
3007	**Bonding Course**	0.09 GAL/SY

** For Informational Purposes Only

GENERAL
Contractor questions and requests for documents on this project are to be addressed to the following individual(s):
Georgetown Kyle.Russell@txdot.gov
Georgetown Jason.Hudson@txdot.gov

Questions and requests for documents will be accepted via the Letting Pre-Bid Q&A web page. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:
https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

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

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

If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by subsequent precipitation, the Contractor is responsible for all costs associated with replacing the work, if required.

The roadbed will be free of organic material prior to placing any section of the pavement structure.

Equip all construction equipment used in roadway work with highly visible omnidirectional flashing warning lights.

Provide a smooth, clean sawcut along the existing asphalt or concrete pavement structure, as directed. Consider subsidiary to the pertinent Items.

Keep the roadway free of debris and sediment caused by construction activities. Dispose of all material in accordance with federal, state, and local regulations. This work is subsidiary.

Damage to existing pipes and SET's due to Contractor operations will be repaired at Contractor's expense.

All locations used for storing construction equipment, materials, and stockpiles of any type, within the right of way, will be as directed. Use of right of way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not obstructed and at other locations where an unsightly appearance will not exist. The Contractor will not have exclusive use of right of way but will cooperate in the use of the right of way with the city/county and various public utility companies as required.

ITEM 5 – CONTROL OF THE WORK
Place construction or silt fence 2 ft. inside TxDOT ROW along the Railroad ROW. If work is to be performed inside the Railroad ROW, then the Contractor will coordinate with the Railroad for a Railroad Flagger. This work is subsidiary.

Place construction stakes at intervals of no more than 100 ft. This work is subsidiary.

Provide a 72 hour advance email notice to AUS_Locate@TxDOT.gov to request illumination, traffic signal, ITS, or toll equipment utility locates. Provide AUS_Locate@TxDOT.gov an electronic pdf of as-builts within 21 calendar days of illumination, traffic signal, ITS, or toll equipment being placed into operation. As-built shall include GPS coordinates of manholes and junction boxes. Include final version of RFI's and revised plan sheets.

Precast Alternate Proposals.
When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at Alternate Precast Proposal Submission (txdot.gov). Acceptance or denial of an alternate is at the sole discretion of the Engineer.

Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Thermoplastic Pipe Alternate Proposals
When a reinforced concrete or corrugated metal pipe is included in the plans, a thermoplastic polypropylene pipe alternate may be submitted in a 2-phase process. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Phase 1 submit an official request to TxDOT PM with a summary of proposed locations, max depth of placement for each location, cover depth, and pipe diameters. TxDOT goal is to review and respond within 10 days. Phase 1 approval does not guarantee Phase 2 approval.
Phase 2 submit the following documents with all documents signed and sealed by a licensed Engineer in the state of Texas. 1-Provide a redline or revised set of drainage plans reflecting the revised locations. 2-Provide certification that the use of the alternate pipe and proposed bedding are adequate for the proposed application, depth, etc. 3-Provide a completed thermoplastic pipe installation drawing using the following,

https://ftp.txdot.gov/pub/txdot/brg/thermoplastic-pipe-installation-drawing.pdf
https://ftp.txdot.gov/pub/txdot/brg/thermoplastic-pipe-installation-drawing.dgn

For all uses of thermoplastic pipe as an alternate, furnish, install, and inspect the thermoplastic pipe in accordance with Item 468 or latest thermoplastic pipe special specification at time of letting. Minimum values, such as cover depth, required by the specification, installation drawing, etc. will not be waived. Use granular backfill unless flowable fill or CSB is required by the alternate design. Backfill locations shown in the bid plans using flowable fill or CSB must use the backfill per the bid plans.

Electronic Shop Drawing Submittals.
Submit electronic shop drawing submittals according to the current Guide to Electronic Shop Drawing Submittal which can be found online at,
https://www.txdot.gov/business/resources/highway/bridge/shop-drawing-submittal-cycle.html.

Pre-approved producers can be found online at,
https://www.txdot.gov/business/resources/materials/material-producer-list.html.

Use the following contact list for all submittals that are not required to be sent to Bridge Division and to copy the Engineer for all submittals to the Bridge Division.

Submittal Contact List
Georgetown Jason.Hudson@txdot.gov AUS_GE-ShopReview@txdot.gov

Alignment and Profile.
Unless shown in the plans, profile and alignment data for roadways being overlaid or widened are for design verification only. Provide survey and construct the roadway in accordance with

the typical section. Bid items and data may be provided to adjust cross slope and super elevations.

ITEM 6 - CONTROL OF MATERIALS
Give a minimum of 1 business day notice for materials, which require inspection at the Plant.

For structures with paint containing hazardous materials, provide locations of material removal 60 days prior to begin removal. For metal elements to be removed, mechanical shear or unbolting for removal and disposal does not require paint abatement but requires 60-day advance notice.

For removal, tie, or tap of asbestos concrete (AC) pipe, contact TxDOT and the local utility company 60 days prior to performing the work. Expose the AC pipe to provide a minimum of 1 ft. of clearance around the top and sides. A minimal amount of soil may remain around the AC pipe to avoid disturbance. The local utility company will be responsible for the demo notice to DSHS and removal of the AC pipe. Tie or tap into existing AC pipe may require removing an entire section of pipe from collar to collar and replacement of pipe with new pipe using existing bid items.

The Buy America Material Classification Sheet for clarification on material categorization is located at the following link: Buy America material classification sheet (txdot.gov)

Storage of Material Near Structures
Do not store equipment or flammable material within 100 ft. of bridges, culverts, or near their openings (portals). Flammable materials include all material that is not metal or aluminum.

Form/Falsework Removal Strength Testing
Request additional compressive strength samples for removal of forms and falsework. Projects with more than 500 CY of structural class concrete, a flat fee of $50.00 per sample will be reimbursed to the Department by a deduction from the Contractor's monthly pay estimate.

ITEM 7 – LEGAL RELATIONS AND RESPONSIBILITIES
Roadway closures during key dates, significant traffic generators, and/or special events are prohibited. See notes for Item 502 for the key dates and/or special events.

Refer to the Environmental Permits, Issues and Commitments (EPIC) plan sheets for additional requirements and permits.

When any abandoned well is encountered, cease construction operations in this area and notify the Engineer who will coordinate the proper plugging procedures. A water well driller licensed in the State of Texas must be used to plug a well.

Perform maintenance of vehicles or equipment at designated maintenance sites. Keep a spill kit on-site during fueling and maintenance. This work is subsidiary.

Maintain positive drainage for permanent and temporary work for the duration of the project. Be responsible for any items associated with the temporary or interim drainage and all related maintenance. This work is subsidiary.

Suspend all activities near any significant recharge features, such as sinkholes, caves, or any other subterranean openings that are discovered during construction or core sampling. Do not proceed until the designated Geologist or TCEQ representative is present to evaluate and approve remedial action.

Locate aboveground storage tanks kept on-site for construction purposes in a contained area as to not allow any exposure to soils. The containment will be sized to capture 150% of the total capacity of the storage tanks.

PSL in Edwards Aquifer Recharge and Contributing Zone.
Obtain written approval from the Engineer for all on or off right of way PSLs not specifically addressed in the plans. Provide a signed sketch of the location 30 business days prior to use of the PSL. Include a list of materials, equipment and portable facilities that will be stored at the PSL. TxDOT will coordinate with the necessary agencies. Approval of the PSL is not guaranteed. Un approved PSL is not a compensable impact.

Work within a USACE Jurisdictional Area.
Do not initiate activities within a U.S. Army Corps of Engineers (USACE) jurisdictional area that have not been previously evaluated by the USACE as part of the permit review of this project. Such activities include, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Obtain written approval from the Engineer for activities not specifically addressed in the plans. Provide a signed sketch and description of the location 60 business days prior to begin work at the location. Complete and return any forms provided by TxDOT. Approval of the work is not guaranteed. Un approved work is not a compensable impact.

Work over or near Bodies of Water (lakes, rivers, ponds, creeks, dry waterways, etc.).
Keep on site a universal spill kit adequate for the body of water and the work being performed. Debris is not allowed to fall into the ordinary high-water level (OHWL). Debris that falls into the OHWL must be removed at the end of each work day. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event. When not in use and at the end of each work shift, all material and equipment must be stored more than 100 ft. away from the ordinary high water mark. This work is subsidiary.

Install and maintain traffic control devices to maintain a navigable corridor for water traffic. Install devices to restrict water traffic during bridge demo and beam placement. This work is subsidiary.

Prior to begin construction, install construction fence, silt fence, rock filter dam, or other temporary barrier from ROW to ROW at a distance 25 feet from the OHWL. This barrier is used to deter construction equipment and personnel from accessing the waterway. Use items that exist in the plans to create the barrier. If items do not exist, payment will be paid using force account

in accordance with Item 9.7, "Payment for Extra Work and Force Account Method." Sections of the barrier may be removed and replaced to access the work shown on the plans. Upon completion of the work located within the barrier, the barrier must be restored ROW to ROW and remain until the project is complete.

Equipment is not allowed to access the area below the OHWL. If allowed to access the area below the OHWL, provide a 14-calendar day notice to the Engineer prior to accessing the water with equipment. Provide a sketch of the pad that will be placed in the water to support the equipment. The pad should be made of 3 in. x 5 in. rock or other material that can be removed when the work is complete. All pads thicker than 2 ft. shall be enclosed by portable concrete traffic barrier to help contain the material. This work is subsidiary.

Equipment is not allowed to cross the waterway from bank to bank. If allowed to cross the water, provide a 14-calendar day notice to the Engineer prior to installing a temporary crossing. The crossing shall be constructed in accordance with the AUS district temporary stream crossing detail. Temporary crossing may not remain in place longer than 12 months unless approved by the Engineer. All work that utilizes the temporary crossing must be completed within 12 months. This work is subsidiary.

DSHS Asbestos and Demolition Notification.
Complete and provide the Texas Department of State Health Services (DSHS) notification form to the Engineer and email to AUS_BRG_Notify@txdot.gov at least 30 calendar days prior to bridge removal or renovation for each phase or step of work. Notify the Engineer via email of any changes to the work start and end dates.

Vehicle Idle Restrictions
With in the limits of City of Austin, Bastrop County, and Travis County, on road vehicles may not idle more than 5 minutes except for following exemptions: vehicle 14,000 pounds or less, vehicles over 14,000 pounds are certified clean ideal as defined by the EPA, or other exemptions as listed in TAC Title 30, Part 1, Chapter 114, Subchapter J, Division 2, 114.517.

Birds and bats may be nesting within the project limits and concentrated on roadway structures such as bridges and culverts. Remove all old and unoccupied migratory bird nests from any structures, trees, etc. between September 16 and February 28. Prevent migratory birds from re-nesting between March 1 and September 15. Prevention shall include all areas within 25 ft. of proposed work. All methods used for the removal of old nesting areas and the prevention of re-nesting must be submitted to TxDOT 30 business days prior to begin work. This work is subsidiary.

If active nests are encountered on-site during construction, all construction activity within 25 ft. of the nest must stop. Contact the Engineer to determine how to proceed.

Tree and Brush Trimming and Removal.
Work will be conducted September 16 thru February 28. Work conducted outside this timeframe will require a bird survey. Submit a survey request to TxDOT 30 business days prior to begin work.

If within the removal time period, removal work may be conducted during delayed start period using proper traffic control per TCP standards.

Upon begin removal operations, all removal work for the project must be completed within 21 calendar days. Completion of removal includes removing from ROW or mulching of all debris.

No extension of time or compensation will be granted for a delay or suspension due to the above bird, bat, and tree/brush requirements.

Law Enforcement Personnel.
Submit charge summary and invoices using the Department forms.

Patrol vehicles must be clearly marked to correspond with the officer's agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.
No payment will be made for law enforcement personnel needed for moving equipment or payment for drive time to/from the event site. A minimum number of hours is not guaranteed. Payment is for work performed. If the Contractor has a field office, provide an office location for a supervisory officer when event requires a supervising officer. This work is subsidiary.

A maximum combined rate of $85 per hour for the law enforcement personnel and the patrol vehicle will be allowed. Any scheduling fee is subsidiary per Standard Specification 502.4.2.
Cancel law enforcement personnel when the event is canceled. Cancellation, minimums or "show up" fees will not be paid when cancellation is made 12 hours prior to beginning of the event. Failure to cancel within 12 hours will not be cause for payment for cancellation, minimums, or "show up" time. Payment of actual "show up" time to the event site due to cancellation will be on a case-by-case basis at a maximum of 2 hours per officer.

Alterations to the cancellation and maximum rate must be approved by the Engineer or pre-determined by official policy of the officer's governing authority.

Back Up Alarm.
For hours 9 P to 5 A, utilize a non-intrusive, self-adjusting noise level reverse signal alarm. This is not applicable to hotmix or seal coat operations. This is subsidiary.

ITEM 8 – PROSECUTION AND PROGRESS

In addition to the daily contract administration liquidated damages (LDs), the project specific LDs will be increased by $1**,300** per working day for Road User Cost (RUC).

County: Travis
Highway: RM 1431
Sheet:
Control: 1378-01-050

ITEM 100 - PREPARING RIGHT OF WAY

Prep ROW must not begin until accessible trees designated for preservation have been protected, items listed in the EPIC have been addressed, and SW3P controls installed in accessible areas.

Backfill material will be Type B Embankment using ordinary compaction.

Follow Item 752.4 Work Methods and Item 752 general notes when removing or working on or near trees and brush.

Unless shown otherwise in the plans or a designated non-mow area, perform trimming or removal for areas within 30 ft. of edge of pavement under construction. Trim or remove to provide minimum of 5 ft. of horizontal clearance and 7 ft. of vertical clearance for the following: sidewalks, paths, guard fence, rails, signs, object markers, and structures. Trim to provide a minimum of 14 ft. vertical clearance under all trees. This work is subsidiary.

ITEM 105 – REMOVING TREATED AND UNTREATED BASE AND ASPHALT PAVEMENT

Existing typical is based on information available. This typical may not account for all maintenance work such as overlays or pavement repairs. A change in material type or thickness does not warrant additional payment. Payment is full compensation for removing all material to the depth specified.

ITEM 110 – EXCAVATION

The Engineer will define unsuitable material.

ITEM 132 – ALL EMBANKMENT

At no time will the retaining wall backfill material exceed the adjacent embankment operation by more than one lift. At no time will the embankment adjacent to the retaining wall backfill exceed the wall backfill by any elevation. Embankment placed over the area of MSE backfill must meet the same backfill requirements for the type specified under Item 423.

The Engineer will define unsuitable material. Material which the Contractor might deem to be unsuitable due to moisture content will not be considered unsuitable material.

Prior to begin embankment of existing area, correct or replace unstable material to a depth of 6 in. below existing grade. Embankment areas will be inspected prior to beginning work.

Rock or broken concrete produced by the project is allowed in earth embankments. The size of the rock or broken concrete will not exceed the layer thickness requirements in Section 132.3.4., "Compaction Methods." The material will not be placed vertically within 5 ft. of the finished subgrade elevation.

Embankment placed vertically within 5 ft. of the finished subgrade elevation or within the edges of the subgrade and treated with lime, cement, or other calcium-based additives must have a sulfate content less than 3000 ppm. Allow 5 business days for testing. Treatment of sulfate material 3000 ppm to 7000 ppm requires 7 days of mellowing and continuous water curing, in accordance TxDOT guidelines for Treatment of Sulfate-Rich Soils and Bases in Pavement Structures (9/2005). Material over 7000 ppm is not allowed.

ITEM 132 – EMBANKMENT TY C
The Department must approve all Type C embankment material before use on the project. Do not furnish shale clays. Furnish embankment with sulfate content less than 3000 ppm if treated with calcium-based chemicals or within 5 ft. of the finished subgrade elevation. Existing material from within the project limits that meets the Type C Substitute requirements may substituted for Type C but is not allowed to substitute for C1, C2, or density-controlled material. Offsite material may be used to blend with onsite material to achieve the Type C requirements. The Type C substitute may also be existing material in accordance with 132 for rock embankment. The Type C substitute material may only be placed vertically beyond 5 ft. below the finished subgrade elevation or 5 ft. beyond the edge of the subgrade.

Type C				
Percent Retained		LL Max	PI Max	PI Min
3"	#4			
0	MIN 45	55	20	6
Type C Substitute				
Percent Retained			PI Max	
3"	#4			
Max 10	10-90		25	

TY C1 and C2

Description	Percent Retained					LL Max	PI Max	PI Min
	3"	1 3/4"	3/8"	#4	#40			
Embankment (Ordinary) (TY C1)	0	0-10	-	45-75	60-85	45	20	6
Embankment (Ordinary) (TY C2)	-	-	0	30-75	50-85	55	25	8

ITEM 134 - BACKFILLING PAVEMENT EDGES

Install at 3:1 slope to tie into existing terrain and apply erosion control material per Item 300 at rate of 0.12 GAL/SY.

For TY A backfill, furnish flexible base meeting the requirement for any type or grade, except Grade 4, in accordance with Item 247. Compressive strengths and wet ball mill for flexible base are waived for this item. Alternate materials include RAP, salvaged material from Item 105, and salvaged material from Item 351. The alternate materials are not required to be tested but visually verified as 100% passing a 2.5 in. sieve.

ITEM 160 - TOPSOIL
Off-site topsoil will have a minimum PI of 25.

No Sandy Loam allowed.

Obtain approval of the actual depth of the topsoil sources for both on-site and off-site sources.

Construct topsoil stockpiles of no more than five (5) feet in height.

It is permissible to use topsoil dikes for erosion control berms within the right of way, as directed.

Seed or track slopes within 14 days of placement.

Salvage topsoil from sites of excavation and embankment. Maximum salvage depth is 6 inches.

Windrowing of topsoil obtained from the Right of Way (ROW) is not allowed.

ITEM 164 – SEEDING FOR EROSION CONTROL
Hydro mulch seeding will be allowed as a substitute for drill seeding if placed October 1 thru January 31. It may only be substituted in areas with a slope less than 1 in. vertical to 12 in. horizontal. It may not be used in the bottom of a ditch or channel. Payment will be made using the existing drill seed item.

ITEM 168 – VEGETATIVE WATERING
Water all areas of project to be seeded or sodded.

Maintain the seedbed in a condition favorable for the growth of grass. Watering can be postponed immediately after a rainfall on the site of ½ inch or greater, but will be resumed before the soil dries out. Continue watering until final acceptance.

Vegetative watering rates and quantities are based on ¼ inch of watering per week over a 3-month watering cycle. The actual rates used and paid for will be as directed and will be based on prevailing weather conditions to maintain the seedbed.

Obtain water at a source that is metered (furnish a current certification of the meter being used) or furnish the manufacturer's specifications showing the tank capacity for each truck used.

Notify the Engineer, each day that watering takes place, before watering, so that meter readings or truck counts can be verified.

ITEM 169 – SOIL RETENTION BLANKETS
Type A blankets containing straw fibers are not allowed. Type B and D blankets shall be a spray type blanket.

ITEM 204 – SPRINKLING
Apply dust control to haul roads, construction traffic routes, staging areas, field office areas, material storage areas, parking areas, and stockpiles as directed. If dust control is not being maintained, the Department may cease operations until dust is controlled. This work is subsidiary.

ITEM 216 - PROOF ROLLING
Correct and perform "Proof Rolling" retest at the Contractor's expense, to the satisfaction of the Engineer, when initial "Proof Rolling" yields a failing result.

ITEM 247 - FLEXIBLE BASE
The layer thickness will be 4 in. to 6 in. unless shown on the plans. Placing in a single layer is allowed when total thickness of base is 8 in. or less. When placed in multiple layers, compact the bottom and middle layers to at least 95% and 98% of the maximum dry density, respectively. When placed in a single layer or the final layer, compact to at least 100%.

Correction of subgrade soft spots is subsidiary.

Complete per plans the subgrade, ditches, slopes, and drainage structures prior to the placement of base.

Do not use a vibratory roller to compact base placed directly on top of a drainage structure.

Grade 4 will have the same material requirements as Grade 5 except minimum compressive strength at lateral pressure 3 psi will be 70 psi and at lateral pressure 15 psi will be 150 psi. Grade 4 does not have a minimum compressive strength at lateral pressure 0 psi.

ITEM 300s – SURFACE COURSES AND PAVEMENTS
The latest work start date for asphalt season is August 1 when a date is required per special provision to Item 8.1.

Overlay and seal coat projects must include placement of surface material on the existing mailbox turnouts, including turnouts that are worn paths without a pavement structure. Apply a new surface and material as necessary to create a mailbox turnout with a cross slope that matches the adjacent pavement. Payment of work will be in accordance with the item for the type of material placed. If no bid item for payment is provided in the Contract, the work will be measured and paid for in accordance with Article 9.7., "Payment for Extra Work and Force Account Method."

ITEM 310 – PRIME COAT
Apply blotter material to all driveways and intersections. This work is subsidiary.

When Multi Option is allowed, provide MC 30, EC 30 or AE-P. MC 30 is not allowed in Travis County.

Rolling to ensure penetration is required.

ITEM 320 - EQUIPMENT FOR ASPHALT CONCRETE PAVEMENT
Use of motor grader is allowed for placement of mixtures greater than 10 inches from the riding surface, when hot-mix is used in lieu of flexible base, or as allowed.

ITEMS 341 THRU 348 - HOT-MIX ASPHALT PAVEMENT
Core holes may be filled with an Asphaltic patching material meeting the requirements of DMS-9203 or with SCM meeting requirements of DMS-9202.

Remove and dispose of off the ROW the audible/profile markings, reflectorized markings, and raised markers.

Install transverse butt joints with 50 ft. H: 1 in. V transition from the new ACP to the existing surface. Install a butt joint with 24 in. H: 1 in. V transition from the new ACP to a driveway, pullout or intersection. Saw cut the existing pavement at the butt joints. This work is subsidiary.

Use a device to create a maximum 3H:1V notched wedge joint on all longitudinal joints of 2 in. or greater. This work is subsidiary.

Prior to milling, core the existing pavement to verify thickness. This work is subsidiary.

Ensure placement sequence to avoid excess distance of longitudinal joint lap back not to exceed one day's production rates.

Submit any proposed adjustments or changes to a JMF before production of the new JMF.

Tack every layer. Do not dilute tack coat. Apply it evenly through a distributor spray bar. Provide a minimum transition of 10-ft for intersections, 10-ft for commercial driveways, and 6-ft for residential driveways unless otherwise shown on the plans.

Irregularities will require the replacement of a full lane width using an asphalt paver. Replace the entire sublot if the irregularities are greater than 40% of the sublot area.

Lime or an approved anti-stripping agent must be used when crushed gravel is utilized to meet a SAC "A" requirement.

When using RAP or RAS, include the management methods of processing, stockpiling, and testing the material in the QCP submitted for the project. If RAP and RAS are used in the same

mix, the QCP must document that both of these materials have dedicated feeder bins for each recycled material. Blending of RAP and RAS in one feeder bin or in a stockpile is not permitted.

Asphalt content and binder properties of RAP and RAS stockpiles must be documented when recycled asphalt content greater than 20% is utilized.

No RAS is allowed in surface courses.

Department approved warm-mix additives is required for all surface mix application when RAP is used. Dosage rates will be approved during JMF approval.

The Hamburg Wheel Test will have a minimum rut depth of 3mm except for SMA with HPG or PG 76.

ITEMS 341 - DENSE-GRADED HOT-MIX ASPHALT
Design all Type D mixtures as a surface mix, maximum 15% RAP and without RAS.

Contractor may not use a substitute PG binder for 76-22. When using substitute binders, mold specimens for mix design and production at the temperature required for the substitute binder used to produce the HMA.

The Hamburg Wheel minimum number of passes for PG 64 or lower is reduced to 7,000. The Engineer may accept Hamburg Wheel test results for production and placement if no more than 1 of the 5 most recent tests is below the specified number of passes and the failing test is no more than 2,000 passes below the specified number of passes.

ITEM 342 - PERMEABLE FRICTION COURSE (PFC)
For SAC A, blending SAC B aggregate with an RSSM greater than the SAC A rating or 10, whichever is greater, is prohibited.

Submit the A-R binder design to the District Laboratory for approval.

Install a butt joint when the edge is adjacent to a driveway or intersection. The taper for the butt joint shall be 24H:1V beyond the normal edge line of the PFC. This work is subsidiary.

ITEM 351 – FLEXIBLE PAVEMENT STRUCTURE REPAIR
Unless otherwise shown on the plans, use the AUS District Flexible Pavement Details found at www.txdot.gov/about/districts/austin-district/district-standards.html.

ITEM 354 - PLANING AND TEXTURING PAVEMENT
Contractor retains ownership of salvaged materials.

Unless shown on the plans, mill and resurface the work area during each shift on roadways with ADT greater than 20,000 or if milling will expose the flex base or subgrade per the typical section. Unless shown on the plans, mill and resurface a work area within 5 days for roadways with ADT 20,000 or less.

Taper permanent transverse faces 50 ft. per 1 in. Taper temporary transverse faces 25 ft. per 1 in. Taper permanent longitudinal faces 6 ft. per 1 in. HMA may be used as temporary tapers. Provide minimum 1 in. butt joints at bridge ends and paving ends. This work is subsidiary.

Milled surfaces directly covered by a mat thickness of 1 in. or less shall produce a milled texture with a ridge to valley depth (RVD) no greater than 0.25 in. (6.5 mm).

ITEM 400 - EXCAVATION AND BACKFILL FOR STRUCTURES
Unless otherwise shown on the plans, for cutting and restoring pavement use the AUS District Flexible Pavement Details found at www.txdot.gov/about/districts/austin-district/district-standards.html.

Saw-cut the pavement at the edge of the excavation. This work is subsidiary.

Backfill the bridge ends in accordance with the limits shown on TxDOT “CSAB” Standard. Use material in accordance with “CSAB” or Item 423, Type BS. The “CSAB” optional bond breaker materials are allowed. This work is subsidiary.

ITEM 432 - RIPRAP
Mow strip riprap will be 4 in. and all other riprap will be 5 in. unless otherwise shown on the plans. Mow strip for cable barrier may be placed monolithically with the barrier foundations if using concrete in accordance with Item 543. Fiber reinforcement is not allowed except in mow strip for cable barrier if foundation and mow strip are placed monolithically. GFRP is allowed reinforcement for all applications.

Saw-cut existing riprap then epoxy 12 in. long No. 3 or No. 4 bars 6 in. deep at a maximum spacing of 18 in. in each direction to tie new riprap to existing riprap. This work is subsidiary.

Provide Type A Grade 3 or 5 flexible base for cement stabilized riprap. Compressive strengths for flexible base are waived.

SGT approach taper, paid for using mow strip item, will be installed using concrete, flexible base coated with SS-1 at a rate of 0.12 GAL/SY, or HMA Type B/C/D. Placement will be ordinary compaction and does not require placement using an asphalt paver.

ITEM 460 - CORRUGATED METAL PIPE
Field adjust pipe end to maintain the necessary slope. Field cutting of pipe end is allowed. Coat all field cuts with asphalt paint. Cut ditches to grade before laying pipe.

ITEM 466 - HEADWALLS AND WINGWALLS
Remove all loose formwork and materials from the waterway at the end of each work week or prior to a rain event. Debris that falls into the waterway must be removed at the end of each work day. Upon completion of the structure, stencil the National Bridge Inventory (NBI)

number (structure number) using black paint and 4 in. tall numbers at 4 locations designated by TxDOT. This work is subsidiary.

ITEM 467 - SAFETY END TREATMENT

Field adjust pipe end to maintain the necessary slope. Field cutting of pipe end is allowed. Coat all metal field cuts or exposed reinforcement with asphalt paint.

For all Type II SETs, provide riprap apron shown in the cast-in-place standards and precast riprap detail standard. This work is subsidiary.

Cast-in-place or precast will be allowed unless stated otherwise.

ITEM 496 - REMOVING STRUCTURES

Submit a demolition plan to the Engineer. Have the plan signed and sealed by a licensed professional engineer when the structure will continue to accommodate traffic after removal has begun and the removal impacts any part of the structure below the deck or riding surface. If applicable, the plan must detail requirements for meeting the U.S. Army Corps of Engineers' Section 404 Permit. The demolition plan must detail handling of roadway and waterway traffic. Waterway traffic must be maintained at all times unless a closure is approved by the Engineer.

No debris is allowed to fall into a body of water. Debris that falls into the water must be removed at the end of each workday. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event.

No debris is allowed to fall directly onto existing pavement. Existing pavement must be protected from damage by debris with a minimum of 1 ft. sand cushion. Submit an alternate roadway protection or cushion material to Engineer for approval. If existing pavement is PFC, use a vacuum truck to remove embedded sand after removal of sand cushion and debris. This work is subsidiary.

ITEM 502 - BARRICADES, SIGNS, AND TRAFFIC HANDLING

Table 1

Roadway	Limits	Allowable Closure Time
IH 35	All (1 lane closed)	9 P to 5 A
IH 35	All (2 lanes closed, see allowable work below)	9 P to 5 A
IH 35	All (2 lanes closed, all work)	11 P to 5 A
SH 45	US 183 to SH130	8 P to 5 A
LP 1	William Cannon to Parmer Lane	8 P to 5 A
US 183	SH 29 to FM 1327	8 P to 5 A
SH 71	SH 130 to IH 35	8 P to 5 A
SH 71	SH 304 to Tahitian Drive	8 P to 5 A
SH 71	US 290 W to RM 3238	8 P to 5 A
US 290 W	IH 35 to Nutty Brown Rd	8 P to 5 A
US 290 E	IH 35 to SH 95	8 P to 5 A
FM 734	FM 1431 to US 290 E	8 P to 5 A
US 79	IH 35 to Bus 79 in Taylor	8 P to 5 A

RM 1431	Lohmans Ford Rd to IH 35	8 P to 5 A
SH 29	LP 332 western terminus to SH 130	8 P to 5 A
SH 80	Charles Austin to River Road	8 P to 5 A
RM 2222	All	8 P to 5 A
RM 620	All	8 P to 5 A
RM 2244	All	8 P to 5 A
SPUR 69	All	8 P to 5 A
LP 360	All	8 P to 5 A
LP 343	All	8 P to 5 A
LP 275	All	8 P to 5 A
FM 1325	All	8 P to 5 A
All	Within 200' of a signalized intersection	9 P to 5 A
All	All (Full Closure, see allowable work below)	11 P to 4 A

Table 3 (Mobile Operations)

Roadway	Allowable Sun Night thru Fri Noon	Allowable Sat thru Sun Morn
Within Austin City Limits	10 A to 2 P and 7 P to 6 A	7 P to 10 A
Outside Austin City Limits	9 A to 3 P and 7 P to 7 A	6 P to 11 A
IH 35 main lanes	10 P to 5 A	9 P to 9 A
AADT over 50,000	8 P to 6 A	8 P to 10 A

For roadways without defined allowable closure times, nighttime lane closures will be allowed from 8 P to 6 A.

Daytime or Friday night lane closures will not be allowed unless otherwise shown on the plans. One lane in each direction will remain open at all times for all roadways unless otherwise shown on the plans.
Two lanes closed on IH 35 allowed to begin at 9 P.M. for main lane (shoulder work not included) hotmix overlay or pavement repair operations (does not include bridge joint work).

Full closures only allowed Friday night thru Monday morning for bridge beam installation, bridge demolition, or OSB truss removal/installation. Full closures only allowed for roadways with frontage roads or if a designated detour route is provided in the plans.

No closures will be allowed on the weekends, working day prior, and working day after the National Holidays defined in the Standard Specifications, Good Friday, and Easter weekend.

No closures will be allowed 1 P.M. to 11 P.M. the Sunday of the Super Bowl.

Time charges will not be suspended during the large and special events listed below. These events are provided in the contract to allow scheduling of work around these lane closure restrictions.

All lanes will be open by noon of the day before the large events listed in below table. No closures will be allowed on Friday and the weekends for projects within 20 miles of these large events:

Table 4 (Large Events)

Event	City	Dates
Formula 1 @ COTA	Austin	Annually (See Event Website)
Moto GP @ COTA	Austin	Annually (See Event Website)
ACL Fest	Austin	Annually (See Event Website)
SXSW	Austin	Annually (See Event Website)
ROT Rally	Bastrop	Annually (See Event Website)
UT Football Games	Austin	Annually (See Event Website)
Sales Tax Holiday	All	Annually (See Event Website)
Rodeo Austin	Austin	Annually (See Event Website)

All lanes will be open by noon of the day before the special events listed in below table. No closures will be allowed on Friday and the weekends for projects within 10 miles of these special events:

Table 5 (Special Events)

Event	City	Dates
Eaker BBQ Competition	Fredericksburg	March 10, 2024
Sherwood Forest Faire	McDade / Paige	Weekends in March and April
Smithville Jamboree	Smithville	April 4-6, 2024
Two Step Inn	Georgetown	April 20-24, 2024
Wiener Dog Races	Buda	April 27-28, 2024
Founders Day Festival	Dripping Springs	April 26-28, 2024
Red Poppy Festival	Georgetown	April 26-28, 2024
Crawfish Open	Llano	3rd Friday and Saturday in April
Fair and Rodeo	Liberty Hill	May 18, 2023
Founders Day Ceremony	Fredericksburg	2nd Weekend in May
Crawfish Festival	Fredericksburg	Saturday before Memorial Day
Lakefest Boat Races	Marble Falls	June 10-11, 2023
Watermelon Thump	Luling	Last Full Weekend in June
Pie in the Sky	Kyle	Sept 1-2, 2023
Wine and Music Festival	Georgetown	Last Saturday of September
Deer Season Opening Weekend	All Counties in Burnet Area Office	1st Friday and Saturday of Season
Christmas Nights of FBG Lights	Fredericksburg	Nov 21, 2023
Christmas on Mercer	Dripping Springs	Dec 2, 2023
Lady of Guadalupe Procession	Fredericksburg	Dec 12, 2023
Texas State Graduation Fall	San Marcos	TBD

Texas State Graduation Spring	San Marcos	TBD

All the large and special events listed in the above tables occur annually. Coordinate with the Department and review the city/event website to plan around the future events.

To account for directional traffic volumes, begin and end times of closures may be shifted equally by the Engineer. The closure duration will remain. Added compensation is not allowed.

One-way traffic control, including work performed under Item 510, must be set up to provide a maximum of 20 minutes of delay to the traveling public.

Submit an emailed request for a lane closure (LCN) to TxDOT. The email will be submitted in the format provided. Receive concurrence prior to implementation. Submit a cancellation of lane closures a minimum of 18 hours prior to implementation. Blanket requests for extended periods are not allowed. Max duration of a request is 2 weeks prior to requiring resubmittal.

Provide 2-hour notice prior to implementation and immediately upon removal of the closure.

For roadways listed in Table 1: Submit the request 96 hours prior to implementation.

For roadways not listed in Table 1: Submit the request a minimum of 48 hours prior to the closure and by the following deadline immediately prior to the closure: 11A on Tuesday or 11A on Friday.

For all roadways: Submit request for traffic detours and full roadway closures 168 hours prior to implementation. Submit request for nighttime work 96 hours to implementation date.

Cancellations of accepted closures (not applicable to full closures or detours) due to weather will not require resubmission in accordance with the above restrictions if the work is completed during the next allowable closure time.

Closures that conflict with adjacent contractor will be prioritized according to critical path work per latest schedule. Conflicting critical path or non-critical work will be approved for first LCN submitted. Denial of a closure due to prioritization or other reasons will not be reason for time suspension, delay, overhead, etc.

Meet with the Engineer prior to lane closures to ensure that sufficient equipment, materials, devices, and workers will be used. Take immediate action to modify current and future traffic control, if at any time the queue becomes greater than 20 minutes.

Consider inclement weather prior to implementing the lane closures. Do not set up traffic control when the pavement is wet.

Cover, relocate, or remove existing small, large, and overhead signs that conflict with traffic control. Cover large and overhead signs to remain using latest standard TS-CD. This work is subsidiary.

Install all permanent signs, delineation, and object markers required for the operation of the roadway before opening to traffic. Use of temporary mounts is allowed or may be required until the permanent mounts are installed or not impacted by construction. Maintain the temporary mounts. This work is subsidiary.

Place a 28-inch cone, meeting requirements of BC (10) and Ty III barricades, on top of foundations that have protruding studs. This work is subsidiary.

Vertical panels used on roadways with speed limit 55mph or greater must be round in shape or have a self-righting mechanism. The "flat" or "oblong" shaped vertical panels are not allowed.

A series of sequential flashing warning lights, per BC(7), must be installed in a merging taper for long term stationary TCP. This includes all TCP setups, such as those shown on the plans or TCP setups per the standards.

Edge condition treatment types must be in accordance with the TxDOT standard. Installation and removal of a safety slope is subsidiary.

To determine a speed limit or an advisory speed limit, submit a request to TxDOT 60 business days prior to manufacture of the sign.

For non-site-specific signal projects, 2 months of barricades will be paid per work order location.

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.

Business access signs will be paid using safety continency. Install as directed by the Engineer. Company logos will not be permitted on the signs. Maintenance of the signs will be subsidiary to Item 502.

ITEM 503 – PORTABLE CHANGEABLE MESSAGE SIGN
Place PCMS 10 calendar days prior to begin work stating "Road Work Begin Soon, Contact 832-7000 For Info".

Place PCMS at time of LCN request. Place the PCMS at the expected end of queue caused by the closure. When the closure is active, revise the message to reflect the actual condition during the closure, such as "RIGHT LN CLOSED XXX FT".

ITEM 504 - FIELD OFFICE AND LABORATORY

Provide a Type E Field Office structure with at least 400 sq. ft. of gross floor area in room(s) 8 ft. high. The structure will include high speed internet service with WIFI signal, minimum of two desks, four chairs, and a storage cabinet. The cabinet will be lockable and a minimum of 3 ft wide by 2 ft deep by 3 ft high. If a field office is required, a concrete testing facility will be required regardless of quantity of concrete.

All labs and offices will include cleaning at least once a week. The cleaning will include sweeping and mopping of floors, cleaning the toilet and lavatory, and emptying wastebaskets. Space heaters are not considered adequate heating.

Projects with more than 500 CY of structural class concrete, 5000 SY of Class P concrete, and/or 2000 CY of non-structural concrete will include a concrete testing facility. Provide a structure with at least 200 sq. ft. of gross floor area in room 8 ft. high. The structure will include the laboratory equipment and all other related items to perform the contract-controlling test procedures.

Projects with HMAC, furnish a Type D structure for the Engineer's exclusive use. The structure will include high speed internet service with WIFI signal, one desk, two chairs, and one file cabinet. Provide a minimum of three 120-volt circuits with 20-amp breakers and at most two grounded convenience outlets per circuit.

ITEM 505 – TRUCK MOUNTED ATTENUATOR AND TRAILER ATTENUATOR
The TMA/TA used for installation/removal of traffic control for a work area will be subsidiary to the TMA/TA used to perform the work.

The contractor will be responsible for determining if one or more operations will be ongoing at the same time to determine the total number of TMA/TA required for the work. TMA/TAs paid by the day is full compensation for all worksite locations during an entire day.
TMA/TAs used to protect damaged attenuators will be paid by the day using the force account item for the repair.

ITEM 506 - TEMPORARY EROSION, SEDIMENTATION, AND ENV CONTROLS
If SW3P plan sheets are not provided, place the control measures as directed.

Install, maintain, remove control measures in areas of the right of way utilized by the Contractor that are outside the limits of disturbance required for construction. Permanently stabilize the area. This work is subsidiary.

Erosion control measures must be initiated immediately in areas where construction activities have ceased and will not resume for a period exceeding 14 calendar days. Vertical track all exposed soil, stockpiles, and slopes. Re-track after each rain event or every 14 days, whichever occurs first. Sheep foot roller is allowed for vertical tracking. This work is subsidiary.

For routine or anticipated dewatering, notify the engineer 72 hours before beginning dewatering. Notify the Engineer within 1 hour of beginning emergency or recent rainfall dewatering. Water located within the ROW that will leave the ROW must appear free of pollutants such as suspended sediment, oil sheen, floating solids, etc. Dirty water must pass thru adequate BMPs prior to leaving the ROW to prevent discharge of dirty water. Bypass pumping of water found in a navigable waterway that enters from outside the ROW and is discharged downstream of the ROW will not require the use of BMPs. Dewatering BMPs will be paid for in conformance with the applicable bid items. However, if the necessary BMP item is not included in the Contract, payment for the BMP will be in accordance with Article 9.7., "Payment for Extra Work and Force Account Method." The act of dewatering and the equipment used to dewater will not be paid for directly but will be subsidiary to pertinent bid items.

Unless a specific pay item is provided in the plans, the installation of the 6:1 or flatter for RFD side slopes in the safety zone will be subsidiary to pertinent bid items.

Cover small waste containers (100 gallons or less) at all times. This work is subsidiary. Large waste containers (more than 100 gallons) must have a secondary discharge containment system around the container using erosion control logs. Installation of the log for each container location will be paid using existing bid items. Repair, remove, or replace of the log will not be paid. Revisions, repairs, remove or replace of the log during exchange of empty/full containers at the same location will not be paid.

Portable restrooms must be located more than 50 ft. from a waterway. Tie or stake down portable restrooms to prevent tipping due to vandalism or weather. This work is subsidiary.

Provide a designated location for disposal when excess and waste, including waste generated from cleaning of all equipment used for mixing, hauling, and transfer concrete is disposed in the ROW or PSL. Manufactured disposal containers must be metal or a plastic material with minimum 10 mil thickness. Paper, earthen berms, or pits must be lined with minimum 10 mill thickness polyethylene sheeting. Disposal locations must be located a minimum of 50 ft. from a waterway, tree, or sensitive feature. The disposal location must have a minimum height of 6 in. Maintain a minimum 4 in. of freeboard at all times. Disposal locations are not required for cleaning of small hand tools. Hardened concrete waste may be used as embankment if placed in accordance with Item 132.

Dust Control
Stockpiles that will be inactive for greater than 14 days must be treated to contain dust by covering with chemical dust suppressant, soil blanket, vertical tracking, or method other than sprinkling with water. Stockpiles that are actively being used must be treated to contain dust by vertical tracking or a method determined by the Contractor. This work is subsidiary.

Provide designated construction traffic routes when feasible. Construction site traffic must be directed to use designated routes.

ITEMS 528, 529, 530, 531, & 536 – MISCELLANEOUS CONSTRUCTION

Reinforcement will be in accordance with Section 432.3.1 unless shown on the plans. Fiber reinforcement is not allowed. GFRP is allowed reinforcement for all applications. Class A and B Concrete are allowed to use Coarse Aggregate Grades 1-8.

Unless shown on the plans, all concrete will be 5 in. thick and have 2 in. sand, base, or RAP bedding. Furnish base meeting the requirement for any type or grade in accordance with Item 247. Compressive strengths for flexible base are waived. RAP must be 100% passing a 1 in. sieve. Bedding and flexible base must be placed using ordinary compaction.

Expansion joints will be placed every 40 ft. Expansion joints must be 1 in. wide asphalt board and flush with the surface. The bottom of the asphalt board will be at half the depth of the concrete. The reinforcement will be continuous thru the expansion joint.

Sidewalk cross slope must not exceed 1.5%.

If roots are encountered verify with the Engineer before accommodating or removing 2 in. diameter or larger roots. Root removal must be in accordance with Section 752.4.2. Roots may remain in the bedding or base. For improvements within 6 in. of a root, the concrete thickness may be reduced by 1 in. and the bedding increased by 1 in. to minimize impacts to the roots. Adjust bedding and surface profile to provide a 1 in. bedding cushion around the roots. The surface profile may be adjusted to the extent allowed by ADA. This work is subsidiary.

ITEM 530 – INTERSECTIONS, DRIVEWAYS, AND TURNOUTS
Notify property owners at least 48 hr. before beginning work on their driveway. Use a means and methods to construct the driveway while maintaining access to the property at all times. Full closure of a driveway is allowed for reconstruction if duration and alternate access are approved by Engineer. Install and maintain material across a work zone as temporary access. This work is subsidiary.

Unless otherwise shown on the plans, use the AUS District Driveway and Mailbox Turnout standard found at www.txdot.gov/about/districts/austin-district/district-standards.html.
Driveways that are public county roads or city streets the pavement structure will match the adjacent roadway.

ITEMS 540, 542, & 544 - METAL BEAM GUARD FENCE AND GUARDRAIL END TREATMENTS
Furnish round timber posts for guard fence. Steel posts for low fill culvert applications is subsidiary including use of low fill culvert application due to other concrete structures such as inlets. Long span application at inlets may be used as an alternate to low fill culvert. Unless otherwise specified on the plans, use of low fill culvert or long span at inlets will be subsidiary to pertinent items. Stake the locations for approval before installation. Adjust the limits of the fence to meet field conditions. Install delineators before opening the road to traffic.

Retain all materials. Existing materials that are structurally sound and dent free may be reused. All reused material will be from this project and in compliance with current standards.

Structurally sound rust spots with the largest dimension of 4 in. may be cleaned and repaired in accordance with Section 540.3.5. Punch or field drill holes in the metal rail element to accommodate post spacing. Additional holes for splice or connections are not allowed. Space the field holes in accordance with the latest standard but no closer than the minimum spacing shown on the current standard.

Remove, replace, and install mow strip block out material. Construct new block outs and backfill unused block outs with class B concrete. This work is subsidiary.

Repair of mow strip damage, not caused by contractor negligence, and installation of new mow strip will be paid with appropriate bid items. Backfill and shoulder up of area around fence and mow strip will be paid using embankment item.

ITEM 585 - RIDE QUALITY FOR PAVEMENT SURFACES
Use Surface Test Type B Pay Schedule B to evaluate ride quality of travel lanes, including service roads.

ITEMS 600s & 6000s – ITS, TOLLING, LIGHTING, SIGNING, MARKINGS, AND SIGNALS
Meet the requirements of the NEC, Texas MUTCD, TxDOT standards, and TxDOT Standard Specifications. Notify the Engineer if existing elements to remain do not meet code or specification.

Provide all service, equipment and material required to provide a functional item and interface with existing equipment and software.

ITEM 644 – SMALL ROADSIDE SIGN ASSEMBLIES
Triangular slip base must be the clamp style to secure the post to the slip base. Set screw style slip base will not be allowed.

ITEM 650 - OVERHEAD SIGN SUPPORTS
Use lengths of trusses, tower heights, and posts shown in the summaries for bidding purposes only.
Verify these dimensions and vertical clearances prior to shop drawing production.

ITEM 658 – DELINEATOR AND OBJECT MARKER ASSEMBLIES
All delineator post and supports, excluding metal components, must be manufactured in the same color that matches the color of the reflector. Field painting is not allowed.

Flexible posts YFLX and WFLX must be tubular in shape. The “flat” flexible posts are not allowed.

Installation and maintenance of portable CTB reflectors will be subsidiary to the barrier.

CTB delineators must be placed on top of the CTB.

ITEM 662 - WORK ZONE PAVEMENT MARKINGS
Notify the Engineer at least 24 hours in advance of work for this item.

Maintain removable and short-term markings daily. Remove within 48 hours after permanent striping has been completed.

Item 668 is not allowed for use as Item 662.

Roadways with existing profile pavement markings or rumble strips must supplement work zone solid lines with traffic buttons spaced at 12 in. Traffic buttons used to supplement the work zone markings will be paid by the each in addition to the work zone item.

ITEM 666 - RETROREFLECTORIZED PAVEMENT MARKINGS
Notify the Engineer at least 24 hr. before beginning work.

All projects, including resurfacing, must increase center-to-center width for center line markings to 18 in. unless the plans or existing is greater than 18 in.

Place longitudinal markings nightly for IH 35 main lanes or roadways with AADT greater than 100,000. Use of temporary flexible reflective roadway marker tabs is subsidiary and at the Contractor’s option. Replace missing or damaged tabs nightly. If using tabs, place longitudinal markings weekly by 5 AM Friday for all weekday work and by 5 AM Monday for all weekend work. Failure to maintain tabs or place longitudinal markings by deadline will require nightly placement of longitudinal markings.

Place longitudinal markings no later than 7 calendar days after placement of the surface for roadways with AADT greater than 20,000.

When the raised portion of a profile marking is placed as a separate operation from the pavement marking, the raised portion must be placed first then covered with TY I.

When using black shadow to cover existing stripe apply a non-retroreflective angular abrasive bead drop. The marking color shall be adjusted to resemble the pavement color. If Item 677 is not used prior to placement of black shadow, scrape the top of the marking with a blade or large piece of equipment unless surface is a seal coat. The scraping of the marking is subsidiary.

ITEM 668 – PREFABRICATED PAVEMENT MARKINGS AND RUMBLE STRIPS
For center line applications of preformed rumble strips on multilane undivided roadways, application shall be continuous even if profile markings are present.

For center line applications of preformed rumble strips on two lane two-way roadways, application shall be continuous even if profile markings are present. The preformed rumble strip must not be placed in conflict with a broken/skip pavement marking.

For edge line applications of preformed rumble strips, use option 7 of standard RS(2) unless option 8 required due to shoulder width.

ITEM 677 - ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS
Dispose of removed materials and debris at locations off the right of way.

Elimination using a pavement marking will not be allowed in lieu of methods listed in specification.

Remove pavement markings on concrete surfaces by a blasting method. Flail milling will be allowed when total quantity of removal on concrete surfaces is less than 1000 ft.

Strip seal is only method allowed on seal coat surface unless project includes placement of a new surface. If total quantity of removal on a seal coat surface is less than 2000 ft., elimination using a pavement marking is allowed if a test section is approved by the Engineer. Test section shall demonstrate the thermo marking color matches the existing pavement color.

Remove pavement markings outside the limits of the new surface by a blasting method.

Use a TRAIL or a non-retroreflective paint to cover stripe remnants that remain after elimination.

The test requirements for these materials are waived. The paint color shall be adjusted to resemble the existing pavement color. Installation and maintenance is subsidiary.

ITEM 752 – TREE AND BRUSH REMOVAL
Follow Item 752.4 Work Methods and Item 752 general notes when removing or working on or near trees and brush even if Item 752 is not included as a pay item.

Flailing equipment is not allowed. Burning brush is not allowed in urban areas or on ROW. Use hand methods or other means of removal if doing work by mechanical methods is impractical.

Prior to begin tree pruning, send email confirmation to the Engineer that training and demonstration of work methods has been provided to the employees. This work is subsidiary.

Shredded vegetation may be blended, at a rate not to exceed 15 percent by volume, with Item 160 if the maximum dimension is not greater than 2 in.

ITEM 3006 – UNDERSEAL COURSE
The minimum application rates are listed in Table UC. No emulsified asphalt material allowed under PFC or SMA, except for use with Item 316, on roadways with ADT greater than 100,000.

Table UC

Material	Minimum Application Rate (mat >1" gal. per square yard)	Minimum Application Rate (mat <= 1" gal. per square yard)
TRAIL – Hot Asphalt	0.15	0.10
Spray Applied Underseal Membrane	0.15	0.15
Seal Coat – Tier II emulsion	0.25	0.25
Seal Coat – Tier II asphalt	0.23	0.23

Table UCS

Material	Minimum Shear Strength (psi)
SMA – Stone-Matrix Asphalt	60.0
PFC – Permeable Friction Course	N/A
All Other Materials	40.0

ITEM 3007 – BONDING COURSE
The minimum application rates are listed in Table BC. Miscellaneous Tack is allowed for use with dense-graded Type B HMA. If a tack bid item is not provided, use bonding course item.

Table BC

Material	Minimum Application Rate (gal. per square yard)
TRAIL – Emulsified Asphalt	0.06
TRAIL – Hot Asphalt	0.12
Spray Applied Underseal Membrane	0.10

Table BCS (For Informational Tests)

Material	Target Shear Bond Strength (Tex-249-F psi)
SMA – Stone-Matrix Asphalt	60.0
PFC – Permeable Friction Course	N/A
All Other Materials	40.0

ITEM 7251 – SUBSURFACE UTILITY LOCATE
This item is available to supplement 811 utility locate. Contractor must receive TxDOT approval prior to use. TxDOT will not be responsible for any damage to utilities regardless of locating method.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1378-01-050 **DISTRICT** Austin **COUNTY** Travis
HIGHWAY RM 1431

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**1378-01-050**			
		PROJECT ID		**A00184597**			
		COUNTY		**Travis**			
		HIGHWAY		**RM 1431**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-7002	PREPARING ROW	STA	72.000		72.000	
	104-7005	REMOV CONC (MOWSTRIP)	LF	3,355.000		3,355.000	
	104-7006	REMOV CONC (RIPRAP)	SY	3,880.000		3,880.000	
	105-7002	RMV (2"-6") TRT/UNTRT BASE & ASPH PAV	SY	7,984.000		7,984.000	
	110-7001	EXCAV (ROADWAY)	CY	12,694.000		12,694.000	
	132-7003	EMBANK (FNL)(OC)(TY B)	CY	7,919.000		7,919.000	
	132-7005	EMBANK (FNL)(OC)(TY C)	CY	1,762.000		1,762.000	
	160-7002	FURN & PLACE TOPSOIL (4")	SY	46,017.000		46,017.000	
	164-7007	BROADCAST SEED (TEMP_WARM_COOL)	SY	46,716.000		46,716.000	
	164-7010	DRILL SEED (PERM_RURAL_CLAY)	SY	46,716.000		46,716.000	
	168-7001	VEGETATIVE WATERING	TGL	785.000		785.000	
	169-7003	SOIL RET BLKT(SL_MOD_SAND_SHORT)	SY	46,716.000		46,716.000	
	247-7179	FL BS (CMP IN PLC)(TY A GR 5)(FNAL POS)	CY	3,375.000		3,375.000	
	310-7013	PRIME COAT(MC-30 OR AE-P)	GAL	3,037.000		3,037.000	
	341-7003	D-GR HMA TY-B PG64-22 (EXEMPT)	TON	2,506.000		2,506.000	
	341-7059	D-GR HMA TY-D PG76-22 (LEVEL-UP)	TON	4,315.000		4,315.000	
	341-7065	D-GR HMA TY-D PG 76-22 (EXEMPT)	TON	1,671.000		1,671.000	
	342-7001	PFC-C PG76-22 SAC-A	TON	3,614.000		3,614.000	
	351-7005	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	SY	2,400.000		2,400.000	
	354-7032	PLANE ASPH CONC PAV(0" TO 2")	SY	38,565.000		38,565.000	
	400-7002	STRUCT EXCAV (BOX)	CY	1,684.000		1,684.000	
	400-7006	CUT & RESTORING PAV	SY	325.000		325.000	
	400-7010	CEM STABIL BKFL	CY	296.000		296.000	
	402-7001	TRENCH EXCAVATION PROTECTION	LF	539.000		539.000	
	403-7001	TEMPORARY SPL SHORING	SF	19,539.000		19,539.000	
	432-7001	RIPRAP (CONC)(4 IN)	CY	1,029.000		1,029.000	
	432-7013	RIPRAP (MOW STRIP)(4 IN)	CY	244.000		244.000	
	432-7032	RIRRAP (STONE COMMON)(DRY)(15 IN)	CY	175.000		175.000	
	462-7005	CONC BOX CULV (4 FT X 4 FT)	LF	111.000		111.000	
	462-7009	CONC BOX CULV (5 FT X 5 FT)	LF	98.000		98.000	
	462-7021	CONC BOX CULV (8 FT X 4 FT)	LF	131.000		131.000	
	462-7036	CONC BOX CULV (10 FT X 8 FT)	LF	199.000		199.000	
	464-7003	RC PIPE (CL III)(18 IN)	LF	595.000		595.000	
	464-7005	RC PIPE (CL III)(24 IN)	LF	59.000		59.000	
	464-7007	RC PIPE (CL III)(30 IN)	LF	97.000		97.000	
	464-7009	RC PIPE (CL III)(36 IN)	LF	48.000		48.000	
	465-7126	INLET (COMPL)(PSL)(FG)(3FTX3FT-3FTX3FT)	EA	2.000		2.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1378-01-050 **DISTRICT** Austin **COUNTY** Travis
HIGHWAY RM 1431

		CONTROL SECTION JOB		**1378-01-050**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00184597**			
		COUNTY		**Travis**			
		HIGHWAY		**RM 1431**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	465-7134	INLET (COMPL)(PSL)(FG)(5FTX5FT-3FTX3FT)	EA	1.000		1.000	
	466-7175	WINGWALL (PW - 1) (HW=5 FT)	EA	1.000		1.000	
	466-7176	WINGWALL (PW - 1) (HW=6 FT)	EA	1.000		1.000	
	466-7178	WINGWALL (PW - 1) (HW=8 FT)	EA	2.000		2.000	
	466-7179	WINGWALL (PW - 1) (HW=9 FT)	EA	2.000		2.000	
	466-7204	WINGWALL (SW - 0) (HW=5 FT)	EA	1.000		1.000	
	466-7205	WINGWALL (SW - 0) (HW=6 FT)	EA	1.000		1.000	
	467-7305	SET (TY II) (18 IN) (RCP) (3: 1) (C)	EA	3.000		3.000	
	467-7306	SET (TY II) (18 IN) (RCP) (4: 1) (C)	EA	1.000		1.000	
	467-7308	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	6.000		6.000	
	467-7324	SET (TY II) (24 IN) (CMP) (6: 1) (P)	EA	1.000		1.000	
	467-7325	SET (TY II) (24 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	467-7348	SET (TY II) (30 IN) (RCP) (6: 1) (P)	EA	1.000		1.000	
	467-7365	SET (TY II) (36 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	467-7368	SET (TY II) (36 IN) (RCP) (6: 1) (P)	EA	1.000		1.000	
	496-7004	REMOV STR (SET)	EA	22.000		22.000	
	496-7007	REMOV STR (PIPE)	LF	1,282.000		1,282.000	
	496-7008	REMOV STR (BOX CULVERT)	LF	569.000		569.000	
	500-7001	MOBILIZATION	LS	1.000		1.000	
	502-7001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	11.000		11.000	
	503-7002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	505-7001	TMA (STATIONARY)	DAY	300.000		300.000	
	505-7002	TMA (MOBILE OPERATION)	HR	160.000		160.000	
	506-7001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	75.000		75.000	
	506-7004	ROCK FILTER DAMS (INSTALL) (TY 4)	LF	674.000		674.000	
	506-7011	ROCK FILTER DAMS (REMOVE)	LF	749.000		749.000	
	506-7044	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	7,597.000		7,597.000	
	506-7046	BIODEG EROSN CONT LOGS (REMOVE)	LF	7,597.000		7,597.000	
	530-7006	DRIVEWAYS (CONC)	SY	149.000		149.000	
	530-7010	DRIVEWAYS (ACP)	SY	2,929.000		2,929.000	
	540-7001	MTL W-BEAM GD FEN (TIM POST)	LF	5,037.000		5,037.000	
	540-7015	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	10.000		10.000	
	542-7001	REMOVE METAL BEAM GUARD FENCE	LF	3,430.000		3,430.000	
	542-7002	REMOVE TERMINAL ANCHOR SECTION	EA	10.000		10.000	
	544-7001	GUARDRAIL END TREATMENT (INSTALL)	EA	11.000		11.000	
	544-7003	GUARDRAIL END TREATMENT (REMOVE)	EA	11.000		11.000	
	556-7006	PIPE UNDERDRAINS (TY 6) (6")	LF	2,614.000		2,614.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1378-01-050 **DISTRICT** Austin **COUNTY** Travis
HIGHWAY RM 1431

			CONTROL SECTION JOB		**1378-01-050**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00184597**		
			COUNTY		**Travis**		
			HIGHWAY		**RM 1431**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	556-7008	PIPE UNDERDRAINS (TY 8) (6")	LF	12,733.000		12,733.000	
	644-7001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	47.000		47.000	
	658-7018	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	56.000		56.000	
	658-7066	INSTL OM ASSM (OM-3L)(TWT)GND	EA	10.000		10.000	
	658-7070	INSTL OM ASSM (OM-3R)(TWT)GND	EA	10.000		10.000	
	662-7064	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	49,966.000		49,966.000	
	662-7082	WK ZN PAV MRK REMOV (W)(ARROW)	EA	14.000		14.000	
	662-7095	WK ZN PAV MRK REMOV (Y)4"(BRK)	LF	42,828.000		42,828.000	
	662-7097	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	14,276.000		14,276.000	
	666-7042	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	17.000		17.000	
	666-7066	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	2.000		2.000	
	666-7172	RE PM TY II (W) 6" (BRK)	LF	3,560.000		3,560.000	
	666-7175	RE PM TY II (W) 6" (SLD)	LF	14,240.000		14,240.000	
	666-7177	RE PM TY II (W) 8" (DOT)	LF	57.000		57.000	
	666-7179	RE PM TY II (W) 8" (SLD)	LF	600.000		600.000	
	666-7182	RE PM TY II (W) 12" (SLD)	LF	30.000		30.000	
	666-7186	RE PM TY II (W) (ARROW)	EA	17.000		17.000	
	666-7194	RE PM TY II (W) (WORD)	EA	2.000		2.000	
	666-7211	RE PM TY II (Y) 6" (BRK)	LF	3,460.000		3,460.000	
	666-7213	RE PM TY II (Y) 6" (SLD)	LF	14,140.000		14,140.000	
	666-7266	RE PROFILE PM TY I(W)6"(SLD)(100MIL)	LF	14,240.000		14,240.000	
	666-7408	REFL PAV MRK TY I (W)6"(BRK)(100MIL)	LF	3,560.000		3,560.000	
	666-7420	REFL PAV MRK TY I (Y)6"(BRK)(100MIL)	LF	3,460.000		3,460.000	
	666-7423	REFL PAV MRK TY I (Y)6"(SLD)(100MIL)	LF	14,140.000		14,140.000	
	668-7002	PRFB RUMBLE STRIP (BLK)(1')(CENTERLINE)	LF	2,848.000		2,848.000	
	672-7002	REFL PAV MRKR TY I-C	EA	178.000		178.000	
	672-7004	REFL PAV MRKR TY II-A-A	EA	354.000		354.000	
	677-7001	ELIM EXT PM & MRKS (4")	LF	107,070.000		107,070.000	
	3006-7001	UNDERSEAL COURSE	GAL	10,708.000		10,708.000	
	3007-7001	BONDING COURSE	GAL	4,818.000		4,818.000	
	5000-7001	GEOGRID REINFORCE EMBANKMENTS (TY A)	SY	22,169.000		22,169.000	
	7019-7001	SUBSURFACE UTIL LOCATE (OUTSIDE RDBED)	EA	10.000		10.000	
	7019-7002	SUBSURFACE UTIL LOCATE (WITHIN RDBED)	EA	10.000		10.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1378-01-050 **DISTRICT** Austin **COUNTY** Travis
HIGHWAY RM 1431

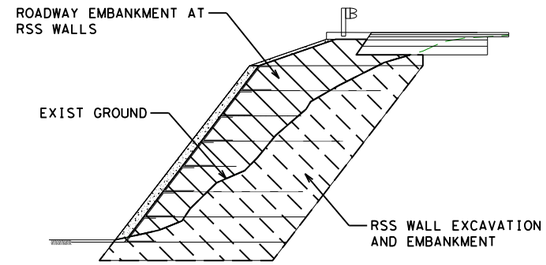
		CONTROL SECTION JOB		**1378-01-050**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00184597**			
		COUNTY		**Travis**			
		HIGHWAY		**RM 1431**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

SUMMARY OF EARTHWORK			
STATION	110 7001 EXCAVATION (ROADWAY) CY	132 7003 EMBANKMENT TYPE B (ROADWAY) CY	132 7005 EMBANKMENT TYPE C (ROADWAY) CY
656+71.50	0.00	0.00	
657+00.00	26.45	0.00	
657+50.00	55.59	0.00	
658+00.00	64.26	0.00	
658+50.00	68.36	0.00	
659+00.00	70.35	0.00	
659+50.00	65.09	0.00	
660+00.00	55.86	0.00	
660+50.00	52.01	0.00	
661+00.00	50.62	0.00	
661+50.00	47.34	0.00	
662+00.00	43.25	0.00	
662+50.00	38.13	42.21	
663+00.00	60.90	91.64	
663+50.00	63.62	54.66	
664+00.00	52.16	11.97	
664+50.00	150.07	11.40	
665+00.00	156.67	13.95	
665+50.00	68.19	22.22	
666+00.00	41.66	88.25	
666+50.00	33.66	127.63	
667+00.00	39.39	89.05	
667+50.00	38.81	128.55	
668+00.00	40.34	153.49	
668+50.00	41.41	153.76	
669+00.00	62.66	183.12	
669+50.00	92.34	127.51	
670+00.00	107.07	68.94	
670+50.00	103.79		43.60
671+00.00	95.67		26.73
671+50.00	96.19		38.34
672+00.00	91.47	46.28	
672+50.00	80.97	68.43	
673+00.00	66.78	76.89	
673+50.00	89.01	68.27	
674+00.00	82.55	147.83	
674+50.00	57.45	168.98	
675+00.00	55.57	68.03	
675+50.00	37.62	20.77	
676+00.00	34.52	20.25	
676+50.00	37.37	17.28	
677+00.00	43.13	13.68	
677+50.00	45.49	10.92	
678+00.00	44.08	9.32	
678+50.00	42.81	13.81	
679+00.00	43.88	23.95	
679+50.00	44.33	49.16	
680+00.00	47.52	59.41	
680+50.00	47.00	92.52	
681+00.00	41.25	136.84	

SUMMARY OF EARTHWORK			
STATION	110 7001 EXCAVATION (ROADWAY) CY	132 7003 EMBANKMENT TYPE B (ROADWAY) CY	132 7005 EMBANKMENT TYPE C (ROADWAY) CY
681+50.00	41.48	155.09	
682+00.00	41.51		179.10
682+50.00	60.26		299.93
683+00.00	62.43	294.55	
683+50.00	43.99	127.40	
684+00.00	47.81	70.31	
684+50.00	55.08	44.71	
685+00.00	68.43	31.82	
685+50.00	75.61	31.02	
686+00.00	60.50	26.61	
686+50.00	32.16	30.10	
687+00.00	35.73	25.25	
687+50.00	71.85		22.07
688+00.00	80.09		30.26
688+17.32	71.37		31.92
688+50.00	54.93		35.05
689+00.00	47.74		29.77
689+50.00	51.11		29.80
690+00.00	64.09	91.68	
690+50.00	61.26	148.97	
691+00.00	38.55	162.96	
691+50.00	42.94	170.71	
692+00.00	57.12	86.70	
692+50.00	64.03	40.35	
693+00.00	116.20	98.19	
693+50.00	215.60	71.50	
693+72.89	235.25	48.51	
694+00.00	258.51	21.30	
694+50.00	243.82	21.08	
695+00.00	170.10	19.17	
695+50.00	77.69	20.65	
696+00.00	48.82	41.75	
696+50.00	60.21	72.97	
697+00.00	65.64	84.91	
697+50.00	67.69	80.69	
698+00.00	75.49	76.03	
698+50.00	73.63	68.54	
699+00.00	75.95	50.75	
699+50.00	145.16	32.86	
700+00.00	162.87		44.70
700+50.00	82.05		87.42
701+00.00	46.11	161.35	
701+50.00	44.12	209.63	
702+00.00	74.25	114.37	
702+50.00	150.91	37.77	
703+00.00	244.35	34.75	
703+50.00	300.65	8.60	
704+00.00	220.92	3.19	
704+50.00	144.69	7.04	
705+00.00	148.98	4.85	

SUMMARY OF EARTHWORK			
STATION	110 7001 EXCAVATION (ROADWAY) CY	132 7003 EMBANKMENT TYPE B (ROADWAY) CY	132 7005 EMBANKMENT TYPE C (ROADWAY) CY
705+50.00	96.63	13.09	
706+00.00	85.50	83.98	
706+50.00	97.69	108.64	
707+00.00	81.80	91.61	
707+50.00	95.24	95.56	
708+00.00	96.67	73.25	
708+50.00	83.75	60.95	
709+00.00	70.98	57.01	
709+50.00	53.68	53.22	
710+00.00	47.93	57.38	
710+50.00	57.31	35.95	
711+00.00	55.98		35.62
711+50.00	65.28		78.66
712+00.00	99.64		87.41
712+50.00	128.05	71.36	
713+00.00	125.90	86.97	
713+50.00	137.39	106.57	
714+00.00	99.28	119.69	
714+50.00	36.65	90.65	
715+00.00	80.25	25.79	
715+50.00	85.89	20.79	
716+00.00	42.86	21.62	
716+50.00	32.45	8.45	
717+00.00	36.36	15.58	
717+50.00	48.84	67.84	
718+00.00	47.49	148.42	
718+50.00	45.17	198.06	
719+00.00	45.07	221.93	
719+50.00	33.67	208.15	
720+00.00	34.03	136.73	
720+50.00	84.24	68.39	
721+00.00	126.90	33.75	
721+50.00	117.69	15.77	
722+00.00	313.25	15.50	
722+50.00	811.83	10.14	
723+00.00	711.77	3.21	
723+50.00	308.39	9.59	
724+00.00	264.67	12.41	
724+50.00	257.14	11.00	
725+00.00	315.90	8.25	
725+50.00	331.77	8.12	
726+00.00	232.25	12.52	
726+50.00	123.69	21.69	
727+00.00	92.24		24.21
727+50.00	67.91		23.79
728+00.00	41.36		43.89
728+09.94	6.46		13.94

SUMMARY OF EARTHWORK: RSS WALLS		
STATION	110 7001 EXCAVATION (ROADWAY) CY	132 7005 EMBANKMENT TYPE C (ROADWAY) CY
RSS WALL 01	97.10	97.10
RSS WALL 02	123.29	123.29
RSS WALL 03	99.39	99.39
RSS WALL 04	43.95	43.95
RSS WALL 05	11.39	11.39
RSS WALL 06	80.98	80.98



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TBPELS FIRM NO. F-312

RM 1431 EARTHWORK QUANTITIES

SHEET 01 OF 01

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 13

SUMMARY OF ROADWAY ITEMS - MAINLANES
CSJ 1378-01-050

SHEET	BEGIN STA.	END STA.	LENGTH (FT)	100	132	132	247	310	341	341	341	342	3007
				7002	7003	7005	7179	7013	7003	7059	7065	7001	7001
				PREPARING ROW	EMBANKMENT (FINAL) (ORD COMP) (TYP B)	EMBANKMENT (FINAL) (ORD COMP) (TYP C)	FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS)	PRIME COAT (MULTI OPTION)	D-GR HMA TY-B PG 64-22 (EXEMPT)	D-GR HMA TY-D PG 76-22 (LEVEL-UP)	D-GR HMA TY-D PG 76-22 (EXEMPT)	PFC-C-PG76-22 SAC-A	BONDING COURSE
				STA	CY	CY	CY	GAL	TON	TON	TON	TON	GAL
1 OF 6	656+00	668+00	1200	12	835	0	211	190	157	924	105	593	790
2 OF 6	668+00	680+00	1200	12	1417	109	681	613	506	675	337	616	821
3 OF 6	680+00	692+00	1200	12	1727	658	622	560	462	677	308	603	804
4 OF 6	692+00	704+00	1200	12	1419	132	624	561	463	675	309	603	805
5 OF 6	704+00	716+00	1200	12	1286	202	622	560	462	676	308	603	804
6 OF 6	716+00	728+00	1200	12	1235	106	615	553	456	688	304	596	794
RM1431 MAINLANES SUBTOTALS (CSJ 1378-01-050):				72	7919	1207	3375	3037	2506	4315	1671	3614	4818

SHEET	BEGIN STA.	END STA.	LENGTH (FT)	3006	351	432	432	530	530	540	540	544	556	7019
				7001	7005	7001	7013	7006	7010	7001	7015	7001	778	7001
				UNDERSEAL COURSE	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	RIPRAP (CONC) (4IN)	RIPRAP (MOW STRIP)(4IN)	DRIVEWAYS (CONC)	DRIVEWAYS (ACP)	MTL W-BEAM GD FENCE (TIM POST)	DOWNSTREAM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)	PIPE UNDERDRAINS (TY 8) (6")	SUBSURFACE UTIL LOCATE (OUTSIDE RDBED)
				GAL	SY	CY	CY	SY	SY	LF	EA	EA	LF	EA
1 OF 6	656+00	668+00	489	1756	-	76	21	0	311	474	0	1	813	-
2 OF 6	668+00	680+00	1200	1825	-	134	55	0	521	1232	2	1	2400	-
3 OF 6	680+00	692+00	1200	1787	-	216	75	0	15	1683	3	3	2400	-
4 OF 6	692+00	704+00	1200	1788	-	118	31	0	592	664	2	2	2400	-
5 OF 6	704+00	716+00	1200	1787	-	150	51	149	518	845	3	3	2400	-
6 OF 6	716+00	728+00	1200	1765	-	80	11	0	972	139	0	1	2320	-
RM1431 MAINLANES SUBTOTALS (CSJ 1378-01-050):				10708	2400	774	244	149	2929	5037	10	11	12733	10

SHEET	LOCATION	7019	403	5000	556
		7002	7001	7001	7006
		SUBSURFACE UTIL LOCATE (WITHIN RDBED)	TEMPORARY SPL SHORING	GEOGRID REINFORCE FOR EMBANKMENTS (TY A)	PIPE UNDERDRAINS (TY 6) (6'')
		EA	SF	SY	LF
1 OF 5	RSS WALL 01	-	4443	5055	479
2 OF 5	RSS WALL 02	-	4033	7413	377
3 OF 5	RSS WALL 03	-	791	877	297
4 OF 5	RSS WALL 04	-	3020	4980	769
5 OF 5	RSS WALL 05	-	1543	1419	204
6 OF 6	RSS WALL 06	-	2232	2425	488
RM1431 RSS WALLS SUBTOTALS (CSJ 1378-01-050):		10	16062	22169	2614

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RM 1431 ROADWAY QUANTITIES

SHEET 01 OF 01

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	14

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SUMMARY OF REMOVAL ITEMS
CSJ 1378-01-050

SHEET	BEGIN STA.	END STA.	104 7006 REMOVE CONC (RIPRAP) SY	104 7005 REMOVING CONCRETE (MOW STRIP) LF	105 7002 REMOVING STAB BASE & ASPH (2"-6") SY	110 7001 EXCAVATION (ROADWAY) CY	354 7032 PLANE ASPH CONC PAVE (0" TO 2") SY	496 7004 REMOVE STR (SET) EA	496 7007 REMOVE STR (PIPE) LF	496 7008 REMOVE STR (BOX CULVERT) LF	542 7001 REMOVE METAL BEAM GUARD FENCE LF	542 7002 REMOVE TERMINAL ANCHOR SECTION EA	544 7003 GUARDRAIL END TREATMENT (REMOVE) EA	REMOVING CONC (DRIVEWAY)* SY	REMOVING ASPH (DRIVEWAY)* SY	REMOVE GRAVEL (DRIVEWAY)* SY
1 OF 6	656+00	668+00	363	546	586	699	7828	6	142	98	562	2	3	0	346	0
2 OF 6	668+00	680+00	1367	641	1782	1553	6133	0	0	0	642	1	1	123	533	0
3 OF 6	680+00	692+00	119	1106	1203	1272	6132	3	47	131	1084	4	2	0	15	0
4 OF 6	692+00	704+00	359	244	1464	2993	6133	2	124	0	235	1	2	0	486	99
5 OF 6	704+00	716+00	1446	316	1176	2238	6134	7	344	219	312	1	2	171	1194	0
6 OF 6	716+00	728+00	80	502	1773	3384	6205	4	88	121	595	1	1	0	587	555
RM1431 REMOVALS CSJ 1378-01-050			3734	3355	7984	12139	38565	22	745	569	3430	10	11	294	3161	654

*NOTE: ITEM SUBSIDIARY TO ITEM 530. QUANTITIES FOR CONTRACTOR INFO ONLY.

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RM 1431
REMOVAL QUANTITIES

SHEET 01 OF 01

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 15

SUMMARY OF DRAINAGE ITEMS - MAINLANES

SHEET	LOCATION	104	400	400	400	402	403	432	462	462	462	462
		7006	7002	7010	7006	7001	7001	7032	7005	7009	7021	7036
		REMOVE CONC (RIPRAP)	STRUCT EXCAV (BOX)	CEM STABIL BKFL	CUT & RESTORING PAV	TRENCH EXCAVATION PROTECTION	TEMPORARY SPL SHORING	RIPRAP (STONE COMMON)(DRY)(15IN)	CONC BOX CULV (4FTX4FT)	CONC BOX CULV (5FTX5FT)	CONC BOX CULV (8FTX4FT)	CONC BOX CULV (10FTX8FT)
		SY	CY	CY	SY	LF	SF	CY	LF	LF	LF	LF
1 OF 4	CULVERT 01	23	174	44	59	98	452	11	-	98	-	-
2 OF 4	CULVERT 02	12	292	52	80	131	960	6	-	-	131	-
3 OF 4	CULVERT 03	68	1071	157	131	199	1485	158	-	-	-	199
4 OF 4	CULVERT 04	43	147	43	55	111	580	-	111	-	-	-
RM1431 MAINLANES SUBTOTALS (CSJ 1378-01-050):		146	1684	296	325	539	3477	175	111	98	131	199

SHEET	LOCATION	466	466	466	466	466	466	496
		7162	7175	7176	7178	7179	7204	7007
		WINGWALL (FW - S) (HW=6 FT)	WINGWALL (PW - 1) (HW = 5 FT)	WINGWALL (PW - 1) (HW = 6 FT)	WINGWALL (PW - 1) (HW = 8 FT)	WINGWALL (PW - 1) (HW = 9 FT)	WINGWALL (SW - 0) (HW=5 FT)	REMOVE STR (PIPE)
		EA	EA	EA	EA	EA	EA	LF
1 OF 4	CULVERT 01	-	-	1	1	-	-	92
2 OF 4	CULVERT 02	-	1	-	1	-	-	123
3 OF 4	CULVERT 03	-	-	-	-	2	-	209
4 OF 4	CULVERT 04	1	-	-	-	-	1	113
RM1431 MAINLANES SUBTOTALS (CSJ 1378-01-050):		1	1	1	2	2	1	537

SHEET	LOCATION	464	464	464	464	465	465	467	467	467	467	467	467
		7003	7005	7007	7009	7126	7134	7305	7306	7308	7325	7328	7348
		RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	RC PIPE (CL III) (30 IN)	RC PIPE (CL III) (36 IN)	INLET (COMPL)(PSL)(FG)(3FTX3FT-3FTX3FT)	INLET (COMPL)(PSL)(FG)(5FTX5FT-3FTX3FT)	SET (TY II) (18 IN) (RCP) (3: 1) (C)	SET (TY II) (18 IN) (RCP) (4: 1) (C)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (3: 1) (C)	SET (TY II) (24 IN) (RCP) (6: 1) (P)	SET (TY II) (30 IN) (RCP) (6: 1) (P)
		LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA
RM1431 MAINLANES SUBTOTALS (CSJ 1378-01-050):		595	59	97	48	2	1	3	1	6	1	1	1

SHEET	LOCATION	467	467
		7365	7368
		SET (TY II) (36 IN) (RCP) (3: 1) (C)	SET (TY II) (36 IN) (RCP) (6:1) (P)
		EA	EA
RM1431 MAINLANES SUBTOTALS (CSJ 1378-01-050):		1	1

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RM 1431
DRAINAGE QUANTITIES

SHEET 01 OF 01

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 16

SUMMARY OF ROADWAY ITEMS - TCP CSJ 1378-01-050									
	502	503	505	505	662	662	662	662	677
	7001	7002	7001	7002	7064	7082	7095	7097	7001
	BARRICADES, SIGNS AND TRAFFIC HANDLING	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)	WK ZN PAV MRK REMOV (W)4" (SLD)	WK ZN PAV MRK REMOV (W) (ARROW)	WK ZN PAV MRK REMOV (Y)4" (BRK)	WK ZN PAV MRK REMOV (Y)4" (SLD)	ELIM EXT PAV MRK & MRKS (4")
	MO	EA	DAY	HR	LF	EA	LF	LF	LF
PHASE 1	11	2	300	160	14276	14	14276		
PHASE 2					7138				28552
PHASE 3					14276		14276		7138
PHASE 4					14276		14276	14276	71380
RM1431 TCP	11	2	300	160	49966	14	42828	14276	107070

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RM 1431
TCP QUANTITIES

SHEET 01 OF 01

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	17

Sheet	BEGIN STA	END STA	LENGTH, FT	658	658	658	666	666	666	666	666	666	666	666	666	666	666	666	666	666	668	672	672
				7018	7066	7070	7042	7066	7172	7175	7177	7179	7182	7186	7194	7211	7213	7266	7408	7420	7423	7002	7002	7004
				INSTL DEL ASSM (D-SW)SZ 1(BRF)GF 2	INSTL OM ASSM (OM-3L)(TWT) GND	INSTL OM ASSM (OM-3R)(TWT) GND	REFL PAV MRK TY I (W)(ARROW)(100 MIL)	REFL PAV MRK TY I (W)(WORD)(100MIL)	RE PM TY II (W) 6" (BRK)	RE PM TY II (W) 6" (SLD)	RE PM TY II (W) 8" (DOT)	RE PM TY II (W) 8" (SLD)	RE PM TY II (W) 12" (SLD)	RE PM TY II (W) (ARROW)	RE PM TY II (W) (WORD)	RE PM TY II (Y) 6" (BRK)	RE PM TY II (Y) 6" (SLD)	RE PROFILE PM TY I(W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	PRFB RUMBLE STRIP (BLK)(1')(CENTERLINE)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A
				G	HL	HR	E	F	C	A	K	J	L	E	F	C	B	A	C	D	B	A	M	N
				EA	EA	EA	EA	EA	LF	LF	LF	LF	LF	EA	EA	LF	LF	LF	LF	LF	LF	LF	EA	EA
1	656+71.50	680+50.00	2380	20	2	3	7	2	1190	4760	57	600	10	7	2	1090	4660	4760	1190	1090	4660	952	59	117
2	680+50.00	704+50.00	2400	26	5	4	4	0	1200	4800	0	0	0	4	0	1200	4800	4800	1200	1200	4800	960	60	120
3	704+50.00	727+85.99	2340	10	3	3	6	0	1170	4680	0	0	20	6	0	1170	4680	4680	1170	1170	4680	936	59	117
TOTAL	656+71.50	727+85.99	7120	56	10	10	17	2	3560	14240	57	600	30	17	2	3460	14140	14240	3560	3460	14140	2848	178	354

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Austin District

HVJ ASSOCIATES
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HOUSTON, TEXAS 77072
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TEXAS FIRM # 000646

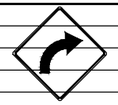
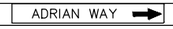
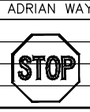
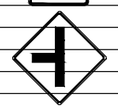
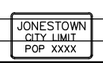
RM 1431
STRIPING SUMMARY

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
		RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	18

SUMMARY OF SMALL SIGNS (TO BE REMOVED)

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												
	1	W1-2R (R)										
	2	W13-1P										
	3	R5-4aT										
	4	D3-2										
	5	R2-1										
	10	R2-1										
	6	I-2aT										
	7	D3-2										
	8	D3-1										
	9	R1-1										
2												
	1	D3-2										
	2	R1-1										
	3	D14-4T										
	8	D14-4T										
	4	D3-2										
	5	R4-3										
	9	R4-3										
	6	W2-2L										
	7	R2-1										
	10	D9-3a M6-4B										
	11	I-2aT										

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

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

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

DATE:
FILE:

Texas Department of Transportation

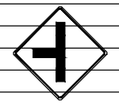
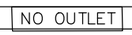
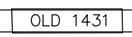
Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS SHEET 1 OF 2

SOSS

FILE: sums16.dgn	DN: AM	CK: SM	DW: SM	CK: LB
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
4-16 8-16	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		19

SUMMARY OF SMALL SIGNS (TO BE REMOVED)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
										PREFABRICATED	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
	12	W2-2L										
3												
	1	R5-4aT										
	2	M1-6R										
	7	D10-7aT										
	3	R1-1										
	4	W14-2a										
	5	D3-1										
	6	D9-3a M6-4B										
3												

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
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DATE:
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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS SHEET 2 OF 2

SOSS

FILE: sums16.dgn	DN: AM	CK: SM	DW: SM	CK: LB
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
4-16 8-16	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		20

SUMMARY OF SMALL SIGNS (TO BE INSTALLED)

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
1												
	1	R3-9B	CENTER LANE ONLY	24X36	X		10BWG	1	SA	P		
	2	R3-9B										
	3	R3-9B										
	4	R3-9B										
	5	W1-2R		36X36	X		10BWG	1	SA	P		
	6	W13-1P	50 MPH	24X24	X					P		
	7	R3-9dP	END *MOUNTED WITH R3-9B	30X12	X					P		
	8	R5-4aT	NO ENGINE BRAKE	24X24	X		10BWG	1	SA	P		
	9	R3-9cP	BEGIN *MOUNTED WITH R3-9B	30X12	X					P		
	10	D1-1R	ADRIAN WAY	90X18	X		10BWG	1	SA	T		
	11	R2-1	SPEED LIMIT 55	30X36	X		10BWG	1	SA	P		
	19	R2-1										
	12	I-2aT	LAGO VISTA CITY LIMITS POP 6041	36X24			10BWG	1	SA	P		
	13	D1-1L	ADRIAN WAY	90X18	X		10BWG	1	SA	T		
	14	D3-1G	ADRIAN WAY *MOUNTED WITH R1-1	72X18	X							
	15	R1-1	STOP	36X36	X		10BWG	1	SA	P		
	16	D1-1L	DESTINATION WAY	120X18	X		10BWG	1	SA	T		
	17	W2-2L		36X36	X		10BWG	1	SA	P		
	18	R3-5R	ONLY	30X36	X		10BWG		SA	P		
2												
	1	R3-9B	CENTER LANE ONLY	24X36	X		10BWG	1	SA	P		
	2	R3-9B										
	3	R3-9B										
	4	R3-9B										
	5	D1-1R	TYLER TRAIL	78X18	X		10BWG	1	SA	T		
	6	R1-1	STOP	36X36	X		10BWG	1	SA	P		
	7	D14-4T	ADOPT A HIGHWAY NEXT 2 MILES EMPLOYEES OF KC WATER PROTECTION	48X48	X		10BWG	1	SA	P		
	8	D1-1L	TYLER TRAIL	78X18	X		10BWG	1	SA	T		

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

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS SHEET 1 OF 2

SOSS

FILE: sums16.dgn	DN: AM	CK: SM	DW: SM	CK: LB
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
4-16	DIST	COUNTY		SHEET NO.
8-16	AUS	TRAVIS		21

SUMMARY OF SMALL SIGNS (TO BE INSTALLED)

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
2												
	9	R4-3	SLOWER TRAFFIC KEEP RIGHT	24X30	X		10BWG	1	SA	P		
	13	R4-3										
	10	W2-2L		36X36	X		10BWG	1	SA	P		
	11	R2-1	SPEED LIMIT 55	30X36	X		10BWG	1	SA	P		
	12	D14-4T	ADOPT A HIGHWAY NEXT 2 MILES GYPSY MC LIBERTY HILL CHAPTER	48X48	X		10BWG	1	SA	P		
	14	D9-3a		24X24	X		10BWG	1	SA	P		
		M6-4B		21X15	X							
	15	I-2aT	JONESTOWN CITY LIMIT POP XXXX	36X24	X		10BWG	1	SA	P		
	16	W2-2L		36X36	X		10BWG	1	SA	P		
3												
	1	R3-9B	CENTER LANE ONLY	24X36	X		10BWG	1	SA	P		
	2	R3-9B										
	3	R3-9B										
	4	R3-9B										
	11	R3-9B										
	12	R3-9B										
	5	R5-4aT	NO ENGINE BRAKE	24X24	X		10BWG	1	SA	P		
	6	M1-6R	RANCH 1431 ROAD	24X24	X		10BWG	1	SA	P		
	10	D10-7aT	5 4 4 *MOUNTED WITH M1-6R	3X12	X							
	7	R1-1	STOP	36X36	X		10BWG	1	SA	P		
	8	D3-1B	NO OUTLET *MOUNTED WITH R1-1		X							
	9	D3-1G	OLD 1431 *MOUNTED WITH R1-1		X							
	13	D9-3a		24X24	X		10BWG	1	SA	P		
		M6-4B		21X15	X							

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS SHEET 2 OF 2

SOSS

FILE: sums16.dgn	DN: AM	CK: SM	DW: SM	CK: LB
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
4-16	DIST	COUNTY		SHEET NO.
8-16	AUS	TRAVIS		22

Sheet	BEGIN STA	END STA	LENGTH, FT	644 7001 CNT LN LT ARROW (R2-9B) (EA)	644 7001 BEGIN (R3-9cP) (EA)	644 7001 END (R3-9cP) (EA)	644 7001 STOP SIGN (R1-1) (EA)	644 7001 SPEED LIMIT (R2-1) (EA)	644 7001 SPEED LIMIT (W13-1P) (EA)	644 7001 LEFT INTERSECTION (W2-2L) (EA)	644 7001 RM 1431 (M1-6R) (EA)	644 7001 TEXAS REFERENCE MARKER 544 (D10-7aT) (EA)	644 7001 ADOPT A HIGHWAY (DT14-4T) (EA)	644 7001 SLOWER TRAFFIC KEEP RIGHT (R4-3) (EA)	644 7001 LAGO VISTA CITY LIMIT (1-2AT) (EA)	644 7001 NO ENGINE BRAKE (R5-4AT) (EA)	644 7001 NO OUTLET (D3-1B) (EA)	644 7001 ADRIAN WAY (D3-1G) (EA)	644 7001 OLD 1431 (D3-1) (EA)	644 7001 ADRIAN WAY (D1-1) (EA)	644 7001 TYLER TRL (D1-1) (EA)	644 7001 DESTINATION WAY (D1-1) (EA)	644 7001 RIGHT ONLY (R3-5R) (EA)	644 7001 CAMPER (D9-3a) WITH ARROW (M6-4B) (EA)	644 7001 JONESTOWN CITY LIMIT POP XXXX (EA)
1	656+71.50	680+50.00	2380	4	1	1	1	2	1	1					1	1		1		2		1	1		
2	680+50.00	704+50.00	2400	4			1	1		2				2	2						2			1	1
3	704+50.00	727+85.99	2340	6			1				1	1				1	1		1					1	
TOTAL	656+71.50	727+85.99	7120	14	1	1	3	3	1	3	1	1	2	2	1	2	1	1	1	2	2	1	1	2	1

PRINT DATE	REVISION DATE
	.

Texas Department of Transportation
Austin District

HVJ ASSOCIATES
6120 S.DAIRY ASHFORD ROAD
HOUSTON, TEXAS 77072
281.933.7388
TEXAS FIRM # 000646

RM 1431

SIGNING SUMMARY

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
		RM 1431

STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS

CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	23

Sheet	BEGIN STA	END STA	LENGTH, FT	160	164	164	164	168	169	506	506	506	506	506
				7002	7010	7007	7007	7001	7003	7001	7004	7011	7044	7046
				FURN & PLACE TOPSOIL (4")	DRILL SEED (PERM_RURAL_CLAY)	BROAD CAST SEED (TEMP_COOL)	BROADCAST SEED (TEMP_WARM)	VEGETATIVE WATERING	SOIL RET BLKT (SL_MOD_SAND_SHORT)	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (INSTALL) (TY 4)	ROCK FILTER DAMS (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
				SY	SY	SY	SY	TGL	SY	LF	LF	LF	LF	LF
1	656+71.50	680+50.00	2380	10486	10486	5243	5243	176	10486	0	198	198	2879	2879
2	680+50.00	704+50.00	2400	15538	16237	8118	8118	273	16237	0	274	274	2196	2196
3	704+50.00	727+85.99	2340	19993	19993	9997	9997	336	19993	75	202	277	2522	2522
TOTAL	656+71.50	727+85.99	7120	46017	46716	23358	23358	785	46716	75	674	749	7597	7597

PRINT DATE	REVISION DATE
	-

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Austin District

HVJ ASSOCIATES
6120 S.DAIRY ASHFORD ROAD
HOUSTON, TEXAS 77072
281.933.7388
TEXAS FIRM # 000646

RM 1431

SW3P QUANTITIES

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS

CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	24

GENERAL NOTES

1. INCORPORATE 3:1 SAFETY WEDGES FOR ALL DROP OFFS GREATER THAN TWO INCHES LEFT DURING NON-WORK HOURS.

2. MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT SITE TO REDUCE PONDING.

3. SET ELECTRONIC PORTABLE CHANGEABLE MESSAGE SIGNS 7 DAYS PRIOR TO BEGINNING WORK.

SEQUENCE OF CONSTRUCTION:

PHASE I

STEP I

1. REDUCE SPEED LIMIT TO 45 MPH AND INSTALL PROJECT BARRICADES ACCORDING TO APPROPRIATE BC SHEETS.

2. INSTALL NECESSARY EROSION CONTROL DEVICES AS DIRECTED BY THE ENGINEER.

3. PREPARE RIGHT OF WAY.

STEP II: CROSS CULVERT REMOVALS/INSTALLATIONS

ROAD CLOSURES FOR EACH CULVERT REPLACEMENT WILL BEGIN FRIDAY AT 7PM AND END MONDAY AT 5AM. CONTRACTOR WILL WORK CONTINUOUSLY UNTIL CULVERT WORK IS COMPLETE AND ROAD IS FULLY OPEN. FULL DEPTH SECTION AFTER CULVERT INSTALLATION MAY BE USED TO ACCELERATE CONSTRUCTION PROCESS.

1. UTILIZING TCP(2-4B)-18 PERFORM CULVERT REMOVAL/INSTALLATION FROM THE OUTFALL TO THE CENTER OF EB INSIDE LANE.

2. UTILIZING TCP(2-2B)-18 PERFORM CULVERT REMOVAL/INSTALLATION FROM THE CENTER OF EB INSIDE LANE TO CENTER OF WB INSIDE LANE.
   NOTE: ONE-LANE TWO-WAY TRAFFIC CONTROL IS ALLOWED FOR 8 HOURS MAX PER CULVERT LOCATION ON EB OUTSIDE LANE.

3. UTILIZING TCP(2-4B)-18 PERFORM CULVERT REMOVAL/INSTALLATION FROM THE CENTER OF WB INSIDE LANE TO UPSTREAM ENTRANCE.

PHASE II

1. REMOVE CONFLICTING PAVEMENT MARKINGS AND INSTALL NON-REMOVE TEMPORARY PAVEMENT MARKINGS IN ORDER TO RECONFIGURE TRAFFIC AS SHOWN ON THE TCP PHASE II LAYOUT SHEET.

2. INSTALL NECESSARY EROSION CONTROL DEVICES AS DIRECTED BY THE ENGINEER.

3. PERFORM FLEXIBLE PAVEMENT STRUCTURE REPAIRS. REPAIR LOCATIONS TO BE DETERMINED AND MARKED IN THE FIELD BY THE ENGINEER. THE CONTRACTOR SHALL BE PRESENT AT THE TIME THAT THE REPAIR AREAS ARE MARKED. ANY NECESSARY TRAFFIC CONTROL SHALL BE PROVIDED BY THE CONTRACTOR, AND SHALL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.

4. SAW CUT, EXCAVATE, REMOVE ITEMS PER PLAN, INSTALL RSS WALLS, AND PREPARE SUBGRADE.

5. INSTALL PARALLEL DRAINAGE SYSTEMS AND CULVERT END TREATMENTS.

6. PLACE FLEX BASE.

7. PLACE CONCRETE RIPRAP AND MOW STRIP.

8. PLACE HMA TY B.

9. PERFORM MILLING AS SHOWN IN THE TYPICAL SECTIONS, PLACE LEVEL-UP FOR CROSS SLOPE CORRECTION, AND PLACE HMA TY D IN ONE CONTINUOUS OPERATION. CONTRACTOR WILL NOT MILL MORE THAN THEY CAN REPLACE IN ONE NIGHT'S PRODUCTION.

10. PERFORM RECONSTRUCTION OF SIDE STREETS AND DRIVEWAYS.

11. PLACE PFC OVERLAY. APPLY TYPE II PAVEMENT MARKINGS.

12. PLACE TOP SOIL AND SEEDING.

13. INSTALL METAL BEAM GUARD FENCE.

14. INSTALL PERMANENT PAVEMENT MARKINGS:
    PLACE TY I AND RAISED PAVEMENT MARKINGS A MINIMUM OF 10 DAYS AFTER FINAL PAVING AND COMPLETE ANY MISCELLANOUS WORK TO FINISH THE PROJECT AS DIRECTED BY THE ENGINEER.

15. REMOVE EROSION CONTROL DEVICES ONCE VEGETATION IS ESTABLISHED TO THE SATISFACTION OF THE ENGINEER.

16. REMOVE PROJECT BARRICADES WHEN DIRECTED BY ENGINEER.

***NOTE:
THE ABOVE SEQUENCE IS ESTABLISHED AS THE MOST APPROPRIATE METHOD TO CONSTRUCT THIS PROJECT. THE CONTRACTOR WILL BE REQUIRED TO GAIN THE ENGINEER'S APPROVAL PRIOR TO DEVIATION FROM THE ABOVE ESTABLISHED METHOD.

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED PROFESSIONAL ENGINEER
P.E.

11/16/2023

PRINT DATE	REVISION DATE
11/16/2023	

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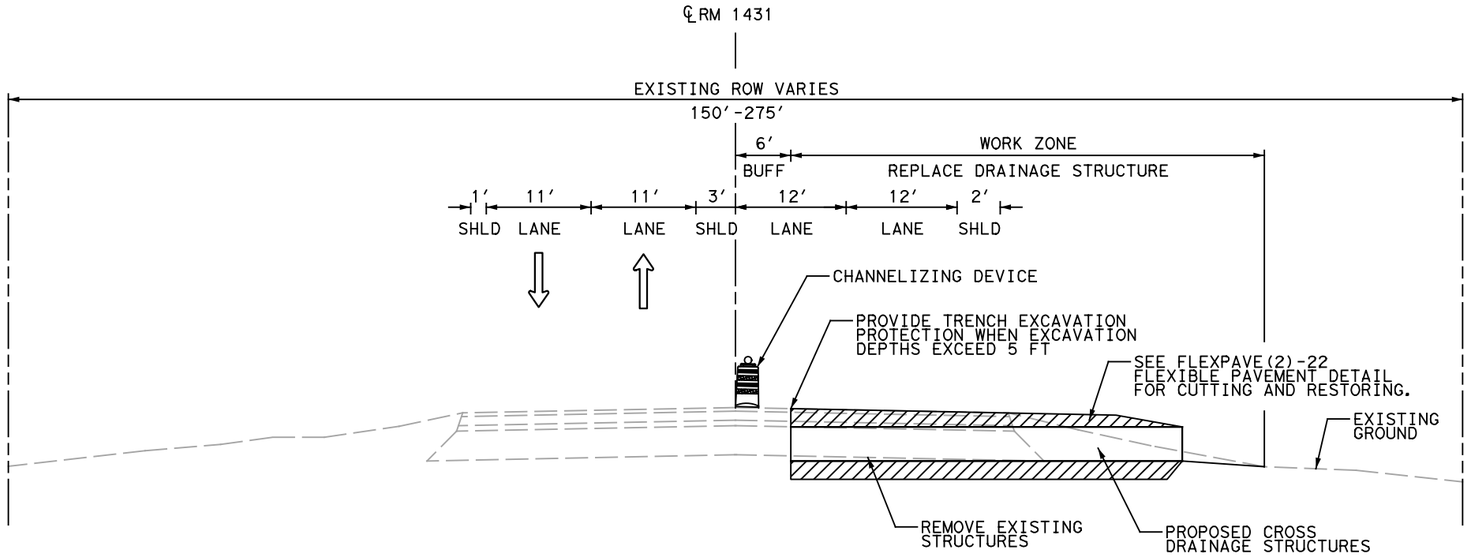
13620 BRIARWICK DRIVE, STE 100
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

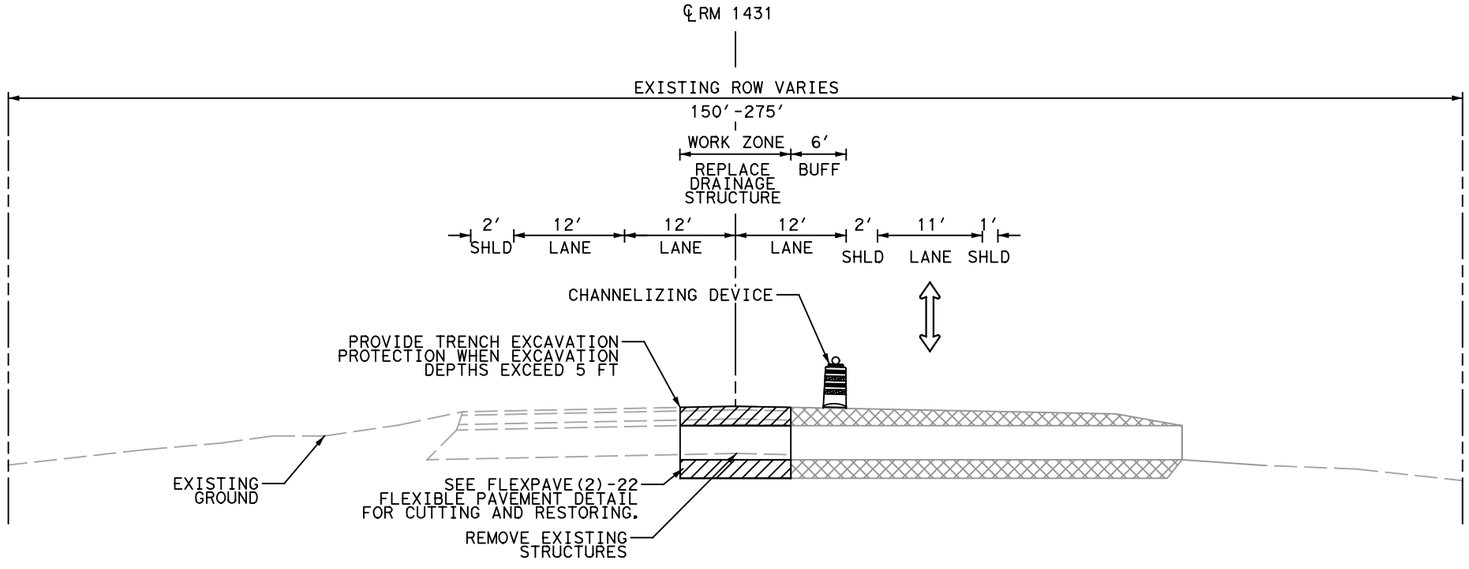
RM 1431 SEQUENCE OF CONSTRUCTION

SHEET 01 OF 01

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 25



PHASE 1 STEP II
REPLACE DOWNSTREAM END OF CULVERT
NTS
STA. 656+71.50 TO STA.728+09.94



PHASE 1 STEP II
REPLACE MID PORTION OF CULVERT
NTS
STA. 656+71.50 TO STA.728+09.94

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED PROFESSIONAL ENGINEER
08/02/2024

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

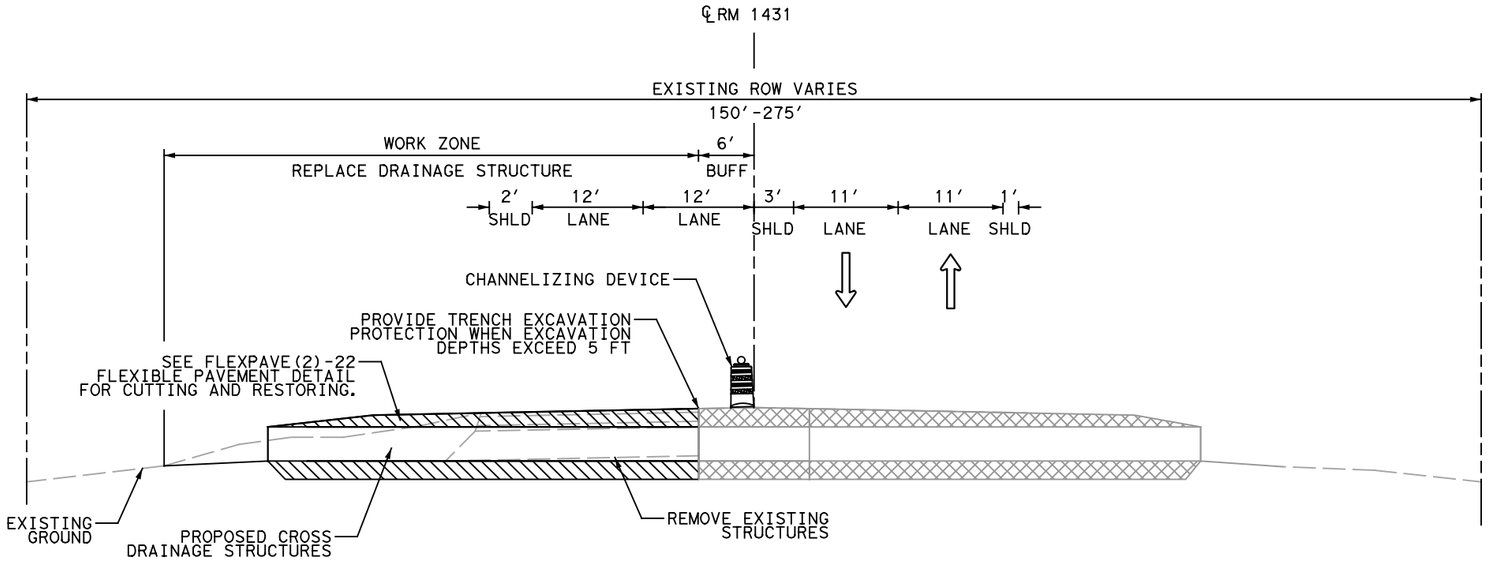
RM 1431
TCP PHASE 1 STEP II
TYPICAL SECTIONS

SHEET 01 OF 02

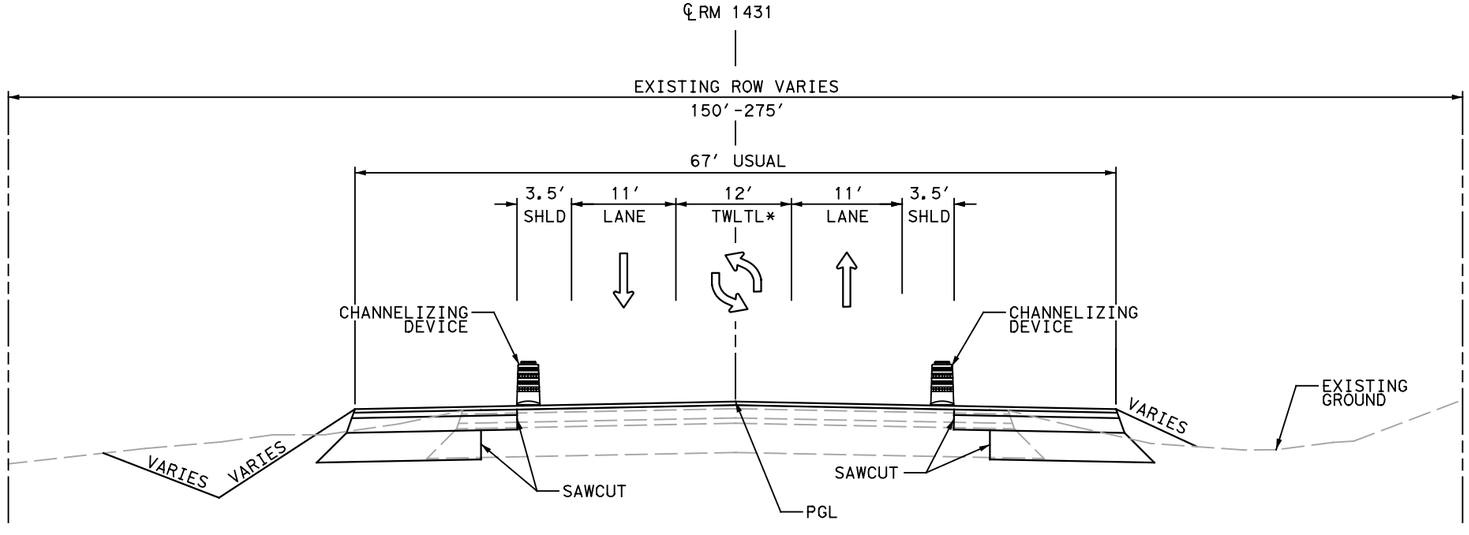
FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	26

DATE: 8/2/2024 9:31:46 AM
FILE: pw://halff-pw.bentley.com:halff-pw-01/Documents/37547.003 RM 1431 Widening/500 CADD/4 - Design/Plan Set/2. TCP/RM1431_TCP_TYP_050dgn



PHASE 1 STEP II
REPLACE DOWNSTREAM PORTION OF CULVERT
NTS
STA. 656+71.50 TO STA.728+09.94



PHASE 2
CONSTRUCT EB AND WB WIDENING
NTS
STA. 656+71.50 TO STA.728+09.94

*ELIMINATE TWLT LANE IN FRONT OF RSS WALL LIMITS.

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED PROFESSIONAL ENGINEER

08/02/2024

PRINT DATE	REVISION DATE
8/2/2024	

Texas Department of Transportation
Austin District

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

RM 1431
TCP PHASE 1 STEP II, PHASE 2
TYPICAL SECTIONS

SHEET 02 OF 02

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	27

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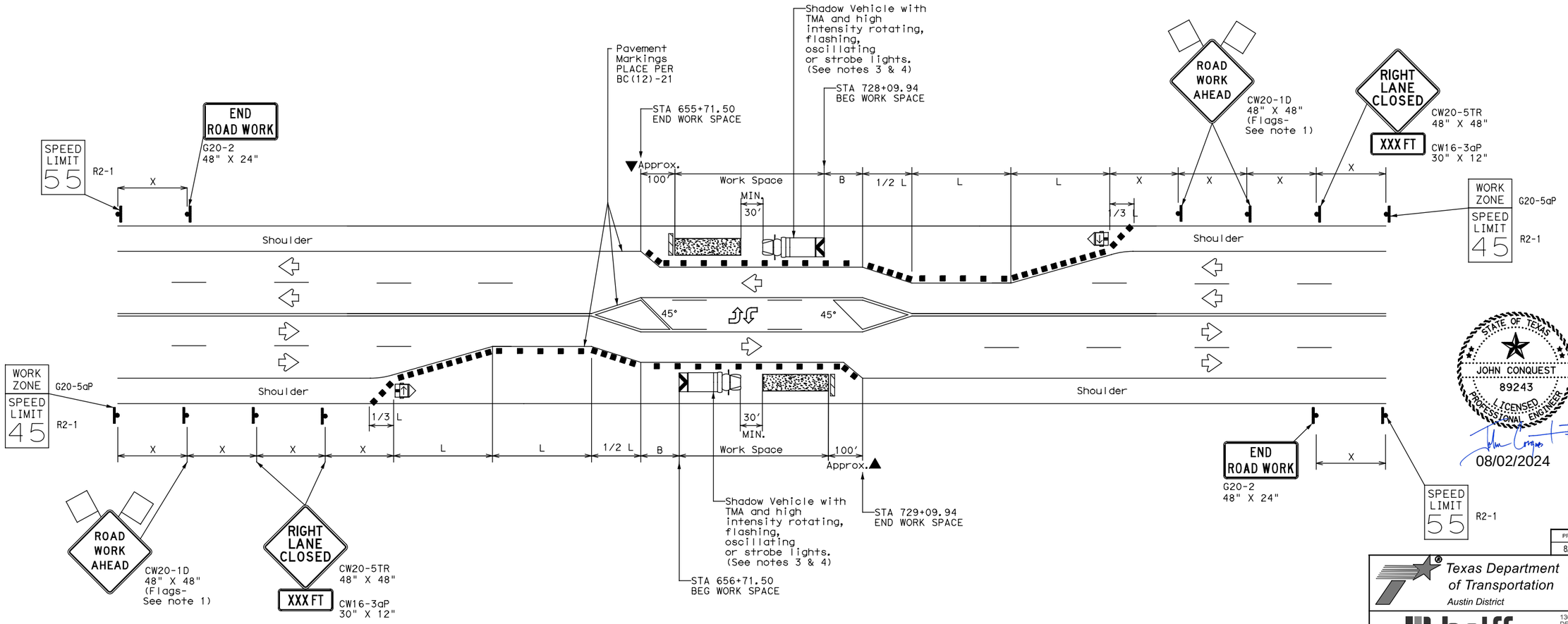
ITEM	DESCRIPTION	UNIT	QUANTITY
662 7018	WK ZN PAV MRK REMOV (W)(ARROW)	EA	14
662 7095	WK ZN PAV MRK REMOV (Y)4"(BRK)	LF	42828
662 7097	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	14276
662 7064	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	49966
677 7001	ELIM EXT PAV MRK & MRKS (4")	LF	107070

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"
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′

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

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



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. 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 eposure 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 substitutued for the Shadow Vehicle and TMA.
4. 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.
5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.
6. Conflicting pavement markings shall be removed by strip sealing.

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED
PROFESSIONAL ENGINEER
08/02/2024

PRINT DATE	REVISION DATE
8/2/2024	

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Austin District

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13620 BRIARWICK DRIVE, STE 100
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

TRAFFIC CONTROL PLAN PHASE II

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 28

DATE: 8/2/2024 11:06:42 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

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	1378	01	050	RM 1431
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	AUS	TRAVIS		29
5-10 5-21				

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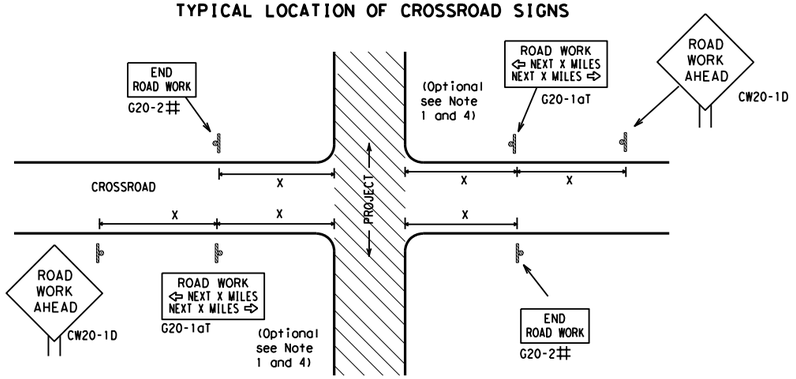
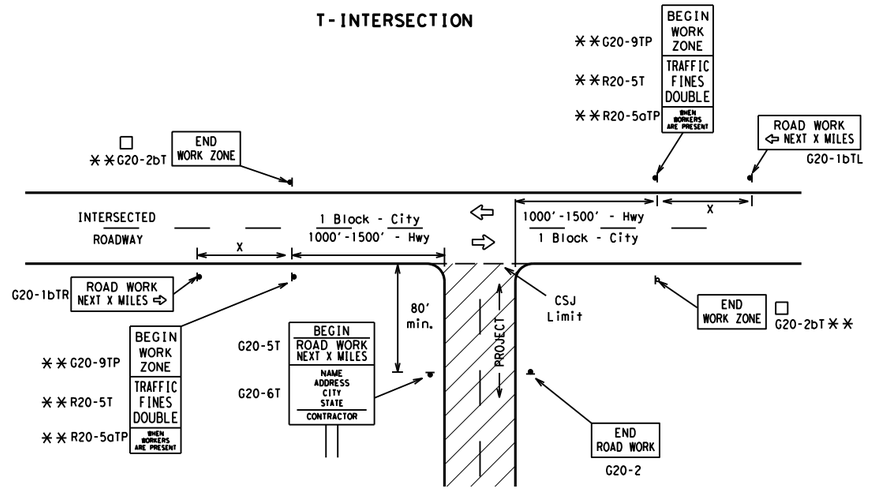
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

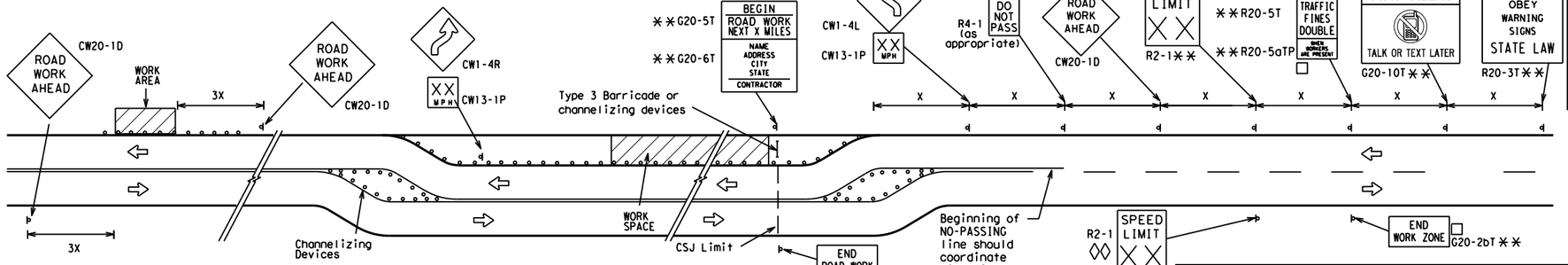
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

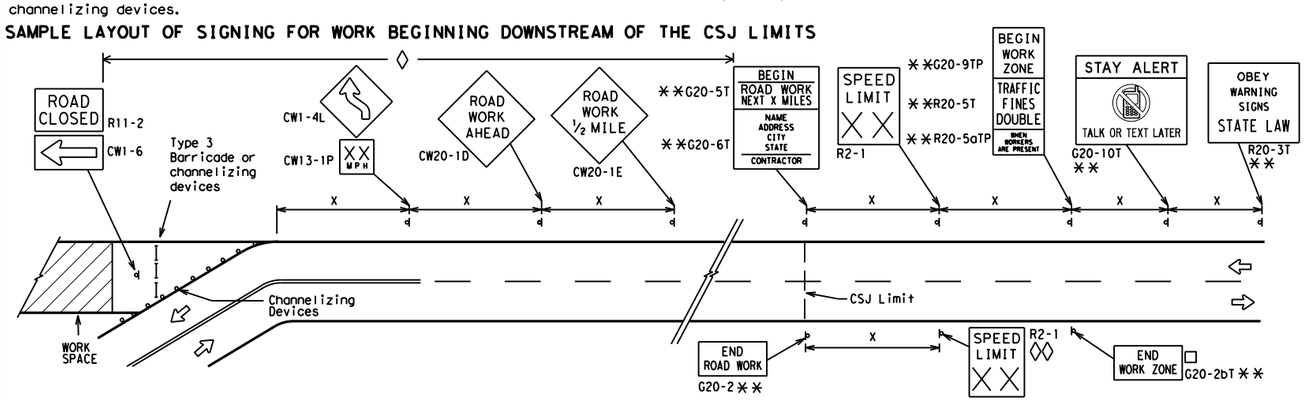
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

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

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
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REVISIONS	1378	01	050	RM 1431
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		30

DATE: 1/31/2023 9:02:31 AM
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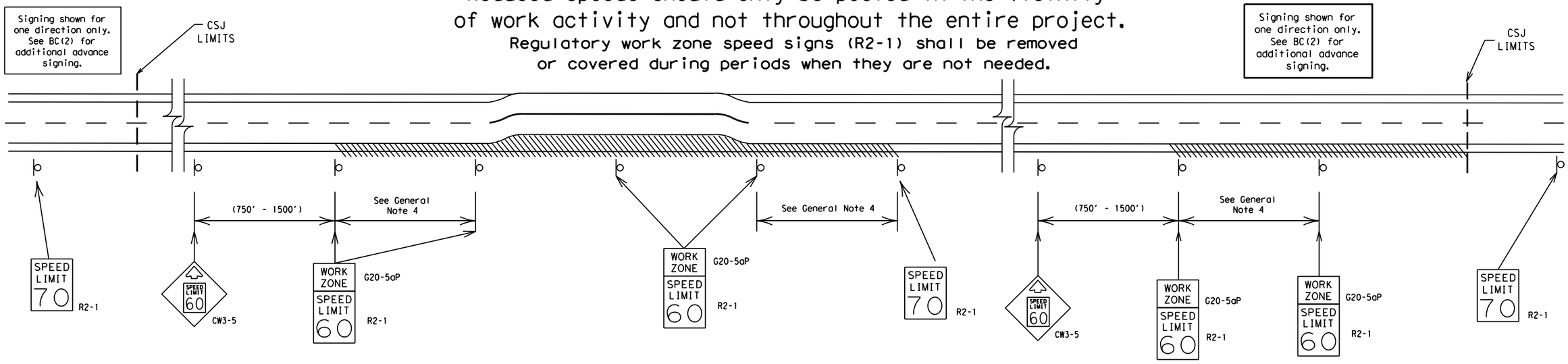
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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	1378	01	050	RM 1431
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		31

DATE: 1/31/2023 9:02:31 AM
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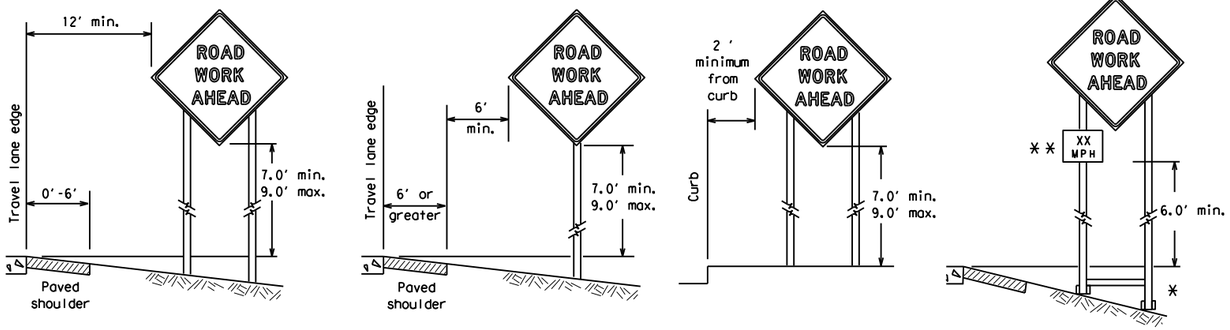
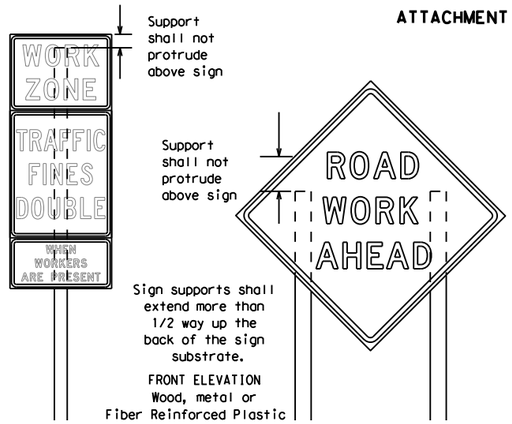
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

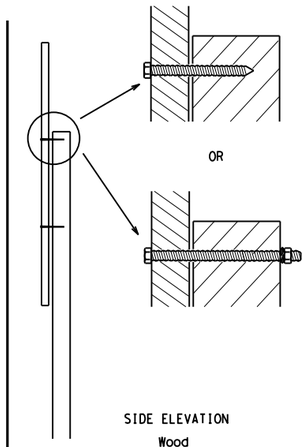


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





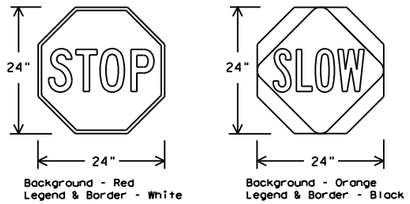
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

Texas Department of Transportation | Traffic Safety Division Standard

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	1378	01	050	RM 1431
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		32

DATE: 1/31/2023 9:02:31 AM
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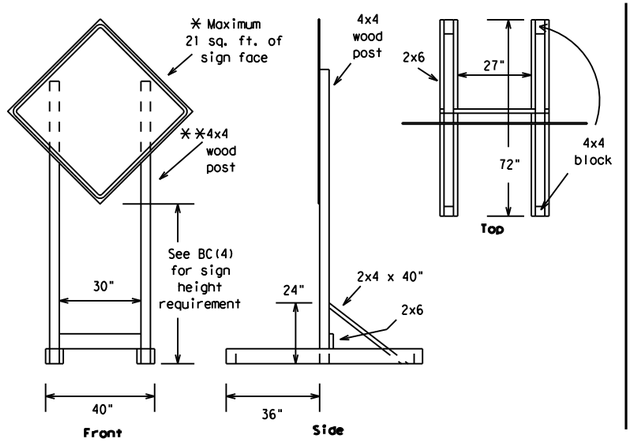
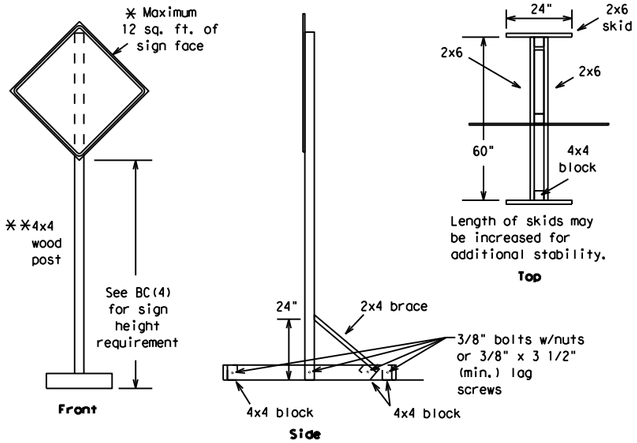
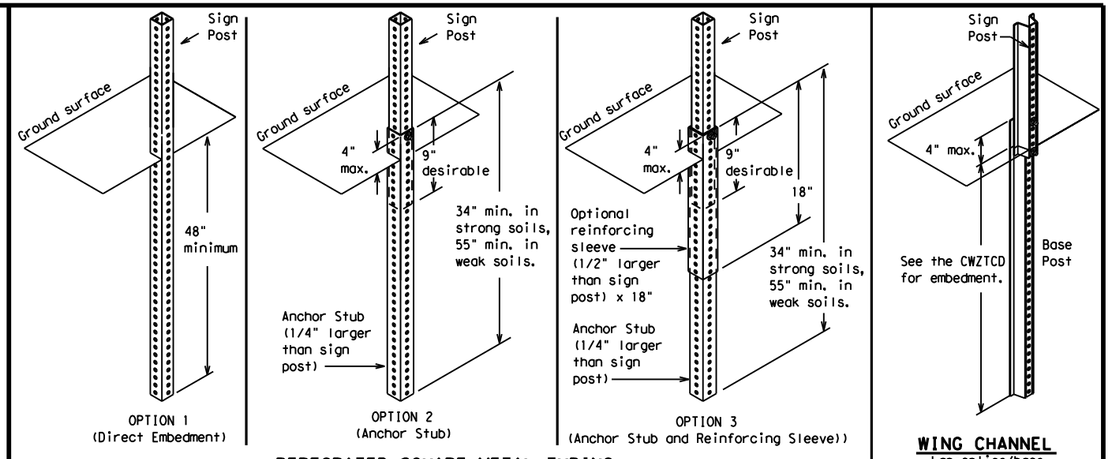




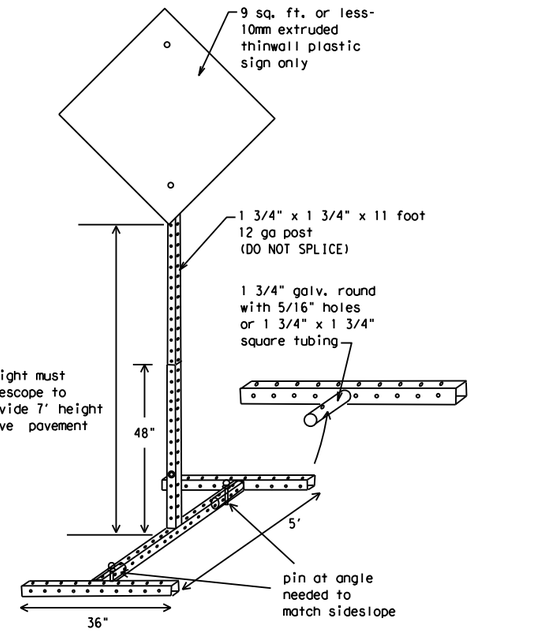
SKID MOUNTED WOOD SIGN SUPPORTS

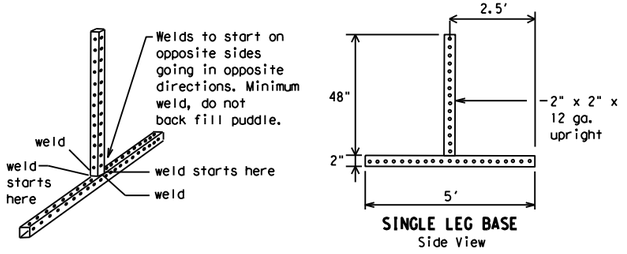
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

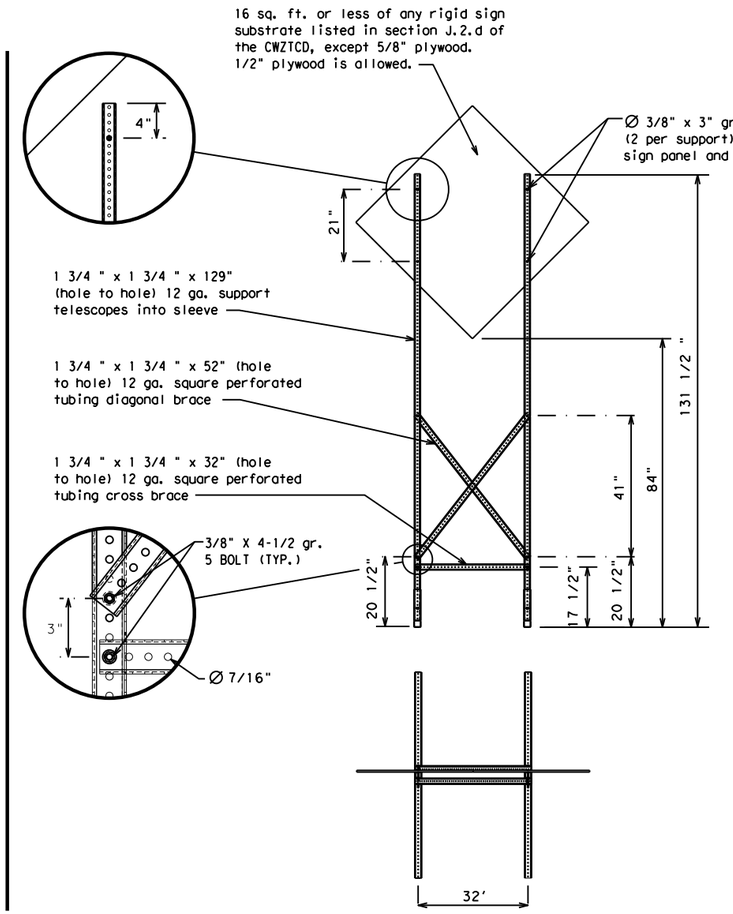


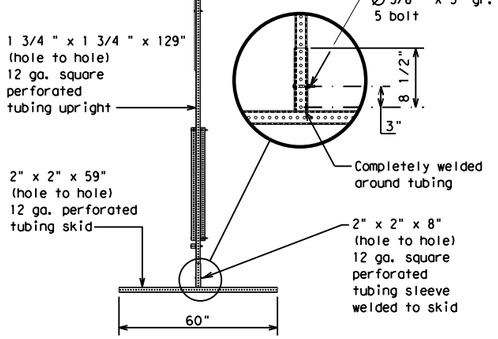
GROUND MOUNTED SIGN SUPPORTS

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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		33

DATE: 1/31/2023 9:02:32 AM
FILE: pw://halff-pw.bentley.com:halff-pw-01/Documents/37547.003 RM 1431 Widening/900 SUBCONSULTANTS/GTAO/CADD/Sheets/Standards/051/TCP7bc-21.dgn

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** 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
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		34

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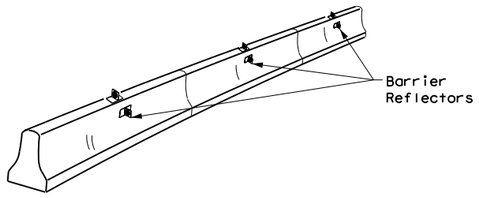
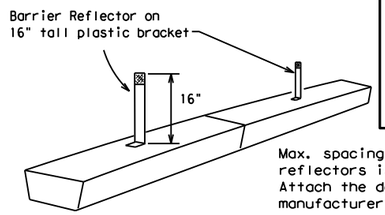
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)

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

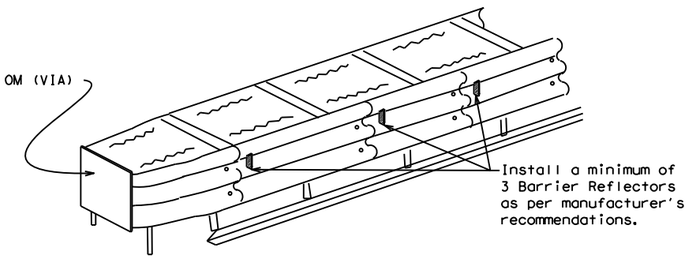


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

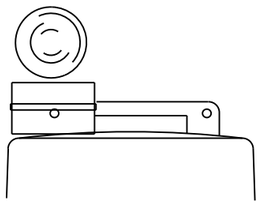


DELINEATION OF END TREATMENTS

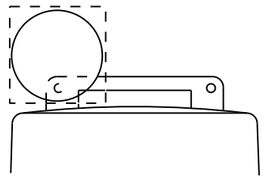
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

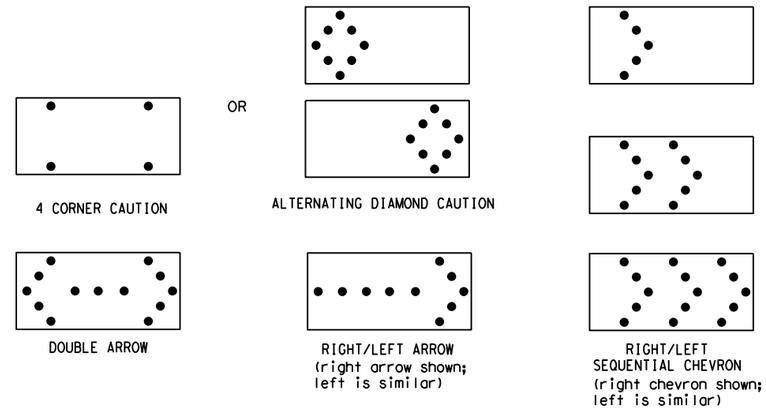
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

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

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

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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

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
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REVISIONS	1378	01	050	RM 1431
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		35

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DATE: 1/31/2023 9:02:32 AM
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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:

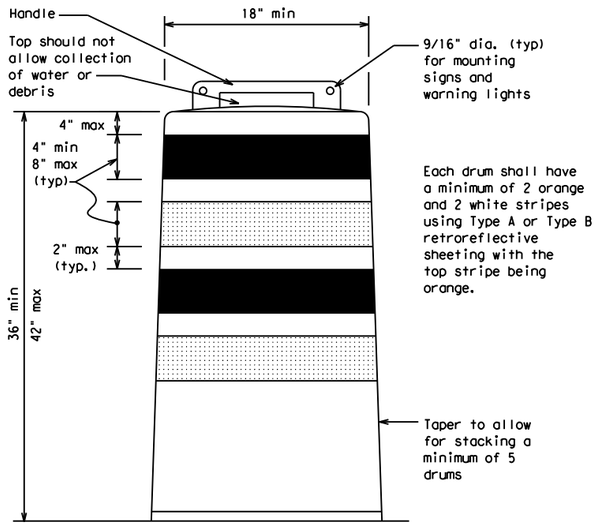
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.

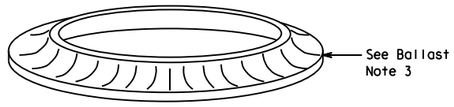
RETROREFLECTIVE SHEETING

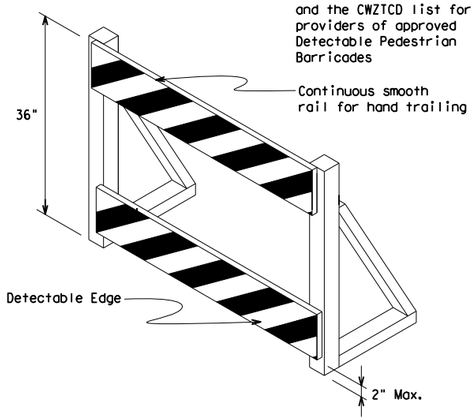
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall 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.

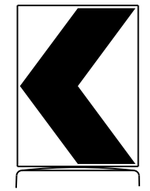




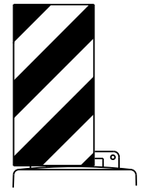


DETECTABLE PEDESTRIAN BARRICADES

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

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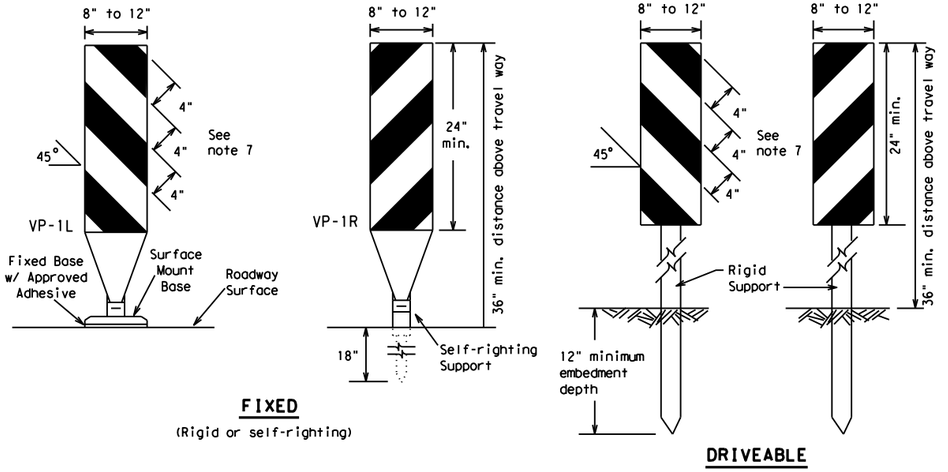
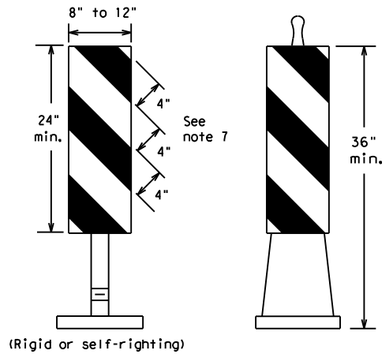


FIXED
(Rigid or self-righting)

DRIVEABLE

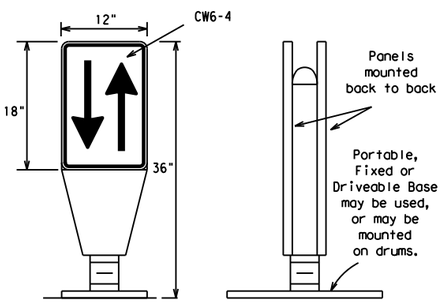


(Rigid or self-righting)

PORTABLE

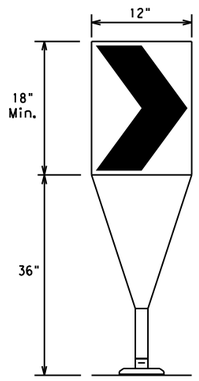
VERTICAL PANELS (VPs)

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



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)



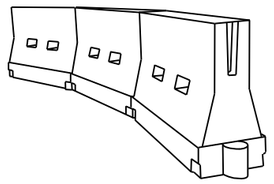
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

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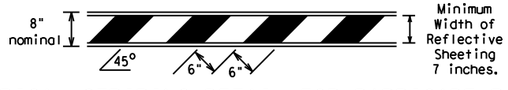
7-13 5-21	AUS	TRAVIS		37

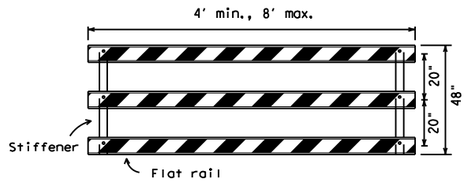
TYPE 3 BARRICADES

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.



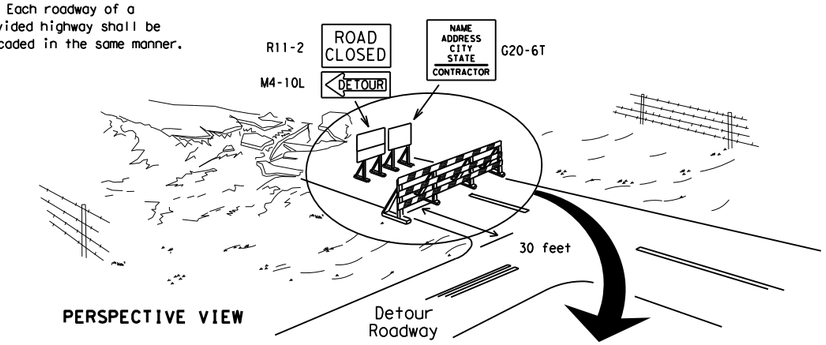
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

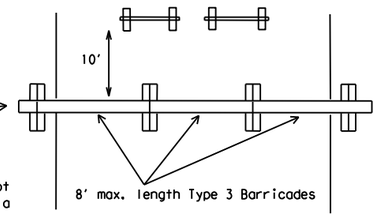
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

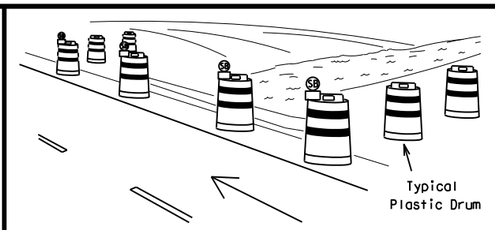
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

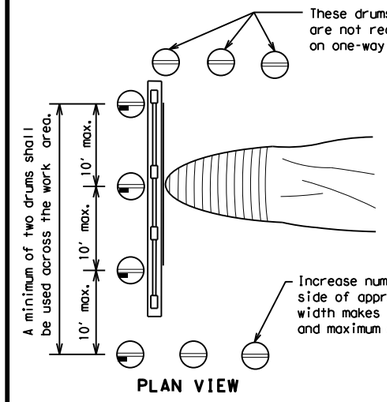
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

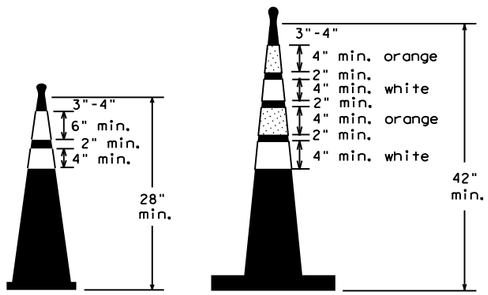
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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.



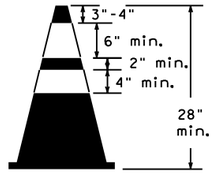
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

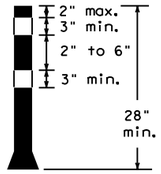
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

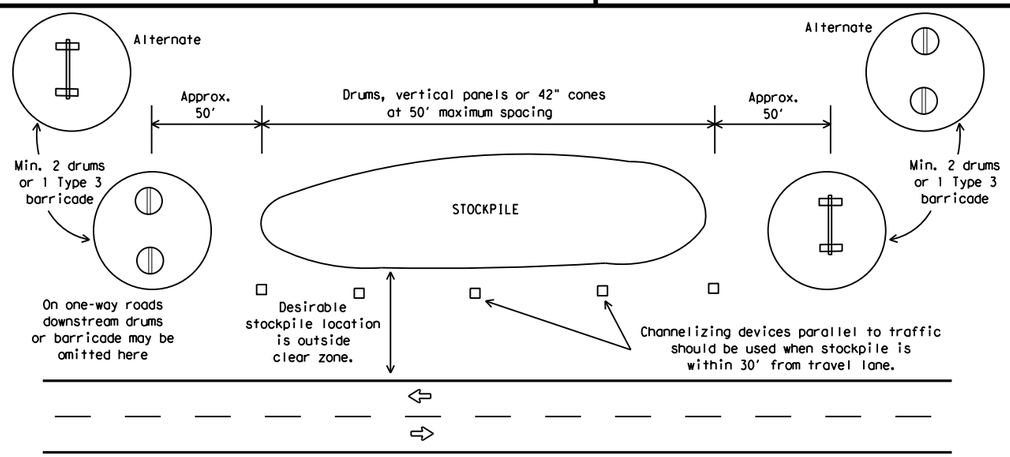


Tubular Marker

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		38

104

DATE: 1/31/2023 9:02:33 AM
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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

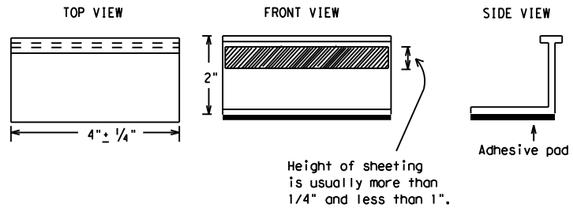
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

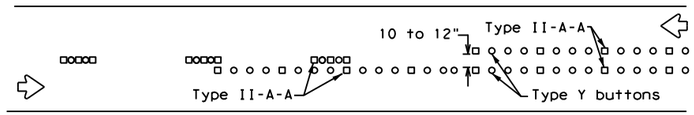
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	AUS	TRAVIS		39
11-02 8-14				

105

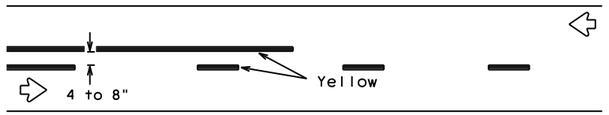
DATE: 1/31/2023 9:02:33 AM
FILE: pw://halff-pw.bentley.com:halff-pw-01/Documents/37547.003 RM 1431 Widening/900 SUBCONSULTANTS/GTAO/CADD/Sheets/Standards/051/TCP/bc-21.dgn

PAVEMENT MARKING PATTERNS

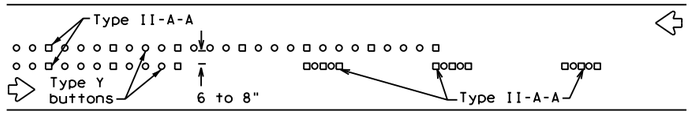
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



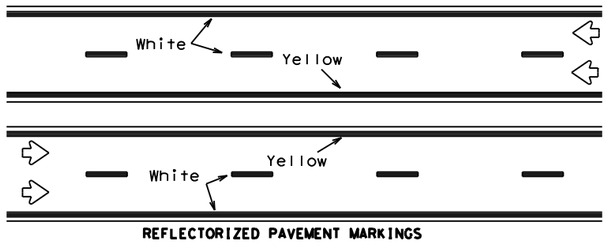
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



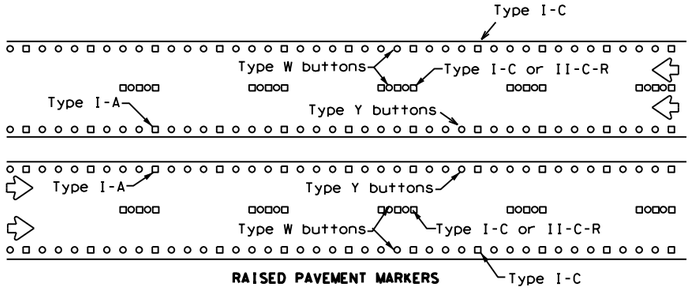
RAISED PAVEMENT MARKERS - PATTERN B

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

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



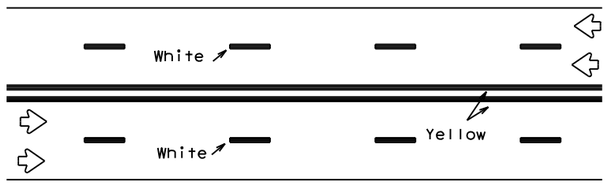
REFLECTORIZED PAVEMENT MARKINGS



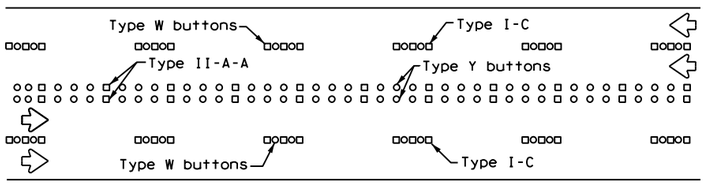
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



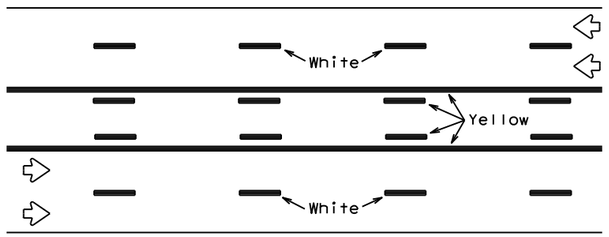
REFLECTORIZED PAVEMENT MARKINGS



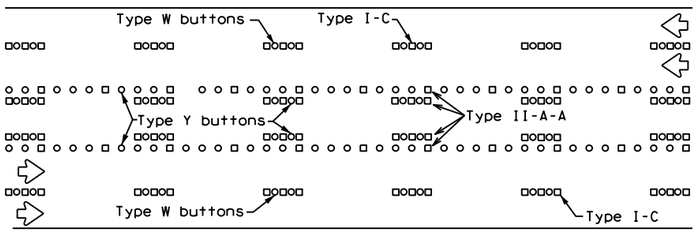
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

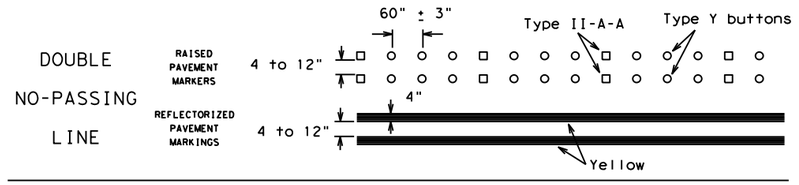
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

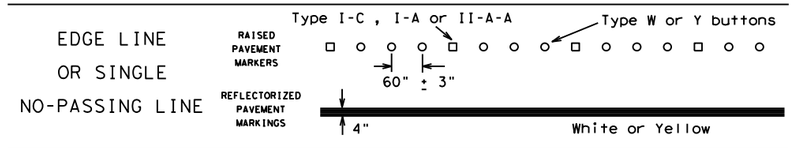
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

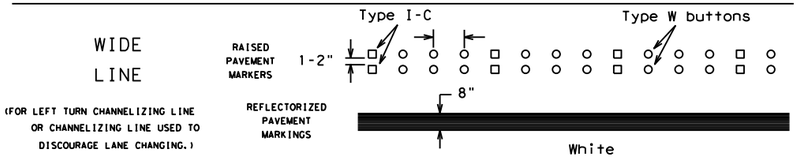


EDGE LINE OR SINGLE NO-PASSING LINE



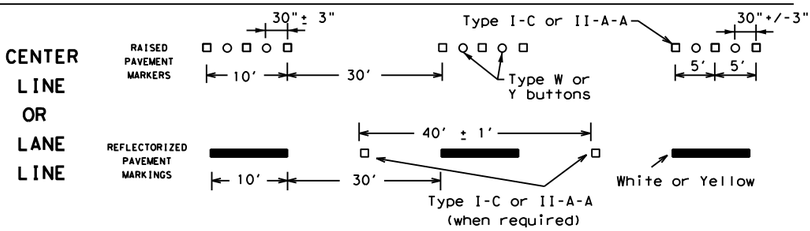
WIDE LINE

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

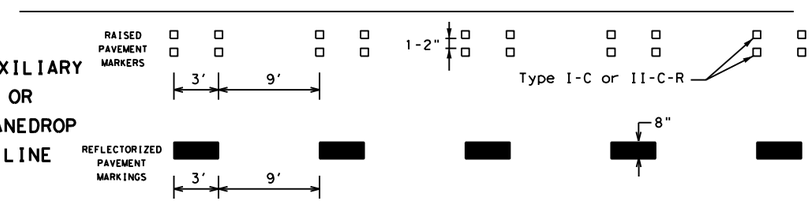


BROKEN LINES

CENTER LINE OR LANE LINE

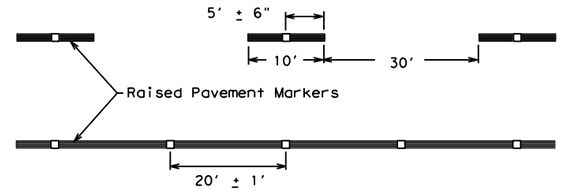


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	1378	01	050	RM 1431
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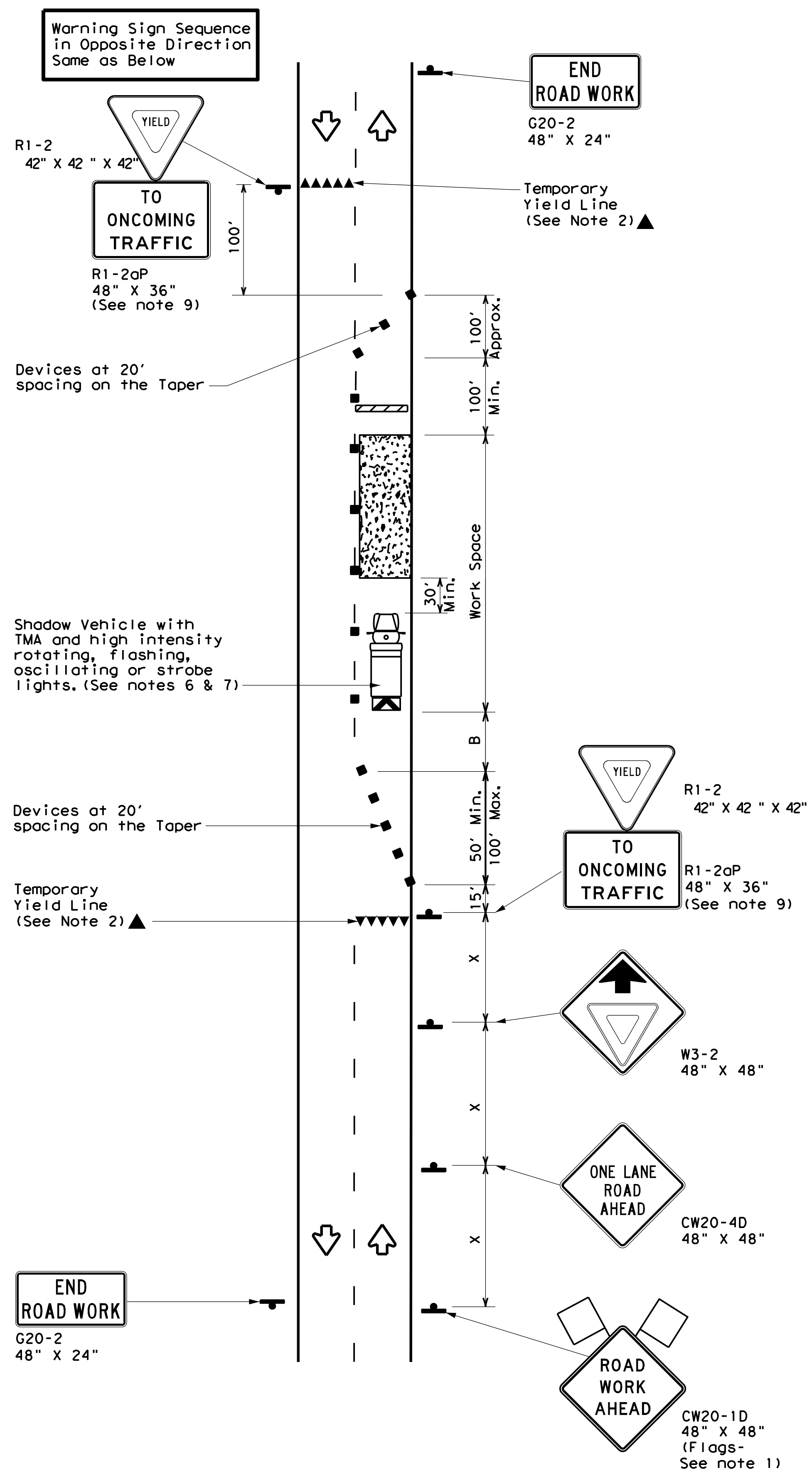


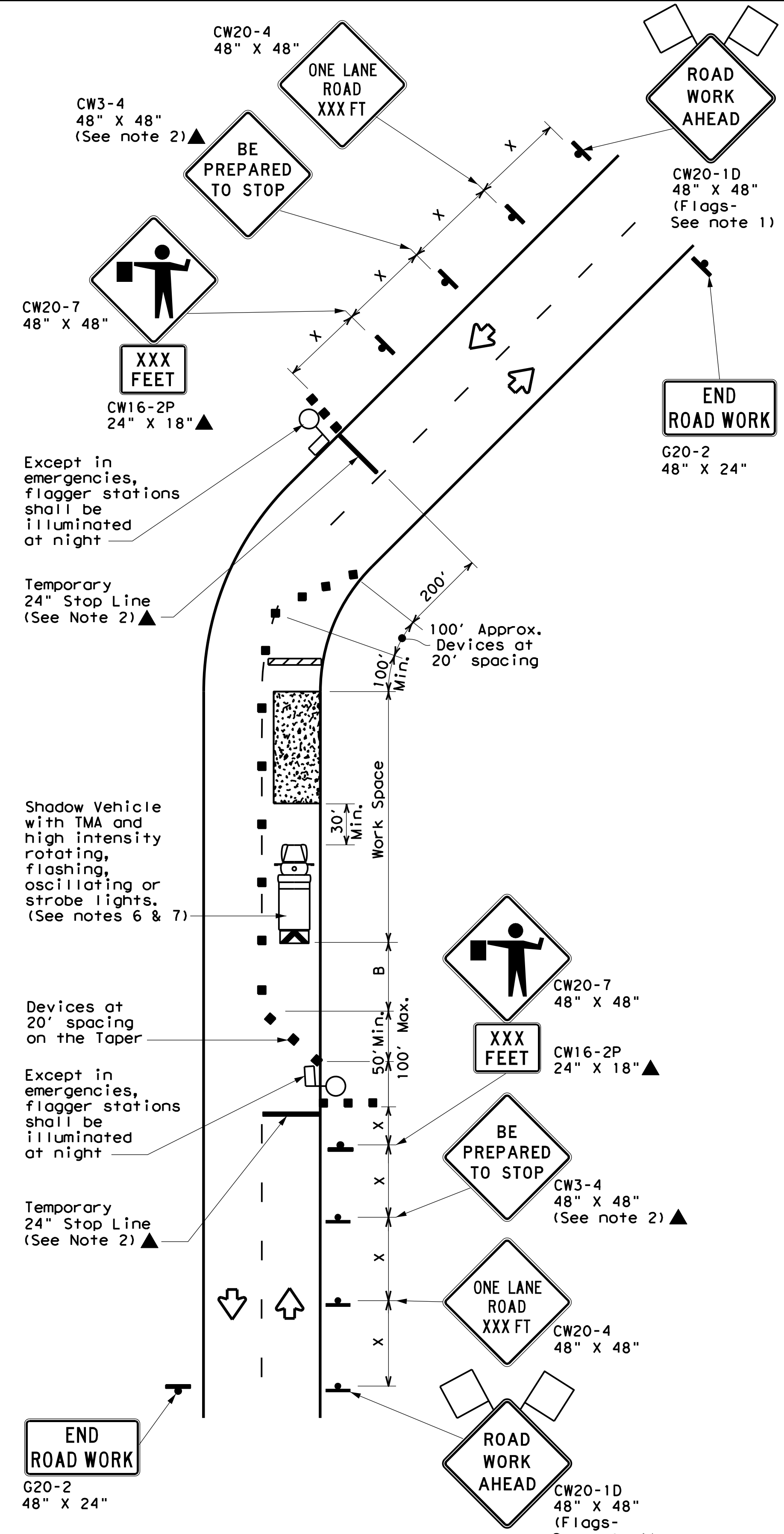
TCP (2-2a)

2-LANE ROADWAY WITHOUT PAVED SHOULDERS

ONE LANE TWO-WAY

CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See Note 9)



TCP (2-2b)

2-LANE ROADWAY WITHOUT PAVED SHOULDERS

ONE LANE TWO-WAY

CONTROL WITH FLAGGERS

LEGEND

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

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

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

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

GENERAL NOTES

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

TCP (2-2a)

8. The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
9. The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:	
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY	
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	1378	01	050	RM 1431	
	DIST		COUNTY		SHEET NO.
	AUS		TRAVIS		41

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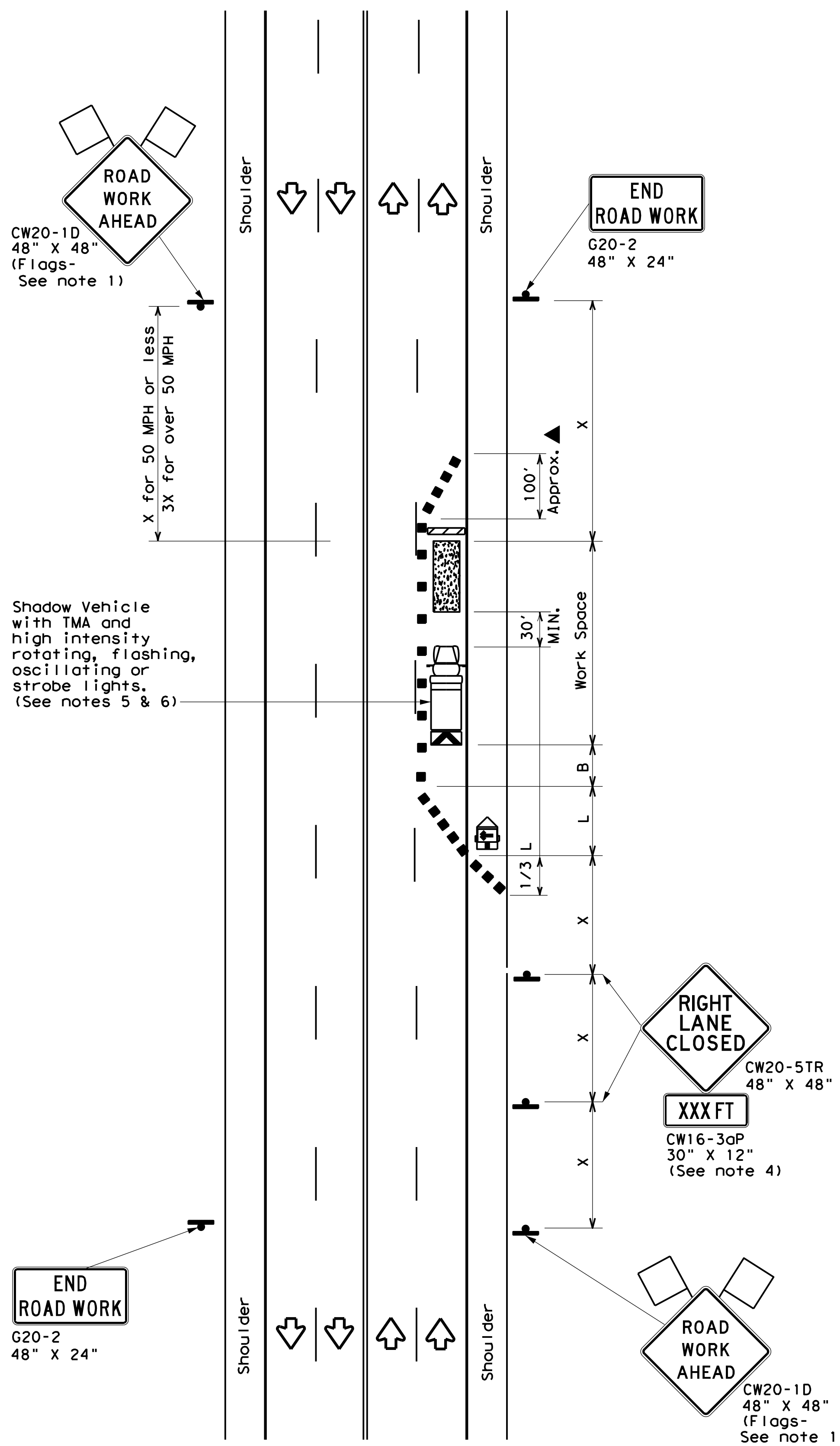
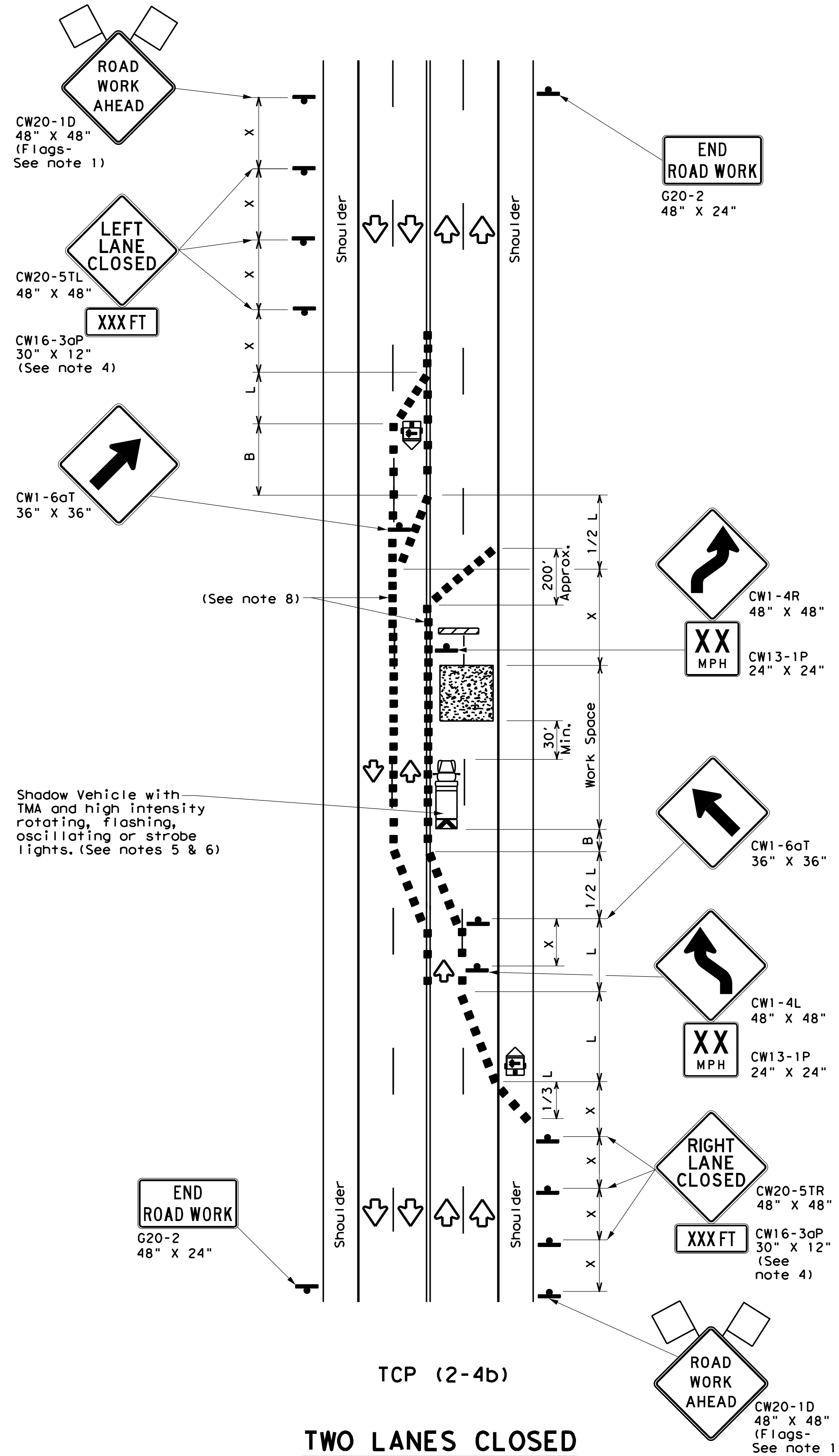


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

LEGEND

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

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

* Conventional Roads Only

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

TYPICAL USAGE

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

GENERAL NOTES

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

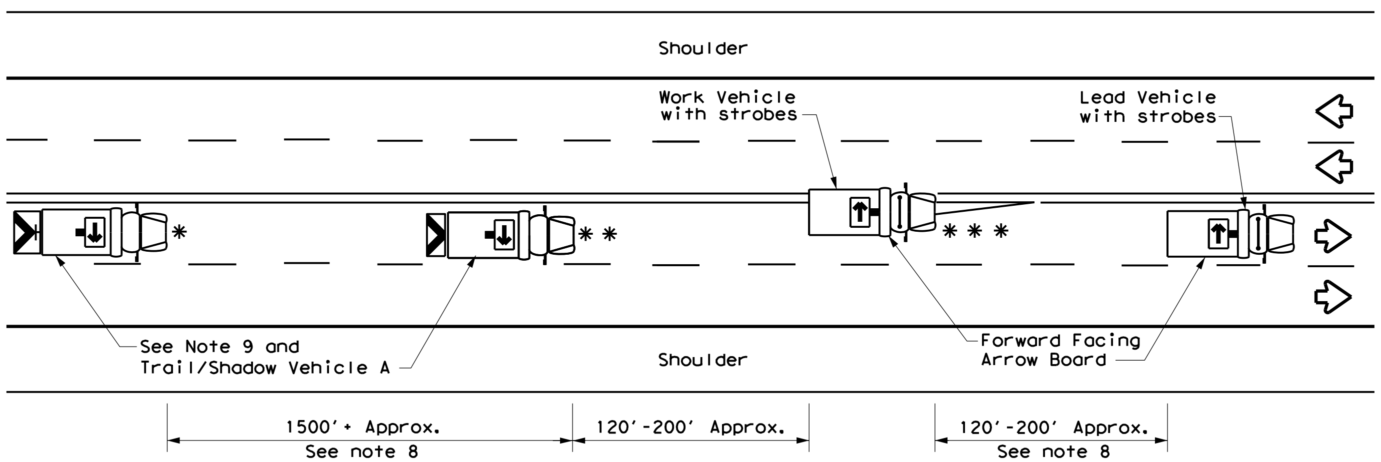
8. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing 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

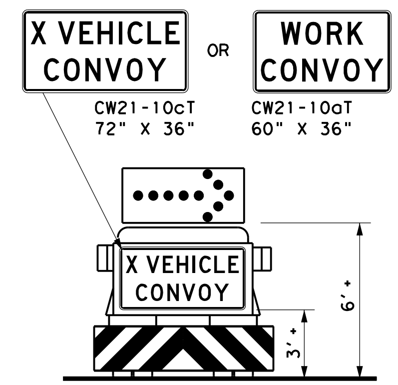
TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:		CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB		HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	1378	01	050		RM 1431
	DIST	COUNTY			SHEET NO.
	AUS	TRAVIS			42



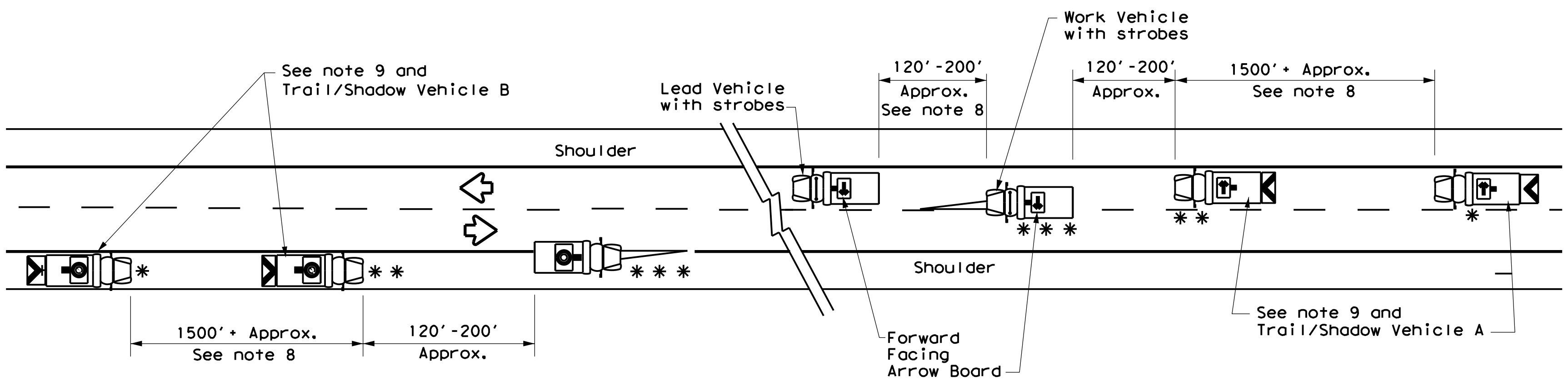
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

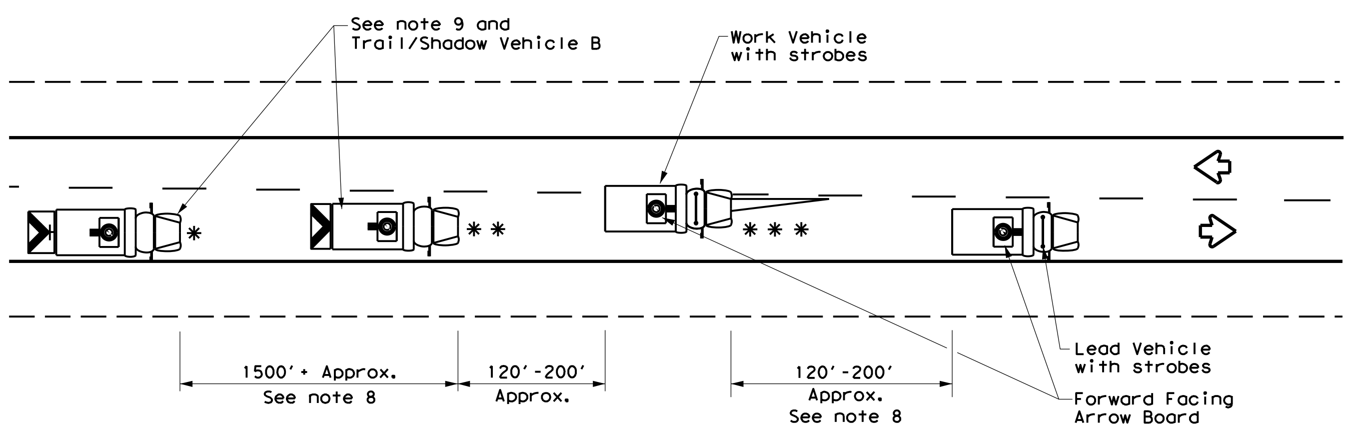


WORK ON SHOULDER

WORK ON TRAVEL LANE

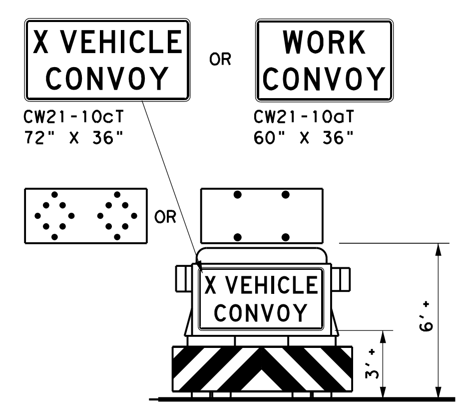
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display

LEGEND

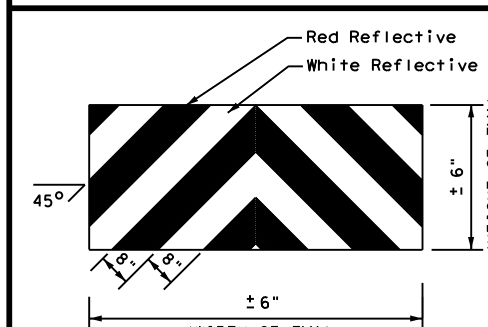
Symbol	Description	Symbol	ARROW BOARD DISPLAY
*	Trail Vehicle		
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	1378	01	050	RM 1431
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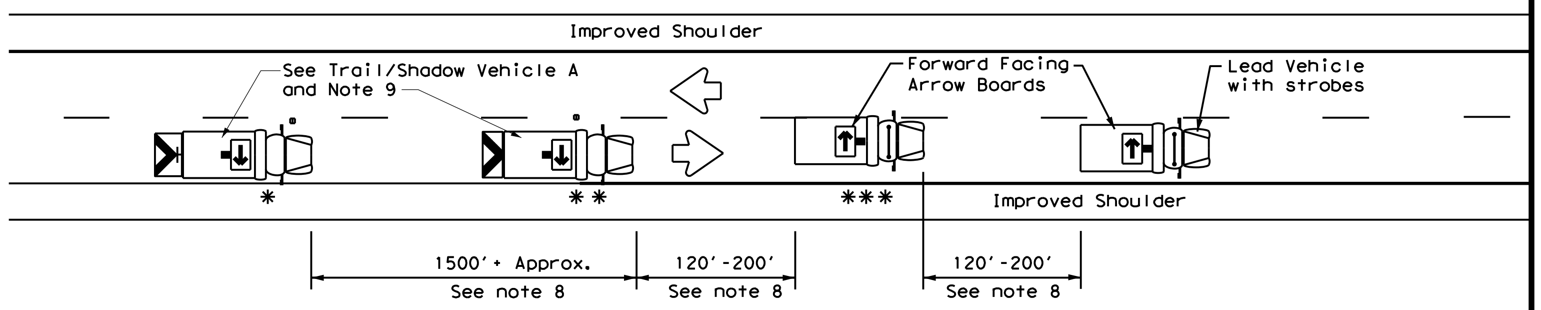
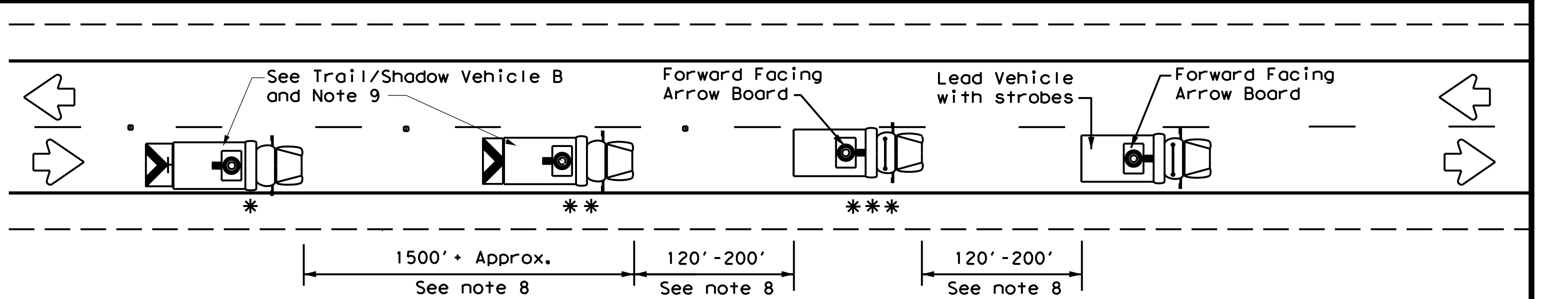


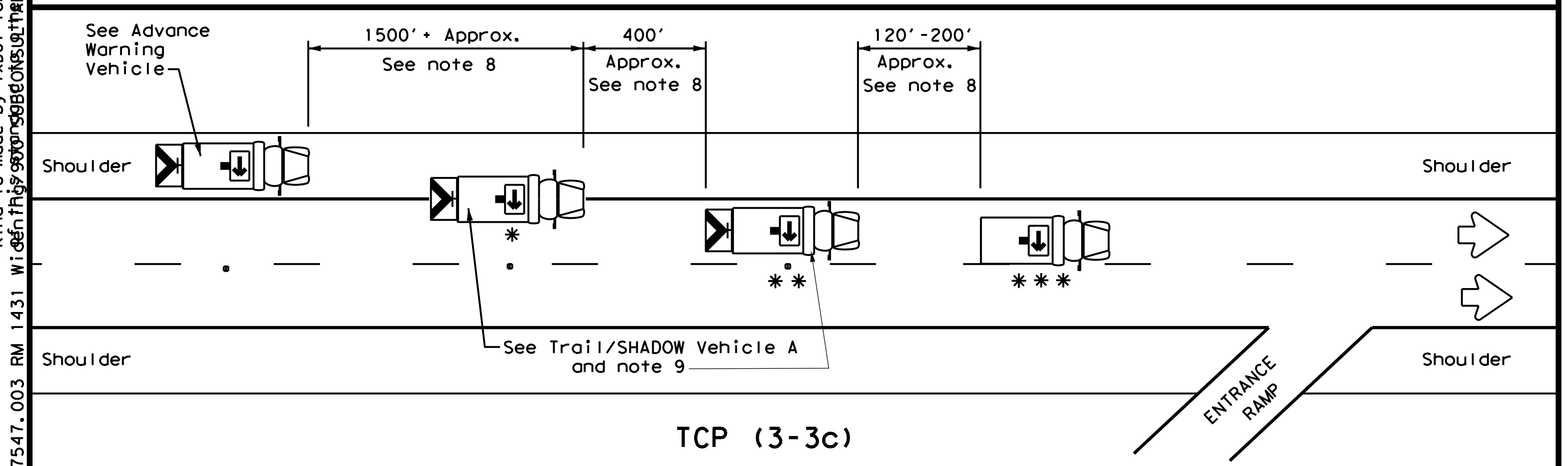
TCP (3-3a)

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



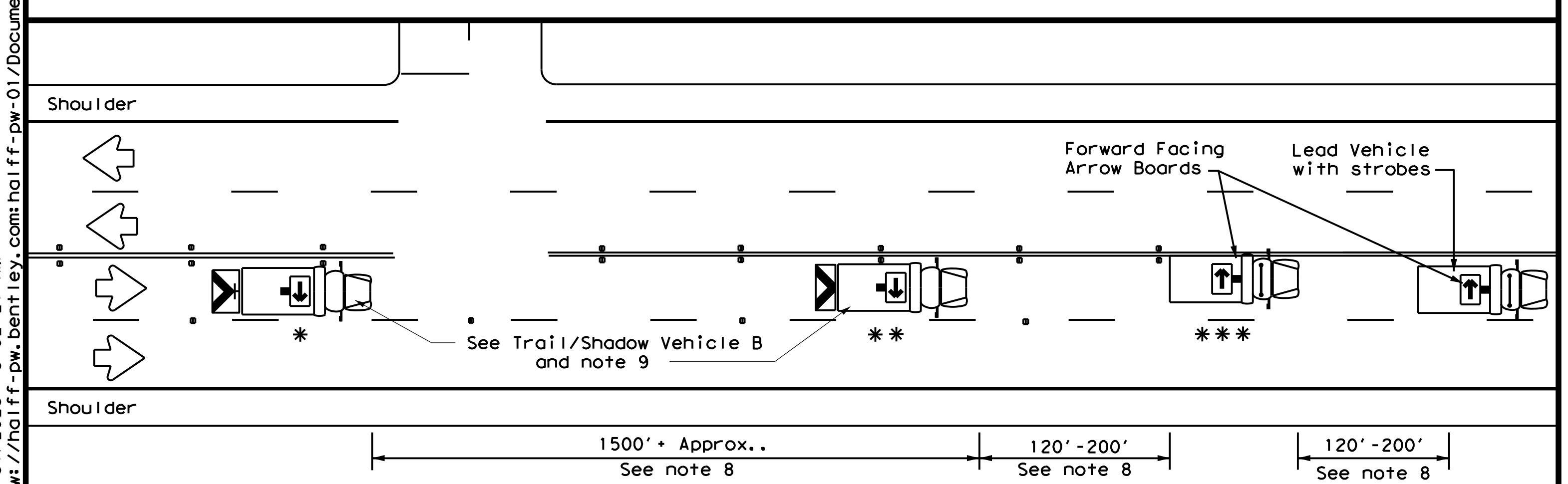
TCP (3-3b)

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



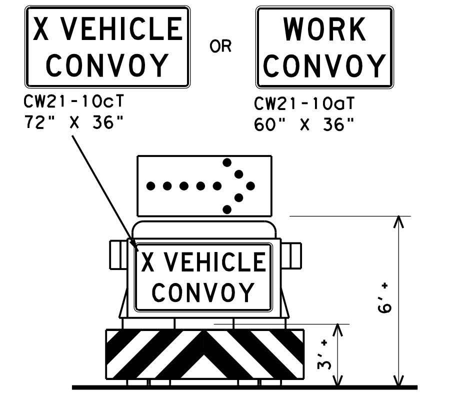
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



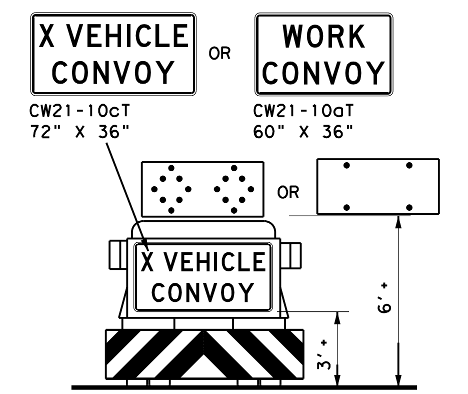
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



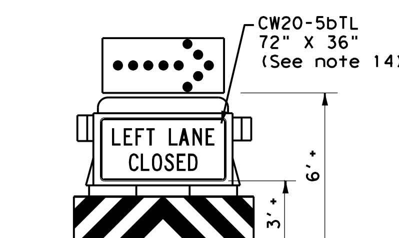
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

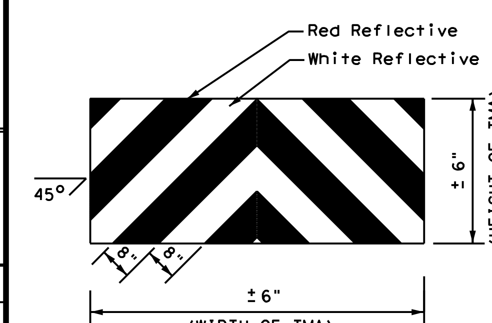


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND

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

TYPICAL USAGE

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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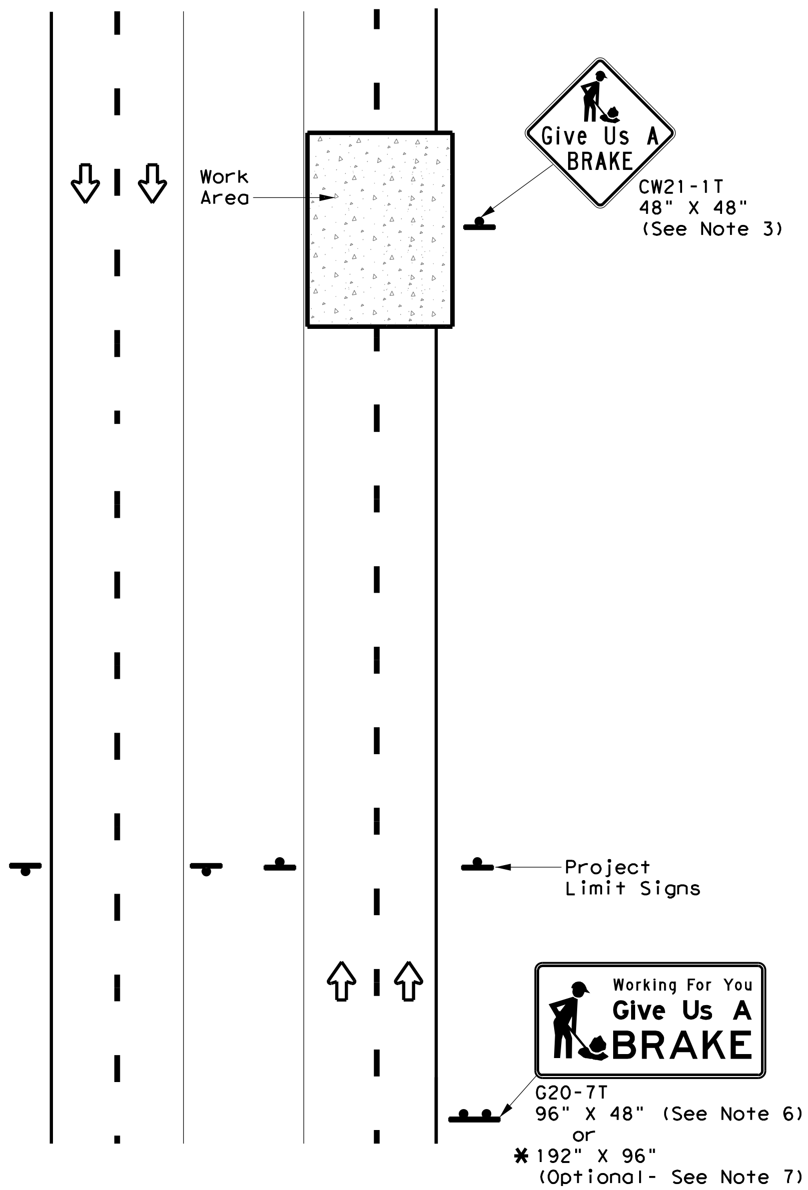
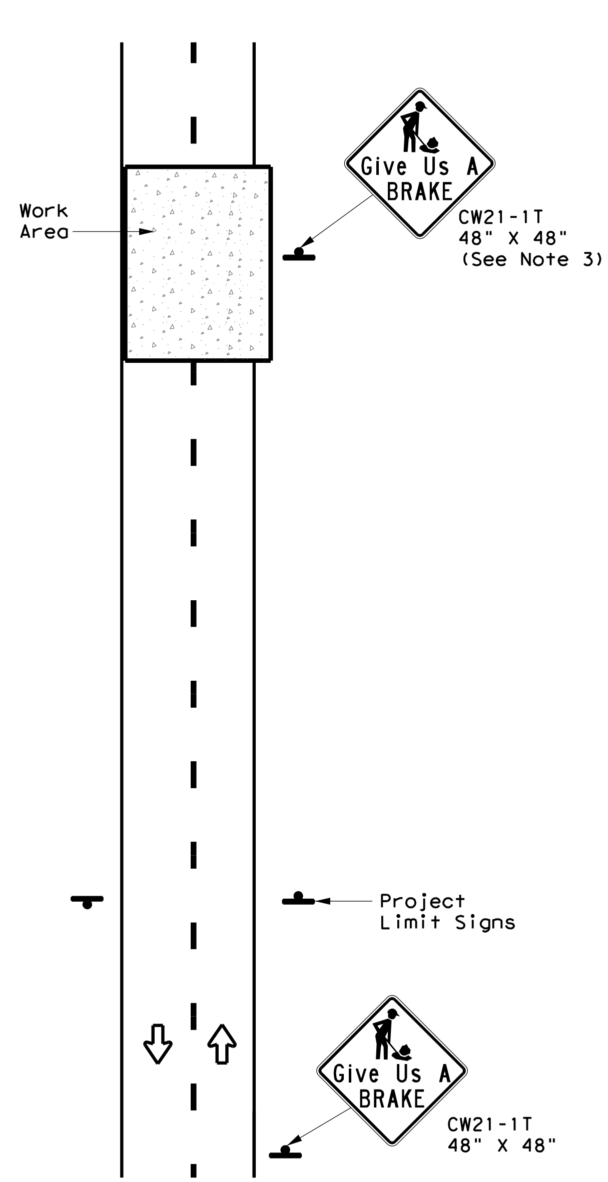
1-97 7-14	AUS		TRAVIS	44



DIVIDED HIGHWAY



UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

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

SUMMARY OF LARGE SIGNS

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

▲ See Note 6 Below

LEGEND

Symbol	Meaning
(sign symbol)	Sign
(large sign symbol)	Large Sign
⇦	Traffic Flow

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

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

GENERAL NOTES

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

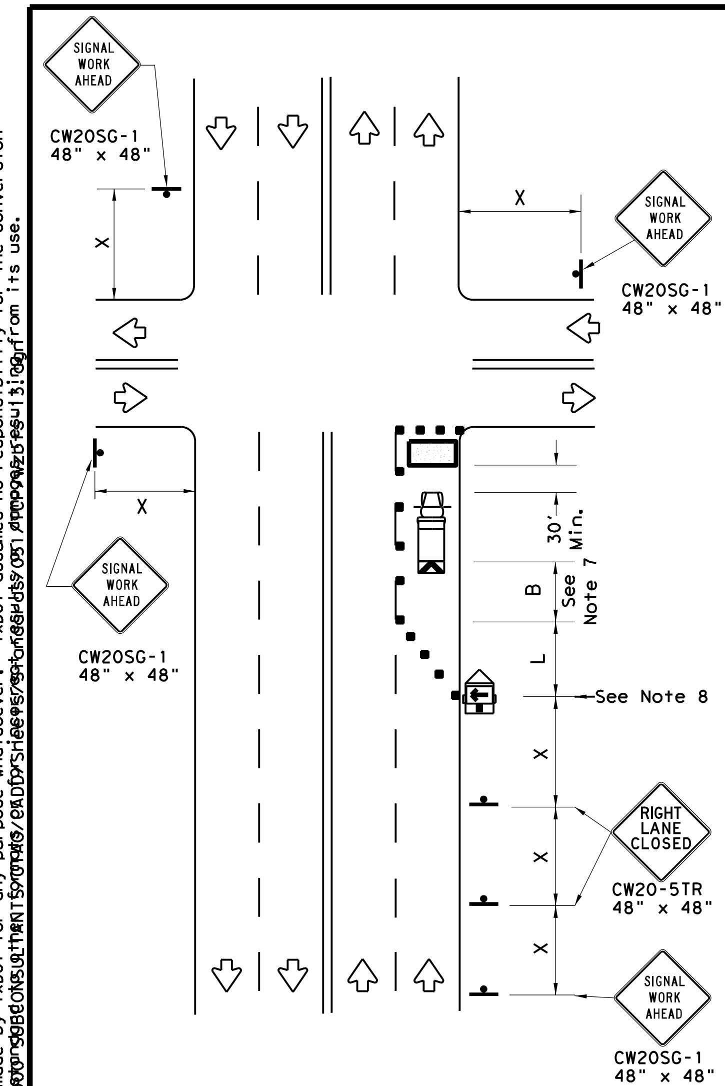
Texas Department of Transportation
Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

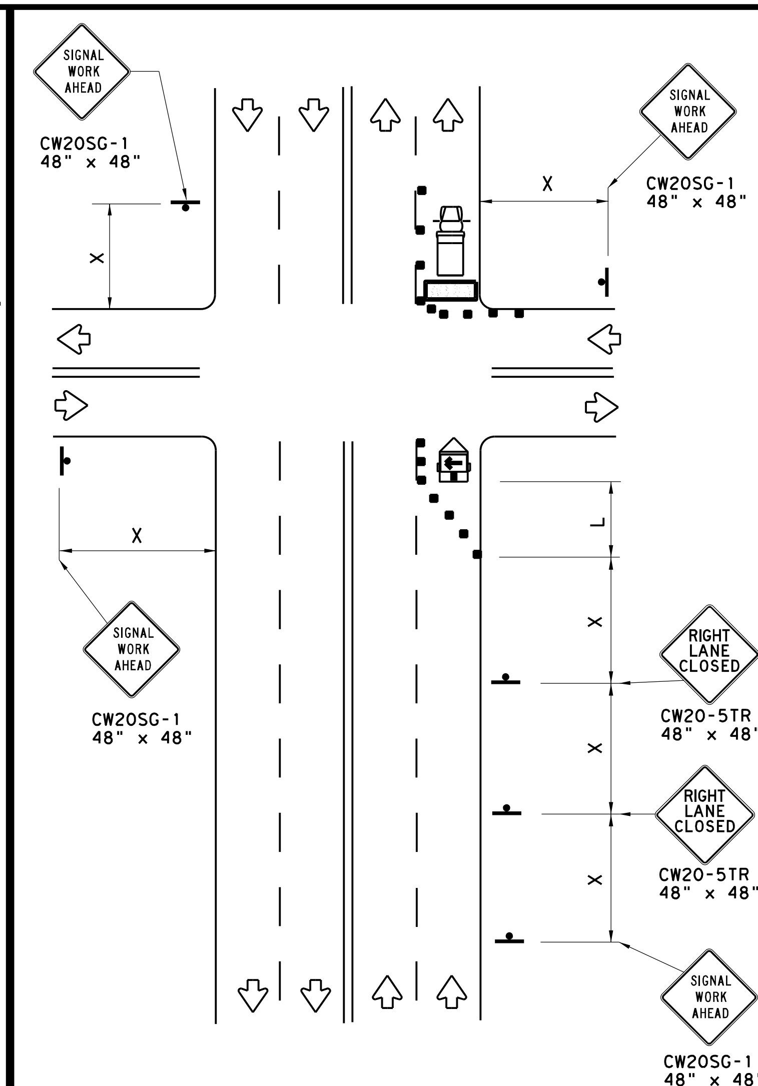
FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT 1378	SECT 01	JOB 050	HIGHWAY RM 1431
REVISIONS 6-96 5-98 7-13 8-96 3-03	DIST AUS	COUNTY TRAVIS		SHEET NO. 45

116



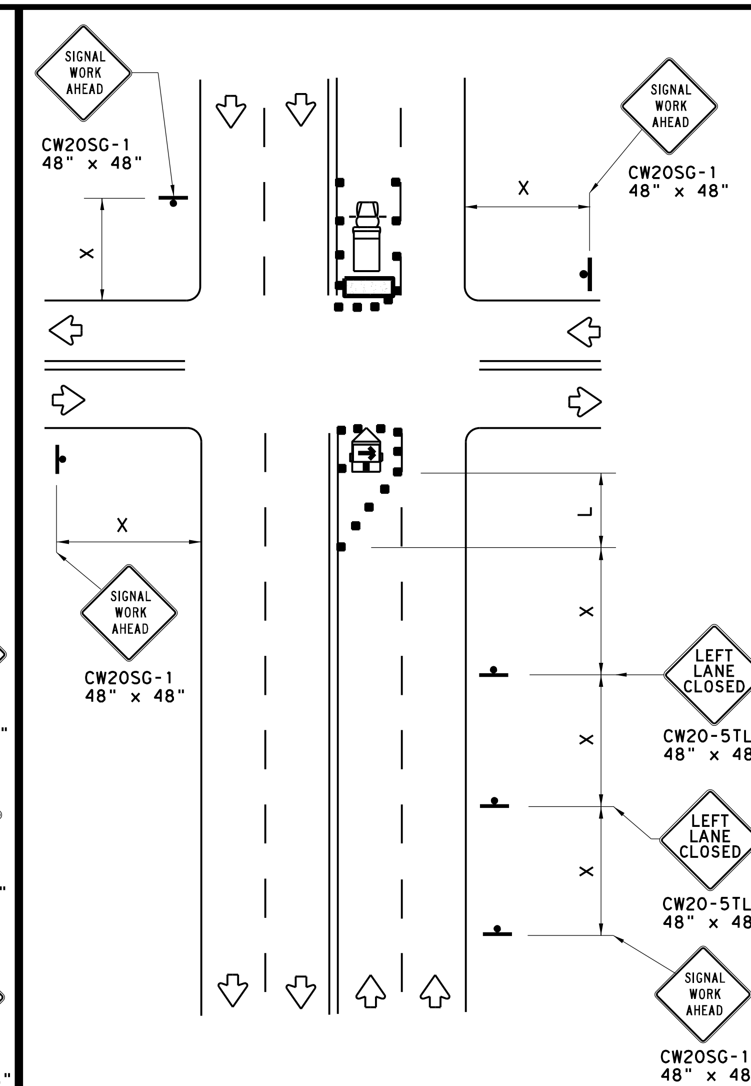
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE RIGHT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY

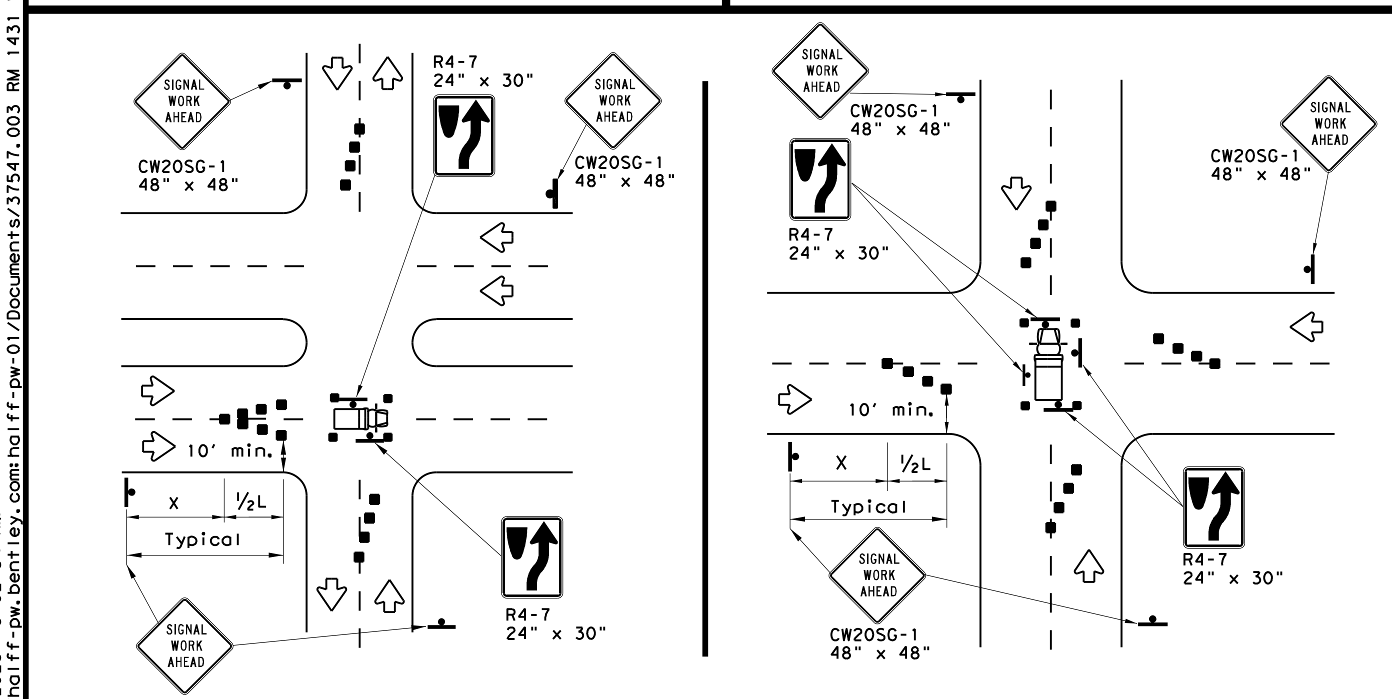
LEGEND			
(symbol)	Type 3 Barricade	(symbol)	Channelizing Devices
(symbol)	Heavy Work Vehicle	(symbol)	Truck Mounted Attenuator (TMA)
(symbol)	Trailer Mounted Flashing Arrow Board	(symbol)	Portable Changeable Message Sign (PCMS)
(symbol)	Sign	(symbol)	Traffic Flow
(symbol)	Flag	(symbol)	Flagger

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

* Conventional Roads Only

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

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



OPERATIONS IN THE INTERSECTION

SHORT DURATION

GENERAL NOTES

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

SHEET 1 OF 2

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT 1378	SECT 01	JOB 050	HIGHWAY RM 1431
REVISIONS 2-98 10-99 7-13 4-98 3-03	DIST AUS		COUNTY TRAVIS	SHEET NO. 46

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DATE: 1/31/2023 9:02:54 AM
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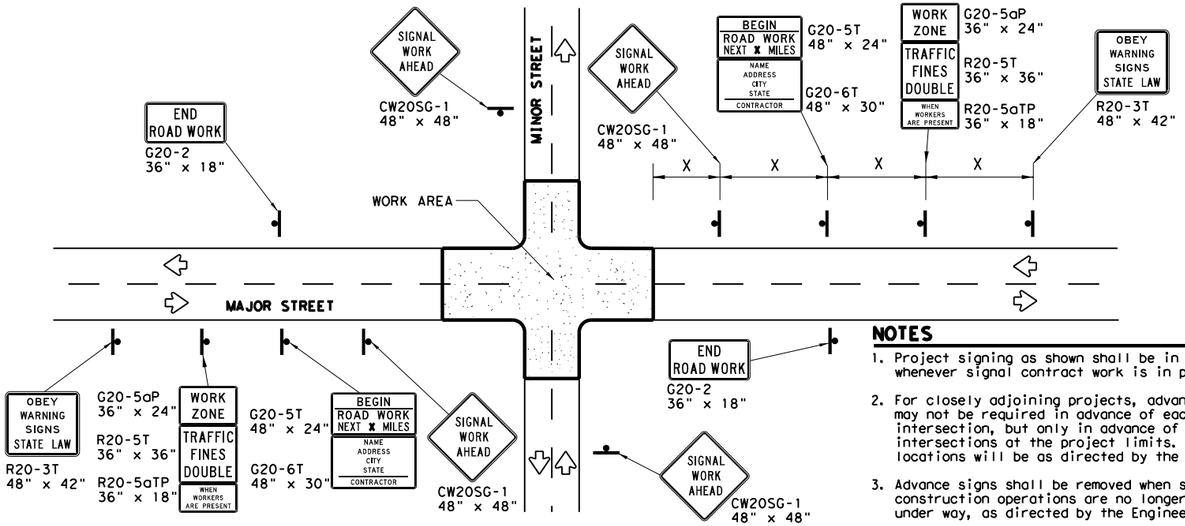


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

DURATION OF WORK

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

SIGN MOUNTING HEIGHT

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

REMOVING OR COVERING

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

REFLECTIVE SHEETING

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

SIGN SUPPORT WEIGHTS

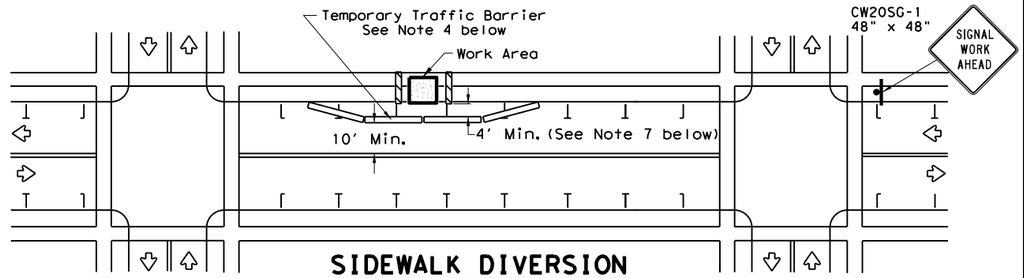
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support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

LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

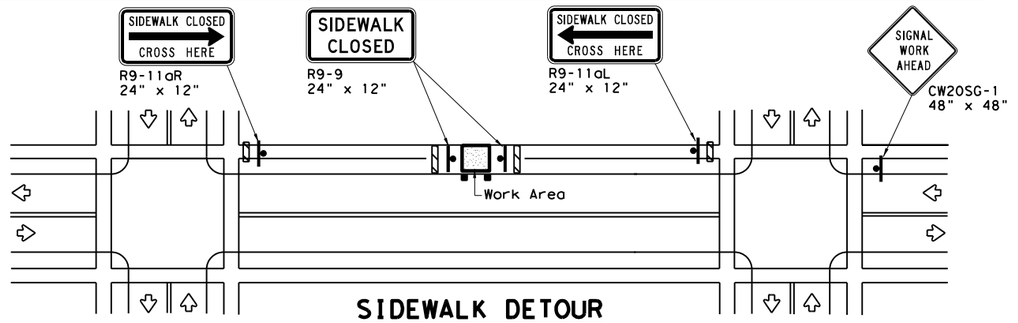
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

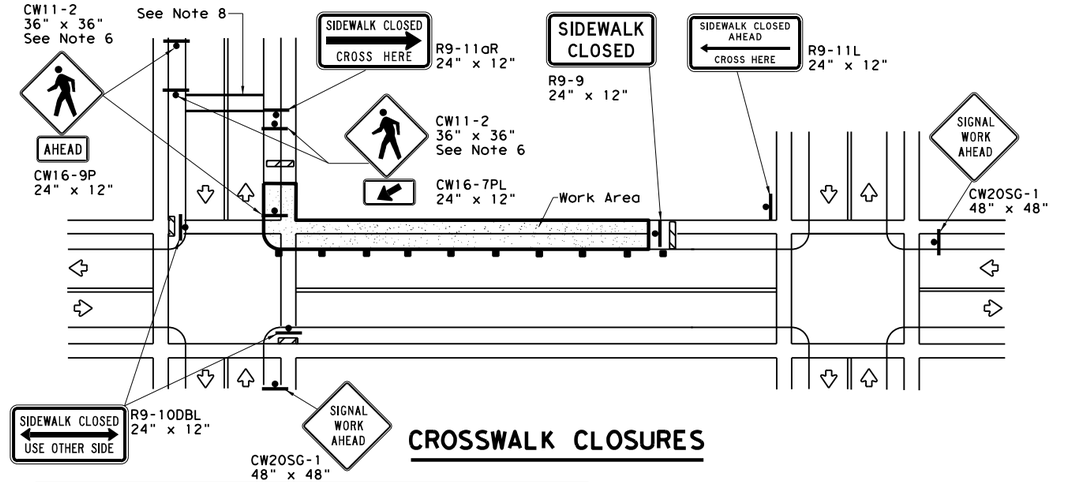
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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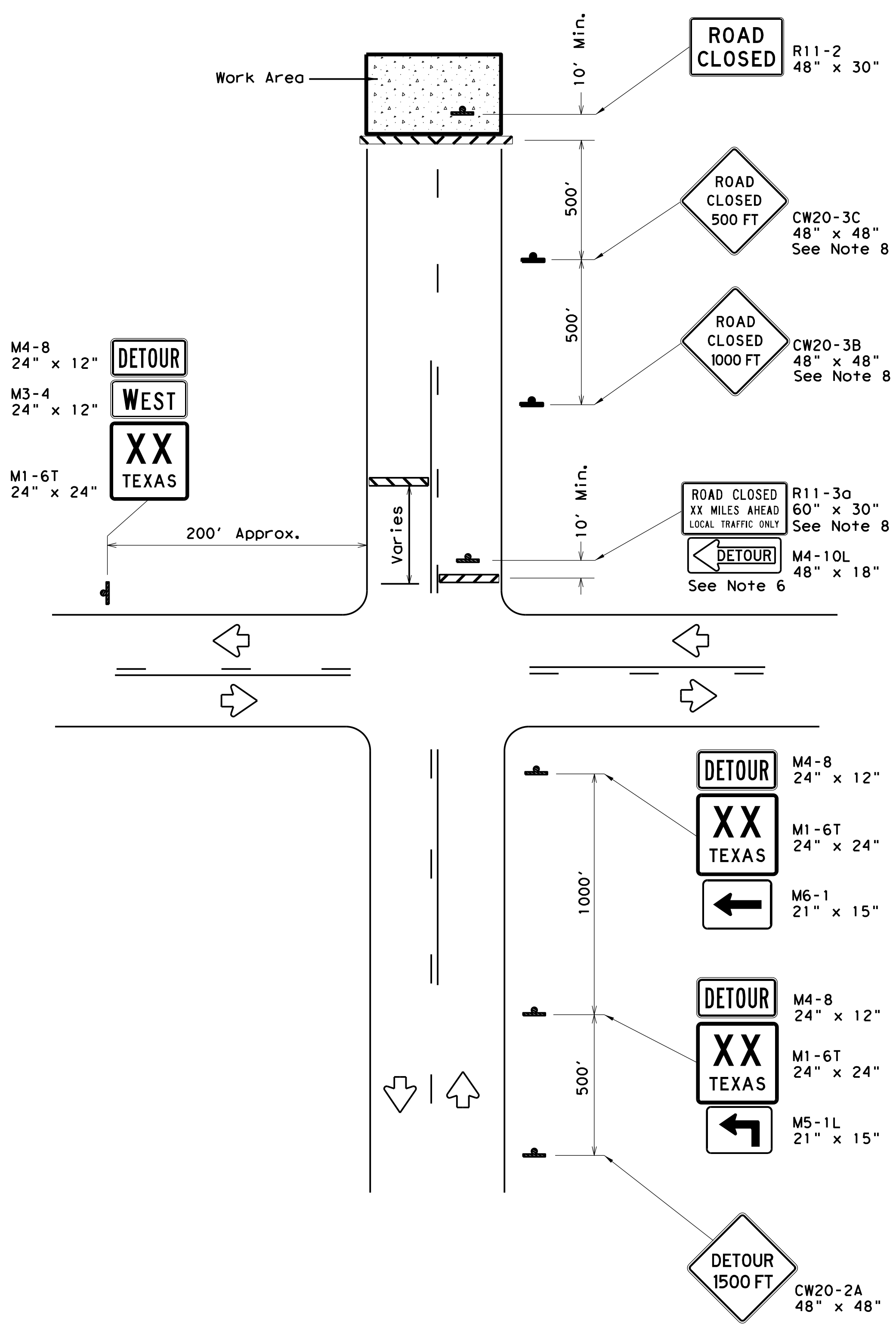
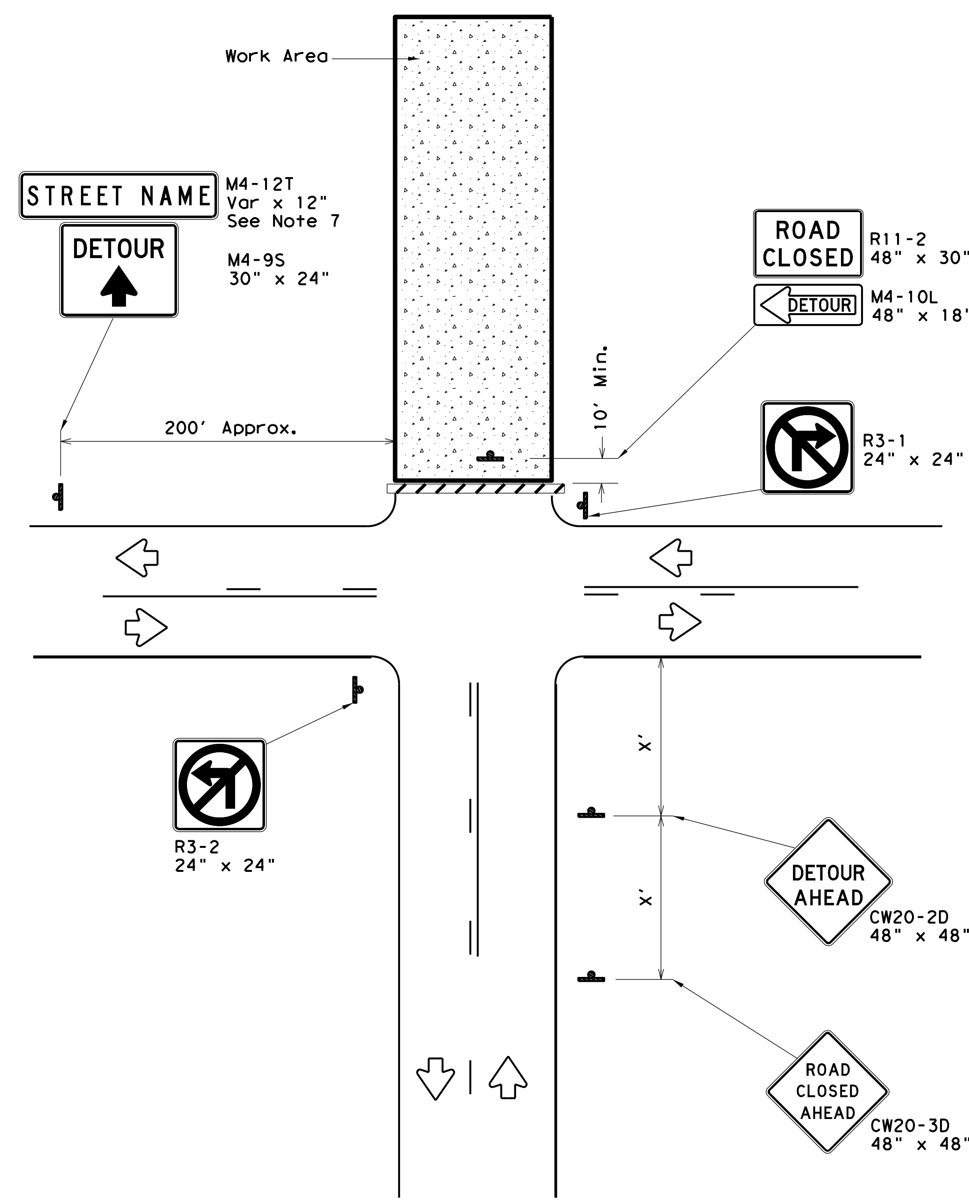
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	AUS	TRAVIS		47



ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

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

LEGEND	
(hatched bar)	Type 3 Barricade
(sign symbol)	Sign

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

* Conventional Roads Only

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

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© TxDOT August 1995	CONT 1378	SECT 01	JOB 050	HIGHWAY RM 1431
REVISIONS 1-97 4-98 7-13 2-98 3-03	DIST AUS	COUNTY TRAVIS		SHEET NO. 48

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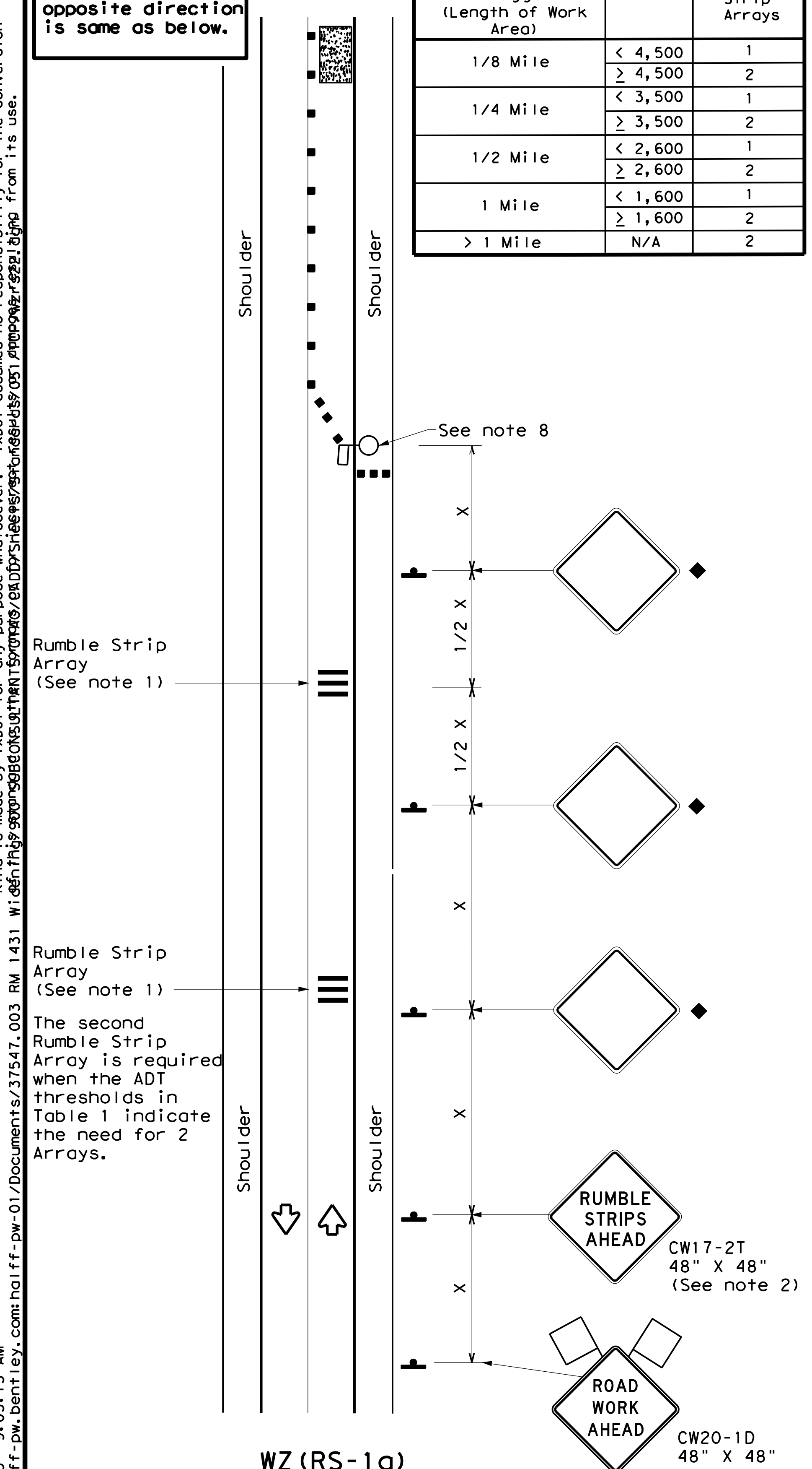
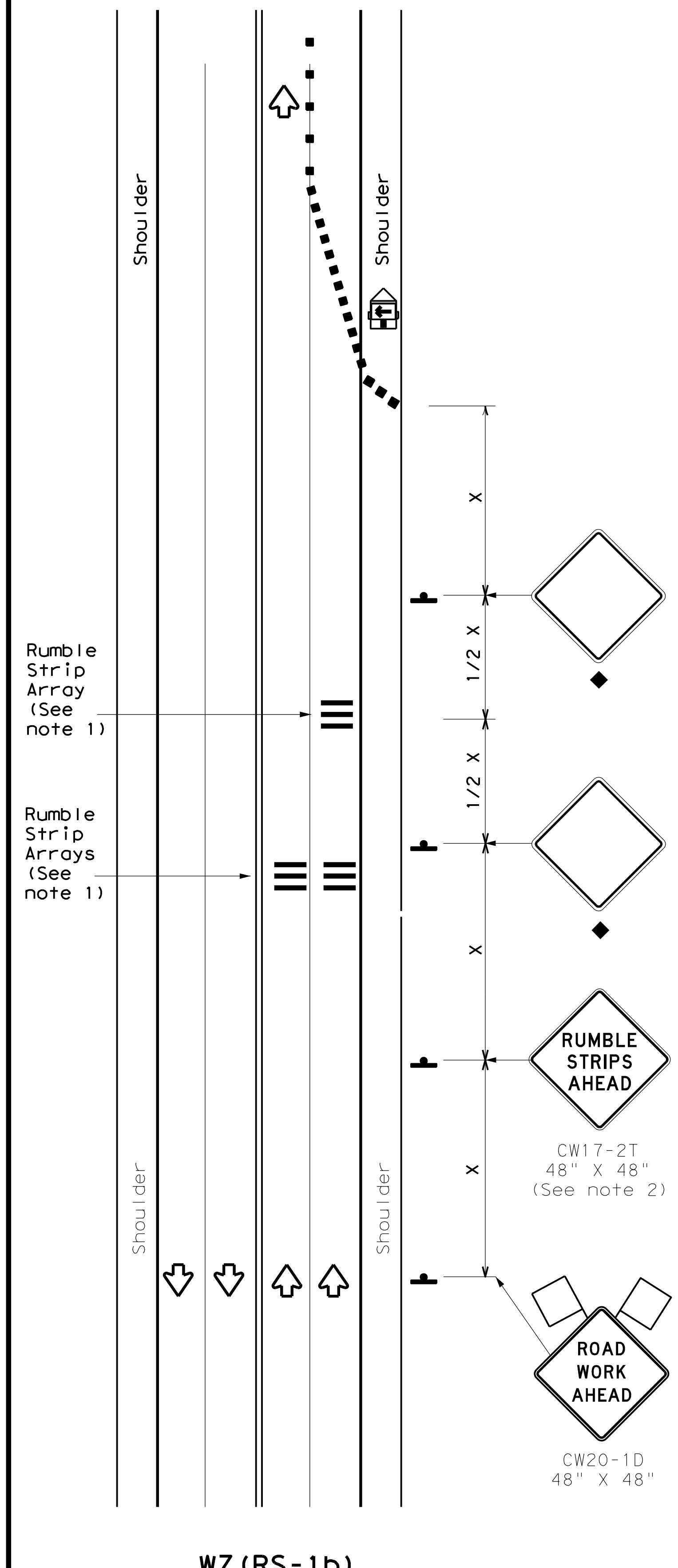
Warning sign and rumble strip sequence in opposite direction is same as below.

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



RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



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

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

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

* Conventional Roads Only

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

TYPICAL USAGE

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

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

* **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
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REVISIONS 2-14 1-22 4-16	1378	01	050	RM 1431
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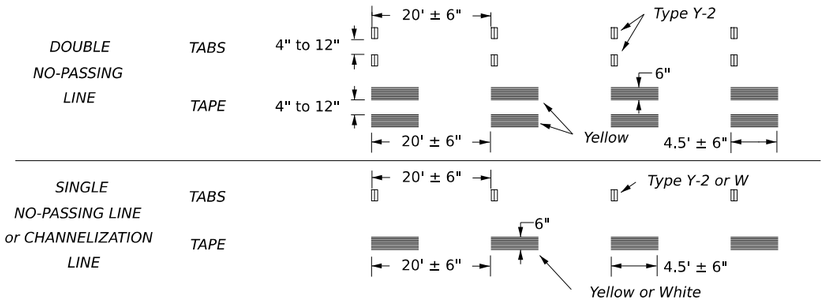
	AUS	TRAVIS		49

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



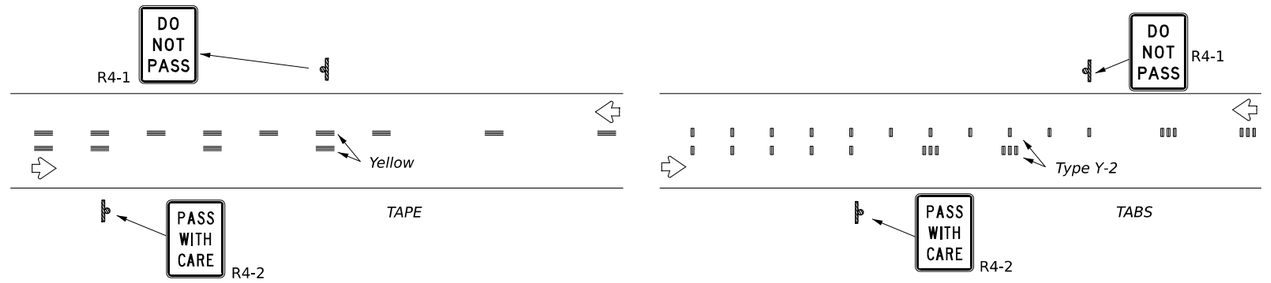
NOTES:

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.

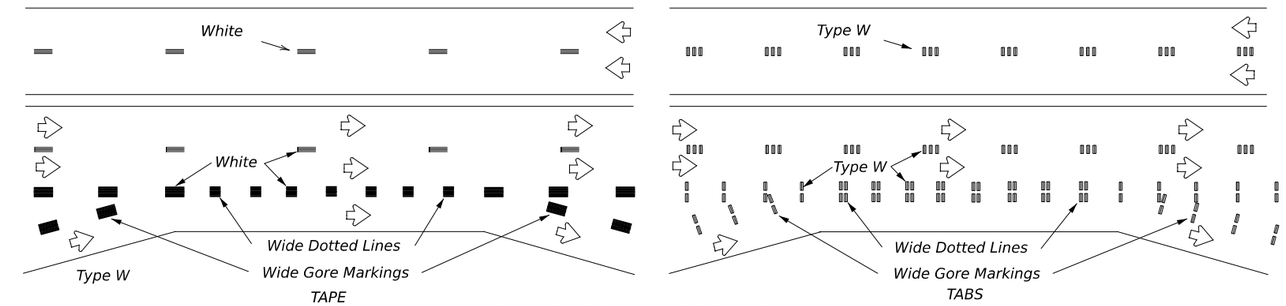
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

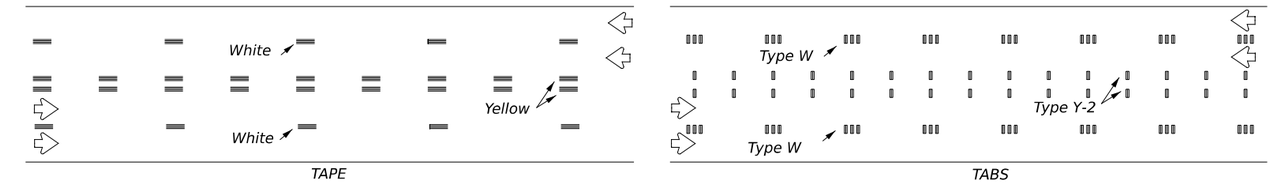
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



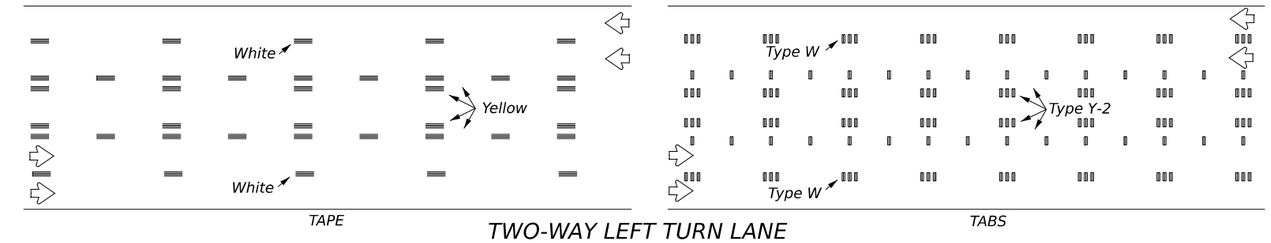
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



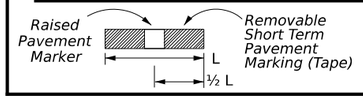
LANE LINES FOR DIVIDED HIGHWAY



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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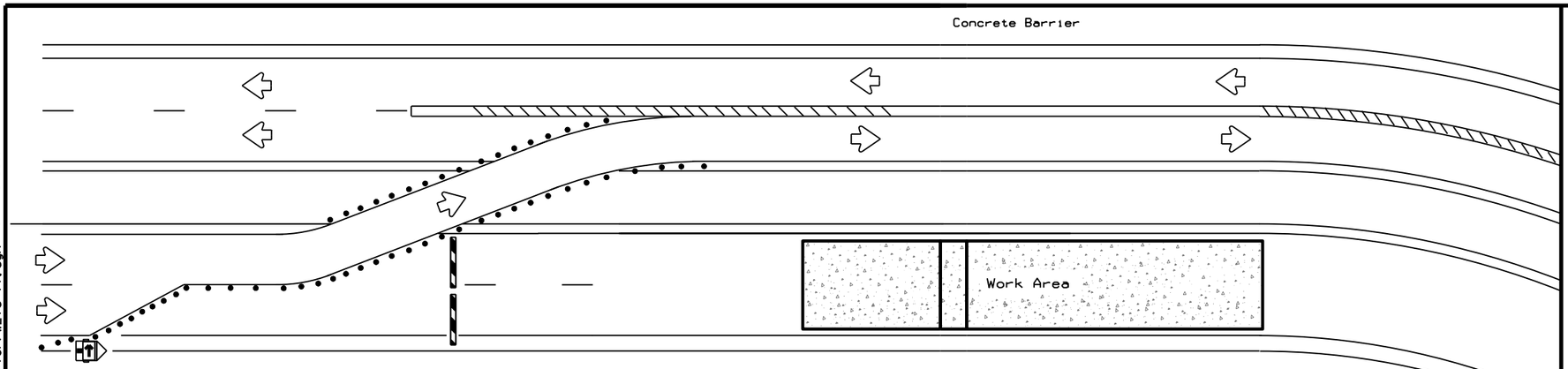


NOTES:

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

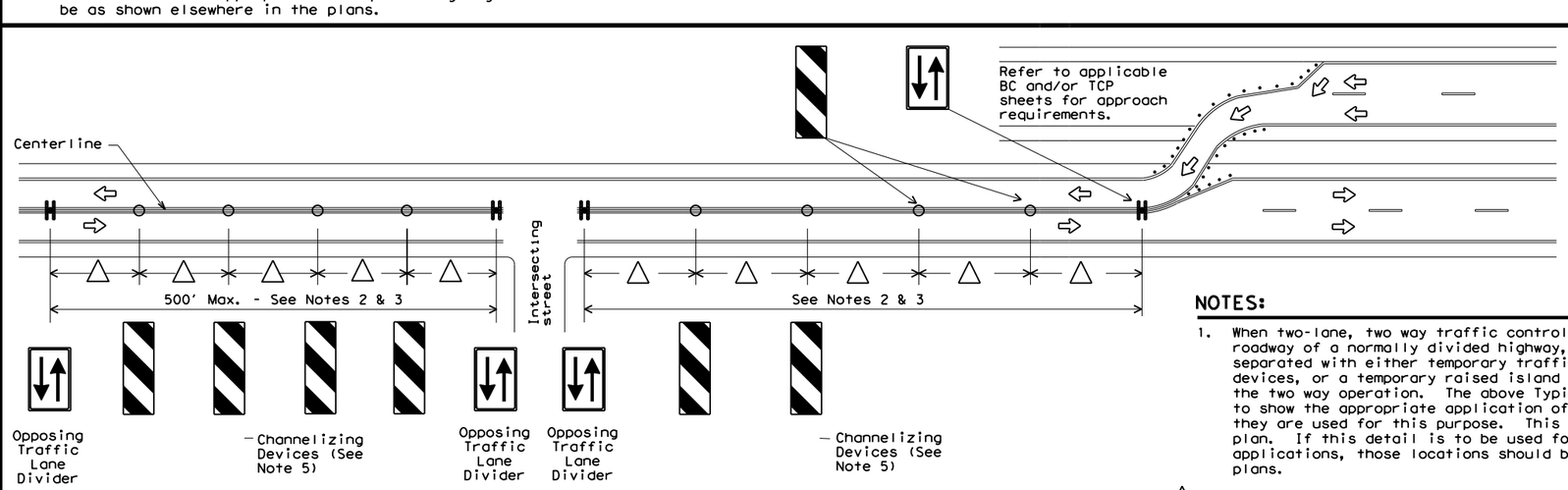
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

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

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

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

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



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

NOTES:

1. When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the plans.

△2. Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100'.

3. Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
4. Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.
5. Channelizing devices are to be vertical panels, 42" cones or tubular markers that are at least 36" tall. Tubular markers used to separate traffic should have a rubber base weighing at least 30 pounds. Tubular markers that are 42" tall or more shall have four bands of reflective material as detailed for 42" cones on BC(10). Tubular markers less than 42" but at least 36" tall shall have three bands of 3" wide white reflective material spaced 2" apart. Reflective material shall meet DMS-8300, Type A.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TYPICAL DETAILS

WZ(TD)-17

FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 2-17 3-03 7-13	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		51

110

DATE: 1/31/2023 9:03:43 AM
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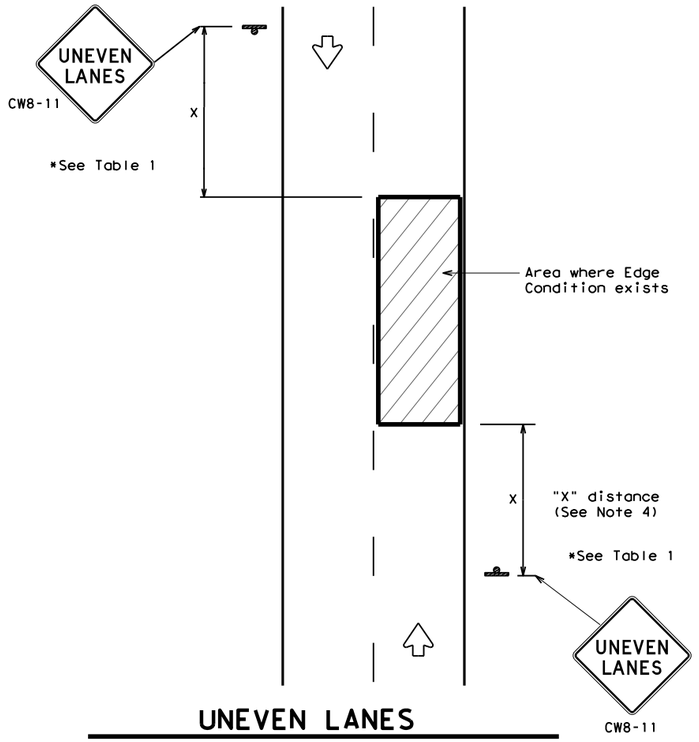
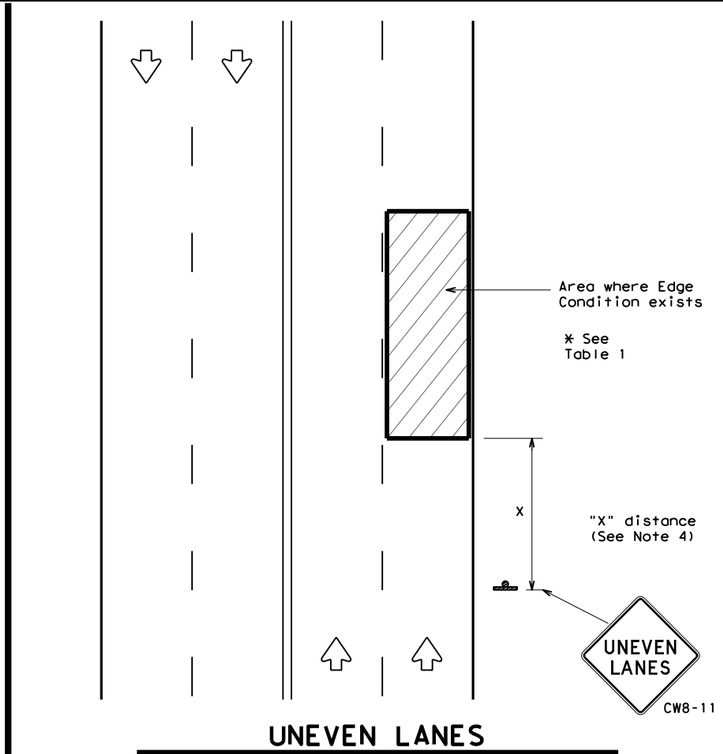
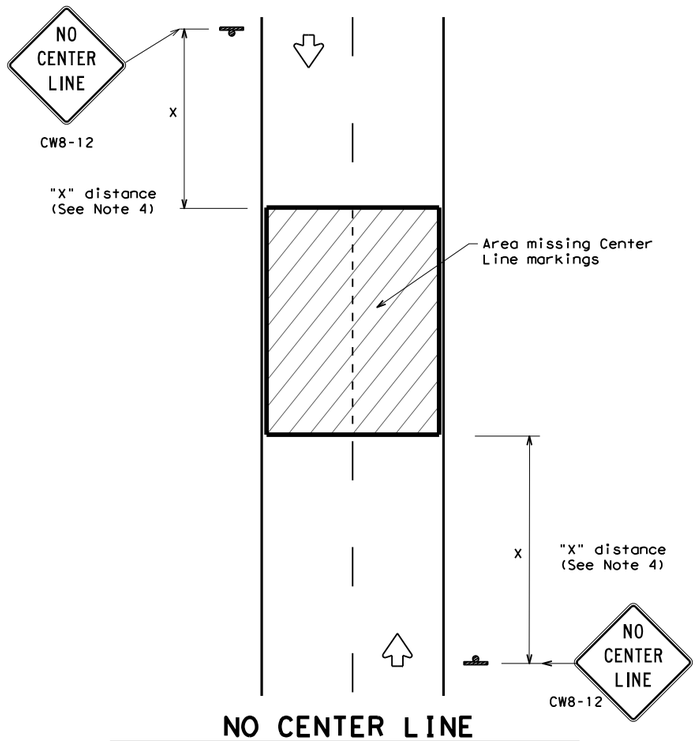


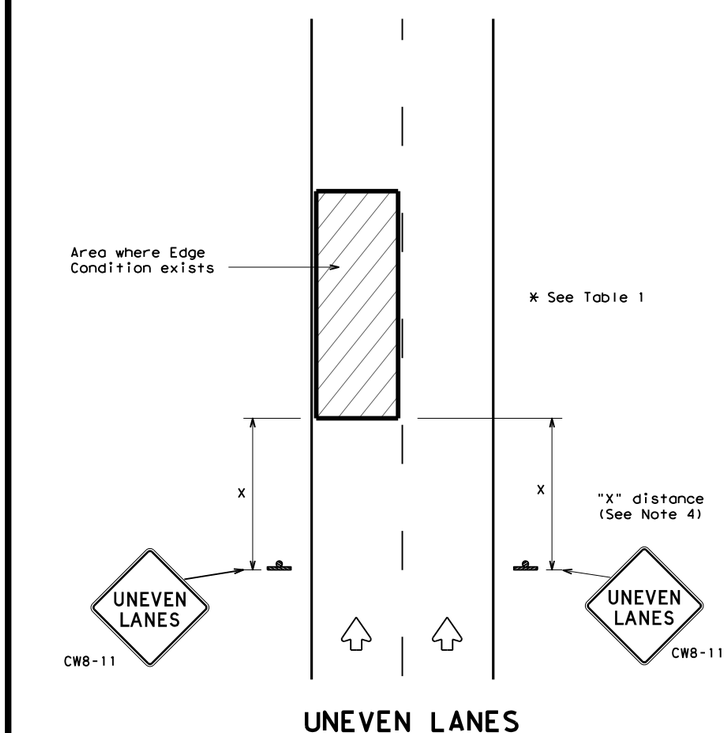
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

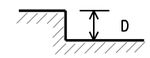
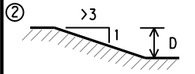
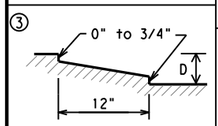
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

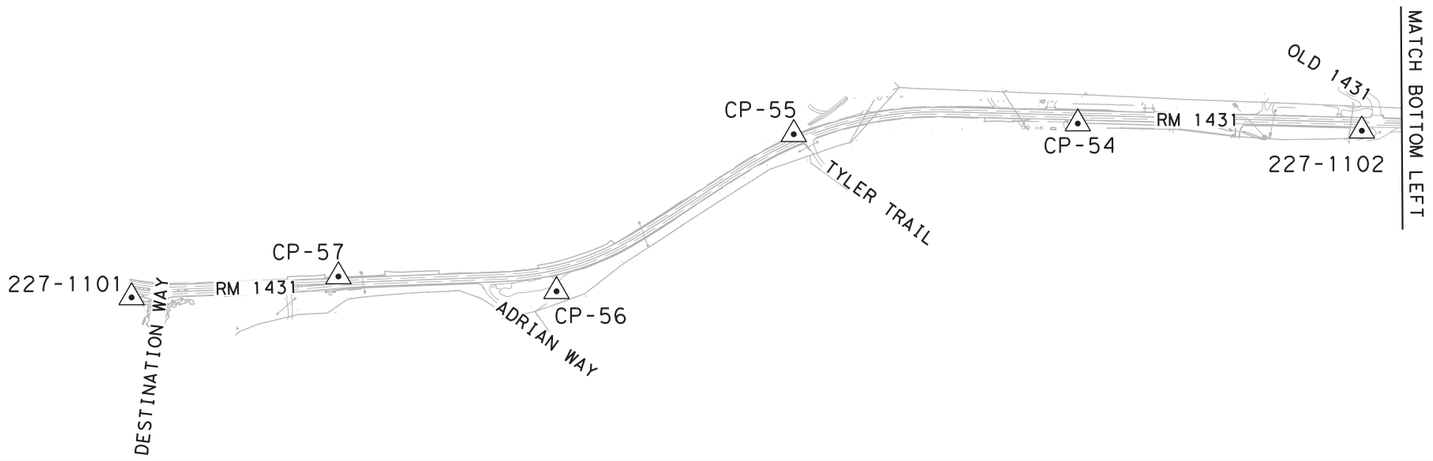
Traffic Operations Division Standard

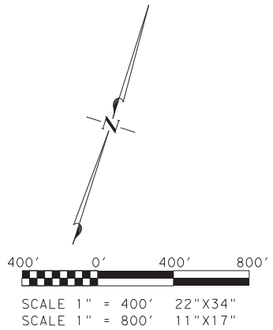
SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	AUS	TRAVIS		52

SURVEY CONTROL POINTS - SURFACE COORDINATES				
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
227-1101	10,144,145.75′	3,041,770.55′	992.43′	TXDOT ALUMINUM DISK SET IN CONCRETE
227-1102	10,146,950.80′	3,047,695.59′	942.03′	TXDOT ALUMINUM DISK SET IN CONCRETE
227-1103	10,149,539.92′	3,053,716.37′	821.03′	TXDOT ALUMINUM DISK SET IN CONCRETE
50	10,148,411.55′	3,052,726.19′	762.10′	1/2" IRON ROD SET W/ MCGRAY CAP
51	10,148,080.26′	3,051,264.15′	840.16′	1/2" IRON ROD SET W/ MCGRAY CAP
52	10,147,683.96′	3,049,816.65′	862.55′	1/2" IRON ROD SET W/ MCGRAY CAP
53	10,147,248.96′	3,048,676.02′	925.99′	1/2" IRON ROD SET W/ MCGRAY CAP
54	10,146,533.04′	3,046,254.61′	1,000.47′	1/2" IRON ROD SET W/ MCGRAY CAP
55	10,146,025.13′	3,044,842.30′	1,032.42′	1/2" IRON ROD SET W/ MCGRAY CAP
56	10,144,858.96′	3,043,896.26′	982.33′	1/2" IRON ROD SET W/ MCGRAY CAP
57	10,144,581.63′	3,042,778.02′	961.96′	1/2" IRON ROD SET W/ MCGRAY CAP



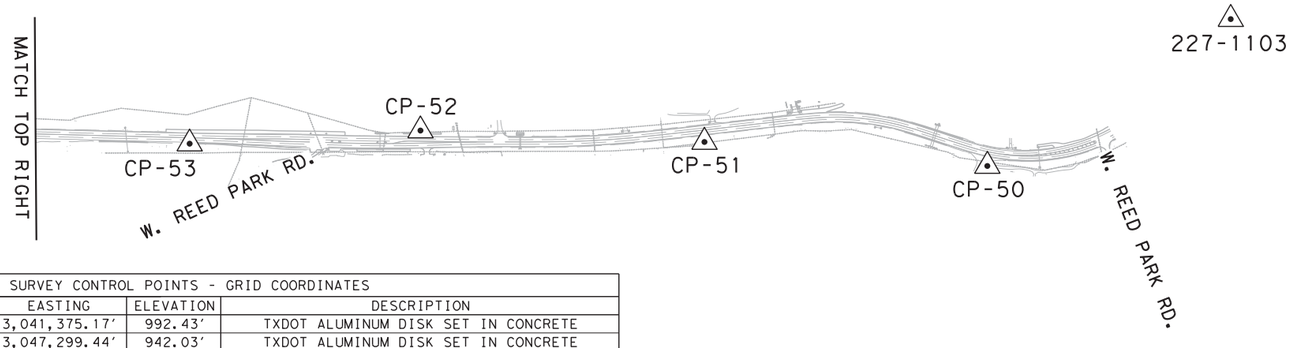


NOTES:

1. THIS PROJECT IS REFERENCED, FOR ALL BEARING AND COORDINATE BASIS, TO THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011) EPOCH 2010.00, (GEOID18).

2. ALL COORDINATES SHOWN HEREON ARE IN U.S. SURVEY FEET. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE COORDINATES AND CAN BE CONVERTED TO GRID BY DIVIDING BY A COMBINED SCALE FACTOR OF 1.00013.

3. ALL ELEVATIONS SHOWN HEREON ARE NORTH AMERICAN VERTICAL DATUM (NAVD) 88 AND WERE DERIVED FROM GPS OBSERVATIONS.



SURVEY CONTROL POINTS - GRID COORDINATES				
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
227-1101	10,142,827.18′	3,041,375.17′	992.43′	TXDOT ALUMINUM DISK SET IN CONCRETE
227-1102	10,145,631.87′	3,047,299.44′	942.03′	TXDOT ALUMINUM DISK SET IN CONCRETE
227-1103	10,148,220.65′	3,053,319.44′	821.03′	TXDOT ALUMINUM DISK SET IN CONCRETE
50	10,147,092.43′	3,052,329.39′	762.10′	1/2" IRON ROD SET W/ MCGRAY CAP
51	10,146,761.18′	3,050,867.53′	840.16′	1/2" IRON ROD SET W/ MCGRAY CAP
52	10,146,364.93′	3,049,420.23′	862.55′	1/2" IRON ROD SET W/ MCGRAY CAP
53	10,145,929.99′	3,048,279.74′	925.99′	1/2" IRON ROD SET W/ MCGRAY CAP
54	10,145,214.17′	3,045,858.64′	1,000.47′	1/2" IRON ROD SET W/ MCGRAY CAP
55	10,144,706.32′	3,044,446.52′	1,032.42′	1/2" IRON ROD SET W/ MCGRAY CAP
56	10,143,540.30′	3,043,500.61′	982.33′	1/2" IRON ROD SET W/ MCGRAY CAP
57	10,143,263.01′	3,042,382.51′	961.96′	1/2" IRON ROD SET W/ MCGRAY CAP

I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WAS DETERMINED BY MULTIPLE GPS OBSERVATIONS (RTN) IN JUNE 2022.

STATE OF TEXAS
REGISTERED
CHRIS CONRAD
5623
PROFESSIONAL
LAND SURVEYOR

9/7/2022

CHRIS I. CONRAD, REG. PROF. LAND SURVEYOR NO. 5623 — DATE

McGRAY & McGRAY
LAND SURVEYORS, INC.
TBPELS SURVEY FIRM # 10095500
3301 HANCOCK DRIVE #6
AUSTIN, TEXAS 78731
(512) 451-8591
www.mcgray.com

Texas Department of Transportation

RM 1431
CONTROL INDEX SHEET

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET
6	TEXAS	SEE TITLE SHEET	53
STATE DISTRICT	COUNTY	TXDOT CONTROL-SECTION-JOB NO.	HWY. NO.
AUSTIN	TRAVIS	1378-01-050 1378-01-051	RM 1431

RM 1431 CENTERLINE

	STATION	E	N
POT	645+00.000 R1	3040864.265	10144477.369
PC	645+54.395 R1	3040906.739	10144443.386
Tangential Direction:	S51°20'15.848"E		
Tangential Length:	54.395		
PC	645+54.395 R1	3040906.739	10144443.386
PI	652+00.188 R1	3041411.001	10144039.941
CC		3041622.053	10145337.450
PT	657+30.395 R1	3042017.133	10144262.771
Radius:	1145.000		
Delta:	58°50'49.193" Left		
Degree of Curvature(Arc):	05°00'14.394"		
Length:	1176.000		
Tangent:	645.793		
Chord:	1124.988		
Middle Ordinate:	147.691		
External:	169.562		
Tangent Back Direction:	S51°20'15.848"E		
Radial Direction:	S38°39'44.152"W		
Chord Direction:	S80°45'40.444"E		
Radial Direction:	S20°11'05.041"E		
Tangent Ahead Direction:	N69°48'54.959"E		
PT	657+30.395 R1	3042017.133	10144262.771
PI	669+37.427 R1	3043150.035	10144679.255
Tangential Direction:	N69°48'54.959"E		
Tangential Length:	1207.032		
PI	669+37.427 R1	3043150.035	10144679.255
PC	674+35.707 R1	3043619.174	10144847.159
Tangential Direction:	N70°18'28.108"E		
Tangential Length:	498.280		
PC	674+35.707 R1	3043619.174	10144847.159
PI	678+35.000 R1	3043995.115	10144981.707
CC		3043135.627	10146198.235
PT	682+14.591 R1	3044247.529	10145291.098
Radius:	1435.000		
Delta:	31°05'55.579" Left		
Degree of Curvature(Arc):	03°59'33.854"		
Length:	778.884		
Tangent:	399.293		
Chord:	769.358		
Middle Ordinate:	52.521		
External:	54.517		
Tangent Back Direction:	N70°18'28.108"E		
Radial Direction:	S19°41'31.892"E		
Chord Direction:	N54°45'30.318"E		
Radial Direction:	S50°47'27.471"E		
Tangent Ahead Direction:	N39°12'32.529"E		
PT	682+14.591 R1	3044247.529	10145291.098
PC	688+12.577 R1	3044625.547	10145754.444
Tangential Direction:	N39°12'32.529"E		
Tangential Length:	597.986		
PC	688+12.577 R1	3044625.547	10145754.444
PI	694+08.028 R1	3045001.962	10146215.826
CC		3046105.501	10144547.035
PT	699+67.002 R1	3045573.883	10146381.560
Radius:	1910.000		
Delta:	34°37'48.674" Right		
Degree of Curvature(Arc):	02°59'59.205"		
Length:	1154.425		
Tangent:	595.451		
Chord:	1136.933		
Middle Ordinate:	86.557		
External:	90.665		
Tangent Back Direction:	N39°12'32.529"E		
Radial Direction:	S50°47'27.471"E		
Chord Direction:	N56°31'26.866"E		
Radial Direction:	S16°09'38.797"E		
Tangent Ahead Direction:	N73°50'21.203"E		
PT	699+67.002 R1	3045573.883	10146381.560
PI	703+37.686 R1	3045929.920	10146484.734
Tangential Direction:	N73°50'21.203"E		
Tangential Length:	370.685		
PI	703+37.686 R1	3045929.920	10146484.734
POT	730+00.000 R1	3048487.031	10147225.746
Tangential Direction:	N73°50'21.203"E		
Tangential Length:	2662.314		

PRINT DATE	REVISION DATE
11/16/2023	

Texas Department of Transportation
Austin District

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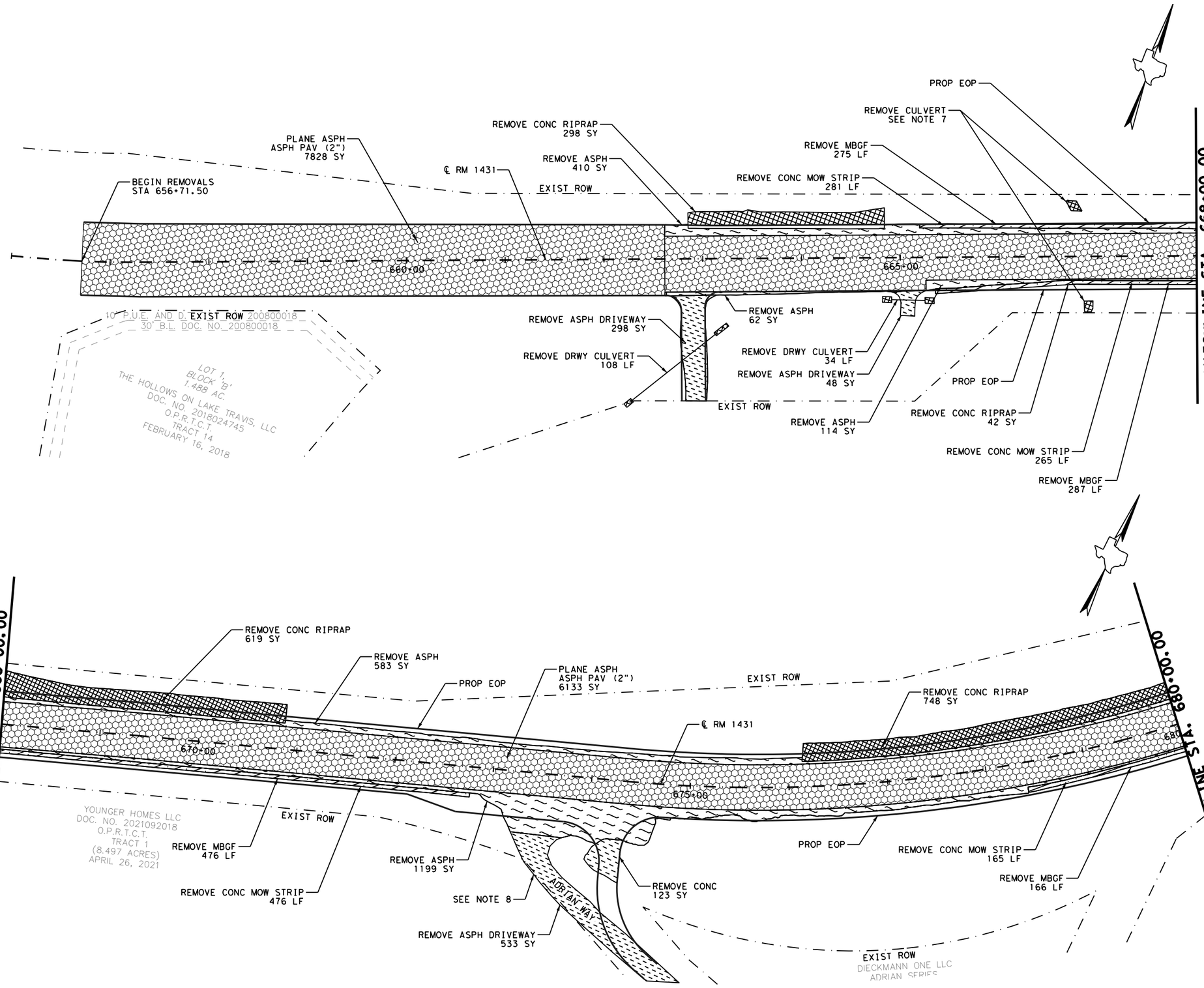
TBPELS FIRM NO. F-312

RM 1431
HORIZONTAL ALIGNMENT

SHEET 01 OF 01

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	54



LEGEND

- REMOVE ASPHALT: ITEM 105-6001: REMOVING STAB BASE & ASPH (2"-6")
- REMOVE DRIVEWAYS: SUBSIDIARY TO ITEM 530-6005 *FOR CONTRACTOR INFO ONLY
- MILLING: PLANE ASPH CONC PAV (2") ITEM 354-6021: PLANE ASPH CONC PAV (0"-2")
- REMOVE CONCRETE: ITEM 104-6009: REMOVING CONC (RIPRAP)
- REMOVE CONCRETE: ITEM 104-6054: REMOVING CONC (MOW STRIP)

HORIZONTAL
0 50 100 200 FT

NOTES

1. CONTRACTOR SHALL SEQUENCE REMOVALS IN ACCORDANCE WITH TCP SEQUENCE REQUIREMENTS. WHERE PRACTICAL, EXISTING PROTECTIVE MEASURES AND MBGF SHALL REMAIN IN PLACE UNTIL REPLACEMENT IS IMMINENT.
2. THE FOLLOWING ITEMS OF WORK SHALL BE CONSIDERED SUBSIDIARY TO ITEM 100-6002, PREPARING ROW:
   (a) DELINEATORS AND OBJECT MARKERS;
   (b) MOW STRIP ASSOCIATED WITH MBGF;
3. REMOVAL OF SGT, THRIE-BEAM TRANSITION AND TERMINAL ANCHOR SECTION SHALL BE CONSIDERED TO BE SUBSIDIARY TO ITEM 542-6001 REMOVE MBGF. THESE WILL BE MEASURED AS LINEAR FEET INCLUDED IN THE MBGF QUANTITY AS PART OF MBGF PAYMENT.
5. TREE REMOVALS REQUIRED FOR ROADWAY CONSTRUCTION OR AS INDICATED BY THE ENGINEER SHALL BE BE PART OF ITEM 100-6002, PREPARING ROW.
6. SEE EXISTING ROADWAY TYPICAL SECTIONS FOR EXISTING PAVEMENT STRUCTURE INFORMATION.
7. REFER TO CULVERT LAYOUT SHEETS FOR ADDITIONAL REMOVAL ITEMS ASSOCIATED WITH THIS TYPE OF WORK.
8. RELOCATE ADRIAN WAY AND RESTORE OLD LOCATION TO ORIGINAL CONDITIONS. SEE SWP3 FOR SEEDING PLAN.

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED
PROFESSIONAL ENGINEER
11/16/2023

PRINT DATE	REVISION DATE
11/16/2023	

Texas Department of Transportation
Austin District
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RM 1431

REMOVAL PLAN
BEGIN TO STA 668+00
STA 668+00 TO STA 680+00

SHEET 01 OF 03 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	55

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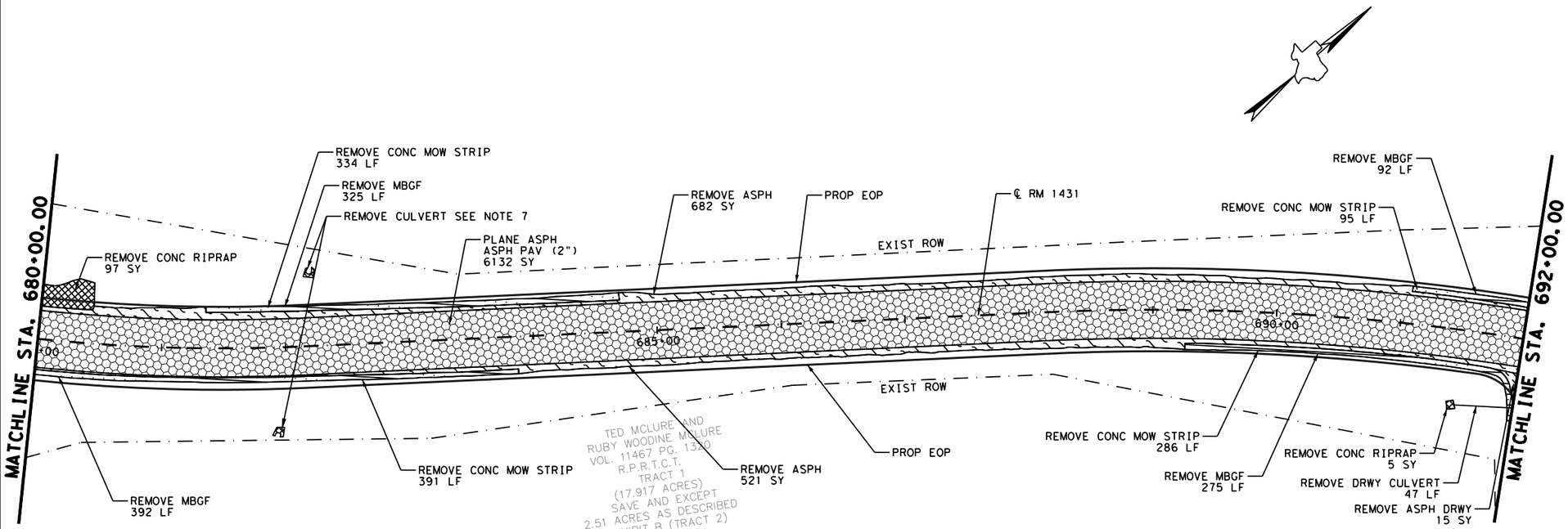

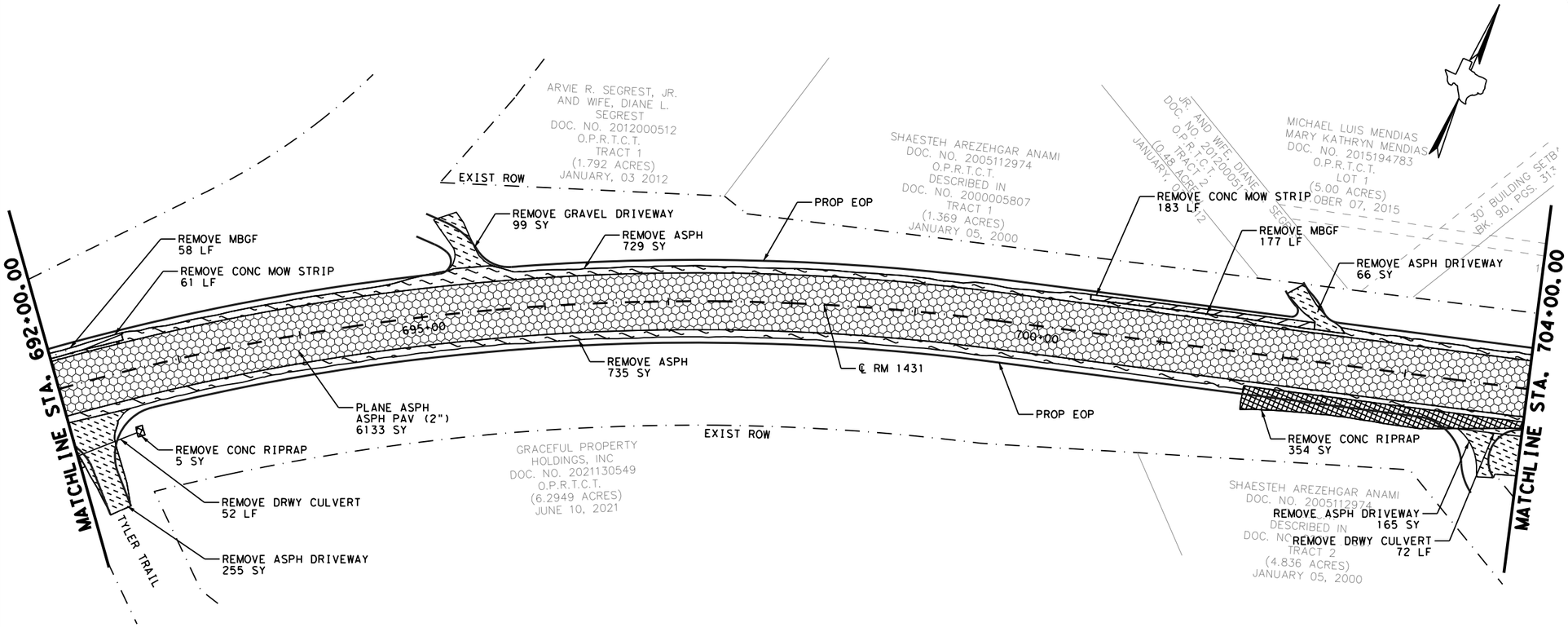

LEGEND

- REMOVE ASPHALT: ITEM 105-6001: REMOVING STAB BASE & ASPH (2"-6")
- REMOVE DRIVEWAYS: SUBSIDIARY TO ITEM 530-6005 *FOR CONTRACTOR INFO ONLY
- MILLING: PLANE ASPH CONC PAV (2") ITEM 354-6021: PLANE ASPH CONC PAV (0"-2")
- REMOVE CONCRETE: ITEM 104-6009: REMOVING CONC (RIPRAP)
- REMOVE CONCRETE: ITEM 104-6054: REMOVING CONC (MOW STRIP)

HORIZONTAL
0 50 100 200 FT

NOTES

1. CONTRACTOR SHALL SEQUENCE REMOVALS IN ACCORDANCE WITH TCP SEQUENCE REQUIREMENTS. WHERE PRACTICAL, EXISTING PROTECTIVE MEASURES AND MBGF SHALL REMAIN IN PLACE UNTIL REPLACEMENT IS IMMINENT.
2. THE FOLLOWING ITEMS OF WORK SHALL BE CONSIDERED SUBSIDIARY TO ITEM 100-6002, PREPAIRING ROW:
   (a) DELINEATORS AND OBJECT MARKERS;
   (b) MOW STRIP ASSOCIATED WITH MBGF;
   (c) CONCRETE CURB AND CURB AND GUTTER.
3. REMOVAL OF SGT, THRIE-BEAM TRANSITION AND TERMINAL ANCHOR SECTION SHALL BE CONSIDERED TO BE SUBSIDIARY TO ITEM 542-6001 REMOVE MBGF. THESE WILL BE MEASURED AS LINEAR FEET INCLUDED IN THE MBGF QUANTITY AS PART OF MBGF PAYMENT.
5. TREE REMOVALS REQUIRED FOR ROADWAY CONSTRUCTION OR AS INDICATED BY THE ENGINEER SHALL BE BE PART OF ITEM 100-6002, PREPARING ROW.
6. SEE EXISTING ROADWAY TYPICAL SECTIONS FOR EXISTING PAVEMENT STRUCTURE INFORMATION.
7. REFER TO ILLUMINATION, TRAFFIC SIGNAL, TMS, AND BRIDGE PLANS FOR ADDITIONAL REMOVAL ITEMS ASSCOCIATED WTH THIS TYPE OF WORK.

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED
PROFESSIONAL ENGINEER
11/16/2023

PRINT DATE	REVISION DATE
11/16/2023	

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TBPELS FIRM NO. F-312

RM 1431

REMOVAL PLAN
STA 680+00 TO STA 692+00
STA 692+00 TO STA 704+00

SHEET 02 OF 03 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 56

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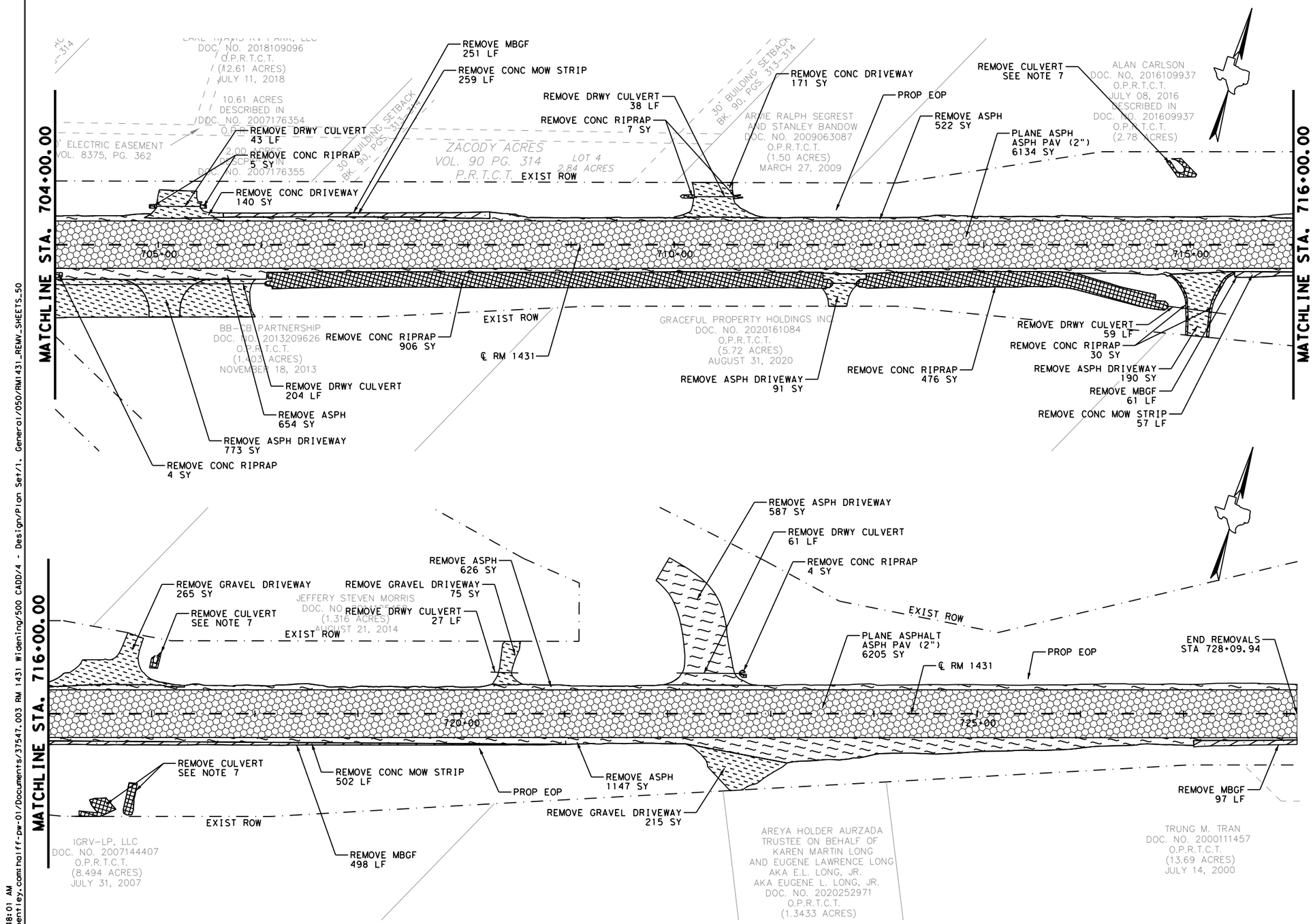

LEGEND

- REMOVE ASPHALT: ITEM 105-6001: REMOVING STAB BASE & ASPH (2"-6")
- REMOVE DRIVEWAYS: SUBSIDIARY TO ITEM 530-6005 *FOR CONTRACTOR INFO ONLY
- MILLING: PLANE ASPH CONC PAV (2") ITEM 354-6021: PLANE ASPH CONC PAV (0"-2")
- REMOVE CONCRETE: ITEM 104-6009: REMOVING CONC (RIPRAP)
- REMOVE CONCRETE: ITEM 104-6054: REMOVING CONC (MOW STRIP)

HORIZONTAL
0 50 100 200 FT

NOTES

1. CONTRACTOR SHALL SEQUENCE REMOVALS IN ACCORDANCE WITH TCP SEQUENCE REQUIREMENTS. WHERE PRACTICAL, EXISTING PROTECTIVE MEASURES AND MBGF SHALL REMAIN IN PLACE UNTIL REPLACEMENT IS IMMINENT.
2. THE FOLLOWING ITEMS OF WORK SHALL BE CONSIDERED SUBSIDIARY TO ITEM 100-6002, PREPAIRING ROW:
   (a) DELINEATORS AND OBJECT MARKERS;
   (b) MOW STRIP ASSOCIATED WITH MBGF;
   (c) CONCRETE CURB AND CURB AND GUTTER.
3. REMOVAL OF SGT, THRIE-BEAM TRANSITION AND TERMINAL ANCHOR SECTION SHALL BE CONSIDERED TO BE SUBSIDIARY TO ITEM 542-6001 REMOVE MBGF. THESE WILL BE MEASURED AS LINEAR FEET INCLUDED IN THE MBGF QUANTITY AS PART OF MBGF PAYMENT.
5. TREE REMOVALS REQUIRED FOR ROADWAY CONSTRUCTION OR AS INDICATED BY THE ENGINEER SHALL BE BE PART OF ITEM 100-6002, PREPARING ROW.
6. SEE EXISTING ROADWAY TYPICAL SECTIONS FOR EXISTING PAVEMENT STRUCTURE INFORMATION.
7. REFER TO ILLUMINATION, TRAFFIC SIGNAL, TMS, AND BRIDGE PLANS FOR ADDITIONAL REMOVAL ITEMS ASSCOCIATED WTH THIS TYPE OF WORK.

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED
PROFESSIONAL ENGINEER
P.E.
02/02/2024

PRINT DATE	REVISION DATE
2/2/2024	

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AUSTIN, TX 78729
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TBPELS FIRM NO. F-312

RM 1431

REMOVAL PLAN
STA 704+00 TO STA 716+00
STA 716+00 TO END

SHEET 03 OF 03 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 57

DATE: 2/2/2024 11:48:01 AM
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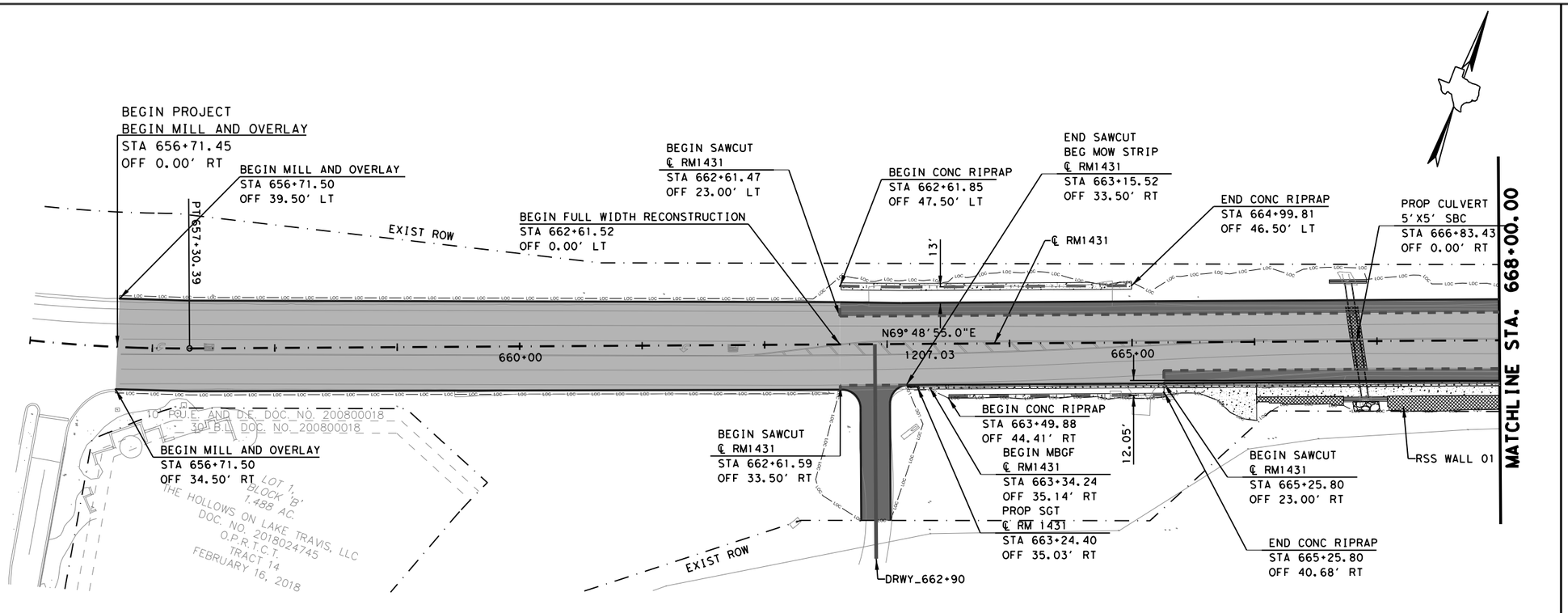

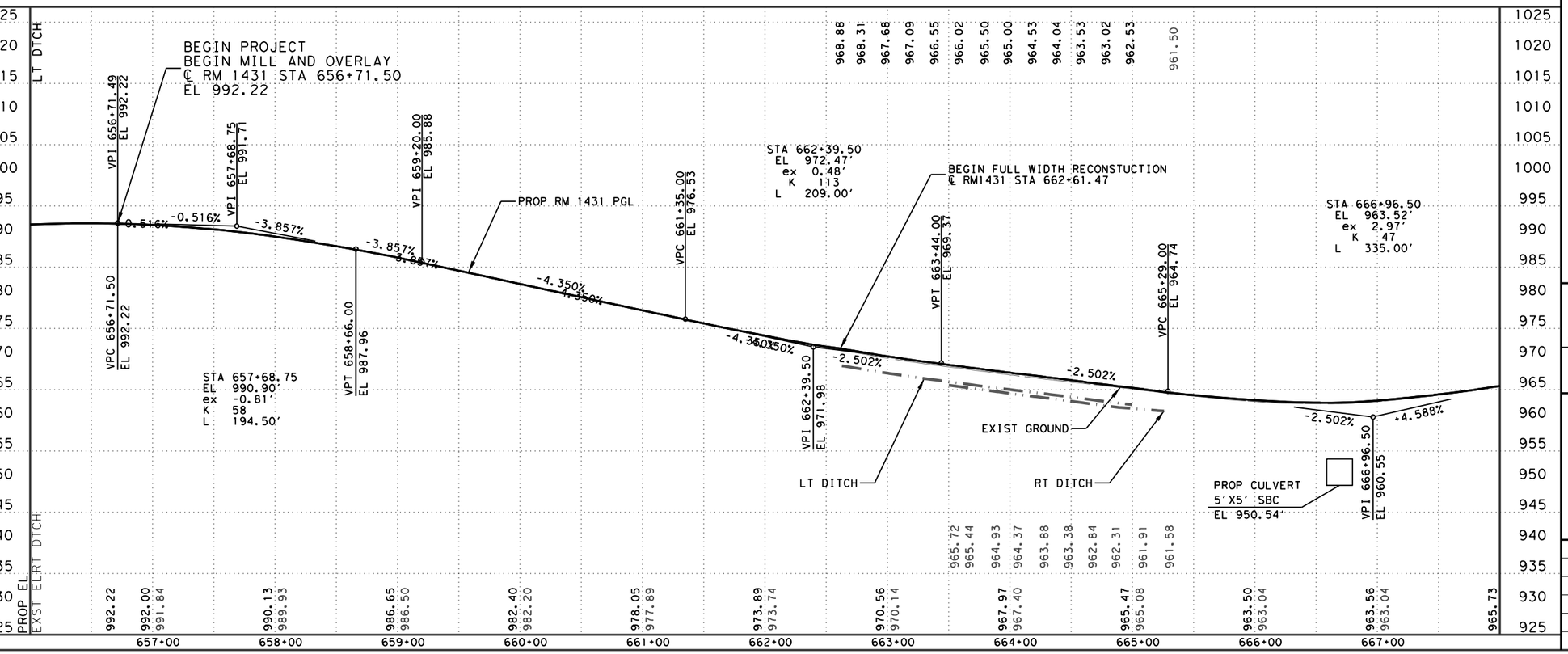

NOTES

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3. SEE INTERSECTION LAYOUTS AND ROADWAY DETAILS FOR ADDITIONAL INFORMATION.
4. ALL OFFSETS AND DIMENSIONS ARE RELATIVE TO BACK OF TRAFFIC RAIL, OR EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
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EOP = EDGE OF PAVEMENT
OFF = OFFSET
LT = LEFT
RT = RIGHT
STA = STATION

LEGEND

- WIDENING
- 2" MILL & OVERLAY
- EXISTING LANE
- PROPOSED LANE
- DITCH FLOW LINE
- CONC RIPRAP
- RSS WALL

STATE OF TEXAS
JOHN CONQUEST
89243
PROFESSIONAL ENGINEER
02/02/2024

HORIZONTAL
0 50 100 200 FT

VERTICAL
0 10 20 40 FT

PRINT DATE	REVISION DATE
2/2/2024	

Texas Department of Transportation
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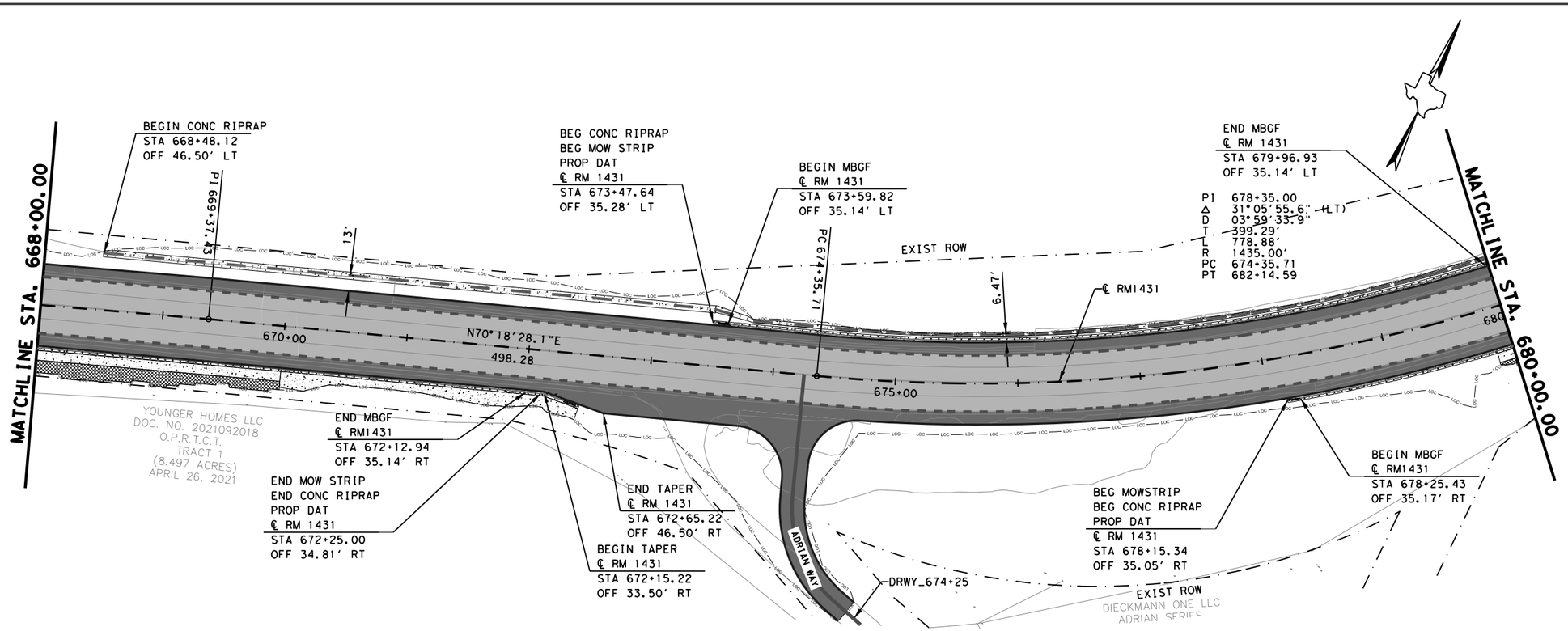
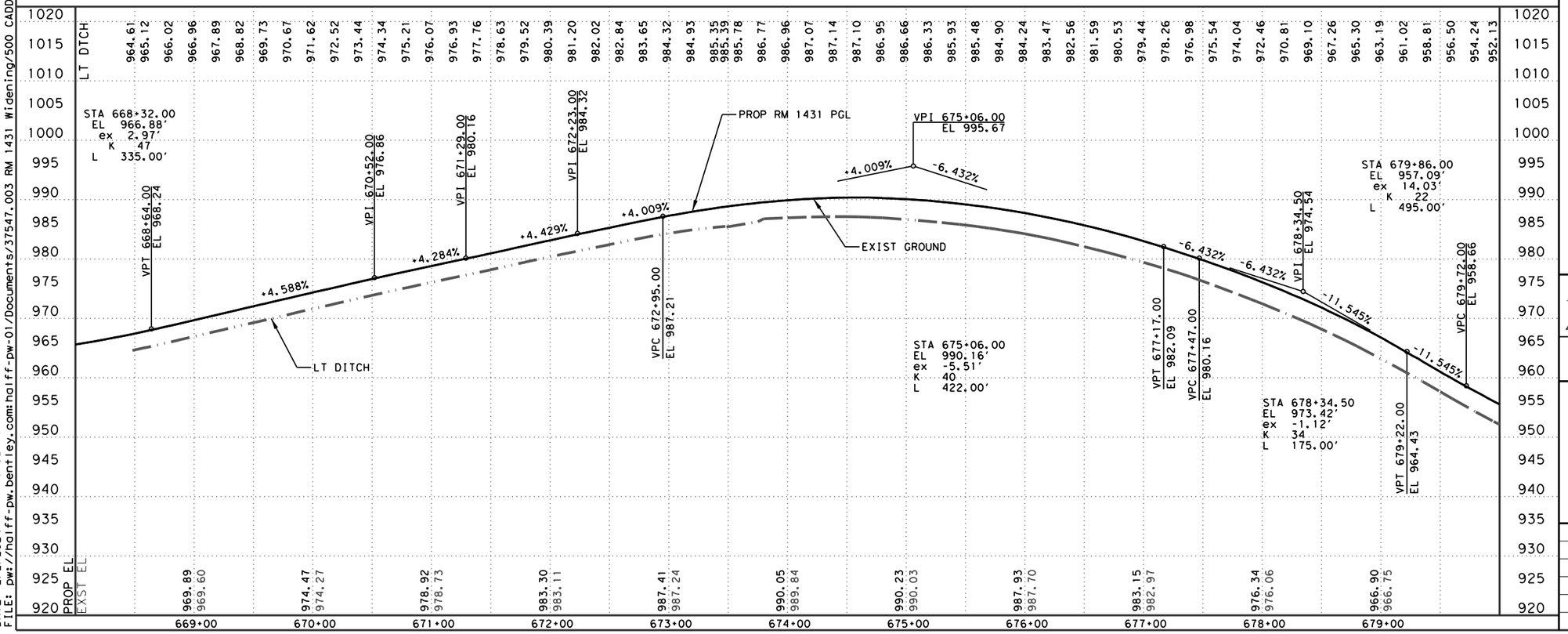
13620 BRIARWICK
DRIVE, STE 100
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

RM 1431
PLAN AND PROFILE
STA 656+00 TO STA 668+00

SHEET 01 OF 06

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	58





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LEGEND

- WIDENING
- 2" MILL & OVERLAY
- EXISTING LANE
- PROPOSED LANE
- DITCH FLOW LINE
- CONC RIPRAP
- RSS WALL

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED PROFESSIONAL ENGINEER
02/02/2024

HORIZONTAL
0 50 100 200 FT

VERTICAL
0 10 20 40 FT

PRINT DATE	REVISION DATE
2/2/2024	

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Austin District

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RM 1431
PLAN AND PROFILE
STA 668+00 TO STA 680+00

SHEET 02 OF 06

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	59

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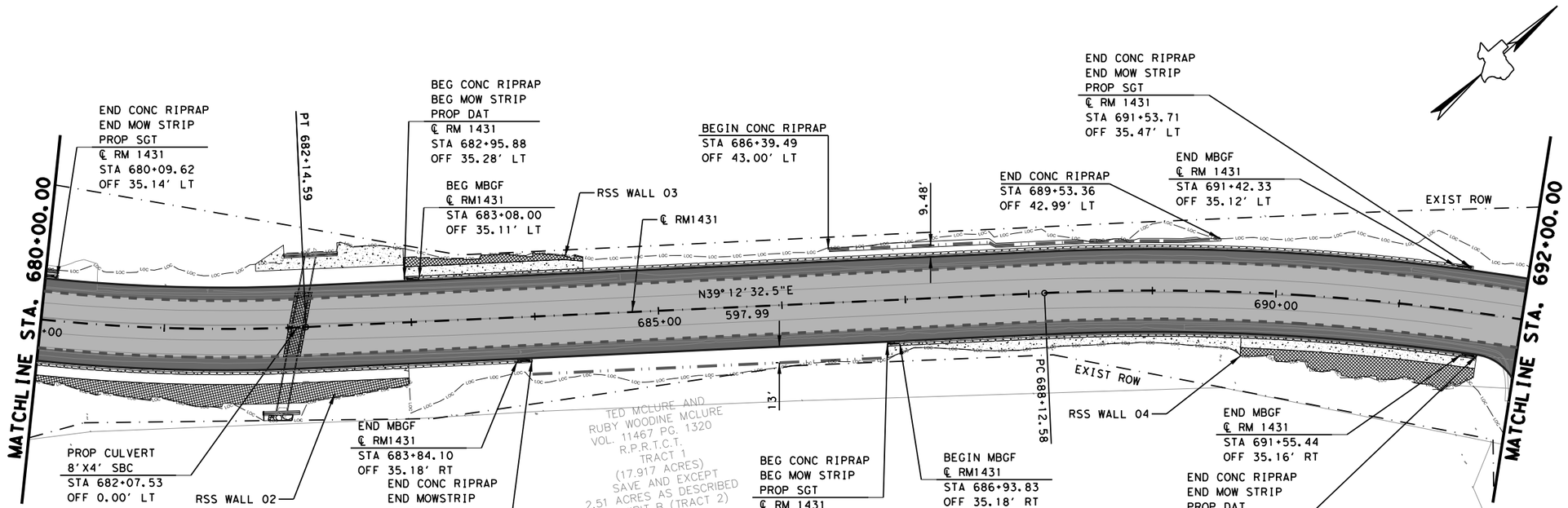

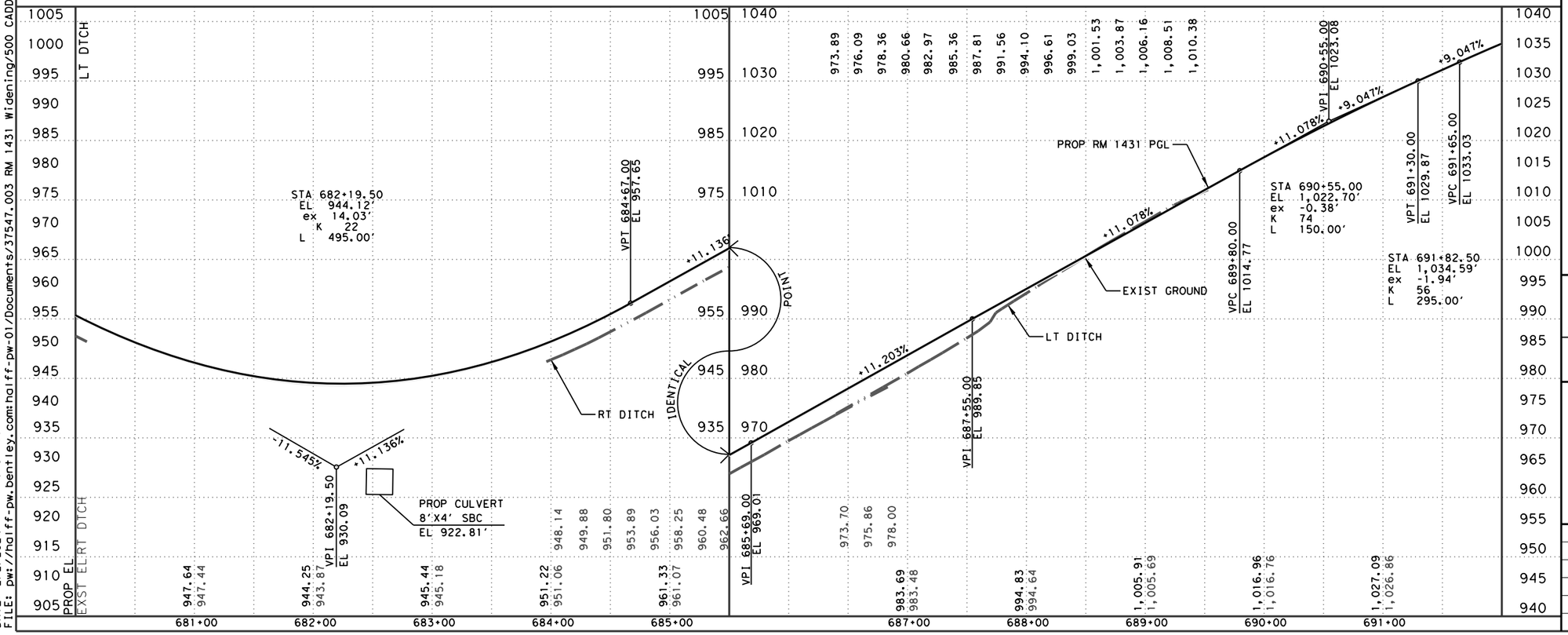

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LEGEND

- WIDENING
- 2" MILL & OVERLAY
- EXISTING LANE
- PROPOSED LANE
- DITCH FLOW LINE
- CONC RIPRAP
- RSS WALL

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED
PROFESSIONAL ENGINEER
02/02/2024

HORIZONTAL
0 50 100 200 FT

VERTICAL
0 10 20 40 FT

PRINT DATE	REVISION DATE
2/2/2024	

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TBPELS FIRM NO. F-312

RM 1431
PLAN AND PROFILE
STA 680+00 TO STA 692+00

SHEET 03 OF 06

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 60

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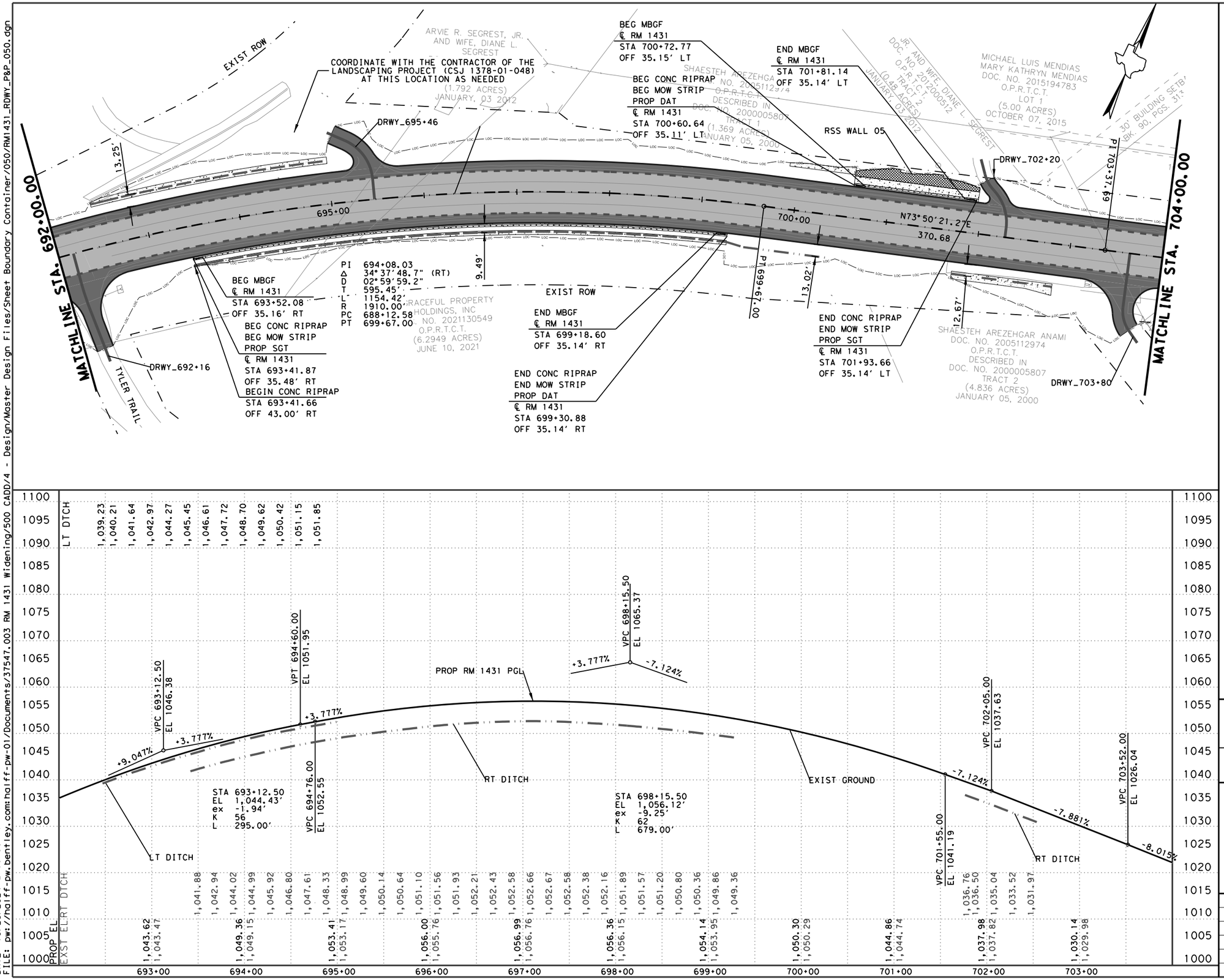

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LEGEND

- WIDENING
- 2" MILL & OVERLAY
- EXISTING LANE
- PROPOSED LANE
- DITCH FLOW LINE
- CONC RIPRAP
- RSS WALL

STATE OF TEXAS
JOHN CONQUEST
89243
PROFESSIONAL ENGINEER
P.E.
10/28/2024

HORIZONTAL
0 50 100 200 FT

VERTICAL
0 10 20 40 FT

PRINT DATE	REVISION DATE
10/28/2024	

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RM 1431
PLAN AND PROFILE
STA 692+00 TO STA 704+00

SHEET 04 OF 06

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 61

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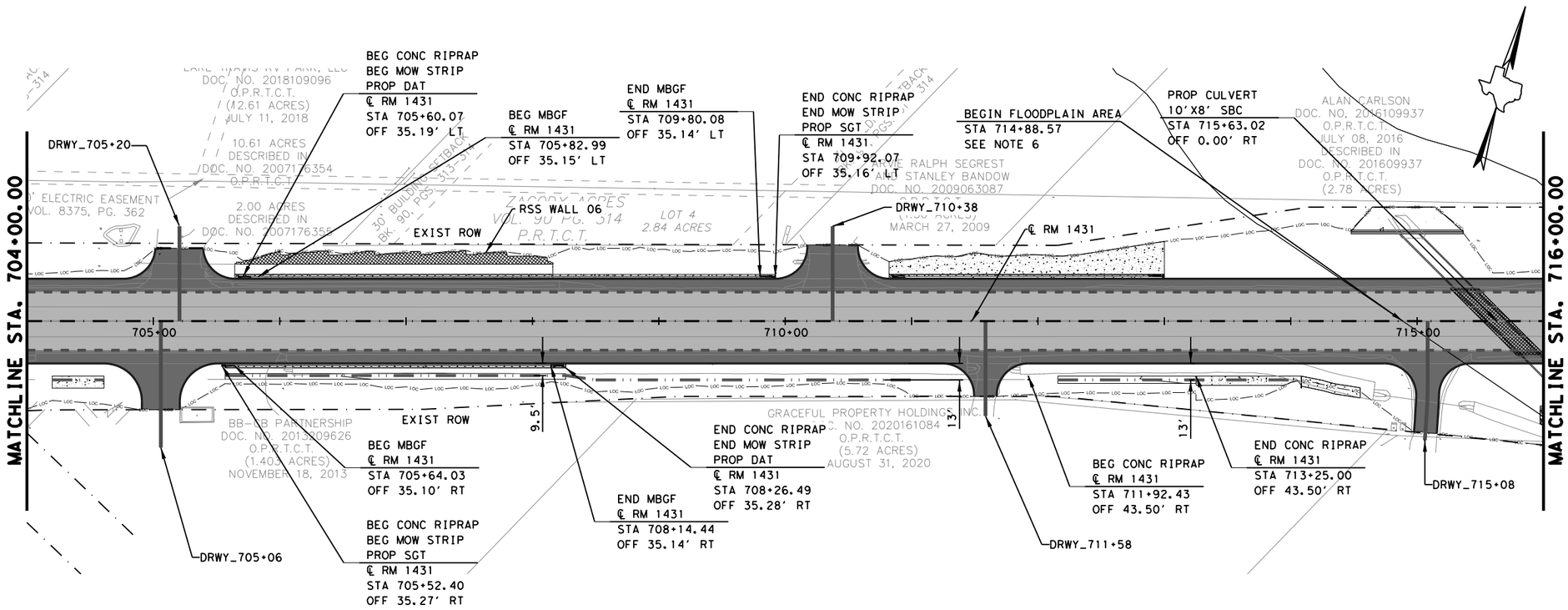

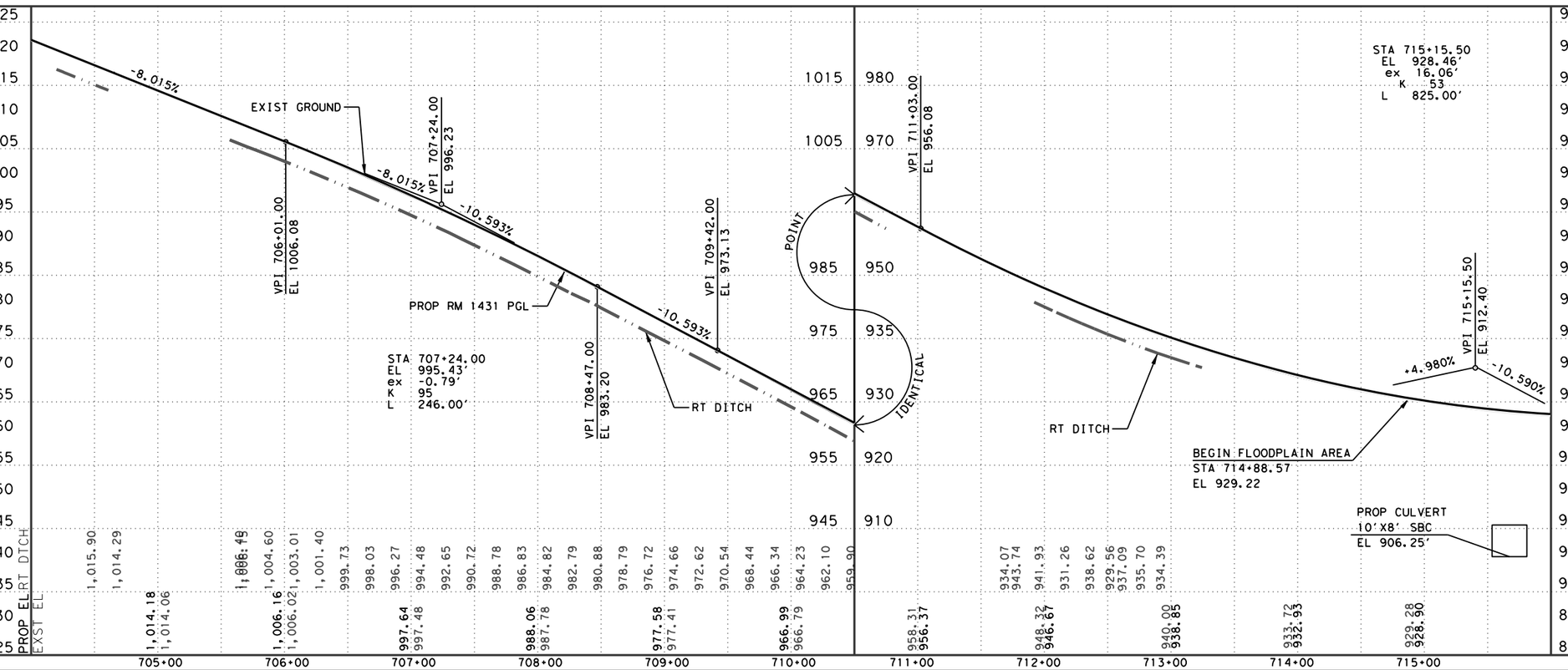

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6. PLANS AND H&H FILES WERE SENT TO THE LOCAL FLOODPLAIN ADMINISTRATOR TRAVIS COUNTY ON 11/1/2023.

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OFF = OFFSET
LT = LEFT
RT = RIGHT
STA = STATION

LEGEND

- WIDENING
- 2" MILL & OVERLAY
- EXISTING LANE
- PROPOSED LANE
- DITCH FLOW LINE
- CONC RIPRAP
- RSS WALL

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED
PROFESSIONAL ENGINEER
02/02/2024

HORIZONTAL
0 50 100 200 FT

VERTICAL
0 10 20 40 FT

PRINT DATE	REVISION DATE
2/2/2024	

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TBPELS FIRM NO. F-312

RM 1431
PLAN AND PROFILE
STA 704+00 TO STA 716+00

SHEET 05 OF 06

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 62

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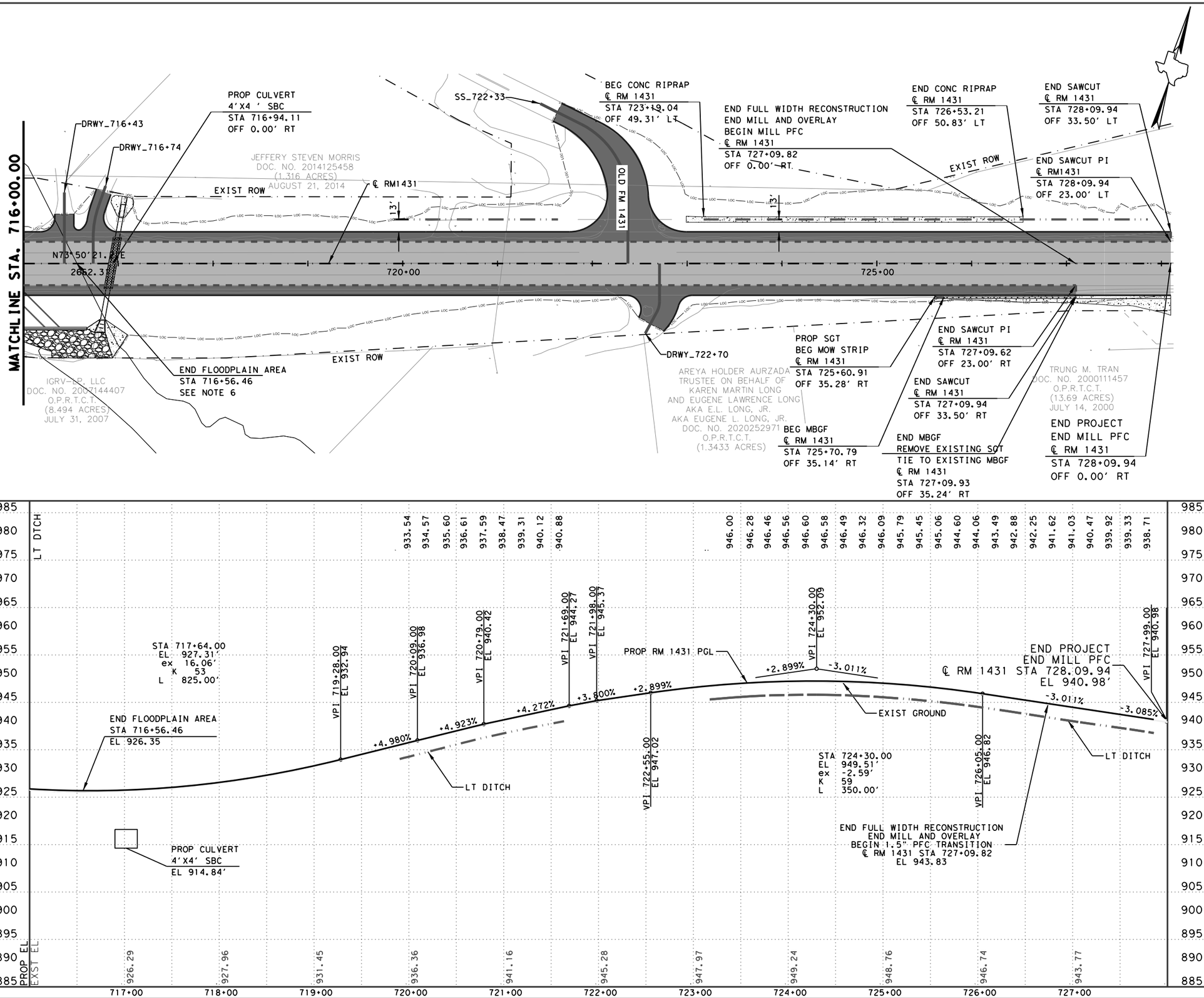

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LEGEND

- WIDENING
- 2" MILL & OVERLAY
- EXISTING LANE
- PROPOSED LANE
- DITCH FLOW LINE
- CONC RIPRAP
- RSS WALL

STATE OF TEXAS
JOHN CONQUEST
89243
PROFESSIONAL ENGINEER
02/02/2024

HORIZONTAL
0 50 100 200 FT

VERTICAL
0 10 20 40 FT

PRINT DATE	REVISION DATE
2/2/2024	

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RM 1431
PLAN AND PROFILE
STA 716+00 TO END

SHEET 06 OF 06

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	63

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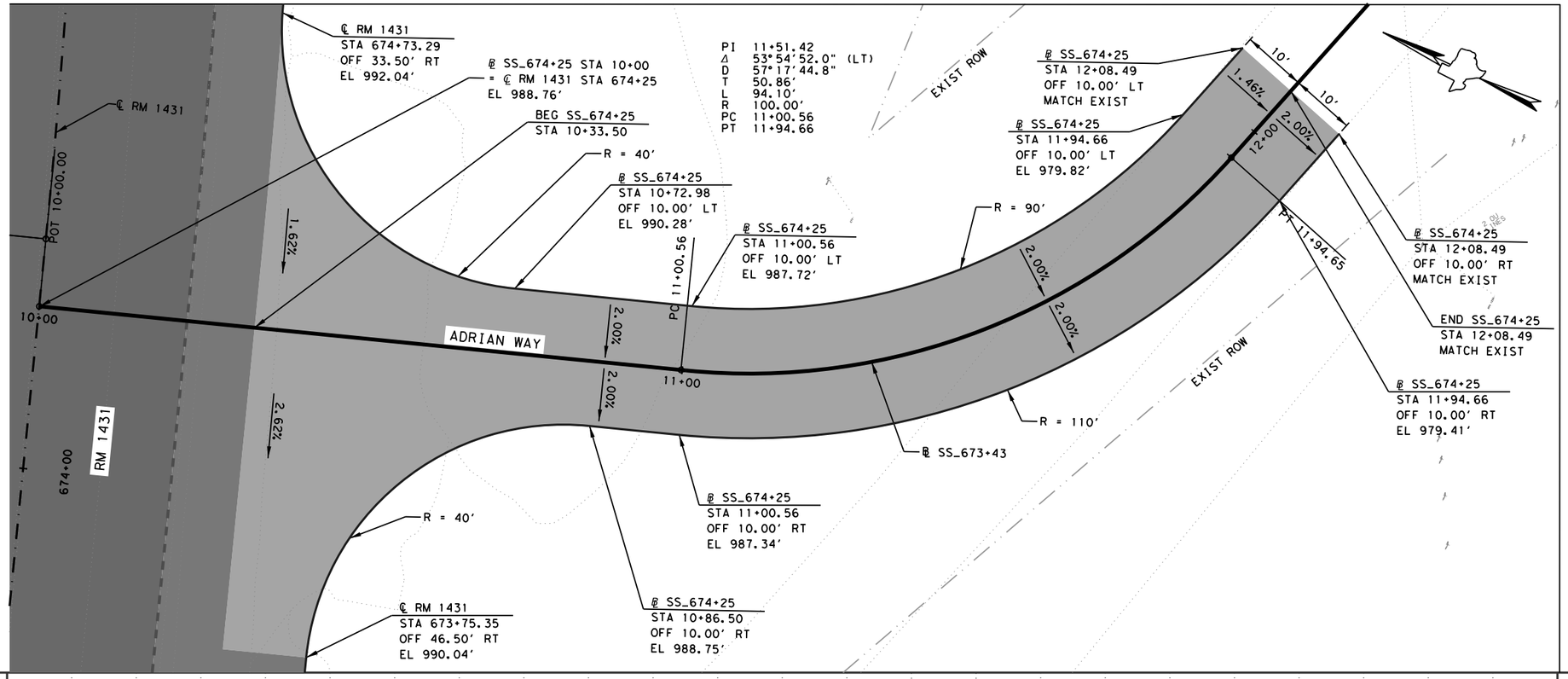

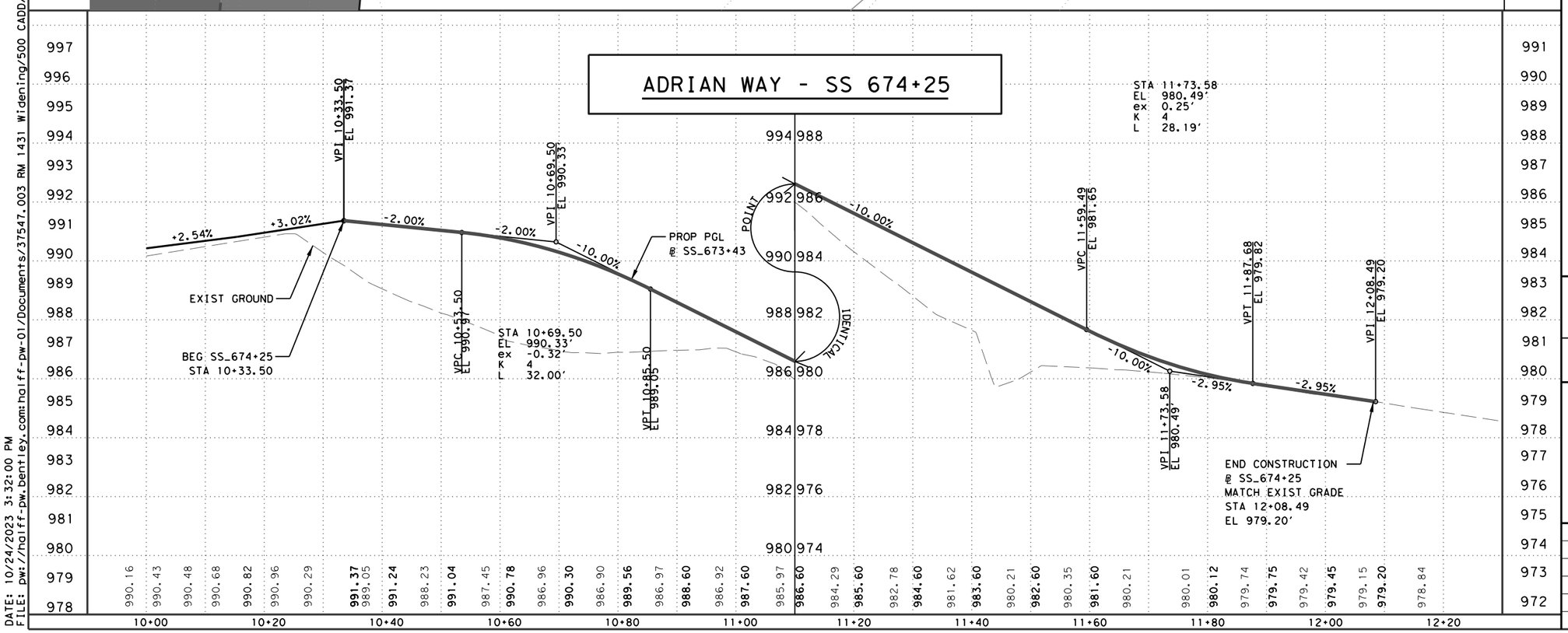

NOTES

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STA = STATION

LEGEND

- WIDENING
- 2" MILL & OVERLAY
- SIDESTREET

STATE OF TEXAS
JOHN CONQUEST
89243
PROFESSIONAL LICENSED ENGINEER
11/09/2023

HORIZONTAL
0 10 20 40 FT

VERTICAL
0 2 4 8 FT

PRINT DATE	REVISION DATE
10/24/2023	

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SIDE STREET PLAN AND PROFILE ADRIAN WAY

STA 674+25

SHEET 01 OF 04 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 64

DATE: 10/24/2023 3:32:00 PM
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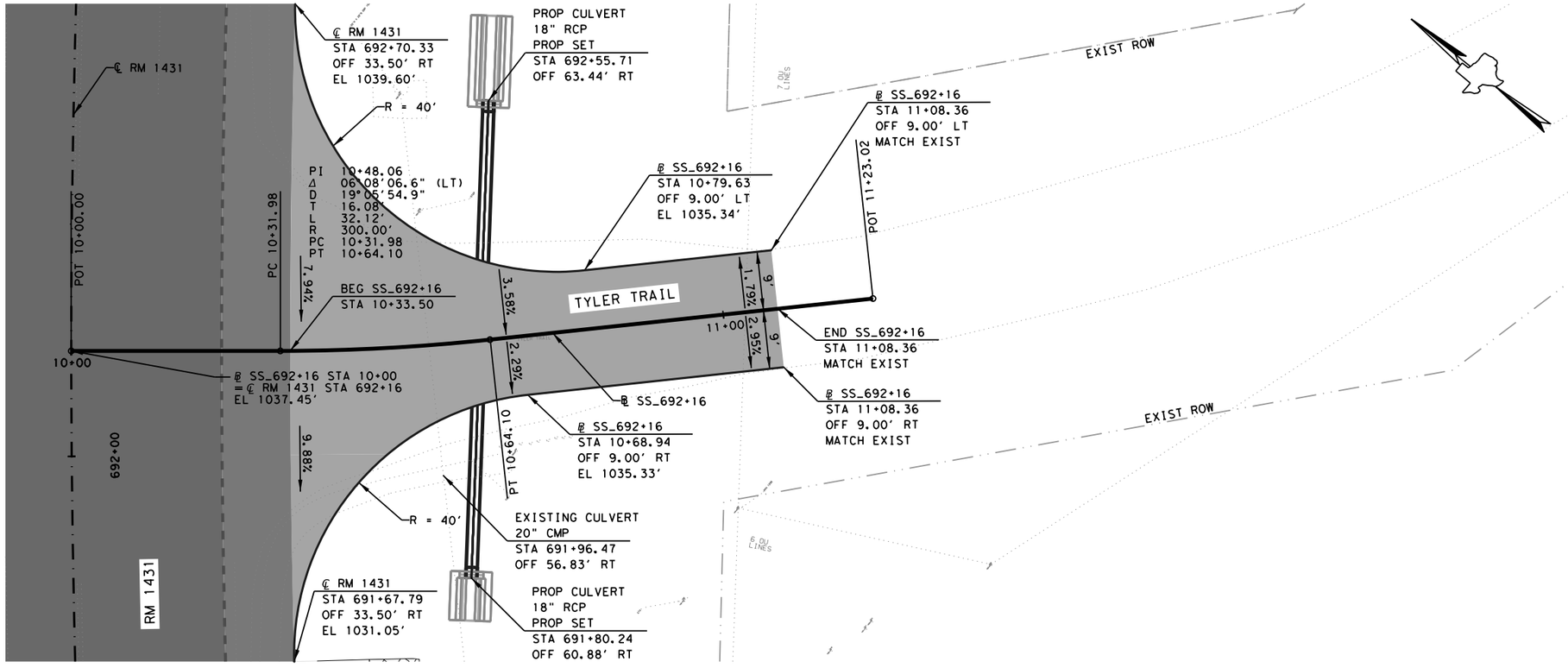

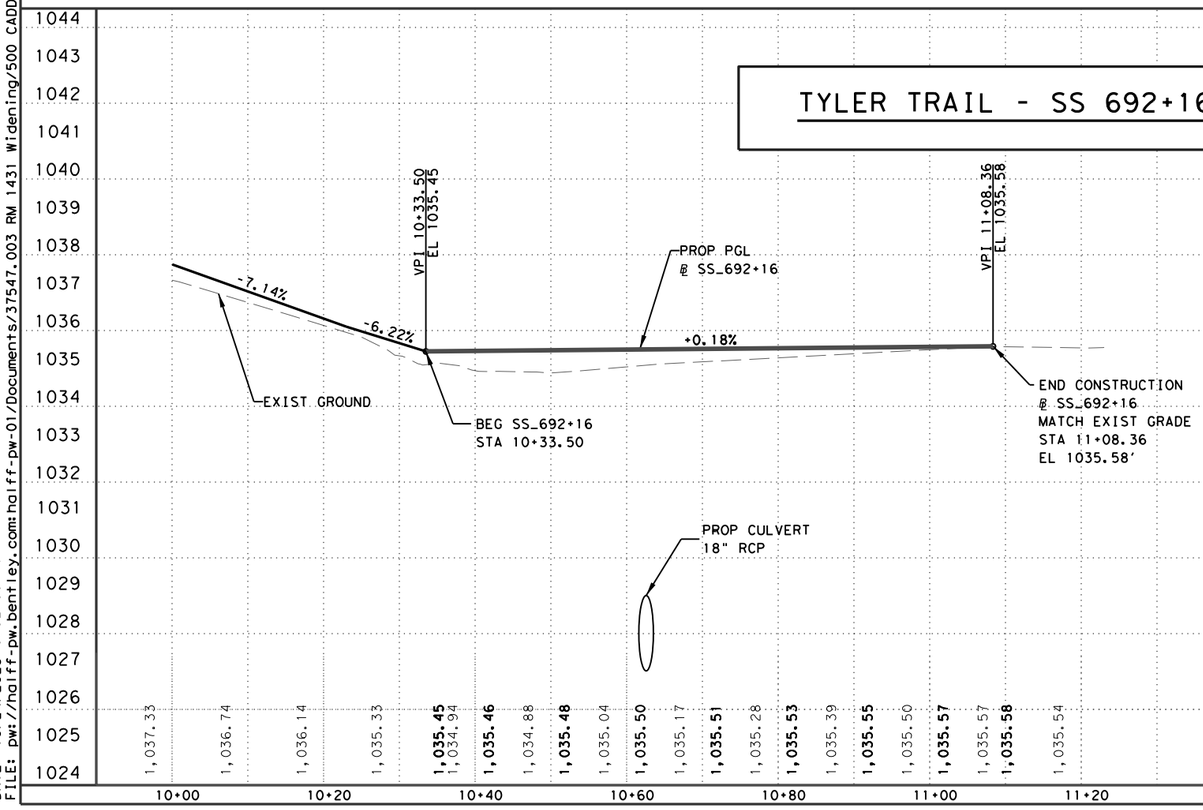

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LEGEND

- WIDENING
- 2" MILL & OVERLAY
- SIDESTREET

STATE OF TEXAS
JOHN CONQUEST
89243
PROFESSIONAL ENGINEER
LICENSED
John Conquest P.E.
11/09/2023

HORIZONTAL
0 10 20 40 FT

VERTICAL
0 2 4 8 FT

PRINT DATE	REVISION DATE
10/24/2023	

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Austin District

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13620 BRIARWICK DRIVE, STE 100
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

SIDE STREET PLAN AND PROFILE TYLER TRAIL

STA 692+16

SHEET 02 OF 04 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 65

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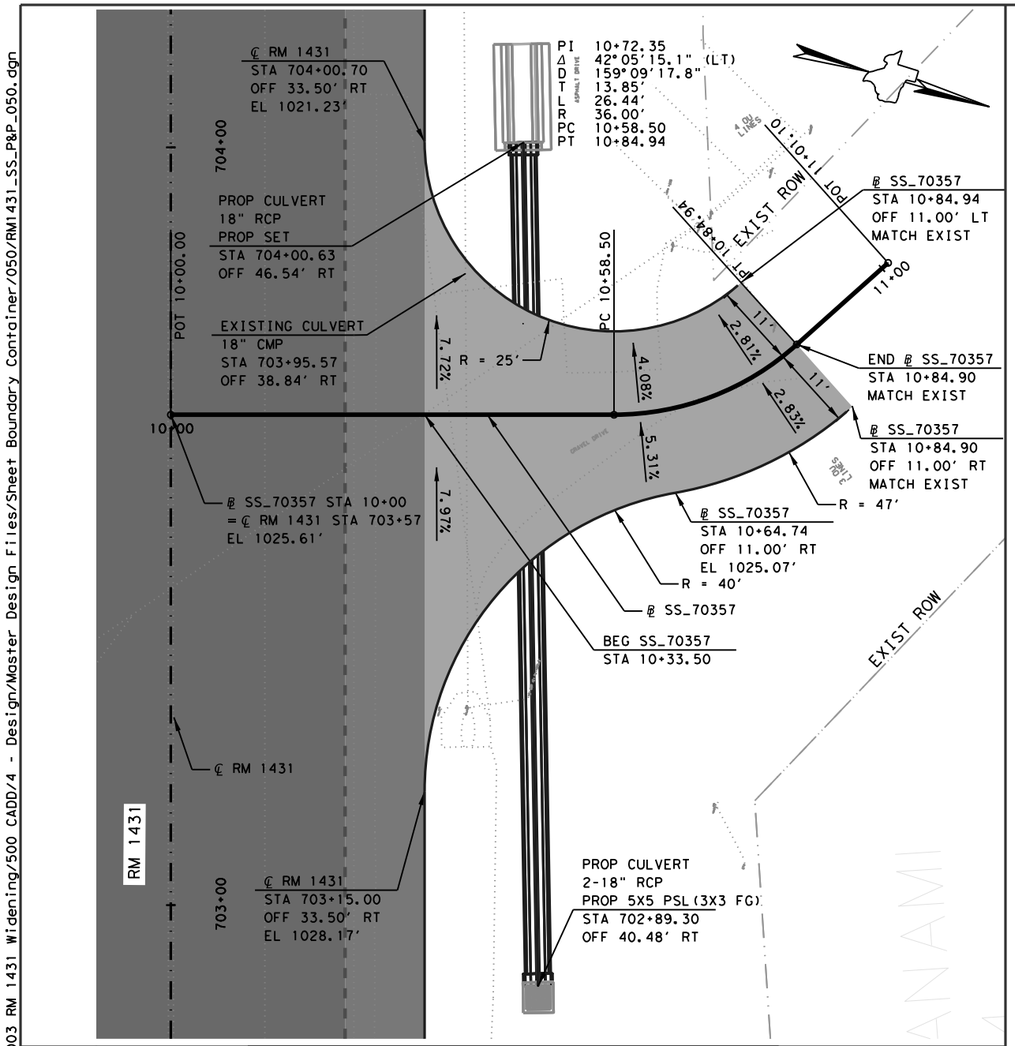

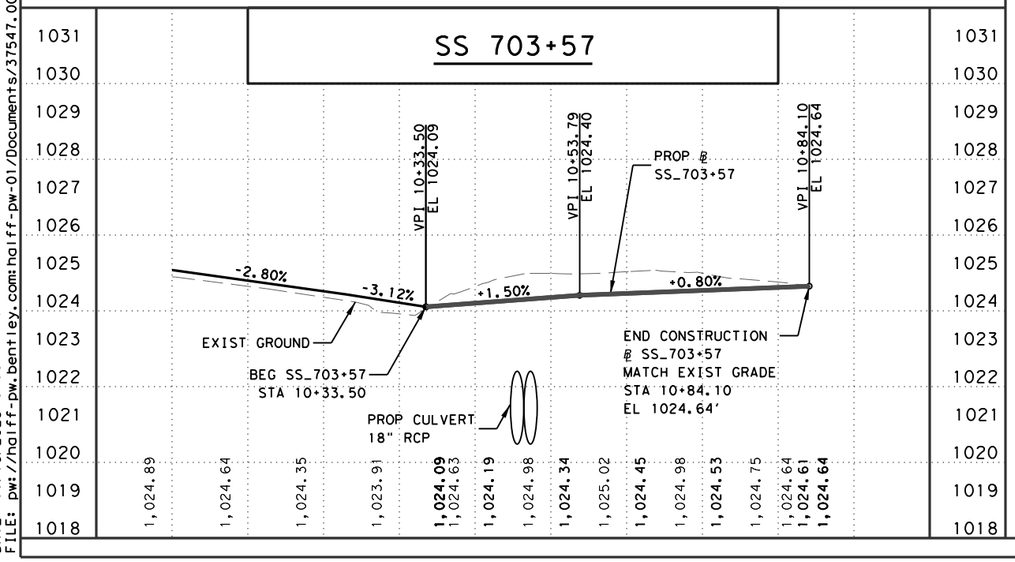

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- 2" MILL & OVERLAY
- SIDESTREET

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED PROFESSIONAL ENGINEER
P.E.
11/16/2023

HORIZONTAL
0 10 20 40 FT

VERTICAL
0 2 4 8 FT

PRINT DATE	REVISION DATE
11/16/2023	

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SIDE STREET PLAN AND PROFILE UNNAMED ROAD

STA 703+57

SHEET 03 OF 04 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 66

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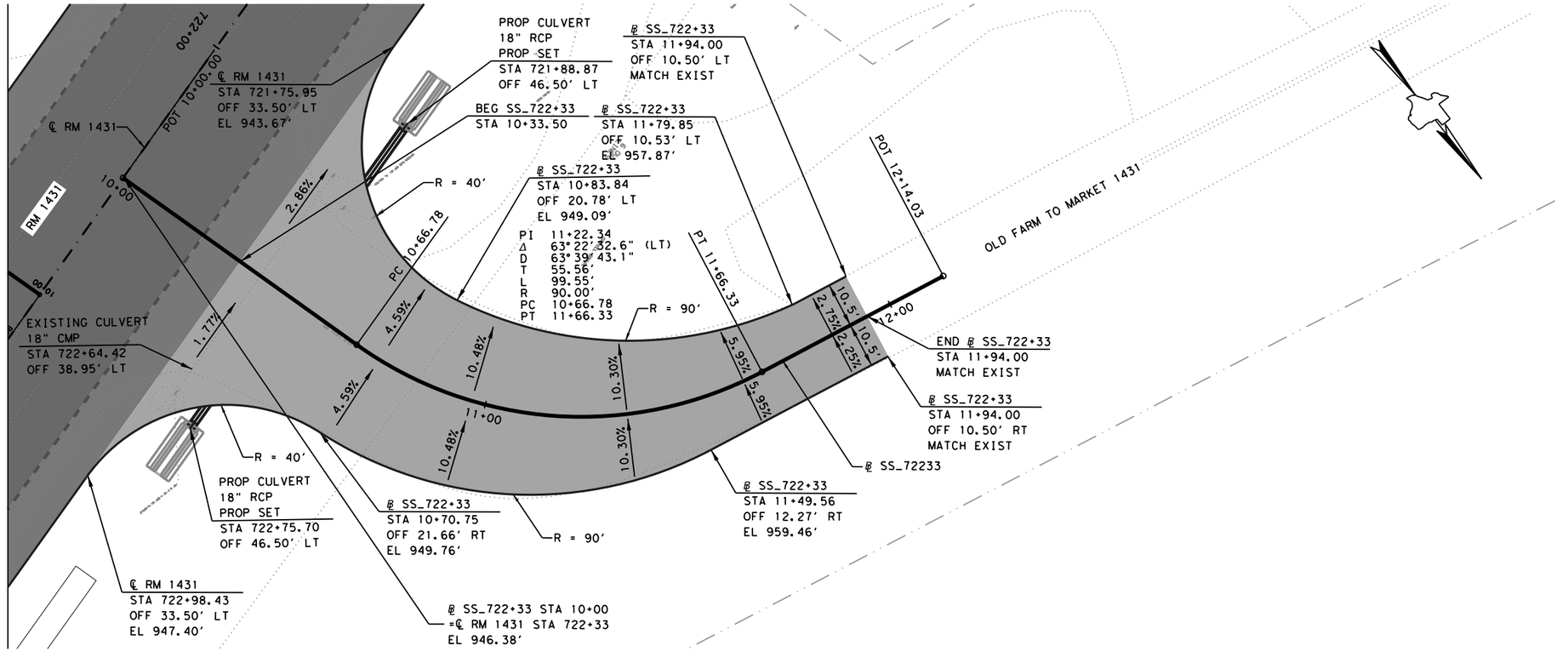


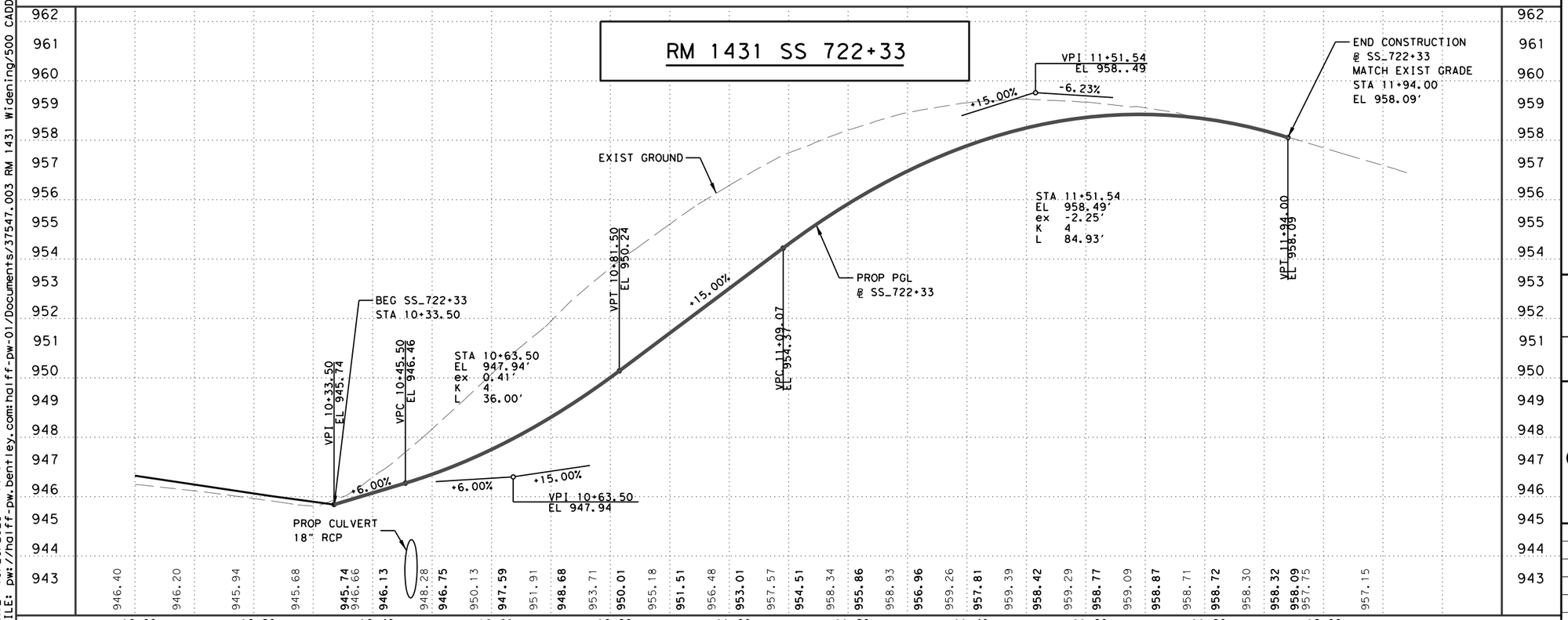
NOTES

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

EOP = EDGE OF PAVEMENT
OFF = OFFSET
LT = LEFT
RT = RIGHT
STA = STATION

LEGEND

- WIDENING
- 2" MILL & OVERLAY
- SIDESTREET



11/09/2023

HORIZONTAL
0 7.5 15 60 FT

VERTICAL
0 2 4 8 FT

PRINT DATE	REVISION DATE
10/26/2023	

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Austin District

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

SIDE STREET PLAN AND PROFILE OLD FARM TO MARKET 1431

STA 722+33

SHEET 04 OF 04 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 67

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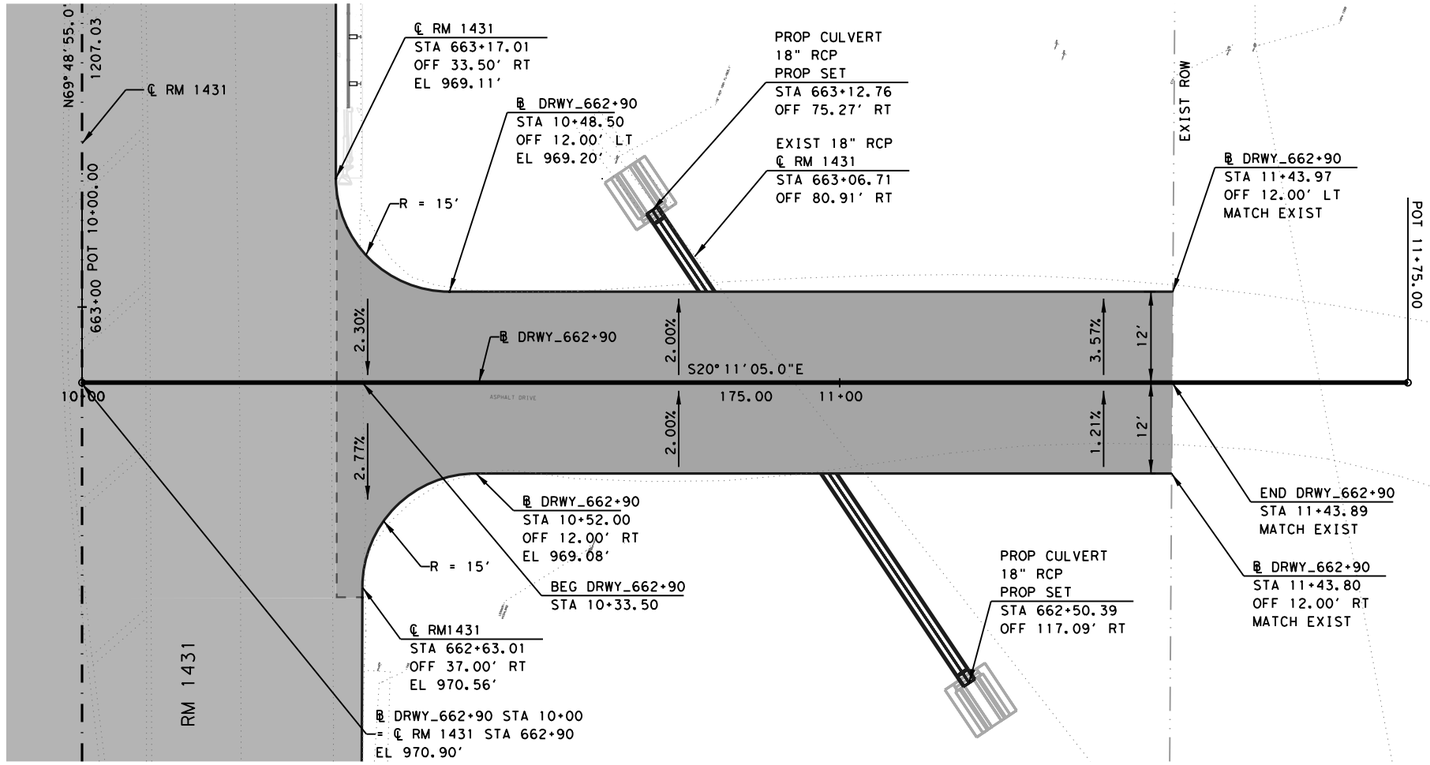

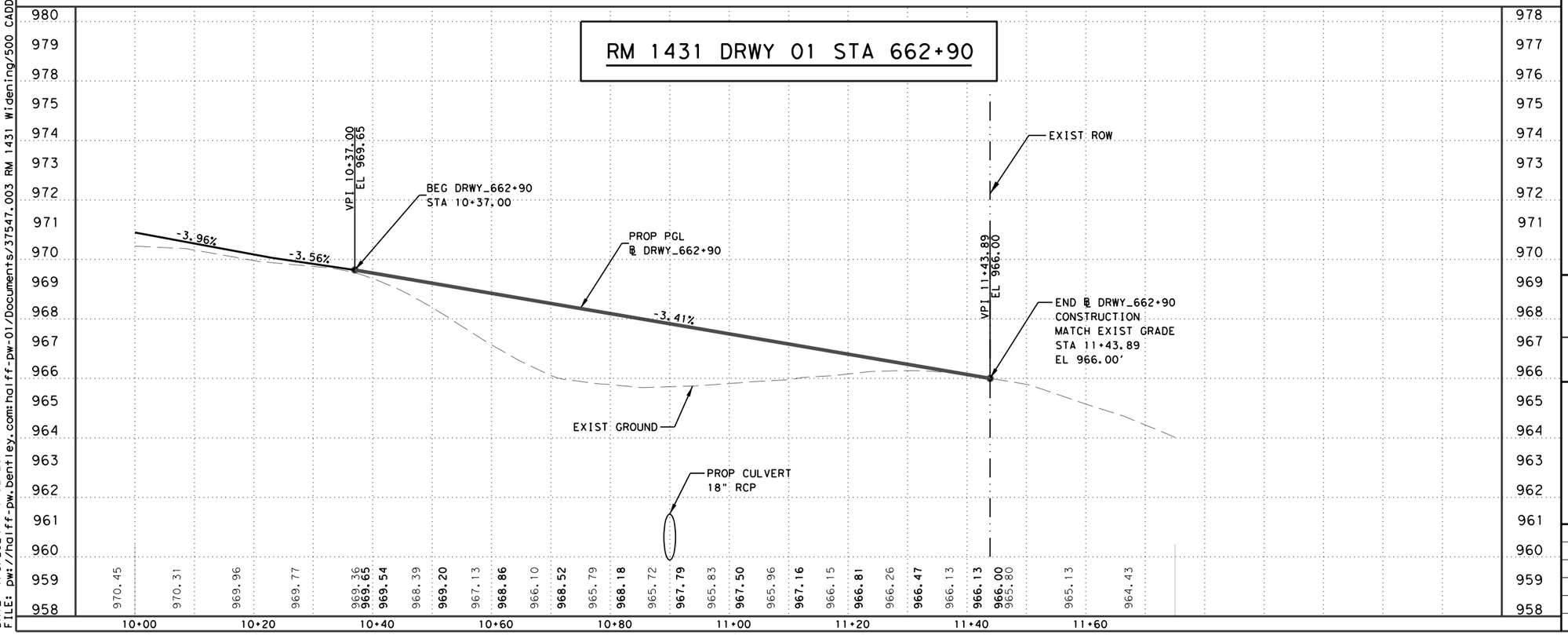

NOTES

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EOP = EDGE OF PAVEMENT
OFF = OFFSET
LT = LEFT
RT = RIGHT
STA = STATION

LEGEND

- WIDENING
- 2" MILL & OVERLAY
- SIDESTREET

STATE OF TEXAS
JOHN CONQUEST
89243
PROFESSIONAL LICENSED ENGINEER
P.E.
01/09/2024

HORIZONTAL
0 10 20 40 FT

VERTICAL
0 2 4 8 FT

PRINT DATE	REVISION DATE
1/8/2024	

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Austin District

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

DRIVEWAY LAYOUTS PLAN AND PROFILE
STA 662+90

SHEET 01 OF 06 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 68

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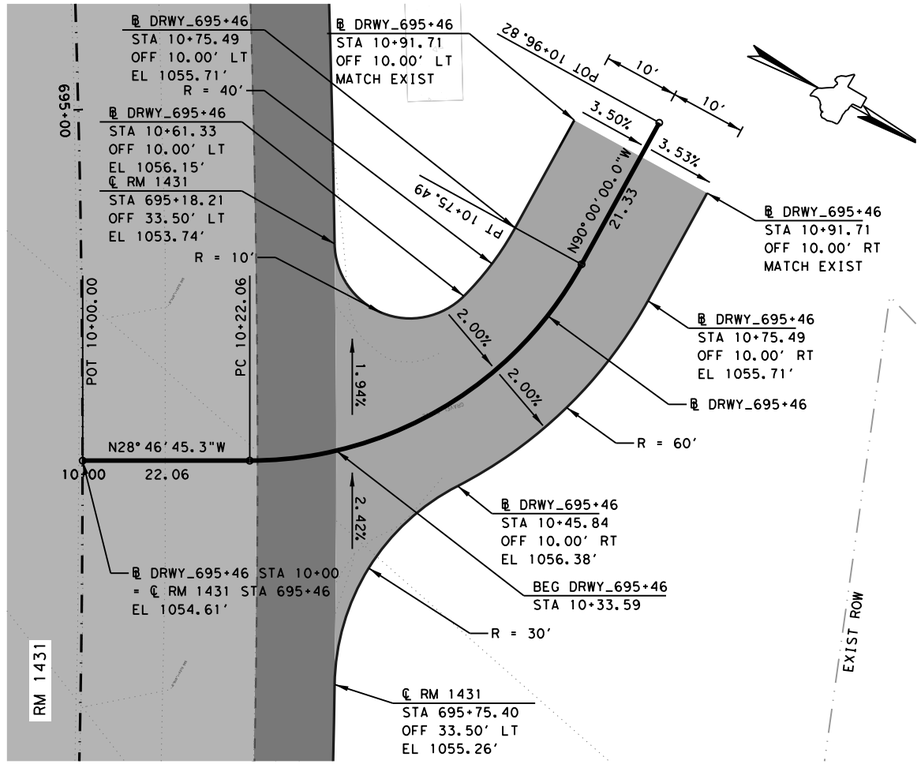

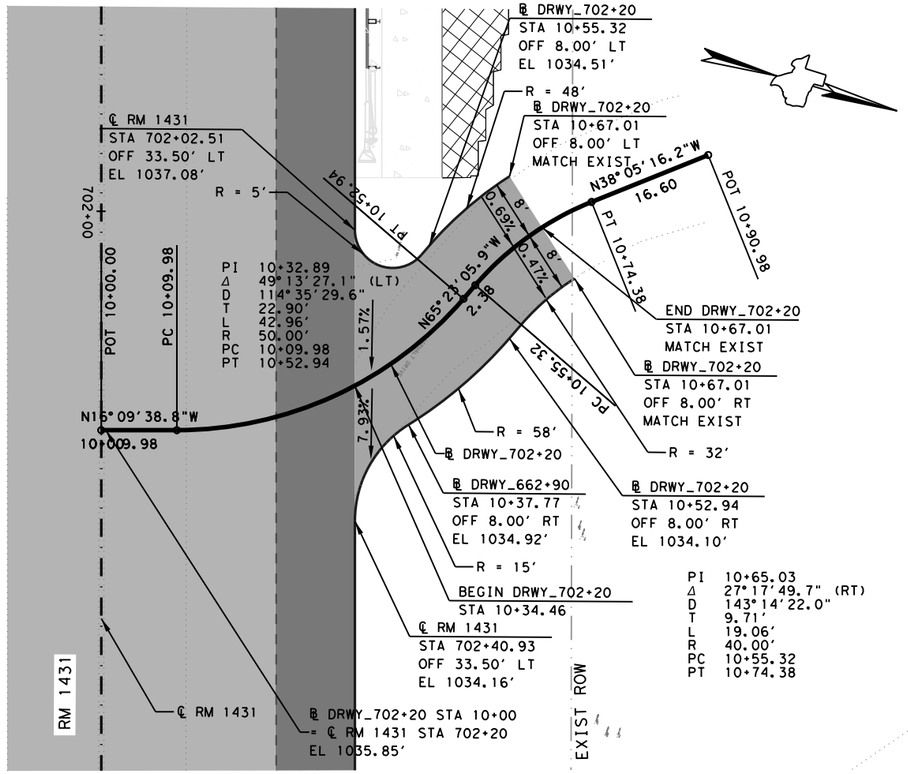

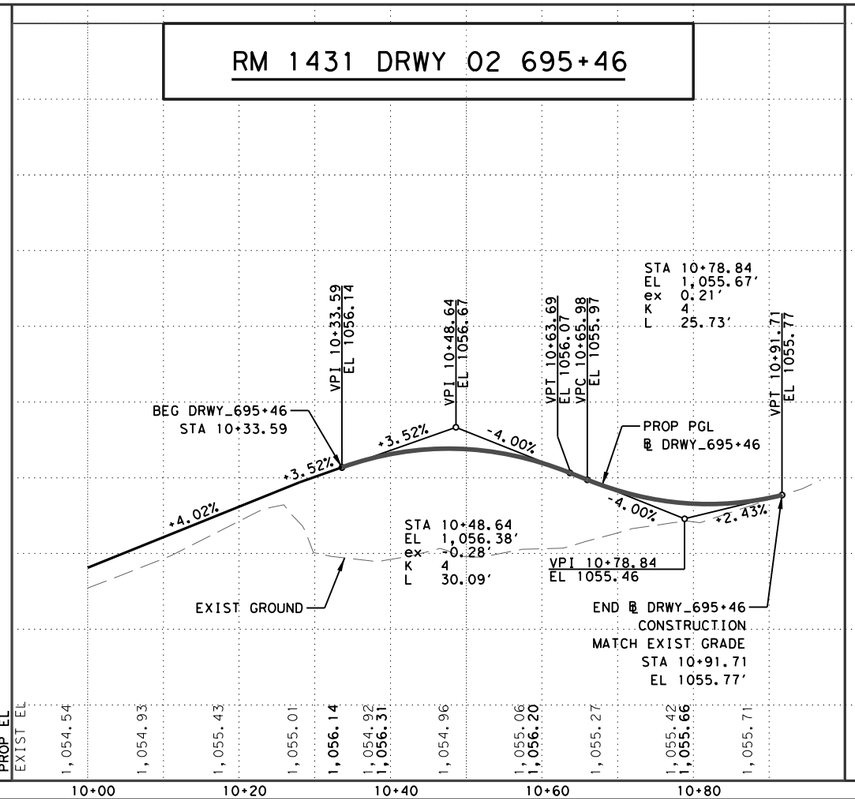

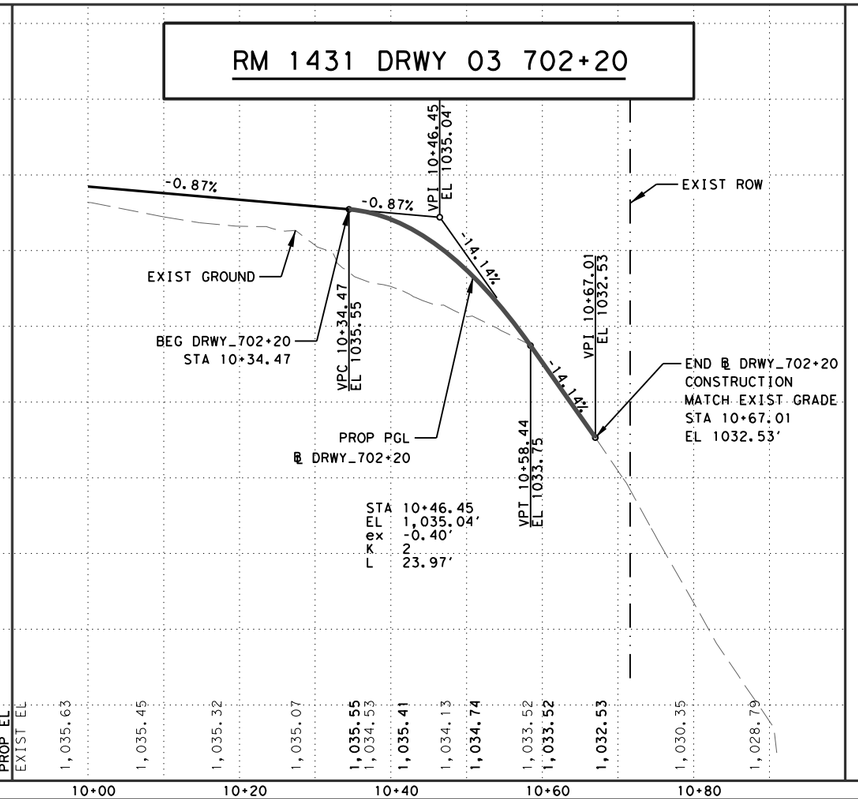

NOTES

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LEGEND

- NEW CONSTRUCTION
- 2" MILL & OVERLAY
- DRIVEWAY

HORIZONTAL
0 10 20 40 FT

VERTICAL
0 1 2 4 FT

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED
PROFESSIONAL ENGINEER
P.E.

01/09/2024

PRINT DATE	REVISION DATE
1/8/2024	

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Austin District
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DRIVEWAY LAYOUTS PLAN AND PROFILE

STA 695+46 TO STA 702+20

SHEET 02 OF 06 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 69

DATE: 1/8/2024 3:59:52 PM
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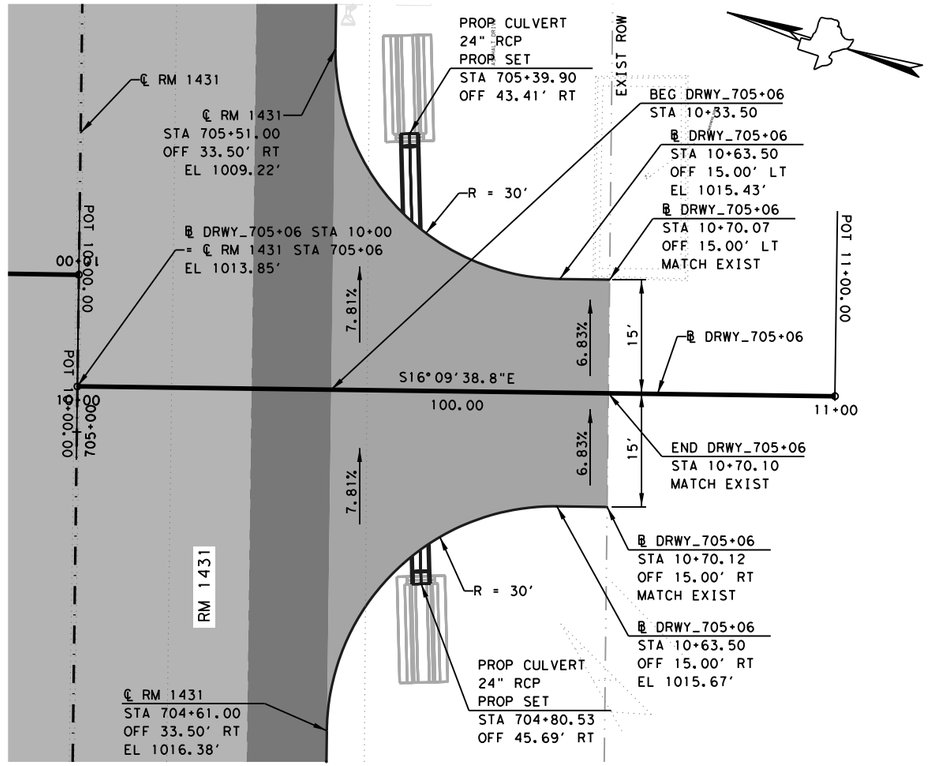

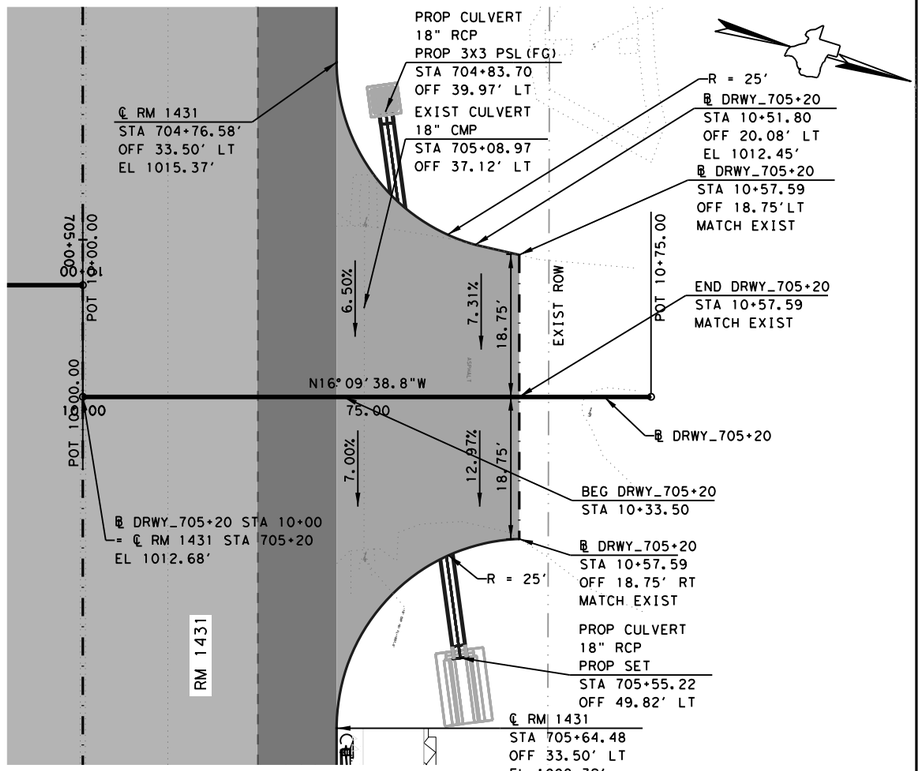

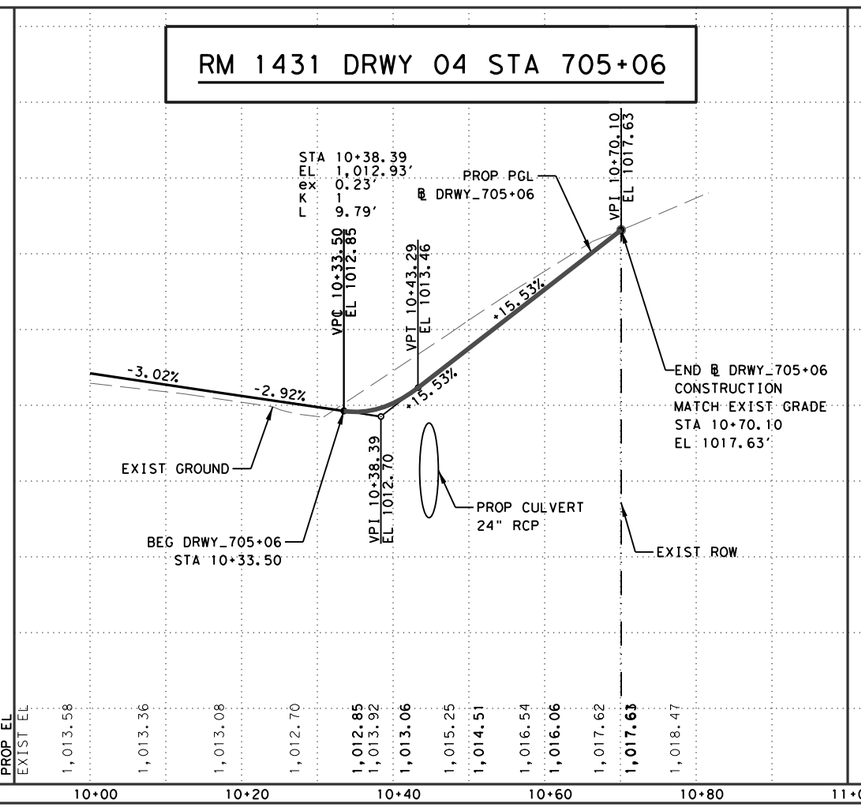

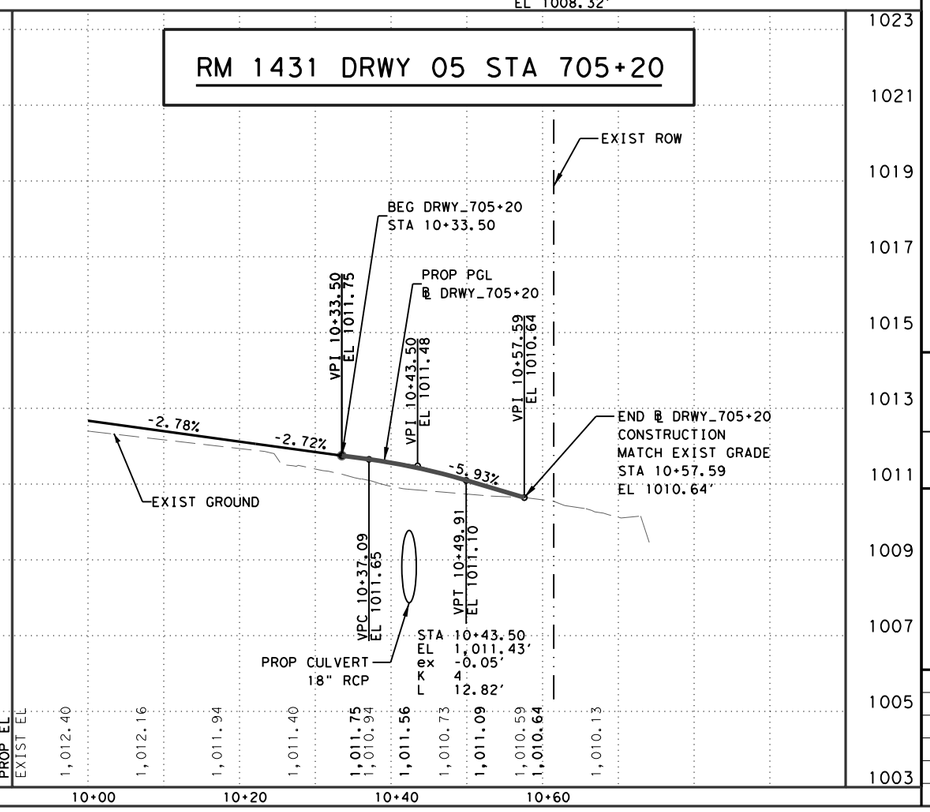

NOTES

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LEGEND

- NEW CONSTRUCTION
- 2" MILL & OVERLAY
- DRIVEWAY

HORIZONTAL
0 10 20 40 FT

VERTICAL
0 2 4 8 FT

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED PROFESSIONAL ENGINEER
P.E.
01/09/2024

PRINT DATE	REVISION DATE
1/8/2024	

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DRIVEWAY LAYOUTS PLAN AND PROFILE

STA 705+06 TO STA 705+20

SHEET 03 OF 06 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 70

DATE: 1/8/2024 4:04:18 PM
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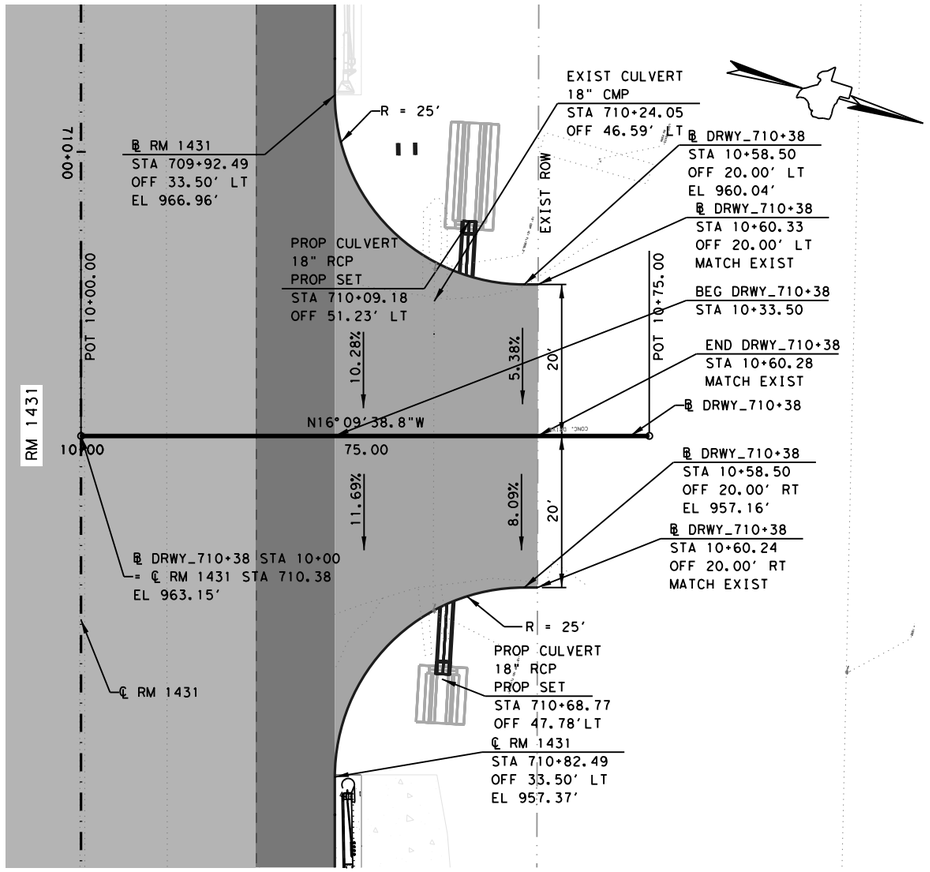
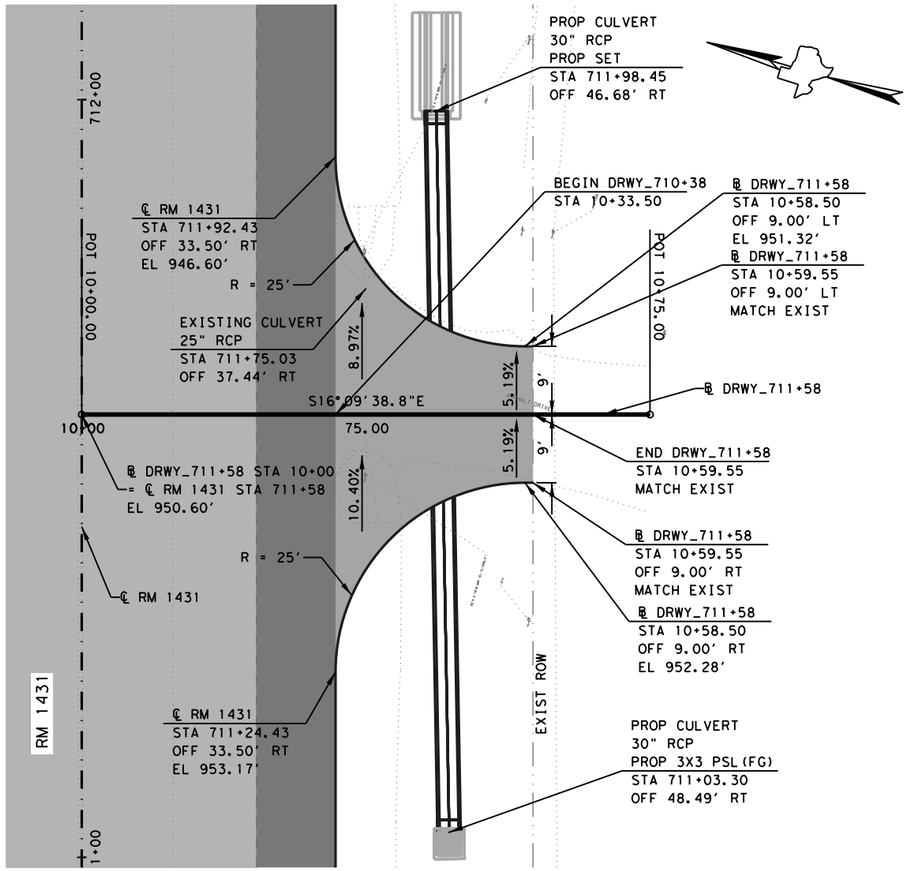
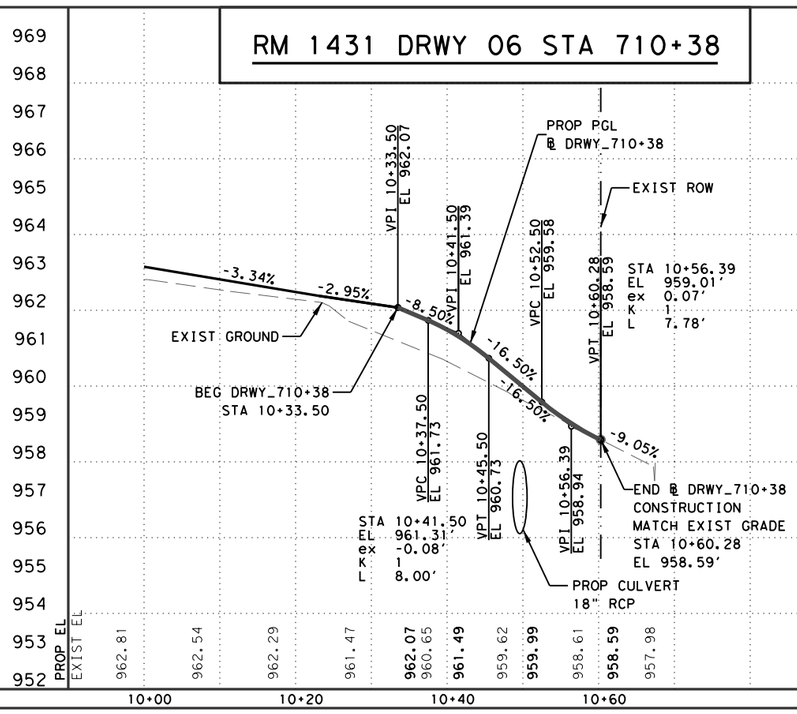
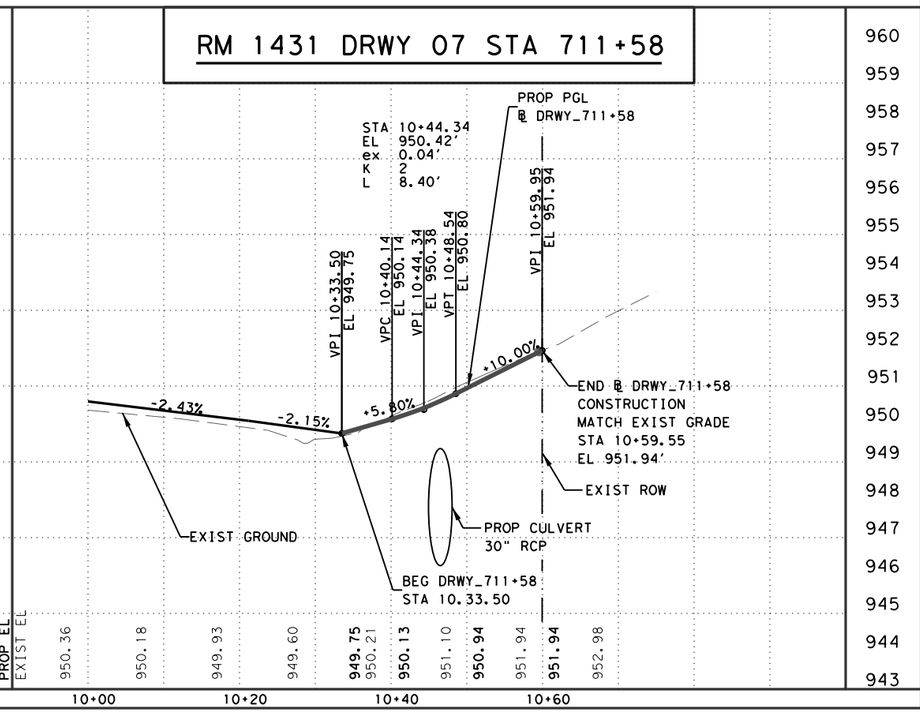




RM 1431 DRWY 06 STA 710+38



RM 1431 DRWY 07 STA 711+58



NOTES

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

LEGEND

- NEW CONSTRUCTION
- 2" MILL & OVERLAY
- DRIVEWAY

HORIZONTAL
0 10 20 40 FT

VERTICAL
0 2 4 8 FT

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED
PROFESSIONAL ENGINEER
P.E.

01/09/2024

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DRIVEWAY LAYOUTS PLAN AND PROFILE

STA 710+38 TO STA 711+58

SHEET 04 OF 06 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 71

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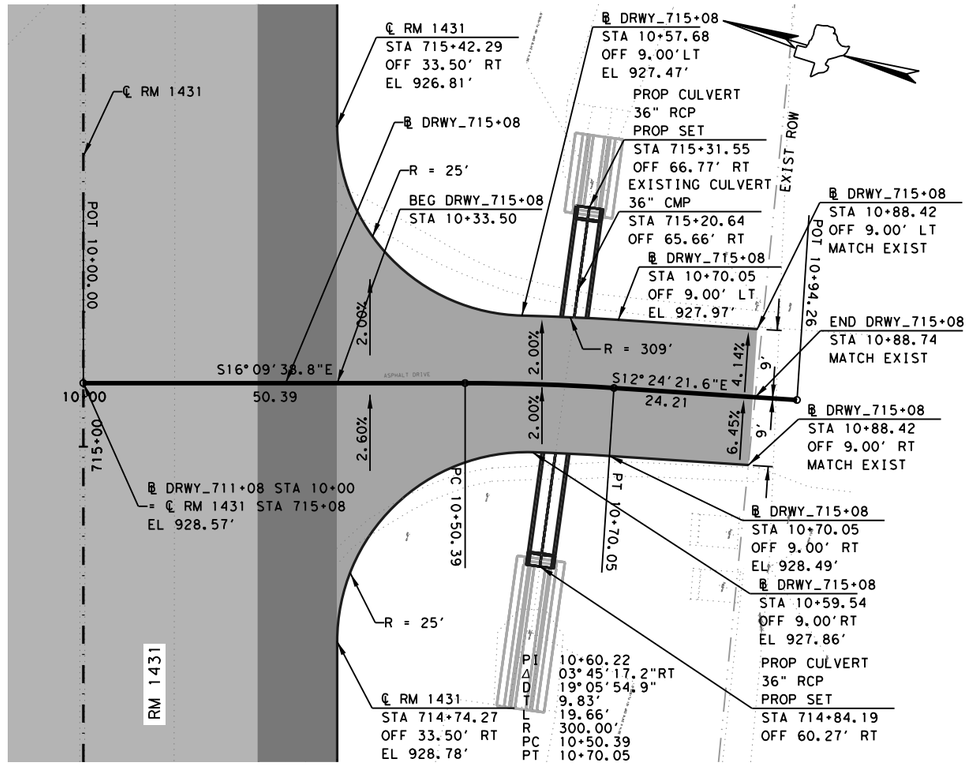
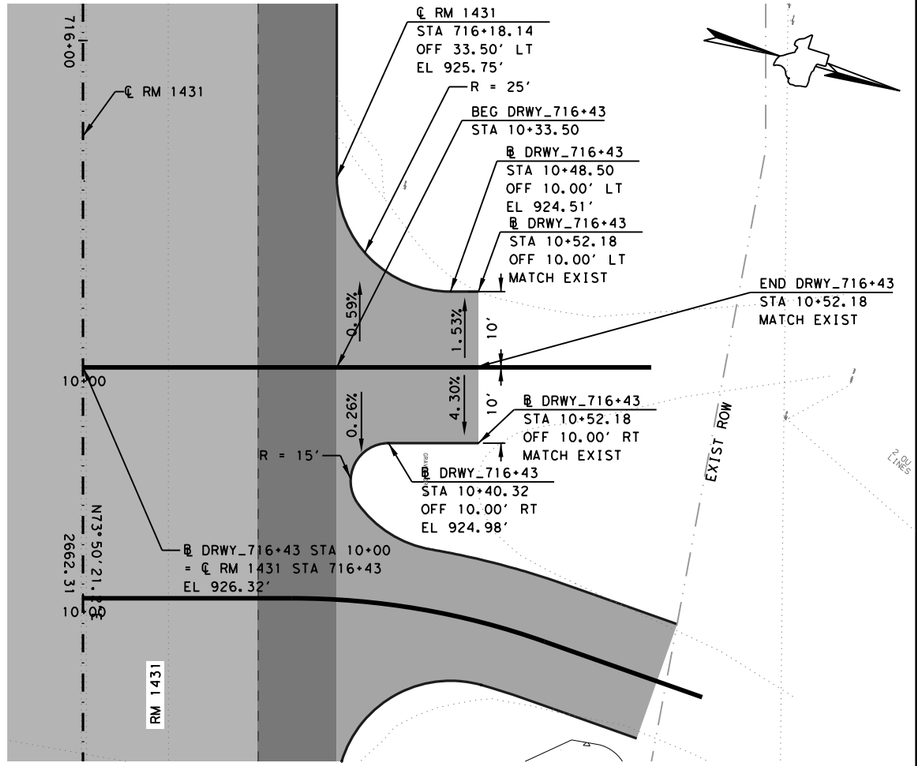




NOTES

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

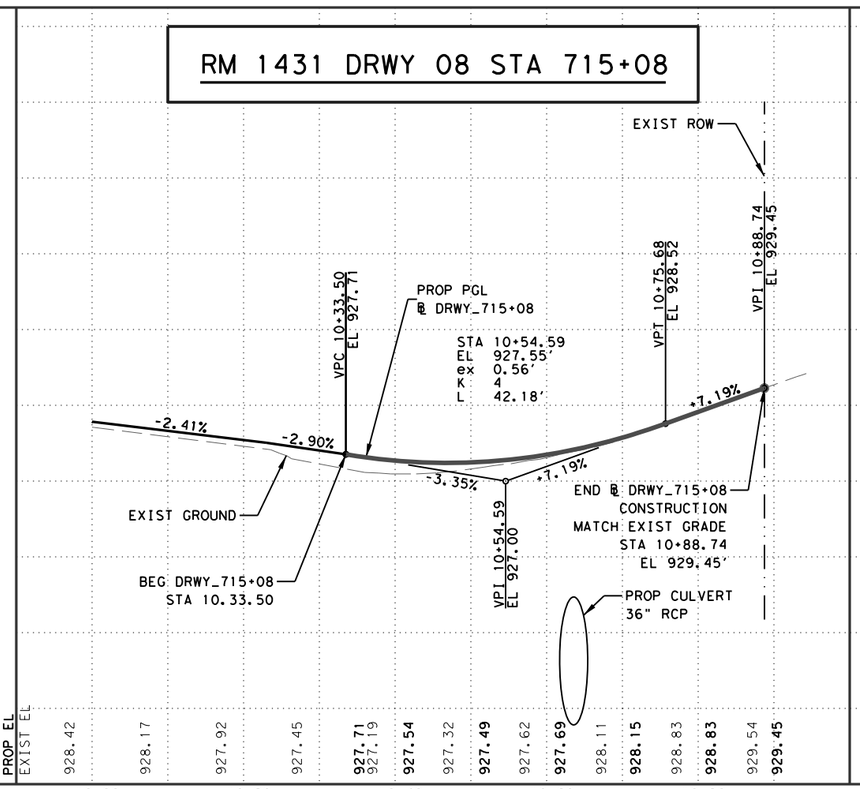
LEGEND

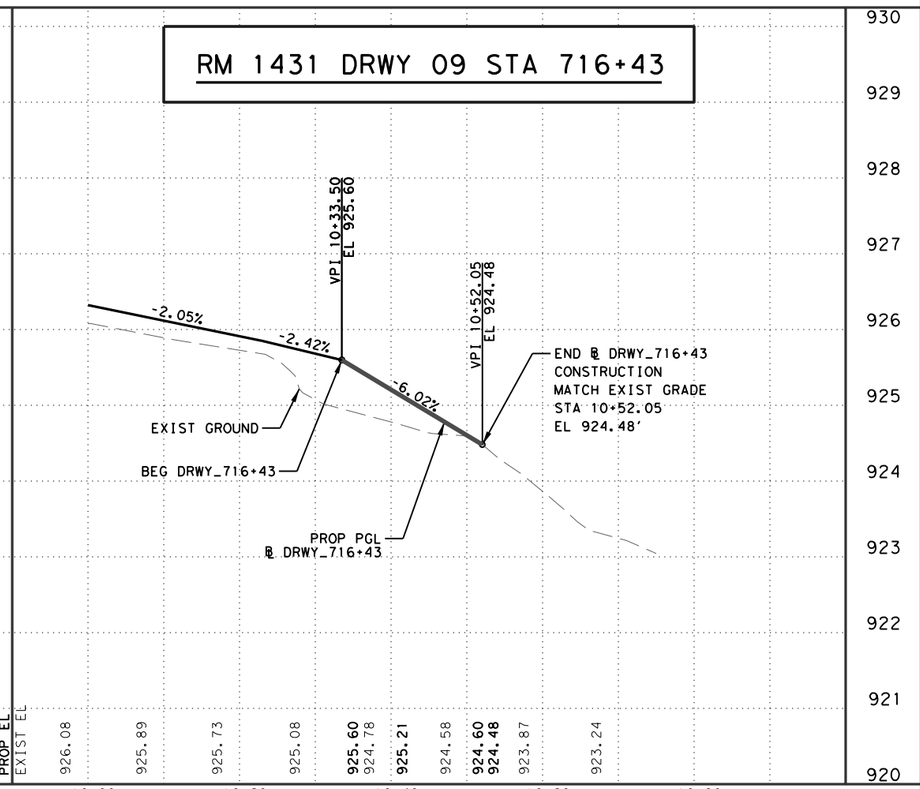
- NEW CONSTRUCTION
- 2" MILL & OVERLAY
- DRIVEWAY

HORIZONTAL
0 10 20 40 FT

VERTICAL DRWY_08
0 2 4 8 FT

VERTICAL DRWY_09
0 1 2 4 FT





01/09/2024

PRINT DATE	REVISION DATE
1/8/2024	

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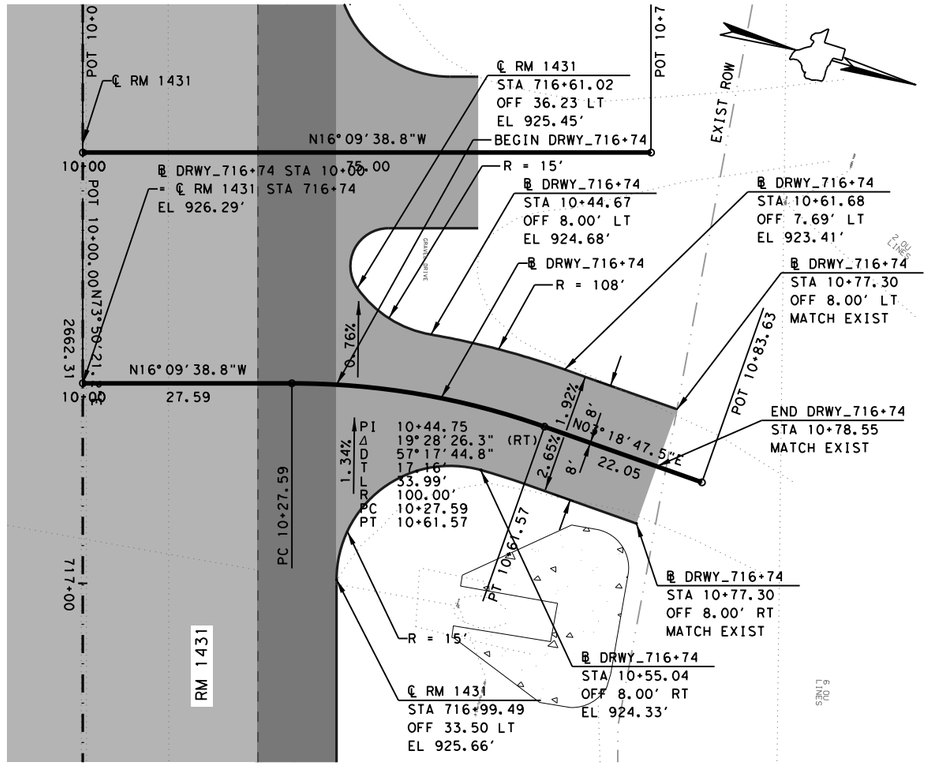
TBPELS FIRM NO. F-312

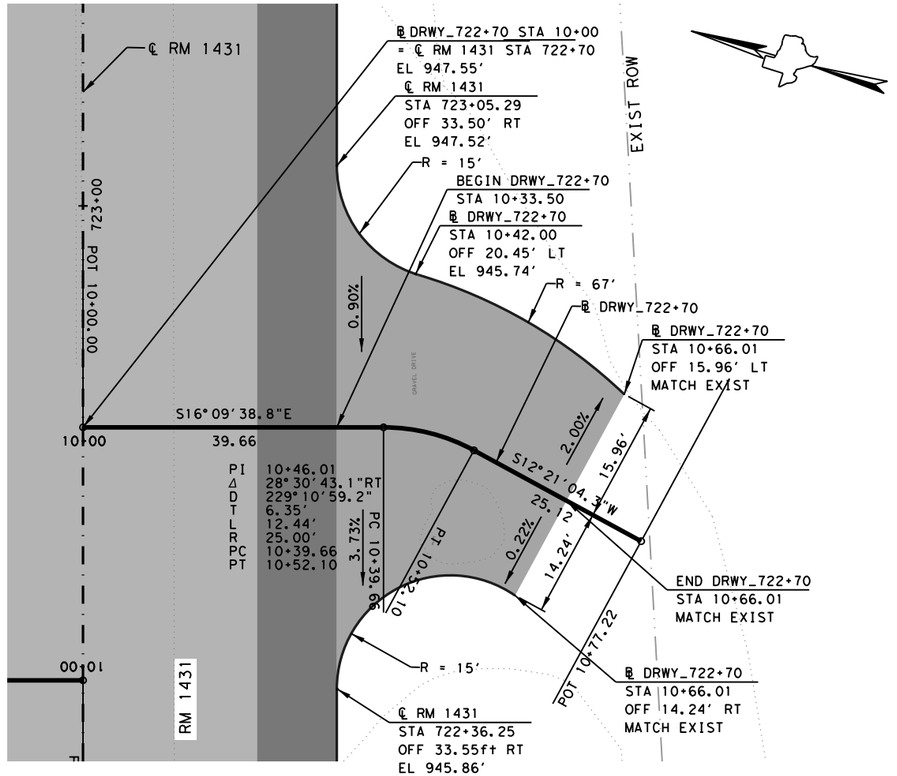
DRIVEWAY LAYOUTS PLAN AND PROFILE

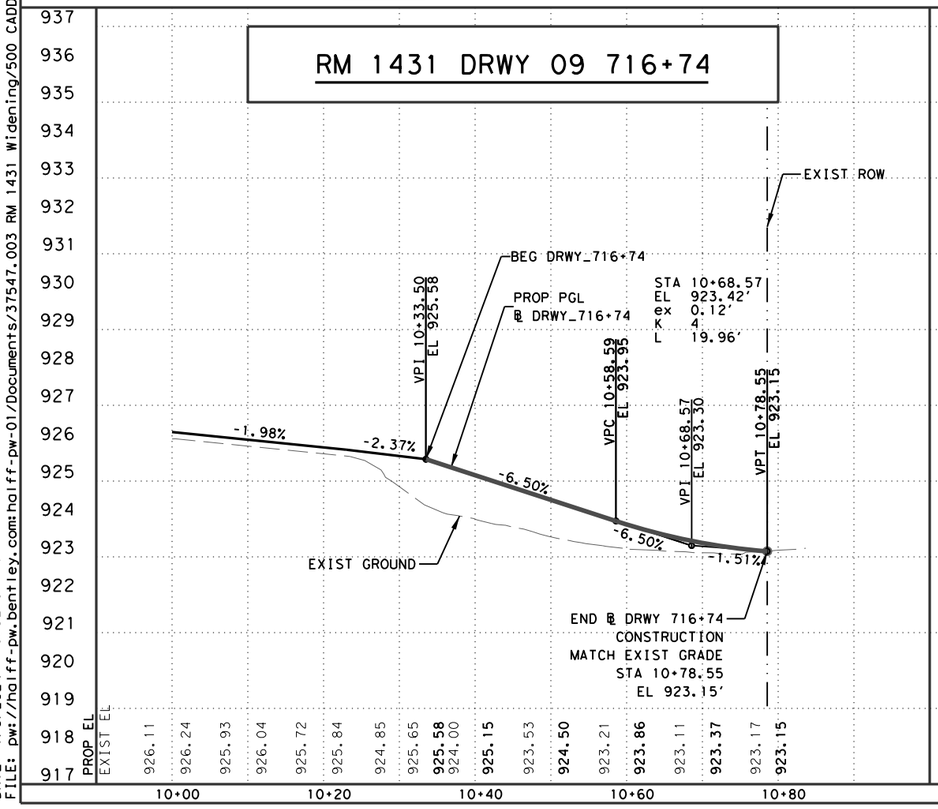
STA 716+43 TO STA 716+74

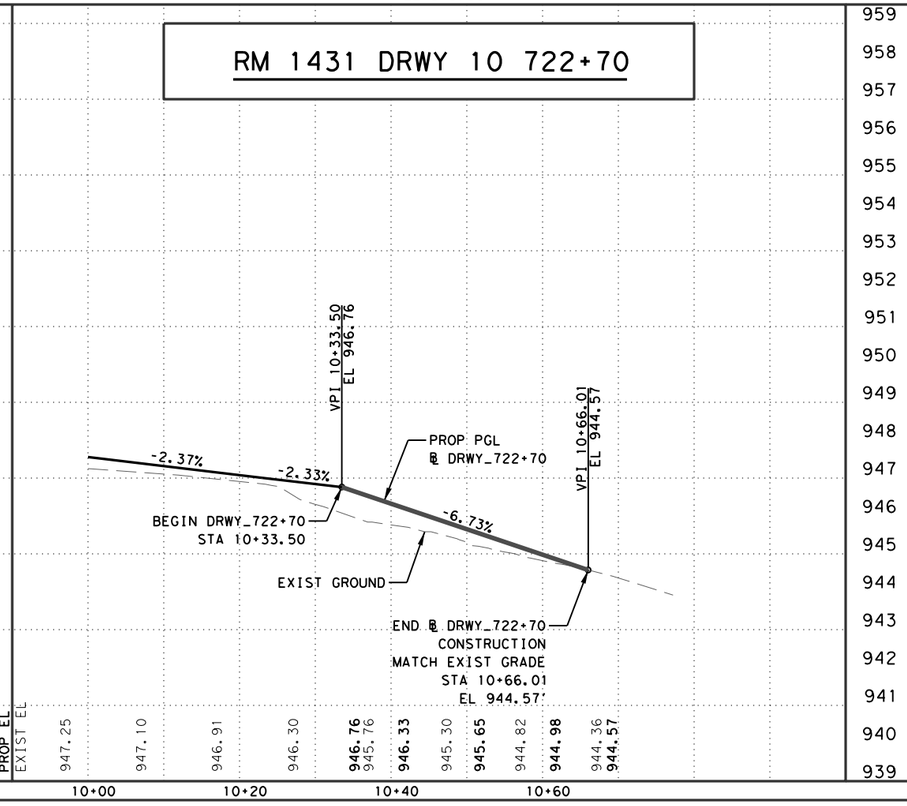
SHEET 05 OF 06 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 72









NOTES

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LEGEND

- NEW CONSTRUCTION
- 2" MILL & OVERLAY
- DRIVEWAY

HORIZONTAL
0 10 20 40 FT

VERTICAL
0 2 4 8 FT

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED
PROFESSIONAL ENGINEER
P.E.

01/09/2024

PRINT DATE	REVISION DATE
1/8/2024	

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DRIVEWAY LAYOUTS PLAN AND PROFILE
STA 722+70

SHEET 06 OF 06 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 73

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DRIVEWAY NO.	P&P SHEET NO.	DRIVEWAY TYPE	STATION	SIDE (LT/RT)	DRWY LENGTH L (FT)	DRWY WIDTH @ MOUTH (FT)	DRWY WIDTH @ THROAT (FT)	SURFACE AREA (SY)	RADIUS RL (FT)	RADIUS RR (FT)	MAILBOX TURNOUT (FT)	DRIVEWAY CL	DRIVEWAY R.O.W.	
												OFFSET (FT)	OFFSET (FT)*	ELEVATION (FT)
1	1	ACP	662+90	RT	110.3	55.4	24.0	311.5	15.0	15.0	-	37.00' RT	-	969.65
2	2	ACP	695+46	LT	58.0	58.2	20.0	145.6	10.0	30.0	-	33.50' LT	-	1055.95
3	2	ACP	702+20	LT	32.5	38.4	16.0	62.6	5.0	15.0	-	33.50' LT	-	1035.55
4	3	ACP	705+06	LT	36.6	90.0	30.0	164.9	30.0	30.0	-	33.50' LT	-	1012.85
5	3	ACP	705+20	RT	24.1	87.9	37.5	131.2	25.0	25.0	-	33.50' RT	-	1011.75
6	4	CONC	710+38	LT	26.8	90.0	40.0	148.8	25.0	25.0	-	33.50' LT	-	962.07
7	4	ACP	711+58	RT	26.1	68.0	18.0	81.9	25.0	25.0	-	33.50' RT	-	949.75
8	5	ACP	715+08	RT	54.9	68.0	18.0	139.7	25.0	25.0	-	33.50' RT	-	927.71
9	5	ACP	716+43	LT	18.7	40.0	20.0	48.6	15.0	5.0	-	33.50' LT	-	925.60
10	6	ACP	716+74	LT	43.8	42.0	16.0	89.9	15.0	15.0	-	33.50' LT	-	925.58
11	6	ACP	722+70	RT	32.5	69.0	30.0	141.4	15.0	15.0	-	33.50' RT	-	946.76
SS1	1	ACP	674+25	RT	175.0	99.0	20.0	521.0	40.0	40.0	-	33.50' RT	-	991.37
SS2	2	ACP	692+16	RT	74.8	100.2	18.0	231.9	40.0	40.0	-	33.50' RT	-	1035.45
SS3	3	ACP	703+65	RT	51.4	85.7	22.0	174.1	25.0	40.0	-	33.50' RT	-	1024.09
SS4	4	ACP	722+33	LT	160.5	123.0	21.0	692.2	40.0	40.0	-	33.50' LT	-	945.74

DRIVEWAY	P&P SHEET NO.	STATION USFL	OFFSET USFL	US ELEVATION	US SET SLOPE	STATION DSFL	OFFSET DSFL	DS ELEVATION	DS SET SLOPE	LT/RT	PIPE LENGTH (FT)	PIPE MATERIAL
1	DRWY 1	663+06.71	80.91	954.51	3:1	662+50.39	117.09	962.32	3:1	RT	75	RCP
3	SS 2	691+80.24	60.88	1024.21	6:1	691+80.24	60.88	1030.41	6:1	RT	73	RCP
5	SS 3	702+89.30	40.48	1018.83	3X3 PSL	704+00.00	46.54	1018.28	4:1	RT	226	RCP
4	DRWY 3	704+80.53	45.69	1012.44	6:1	705+39.90	43.41	1007.73	3:1	RT	59	RCP
3	DRWY 3	704+83.70	-39.97	1004.64	3X3 PSL	705+64.48	-49.82	1004.27	6:1	LT	74	RCP
5	DRWY 4	710+24.05	-46.59	958.96	6:1	710+68.77	-47.78	953.39	3:1	LT	60	RCP
6	DRWY 4	711+03.30	48.49	942.88	3X3 PSL	711+98.45	46.68	942.40	6:1	RT	97	RCP
7	DRWY 5	714+84.19	60.27	922.15	3:1	715+20.64	66.77	919.50	6:1	RT	48	RCP
4	SS 4	722+75.70	-46.50	943.90	6:1	721+88.87	-46.50	941.51	6:1	LT	87	RCP

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED
PROFESSIONAL ENGINEER

11/16/2023

NOTE TO CONTRACTOR:

MAINTAIN POSITIVE DRAINAGE AT ALL TIMES.

DRIVEWAY EARTHWORK QUANTITIES CALCULATEDE BEYOND TYPICAL ROADWAY SLOPE.

GRADE ALL DRIVEWAYS TO DRAIN.

*OFFSET DISTANCE FROM EDGE OF R.O.W. FOR CONSTRUCTION EASEMENT PURPOSES. VALUES ONLY GIVEN IF BEYOND R.O.W.

PRINT DATE	REVISION DATE
11/28/2023	

Texas Department of Transportation
Austin District

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13620 BRIARWICK DRIVE, STE 100
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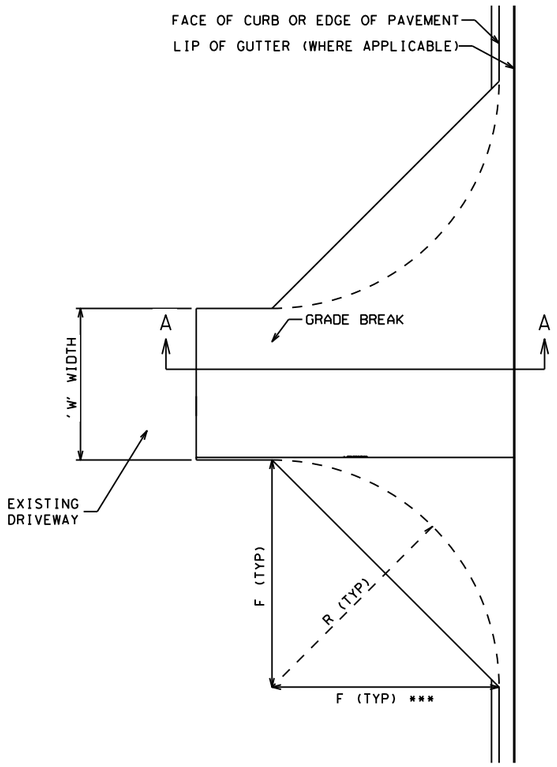
(512) 777-4600
TBPELS FIRM NO. F-312

RM 1431
DRIVEWAY DETAILS

SHEET 01 OF 01

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 74



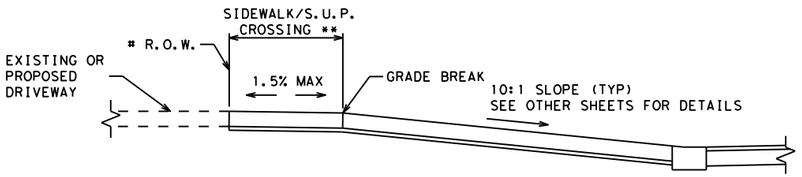
DRIVEWAY PLAN

FLARE OR RADIUS	FARM/RANCH	RESIDENTIAL	COMMERCIAL
"F" OR "R" (FT)	25	25	25

THESE ARE STANDARD DIMENSIONS UNLESS OTHERWISE SHOWN ELSEWHERE ON THE PLANS.

FLARES ARE TYPICALLY USED FOR SUBURBAN/URBAN (CURBED) ROADWAYS. RADII ARE TYPICALLY USED FOR RURAL OR UNCURBED ROADWAYS.

*** THIS 'F' DIMENSION MAY BE REDUCED TO KEEP WORK WITHIN THE ROW.

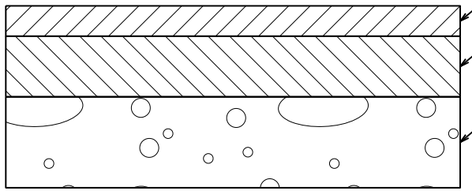


ACTUAL TIE-IN SHOWN ELSEWHERE IN PLANS OR AS DIRECTED

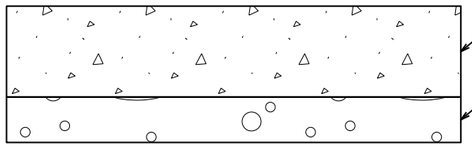
DRIVEWAY WITH GUTTER SECTION A-A

ENSURE GRADE BREAK DOES NOT EXCEED 8% UNLESS OTHERWISE DIRECTED. PROVIDE ABSOLUTE MINIMUM SIDEWALK CROSSING WIDTH OF 4' FOR DRIVEWAYS WIDTH OF 20' OR LESS

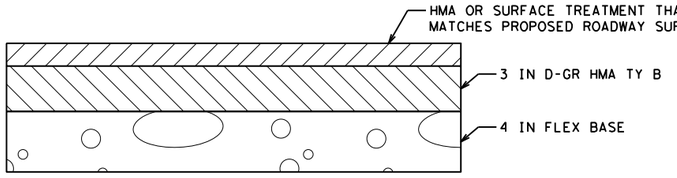
** LOCATE SIDEWALK CROSSING TO ALIGN WITH ADJACENT SIDEWALK; SIDEWALK/S.U.P. WIDTH AND LOCATION SHOWN ELSEWHERE ON THE PLANS.



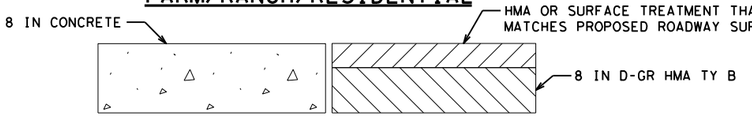
HMA OR SURFACE TREATEMENT - COMMERCIAL



CONCRETE - ALL DRIVEWAY TYPES

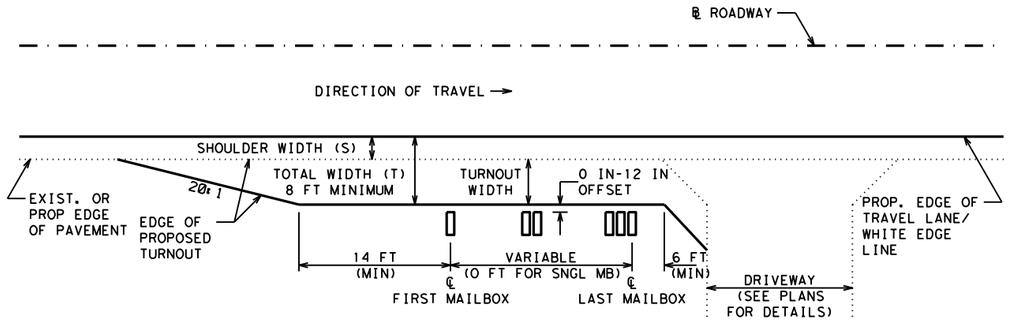


HMA OR SURFACE TREATMENT - FARM/RANCH/RESIDENTIAL

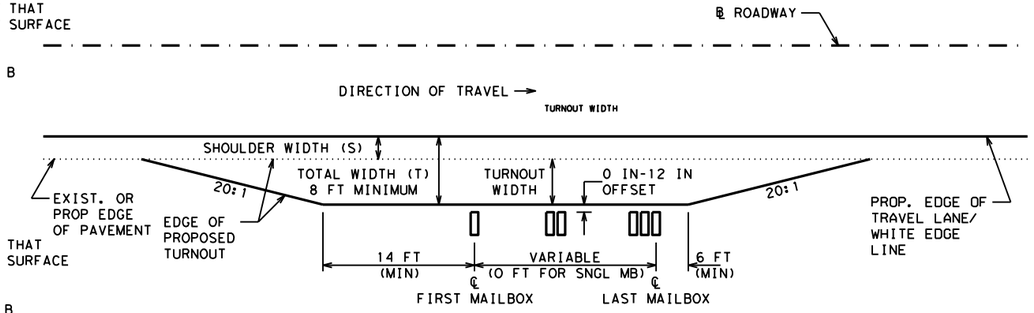


FAST TRACK ACP (TYPE 3) OR CONCRETE

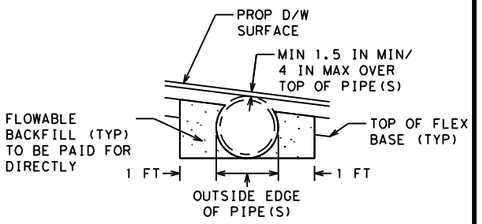
DRIVEWAY AND TURNOUT TYPICAL SECTIONS



MAILBOX TURNOUT PLAN WITH DRIVEWAY



MAILBOX TURNOUT PLAN WITHOUT DRIVEWAY



LOW FILL DRIVEWAY

ONLY ONE PIPE SHOWN
SEE ELSEWHERE ON THE PLANS FOR SPECIFIC DRIVEWAY DETAILS

GENERAL NOTES

PROVIDE EXPANSION 20 FT C-C FOR WIDTH OR LENGTH OVER 25 FT. EXPANSION JOINT PER AUS STANDARD FOR SIDEWALK (MCPSWMD).

REINFORCEMENT WILL BE IN ACCORDANCE WITH ITEM 432.3.1 USING NO. 3 OR NO. 4 BARS.

FIBER REINFORCEMENT IS NOT ALLOWED. CLASS A CONCRETE IS ALLOWED TO USE COARSE AGGREGATE GRADES 1-8.

IN LIEU OF PFC OR TOM, SURFACE MUST BE 1.5" D-GR HMA TY D. IF SURFACE IS A MULTIPLE COURSE SURFACE TREATEMENT, ALL COURSES MUST BE PLACED ON DRIVEWAY. SURFACE HMA IS PG 76-22. NON SURFACE HMA IS PG 64-22 AND MAY BE BLADE LAID.

FURNISH BASE MEETING THE REQUIREMENTS FOR ANY TYPE OR GRADE IN ACCORDANCE WITH ITEM 247. BASE COMPRESSIVE STRENGTHS ARE WAIVED.

THE BASE UNDER THE CONCRETE MAY BE REPLACED WITH CONCRETE AT A RATIO OF 3 INCHES OF BASE EQUALS 2 INCHES OF CONCRETE.

FAST TRACK DRIVEWAYS MUST BE CLOSED, CONSTRUCTED, AND REOPENED WITHIN 24 HOURS.

IF ROOTS ARE ENCOUNTERED VERIFY WITH THE ENGINEER PRIOR TO ACCOMMODATING OR REMOVING 2 IN. DIAMETER OR LARGER ROOTS. ROOT REMOVAL MUST BE IN ACCORDANCE WITH ITEM 752.4.2. ROOTS MAY REMAIN IN THE BASE. FOR IMPROVEMENTS WITHIN 6 IN. OF A ROOT, THE CONCRETE THICKNESS MAY BE REDUCED BY 1 IN. AND THE BASE INCREASED BY 1 IN. TO MINIMIZE IMPACTS TO THE ROOTS. ADJUST BASE AND SURFACE PROFILE TO PROVIDE A 1 IN. BASE CUSHION AROUND THE ROOTS. THE SURFACE PROFILE MAY BE ADJUSTED TO THE EXTENT ALLOWED BY ADA. THIS WORK IS SUBSIDIARY.

Texas Department of Transportation | Austin District Standard

DRIVEWAYS AND MAILBOX TURNOUTS

DWMB-22 (AUS)

REVISIONS
01/16: SHEET CREATED
04/19: APPROVED
11/20: TABLE REVISED, GN ADDED, PLAN & PROFILE MODIFIED
01/22: ADDED TURNOUT INFO

CONT	SECT	JOB	HIGHWAY
1378	01	050	RM 1431
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		75

DATE: 5/18/2022 9:05:34 AM
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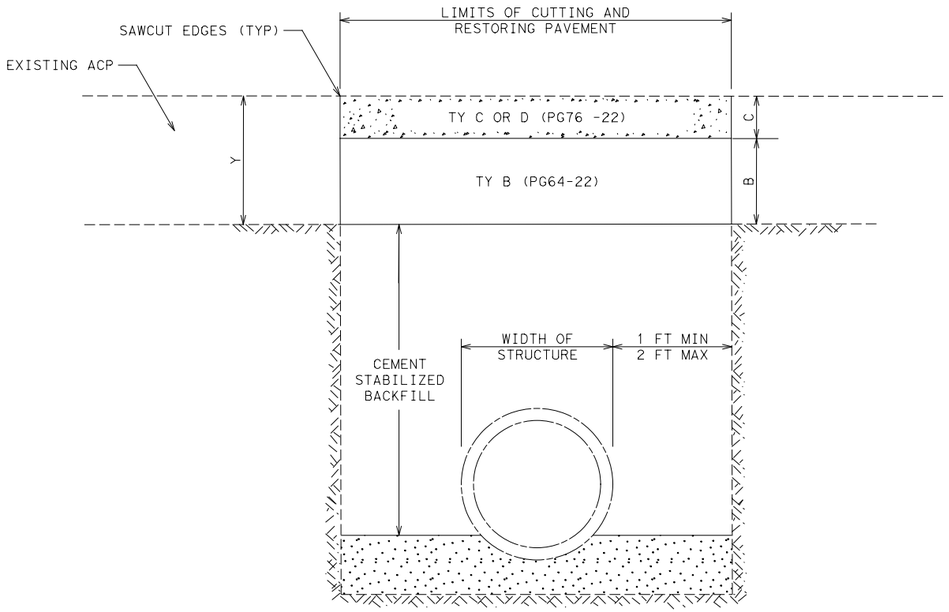
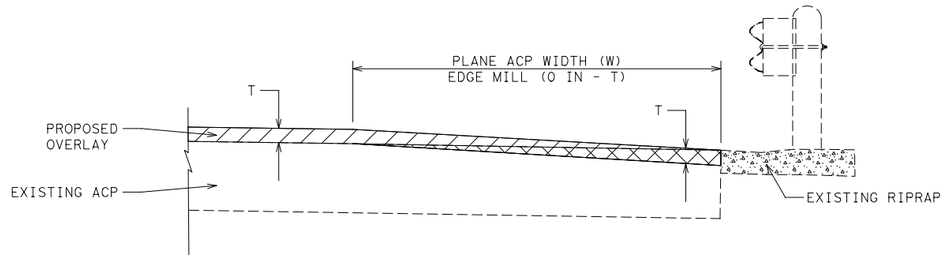


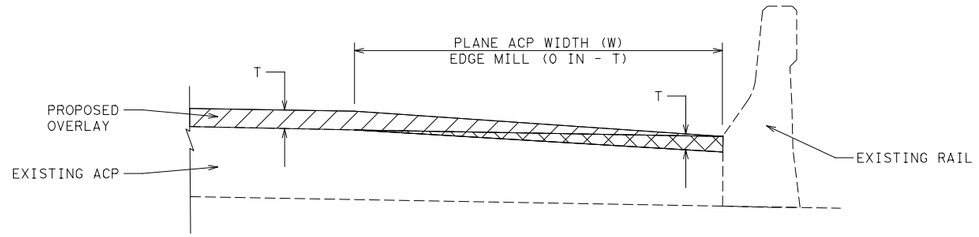
CUTTING AND RESTORING PAVEMENT DETAIL

CUT AND RESTORE NOTES

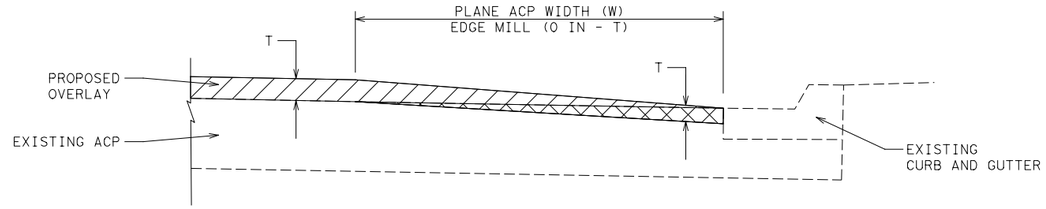
Y = DEPTH OF EXISTING ACP (IN)
Y = C + B
C = MIN 2 IN AND MAX 4 IN THICKNESS
CUTTING AND RESTORING PAVEMENT PER ITEM 400
HMA MAY BE BLADE LAID
ALL ACP PER ITEM 3076
THE FOLLOWING WORK IS SUBSIDIARY:
-CEMENT STABILIZED BACKFILL
-SAWCUT EDGES
-TACK ALL ACP SURFACES IN CUT AND RESTORE



MOWSTRIP OR RIPRAP EDGE MILL DETAIL



RAIL EDGE MILL DETAIL



CURB EDGE MILL DETAIL

EDGE REPAIR NOTES

T = OVERLAY/INLAY THICKNESS (IN)
W = FULL LANE WIDTH OR MINIMUM 10 FT

NOT TO SCALE

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FLEXIBLE PAVEMENT DETAILS

FLEXPAVE(2)-22 (AUS)

©TxDOT$YEAR$	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		76

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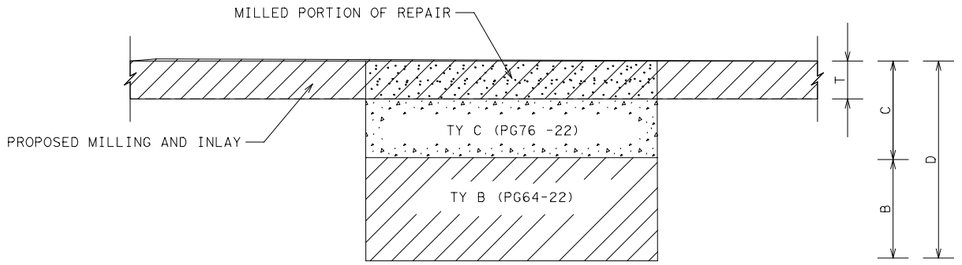
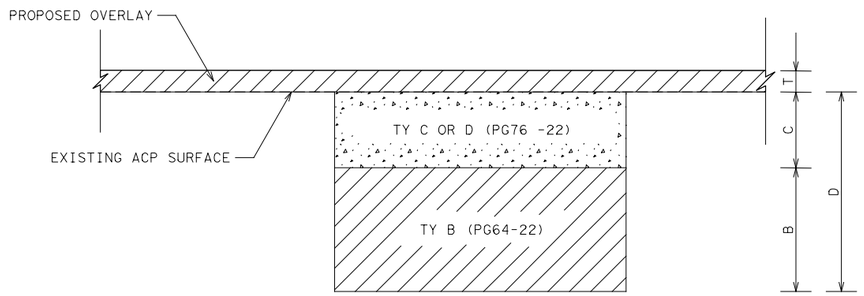
REPAIR DEPTH W/ MILLING	T = 1 IN		T = 1.5 IN		T = 2 IN	
	TY C	TY B	TY C	TY B	TY C	TY B
<= 4	4	0	4	0	4	0
5	5	0	5	0	5	0
6	6	0	6	0	6	0
7	3	4	4	3	4	3
8	4	4	4	4	4	4
>= 9	4	D-4	4	D-4	4	D-4



REPAIR WITH MILLING

REPAIR DEPTH W/O MILLING	TY D	TY C	TY B
2	2	0	0
3	0	3	0
4	0	4	0
5	0	5	0
6	0	6	0
7	2	0	5
8	2	0	6
>= 9	2	0	D-4



REPAIR WITHOUT MILLING

FLEX PAV REPAIR NOTES

T = OVERLAY/INLAY THICKNESS (IN)
D = REPAIR DEPTH
C = TY C/D ACP DEPTH
B = TY B ACP DEPTH

TY B MAY BE BLADE LAID.

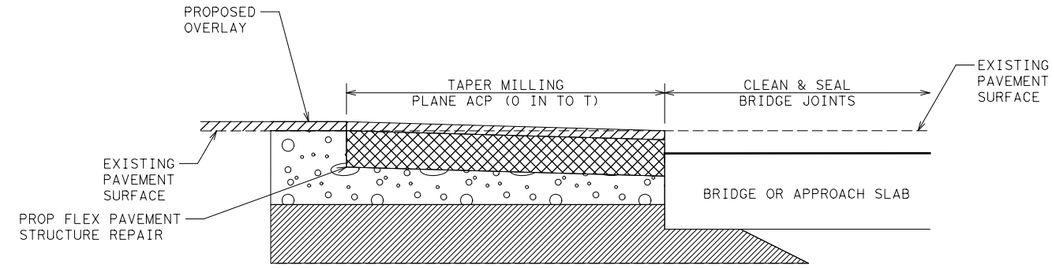
TY C/D MUST BE PAVER LAID.

TY C/D MAX LIFT THICKNESS 3 IN

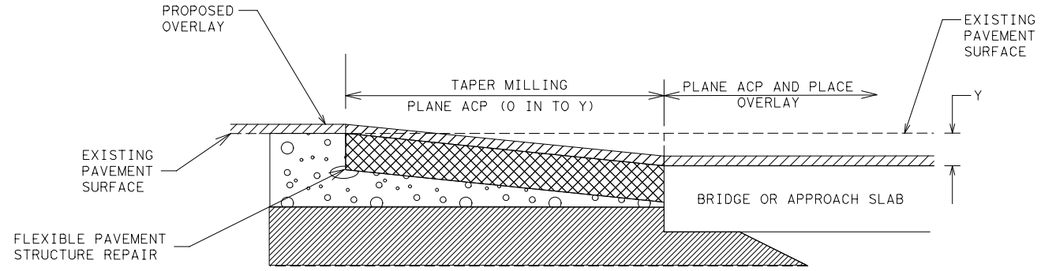
TY B MAX LIFT THICKNESS 5 IN

ALL ACP PER ITEM 3076.

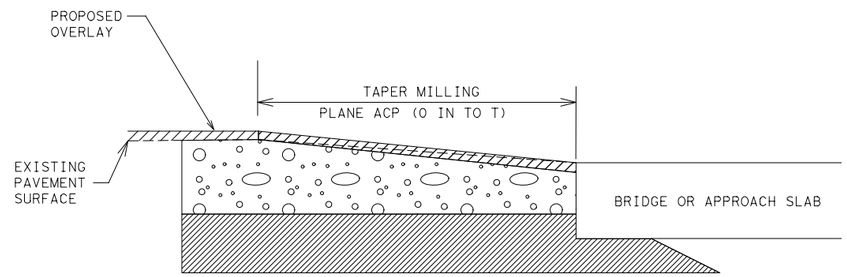
FOLLOWING WORK IS SUBSIDIARY:
-SAW CUT ALL EDGES
-TACK ALL ACP SURFACES AND LAYERS



BRIDGE APPROACH/DEPARTURE TRANSITION
MATCHING EXISTING ACP ON BRIDGE



BRIDGE APPROACH/DEPARTURE TRANSITION
REMOVING EXISTING ACP ON BRIDGE



BRIDGE APPROACH/DEPARTURE TRANSITION
MATCH EXISITING BRIDGE DECK

BRIDGE APPROACH MILLING NOTES

T = OVERLAY/INLAY THICKNESS (IN)
Y = DEPTH OF MILLING ON BRIDGE

TAPER LENGTH = 100 FT PER 1 IN OF T OR Y

ENGINEER SHOULD INCLUDE WORK TO ADJUST MBGF TO MEET STANDARD HEIGHT. ADJUSTMENT TO MBGF WILL BE PAID USING APPROPRIATE BID ITEMS.

ENGINEER MUST INCLUDE WORK TO ADJUST MOWSTRIP TO ELIMINATE PONDING.

NOT TO SCALE

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FLEXIBLE PAVEMENT DETAILS

FLEXPAVE(3)-22 (AUS)

©TxDOT$YEAR$	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		77

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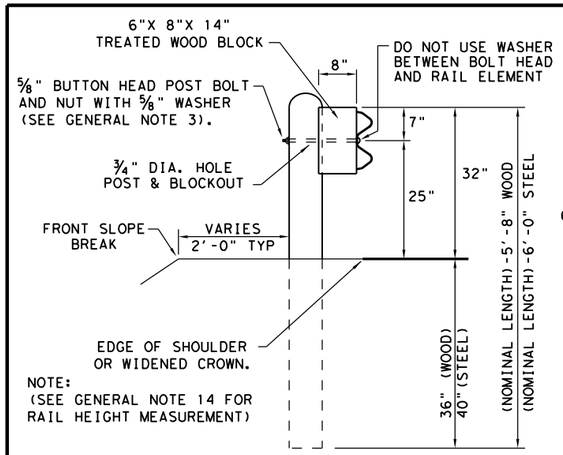
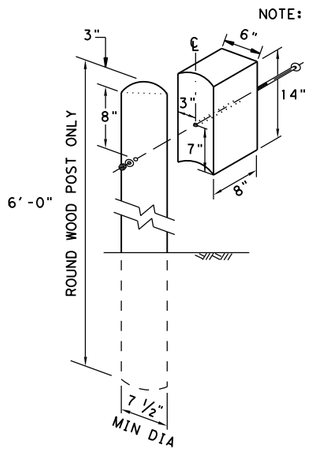
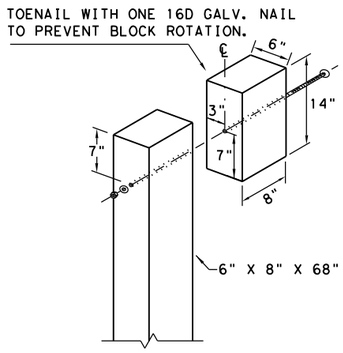


TYPICAL POST PLACEMENT

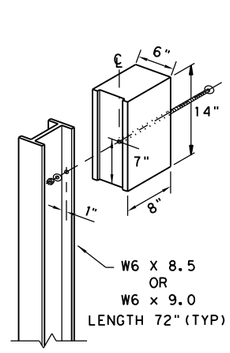


WOOD BLOCK TO ROUND WOOD POST

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

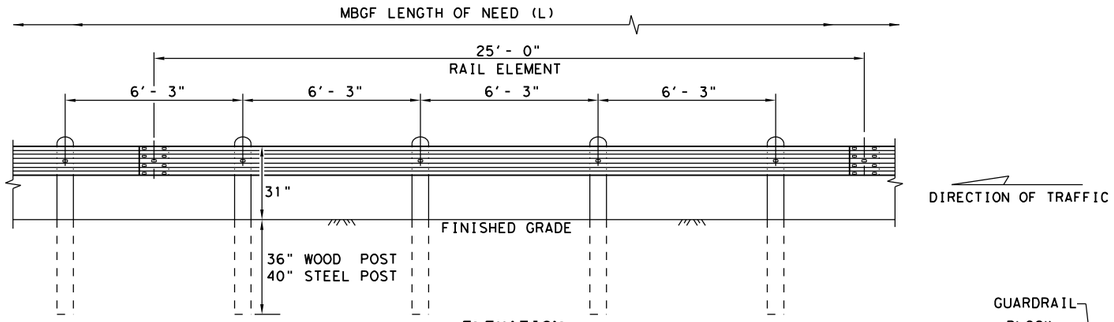


WOOD BLOCK TO RECTANGULAR WOOD POST



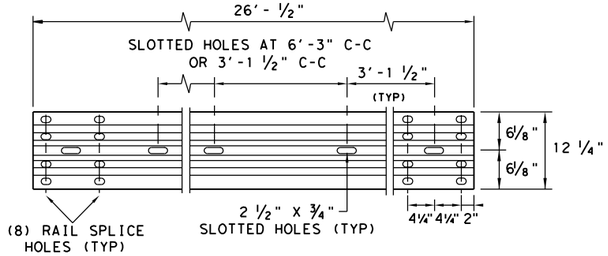
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



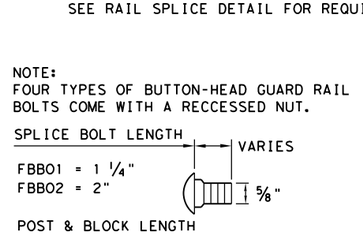
ELEVATION MID-SPAN RAIL SPLICE

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



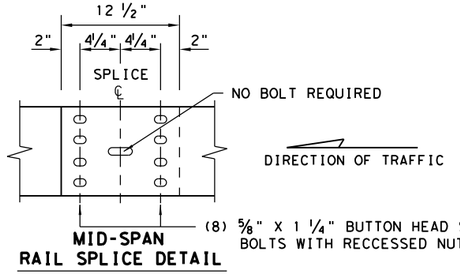
ELEVATION 25'- 0" (NOM.) W-BEAM SECTION

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



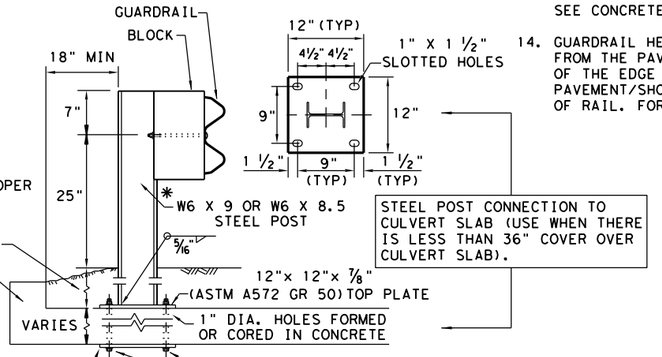
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 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
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	AUS	TRAVIS		78

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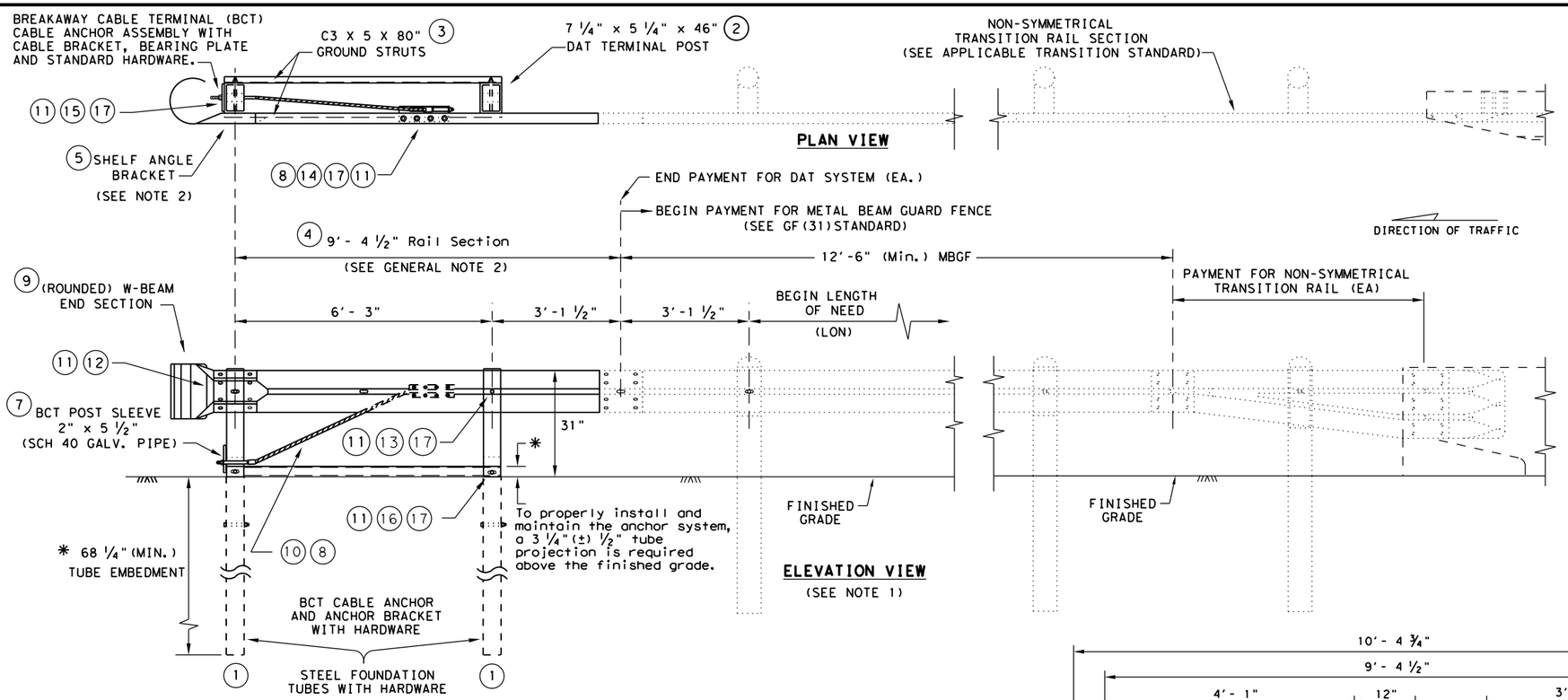


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

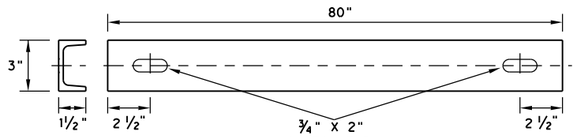
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 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

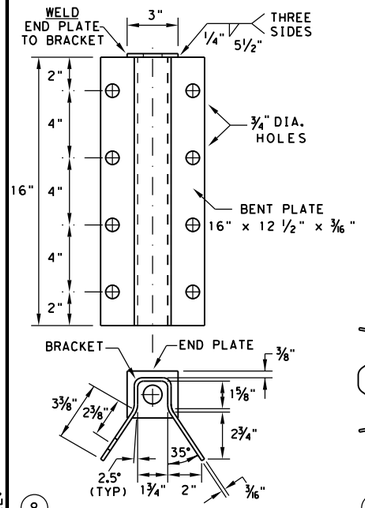
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(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

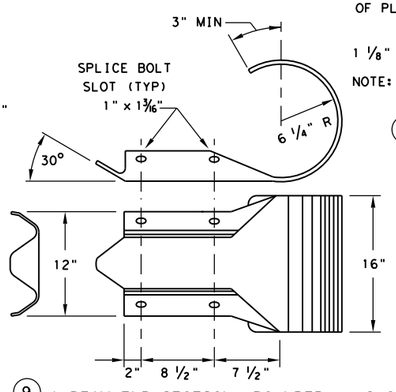
(4) TERMINAL RAIL ELEMENT FOR DAT



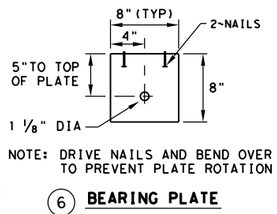
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

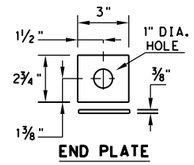


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

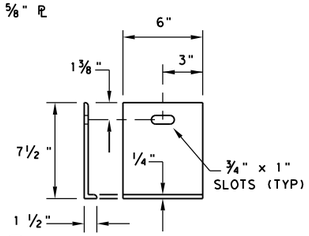


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

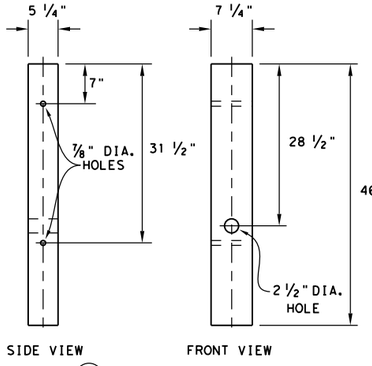
(6) BEARING PLATE
8"x 8"x 5/8" PL



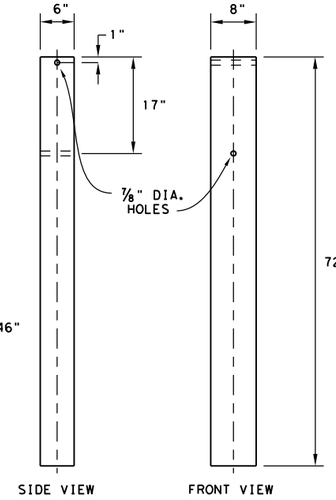
END PLATE



(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

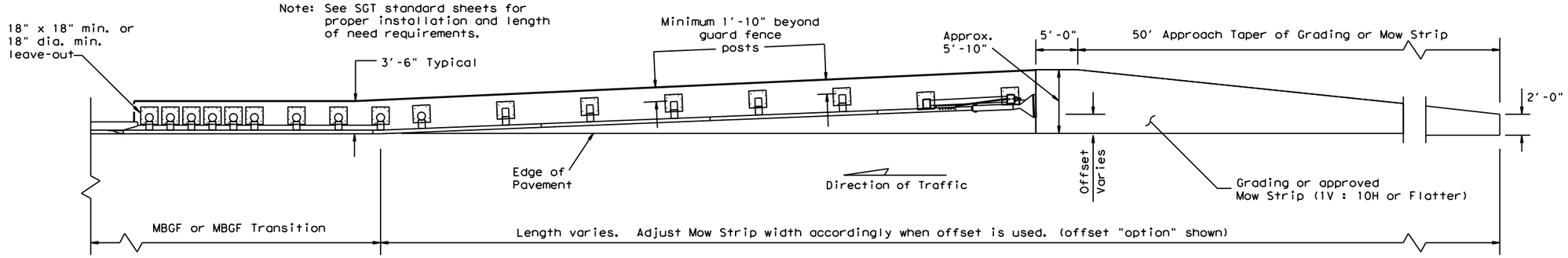
Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT

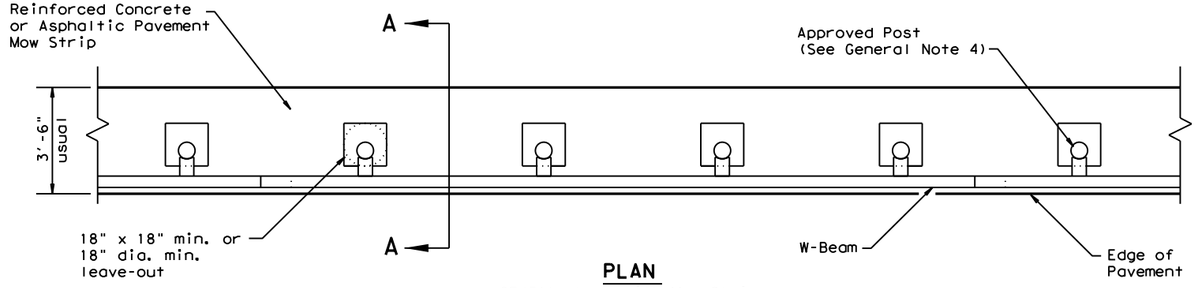
GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		79

DATE:
FILE:

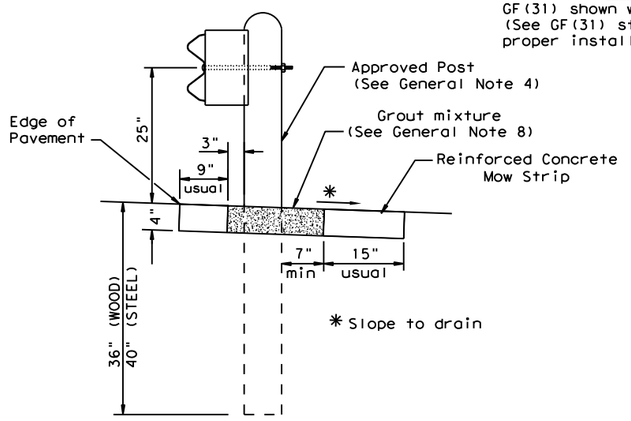


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



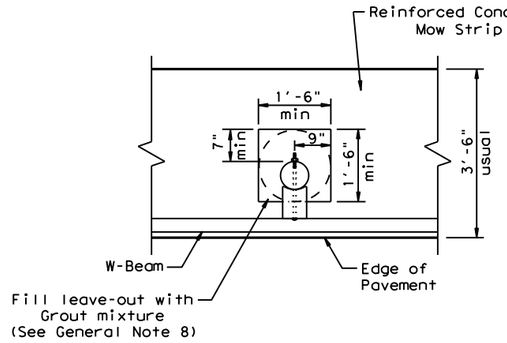
PLAN

GF(31) shown with Mow Strip
(See GF(31) standard sheet for proper installation)



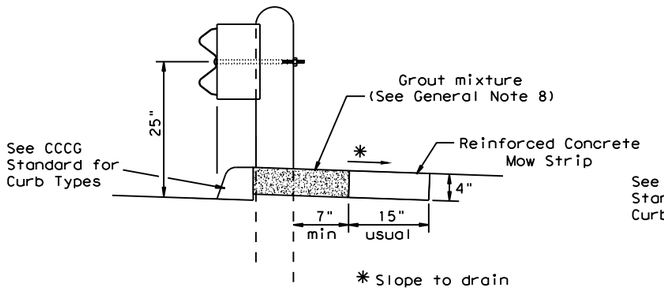
SECTION A-A

Typical



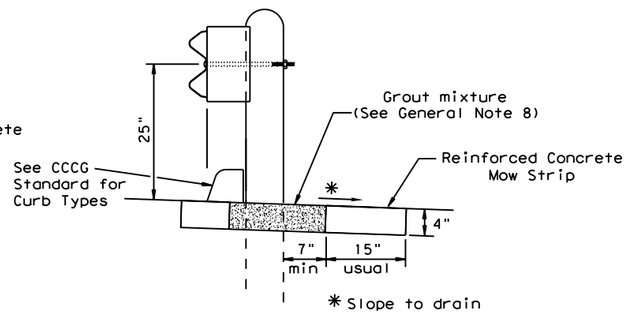
MOW STRIP DETAIL

Reinforced Concrete Mow Strip
with 18" x 18" Square or
18" Dia. minimum leave-out.



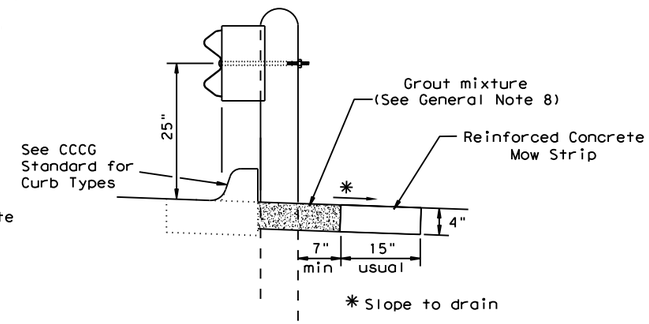
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.

Texas Department of Transportation

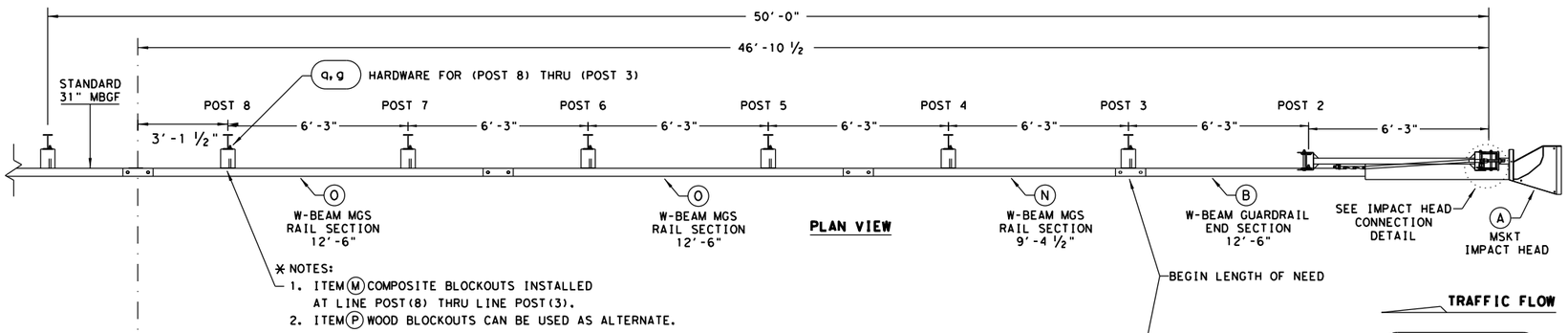
Design Division Standard

METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

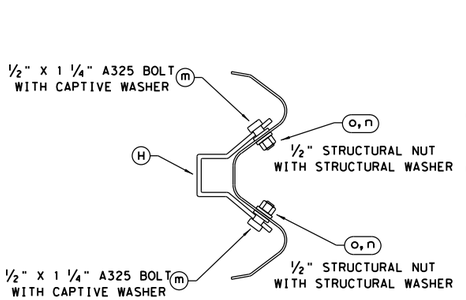
GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1378	01	050	RM 1431	
	DIST	COUNTY		SHEET NO.	
	AUS	TRAVIS		80	

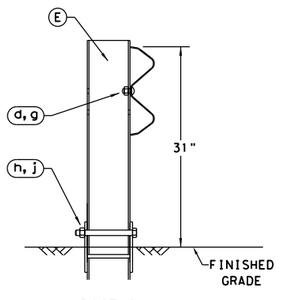
DATE:
FILE:



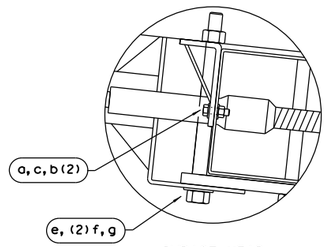
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



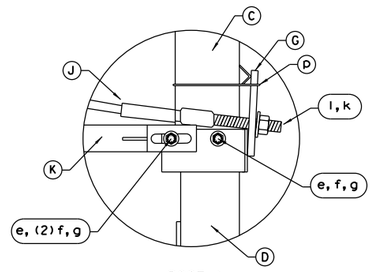
SECTION B-B
ANCHOR BRACKET



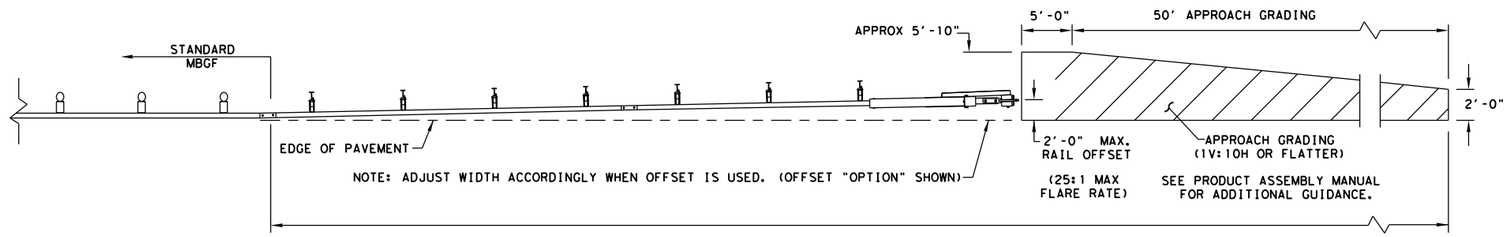
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



TRAFFIC FLOW

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.

GENERAL NOTES

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X ⅛" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 ½")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 9/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

SEE NOTES: *

ALTERNATIVE ITEMS NOT SHOWN. **
* ITEM(P) 8" WOOD-BLOCKOUT
** ITEM(Q) 25'GUARD FENCE PANEL

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	
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	DIST	COUNTY		SHEET NO.	
	AUS	TRAVIS		81	

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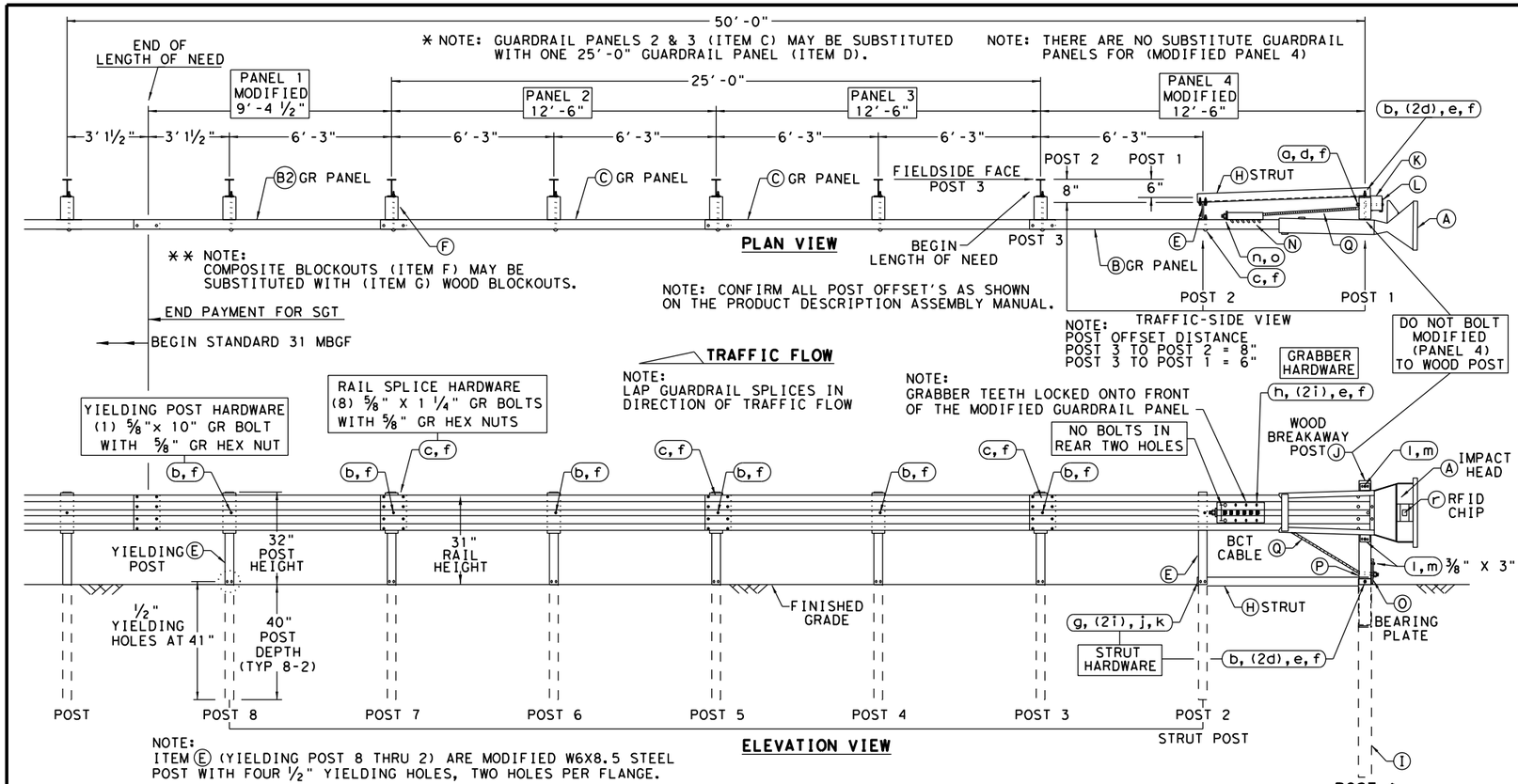
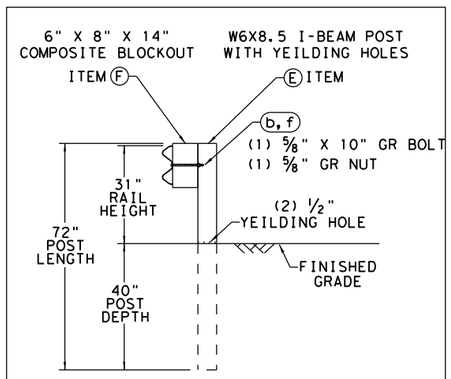


GENERAL NOTES

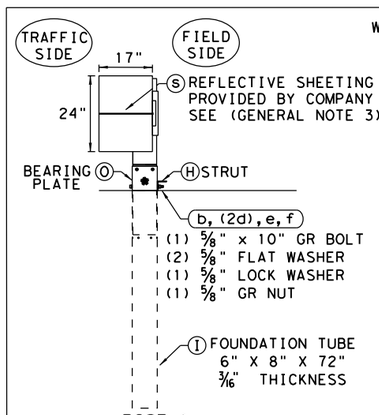
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D *	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G **	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
		SMALL HARDWARE	
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563DH HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

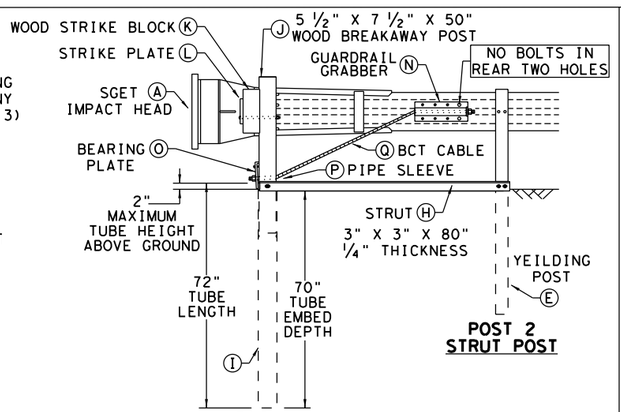
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



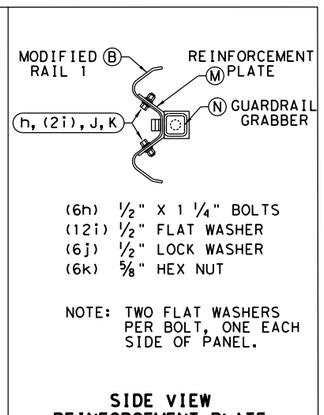
SIDE VIEW
POST 8 - POST 3 (TYP)



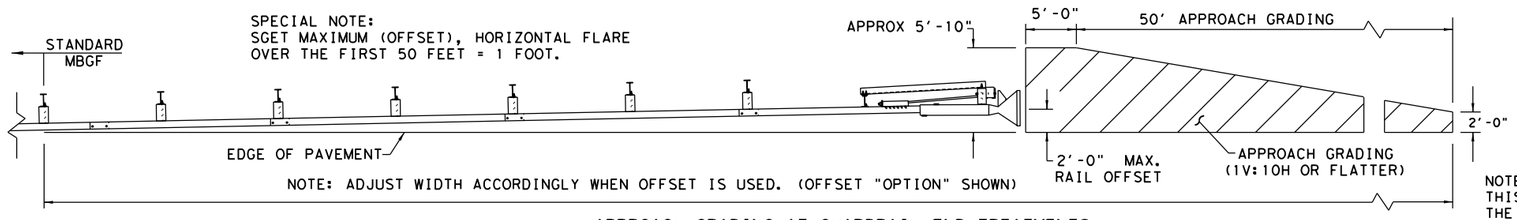
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

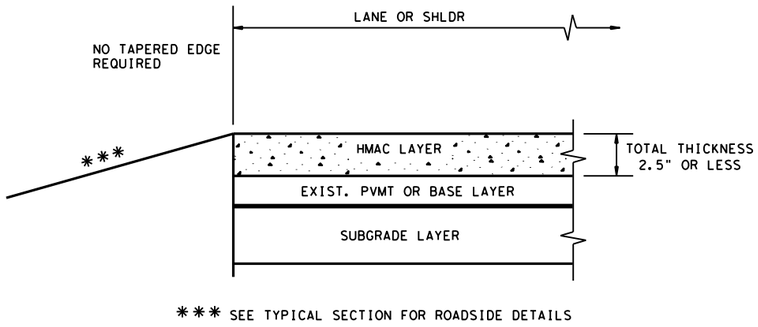
Texas Department of Transportation

Design Division Standard

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

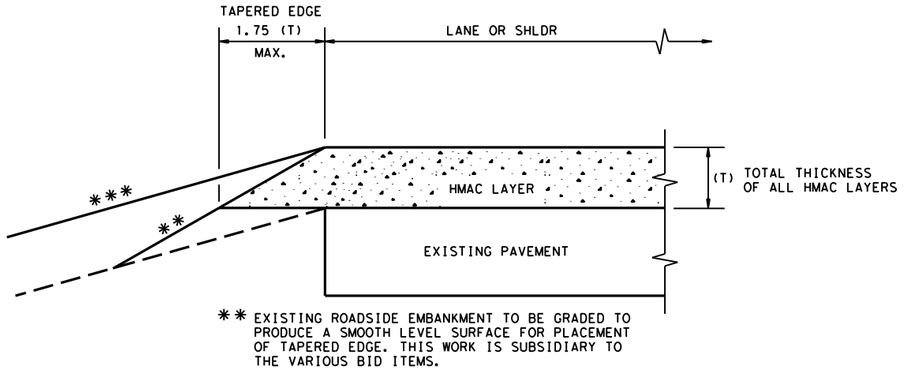
FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		82

DATE:
FILE:



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

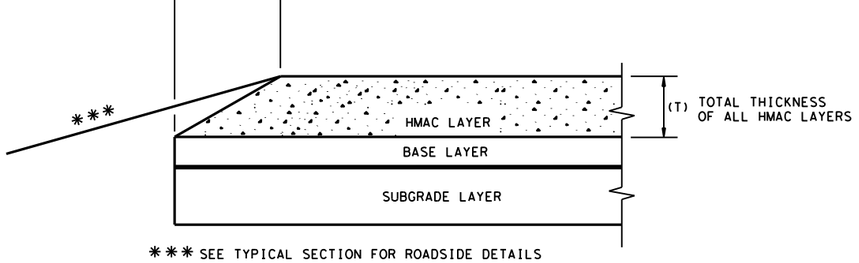
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY
WITH THICKNESS OF 2.5" OR LESS



** 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.

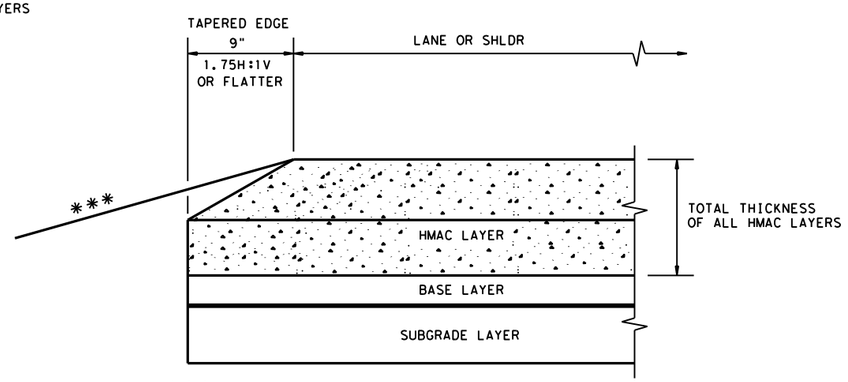
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

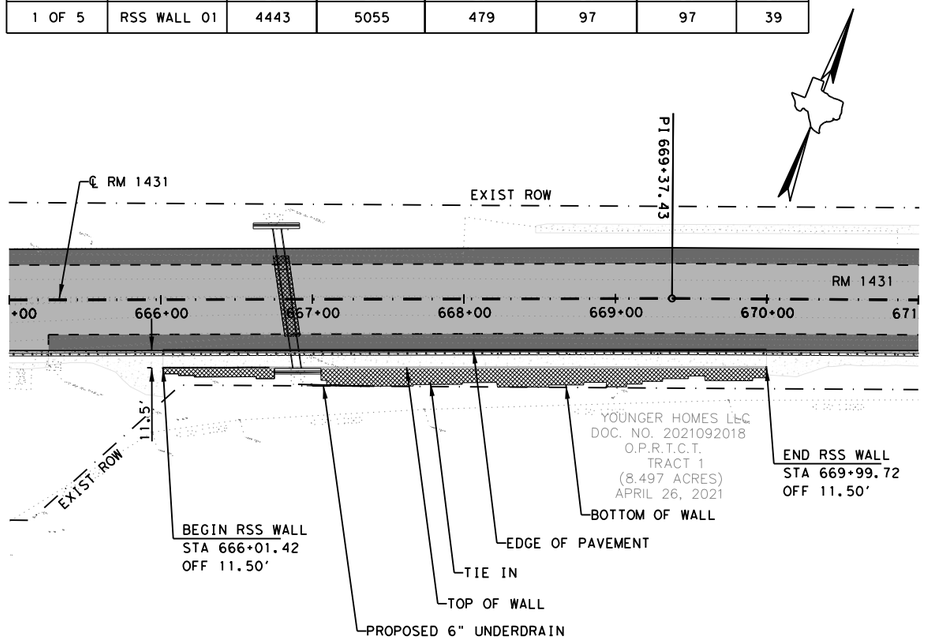
Design Division Standard

TAPERED EDGE DETAILS
HMAC PAVEMENT

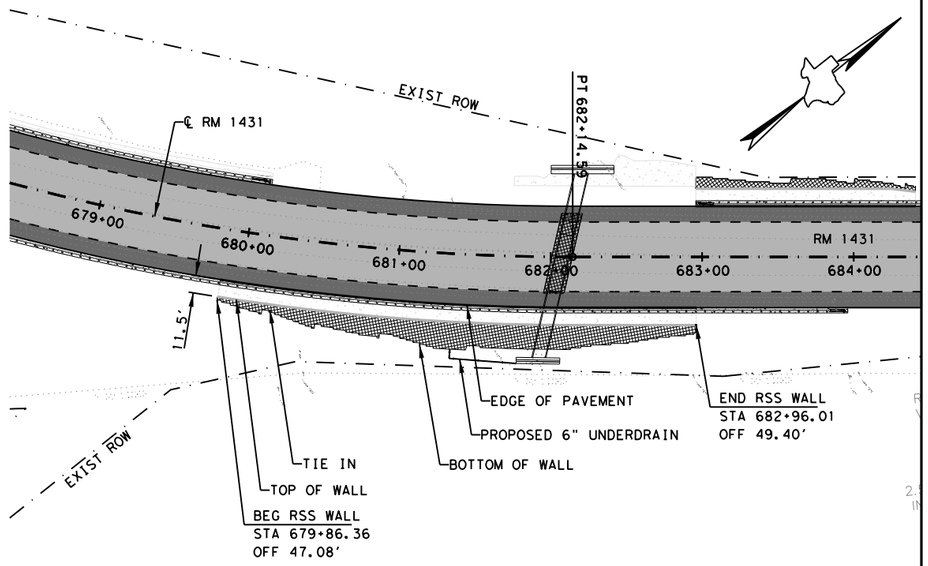
TE(HMAC)-11

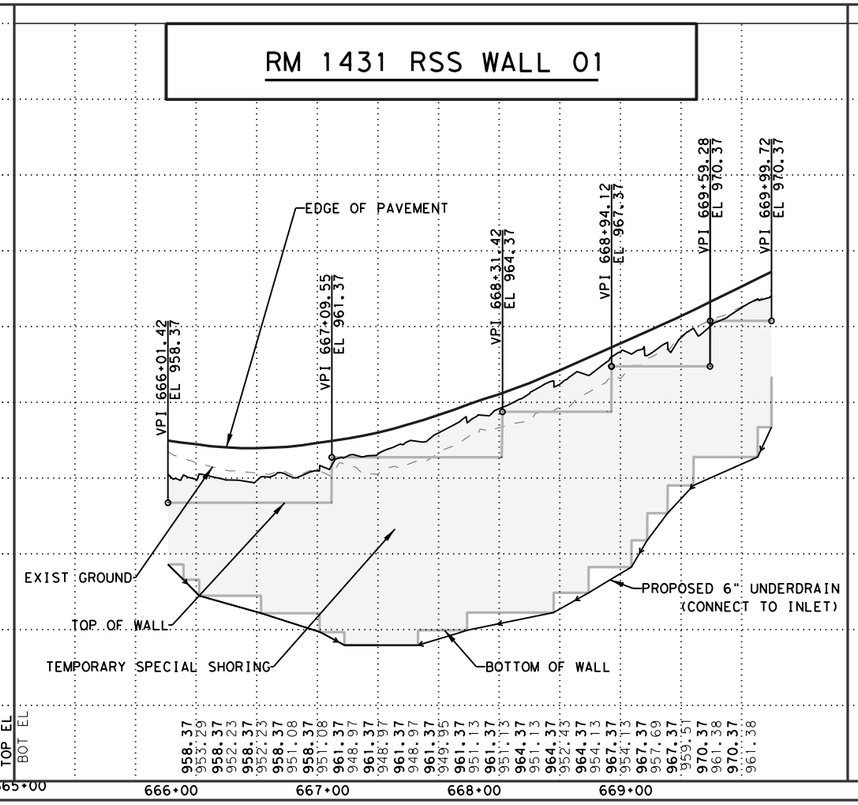
FILE: tehmac11.dgn		DN: TxDOT	CK: RL	DW: KB		CK:	
©TxDOT January 2011		CONT	SECT	JOB		HIGHWAY	
REVISIONS		1378	01	050		RM 1431	
		DIST	COUNTY			SHEET NO.	
		AUS	TRAVIS			83	

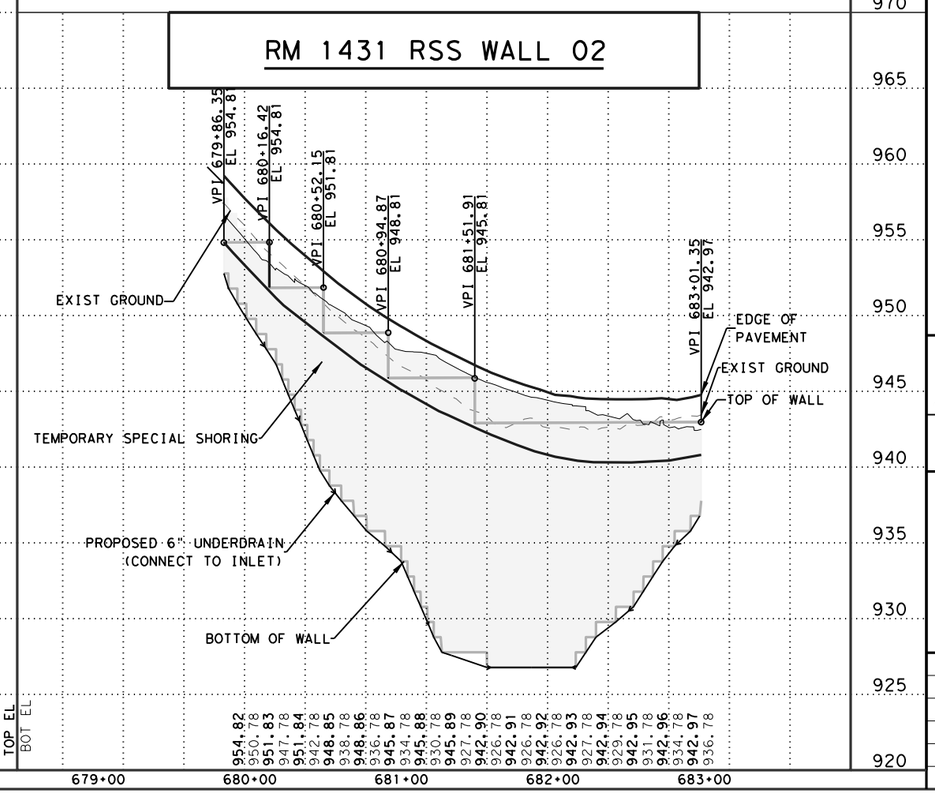
SHEET	LOCATION	403	5000	556	132	110	432
		7001	7001	7006	7005	7001	7001
		TEMPORARY SPL SHORING	GEOGRID REINFORCE EMBANKMENTS (TY A)	PIPE UNDERDRAINS (TY 6) (6'')	EMBANKMENT (FINAL) (ORD COMP) (TYP C)	EXCAVATION (ROADWAY)	RIPRAP (CONC) (4IN)
		SF	SY	LF	CY	CY	CY
1 OF 5	RSS WALL 01	4443	5055	479	97	97	39



SHEET	LOCATION	403	5000	556	132	110	432
		7001	7001	7006	7005	7001	7001
		TEMPORARY SPL SHORING	GEOGRID REINFORCE EMBANKMENTS (TY A)	PIPE UNDERDRAINS (TY 6) (6'')	EMBANKMENT (FINAL) (ORD COMP) (TYP C)	EXCAVATION (ROADWAY)	RIPRAP (CONC) (4IN)
		SF	SY	LF	CY	CY	CY
2 OF 5	RSS WALL 02	4033	7413	377	223	223	31







LEGEND

- CONC RIPRAP
- RSS WALL

NOTES

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.
2. FOR CONTRACTOR INFO ONLY.
3. VENDOR TO DESIGN RSS WALLS TO MEET STABILITY REQUIREMENTS PER GEC-11 DESIGN AND CONSTRUCTION OF MECHANICALLY STABILIZED EARTH WALLS AND REINFORCED SOIL SLOPES MANUAL.

HORIZONTAL
0 10 20 40 FT

VERTICAL
0 5 10 20 FT

FOR INFORMATION ONLY
LAYOUT IS FOR BASIS OF ESTIMATE
SUPPLIER TO DESIGN RSS WALL

PRINT DATE	REVISION DATE
10/24/2023	

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Austin District

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

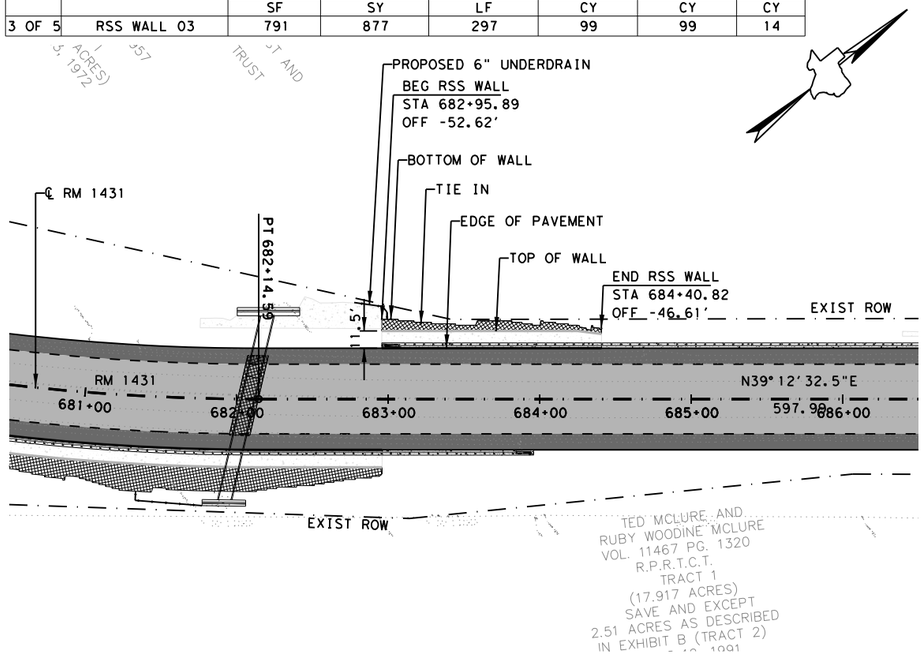
RM 1431
RSS WALL LAYOUTS
STA 665+49 TO STA 684+36

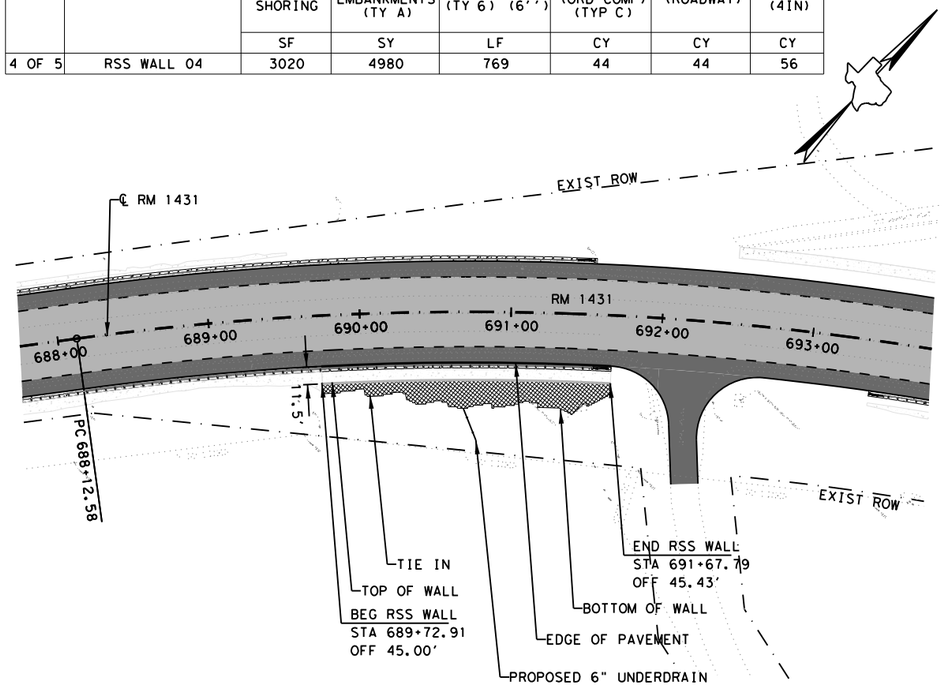
SHEET 01 OF 03 SHEETS

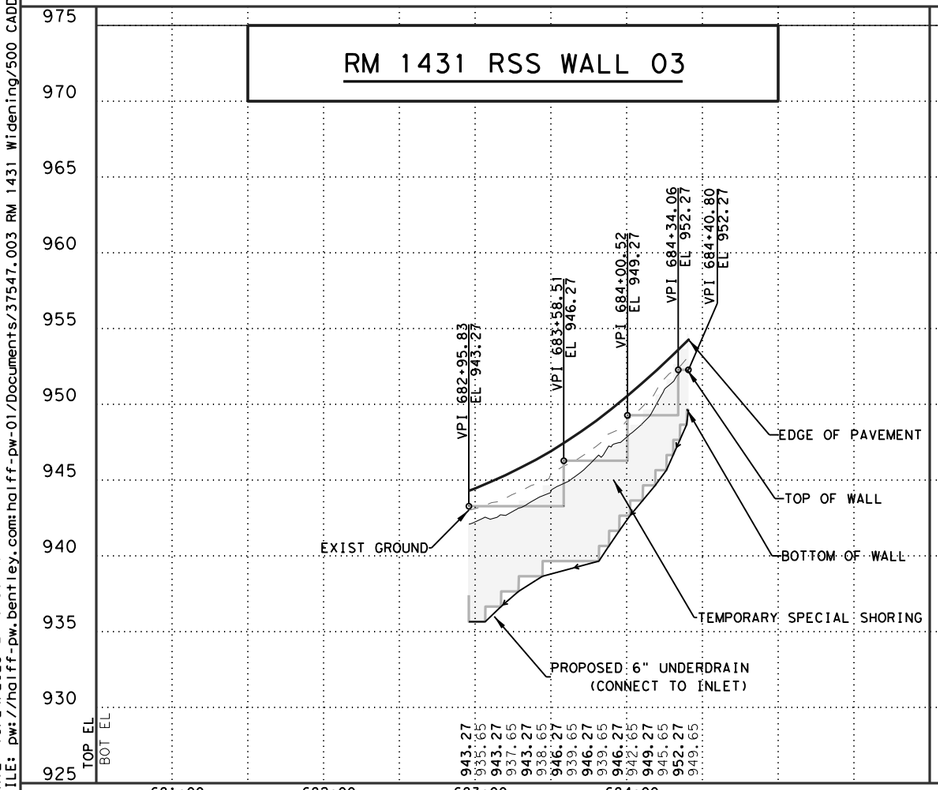
FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 84

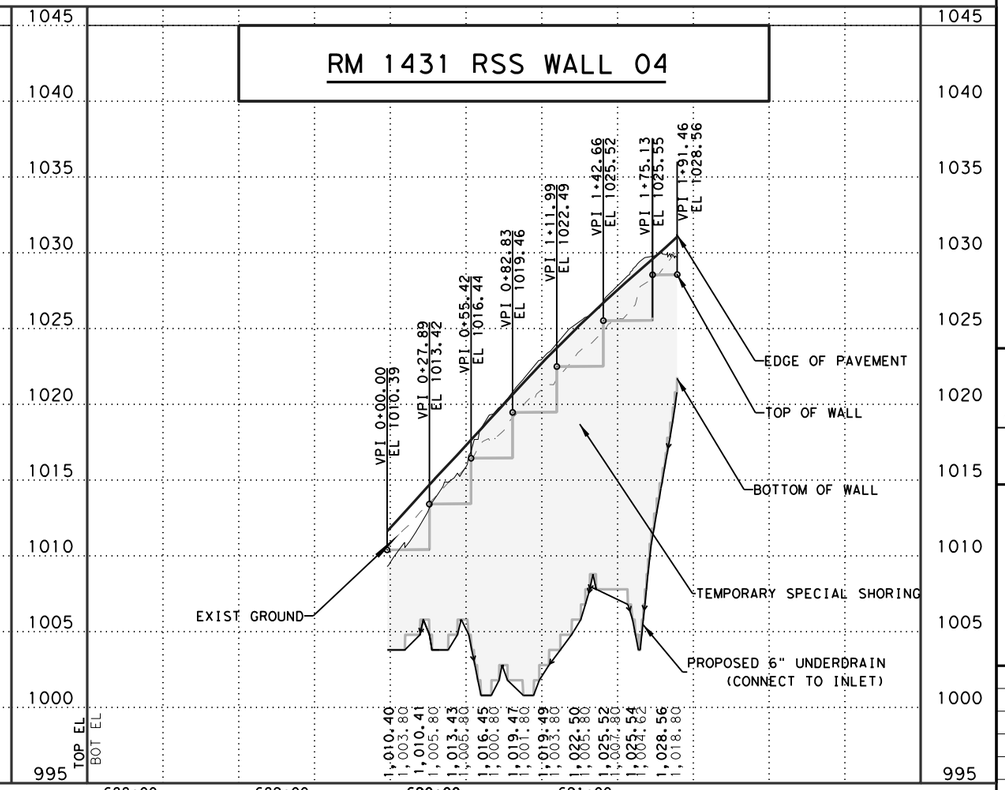
SHEET	LOCATION	403 7001 TEMPORARY SPL SHORING	5000 7001 GEOGRID REINFORCE EMBANKMENTS (TY A)	556 7006 PIPE UNDERDRAINS (TY 6) (6'')	132 7005 EMBANKMENT (FINAL) (ORD COMP) (TYP C)	110 7001 EXCAVATION (ROADWAY)	432 7001 RIPRAP (CONC) (4IN)
		SF	SY	LF	CY	CY	CY
3 OF 5	RSS WALL 03	791	877	297	99	99	14

SHEET	LOCATION	403 7001 TEMPORARY SPL SHORING	5000 7001 GEOGRID REINFORCE EMBANKMENTS (TY A)	556 7006 PIPE UNDERDRAINS (TY 6) (6'')	132 7005 EMBANKMENT (FINAL) (ORD COMP) (TYP C)	110 7001 EXCAVATION (ROADWAY)	432 7001 RIPRAP (CONC) (4IN)
		SF	SY	LF	CY	CY	CY
4 OF 5	RSS WALL 04	3020	4980	769	44	44	56









LEGEND

- CONC RIPRAP
- RSS WALL

NOTES

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.
2. FOR CONTRACTOR INFO ONLY.
3. VENDOR TO DESIGN RSS WALLS TO MEET STABILITY REQUIREMENTS PER GEC-11 DESIGN AND CONSTRUCTION OF MECHANICALLY STABILIZED EARTH WALLS AND REINFORCED SOIL SLOPES MANUAL.

HORIZONTAL
0 10 20 40 FT

VERTICAL
0 5 10 20 FT

FOR INFORMATION ONLY
LAYOUT IS FOR BASIS OF ESTIMATE
SUPPLIER TO DESIGN RSS WALL

PRINT DATE	REVISION DATE
10/24/2023	

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Austin District

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

RM 1431
RSS WALL LAYOUTS
STA 680+87 TO STA 693+92

SHEET 02 OF 03 SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 85

DATE: 10/24/2023 2:40:50 PM
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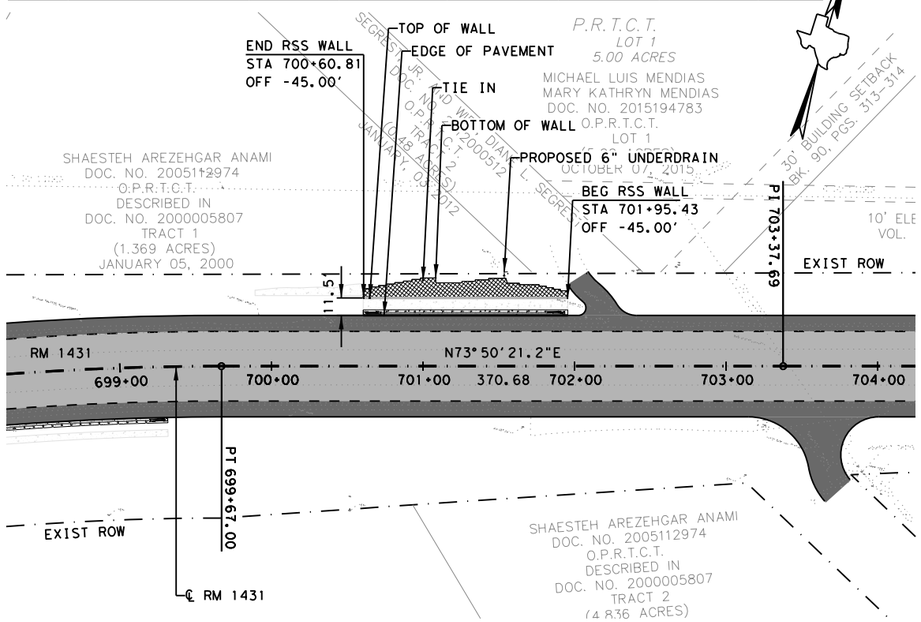
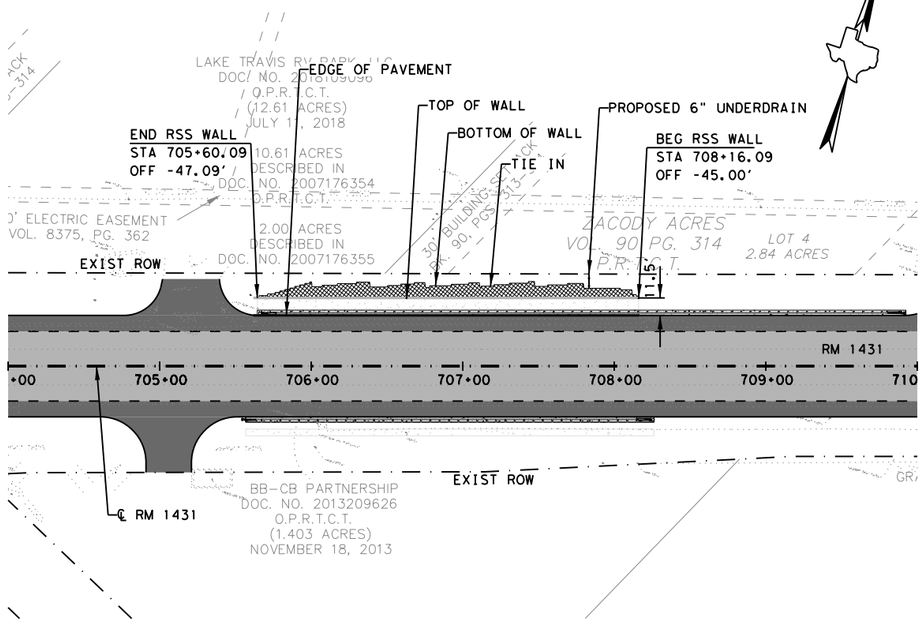
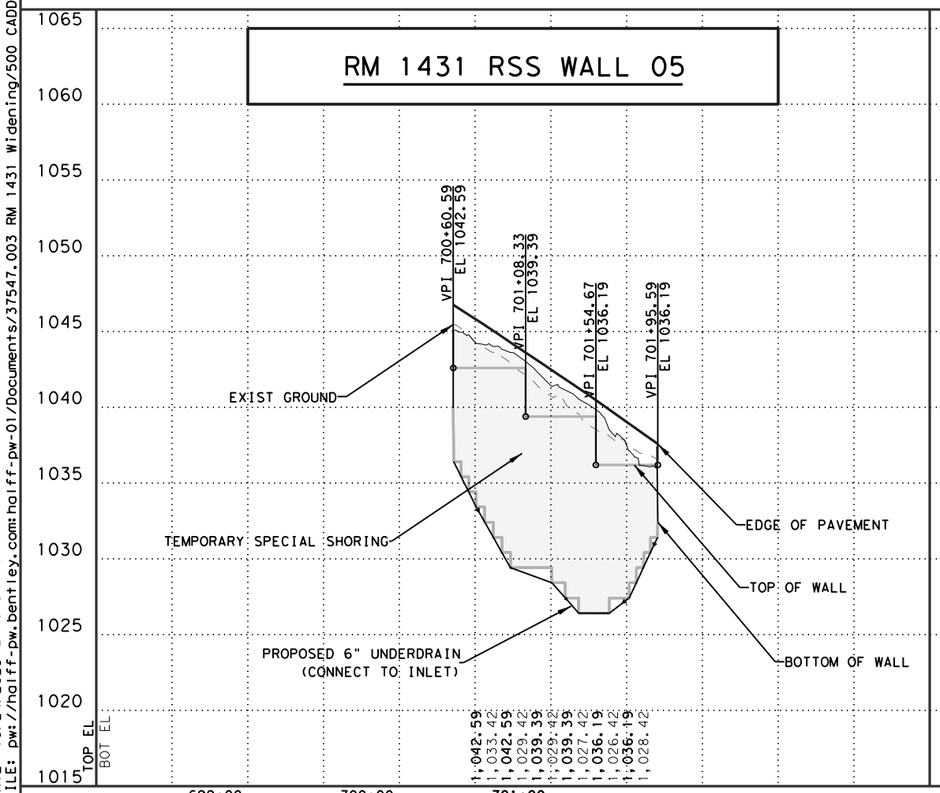
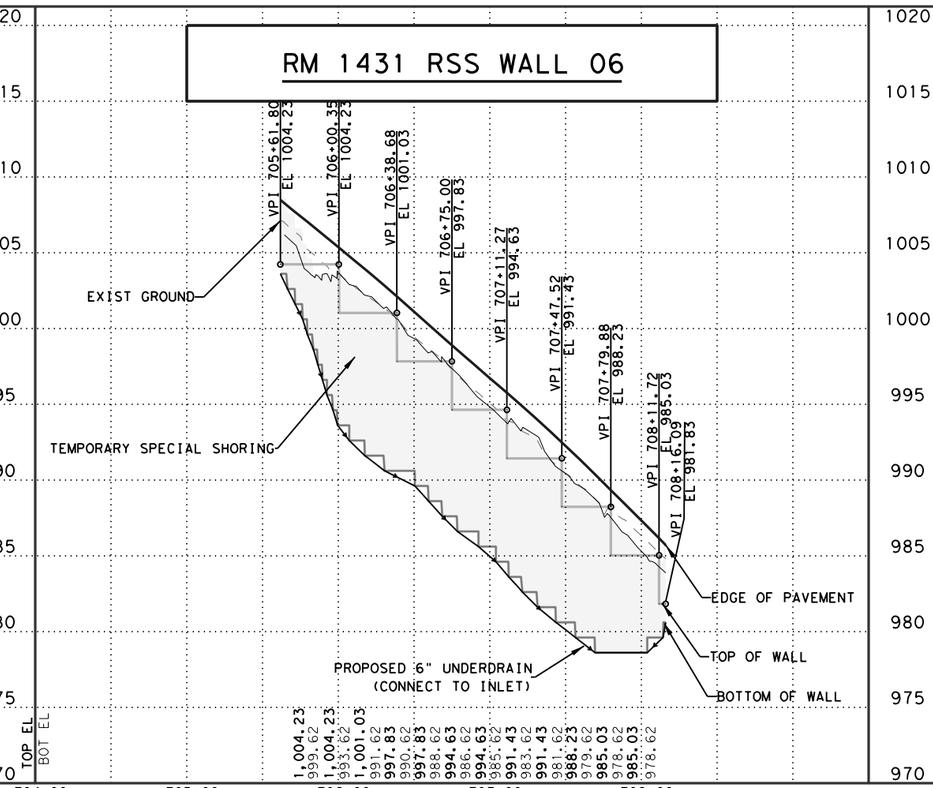
SHEET	LOCATION	403	5000	556	132	110	432
		7001	7001	7006	7005	7001	7001
		TEMPORARY SPL SHORING	GEOGRID REINFORCE EMBANKMENTS (TY A)	PIPE UNDERDRAINS (TY 6) (6'')	EMBANKMENT (FINAL) (ORD COMP) (TYP C)	EXCAVATION (ROADWAY)	RIPRAP (CONC) (4IN)
		SF	SY	LF	CY	CY	CY
5 OF 5	RSS WALL 05	1543	1419	204	11	11	40

SHEET	LOCATION	403	5000	556	132	110	432
		7001	7001	7006	7005	7001	7001
		TEMPORARY SPL SHORING	GEOGRID REINFORCE EMBANKMENTS (TY A)	PIPE UNDERDRAINS (TY 6) (6'')	EMBANKMENT (FINAL) (ORD COMP) (TYP C)	EXCAVATION (ROADWAY)	RIPRAP (CONC) (4IN)
		SF	SY	LF	CY	CY	CY
6 OF 6	RSS WALL 06	2232	2425	488	81	81	75









LEGEND

- CONC RIPRAP
- RSS WALL

NOTES

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.
2. FOR CONTRACTOR INFO ONLY.
3. VENDOR TO DESIGN RSS WALLS TO MEET STABILITY REQUIREMENTS PER GEC-11 DESIGN AND CONSTRUCTION OF MECHANICALLY STABILIZED EARTH WALLS AND REINFORCED SOIL SLOPES MANUAL.

HORIZONTAL
0 10 20 40 FT

VERTICAL
0 5 10 20 FT

FOR INFORMATION ONLY
LAYOUT IS FOR BASIS OF ESTIMATE
SUPPLIER TO DESIGN RSS WALL

PRINT DATE	REVISION DATE
10/24/2023	

Texas Department of Transportation
Austin District

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

RM 1431
RSS WALL LAYOUTS
STA 699+72 TO STA 710+00

SHEET 03 OF 03 SHEETS

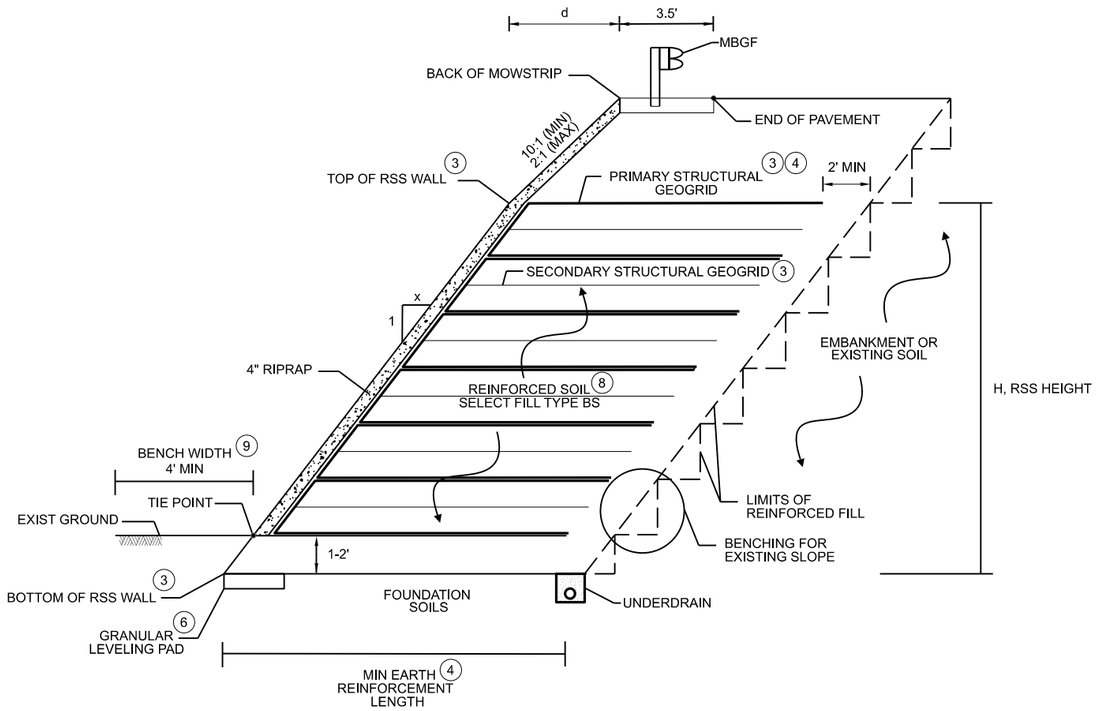
FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 86

DATE: 10/24/2023 2:40:51 PM
FILE: pw://halff-pw.bentley.com:halff-pw-01/Documents/37547.003 RM 1431 Widening/500 CADD/4 - Design/Master Design Files/Sheet Boundary Container/050/RM1431_RSS_WALLS_050.dgn

DATE: 1/9/2024
FILE: pw://halff-pw.bentley.com:halff-pw-01/Documents/37547.003 RM 1431 Widening/500 CADD/4 - Design/Geotech/RM1431_050_RSS_DD_SHEET.dgn

WALL SUMMARY

RSS Retaining Wall	Begin Station (1)	End Station (1)	*d*	*x*	Retained Soil Friction Angle (2)	Foundation Soil Friction Angle (2)	Ground Improvement	Min Earth Reinf. Length (4)	Min Wall Embedment (5)	Underdrain Required	Drawdown Analysis	Bench Width (9)
RM 1431 RSS WALL 01	666+01.42	670+00.00	8	1	27	30	NO	95% H (MIN. 8 ft)	1 FT	YES	NO	4 FT
RM 1431 RSS WALL 02	679+86.75	682+96.00	8	1	27	30	NO	95% H (MIN. 8 ft)	1 FT	YES	NO	4 FT
RM 1431 RSS WALL 03	682+95.83	684+40.83	8	1	27	30	NO	95% H (MIN. 8 ft)	1 FT	YES	NO	4 FT
RM 1431 RSS WALL 04	689+72.91	691+67.79	8	1	27	30	NO	95% H (MIN. 8 ft)	1 FT	YES	NO	4 FT
RM 1431 RSS WALL 05	700+60.59	701+95.59	8	1	27	30	NO	95% H (MIN. 8 ft)	1 FT	YES	NO	4 FT
RM 1431 RSS WALL 06	705+60.09	708+16.09	8	1	27	30	NO	95% H (MIN. 8 ft)	1 FT	YES	NO	4 FT



TYPICAL CROSS SECTION 7
FOR BASIS OF QUANTITIES

(1) Indicate limits for which the stated soil design requirements and assumptions are applicable.

(2) Base the listed retained and foundation friction angle on local experience or measured/correlated long term strength values.

(3) Vertical spacing of primary and secondary structural geogrid; length and need of secondary structural geogrid, and geogrid arrangement at the face of the wall shall be determined by the contractor

(4) Use the maximum value of: minimum length or percentage of wall height, H presentedf in the "Min Earth Reinf. Length" column of the table above. Wall height is equal to the distance between the top of leveling pad and top of RSS wall.

(5) Guidance to wall designer of record for determination of minimum wall embedment. Unless noted elsewhere in the plans, provide a minimum embedment from the top of leveling pad to finished grade of
- 1 foot for level ground where there is no potential for erosion or future excavation, or
- 2 feet for sloping ground (4.0H:1.0V or steeper) or where there is potential for removal of soil in front of the wall.

(6) Granular leveling pad at the bottom of the wall is optional but would also require the installation of underdrain.

(7) Vendor to design RSS walls to meet stability requirements per GEC-11 Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Manual.

(8) In fill sections, use Retained Embankment Fill Type C.

(9) For stability purposes, maintain at least a 4' clearance from tie point away from foot of the wall.

SPECIAL NOTES:
This sheet is to be filled out by the wall designer of record at time of plan preparation to provide soil strength parameters for the design of the specified walls. The completed sheet must be signed, sealed, and dated by alicensed Professional Engineer.

STATE OF TEXAS
LEONEL RUIZ
97291
LICENSED
PROFESSIONAL ENGINEER

01/30/2024

PRINT DATE	REVISION DATE
1/9/2024	

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Austin District

HVJ ASSOCIATES
6120 S.DAIRY ASHFORD ROAD
HOUSTON, TEXAS 7702
281.933.7388
TEXAS FIRM # 000646

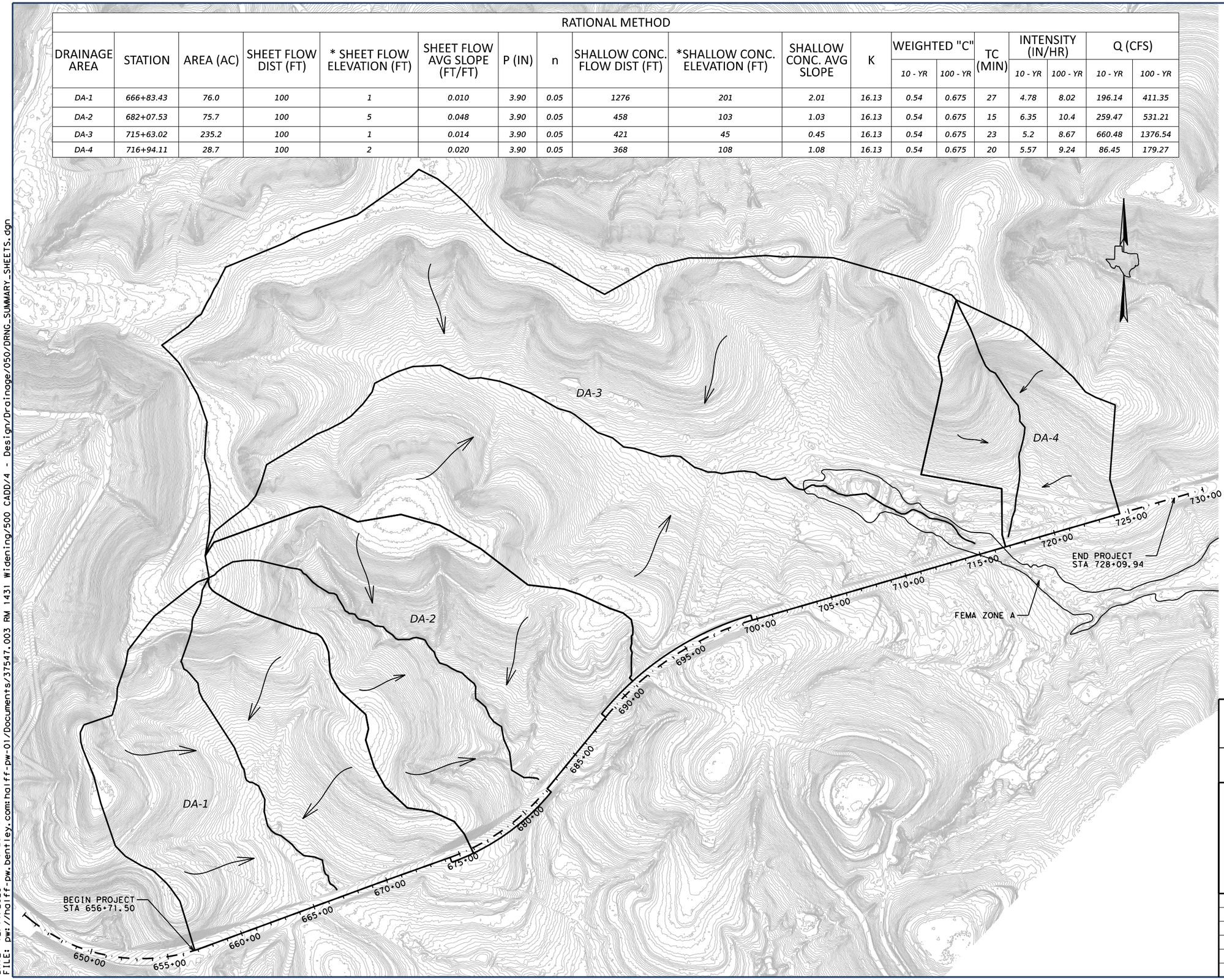
REINFORCED SOIL SLOPE RETAINING WALL DESIGN DATA

RW(RSS)DD

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	87

RATIONAL METHOD																		
DRAINAGE AREA	STATION	AREA (AC)	SHEET FLOW DIST (FT)	* SHEET FLOW ELEVATION (FT)	SHEET FLOW AVG SLOPE (FT/FT)	P (IN)	n	SHALLOW CONC. FLOW DIST (FT)	*SHALLOW CONC. ELEVATION (FT)	SHALLOW CONC. AVG SLOPE	K	WEIGHTED "C"		TC (MIN)	INTENSITY (IN/HR)		Q (CFS)	
												10 - YR	100 - YR		10 - YR	100 - YR	10 - YR	100 - YR
DA-1	666+83.43	76.0	100	1	0.010	3.90	0.05	1276	201	2.01	16.13	0.54	0.675	27	4.78	8.02	196.14	411.35
DA-2	682+07.53	75.7	100	5	0.048	3.90	0.05	458	103	1.03	16.13	0.54	0.675	15	6.35	10.4	259.47	531.21
DA-3	715+63.02	235.2	100	1	0.014	3.90	0.05	421	45	0.45	16.13	0.54	0.675	23	5.2	8.67	660.48	1376.54
DA-4	716+94.11	28.7	100	2	0.020	3.90	0.05	368	108	1.08	16.13	0.54	0.675	20	5.57	9.24	86.45	179.27



LEGEND

- DRAINAGE AREA
- LONGEST FLOW PATH
- FLOW

NOTES:

1. NOAA ATLAS-14 RAINFALL INTENSITIES WERE USED IN CALCS.
2. PLANS AND H&H FILES WERE SENT TO THE LOCAL FLOODPLAIN ADMINISTRATOR TRAVIS COUNTY ON 11/01/2023.

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED
PROFESSIONAL ENGINEER

12/21/2023

PRINT DATE	REVISION DATE
12/11/2023	

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Austin District

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

RM 1431 HYDROLIC DATA SHEET

SHEET 01 OF 01

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	88

DATE: 12/11/2023 11:46:25 AM
FILE: pw://halff-pw.bentley.com:halff-pw-01/Documents/37547.003 RM 1431 Widening/500 CADD/4 - Design/Drainage/050/DRNG_SUMMARY_SHEETS.dgn

CSJ 1378-01-050

RATIONAL METHOD

DRAINAGE AREA	AREA (AC)	SHEET FLOW DIST (FT)	SHEET FLOW ELEVATION (FT)	SHEET FLOW AVG SLOPE (FT/FT)	P (IN)	n	SHALLOW CONC. FLOW DIST (FT)	SHALLOW CONC. ELEVATION (FT)	SHALLOW CONC. AVG SLOPE (FT/FT)	K	WEIGHTED "C"		Tc (MIN)	INTENSITY (IN/HR)	
											5 - YR	100 - YR		5 - YR	100 - YR
DA-1 RT	0.50	100	992	0.02	3.91	0.4	311.70	990	0.24	16.13	0.66	0.82	20	4.60	9.24
DA-2 RT	2.54	100	1078	0.02	3.91	0.4	126.20	1076.00	0.29	16.13	0.58	0.73	21	4.49	9.04
DA-3 RT	3.79	100	1078	0.03	3.91	0.4	53.06	1074.00	0.13	16.13	0.66	0.82	17	4.97	9.90
DA-4 LT	0.26	0	0	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.62	0.78	5	7.53	14.16
DA-5 RT	5.14	100	996	0.01	3.91	0.4	211.28	986.00	0.22	16.13	0.67	0.83	11	5.95	11.60
DA-6 LT	0.25	100	996	0.14	3.91	0.4	374.93	982.00	0.37	16.13	0.62	0.77	10	7.53	14.16
DA-7 RT	3.30	100	1174	0.02	3.91	0.4	1231.18	1172.00	2.08	16.13	0.69	0.87	20	6.16	11.96
DA-8 LT	1.87	100	974	0.13	3.91	0.4	0.00	0.00	0.00	0.00	0.67	0.84	5	4.60	9.24

RM 1431 DITCH CALCULATIONS - 5 - YEAR

DITCH I.D.	REACH (STA)		LENGTH	FORESLOPE	BACKSLOPE	BOTTOM WIDTH	MANNING'S "n"	DITCH SLOPE	D.A. BASIN I.D.	BASIN FLOW	% OF BASIN	NORMAL DEPTH	DITCH CAPACITY	VELOCITY	SHEAR
	FROM	TO		(H:1)	(H:1)	(FT)		(FT/FT)		(CFS)		(FT)	(CFS)	(FT/S)	(PSF)
D_FL_LT1	662+65.00	665+00.00	235.00	6	1.3	0	0.033	0.027	DA-1	13.42	100	0.98	150.00	3.95	0.64
D_FL_RT2	663+50.00	665+26.00	176.00	3	3	0	0.033	0.024	DA-2	20.80	100	1.53	126.50	4.67	0.87
D_FL_LT3	668+48.00	673+48.00	500.00	6	1.3	0	0.033	0.042	DA-3	26.16	100	0.91	284.91	7.16	2.98
D_FL_LT4	673+48.00	680+10.00	662.00	3	1.3	0	0.033	0.053	DA-4	51.05	100	1.80	45.29	8.08	2.54
D_FL_RT5	683+96.00	686+84.00	288.00	6	2	0	0.033	0.106	DA-5	20.80	100	0.40	258.23	5.90	2.31
D_FL_LT6	686+40.00	689+53.00	313.00	3	1.3	0	0.033	0.119	DA-6	14.94	100	0.89	184.75	9.74	4.67
D_FL_LT7	692+47.00	695+00.00	253.00	6	3	0	0.033	0.051	DA-7	17.57	100	0.83	350.14	7.12	3.19
D_FL_RT8	693+42.00	700+43.00	701.00	3	1.3	0	0.033	0.004	DA-8	14.38	100	1.19	129.31	5.01	1.22
D_FL_RT9	701+76.00	702+86.00	110.00	6	2.5	0	0.033	0.076	DA-9	18.19	100	0.78	353.25	7.46	2.55
D_FL_RT10	704+20.00	704+61.00	41.00	6	3	0	0.033	0.081	DA-10	4.22	100	0.44	314.00	4.78	1.20
D_FL_RT11	705+57.00	711+00.00	543.00	3	1.3	0	0.033	0.097	DA-11	26.30	100	0.98	610.83	8.17	2.98
D_FL_RT12	712+16.00	714+08.00	192.00	6	1.3	0	0.033	0.067	DA-12	47.33	100	0.92	1052.50	9.03	3.14
D_FL_LT13	719+90.00	721+64.00	174.00	6	2	0	0.033	0.046	DA-13	20.76	100	0.91	285.40	6.56	2.09
D_FL_LT14	723+17.00	727+86.00	469.00	6	1.3	0	0.033	0.015	DA-14	30.84	100	1.39	537.55	4.26	0.63

RM 1431 DRWY CULVERT CALCULATIONS - 5 - YEAR

DRIVEWAY	P&P SHEET NO.	NO. OF BARRELS	PIPE SIZE	5 YR FLOW (CFS)	VELOCITY (CSF)
1	DRWY 1	1	18"	1.52	10.28
3	SS 2	1	18"	6.64	13.72
5	SS 3	2	18"	12.34	5.17
4	DRWY 3	1	24"	12.34	15.14
3	DRWY 3	1	18	1.20	3.27
5	DRWY 4	1	18"	2.36	11.24
6	DRWY 4	1	30"	32.75	7.98
7	DRWY 5	1	36"	46.83	15.61
4	SS 4	1	18"	5.80	9.41

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RM 1431
INTERNAL HYDROLOGY - DITCH DATA

SHEET 01 OF 01

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	89

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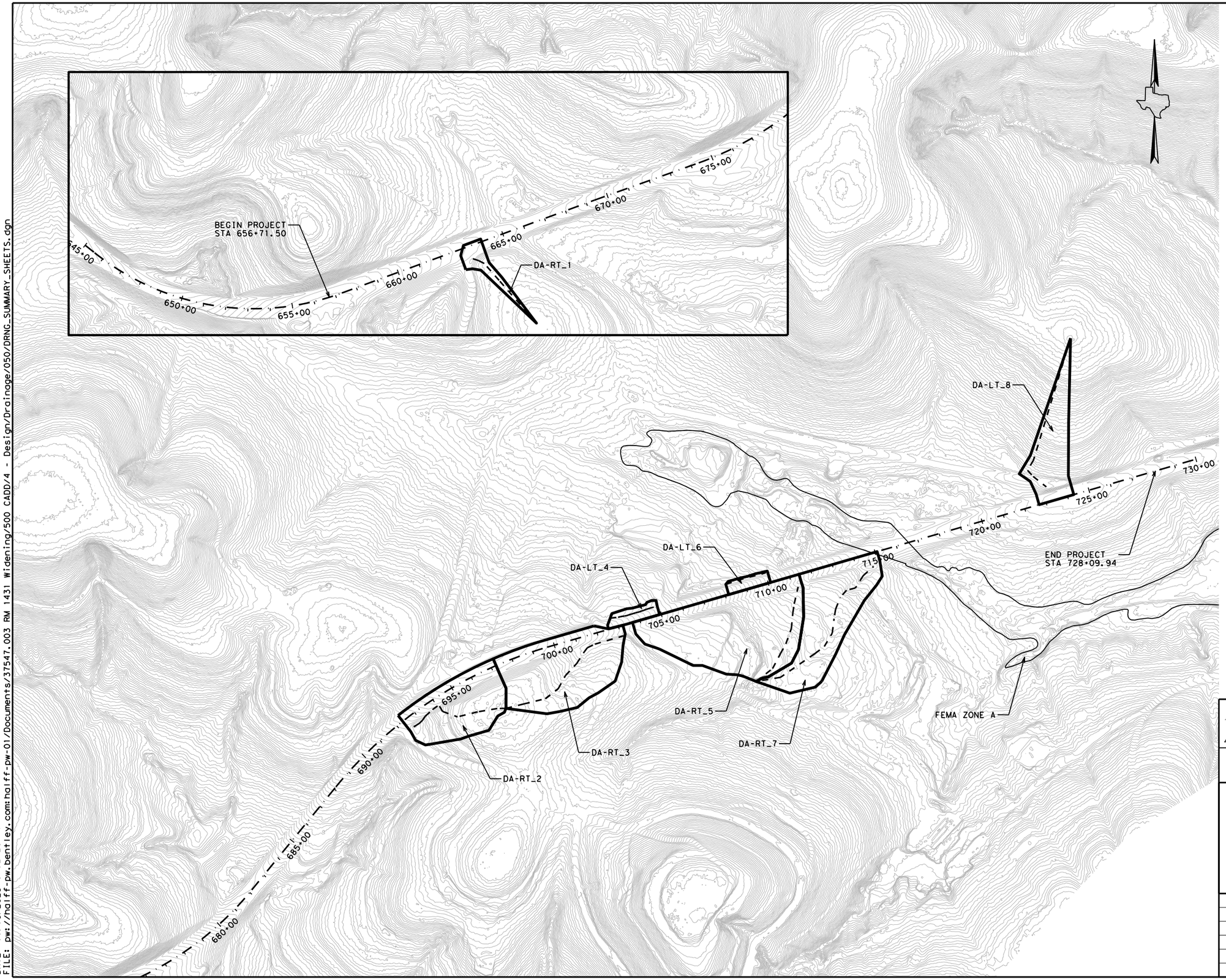

LEGEND

DRAINAGE AREA

LONGEST FLOW PATH

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RM 1431
INTERNAL HYDROLIC DATA SHEET

SHEET 01 OF 01

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
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STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	90

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HY-8 EXISTING CULVERT ANALYSIS - RM 1431 - CULVERT 666+83.43

Return Interval	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2 year	117.76	117.76	957.37	5.43	2.57	5-S2n	2.57	3.15	2.59	0.59	11.89	5.07
5 year	161.26	161.26	959.37	7.43	5.57	5-S2n	3.15	3.68	3.15	0.66	12.91	5.49
10 year	196.14	196.14	961.46	9.52	7.71	5-S2n	3.69	4.02	3.7	0.72	13.26	5.76
25 year	269.91	215.68	962.85	10.91	9.07	5-S2n	4.1	4.17	4.1	0.81	13.25	6.24
50 year	342.21	217.19	962.97	11.03	9.17	5-S2n	4.15	4.18	4.15	0.88	13.23	6.62
100 year	411.35	218.36	963.06	11.12	9.26	5-S2n	4.19	4.19	4.19	0.94	13.2	6.94

****

Culvert Barrel Type Straight Culvert
Inlet Elevation (invert): 951.94 ft, Outlet Elevation (invert): 949.17 ft
Culvert Length: 98.29 ft, Culvert Slope: 0.0282

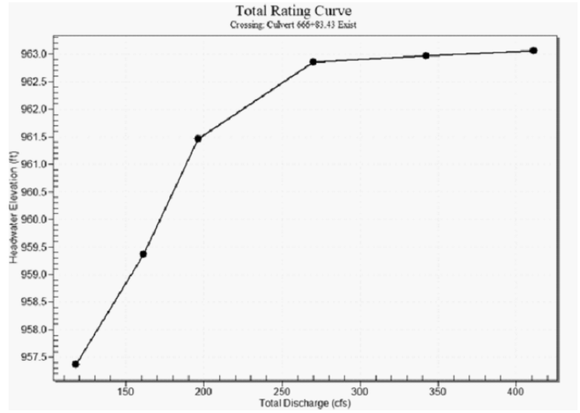
****

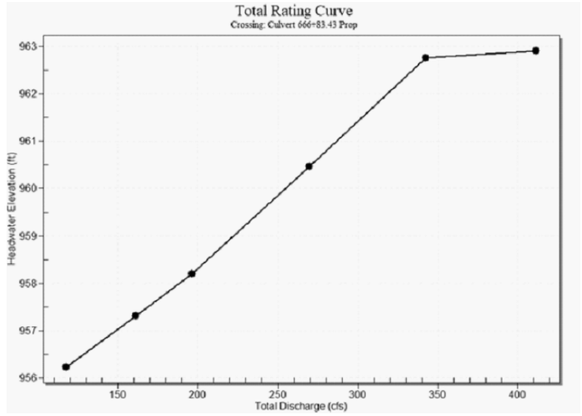
Site Data - Culvert 666+83.43 Exist
Site Data Option: Culvert Invert Data
Inlet Station: 50.40 ft
Inlet Elevation: 951.94 ft
Outlet Station: 148.65 ft
Outlet Elevation: 949.17 ft
Number of Barrels: 1

Culvert Data Summary - Culvert 666+83.43 Exist
Barrel Shape: Circular
Barrel Diameter: 4.75 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Thin Edge Projecting
Inlet Depression: None

Tailwater Channel Data - Culvert 666+83.43 Exist
Tailwater Channel Option: Irregular Channel
Channel Slope: Irregular Channel

Roadway Data for Crossing: Culvert 666+83.43 Exist
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 300.00 ft
Crest Elevation: 962.70 ft
Roadway Surface: Paved
Roadway Top Width: 61.00 ft





HY-8 PROPOSED CULVERT ANALYSIS - RM 1431 - CULVERT 666+83.43

Return Interval	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2-yr	117.76	117.76	956.24	4.30	0.45	1-S2n	1.34	2.58	1.52	0.59	15.48	5.07
5-yr	161.26	161.26	957.31	5.37	1.61	5-S2n	1.67	3.18	1.95	0.66	16.57	5.49
*10-yr	196.14	196.14	958.21	6.27	2.63	5-S2n	1.92	3.63	2.27	0.72	17.26	5.76
25-yr	269.91	269.91	960.46	8.52	5.33	5-S2n	2.43	4.49	2.93	0.81	18.44	6.24
50-yr	342.21	329.23	962.76	10.82	7.23	5-S2n	2.83	5.00	3.43	0.88	19.20	6.62
100-yr	411.35	332.44	962.90	10.96	7.33	5-S2n	2.85	5.00	3.45	0.94	19.25	6.94

****

Culvert Barrel Type Straight Culvert
Inlet Elevation (invert): 951.94 ft, Outlet Elevation (invert): 949.17 ft
Culvert Length: 97.81 ft, Culvert Slope: 0.0283

****

Site Data Option: Culvert Invert Data
Inlet Station: 50.40 ft
Inlet Elevation: 951.94 ft
Outlet Station: 148.17 ft
Outlet Elevation: 949.17 ft
Number of Barrels: 1

Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 5.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0130
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwall (Ke=0.5)
Inlet Depression: None

Tailwater Channel Data - Culvert 666+83.43 Exist
Tailwater Channel Option: Irregular Channel
Channel Slope: Irregular Channel

Roadway Data for Crossing: Culvert 666+83.43 Prop
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 300.00 ft
Crest Elevation: 962.70 ft
Roadway Surface: Paved
Roadway Top Width: 61.00 ft

** Design ARI based on TxDOT Hydraulic Design Manual Funtional Classification and Structure Type.*

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RM 1431
CULVERT
HYDRAULIC DATA

SHEET 01 OF 04

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	91

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HY-8 EXISTING CULVERT ANALYSIS - RM 1431 - CULVERT 682+07.53

Return Interval	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2 year	158.14	158.14	936.46	11.03	8.18	5-S2n	3.18	3.65	3.18	1.89	14.76	8.25
5 year	214.53	214.53	944.05	18.62	16.8	6-FFc	4.00	4.00	4.00	2.12	17.07	8.90
10 year	259.47	216.36	944.33	18.9	17.12	6-FFc	4.00	4.00	4.00	2.28	17.22	9.34
25 year	353.74	217.06	944.44	19.01	17.24	6-FFc	4.00	4.00	4.00	2.56	17.27	10.09
50 year	445.72	217.58	944.53	19.1	17.33	6-FFc	4.00	4.00	4.00	2.79	17.31	10.69
100 year	531.21	218.00	944.59	19.16	17.40	6-FFc	4.00	4.00	4.00	2.98	17.35	11.17

****

Culvert Barrel Type Straight Culvert
Inlet Elevation (invert): 925.43 ft, Outlet Elevation (invert): 919.72 ft
Culvert Length: 131.12 ft, Culvert Slope: 0.0436

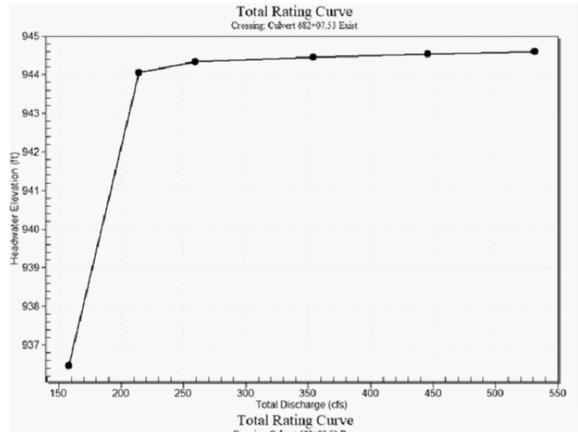
****

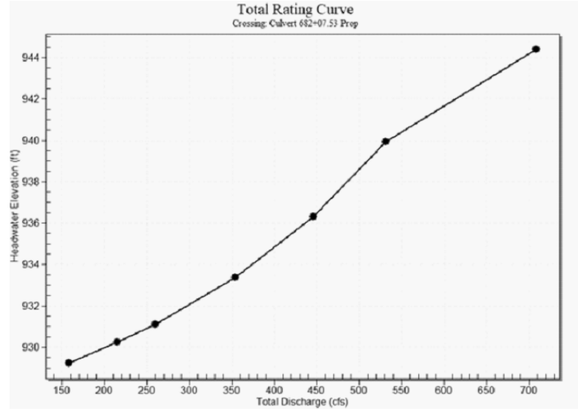
Site Data Option: Culvert Invert Data
Inlet Station: 39.89 ft
Inlet Elevation: 925.43 ft
Outlet Station: 170.89 ft
Outlet Elevation: 919.72 ft
Number of Barrels: 1

Culvert Data Summary - Culvert 682+07.53 Exist
Barrel Shape: Circular
Barrel Diameter: 4.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Thin Edge Projecting (Ke=0.9)
Inlet Depression: None

Tailwater Channel Data - Culvert 682+07.53 Exist
Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 5.36 (_:1)
Channel Slope: 0.0370
Channel Manning's n: 0.0330
Channel Invert Elevation: 919.72 ft

Roadway Data for Crossing: Culvert 682+07.53 Exist
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 500.00 ft
Crest Elevation: 944.24 ft
Roadway Surface: Paved
Roadway Top Width: 61.79 ft





HY-8 PROPOSED CULVERT ANALYSIS - RM 1431 - CULVERT 682+07.53

Return Interval	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2-yr	158.14	158.14	929.24	3.81	-2.70	1-S2n	0.92	2.30	1.04	1.89	18.97	8.25
5-yr	214.53	214.53	930.23	4.80	-1.59	5-S2n	1.13	2.82	1.32	2.12	20.25	8.90
*10-yr	259.47	259.47	931.10	5.67	-0.20	5-S2n	1.28	3.20	1.54	2.28	21.04	9.34
25-yr	353.74	353.74	933.38	7.95	1.81	5-S2n	1.57	3.93	1.98	2.56	22.33	10.09
50-yr	445.72	445.72	936.32	10.89	3.93	5-S2n	1.84	4.00	2.38	2.79	23.41	10.69
100-yr	531.21	531.21	939.92	14.49	6.31	5-S2n	2.08	4.00	2.70	2.98	24.56	11.17

****

Culvert Barrel Type Straight Culvert
Inlet Elevation (invert): 925.43 ft, Outlet Elevation (invert): 919.72 ft
Culvert Length: 131.12 ft, Culvert Slope: 0.0436

****

Site Data Option: Culvert Invert Data
Inlet Station: 39.89 ft
Inlet Elevation: 925.43 ft
Outlet Station: 170.89 ft
Outlet Elevation: 919.72 ft
Number of Barrels: 1

Culvert Data Summary - Culvert 682+07.53 Prop
Barrel Shape: Concrete Box
Barrel Span: 8.00 ft
Barrel Rise: 4.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwall
Inlet Depression: None

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 5.36 (_:1)
Channel Slope: 0.0370
Channel Manning's n: 0.0330
Channel Invert Elevation: 919.72 ft

Roadway Data for Crossing: Culvert 682+07.53 Prop
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 500.00 ft
Crest Elevation: 944.24 ft
Roadway Surface: Paved
Roadway Top Width: 61.79 ft

** Design ARI based on TxDOT Hydraulic Design Manual Funtional Classification and Structure Type.*

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02/09/2024

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RM 1431
CULVERT
HYDRAULIC DATA

SHEET 02 OF 04

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	92

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HY-8 EXISTING CULVERT ANALYSIS - RM 1431 - CULVERT 715+63.02

Return Interval	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2-yr	398.83	398.83	920.70	9.20	4.63	5-S2n	4.17	5.17	4.19	5.86	15.71	11.19
5-yr	543.63	543.63	924.32	12.82	9.13	5-S2n	5.13	6.02	5.16	6.59	16.76	12.09
10-yr	660.48	613.11	926.50	15.00	11.85	5-S2n	5.65	6.34	5.68	7.08	17.09	12.69
25-yr	906.77	628.30	927.02	15.52	13.33	5-S1f	5.77	6.41	7.50	7.98	14.22	13.74
50-yr	1147.72	637.34	927.34	15.84	14.32	4-FFf	5.85	6.44	7.50	8.72	14.43	14.57
100-yr	1376.54	644.08	927.58	16.08	15.17	4-FFf	5.91	6.47	7.50	9.33	14.58	15.25

****

Culvert Barrel Type Straight Culvert
Inlet Elevation (invert): 911.50 ft, Outlet Elevation (invert): 905.86 ft
Culvert Length: 218.70 ft, Culvert Slope: 0.0258

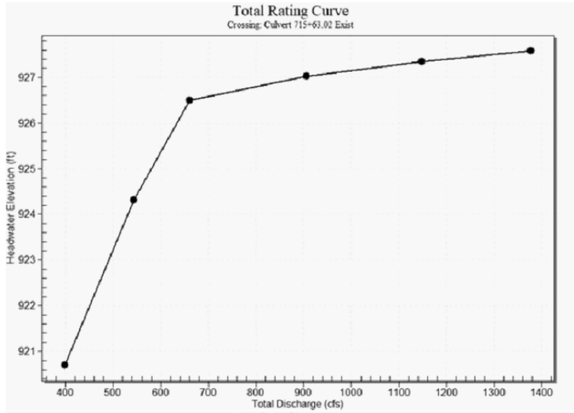
****

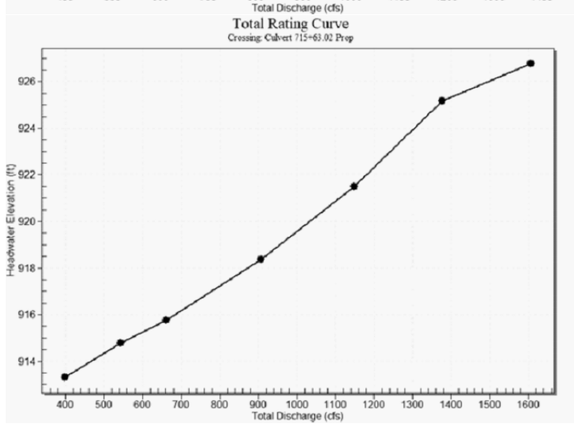
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 911.50 ft
Outlet Station: 218.63 ft
Outlet Elevation: 905.86 ft
Number of Barrels: 1

Culvert Data Summary - Culvert 715+63.02 Exist
Barrel Shape: Circular
Barrel Diameter: 7.50 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Thin Edge Projecting (Ke=0.9)
Inlet Depression: None

Tailwater Channel Data - Culvert 715+63.02 Exist
Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 1.04 (_:1)
Channel Slope: 0.0228
Channel Manning's n: 0.0330
Channel Invert Elevation: 905.86 ft

Roadway Data for Crossing: Culvert 715+63.02 Exist
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 830.00 ft
Crest Elevation: 926.36 ft
Roadway Surface: Paved
Roadway Top Width: 79.50 ft





HY-8 PROPOSED CULVERT ANALYSIS - RM 1431 - CULVERT 715+63.02

Return Interval	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2-yr	398.83	398.83	913.31	6.19	6.31	1-S1t	2.85	3.67	5.86	5.86	6.80	11.19
5-yr	543.63	543.63	914.77	7.62	7.77	1-S1t	3.55	4.51	6.59	6.59	8.25	12.09
*10-yr	660.48	660.48	915.76	8.76	7.84	5-JS1t	4.09	5.14	7.08	7.08	9.32	12.69
25-yr	906.77	906.77	918.37	11.37	10.40	5-JS1t	5.18	6.34	7.98	7.98	11.37	13.74
50-yr	1147.72	1147.72	921.50	14.50	13.29	5-JS1f	6.20	7.42	8.00	8.72	14.35	14.57
100-yr	1376.54	1376.54	925.16	18.16	16.40	4-FFf	7.14	8.00	8.00	9.33	17.21	15.25

****

Culvert Barrel Type Straight Culvert
Inlet Elevation (invert): 907.00 ft, Outlet Elevation (invert): 905.86 ft
Culvert Length: 199.00 ft, Culvert Slope: 0.0057

****

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 907.00 ft
Outlet Station: 199.00 ft
Outlet Elevation: 905.86 ft
Number of Barrels: 1

Barrel Shape: Concrete Box
Barrel Span: 10.00 ft
Barrel Rise: 8.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwall
Inlet Depression: Yes

Tailwater Channel Data - Culvert 715+63.02 Prop
Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 1.16 (_:1)
Channel Slope: 0.0140
Channel Manning's n: 0.0330
Channel Invert Elevation: 905.86 ft

Roadway Data for Crossing: Culvert 715+63.02 Prop
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 830.00 ft
Crest Elevation: 926.36 ft
Roadway Surface: Paved
Roadway Top Width: 79.50 ft

** Design ARI based on TxDOT Hydraulic Design Manual Funtional Classification and Structure Type.*

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SHEET 03 OF 04

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 93

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FILE: pw://halff-pw.bentley.com:halff-pw-01/Documents/37547.003 RM 1431 Widening/500 CADD/4 - Design/Drainage/050/DRNG_SUMMARY_SHEETS.dgn

HY-8 EXISTING CULVERT ANALYSIS - RM 1431 - CULVERT 716.94.11

Return Interval	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2-yr	52.31	52.31	921.21	3.41	-3.14	1-S2n	1.70	2.17	1.70	2.31	10.28	7.75
5-yr	71.40	71.40	922.10	4.30	-1.57	5-S2n	2.03	2.55	2.03	2.59	11.13	8.38
10-yr	86.45	86.45	922.90	5.10	-0.04	5-S2n	2.29	2.82	2.29	2.78	11.62	8.79
25-yr	118.49	118.49	925.05	7.25	4.37	5-S2n	2.84	3.28	2.84	3.13	12.41	9.51
50-yr	149.75	134.14	926.39	8.59	6.61	5-S2n	3.16	3.45	3.16	3.42	12.59	10.08
100-yr	179.27	134.52	926.43	8.63	6.60	5-S2n	3.17	3.46	3.17	3.66	12.59	10.54

****

Culvert Barrel Type Straight Culvert
Inlet Elevation (invert): 917.80 ft, Outlet Elevation (invert): 910.86 ft
Culvert Length: 218.74 ft, Culvert Slope: 0.0317

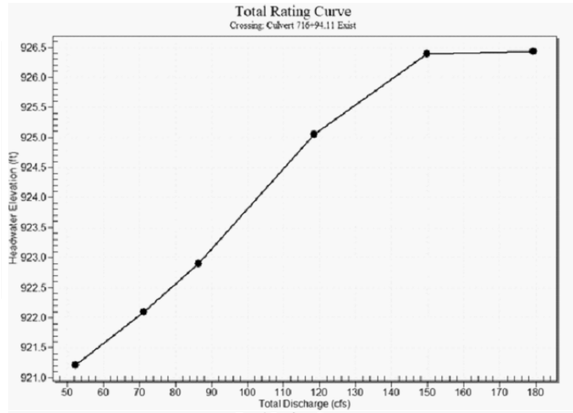
****

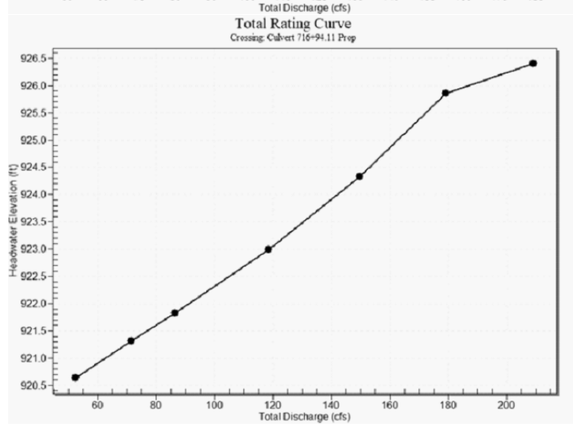
Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 917.80 ft
Outlet Station: 218.63 ft
Outlet Elevation: 910.86 ft
Number of Barrels: 1

Culvert Data Summary - Culvert 716+94.11 Exist
Barrel Shape: Circular
Barrel Diameter: 4.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Thin Edge Projecting (Ke=0.9)
Inlet Depression: None

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 1.27 (_:1)
Channel Slope: 0.0338
Channel Manning's n: 0.0330
Channel Invert Elevation: 911.27 ft

Roadway Data for Crossing: Culvert 716+94.11 Exist
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 830.00 ft
Crest Elevation: 926.36 ft
Roadway Surface: Paved
Roadway Top Width: 64.36 ft





HY-8 PROPOSED CULVERT ANALYSIS - RM 1431 - CULVERT 716.94.11

Return Interval	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2-yr	52.31	52.31	920.64	2.84	-3.9	1-S2n	0.68	1.74	0.74	2.31	17.77	7.75
5-yr	71.4	71.4	921.31	3.51	-3.33	1-S2n	0.84	2.15	0.93	2.59	19.1	8.38
*10-yr	86.45	86.45	921.83	4.03	-2.86	5-S2n	0.96	2.44	1.09	2.78	19.91	8.79
25-yr	118.49	118.49	922.99	5.19	-1.73	5-S2n	1.19	3.01	1.4	3.13	21.13	9.51
50-yr	149.75	149.75	924.33	6.53	-0.10	5-S2n	1.41	3.52	1.7	3.42	22.02	10.08
100-yr	179.27	179.27	925.86	8.06	1.28	5-S2n	1.6	3.97	1.97	3.66	22.71	10.54

****

Culvert Barrel Type Straight Culvert
Inlet Elevation (invert): 917.80 ft, Outlet Elevation (invert): 911.27 ft
Culvert Length: 110.32 ft, Culvert Slope: 0.0593

****

Site Data Option: Culvert Invert Data
Inlet Station: 49.83 ft
Inlet Elevation: 917.80 ft
Outlet Station: 159.96 ft
Outlet Elevation: 911.27 ft
Number of Barrels: 1

Culvert Data Summary - Culvert 716+94.11 Prop
Barrel Shape: Concrete Box
Barrel Span: 4.00 ft
Barrel Rise: 4.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwall
Inlet Depression: None

Tailwater Channel Data - Culvert 716+94.11 Prop
Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 1.27 (_:1)
Channel Slope: 0.0338
Channel Manning's n: 0.0330
Channel Invert Elevation: 911.27 ft

Roadway Data for Crossing: Culvert 716+94.11 Prop
Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 830.00 ft
Crest Elevation: 926.36 ft
Roadway Surface: Paved
Roadway Top Width: 64.36 ft

** Design ARI based on TxDOT Hydraulic Design Manual Funtional Classification and Structure Type.*

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RM 1431
CULVERT
HYDRAULIC DATA

SHEET 04 OF 04

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	94

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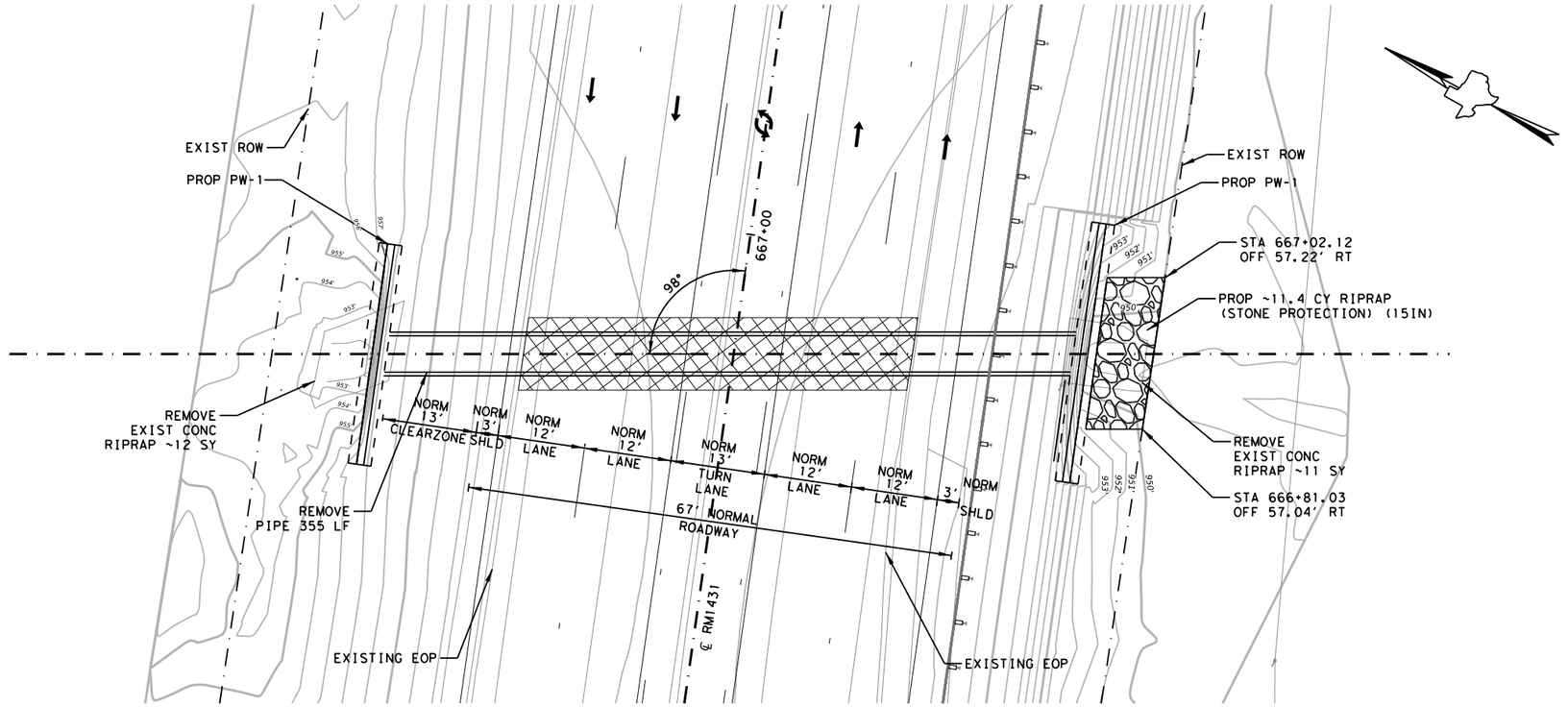

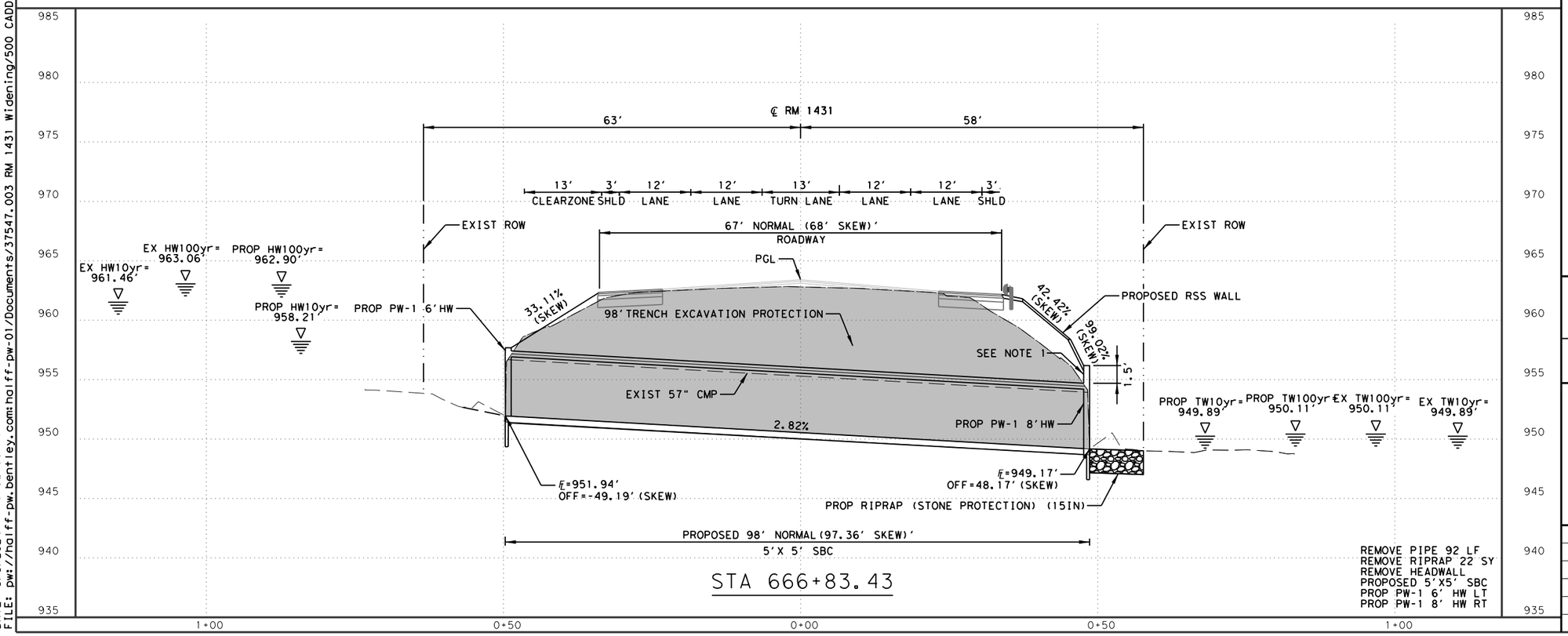

STA 666+83.43

REMOVE PIPE 92 LF
REMOVE RIPRAP 22 SY
REMOVE HEADWALL
PROPOSED 5'X5' SBC
PROP PW-1 6' HW LT
PROP PW-1 8' HW RT

LEGEND

CUT AND RESTORE PAVE

NOTES

1. REFER TO EXTENDED CURB DETAILS FROM 1'TO 5' (MC-ECD-20).

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HORIZONTAL
0 10 20 40 FT

VERTICAL
0 5 10 20 FT

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RM 1431
CULVERT LAYOUT
STA 666+83.43

SHEET 01 OF 04

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 95

DATE: 8/8/2024 10:52:33 AM
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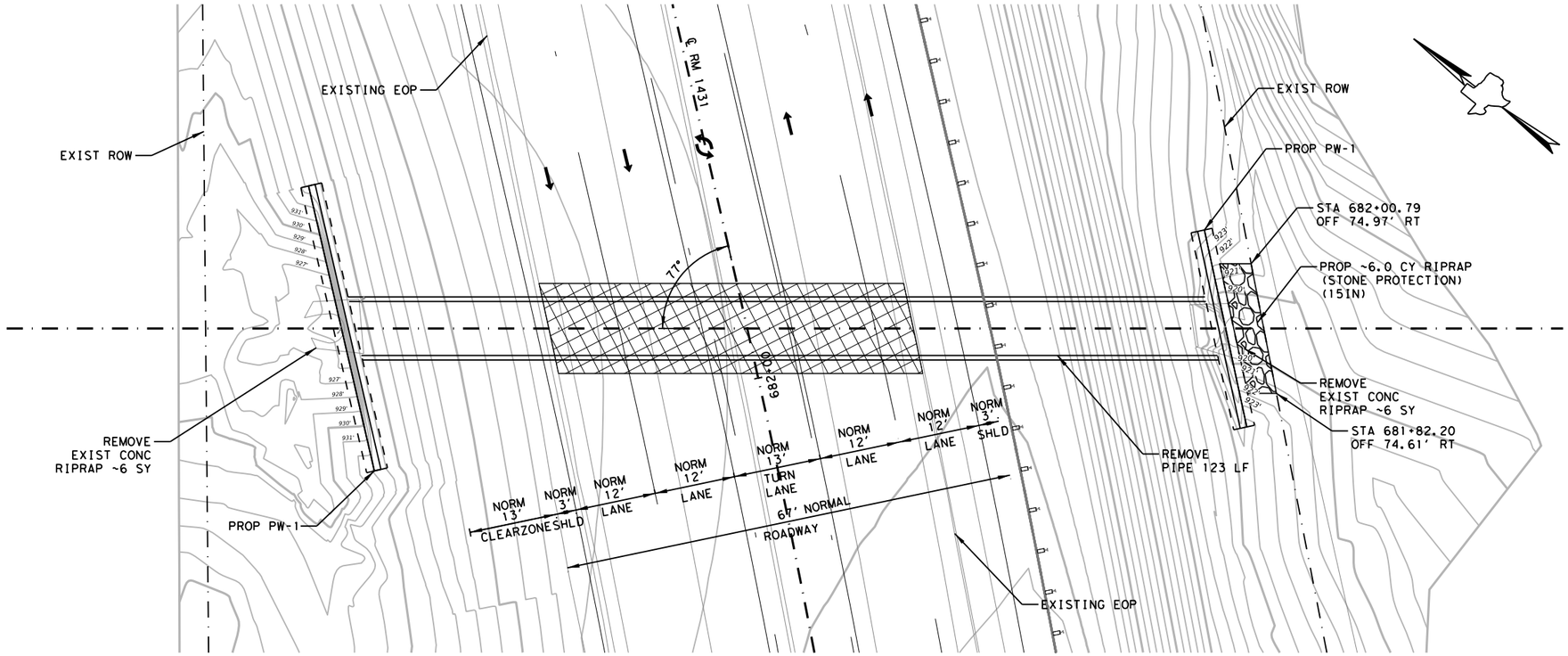

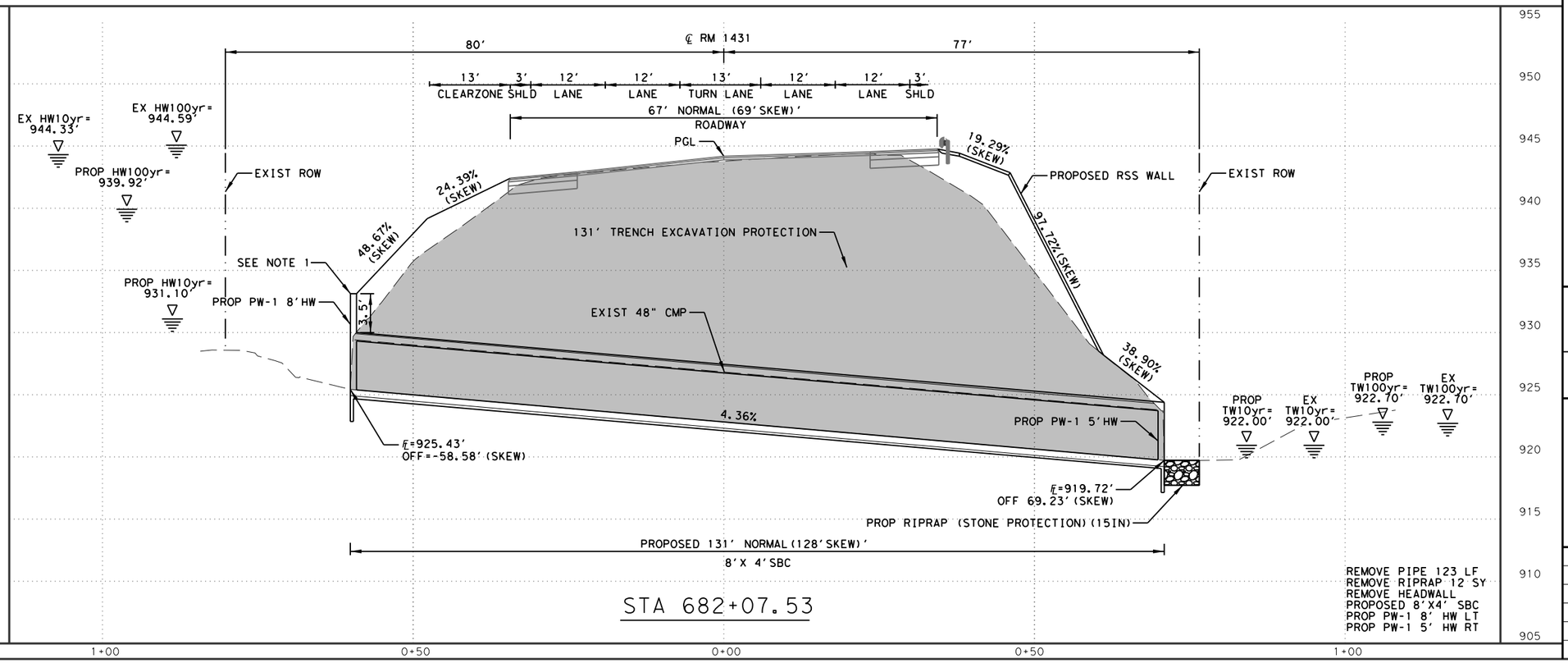

STA 682+07.53

REMOVE PIPE 123 LF
REMOVE RIPRAP 12 SY
REMOVE HEADWALL
PROPOSED 8'X4' SBC
PROP PW-1 8' HW LT
PROP PW-1 5' HW RT

LEGEND

CUT AND RESTORE PAVE

NOTES

1. REFER TO EXTENDED CURB DETAILS FROM 1' TO 5' (MC-ECD-20).

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HORIZONTAL
0 10 20 40 FT

VERTICAL
0 5 10 20 FT

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STA 682+07.53

SHEET 02 OF 04

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 96

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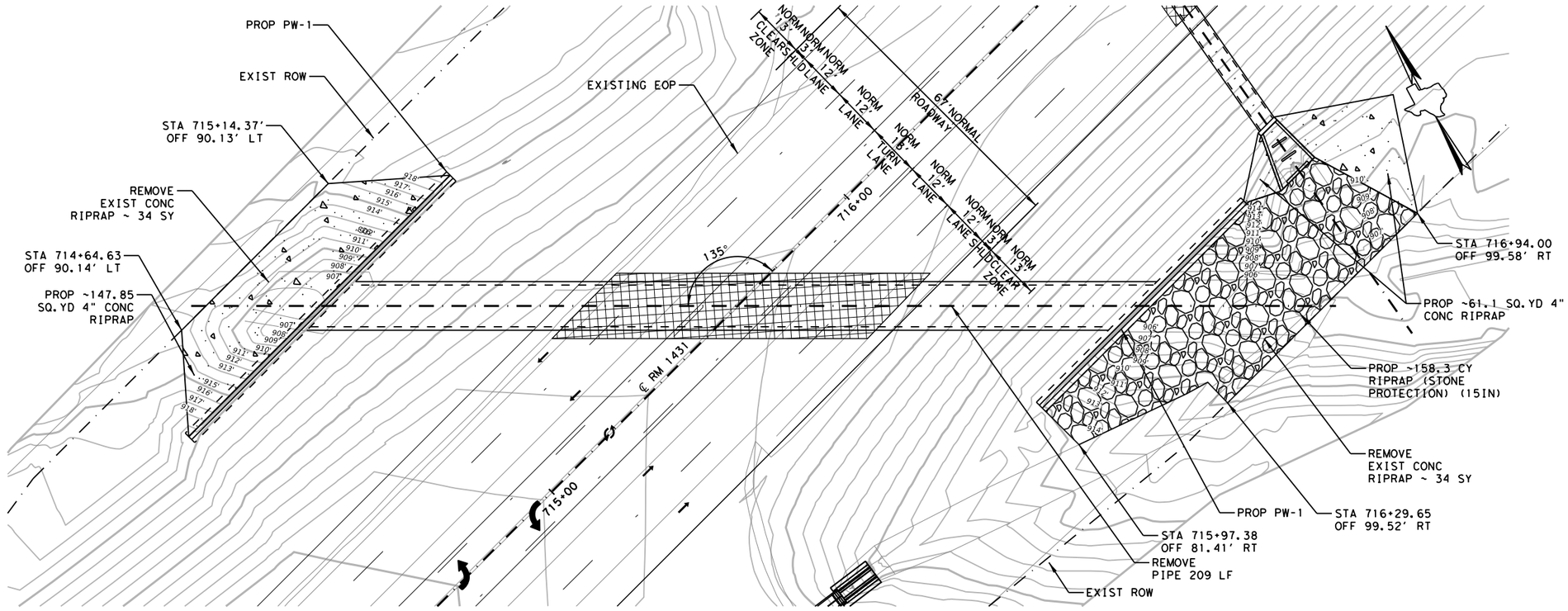

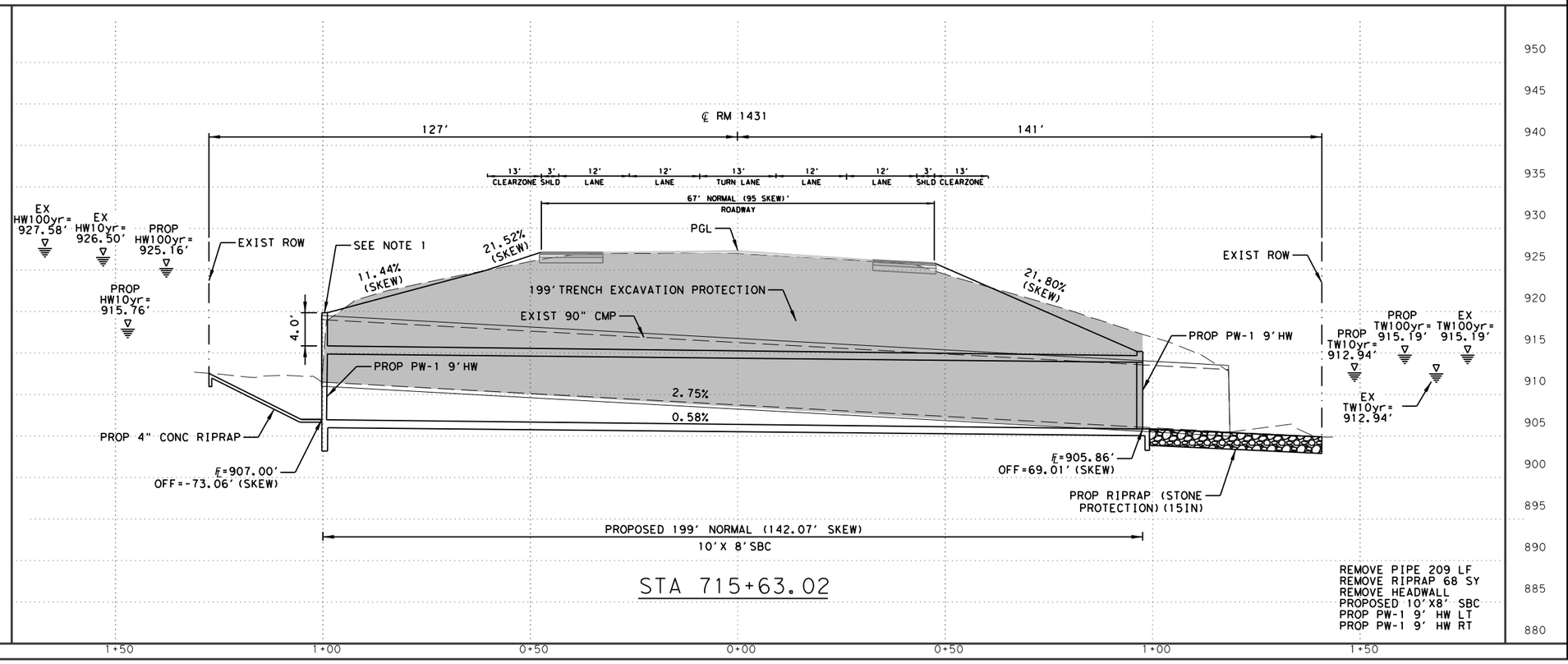

STA 715+63.02

REMOVE PIPE 209 LF
REMOVE RIPRAP 68 SY
REMOVE HEADWALL
PROPOSED 10'X8' SBC
PROP PW-1 9' HW LT
PROP PW-1 9' HW RT

LEGEND

CUT AND RESTORE PAVE

NOTES

1. REFER TO EXTENDED CURB DETAILS FROM 1'TO 5' (MC-ECD-20).

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HORIZONTAL
0 15 30 60 FT

VERTICAL
0 7.5 15 30 FT

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SHEET 03 OF 04

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 97

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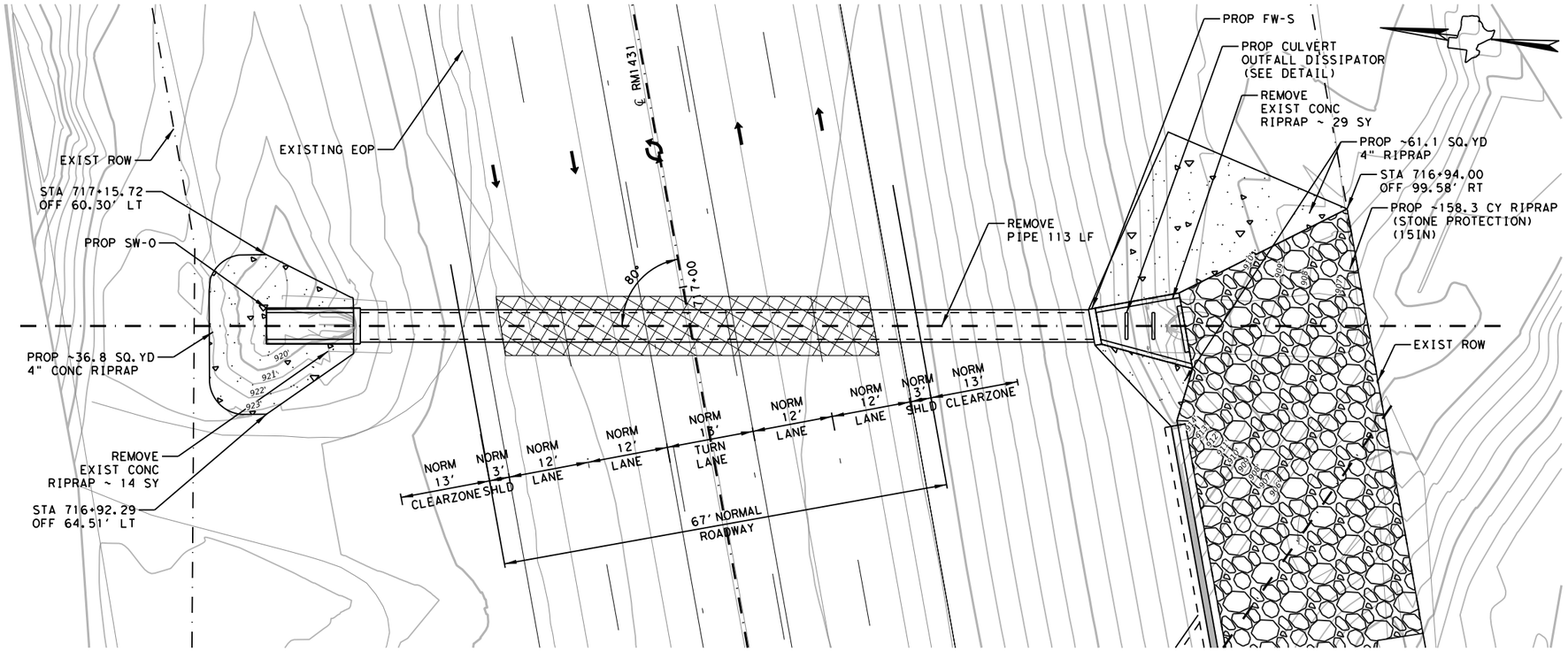

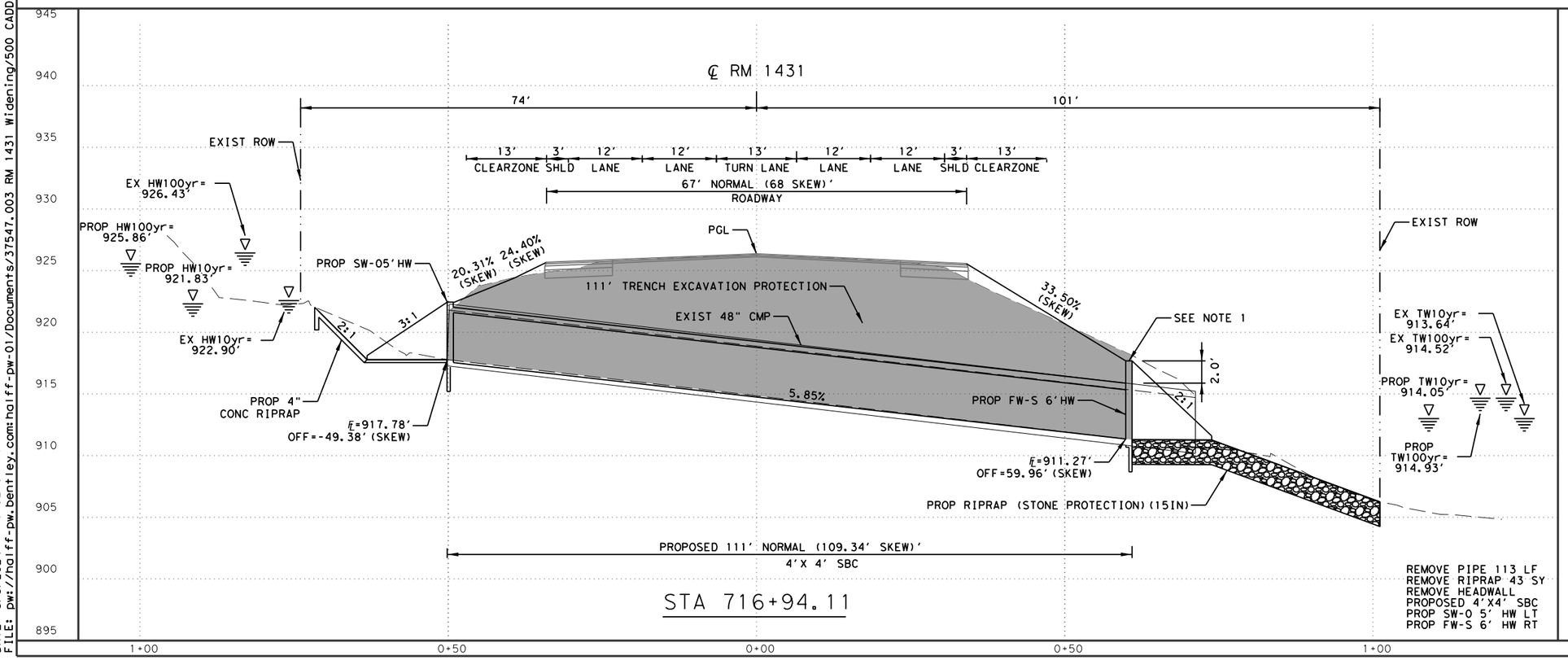

LEGEND

CUT AND RESTORE PAVE

NOTES

1. REFER TO EXTENDED CURB DETAILS FROM 1' TO 5' (MC-ECD-20).

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HORIZONTAL
0 10 20 40 FT

VERTICAL
0 5 10 20 FT

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CULVERT LAYOUT
STA 716+94.11

SHEET 04 OF 04

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 98

Culvert Station and/or Creek Name	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (FT)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (IN)	U Culvert Wall Thickness (IN)	C Estimated Curb Height (FT)	Hw Height (1) of Wingwall (FT)	A Curb to End of Wingwall (FT)	B Offset of End of Wingwall (FT)	Lw Length of Longest Wingwall (FT)	Ltw Culvert Toewall Length (FT)	Atw Anchor Toewall Length (FT)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
666+83.43 (LT)	1 ~ 5' X 5'	7.32	SCP-5	PW-1	15	2	8	7	0.25	5.92	N/A	N/A	12.25	6.38	N/A	0.0	0.1	9.4	145
666+83.43 (RT)	1 ~ 5' X 5'	7.32	SCP-5	PW-1	15	2	8	7	1.50	7.17	N/A	N/A	14.84	6.38	N/A	13.96	0.4	14.0	213
682+07.53 (LT)	1 ~ 8' X 4'	18.80	SCP-8	PW-1	15	2	10	8	3.50	8.33	N/A	N/A	17.26	9.66	N/A	0.0	1.3	18.2	288
682+07.53 (RT)	1 ~ 8' X 4'	18.80	SCP-8	PW-1	15	2	10	8	0.25	5.08	N/A	N/A	10.53	9.66	N/A	8.05	0.1	7.8	107
715+63.02 (LT)	1 ~ 10' X 8'	11.78	SCP-10	PW-1	45	2	10	8	4.00	12.83	N/A	N/A	36.30	16.03	N/A	87.73	2.4	68.5	932
715+63.02 (RT)	1 ~ 10' X 8'	11.78	SCP-10	PW-1	45	2	10	8	0.50	9.33	N/A	N/A	26.40	16.03	N/A	203.25	0.3	31.8	493
716+94.11(LT)	1 ~ 4' X 4'	8.18	SCP-4	SW-0	0	3	8	7	0.25	4.67	N/A	N/A	13.00	N/A	N/A	15.80	0.0	4.5	65
716+94.11 (RT)	1 ~ 4' X 4'	8.18	SCP-4	FW-S	15	2	8	7	2.00	6.42	N/A	N/A	14.05	N/A	N/A	0.0	0.4	5.4	88

DATE: 12/18/2023 5:24:18 PM
FILE: pw://holff-pw.bentley.com:holff-pw-01/Documents/37547.003 RM 1431 Widening/500 CADD/4 - Design/Drainage/050/BCS-20.dgn

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 = 0 set 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
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John Conquest P.E.
12/21/2023

SPECIAL NOTE:

This sheet is a supplement to the box culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

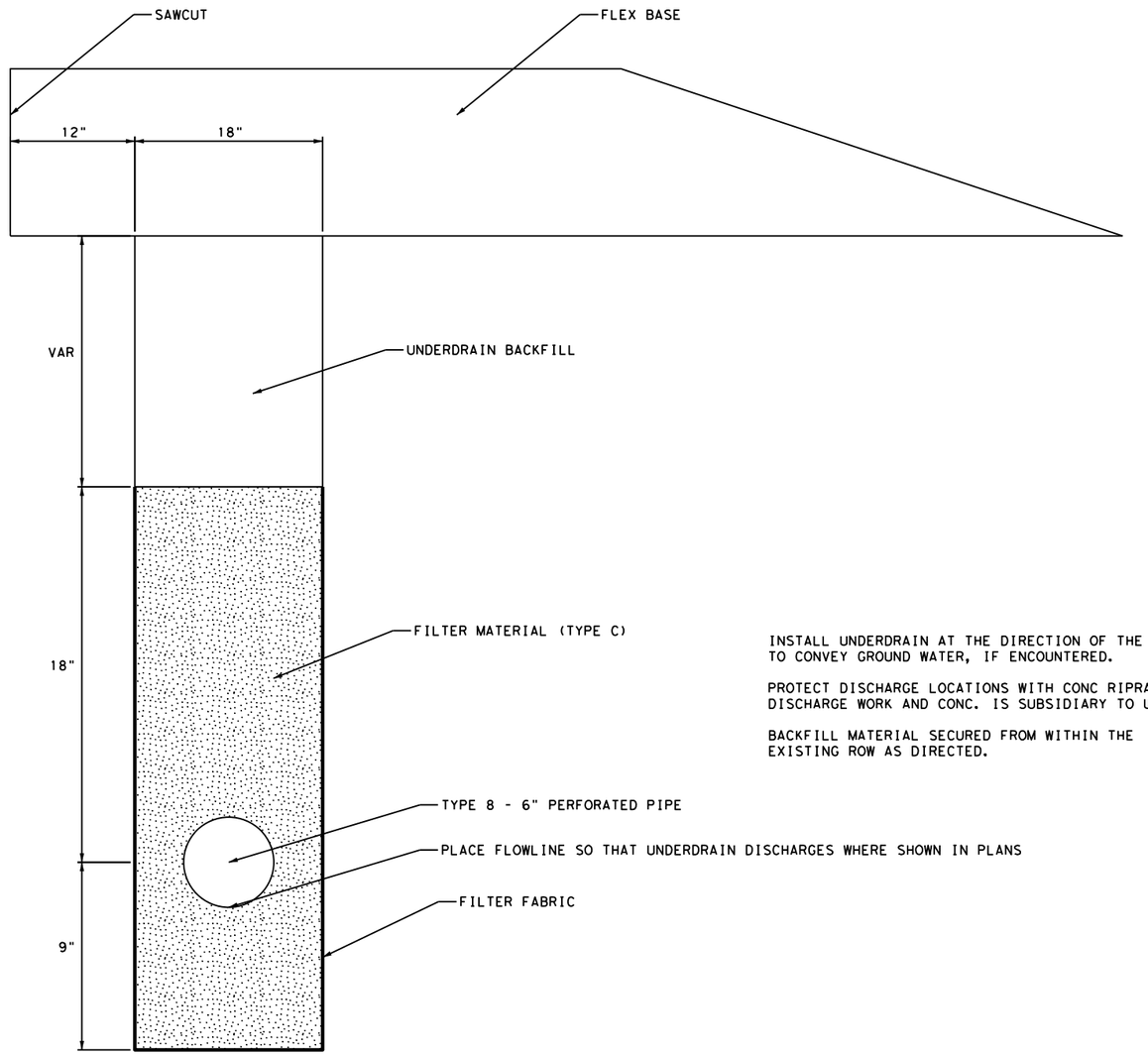
Texas Department of Transportation

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	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		99



UNDERDRAIN DETAIL

INSTALL UNDERDRAIN AT THE DIRECTION OF THE ENGINEER TO CONVEY GROUND WATER, IF ENCOUNTERED.

PROTECT DISCHARGE LOCATIONS WITH CONC RIPRAP. DISCHARGE WORK AND CONC. IS SUBSIDIARY TO UNDERDRAINS.

BACKFILL MATERIAL SECURED FROM WITHIN THE EXISTING ROW AS DIRECTED.

STATE OF TEXAS
JOHN CONQUEST
89243
LICENSED PROFESSIONAL ENGINEER
P.E.

08/02/2024

Austin District
Georgetown Area Office

Texas Department of Transportation

RM 1431

UNDERDRAIN DETAILS

SHEET 1 OF 1

	CONT	SECT	JOB	HIGHWAY
	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		100

DATE: 1/4/2023 2:17:17 PM
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DATE:
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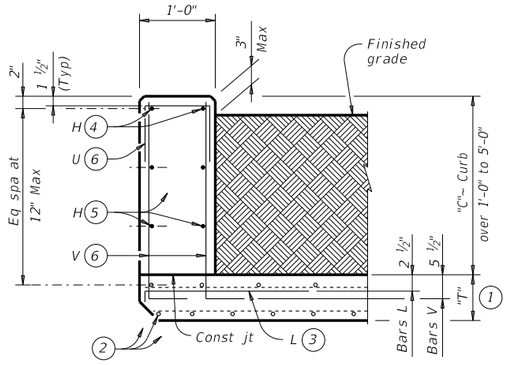
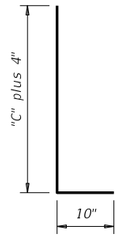
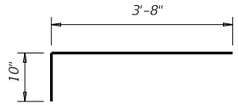


TYPICAL SECTION

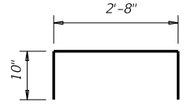
Used for curbs over 1'–0" to 5'–0"



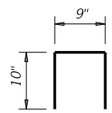
BARS V (#5) (6)
Spaced at 12" Max



BARS L (#5) (3)
Spaced at 12" Max



OPTIONAL BARS L (#5) (3) (7)
Spaced at 12" Max



BARS U (#4) (6)
Spaced at 12" Max

(1) "T" is equal to the culvert top slab thickness. For precast boxes with slabs less than 8" thick, see SCP-MD standard for additional details.

(2) Adjust normal culvert slab bars as necessary to clear obstructions.

(3) Place bars L as shown. Tilt hook as necessary to maintain cover.

(4) Place normal culvert curb bars H(#4) as shown. Adjust as necessary to clear obstructions.

(5) Additional bars H(#4) as required to maintain 12" Max spacing.

(6) Replace normal culvert curb bars K with one bar U and two bars V as shown spaced at 12" Max. Adjust length of bars V as necessary to maintain clear cover.

(7) Optional bars L are to be used only for precast box culverts with 3'–0" closure pour.

(8) Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The value in table can be interpolated for intermediate values of curb height, "C". Quantity includes bars K (when applicable).

TABLE OF ESTIMATED CURB QUANTITIES (8)

Curb Height "C"	Conc (CY/LF)	Reinf Steel (Lb/LF)
1'–0"	0.037	10.4
1'–6"	0.056	14.5
2'–0"	0.074	15.6
2'–6"	0.093	18.0
3'–0"	0.111	19.0
3'–6"	0.130	21.3
4'–0"	0.148	22.4
4'–6"	0.167	24.8
5'–0"	0.185	25.9

CONSTRUCTION NOTES:

Adjust reinforcing steel as necessary to provide 1 ¼" cover.
For vehicle safety, top of the curb must not project more than 3" above the finished grade.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class "C" concrete (f'_c = 3,600 psi) minimum for curbs.
Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'–8" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
These extended curb details have sufficient strength to allow for future retrofit of Type T631 or T631LS railing. These details are suitable for use with PR11, PR22 and PR3 type rails. These details are not suitable for the mounting of other rail types. For new construction using T631 or T631LS railing, use the T631-CM standard.
This Curb is considered as part of the Box Culvert for payment.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation

Bridge Division Standard

EXTENDED CURB DETAILS
FOR BOX CULVERTS WITH CURBS OVER 1'-0" TO 5'-0" TALL

ECD

FILE: CD-ECD-20.dgn	DN: GAF	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		101

DATE: 1/12/2023 5:08:27 PM
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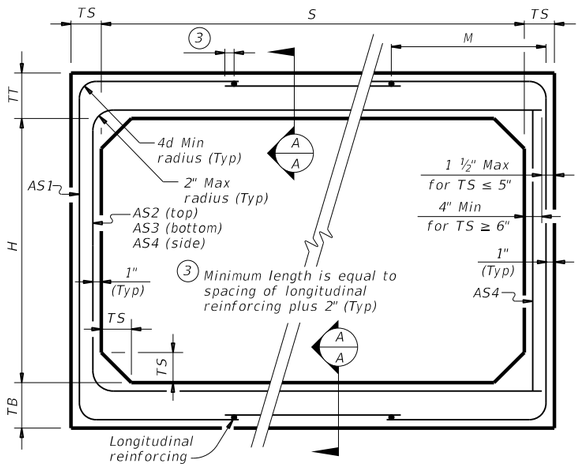
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
4	2	7.5	6	5	< 2	–	0.18	0.27	0.15	0.12	0.18	0.18	0.14	4.5
4	2	5	5	5	2 < 3	38	0.18	0.19	0.17	0.12	–	–	–	3.6
4	2	5	5	5	3 – 5	38	0.13	0.13	0.13	0.12	–	–	–	3.6
4	2	5	5	5	10	38	0.12	0.12	0.12	0.12	–	–	–	3.6
4	2	5	5	5	15	38	0.14	0.16	0.16	0.12	–	–	–	3.6
4	2	5	5	5	20	38	0.18	0.20	0.21	0.12	–	–	–	3.6
4	2	5	5	5	25	38	0.23	0.25	0.25	0.12	–	–	–	3.6
4	2	5	5	5	30	38	0.28	0.30	0.30	0.12	–	–	–	3.6
4	3	7.5	6	5	< 2	–	0.18	0.31	0.18	0.12	0.18	0.18	0.14	5.0
4	3	5	5	5	2 < 3	38	0.15	0.23	0.20	0.12	–	–	–	4.1
4	3	5	5	5	3 – 5	38	0.12	0.16	0.16	0.12	–	–	–	4.1
4	3	5	5	5	10	38	0.12	0.14	0.14	0.12	–	–	–	4.1
4	3	5	5	5	15	38	0.12	0.18	0.18	0.12	–	–	–	4.1
4	3	5	5	5	20	38	0.14	0.23	0.24	0.12	–	–	–	4.1
4	3	5	5	5	25	38	0.17	0.29	0.29	0.12	–	–	–	4.1
4	3	5	5	5	30	38	0.21	0.35	0.35	0.12	–	–	–	4.1
4	4	7.5	6	5	< 2	–	0.18	0.33	0.20	0.12	0.18	0.18	0.14	5.5
4	4	5	5	5	2 < 3	38	0.12	0.26	0.23	0.12	–	–	–	4.6
4	4	5	5	5	3 – 5	38	0.12	0.18	0.18	0.12	–	–	–	4.6
4	4	5	5	5	10	38	0.12	0.15	0.15	0.12	–	–	–	4.6
4	4	5	5	5	15	38	0.12	0.19	0.20	0.12	–	–	–	4.6
4	4	5	5	5	20	38	0.12	0.25	0.25	0.12	–	–	–	4.6
4	4	5	5	5	25	38	0.14	0.31	0.31	0.12	–	–	–	4.6
4	4	5	5	5	30	38	0.17	0.37	0.37	0.12	–	–	–	4.6

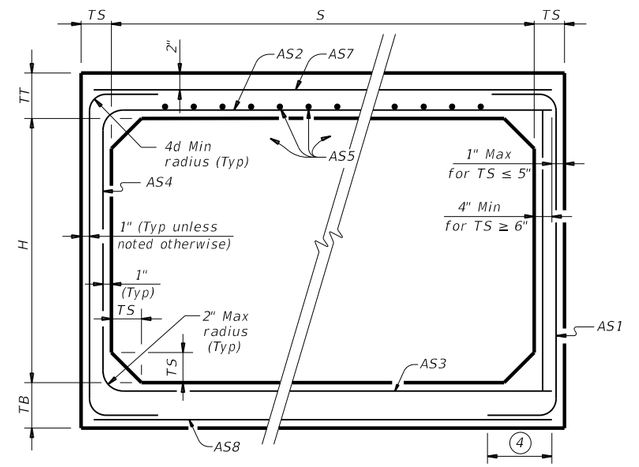
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

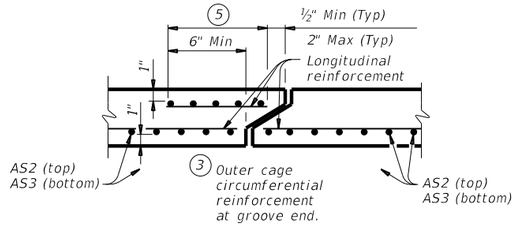
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

4'-0" SPAN

SCP-4

FILE: scp04sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		102

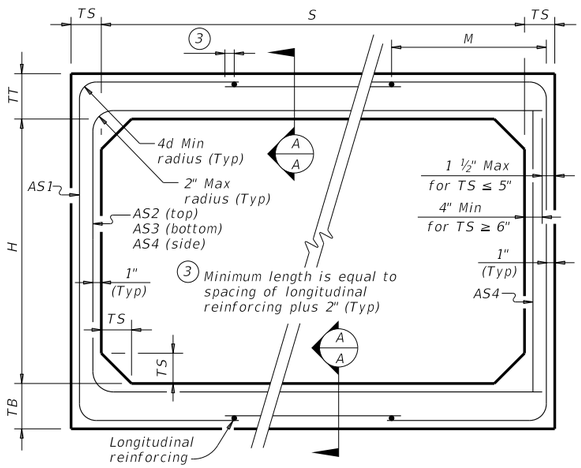
DATE:
FILE:

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
5	2	8	7	6	< 2	–	0.19	0.27	0.18	0.14	0.19	0.19	0.17	6.0
5	2	6	6	6	2 < 3	44	0.22	0.20	0.16	0.14	–	–	–	5.1
5	2	6	6	6	3 – 5	44	0.16	0.14	0.14	0.14	–	–	–	5.1
5	2	6	6	6	10	36	0.15	0.14	0.14	0.14	–	–	–	5.1
5	2	6	6	6	15	36	0.20	0.18	0.18	0.14	–	–	–	5.1
5	2	6	6	6	20	36	0.26	0.23	0.24	0.14	–	–	–	5.1
5	2	6	6	6	25	36	0.33	0.29	0.29	0.14	–	–	–	5.1
5	2	6	6	6	30	36	0.39	0.34	0.35	0.14	–	–	–	5.1
5	3	8	7	6	< 2	–	0.19	0.31	0.21	0.14	0.19	0.19	0.17	6.6
5	3	6	6	6	2 < 3	45	0.18	0.24	0.19	0.14	–	–	–	5.7
5	3	6	6	6	3 – 5	36	0.14	0.17	0.16	0.14	–	–	–	5.7
5	3	6	6	6	10	36	0.14	0.16	0.17	0.14	–	–	–	5.7
5	3	6	6	6	15	35	0.16	0.21	0.22	0.14	–	–	–	5.7
5	3	6	6	6	20	35	0.21	0.27	0.28	0.14	–	–	–	5.7
5	3	6	6	6	25	35	0.26	0.34	0.34	0.14	–	–	–	5.7
5	3	6	6	6	30	35	0.31	0.41	0.41	0.14	–	–	–	5.7
5	4	8	7	6	< 2	–	0.19	0.33	0.24	0.14	0.19	0.19	0.17	7.2
5	4	6	6	6	2 < 3	45	0.16	0.27	0.22	0.14	–	–	–	6.3
5	4	6	6	6	3 – 5	45	0.14	0.19	0.18	0.14	–	–	–	6.3
5	4	6	6	6	10	36	0.14	0.18	0.18	0.14	–	–	–	6.3
5	4	6	6	6	15	35	0.14	0.23	0.24	0.14	–	–	–	6.3
5	4	6	6	6	20	35	0.17	0.30	0.31	0.14	–	–	–	6.3
5	4	6	6	6	25	35	0.21	0.37	0.38	0.14	–	–	–	6.3
5	4	6	6	6	30	35	0.25	0.44	0.45	0.14	–	–	–	6.3
5	5	8	7	6	< 2	–	0.19	0.35	0.26	0.14	0.19	0.19	0.17	7.8
5	5	6	6	6	2 < 3	45	0.14	0.29	0.24	0.14	–	–	–	6.9
5	5	6	6	6	3 – 5	45	0.14	0.21	0.20	0.14	–	–	–	6.9
5	5	6	6	6	10	45	0.14	0.19	0.20	0.14	–	–	–	6.9
5	5	6	6	6	15	36	0.14	0.24	0.25	0.14	–	–	–	6.9
5	5	6	6	6	20	35	0.15	0.31	0.32	0.14	–	–	–	6.9
5	5	6	6	6	25	35	0.18	0.38	0.39	0.14	–	–	–	6.9
5	5	6	6	6	30	35	0.21	0.46	0.47	0.14	–	–	–	6.9

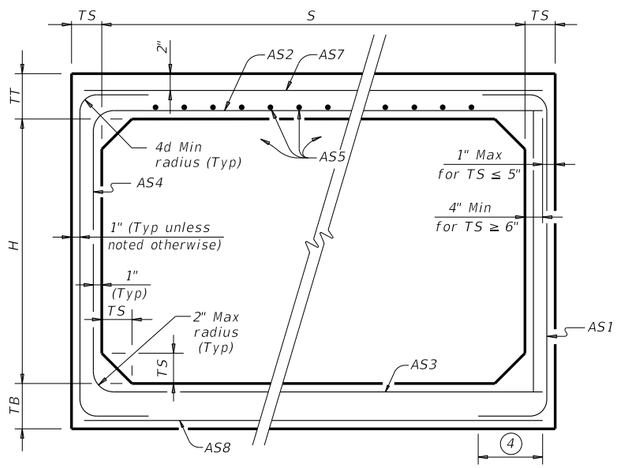
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

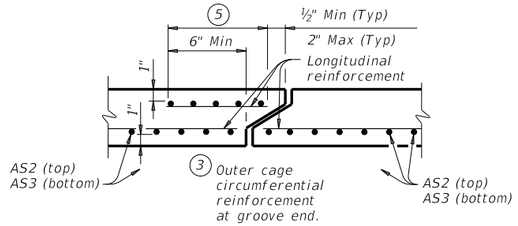
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)."

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

5'-0" SPAN

SCP-5

FILE: CD-SCP05-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		103

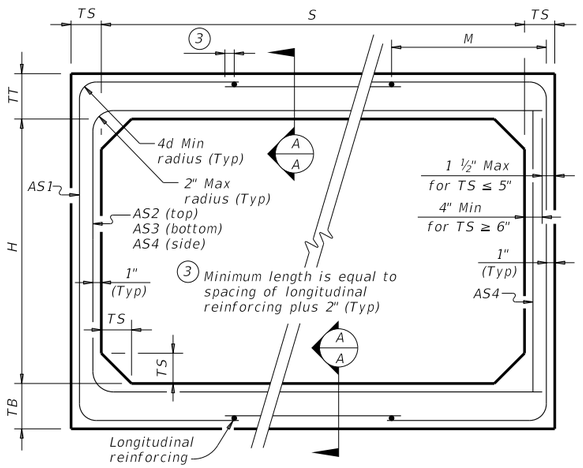
DATE:
FILE:

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
8	3	8	8	8	< 2	–	0.31	0.35	0.25	0.19	0.19	0.19	0.19	10.4
8	3	8	8	8	2 < 3	55	0.35	0.29	0.28	0.19	–	–	–	10.4
8	3	8	8	8	3 – 5	50	0.28	0.23	0.24	0.19	–	–	–	10.4
8	3	8	8	8	10	45	0.29	0.25	0.26	0.19	–	–	–	10.4
8	3	8	8	8	15	45	0.39	0.33	0.34	0.19	–	–	–	10.4
8	3	8	8	8	20	45	0.51	0.43	0.44	0.19	–	–	–	10.4
8	3	8	8	8	25	45	0.63	0.53	0.54	0.19	–	–	–	10.4
8	4	8	8	8	< 2	–	0.27	0.38	0.29	0.19	0.19	0.19	0.19	11.2
8	4	8	8	8	2 < 3	50	0.31	0.34	0.32	0.19	–	–	–	11.2
8	4	8	8	8	3 – 5	50	0.25	0.27	0.27	0.19	–	–	–	11.2
8	4	8	8	8	10	45	0.26	0.28	0.29	0.19	–	–	–	11.2
8	4	8	8	8	15	41	0.34	0.37	0.38	0.19	–	–	–	11.2
8	4	8	8	8	20	41	0.44	0.48	0.49	0.19	–	–	–	11.2
8	5	8	8	8	< 2	–	0.24	0.40	0.32	0.19	0.19	0.19	0.19	12.0
8	5	8	8	8	2 < 3	50	0.28	0.37	0.35	0.19	–	–	–	12.0
8	5	8	8	8	3 – 5	45	0.23	0.29	0.30	0.19	–	–	–	12.0
8	5	8	8	8	10	45	0.23	0.31	0.32	0.19	–	–	–	12.0
8	5	8	8	8	15	41	0.30	0.41	0.42	0.19	–	–	–	12.0
8	5	8	8	8	20	41	0.39	0.52	0.54	0.19	–	–	–	12.0
8	6	8	8	8	< 2	–	0.22	0.42	0.35	0.19	0.19	0.19	0.19	12.8
8	6	8	8	8	2 < 3	50	0.25	0.40	0.38	0.19	–	–	–	12.8
8	6	8	8	8	3 – 5	50	0.21	0.32	0.33	0.19	–	–	–	12.8
8	6	8	8	8	10	45	0.22	0.33	0.34	0.19	–	–	–	12.8
8	6	8	8	8	15	41	0.28	0.43	0.45	0.19	–	–	–	12.8
8	6	8	8	8	20	41	0.36	0.55	0.57	0.19	–	–	–	12.8
8	7	8	8	8	< 2	–	0.20	0.44	0.37	0.19	0.19	0.19	0.19	13.6
8	7	8	8	8	2 < 3	55	0.23	0.43	0.41	0.19	–	–	–	13.6
8	7	8	8	8	3 – 5	55	0.19	0.34	0.35	0.19	–	–	–	13.6
8	7	8	8	8	10	50	0.20	0.34	0.36	0.19	–	–	–	13.6
8	7	8	8	8	15	41	0.26	0.45	0.47	0.19	–	–	–	13.6
8	7	8	8	8	20	41	0.33	0.57	0.60	0.19	–	–	–	13.6
8	8	8	8	8	< 2	–	0.20	0.45	0.40	0.19	0.19	0.19	0.19	14.4
8	8	8	8	8	2 < 3	65	0.21	0.45	0.44	0.19	–	–	–	14.4
8	8	8	8	8	3 – 5	65	0.19	0.36	0.38	0.19	–	–	–	14.4
8	8	8	8	8	10	55	0.19	0.35	0.38	0.19	–	–	–	14.4
8	8	8	8	8	15	45	0.24	0.46	0.49	0.19	–	–	–	14.4
8	8	8	8	8	20	45	0.31	0.59	0.62	0.19	–	–	–	14.4

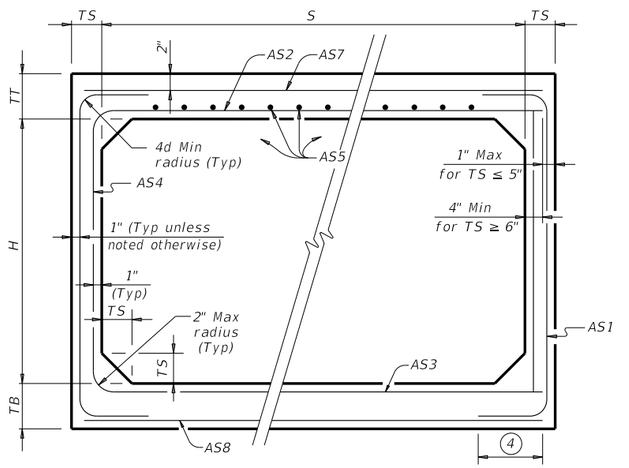
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

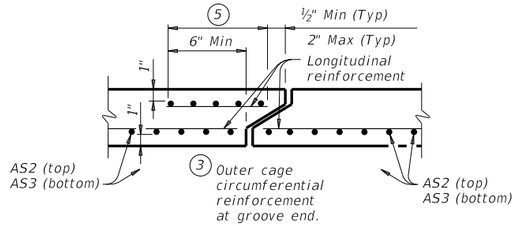
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

8'-0" SPAN

SCP-8

FILE: CD-SCP08-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		104

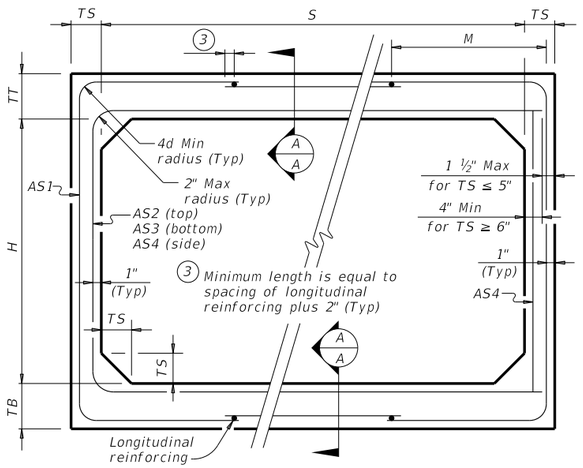
DATE:
FILE:

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
10	4	10	10	10	< 2	–	0.33	0.34	0.27	0.24	0.24	0.24	0.24	16.5
10	4	10	10	10	2 < 3	58	0.38	0.35	0.30	0.24	–	–	–	16.5
10	4	10	10	10	3 – 5	53	0.31	0.28	0.27	0.24	–	–	–	16.5
10	4	10	10	10	10	52	0.36	0.32	0.33	0.24	–	–	–	16.5
10	4	10	10	10	15	52	0.47	0.42	0.43	0.24	–	–	–	16.5
10	4	10	10	10	20	52	0.61	0.54	0.55	0.24	–	–	–	16.5
10	4	10	10	10	25	52	0.75	0.67	0.68	0.24	–	–	–	16.5
10	5	10	10	10	< 2	–	0.30	0.36	0.30	0.24	0.24	0.24	0.24	17.5
10	5	10	10	10	2 < 3	58	0.35	0.39	0.34	0.24	–	–	–	17.5
10	5	10	10	10	3 – 5	52	0.28	0.31	0.30	0.24	–	–	–	17.5
10	5	10	10	10	10	52	0.33	0.35	0.36	0.24	–	–	–	17.5
10	5	10	10	10	15	47	0.42	0.46	0.47	0.24	–	–	–	17.5
10	5	10	10	10	20	47	0.55	0.59	0.61	0.24	–	–	–	17.5
10	5	10	10	10	25	47	0.68	0.73	0.75	0.24	–	–	–	17.5
10	6	10	10	10	< 2	–	0.28	0.38	0.33	0.24	0.24	0.24	0.24	18.5
10	6	10	10	10	2 < 3	58	0.32	0.42	0.37	0.24	–	–	–	18.5
10	6	10	10	10	3 – 5	53	0.26	0.34	0.33	0.24	–	–	–	18.5
10	6	10	10	10	10	52	0.30	0.38	0.39	0.24	–	–	–	18.5
10	6	10	10	10	15	47	0.39	0.49	0.51	0.24	–	–	–	18.5
10	6	10	10	10	20	47	0.50	0.63	0.65	0.24	–	–	–	18.5
10	6	10	10	10	25	47	0.61	0.78	0.80	0.24	–	–	–	18.5
10	7	10	10	10	< 2	–	0.25	0.40	0.36	0.24	0.24	0.24	0.24	19.5
10	7	10	10	10	2 < 3	58	0.30	0.45	0.40	0.24	–	–	–	19.5
10	7	10	10	10	3 – 5	58	0.24	0.36	0.35	0.24	–	–	–	19.5
10	7	10	10	10	10	52	0.28	0.40	0.42	0.24	–	–	–	19.5
10	7	10	10	10	15	47	0.36	0.52	0.54	0.24	–	–	–	19.5
10	7	10	10	10	20	47	0.46	0.67	0.69	0.24	–	–	–	19.5
10	7	10	10	10	25	47	0.56	0.82	0.85	0.24	–	–	–	19.5
10	8	10	10	10	< 2	–	0.24	0.41	0.38	0.24	0.24	0.24	0.24	20.5
10	8	10	10	10	2 < 3	64	0.27	0.47	0.43	0.24	–	–	–	20.5
10	8	10	10	10	3 – 5	58	0.24	0.38	0.38	0.24	–	–	–	20.5
10	8	10	10	10	10	52	0.26	0.42	0.44	0.24	–	–	–	20.5
10	8	10	10	10	15	47	0.34	0.54	0.57	0.24	–	–	–	20.5
10	8	10	10	10	20	47	0.43	0.69	0.72	0.24	–	–	–	20.5
10	9	10	10	10	< 2	–	0.24	0.42	0.41	0.24	0.24	0.24	0.24	21.5
10	9	10	10	10	2 < 3	70	0.26	0.50	0.46	0.24	–	–	–	21.5
10	9	10	10	10	3 – 5	64	0.24	0.40	0.40	0.24	–	–	–	21.5
10	9	10	10	10	10	58	0.25	0.43	0.46	0.24	–	–	–	21.5
10	9	10	10	10	15	52	0.32	0.56	0.59	0.24	–	–	–	21.5
10	9	10	10	10	20	47	0.40	0.71	0.75	0.24	–	–	–	21.5
10	10	10	10	10	< 2	–	0.24	0.44	0.44	0.24	0.24	0.24	0.24	22.5
10	10	10	10	10	2 < 3	79	0.25	0.52	0.48	0.24	–	–	–	22.5
10	10	10	10	10	3 – 5	70	0.24	0.42	0.43	0.24	–	–	–	22.5
10	10	10	10	10	10	64	0.24	0.44	0.48	0.24	–	–	–	22.5
10	10	10	10	10	15	52	0.30	0.57	0.61	0.24	–	–	–	22.5
10	10	10	10	10	20	52	0.38	0.73	0.77	0.24	–	–	–	22.5

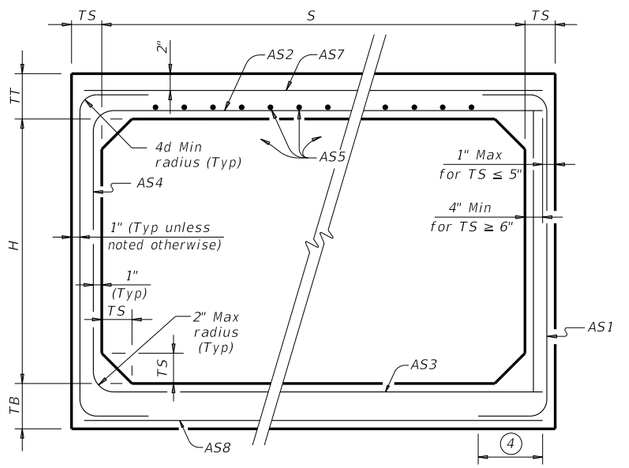
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

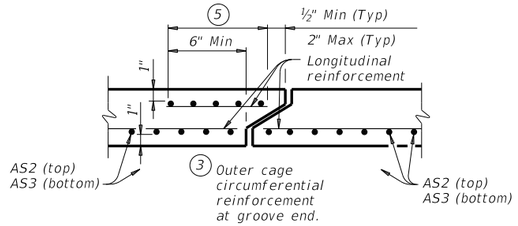
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)."

HL93 LOADING

Texas Department of Transportation

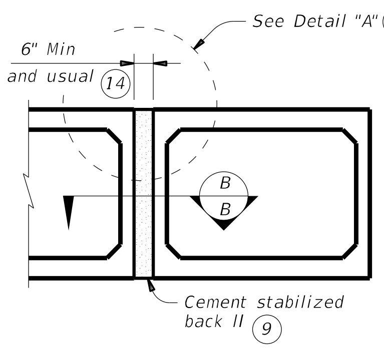
Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

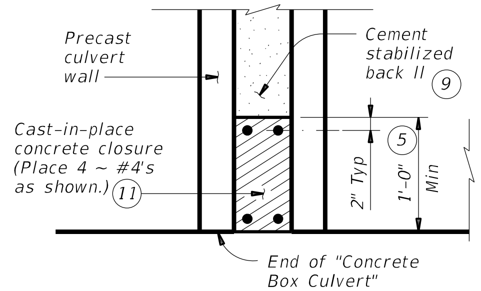
10'-0" SPAN

SCP-10

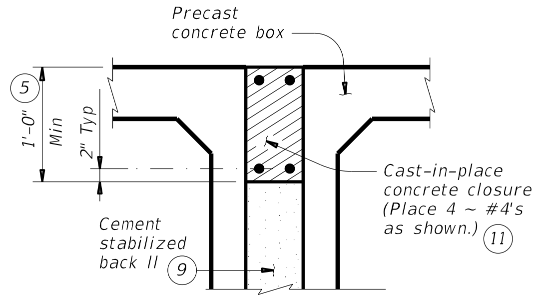
FILE: CD-SCP10-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		105



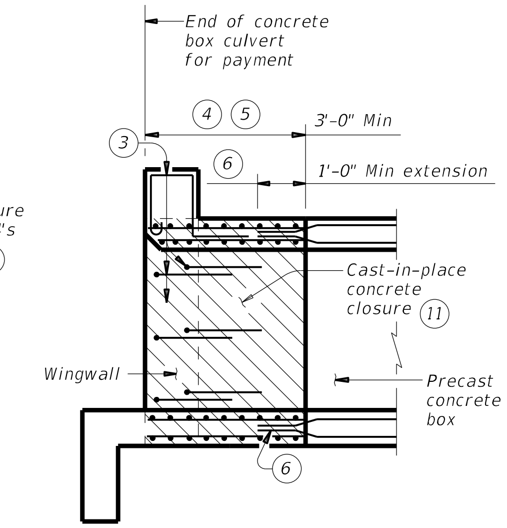
MULTIPLE UNIT PLACEMENT



SECTION B-B

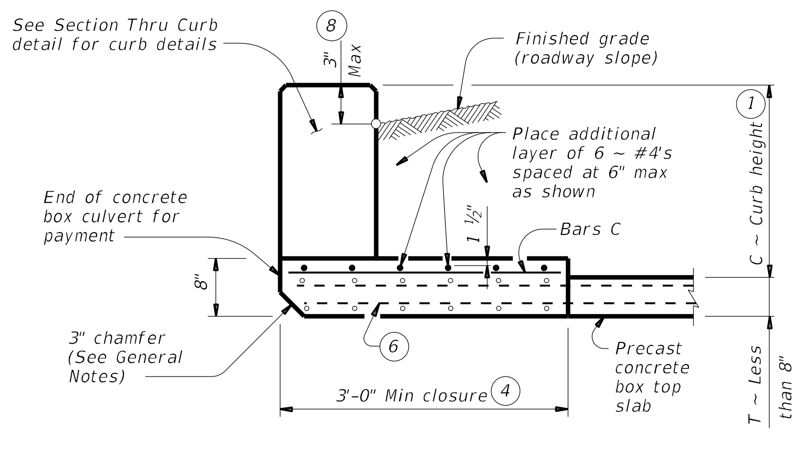


DETAIL "A" 13

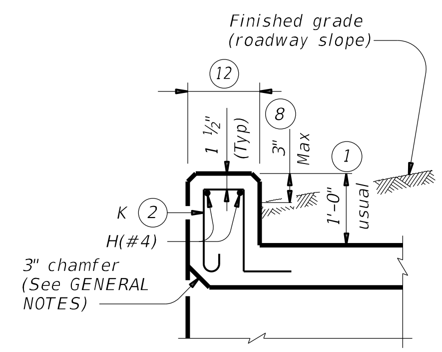


WINGWALL CONNECTION

(Also applies to safety end treatment.)

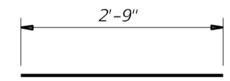


SECTION THRU TOP SLABS LESS THAN 8"

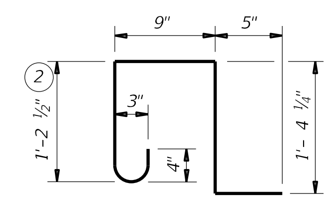


SECTION THRU CURB

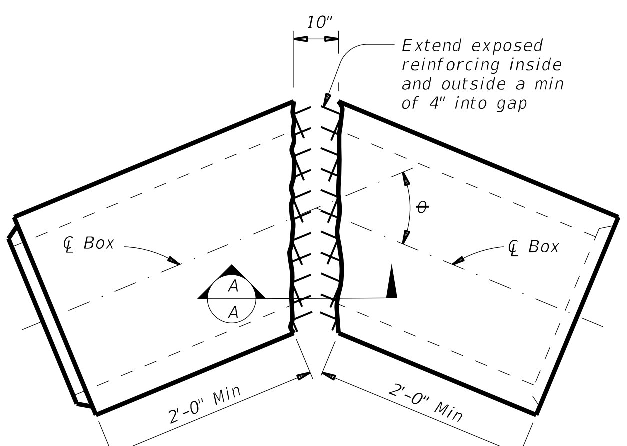
QUANTITIES PER FOOT OF CURB 10	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



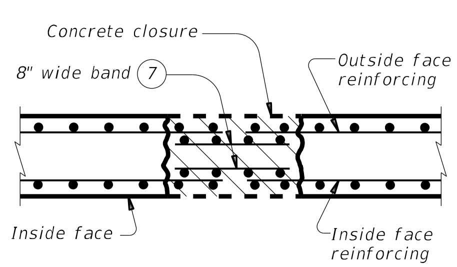
BARS C (#4)
(Spa = 1'-0" Max)



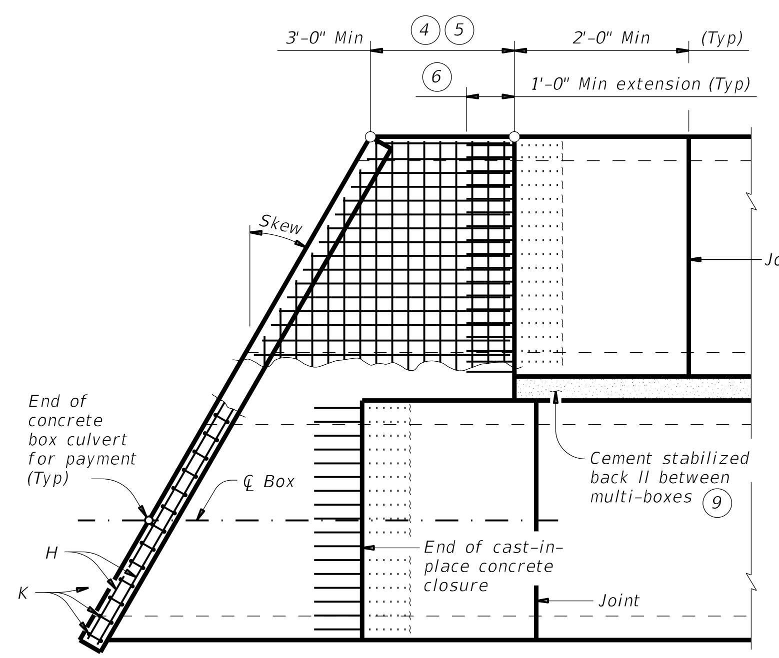
BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
2. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
3. Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not t into closure area.
4. Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the eld or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast-in-place closure ush with the inside and outside faces of the precast box section.
5. For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'-0" Min cast-in-place closure in the top slab, bottom slab, and exterior wall. See Section B-B detail when interior walls are cast full length.
6. Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).
7. Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.
8. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above nished grade.
   - For structures with bridge rail, construct curbs ush with nished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. Cement stabilized back ll between boxes is considered part of the box culvert for payment.
10. All curb concrete and reinforcing is considered part of the box culvert for payment.
11. Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
12. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
13. For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the nal riding surface, provide wall closure as shown in Detail "A".
14. This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized back ll meeting the requirements of Item 400, "Excavation and Back ll for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Speci cations.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bars dimensions are out-to-out of bars.

HL93 LOADING

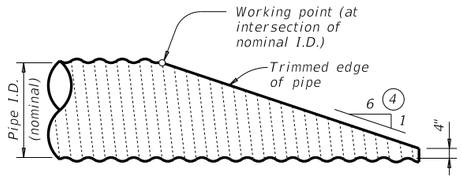
Texas Department of Transportation
Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

FILE: scpmdsts-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT 1378	SECT 01	JOB 050	HIGHWAY RM 1431
REVISIONS	DIST AUS		COUNTY TRAVIS	SHEET NO. 106

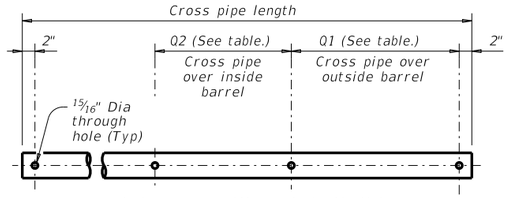
DATE:
FILE:



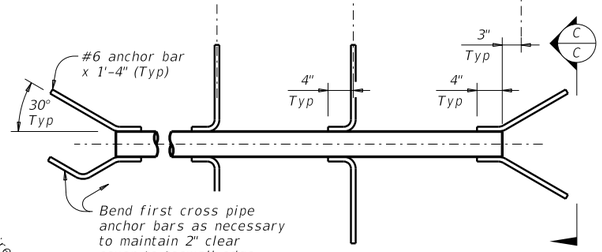
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

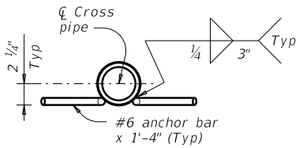
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



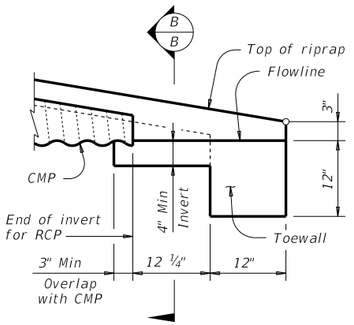
PIPE WITH BOLTED ANCHOR



PIPE WITH ANCHOR BARS

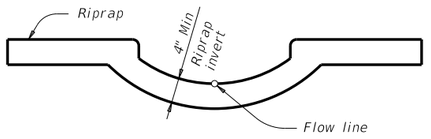


SECTION C-C



DETAIL "A"

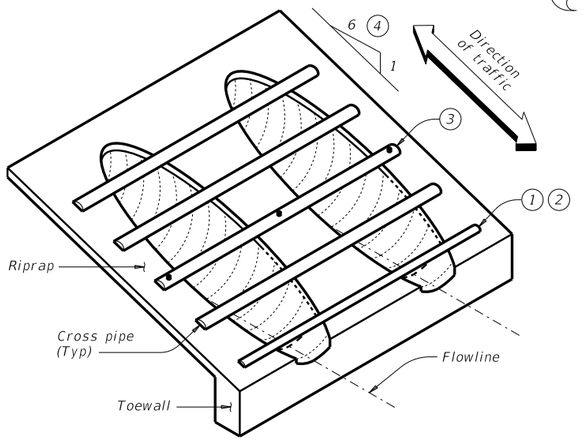
(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)



SECTION B-B

(Cross pipes not shown for clarity.)

CROSS PIPE DETAILS



ISOMETRIC VIEW OF TYPICAL INSTALLATION

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 ½" 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.

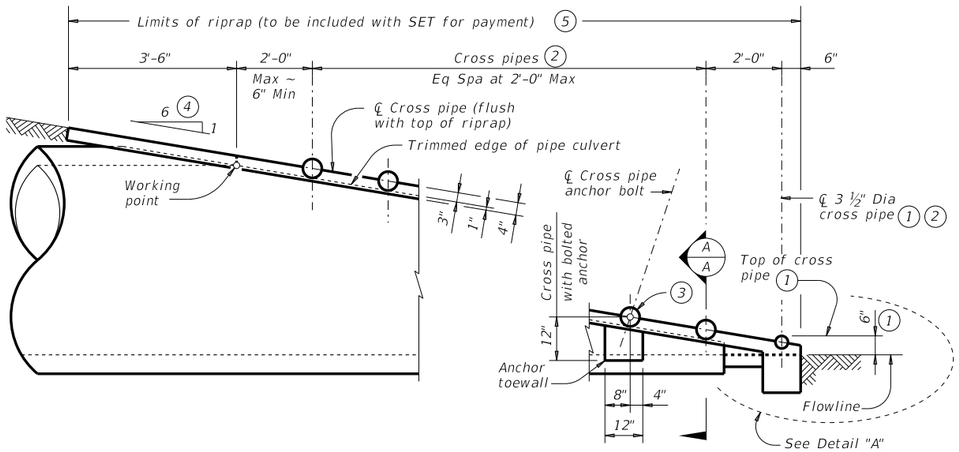
GENERAL NOTES:

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.

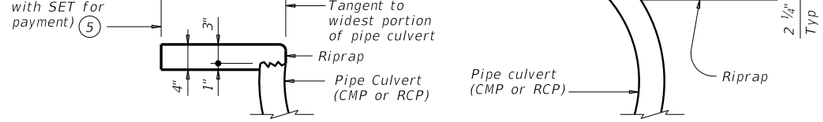
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap."

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



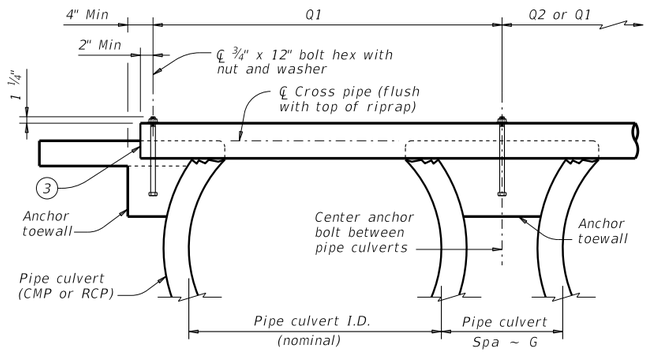
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(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

FILE: CD-SETP-PD-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
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	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		107

DATE:
FILE:

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing length (2~wings) (3)	
					Bars J1		Bars J2			
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9	6"	#6	6"	297.02	1.234

TABLE OF WINGWALL REINFORCING
(2~wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

WING DIMENSION FORMULAS:

(All values are in feet.)

Hw = H + T + C – 0.250'
Lw = (Hw – 0.333') (SL)

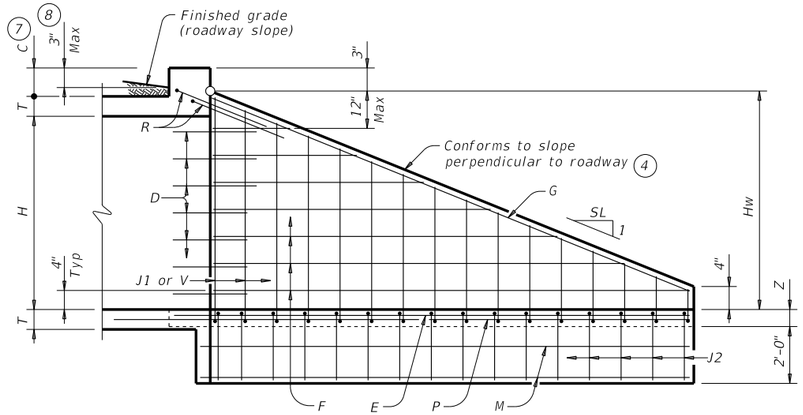
For cast–in–place culverts:
Ltw = (N) (S) + (N + 1) (U)

For precast culverts:
Ltw = (N) (2U + S) + (N – 1) (0.5')

Total Wingwall Area (two wings ~ SF) = (Hw + 0.333') (Lw)

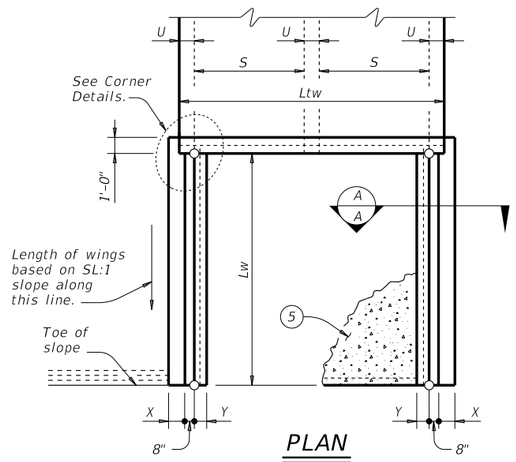
Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans

See applicable box culvert standard sheet for H, S, T, and U values.



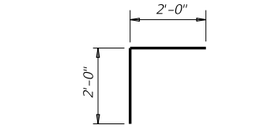
INSIDE ELEVATION

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

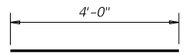


PLAN

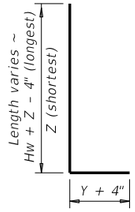
(Showing dimensions.)



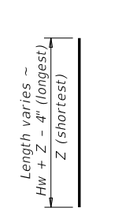
BARS R



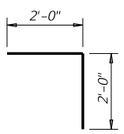
BARS D



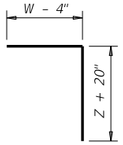
BARS J1



BARS V



BARS L



BARS J2

(1) Extend Bars P 3'–0" minimum into bottom slab of box culvert.

(2) Adjust as necessary to maintain 1 1#2" clear cover and 4" minimum between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings, multiply the tabulated values by Lw.

(4) Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap." Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'–6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of flow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B–B will not be required.

(6) At Contractor's option, culvert toewall may be ended flush with wingwall toewall. Adjust reinforcing as needed.

(7) 0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(8) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

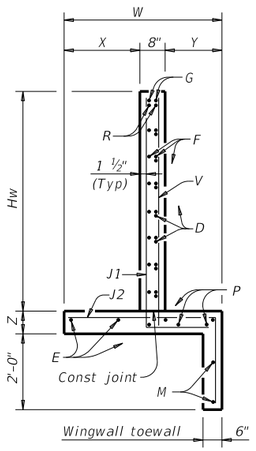
MATERIAL NOTES:

Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
In riprap concrete, synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing unless noted otherwise.

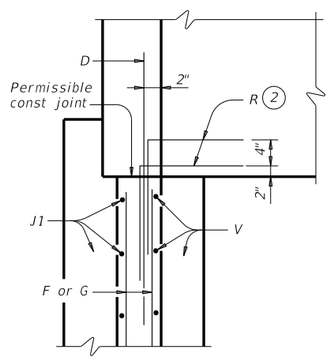
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

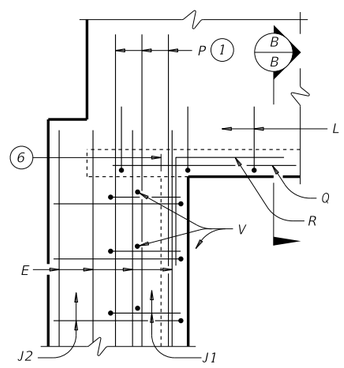
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing dimensions are out-to-out of bars.



SECTION A-A

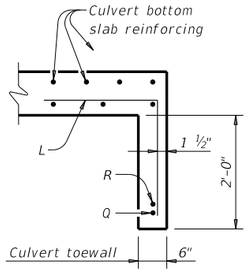


WINGWALL



FOOTING AND TOEWALL

CORNER DETAILS



SECTION B-B (5)

Texas Department of Transportation

Bridge Division Standard

CONCRETE WINGWALLS
WITH STRAIGHT WINGS FOR 0° SKEW BOX CULVERTS

SW-0

FILE: CD-SW0-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
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	DIST	COUNTY		SHEET NO.
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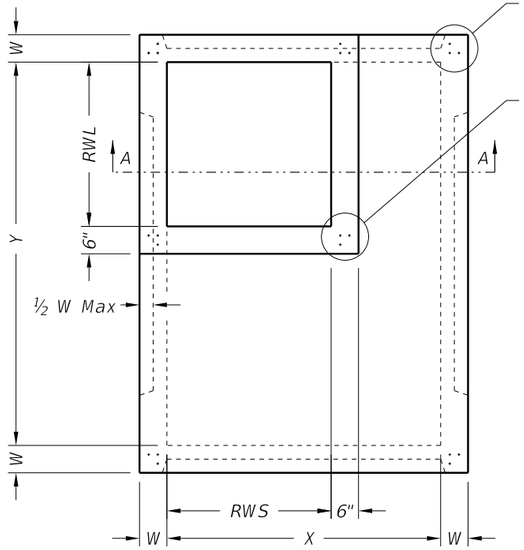
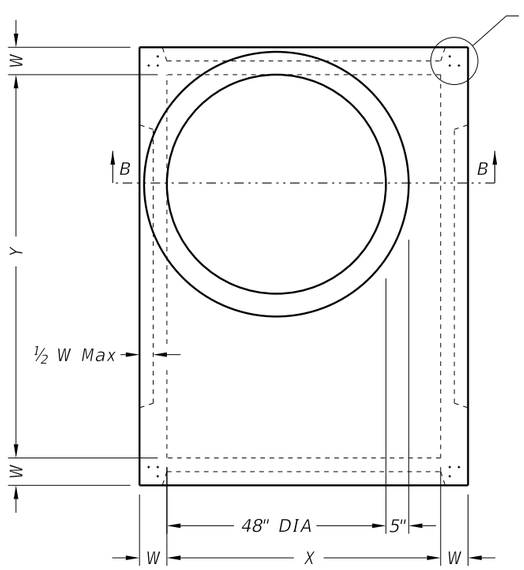


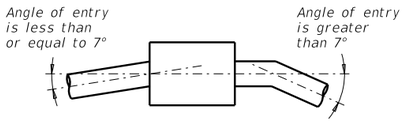
PLAN VIEW "A"

SQUARE REDUCED RISER OPTION



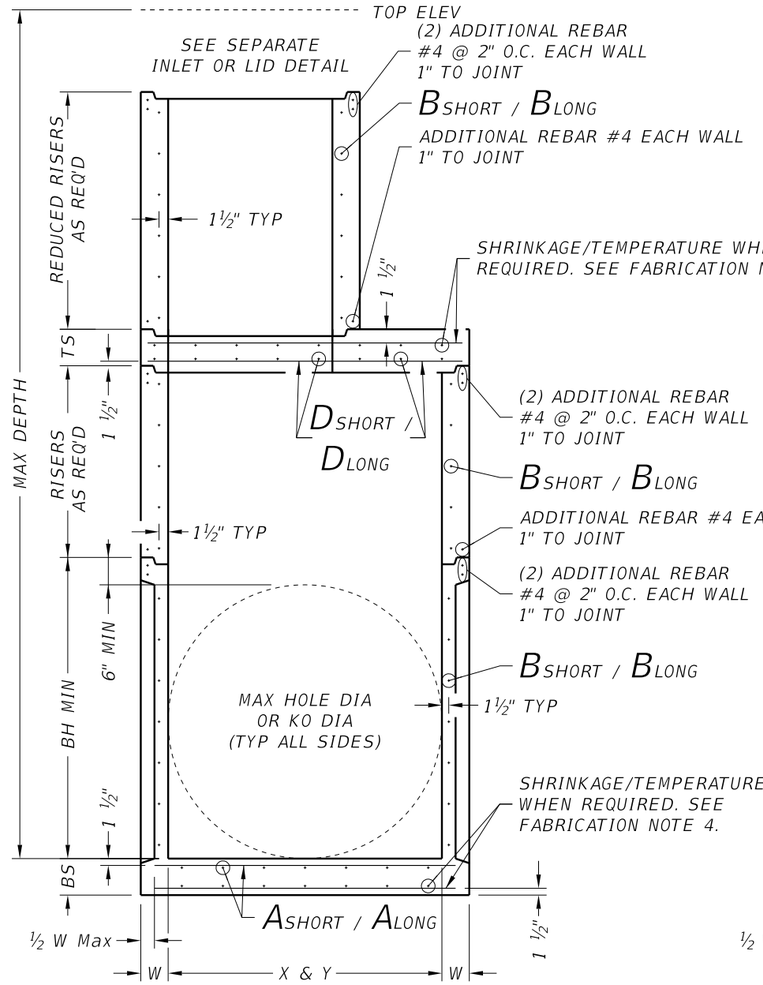
PLAN VIEW "B"

ROUND REDUCED RISER OPTION



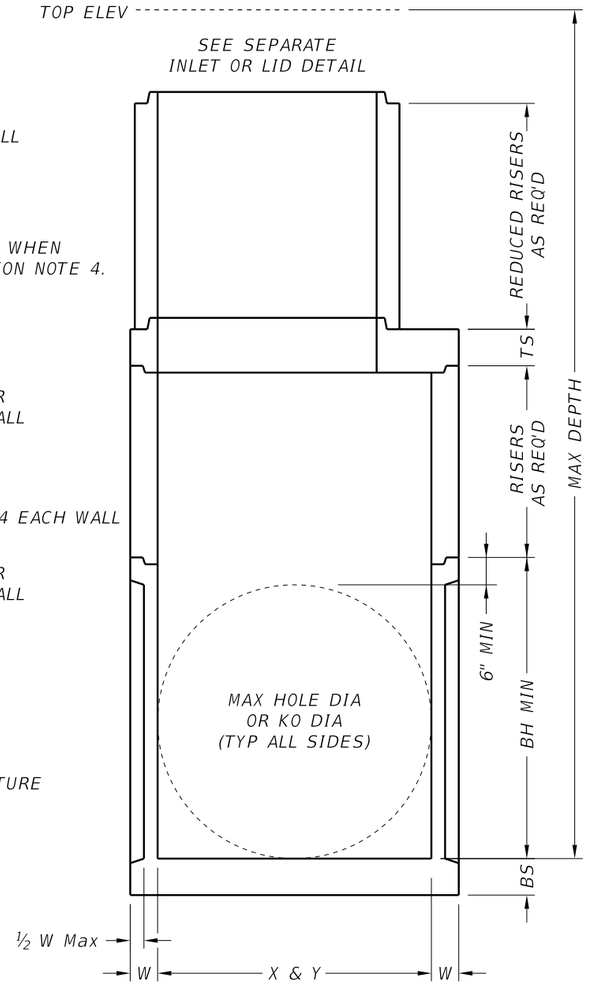
PIPE CONNECTION DETAIL

Connect pipes within 7° of normal to PB wall.
If necessary, use pipe elbow or curved
approach alignment to stay within this limit.



SECTION A-A

SQUARE REDUCED RISER OPTION



SECTION B-B

ROUND REDUCED RISER OPTION

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 ½" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in^2/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.

INSTALLATION NOTES:

1. If required elsewhere. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to specified inlet or manhole.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

GENERAL NOTES:

1. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PDD for sizes.
2. Designed according to ASTM C913.
3. Payment for precast base is subsidiary to the specified inlet, per Item 465, "Junction Boxes, Manholes, and Inlets."

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST BASE

PB

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	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		109

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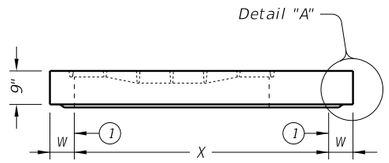
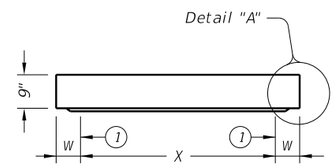
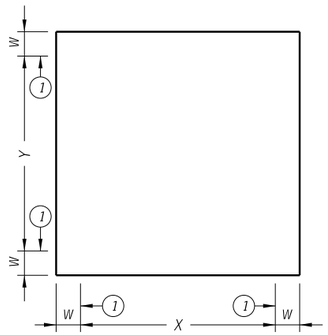


STYLE 'FG'



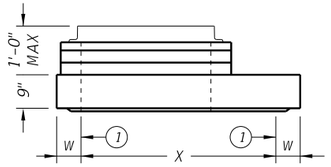
ELEVATION VIEW



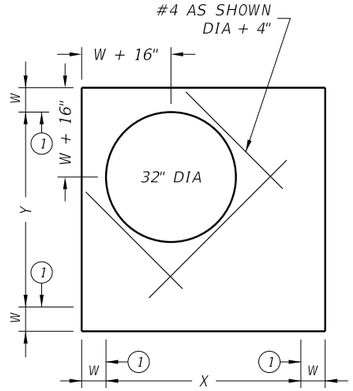
PLAN VIEW

NO OPENINGS

STYLE 'SL'



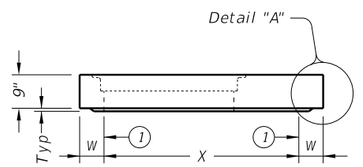
ELEVATION VIEW



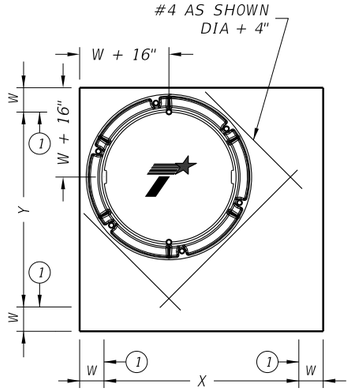
PLAN VIEW

SHIP LOOSE RING & COVER

STYLE 'RH'



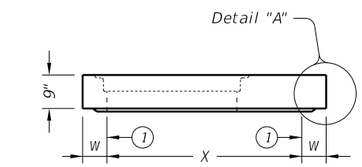
ELEVATION VIEW



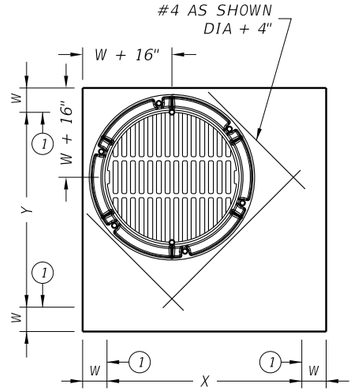
PLAN VIEW

32" DIA CAST-IN RING & COVER

STYLE 'RC'



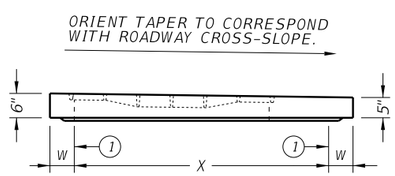
ELEVATION VIEW



PLAN VIEW

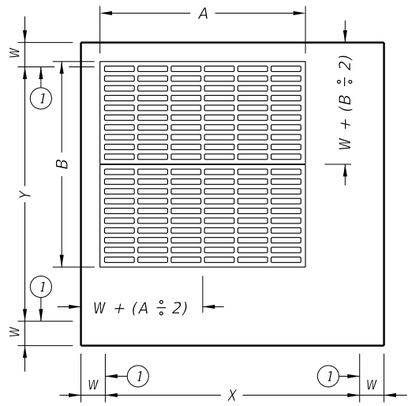
32" DIA CAST-IN RING & GRATE

STYLE 'RG'



STYLE 'SFG'

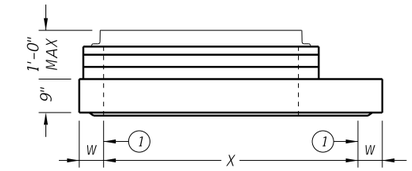
ELEVATION VIEW



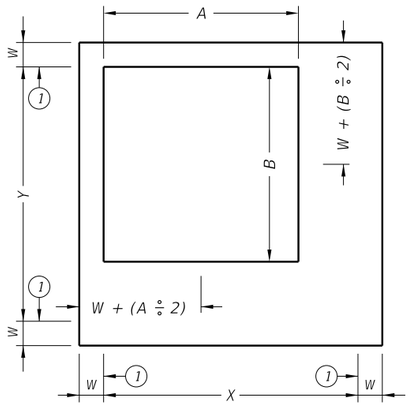
PLAN VIEW

CAST-IN FRAME & GRATE

STYLES 'FG' & 'SFG'



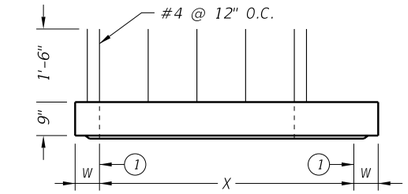
ELEVATION VIEW



PLAN VIEW

SHIP LOOSE FRAME & GRATE

STYLE 'SH'



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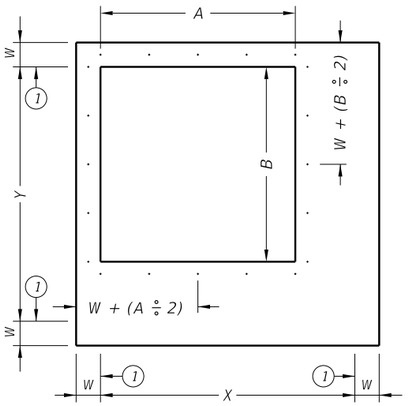


PLAN VIEW

EXPOSED REBAR

STYLE 'S1'

(1) Matches inside face of wall of precast base or riser below inlet.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST SLAB LID

PSL

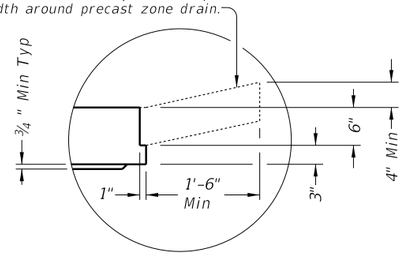
FILE: CD-PSL-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		110

DATE:
FILE:

Style	Size (X x Y)	W (2)	A x B (nominal)	Short Span Reinf Steel Area	Long Span Reinf Steel Area
SL	3'x3'	6"	n/a	0.37 in²/ft	0.37 in²/ft
RH,RC,RG,SH,S1,FG	3'x3'	6"	3'x3' or 32" Dia	0.37 in²/ft	0.37 in²/ft
SFG	3'x3'	6"	3'x3'	0.32 in²/ft	0.32 in²/ft
SL	4'x4'	6"	n/a	0.34 in²/ft	0.34 in²/ft
RH,RC,RG,SH,S1,FG	4'x4'	6"	3'x3' or 32" Dia	0.41 in²/ft	0.41 in²/ft
SH,S1,FG	4'x4'	6"	4'x4'	0.41 in²/ft	0.41 in²/ft
SFG	4'x4'	6"	4'x4'	0.32 in²/ft	0.32 in²/ft
SL	3'x5'	6"	n/a	0.39 in²/ft	0.39 in²/ft
RH,RC,RG,SH,S1,FG	3'x5'	6"	3'x3' or 32" Dia	0.48 in²/ft	0.48 in²/ft
SH,S1,FG	3'x5'	6"	3'x5'	0.48 in²/ft	0.48 in²/ft
SFG	3'x5'	6"	3'x5'	0.32 in²/ft	0.32 in²/ft
SL	4'x5'	6"	n/a	0.42 in²/ft	0.42 in²/ft
RH,RC,RG,SH,S1,FG	4'x5'	6"	3'x3' or 32" Dia	0.42 in²/ft	0.42 in²/ft
SH,S1,FG	4'x5'	6"	4'x4'	0.63 in²/ft	0.63 in²/ft
SH,S1,FG	4'x5'	6"	3'x5'	0.66 in²/ft	0.66 in²/ft
SL	5'x5'	6"	n/a	0.36 in²/ft	0.36 in²/ft
RH,RC,RG,SH,S1,FG	5'x5'	6"	3'x3' or 32" Dia	0.43 in²/ft	0.43 in²/ft
SH,S1,FG	5'x5'	6"	4'x4'	0.63 in²/ft	0.63 in²/ft
SH,S1,FG	5'x5'	6"	3'x5'	0.63 in²/ft	0.63 in²/ft
SL	5'x6'	6"/8"	n/a	0.48 in²/ft	0.48 in²/ft
RH,RC,RG,SH,S1,FG	5'x6'	6"/8"	3'x3' or 32" Dia	0.48 in²/ft	0.48 in²/ft
SH,S1,FG	5'x6'	6"/8"	4'x4'	0.60 in²/ft	0.60 in²/ft
SH,S1,FG	5'x6'	6"/8"	3'x5'	0.60 in²/ft	0.60 in²/ft
SL	6'x6'	6"/8"	n/a	0.43 in²/ft	0.43 in²/ft
RH,RC,RG,SH,S1,FG	6'x6'	6"/8"	3'x3' or 32" Dia	0.56 in²/ft	0.56 in²/ft
SH,S1,FG	6'x6'	6"/8"	4'x4'	0.56 in²/ft	0.56 in²/ft
SH,S1,FG	6'x6'	6"/8"	3'x5'	0.59 in²/ft	0.59 in²/ft
SL	8'x8'	8"/10"	n/a	0.45 in²/ft	0.45 in²/ft
RH,RC,RG,SH,S1,FG	8'x8'	8"/10"	3'x3' or 32" Dia	0.45 in²/ft	0.45 in²/ft
SH,S1,FG	8'x8'	8"/10"	4'x4'	0.45 in²/ft	0.45 in²/ft
SH,S1,FG	8'x8'	8"/10"	3'x5'	0.45 in²/ft	0.45 in²/ft

(2) See sheet PDD for corresponding wall thickness (W) of base unit or riser.

Construct cast-in-place reinforced concrete apron, when shown elsewhere in plans. Use Class "A" concrete. Apron is subsidiary to PSL. Apron is 1'-6" Min width around precast zone drain.



DETAIL "A"

(Reinforcing not shown for clarity)

When an apron is to be cast around PSL, use detail above to create an apron ledge on all 4 sides.

FABRICATION NOTES:

1. Locate penetration (Style 'RH'), ring and cover (Style 'RC'), ring and grate (Style 'RG'), and frame and grate (Style 'FG') in a corner. Only one penetration is allowed per slab lid.
2. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
3. Provide Grade 60 reinforcing steel or equivalent area of WWR.
4. Provide clear cover of ¾" to reinforcing from lower outside shoulder of slab for structural reinforcement, and 2" from top of slab for shrinkage and temperature reinforcement. Place short span reinforcing closest to surface.
5. Slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing. Provide steel area = 0.11 in²/ft each way.
6. No substitution is allowed for diagonal #4 bars around openings.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.

INSTALLATION NOTES:

1. Precast slab lids are intended for direct traffic and may be placed in roadway.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. Initial installation of grade adjustment rings for Styles 'RH' and 'SH' is limited to 1'-0" Max as shown.
5. Grade adjustment rings for Styles 'RH' and 'SH' may be increased to 2'-0" Max when future construction affects final grade of structure. Make adjustments greater than 2'-0" with additional risers. Adjustments can be made up to Max depth shown on sheet PDD. Structure must be evaluated if Max depth will be exceeded.
6. Orient long dimension of grate slots perpendicular to traffic, unless noted otherwise on plans

GENERAL NOTES:

1. Designed according to ASTM C913.
2. Payment for lid is per Item 465, "Junction Boxes, Manholes, and Inlets" by type, style, size, and opening size (when applicable).

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

PRECAST SLAB LID

PSL

FILE: CD-PSL-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		111

DATE: 1/12/2023 5:14:43 PM
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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

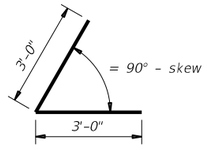
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2–wings) (4)		Estimated Quantities per ft of Toewall (1–toewall)	
Maximum Wingwall Height Hw	W	X	Y	Z	Bars J1		Bars J2					
					Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'–6"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	48.64	0.406	6.85	0.071
2'–9"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	49.31	0.424	6.85	0.071
3'–0"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	49.98	0.444	6.85	0.071
3'–3"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	53.32	0.462	6.85	0.071
3'–6"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	53.98	0.480	6.85	0.071
4'–0"	3'–2"	1'–2"	1'–0"	7"	#4	1'–0"	#4	1'–0"	55.77	0.532	6.85	0.071
4'–6"	3'–2"	1'–2"	1'–0"	7"	#4	1'–0"	#4	1'–0"	59.77	0.568	6.85	0.071
5'–0"	3'–9"	1'–7"	1'–2"	7"	#4	1'–0"	#4	1'–0"	63.45	0.632	6.96	0.075
5'–6"	3'–9"	1'–7"	1'–2"	7"	#4	1'–0"	#4	1'–0"	67.46	0.668	6.96	0.075
6'–0"	4'–4"	2'–0"	1'–4"	7"	#5	1'–0"	#5	1'–0"	80.67	0.730	7.07	0.078
6'–6"	4'–4"	2'–0"	1'–4"	7"	#5	1'–0"	#5	1'–0"	85.05	0.768	7.07	0.078
7'–0"	5'–0"	2'–3"	1'–9"	8"	#5	1'–0"	#5	1'–0"	92.15	0.864	8.07	0.093
7'–6"	5'–0"	2'–3"	1'–9"	8"	#5	1'–0"	#5	1'–0"	96.54	0.902	8.07	0.093
8'–0"	5'–6"	2'–8"	1'–10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'–6"	5'–6"	2'–8"	1'–10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'–6"	6'–0"	2'–10"	2'–2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'–6"	6'–5"	3'–0"	2'–5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'–6"	7'–2"	3'–6"	2'–8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'–6"	7'–8"	3'–9"	2'–11"	1'–0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'–6"	8'–2"	4'–0"	3'–2"	1'–2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'–6"	8'–10"	4'–5"	3'–5"	1'–4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'–6"	9'–6"	4'–10"	3'–8"	1'–6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'–0"	9'–11"	5'–0"	3'–11"	1'–7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2~wings)

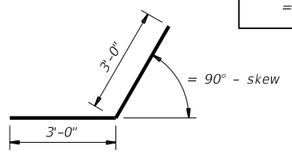
Bar	Size	No.	Spa
D1	#6	~	1'–0"
D2	#6	~	1'–0"
E1	#4	~	1'–0"
F	#4	~	1'–0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'–0"
V	#4	~	1'–0"

TABLE OF TOEWALL REINFORCING

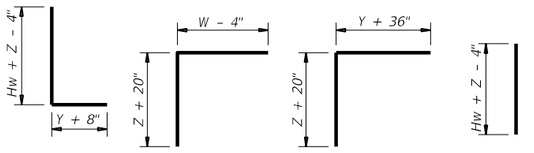
Bar	Size	No.	Spa
J3	#4	~	1'–0"
M2	#4	2	~
E2	#4	~	1'–0"



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

WING DIMENSION FORMULAS:
(All values are in feet.)

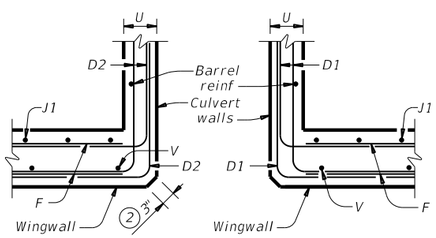
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW–1
= (Hw – 1') (SL) ÷ cosine (θ) for Type PW–2 and Hw ≥ 4'
= (Hw – 0.5') (SL) ÷ cosine (θ) for Type PW–2 and Hw < 4'

For cast–in–place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

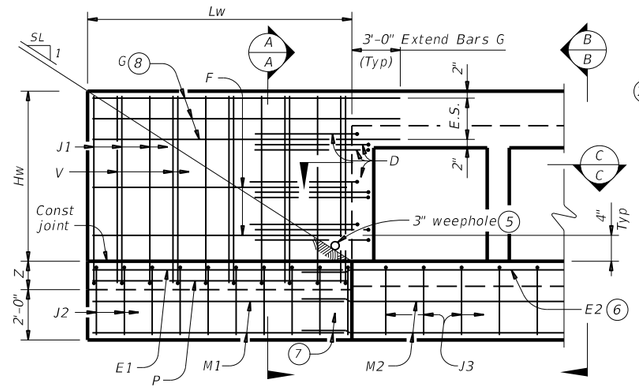
For precast culverts:
Ltw = [(N) (2 U + S) + (N – 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW–1
= (2)(Hw)(Lw) – 6 SF for Type PW–2 and Hw ≥ 4'
= (2)(Hw)(Lw) – 1.5 SF for Type PW–2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

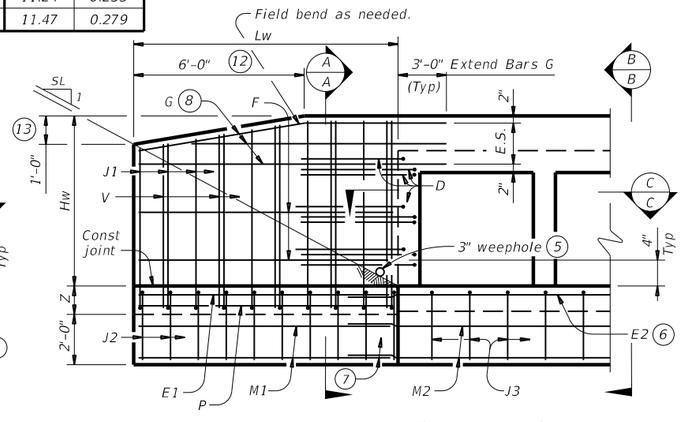
See applicable box culvert standard sheet for S, H, T, and U values.



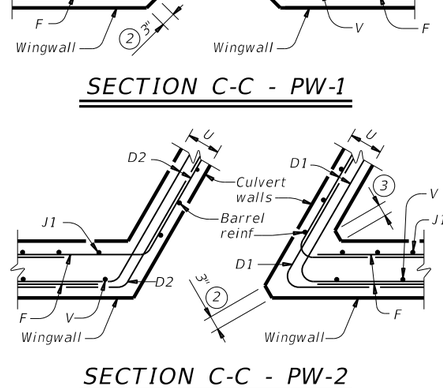
SECTION C-C - PW-1



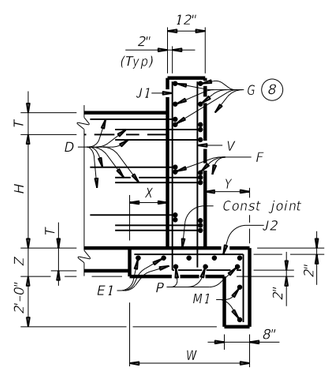
PARTIAL ELEVATION - PW-1



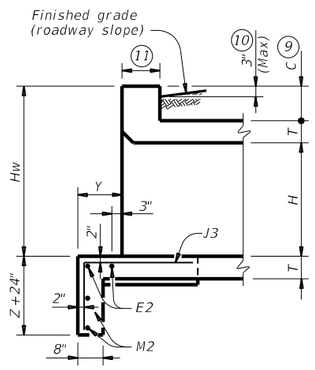
PARTIAL ELEVATION - PW-2



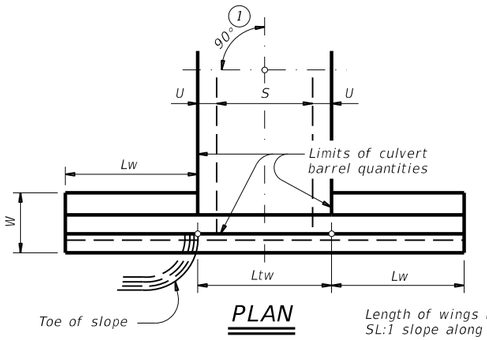
SECTION C-C - PW-2



SECTION A-A
(Showing wing reinforcement.)

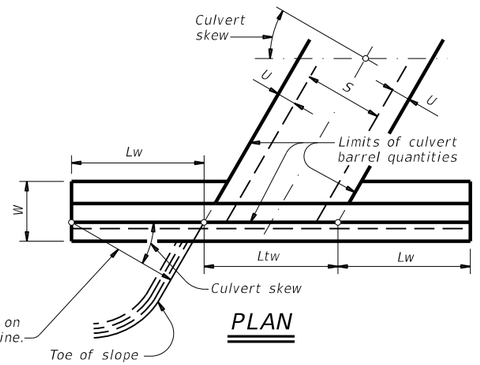


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW–1 wings. Adjust concrete volume for Type PW–2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'–0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'–6" minimum into the wingwall footing.
7. Lap Bars M1 1'–6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, construct curbs no more than 3" above nished grade.
    - For structures with bridge rail, construct curbs ush with nished 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.
11. 1'–0" typical. 2'–3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'–0" for Hw < 4'.
13. 6" for Hw < 4'.

DESIGNER NOTES:
Type PW–1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW–2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Speci cations.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out–to–out of bars.

Texas Department of Transportation
Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS
TYPES PW-1 AND PW-2

PW

FILE:	pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		1378	01	050	RM 1431
		DIST	COUNTY		SHEET NO.
		AUS	TRAVIS		112

PAVEMENT MARKINGS & MARKERS QUANTITIES													
A	B	C	D	E	F	G	HL	HR	J	K	L	M	N
4760	4660	1190	1090	7	2	20	2	3	600	57	10	59	119

LEGEND

PAVEMENT MARKINGS:

- (A) REFL PAV MRK TY II (W)6"(SLD)/REF PROF PAV MRK TYI (W)6"(SLD)(100 MIL)
- (B) REFL PAV MRK TY II (Y)6"(SLD)/RE PM W/RET REQ TY I (Y)6"(SLD)(100 MIL)
- (C) REFL PAV MRK TY II (W)6"(BRK)/RE PM W/RET REQ TY I (W)6"(BRK)(100 MIL)
- (D) REFL PAV MRK TY II (Y)6"(BRK)/RE PM W/RET REQ TY I (Y)6"(BRK)(100 MIL)
- (E) REFL PAV MRK TY II (W)(ARROW)/REFL PAV MRK TY I (W)(ARROW)(100 MIL)
- (F) REFL PAV MRK TY II (W)(WORD) W/RET REQ TYI (W)(WORD)(100MIL)
- (J) REFL PAV MRK TY II (W) 8"(SLD)
- (K) REFL PAV MRK TY II (W) 8"(DOT)
- (L) REFL PAV MRK TY II (W) 12"(SLD)

OBJECT MARKERS:

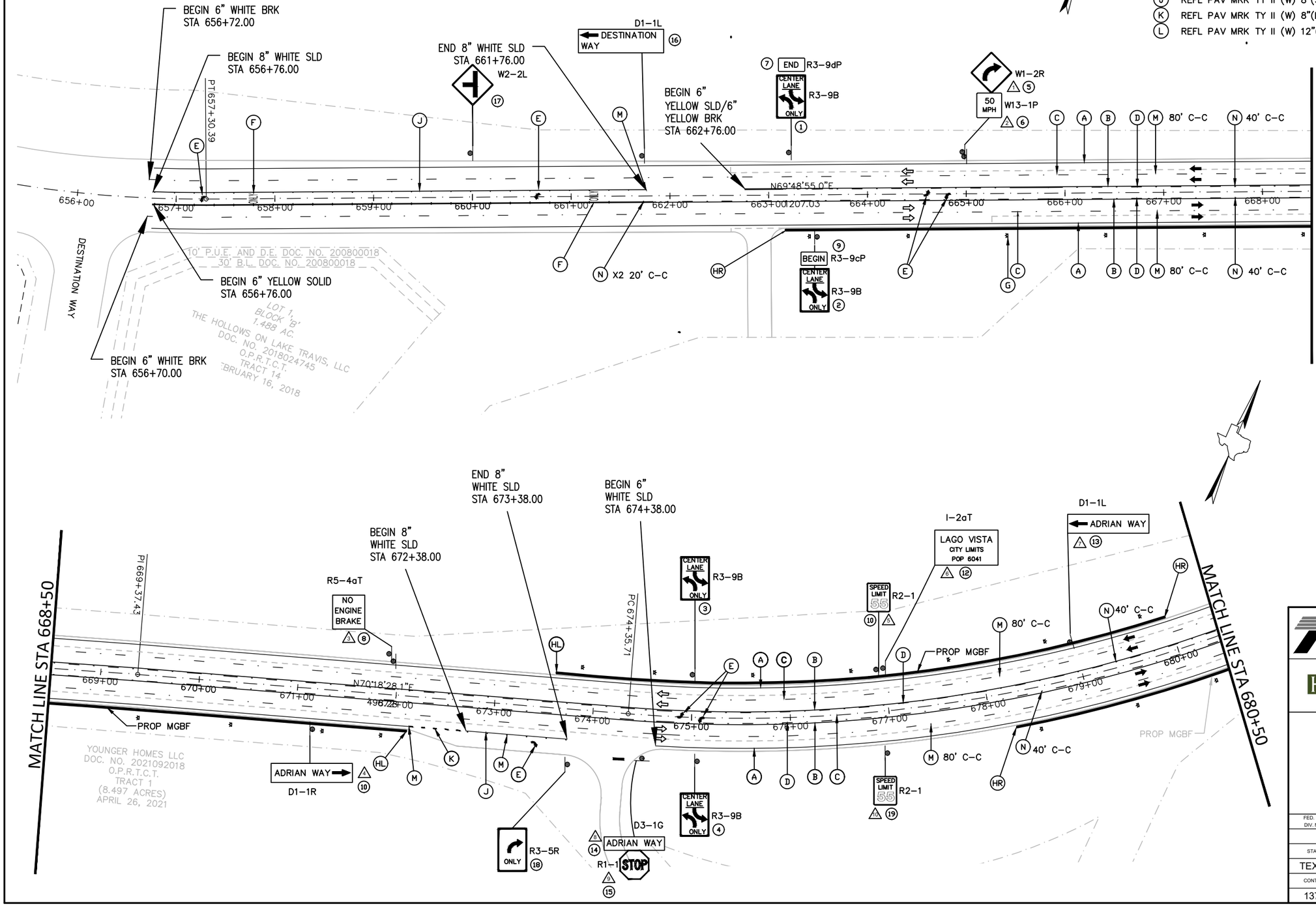
- (HL) INSTL OM ASSM (OM-3L)(TWT)GND
- (HR) INSTL OM ASSM (OM-3R)(TWT)GND
- (G) INSTL DEL ASSM (D-SW)SZ1(BRF)GF2

RAISED PAVEMENT MARKERS:

- (M) REFL PAV MRKR TY I-C
- (N) REFL PAV MRKR TY II-A-A
- PROPOSED DIRECTION OF TRAVEL
- EXISTING DIRECTION OF TRAVEL

SIGNING:

- SIGNS TO BE INSTALLED
- EXISTING SIGNS TO BE REMOVED
- EXISTING SIGNS TO REMAIN



STATE OF TEXAS
LINDA L. BARLOW
63878
LICENSED
PROFESSIONAL ENGINEER

12/18/2023

HORIZONTAL
0 50 100 200 FT

PRINT DATE	REVISION DATE

Texas Department of Transportation © 2023
Austin District

HVJ ASSOCIATES
6120 S.DAIRY ASHFORD ROAD
HOUSTON, TEXAS 77072
281.933.7388
TEXAS FIRM # 000646

RM 1431

SIGNING AND STRIPING BEGIN TO STA. 680+50

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 113

PAVEMENT MARKINGS & MARKERS QUANTITIES													
A	B	C	D	E	F	G	HL	HR	J	K	L	M	N
4800	4800	1200	1200	4	0	26	5	4	0	0	0	60	120

LEGEND

PAVEMENT MARKINGS:

- (A) REFL PAV MRK TY II (W)6"(SLD)/REF PROF PAV MRK TYI (W)6"(SLD)(100 MIL)
- (B) REFL PAV MRK TY II (Y)6"(SLD)/RE PM W/RET REQ TY I (Y)4"(SLD)(100 MIL)
- (C) REFL PAV MRK TY II (W)6"(BRK)/RE PM W/RET REQ TY I (W)6"(BRK)(100 MIL)
- (D) REFL PAV MRK TY II (Y)6"(BRK)/RE PM W/RET REQ TY I (Y)4"(BRK)(100 MIL)
- (E) REFL PAV MRK TY II (W)(ARROW)/REFL PAV MRK TY I (W)(ARROW)(100 MIL)
- (F) REFL PAV MRK TY II (W)(WORD)/REFL PAV MRK TY I (W)(WORD)(100 MIL)
- (J) REFL PAV MRK TY II (W) 8"(SLD)
- (K) REFL PAV MRK TY II (W) 8"(DOY)
- (L) REFL PAV MRK TY II (W) 12"(SLD)

OBJECT MARKERS:

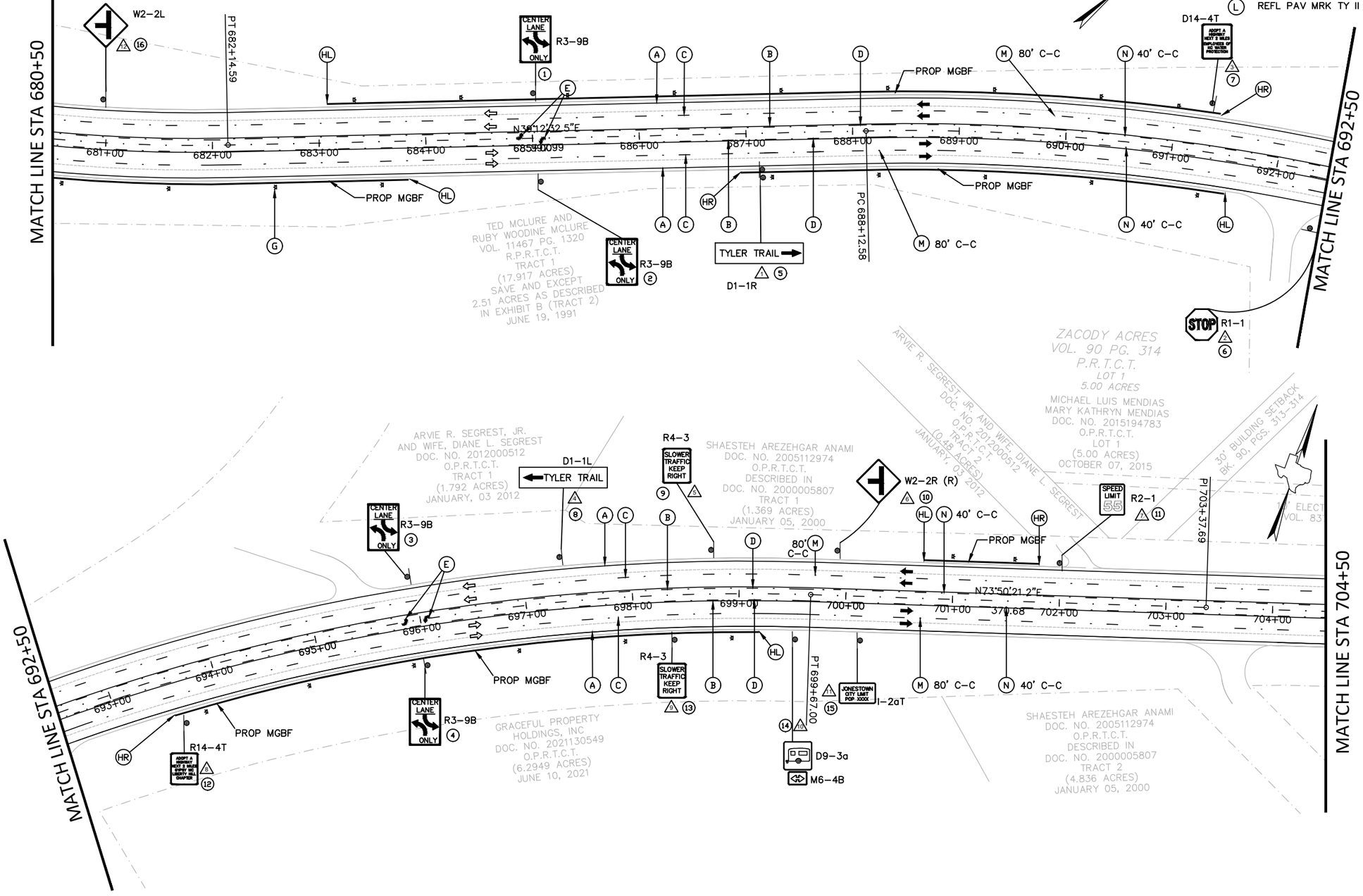
- (HL) INSTL OM ASSM (OM-3L)(TWT)GND
- (HR) INSTL OM ASSM (OM-3R)(TWT)GND
- (G) INSTL DEL ASSM (D-SW)SZ1(BRF)GF2

RAISED PAVEMENT MARKERS:

- (M) REFL PAV MRKR TY I-C
- (N) REFL PAV MRKR TY II-A-A
- PROPOSED DIRECTION OF TRAVEL
- EXISTING DIRECTION OF TRAVEL

SIGNING:

- SIGNS TO BE INSTALLED
- EXISTING SIGNS TO BE REMOVED
- EXISTING SIGNS TO REMAIN



LINDA L. BARLOW
63878
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

07/24/2024

HORIZONTAL
0 50 100 200 FT

PRINT DATE	REVISION DATE
	.

Texas Department of Transportation
Austin District

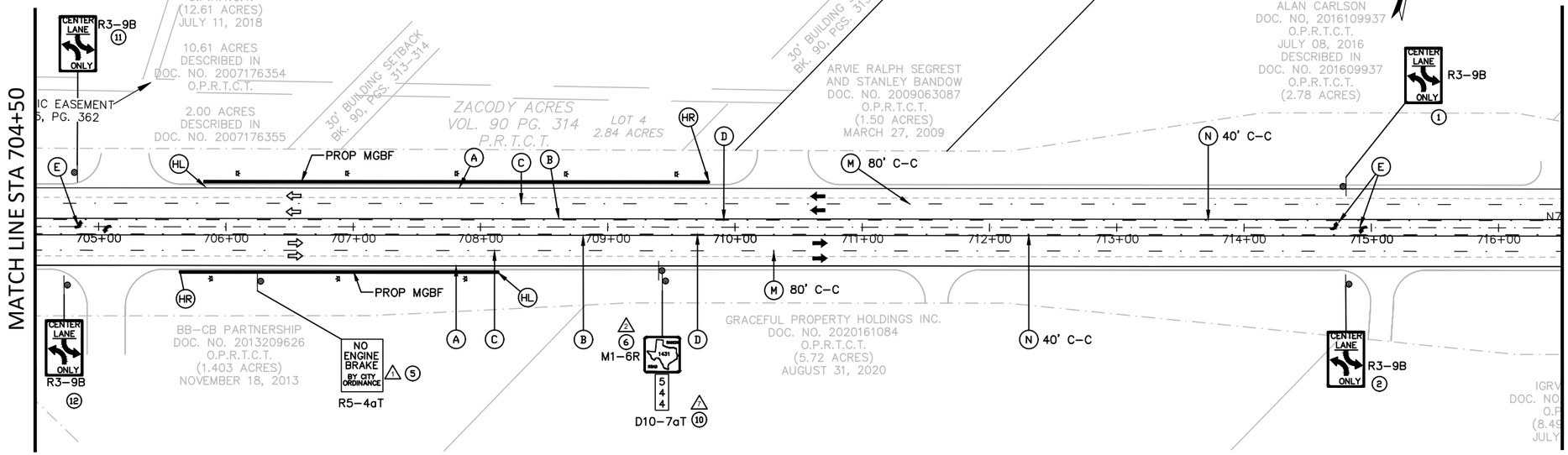
HVJ ASSOCIATES
6120 S.DAIRY ASHFORD ROAD
HOUSTON, TEXAS 77072
281.933.7388
TEXAS FIRM # 000646

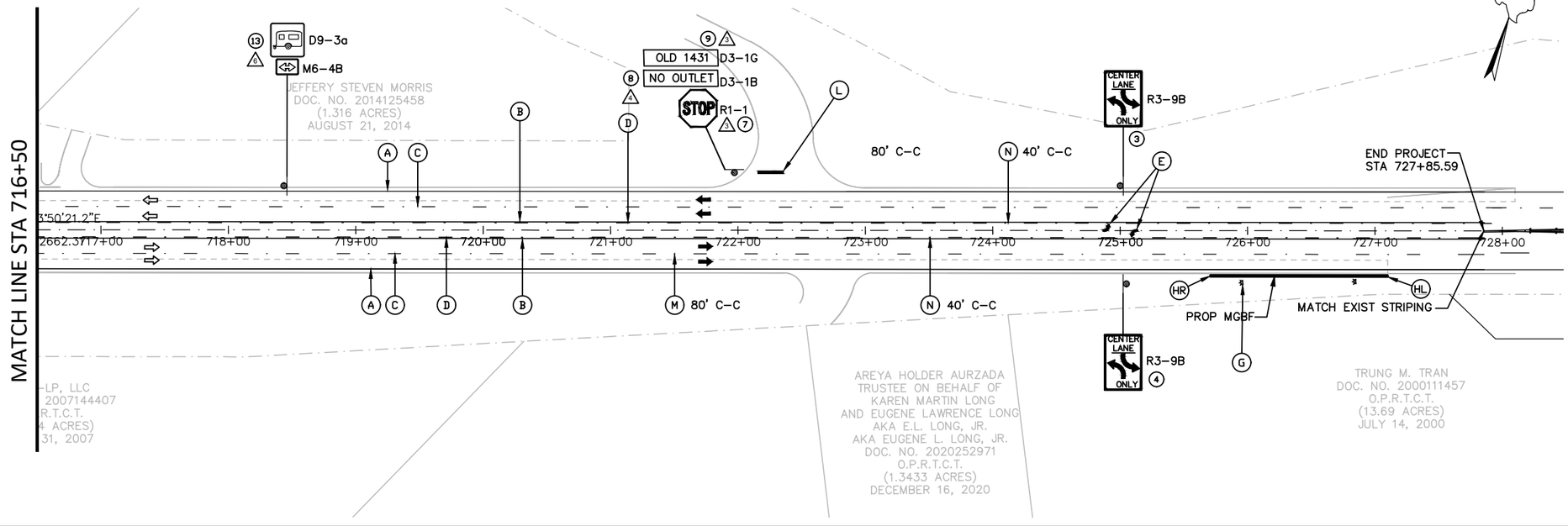
RM 1431

SIGNING AND STRIPING STA. 680+50 TO STA. 704+50

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	051 / 114

PAVEMENT MARKINGS & MARKERS QUANTITIES													
A	B	C	D	E	F	G	HL	HR	J	K	L	M	N
4680	4680	1170	1170	6	0	10	3	3	0	0	20	59	117





LEGEND

PAVEMENT MARKINGS:

- (A) REFL PAV MRK TY II (W)6"(SLD)/REF PROF PAV MRK TYI (W)6"(SLD)(100 MIL)
- (B) REFL PAV MRK TY II (Y)6"(SLD)/RE PM W/RET REQ TY I (Y)6"(SLD)(100 MIL)
- (C) REFL PAV MRK TY II (W)6"(BRK)/RE PM W/RET REQ TY I (W)6"(BRK)(100 MIL)
- (D) REFL PAV MRK TY II (Y)6"(BRK)/RE PM W/RET REQ TY I (Y)6"(BRK)(100 MIL)
- (E) REFL PAV MRK TY II (W)(ARROW)/REFL PAV MRK TY I (W)(ARROW)(100 MIL)
- (F) REFL PAV MRK TY II (W)(WORD) W/RET REQ TYI (W)(WORD)(100MIL)
- (J) REFL PAV MRK TY II (W) 8"(SLD)
- (K) REFL PAV MRK TY II (W) 8"(DOT)
- (L) REFL PAV MRK TY II (W) 12"(SLD)

OBJECT MARKERS:

- (HL) INSTL OM ASSM (OM-3L)(TWT)GND
- (HR) INSTL OM ASSM (OM-3R)(TWT)GND
- (G) INSTL DEL ASSM (D-SW)SZ1(BRF)GF2

RAISED PAVEMENT MARKERS:

- (M) REFL PAV MRKR TY I-C
- (N) REFL PAV MRKR TY II-A-A
- PROPOSED DIRECTION OF TRAVEL
- EXISTING DIRECTION OF TRAVEL

SIGNING:

- SIGNS TO BE INSTALLED
- EXISTING SIGNS TO BE REMOVED
- EXISTING SIGNS TO REMAIN

STATE OF TEXAS
LINDA L. BARLOW
63878
LICENSED
PROFESSIONAL ENGINEER

12/18/2023

HORIZONTAL
0 50 100 200 FT

PRINT DATE	REVISION DATE
	.

Texas Department of Transportation
Austin District
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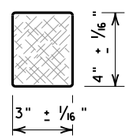
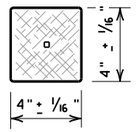
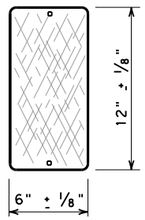
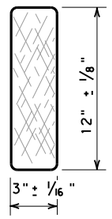
HVJ ASSOCIATES
6120 S.DAIRY ASHFORD ROAD
HOUSTON, TEXAS 77072
281.933.7388
TEXAS FIRM # 000646

RM 1431
SIGNING AND STRIPING
STA. 704+50 TO END

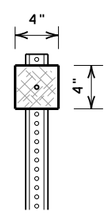
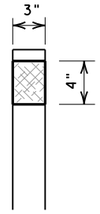
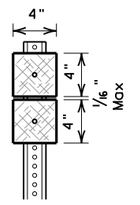
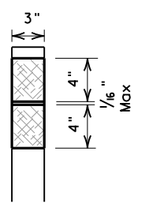
FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	115

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

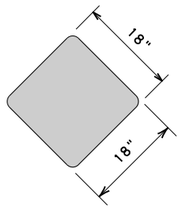
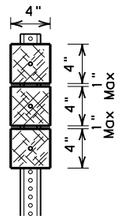
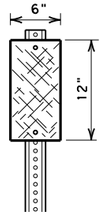
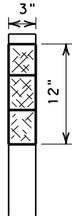
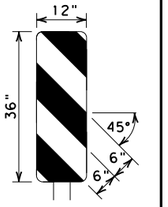
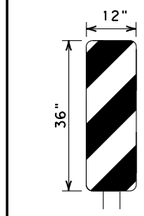
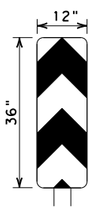
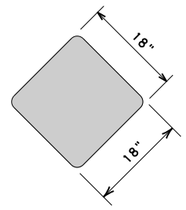
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

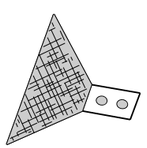
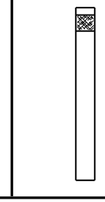
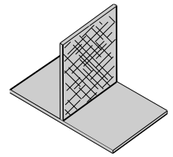
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

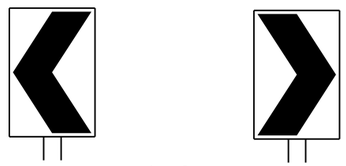
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE



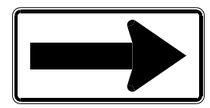
W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	AUS	TRAVIS		116

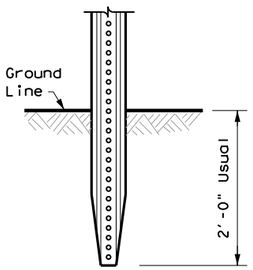
20A

DATE:
FILE:

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

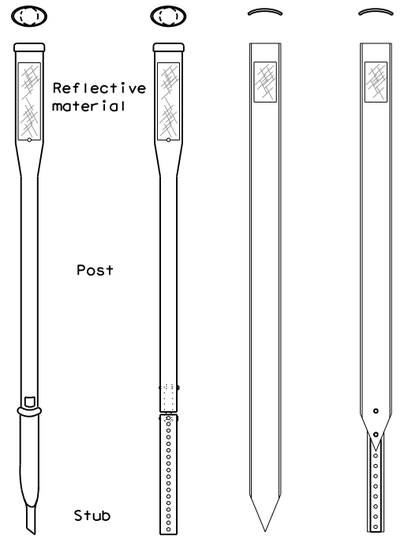


NOTES

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.

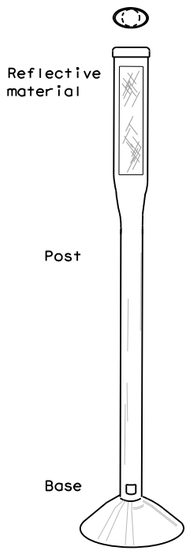
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



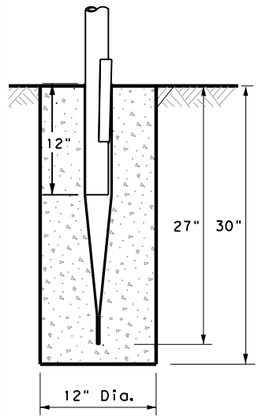
SURFACE MOUNT

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.

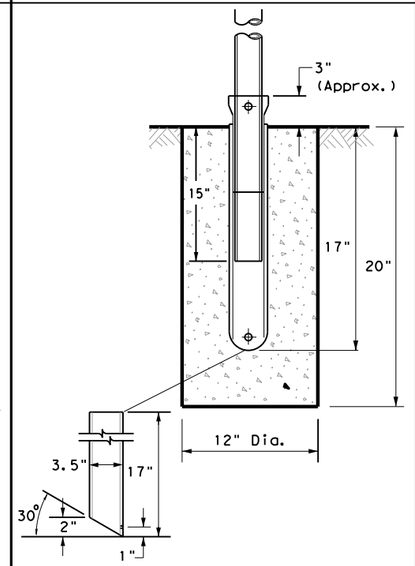
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

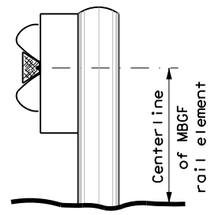
NOTE

1. Install per manufacturer's recommendations.

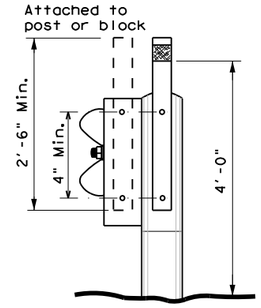
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

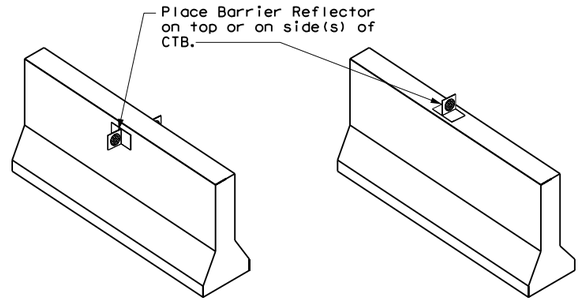
GF1



GF2



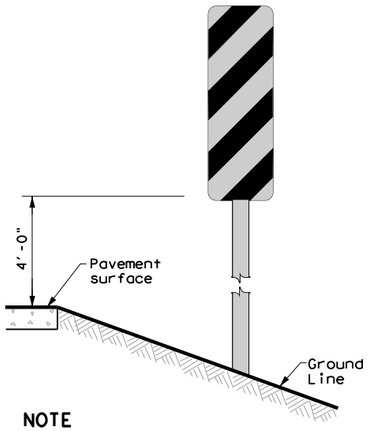
CONCRETE TRAFFIC BARRIER (CTB)



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.

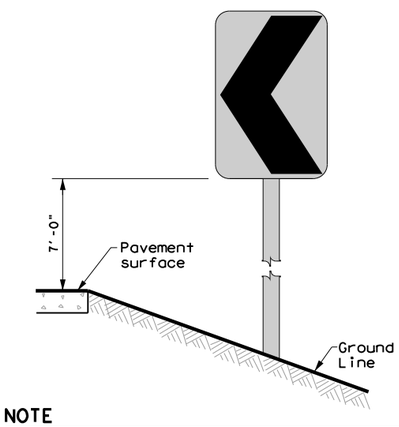
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

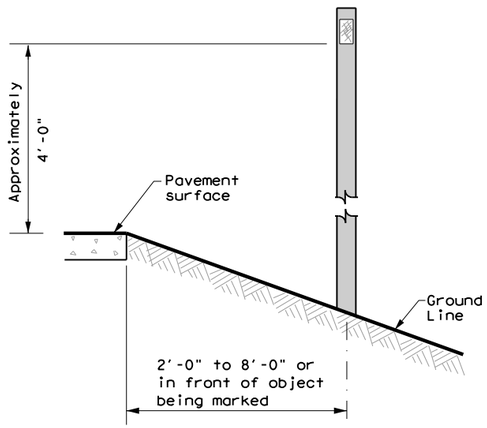
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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	1378	01	050	RM1431
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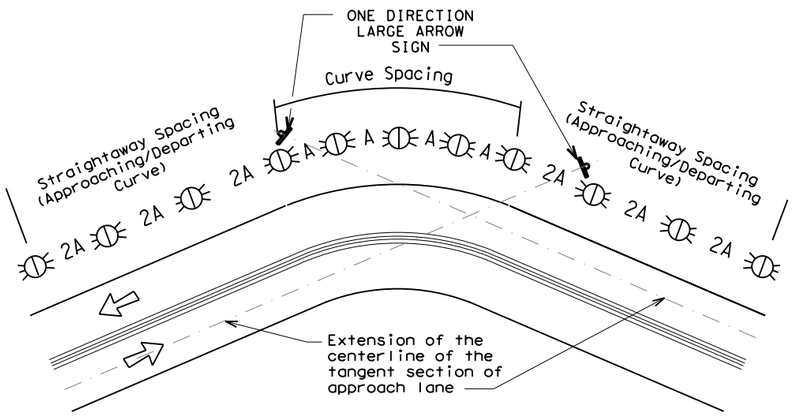
20B

DATE:
FILE:

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

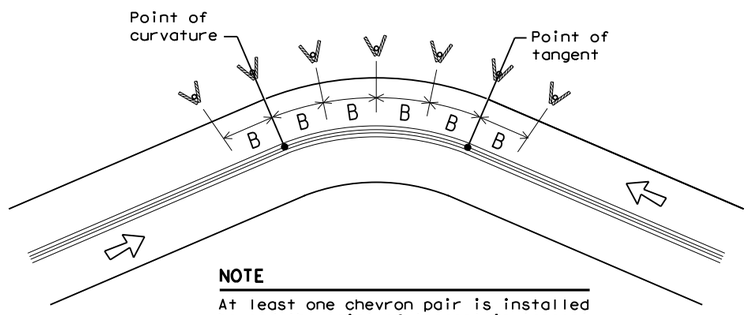
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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	1378	01	050	RM1431
3-15 8-15	DIST	COUNTY		SHEET NO.
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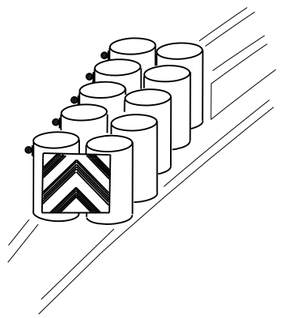
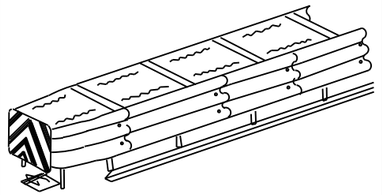
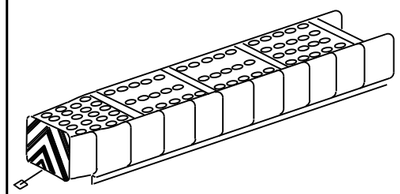
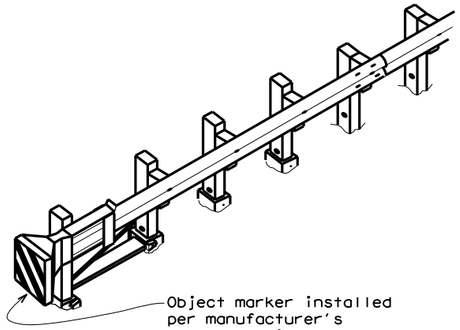
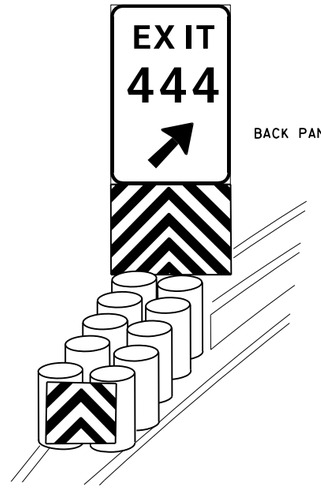
DATE:
FILE:

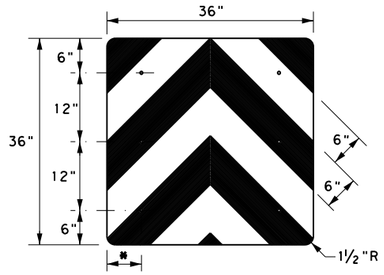


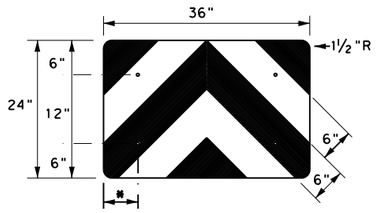




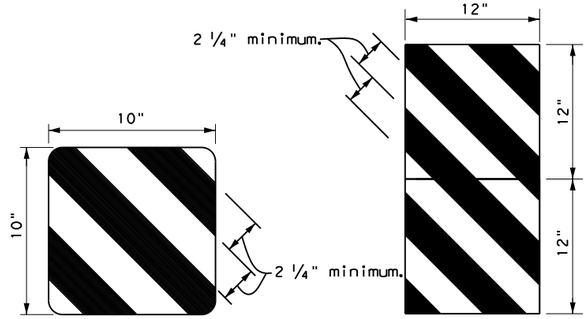




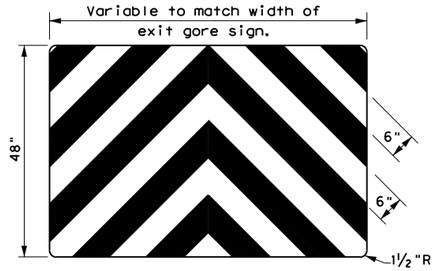


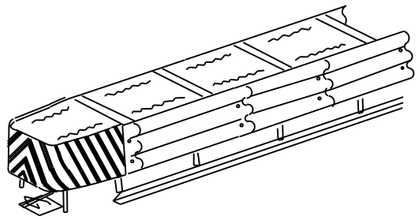


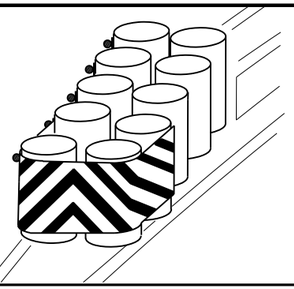
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

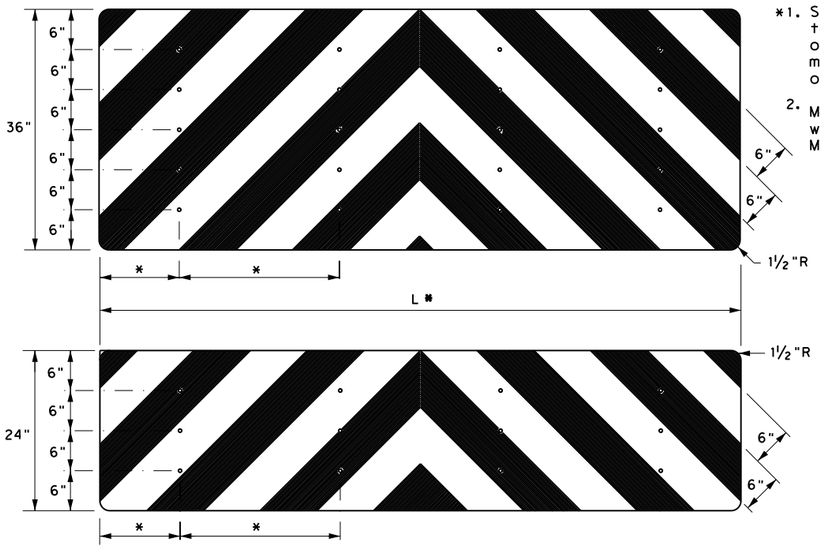


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM1431
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4-98 7-20				

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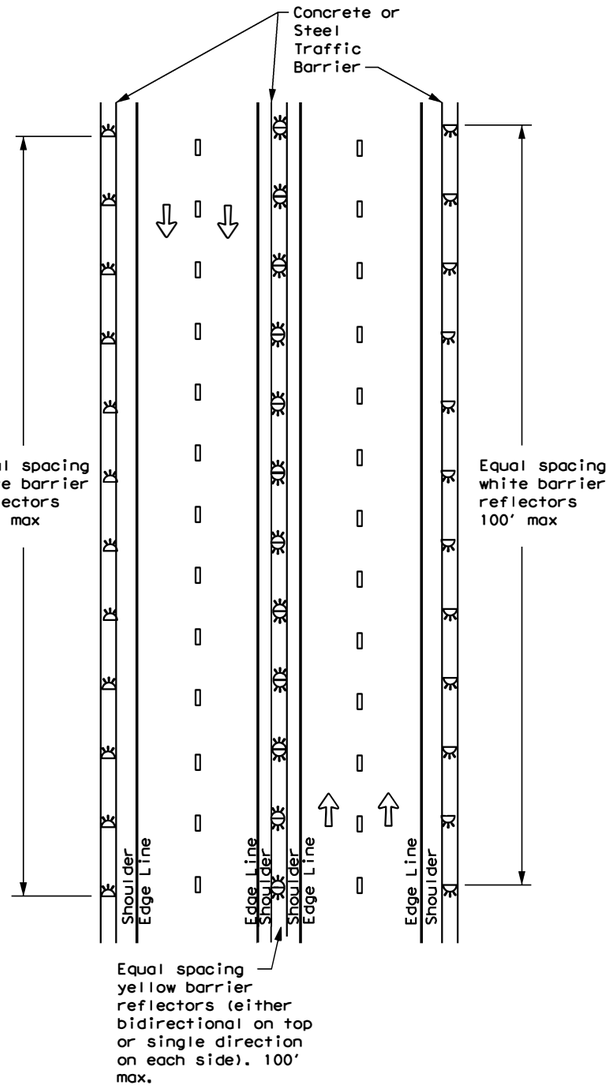
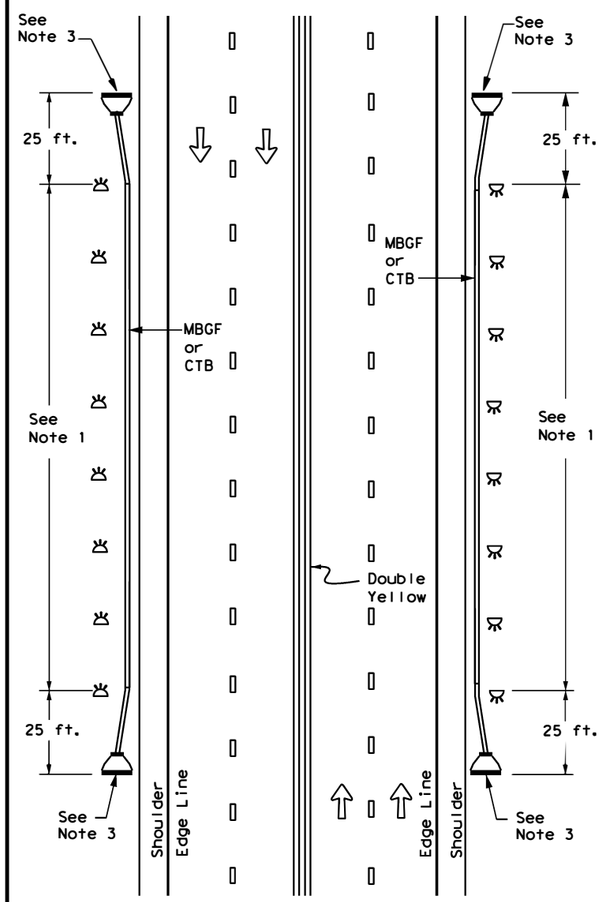
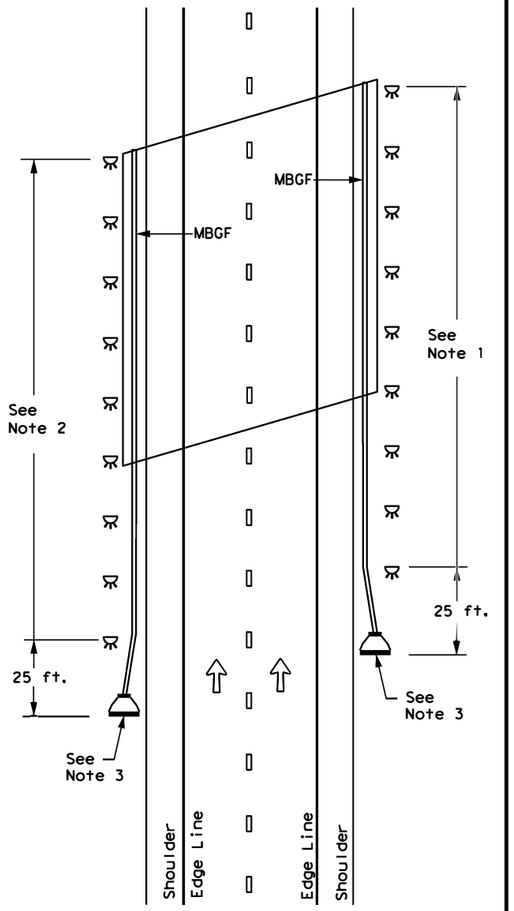
CONTINUOUS CONCRETE OR STEEL BARRIER



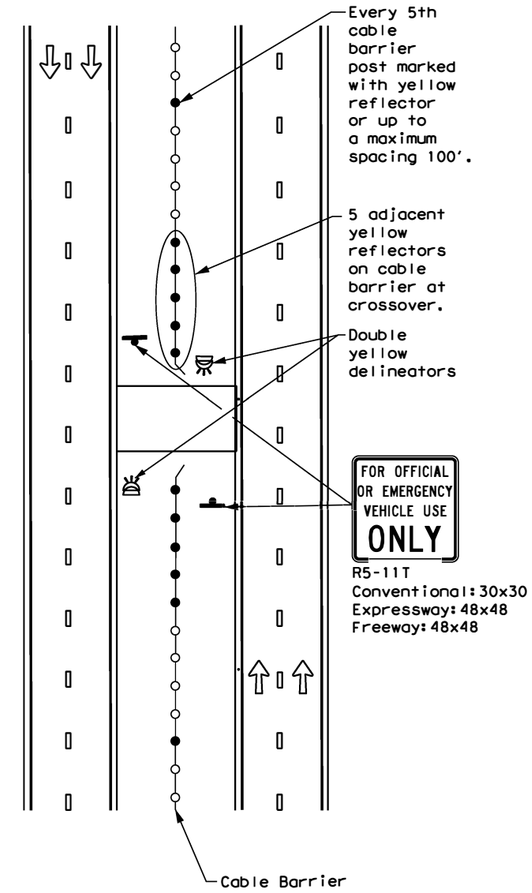
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100' max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100' max.)
2. Equal spacing (100' max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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7-20	DIST	COUNTY		SHEET NO.
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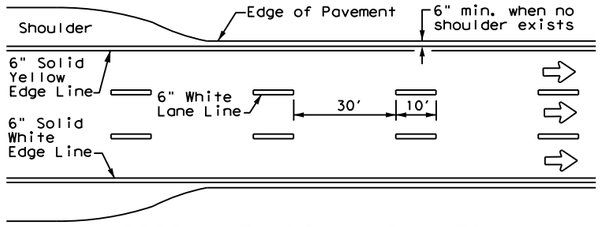
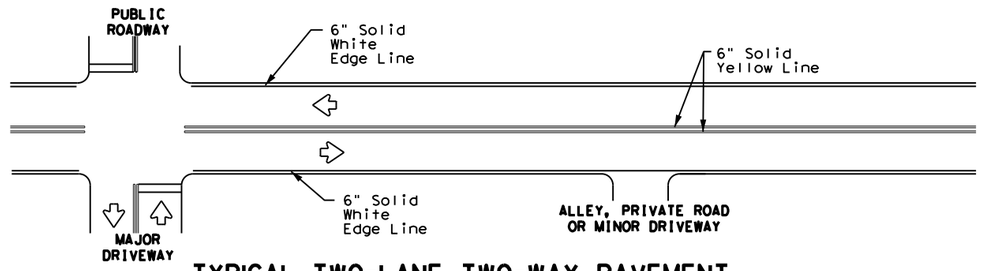
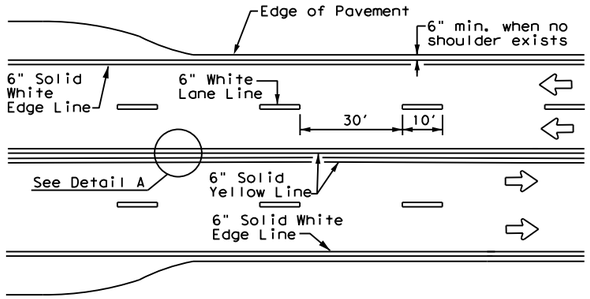
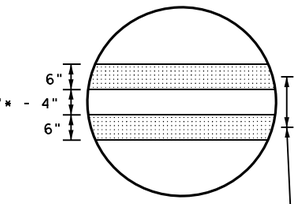


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





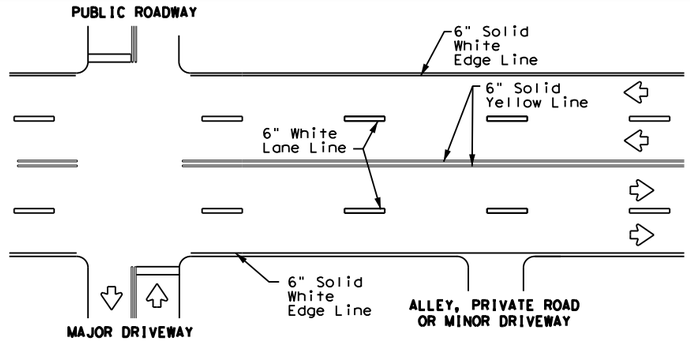
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

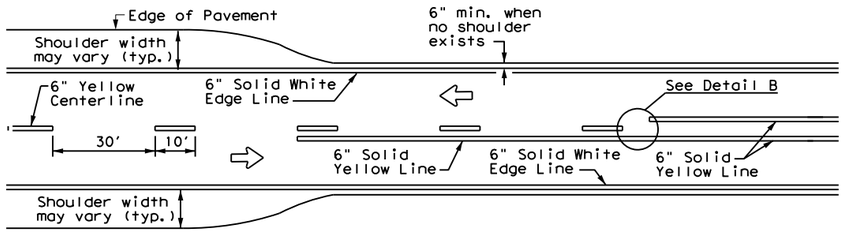
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

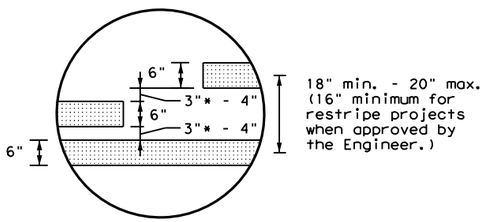
** 8" minimum for restripe projects when approved by the Engineer.



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

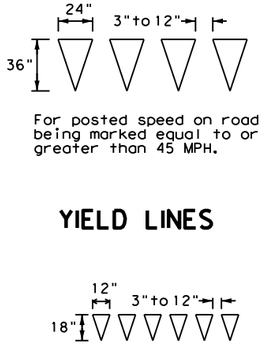


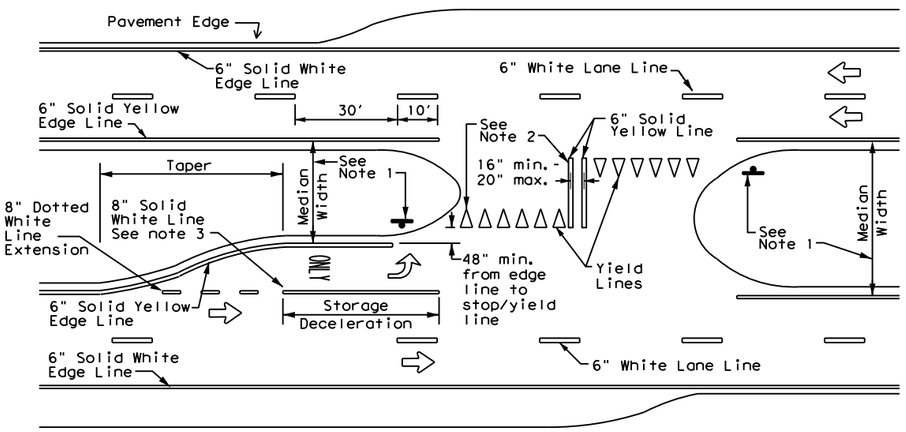
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

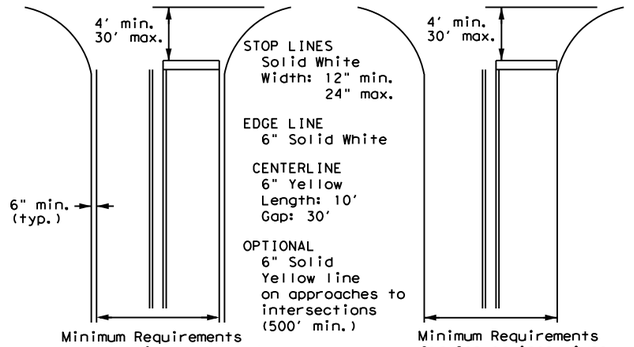
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

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

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



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

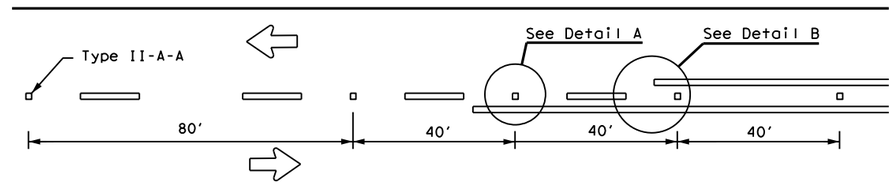
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

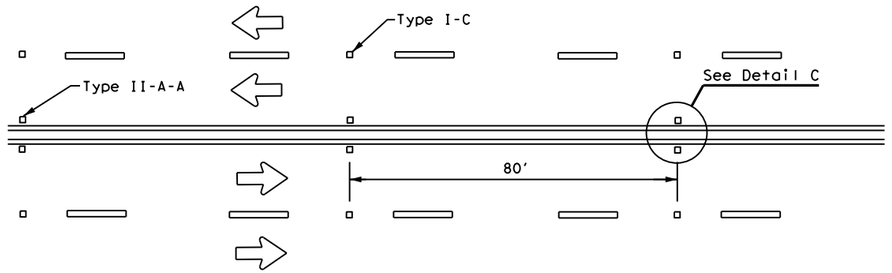
FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20	1378	01	050	RM 1431
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	AUS	TRAVIS		121

22A

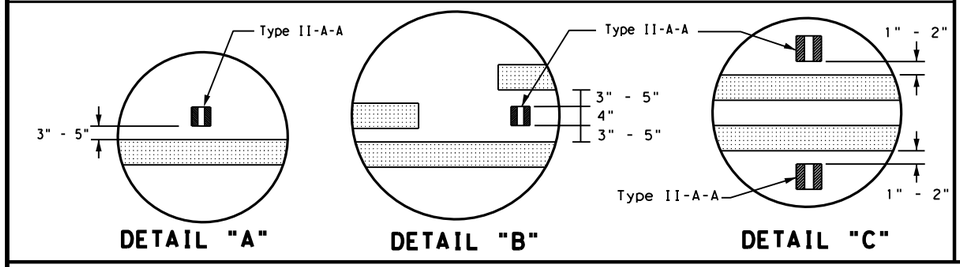
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

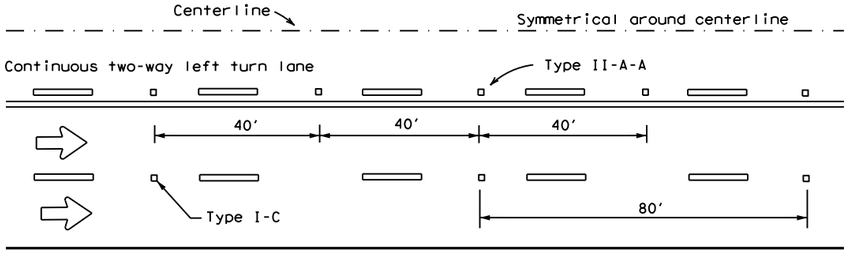


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

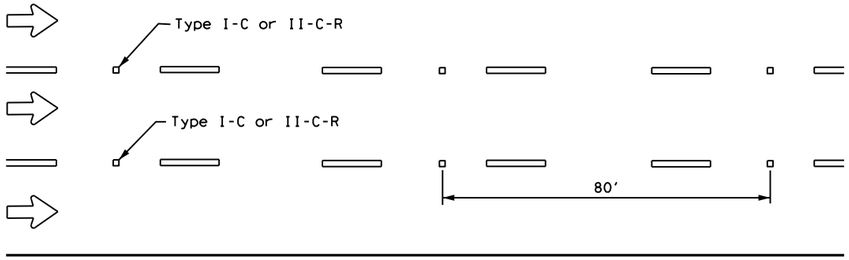


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





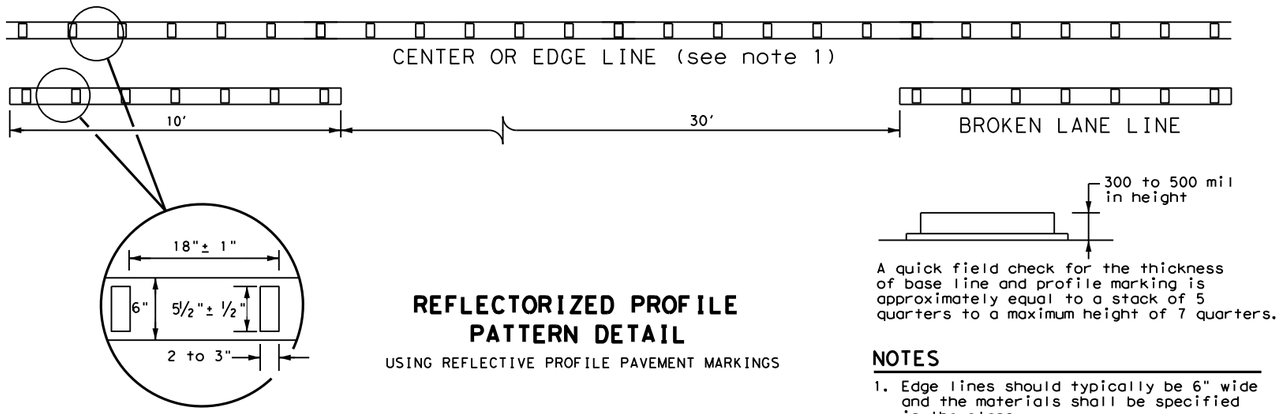
CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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.



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

NOTES

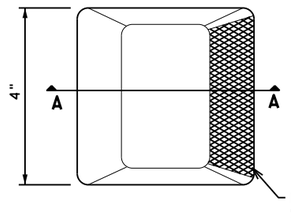
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

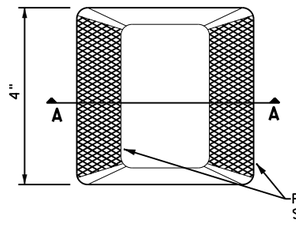
1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

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

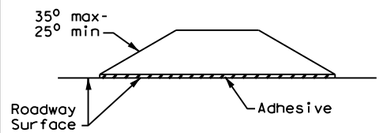
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

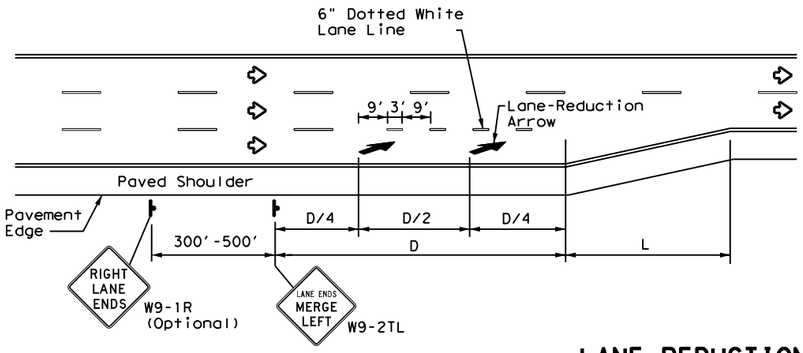
Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		122

22B

DATE:
FILE:

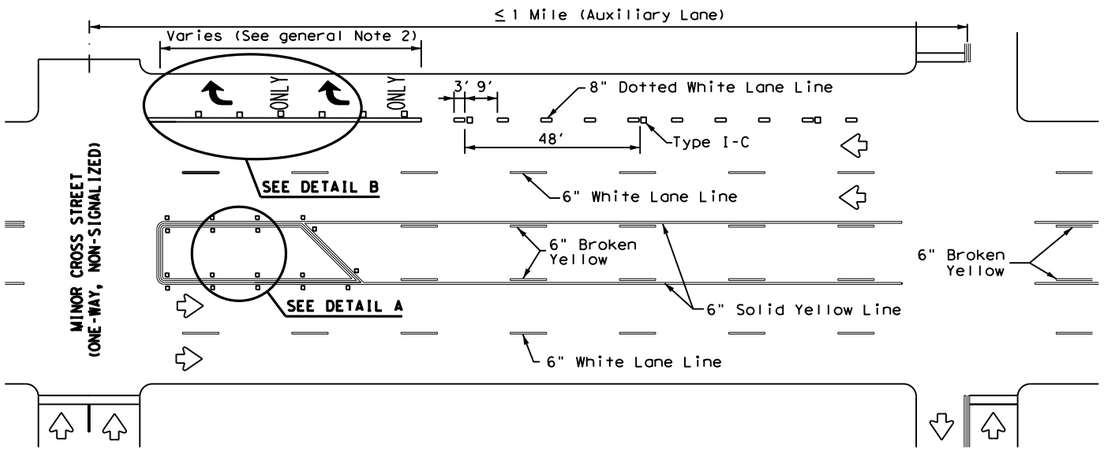


LANE REDUCTION

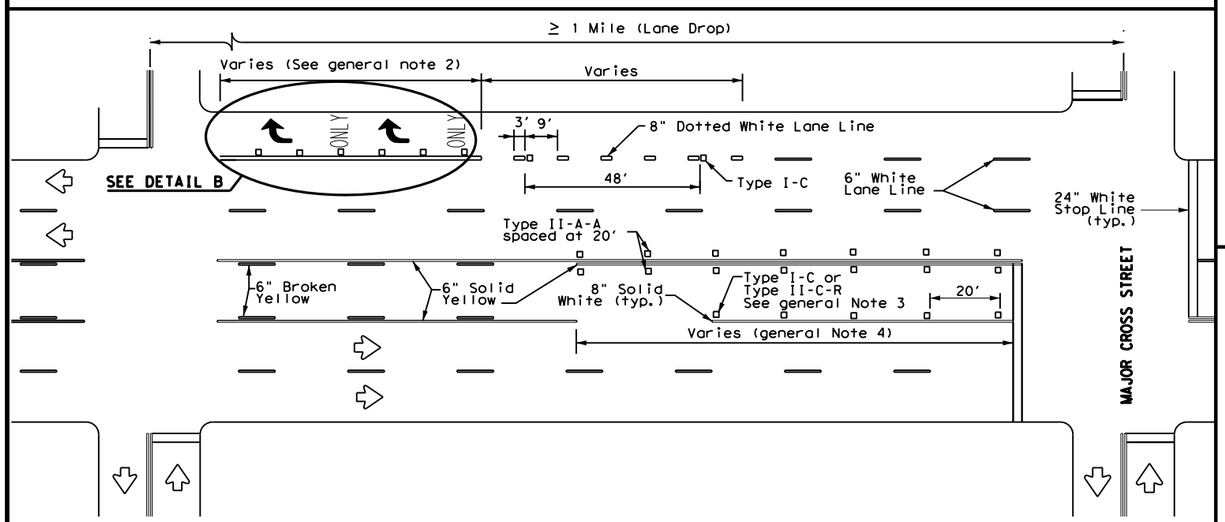
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

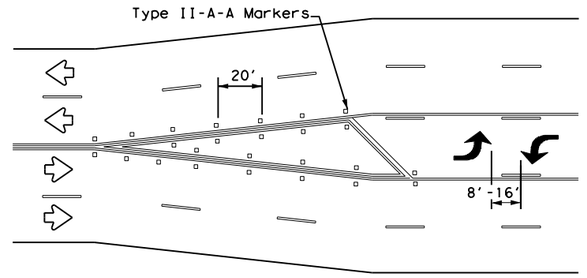
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



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

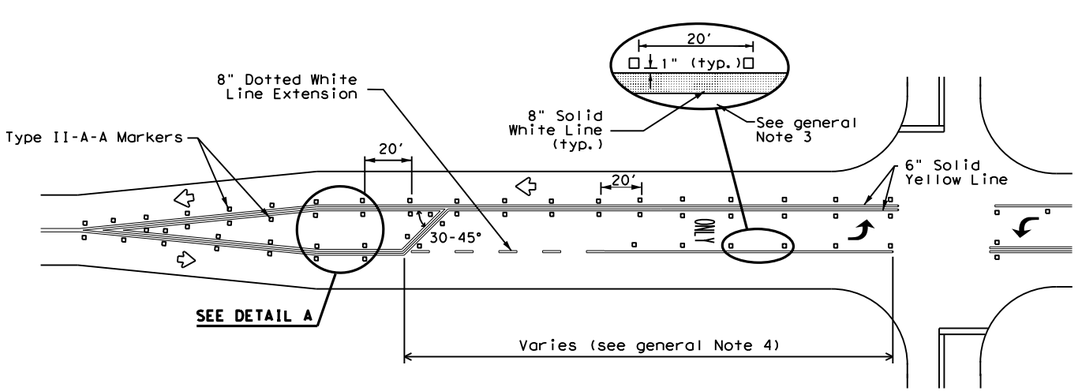


TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP

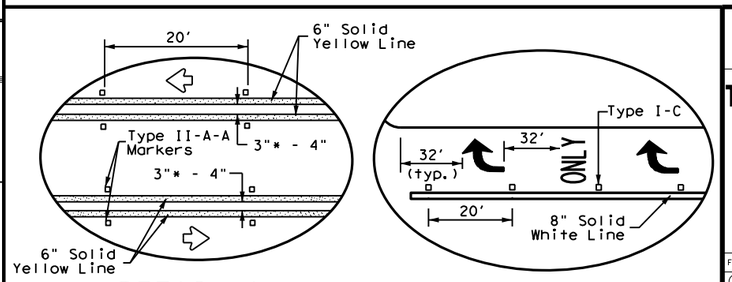


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



* 2" minimum allowed for restripe projects when approved by the Engineer.

GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

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

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

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

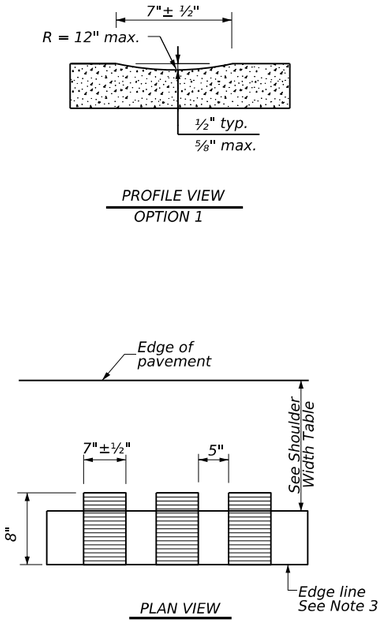
PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		123

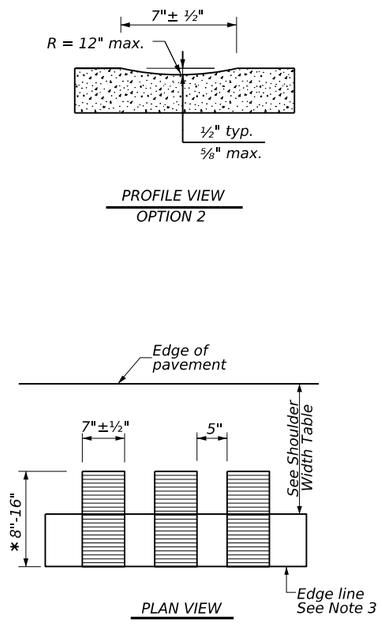
22C

DATE:
FILE:

DATE:
FILE:

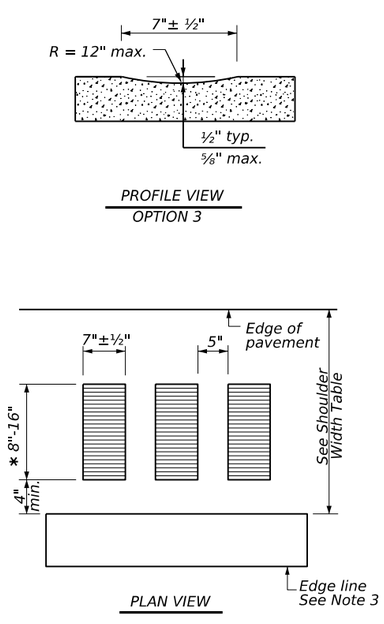


CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



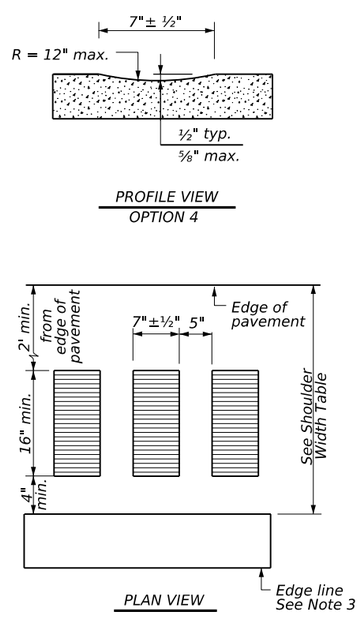
∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

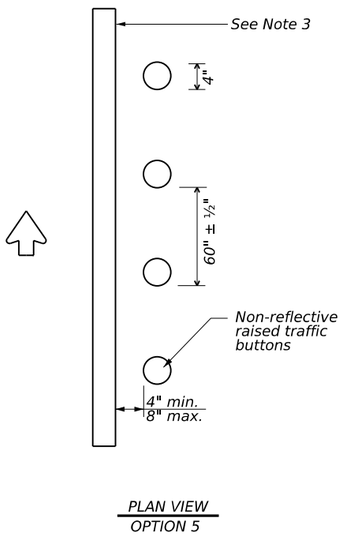


∗ This distance may vary based on width of shoulder

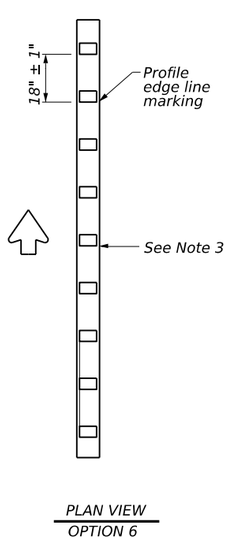
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



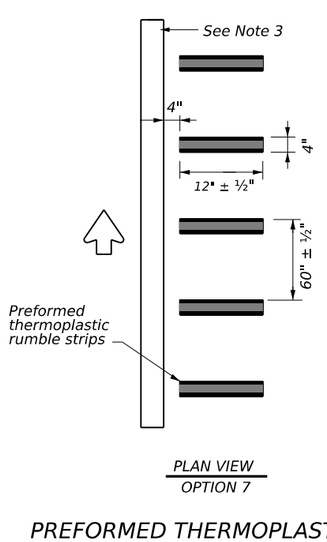
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



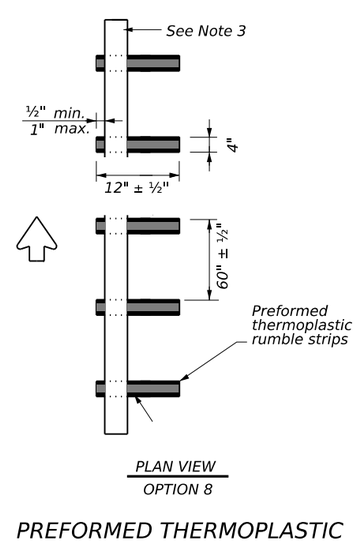
RAISED EDGE LINE (Rumble Strips)



PROFILE EDGE LINE MARKINGS (Rumble Strips)



PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5, 6 or 8	Option 1, 2, 3 5, 6 or 7	Option 2, 4, 5 6 or 7

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edgeline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble strip.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines may substitute for buttons.

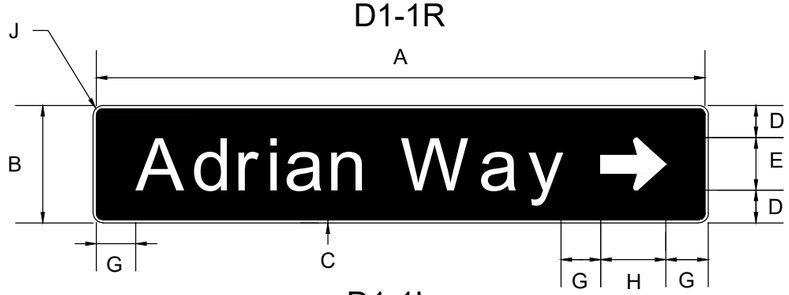
Texas Department of Transportation

Traffic Safety Division Standard

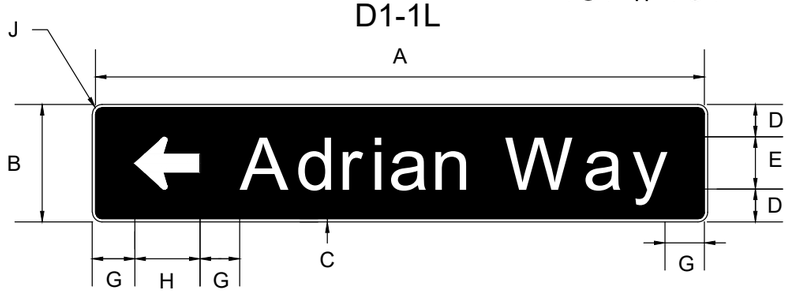
EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(2)-23

FILE: rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1378	01	050	RM 1431
10-13 1-23	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		124

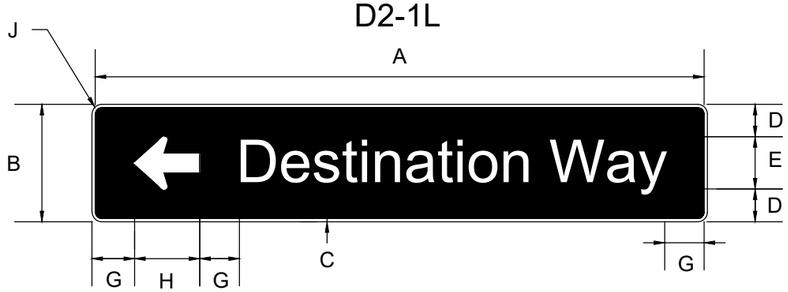
D1-1R



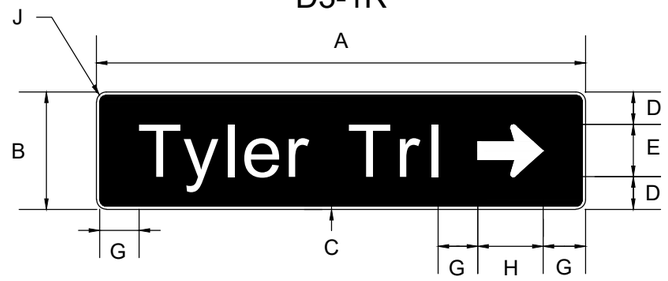
D1-1L



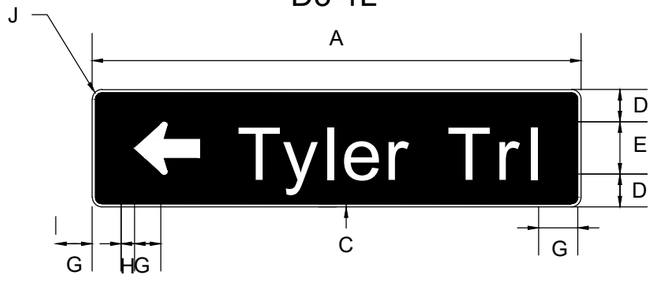
D2-1L



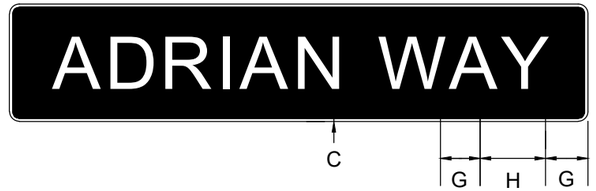
D3-1R



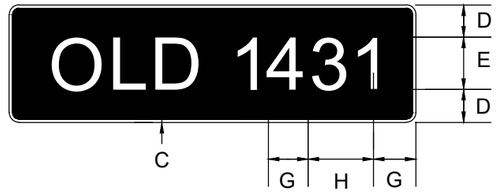
D3-1L



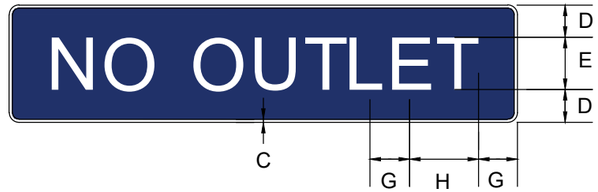
D3-1G



D3-1G



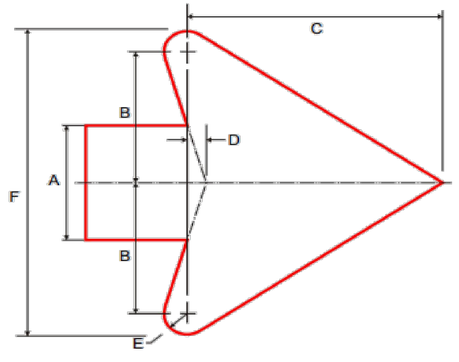
D3-1B



A	B	C	D	E	F	G	H	J
VAR	18	.5	5	8CV-3W	2.75	6	12	1.5

*18" PANEL WITH 8" FONT IS STANDARD DESIGN

STANDARD ARROW DETAILS



A	B	C	D	E	F
2.75	3	5.563	0.438	0.563	7.126

STATE OF TEXAS
LINDA L. BARLOW
63878
LICENSED
PROFESSIONAL ENGINEER

07/25/20234

PRINT DATE	REVISION DATE
	.

Texas Department of Transportation
Austin District

HVJ ASSOCIATES
6120 S.DAIRY ASHFORD ROAD
HOUSTON, TEXAS 77072
281.933.7388
TEXAS FIRM # 000646

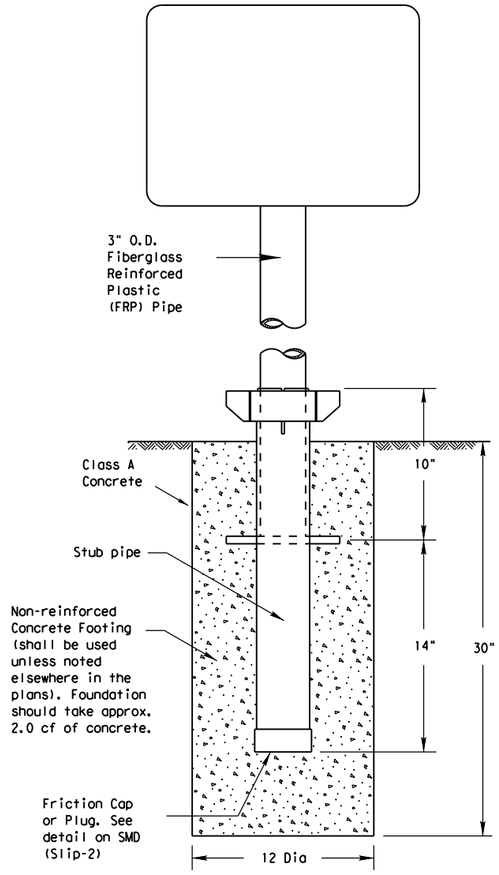
RM 1431

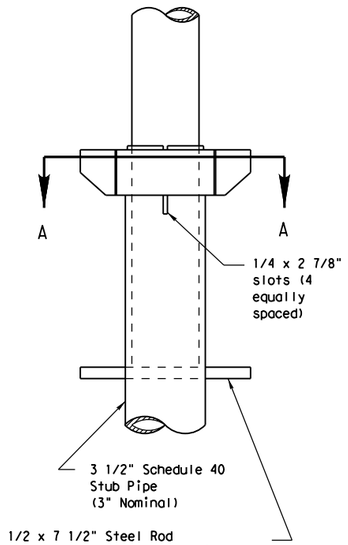
SIGN DETAILS

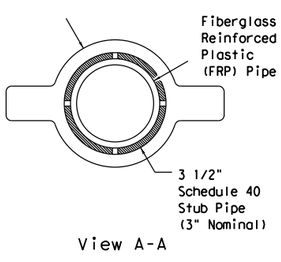
FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
		RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	125

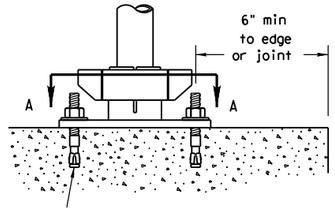
Universal Anchor System with Fiberglass Reinforced Plastic (FRP) Post







SM RD SGN ASSM TY FRP(X)UA(P)



Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.

BOLT-DOWN DETAILS

SM RD SGN ASSM TY FRP(X)UB(P)

GENERAL NOTES:

1. FRP sign supports for a single type sign support may be used for signs up to and including 16 square feet. Dual post installation may be used for signs up to and including 32 square feet.
2. All nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing."
3. See the Traffic Operations Division website for detailed drawings of sign clamps. The website address is: http://www.txdot.gov/publications/traffic.htm

FRP POST REQUIREMENTS

1. Materials shall conform to the requirements of Departmental Material Specification DMS-4410 and will be furnished in a yellow or gray color as specified elsewhere in the plans.
2. Thickness of FRP sign support is 0.125" + 0.031", - 0.0".
3. FRP sign supports are prequalified by the Traffic Operations Division. Prequalification procedures are obtained by writing:
   Texas Department of Transportation
   Traffic Operations Division
   125 East 11th Street
   Austin, Texas 78701-2483

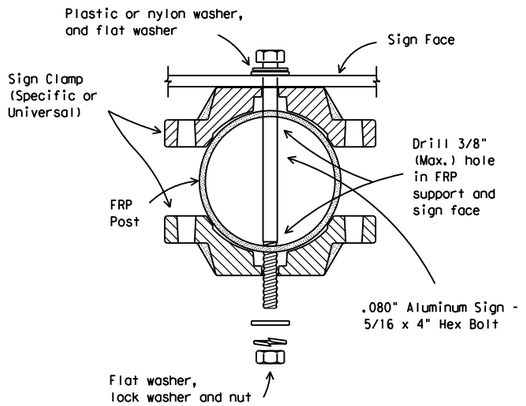
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Insert base post in foundation hole to depths shown and fill hole with concrete. Cut base post from bottom and ensure a minimum of 18" embedment if installed in solid rock.
4. Level and plumb the base post with coupler using a torpedo level and let concrete set a minimum of 4 days, unless otherwise directed by Engineer. Bottom of base post slots shall be above the concrete footing.
5. Attach sign to FRP post.
6. Insert sign post into base post. Lower until the post comes to rest on the steel rod.
7. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
8. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

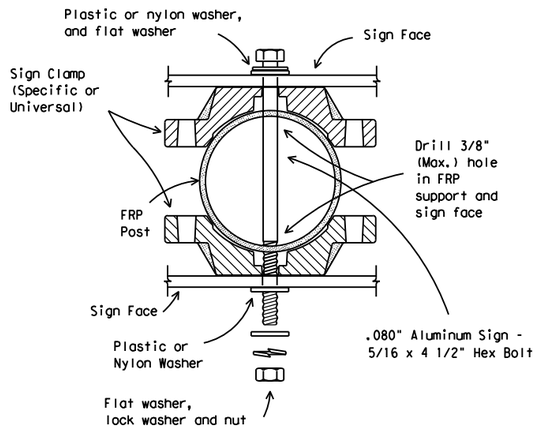
BOLT DOWN SIGN SUPPORT

1. Position base plate with coupler on existing concrete.
2. Drill holes into concrete and insert the 5/8" diameter bolts with wedge anchors, and tighten nuts.
3. Attach sign to FRP post.
4. Insert bottom of sign post into pipe stub.
5. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
6. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

Typical Sign Mounting Detail for FRP Support with Single Sign



Typical Sign Mounting Detail for FRP Support with Back-to-Back Signs



Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS UNIVERSAL ANCHOR SYSTEM WITH FRP POST

SMD(FRP)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
1378	01	050	RM 1431

DIST	COUNTY	SHEET NO.
AUS	TRAVIS	126

REVISIONS
9-08

DATE:
FILE:

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

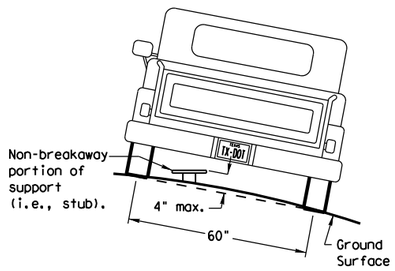
Anchor Type

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

Sign Mounting Designation

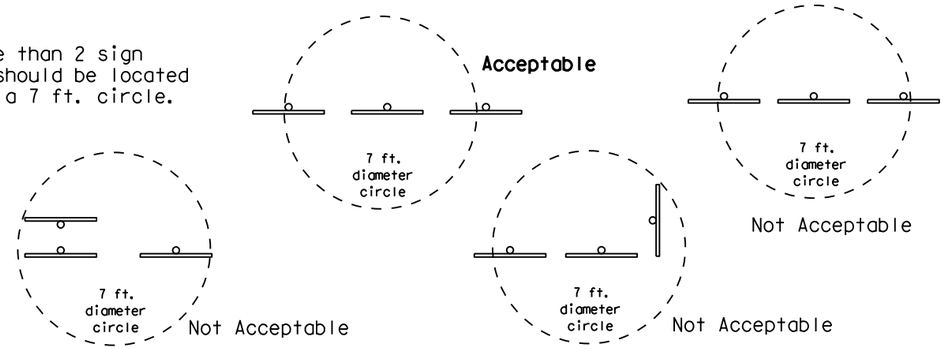
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



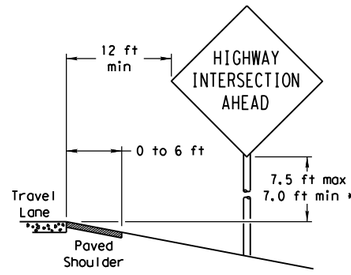
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

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



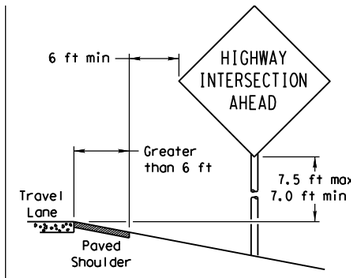
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

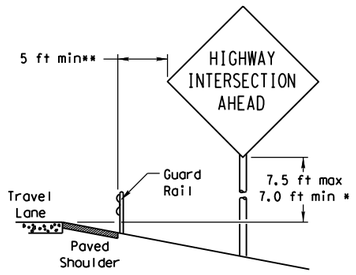
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



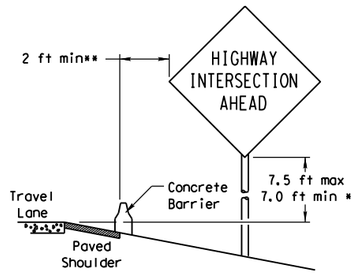
GREATER THAN 6 FT. WIDE

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

BEHIND BARRIER



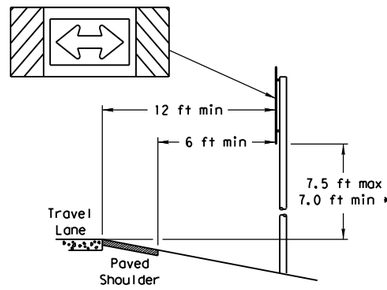
BEHIND GUARDRAIL



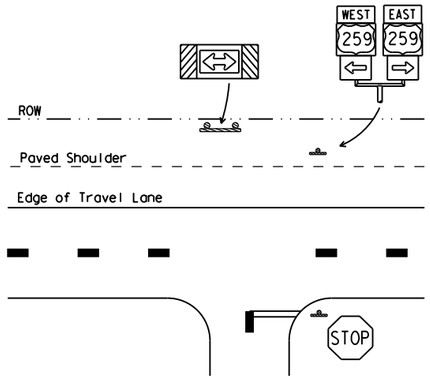
BEHIND CONCRETE BARRIER

****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.

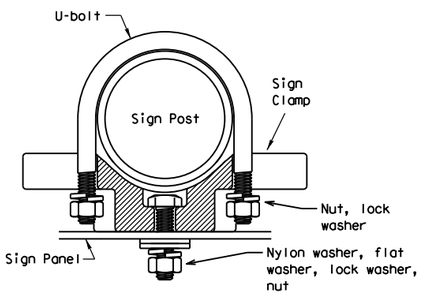
The maximum values may be increased when directed by the Engineer.

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

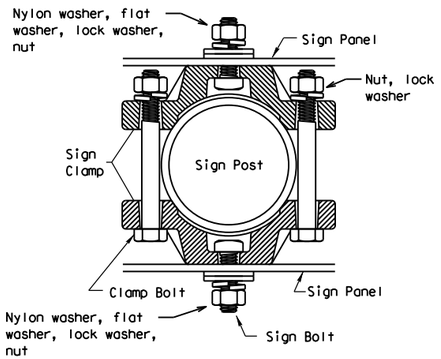
The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



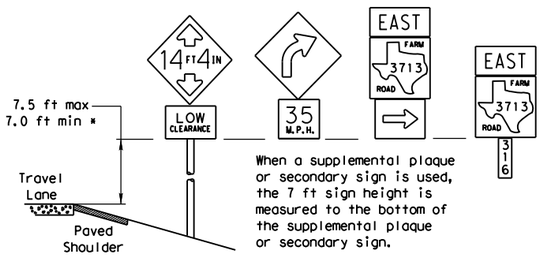
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

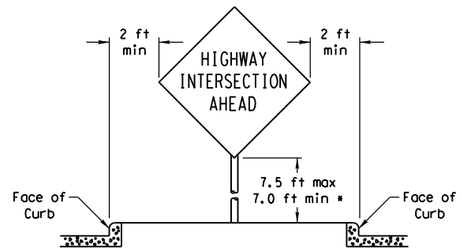
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



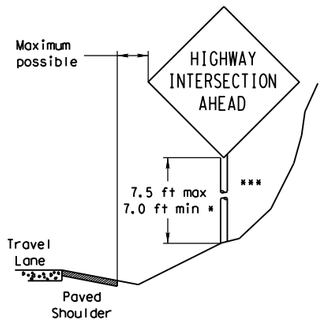
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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

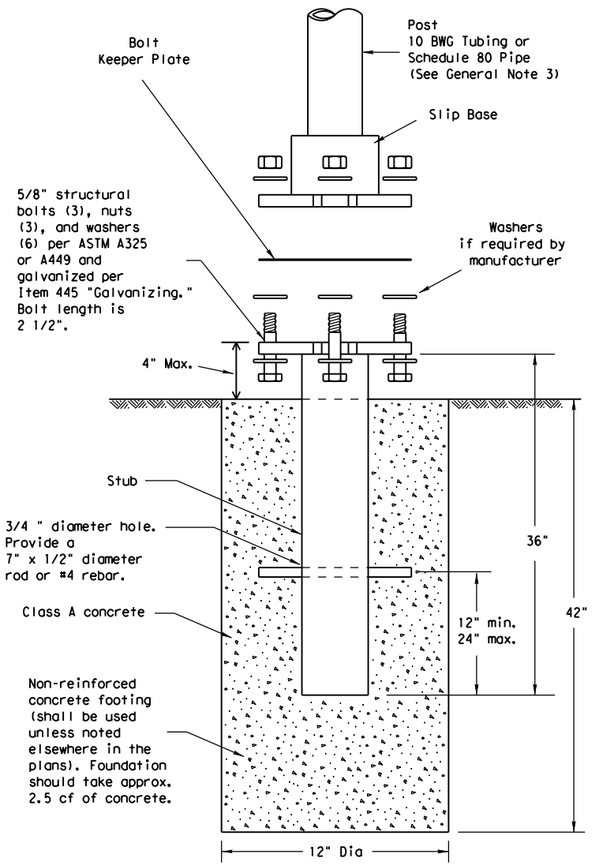
REVISIONS
9-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
1378	01	050	RM 1431
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		127

DATE:
FILE:

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.

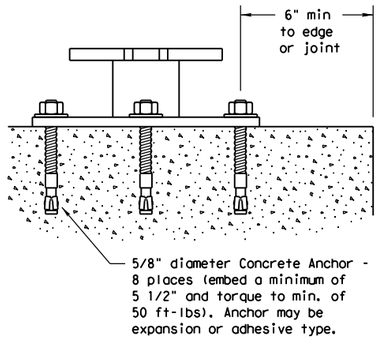
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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

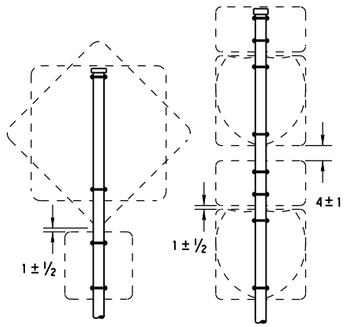
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

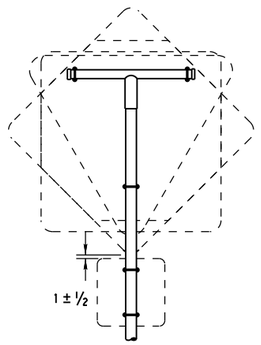
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS 9-08			

CONT	SECT	JOB	HIGHWAY
1378	01	050	RM 1431
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		128

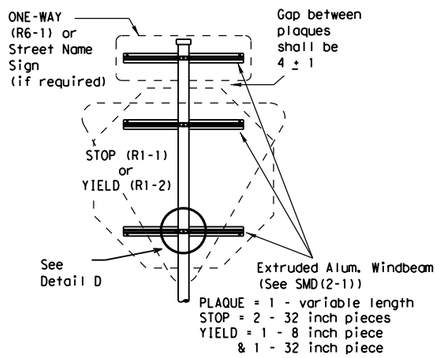
DATE:
FILE:



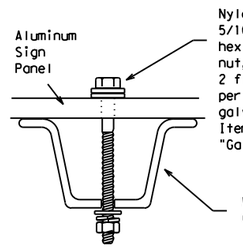
SM RD SGN ASSM TY XXXXX(1)XX(P)



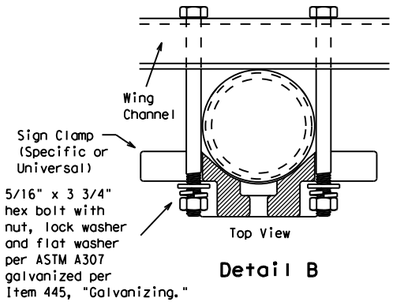
SM RD SGN ASSM TY XXXXX(1)XX(T)



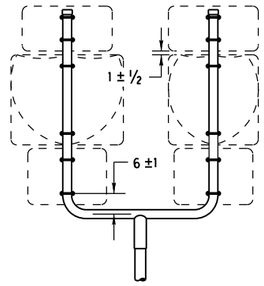
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



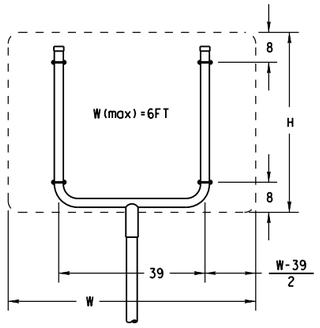
Detail A



Detail B



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



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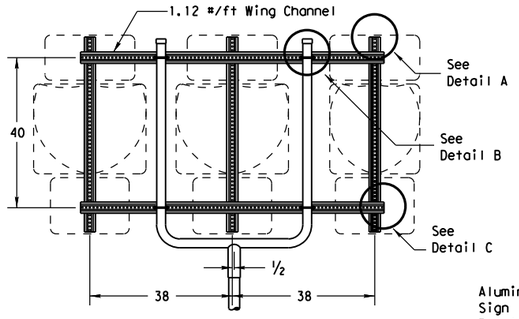
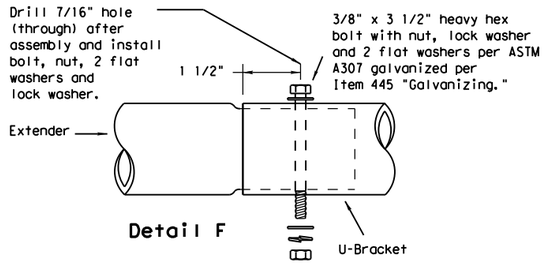
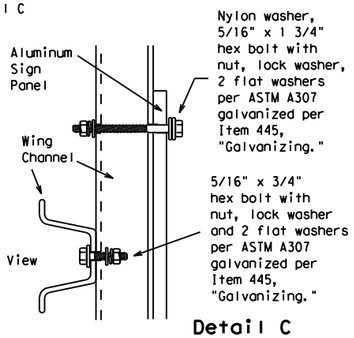


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

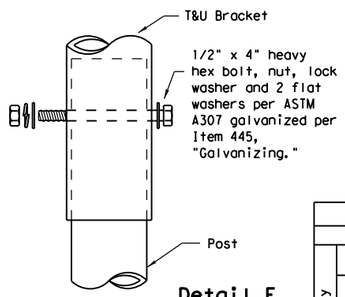


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



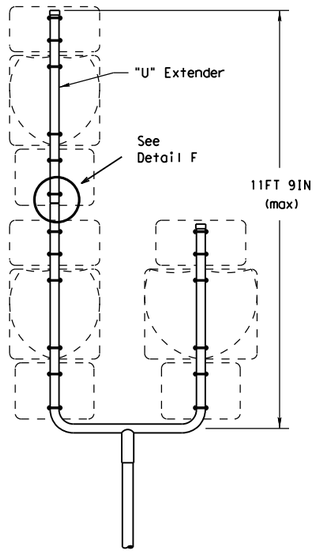
Detail E

GENERAL NOTES:

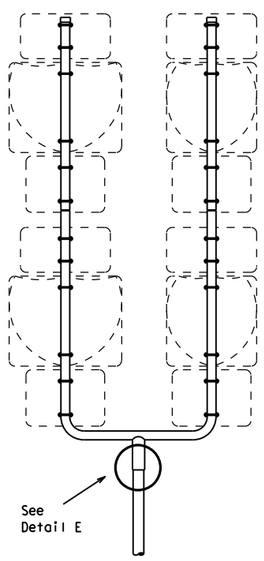
1.

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

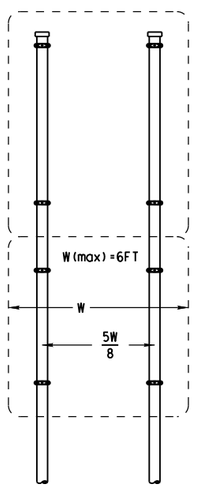
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material 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)

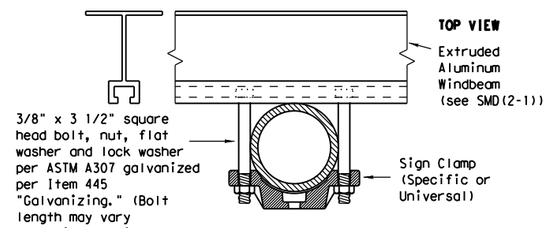


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

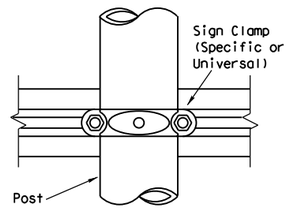


SM RD SGN ASSYM TY XXXXX(2)XX(P)

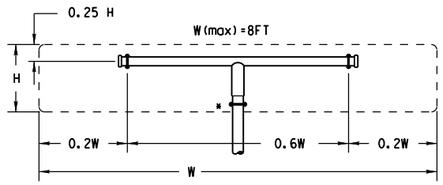
SIDE VIEW



Detail D



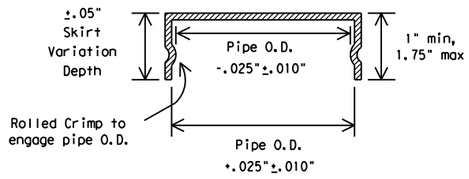
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)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



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

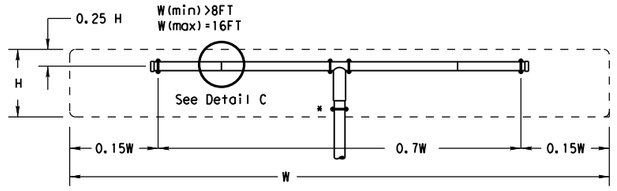
SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
1378	01	050	RM 1431
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		129

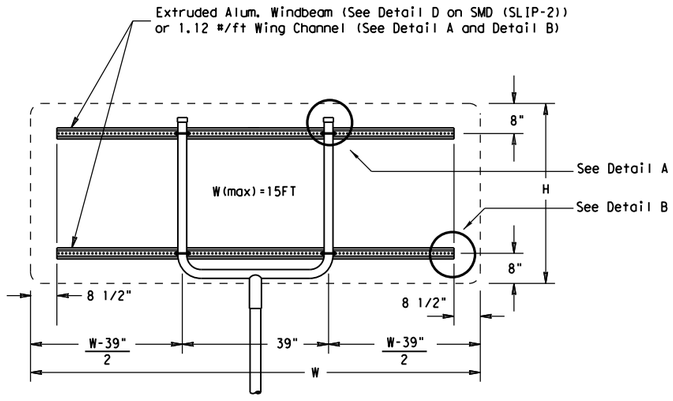
9-08 REVISIONS

DATE:
FILE:

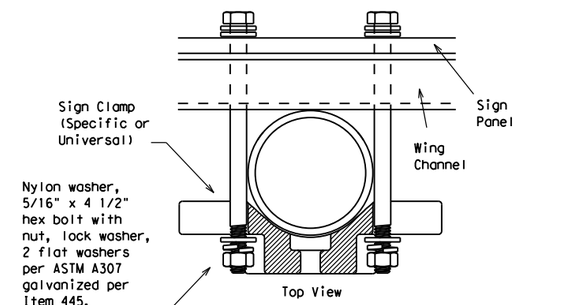
DATE:
FILE:



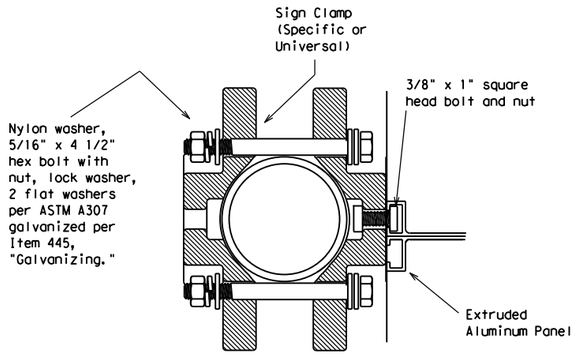
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



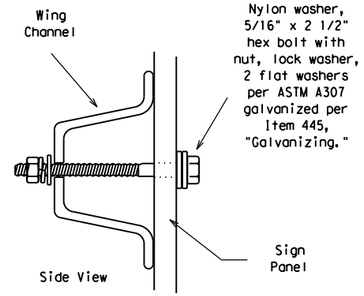
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



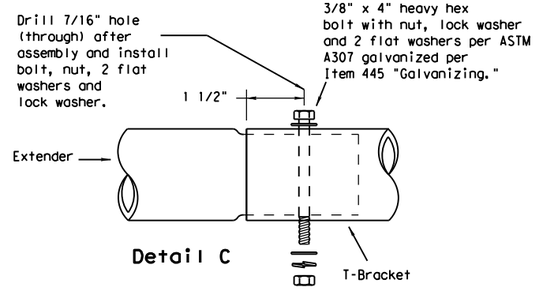
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

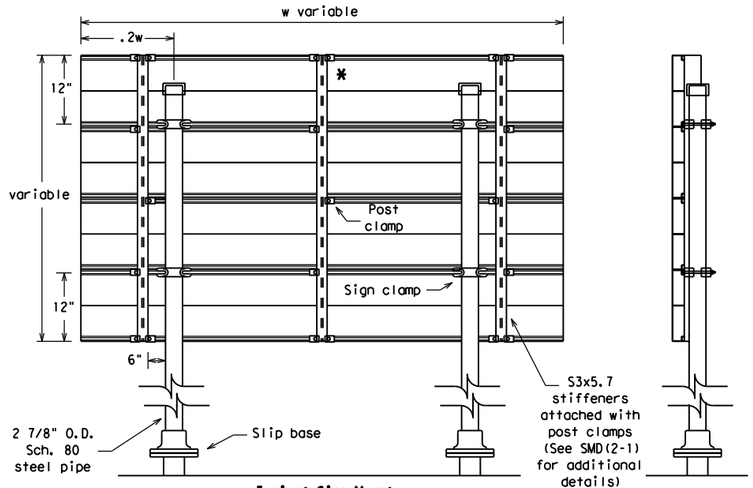


Detail B



Detail C

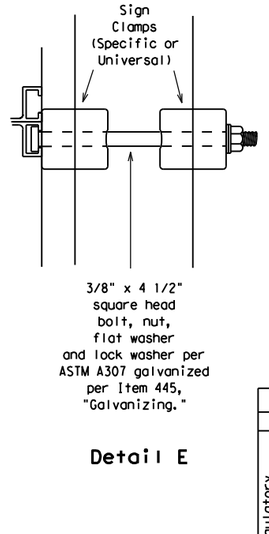
Splices shall only be allowed behind the sign substrate.



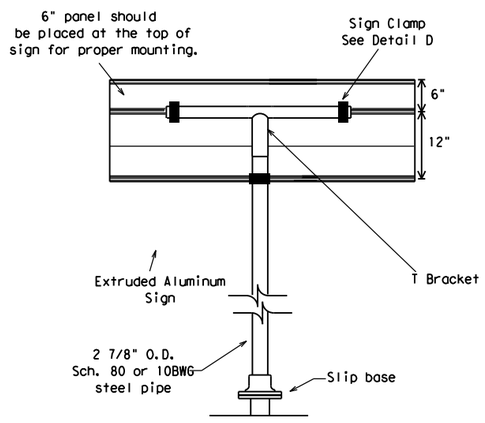
Typical Sign Mount

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

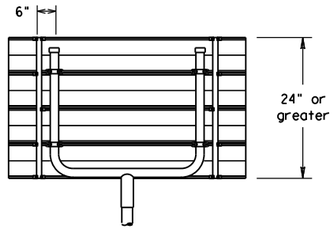
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

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.

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

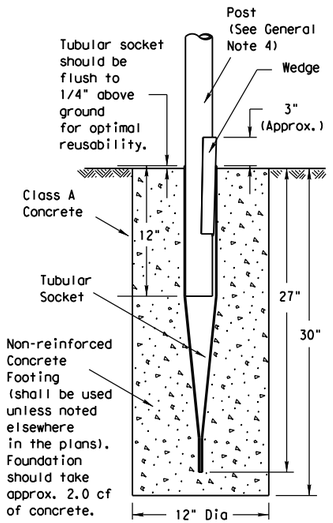
REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
1378	01	050	RM 1431

DIST	COUNTY	SHEET NO.
AUS	TRAVIS	130

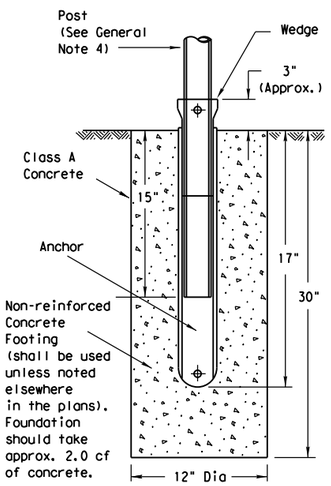
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

Wedge Anchor Steel System



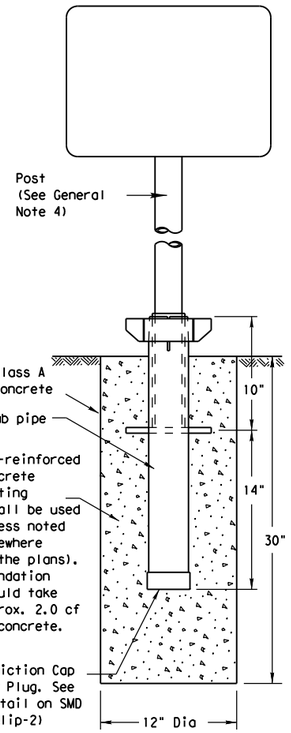
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

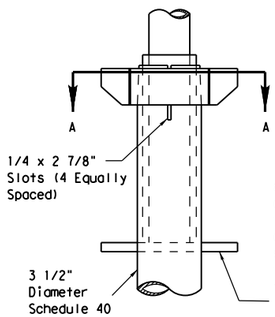


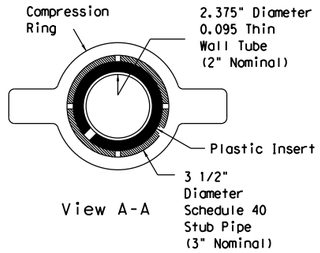
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



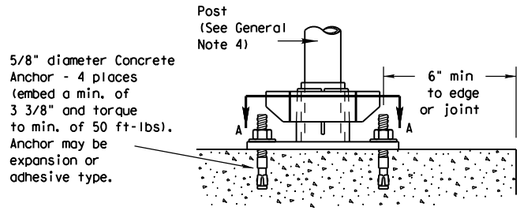
SM RD SGN ASSM TY TWT(X)UA(P)



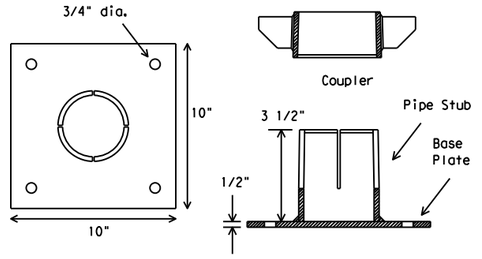


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

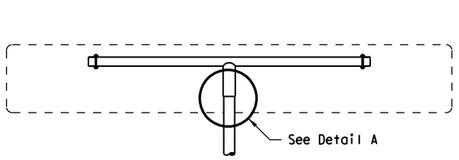


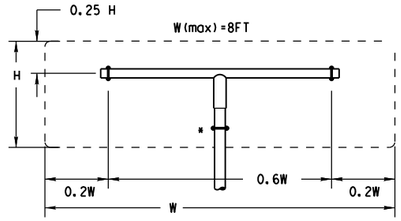
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



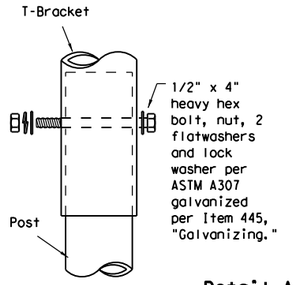
SM RD SGN ASSM TY TWT(X)UB(P)

Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)
(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
1378	01	050	RM 1431

DIST	COUNTY	SHEET NO.
AUS	TRAVIS	131

26E

DATE:
FILE:

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):
1378-01-050

1.2 PROJECT LIMITS:
From: 0.2 Miles E of Destinations Way

To: 0.1 Mile E of Old FM 1431

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 30.5766 ,(Long) -98.1276

END: (Lat) 30.4825 ,(Long) -97.9322

1.4 TOTAL PROJECT AREA (Acres): 21

1.5 TOTAL AREA TO BE DISTURBED (Acres): 18

1.6 NATURE OF CONSTRUCTION ACTIVITY:
Widening from 4 lane section to 5 lane with a two-way left turn lane

1.7 MAJOR SOIL TYPES:

Soil Type	Description
BID	Bracket-Rock outcrop complex, 1 to 12% Slopes
VoD	Volente silty clay loam, 1 to 8% slopes

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
	Lake Travis

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- ☒ Development of plans and specifications
- ☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- ☒ Post Construction Site Notice
- ☒ Submit NOI/CSN to local MS4
- ☒ Perform SWP3 inspections
- ☒ Maintain SWP3 records and update to reflect daily operations
- ☒ Complete and submit Notice of Termination to TCEQ
- ☒ Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- ☒ Day To Day Operational Control
- ☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- ☒ Post Construction Site Notice
- ☒ Submit NOI/CSN to local MS4
- ☒ Maintain schedule of major construction activities
- ☒ Install, maintain and modify BMPs
- ☒ Complete and submit Notice of Termination to TCEQ
- ☒ Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STATE OF TEXAS
DAYA DAYANANDA
83903
LICENSED
PROFESSIONAL ENGINEER
11/10/2023

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		132
STATE	STATE DIST.	COUNTY	
TEXAS	AUS	TRAVIS	
CONT.	SECT.	JOB	HIGHWAY NO.
1378	01	050	RM 1431

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

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☒ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☒ Mulching/ Hydromulching
- ☐ ☒ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ ☐ 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

- ☒ ☐ 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: _____

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:

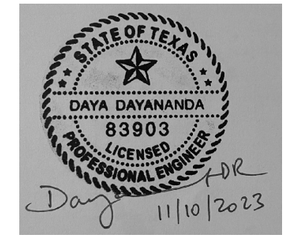
- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges 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:

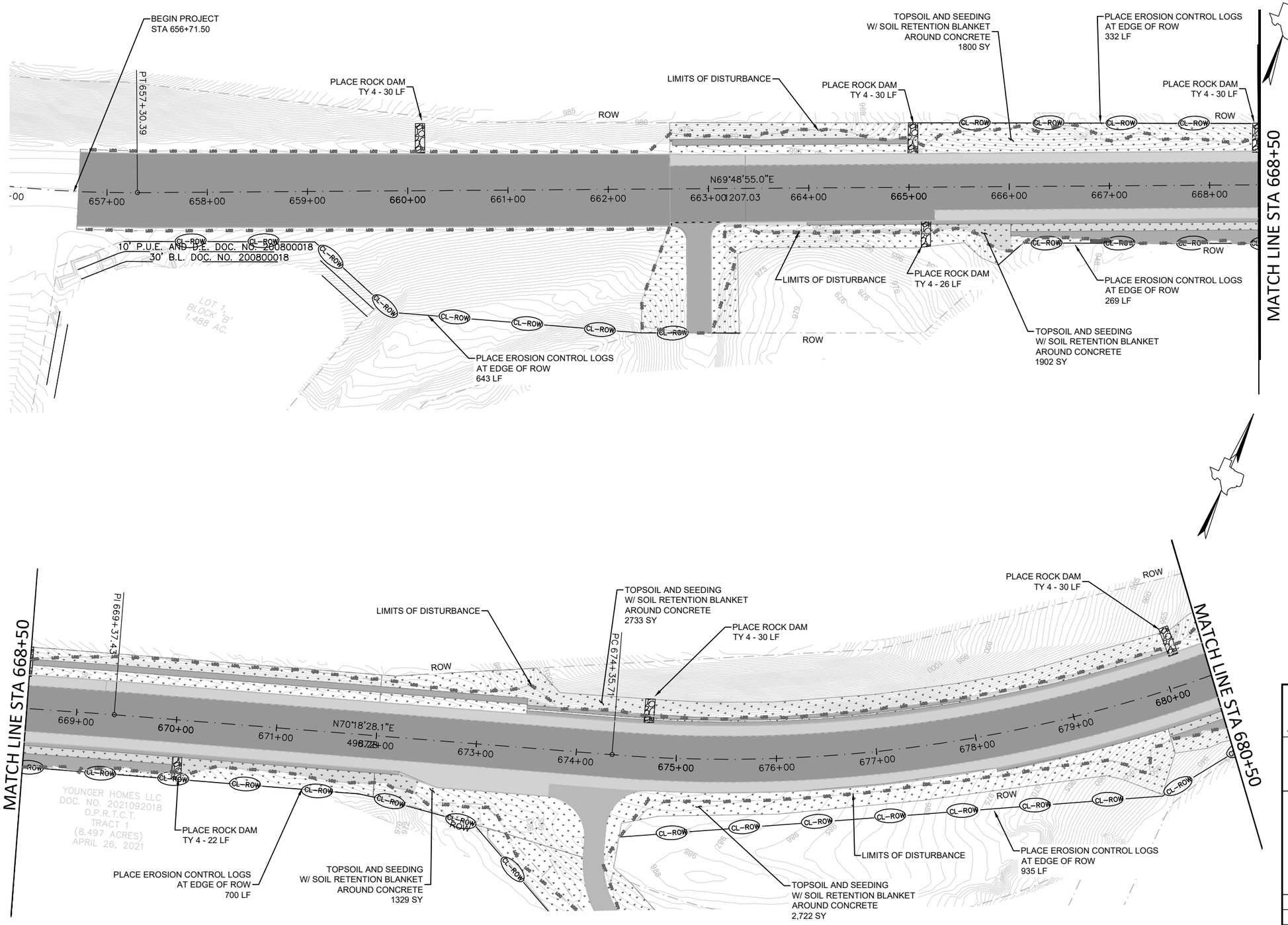
Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being 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.



STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		133
STATE	STATE DIST.	COUNTY	
TEXAS	AUS	TRAVIS	
CONT.	SECT.	JOB	HIGHWAY NO.
1378	01	050	RM 1431



LEGEND

- EROSION CONTROL LOGS
- ROCK DAM
- LIMITS OF DISTURBANCE
- TOPSOIL AND SEEDING
- PROPOSED CONCRETE

NOTE:

1. CONTRACTOR TO TOP SOIL AND SEED WITH RETENTION BLANKET TO RIGHT OF WAY UNLESS OTHER WISE SHOWN.

HORIZONTAL
0 50 100 200 FT

STATE OF TEXAS
DAYA DAYANANDA
83903
LICENSED
PROFESSIONAL ENGINEER
11/10/2023

PRINT DATE	REVISION DATE
	-

Texas Department of Transportation
Austin District

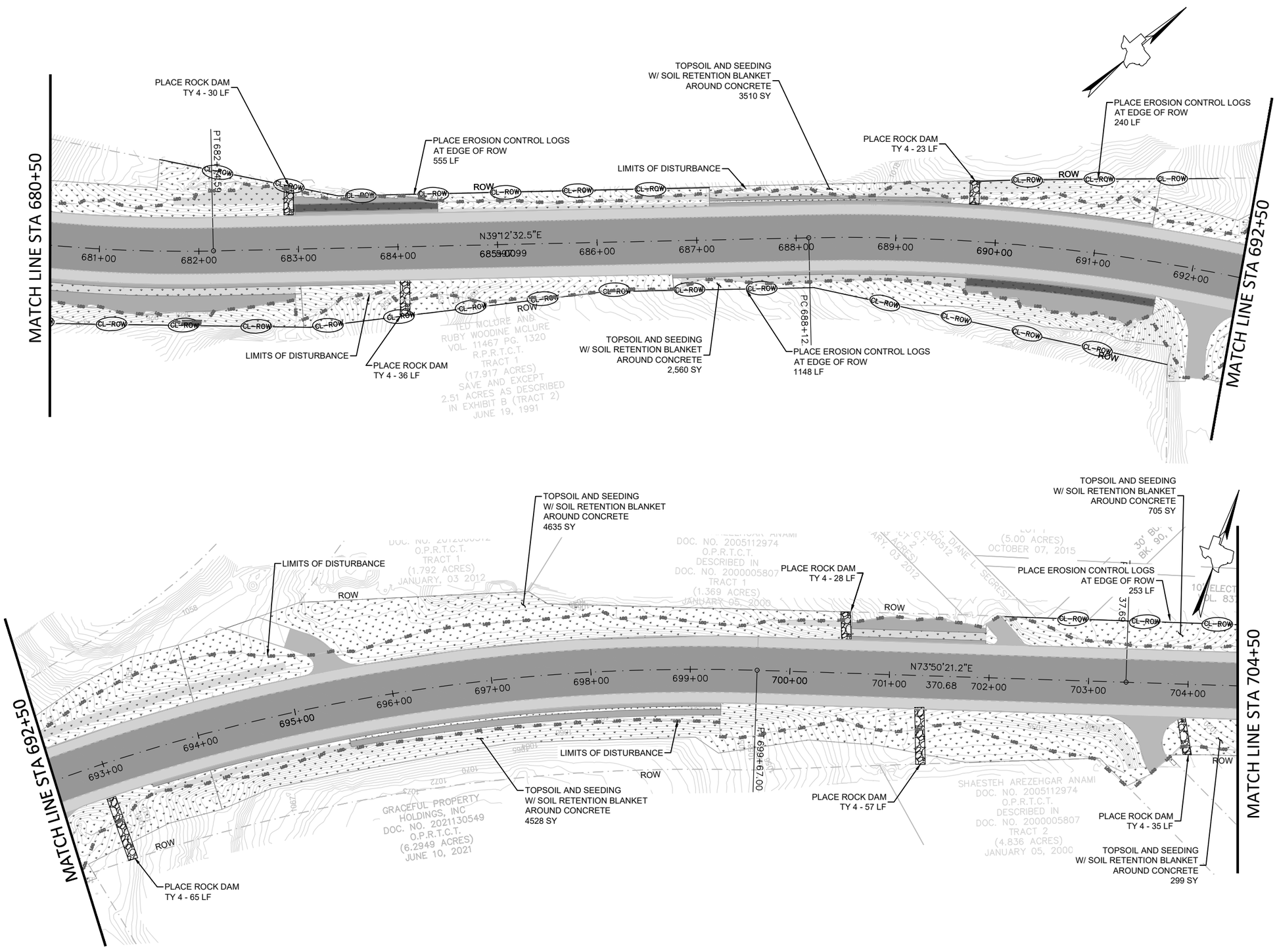
HVJ ASSOCIATES
6120 S.DAIRY ASHFORD ROAD
HOUSTON, TEXAS 77072
281.933.7388
TEXAS FIRM # 000646

RM 1431

STORMWATER POLLUTION PREVENTION PLAN
BEGIN TO STA. 680+50

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	134



LEGEND

- EROSION CONTROL LOGS
- ROCK DAM
- LIMITS OF DISTURBANCE
- TOPSOIL AND SEEDING
- PROPOSED CONCRETE

NOTE:

1. CONTRACTOR TO TOP SOIL AND SEED WITH RETENTION BLANKET TO RIGHT OF WAY UNLESS OTHER WISE SHOWN.

STATE OF TEXAS
DAYA DAYANANDA
83903
LICENSED
PROFESSIONAL ENGINEER
11/10/2023

HORIZONTAL
0 50 100 200 FT

PRINT DATE	REVISION DATE
	.

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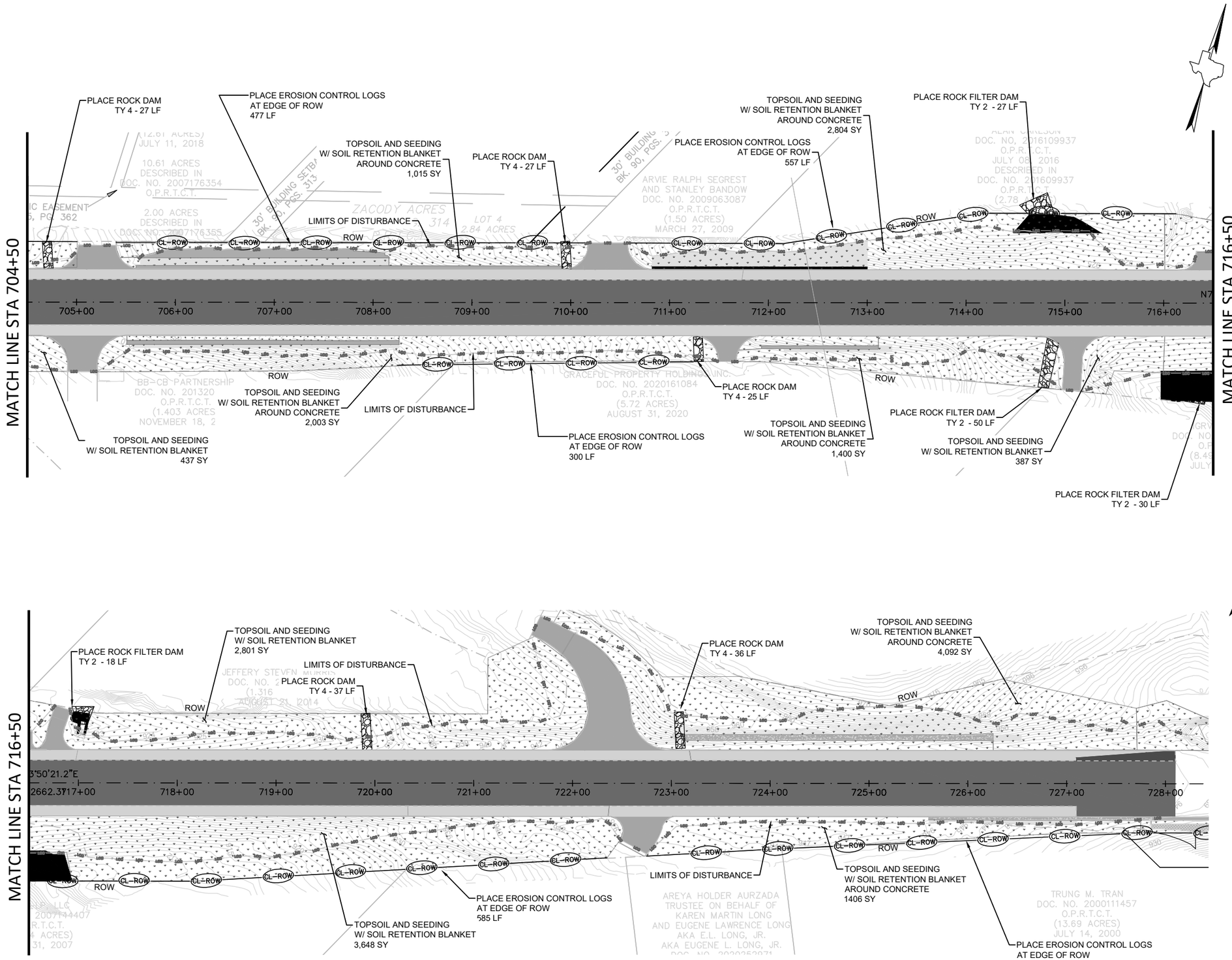
HOUSTON, TEXAS 77072
281.933.7388
TEXAS FIRM # 000646

RM 1431
STORMWATER POLLUTION PREVENTION PLAN
STA. 680+50 TO STA. 704+50

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	135



LEGEND

- EROSION CONTROL LOGS
- ROCK DAM
- LIMITS OF DISTURBANCE
- TOPSOIL AND SEEDING
- PROPOSED CONCRETE

NOTE:

1. CONTRACTOR TO TOP SOIL AND SEED WITH RETENTION BLANKET TO RIGHT OF WAY UNLESS OTHER WISE SHOWN.

STATE OF TEXAS
DAYA DAYANANDA
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RM 1431

STORMWATER POLLUTION PREVENTION PLAN STA. 704+50 TO STA END

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	136

DATE:
FILE:

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.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required
☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☐ Silt Fence	☐ Vegetative Filter Strips
☒ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☒ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☒ Required Action

Action No.

1. Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided. Impacted vegetation should be replaced with in-kind on-site replacement/restoration of native vegetation.
2. The use of seed mix that contains seeds from only regional ecotype native species is recommended.
3. Riparian buffer zones should remain undisturbed.

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. Potential habitat for the golden-cheeked warbler was identified within and adjacent to the project area. Refer to the General Notes for the list of Voluntary conservation measures that must be implemented for this project, in compliance with the Programmatic Consultation Agreement between TxDOT (2017).
2. Implement Bat BMPs. Refer to the General Notes for the Bat BMPs.
3. TxDOT biologist would have to be present at pre-construction meeting with contractor to stress the importance of following VCMs, particularly that removal of any vegetation only occur from September 15 to March 1. In addition, the construction inspector would have to be present during construction/vegetation removal.
4. Refer to General Notes for General Design and Construction BMPs.

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: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.

2.

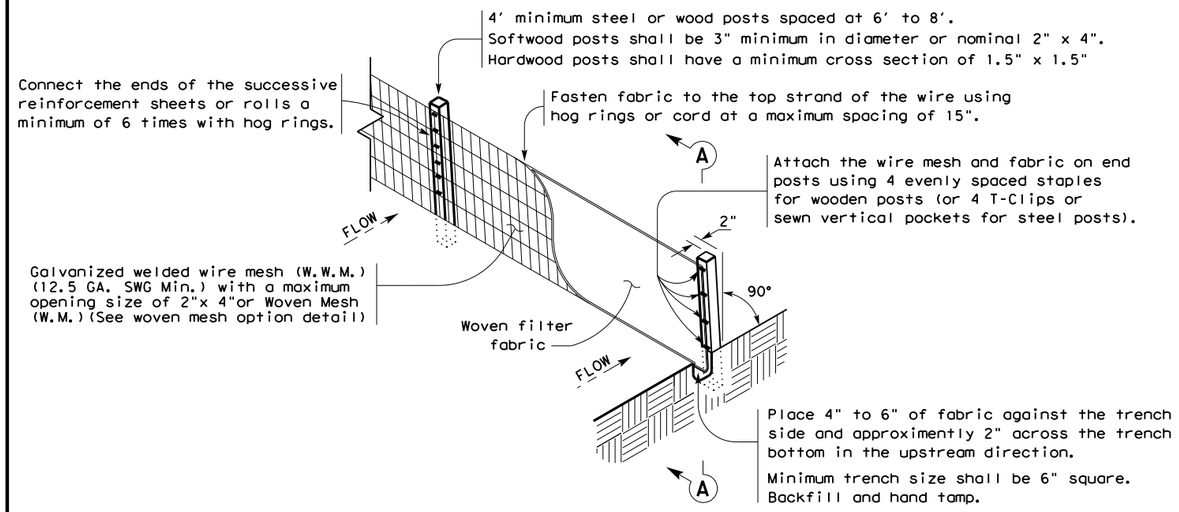
3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

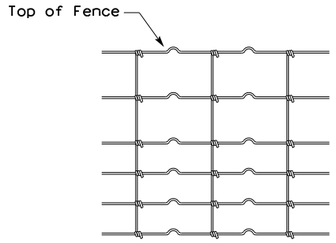
EPIC

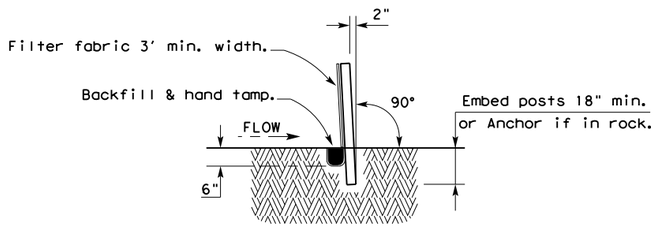
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	1378	01	050	RM 1431
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		137



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

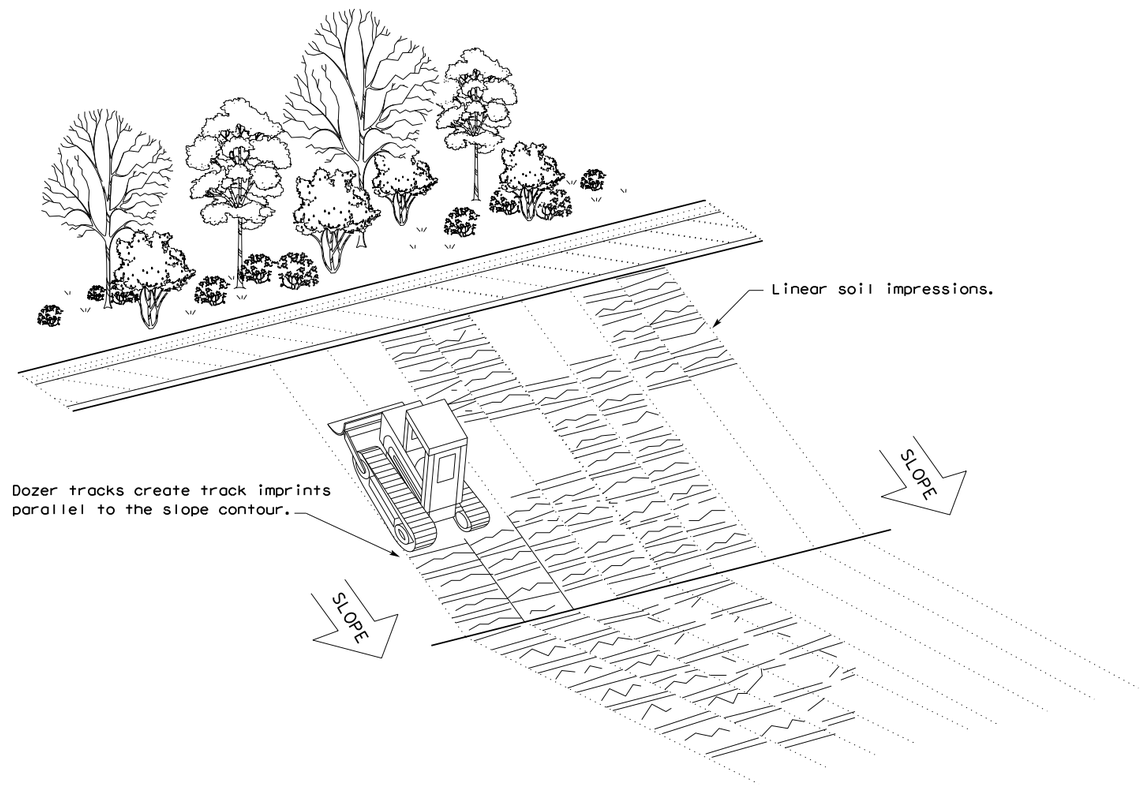
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

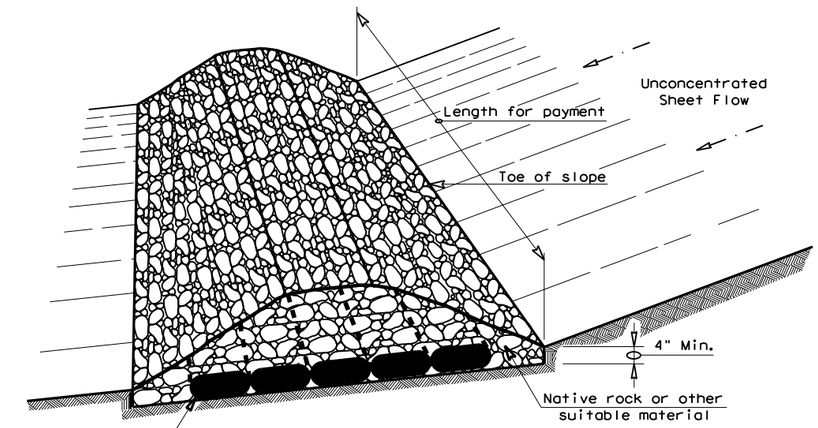
FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM	DW: VP		DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1378	01	050		RM 1431	
	DIST	COUNTY			SHEET NO.	
	AUS	TRAVIS			138	

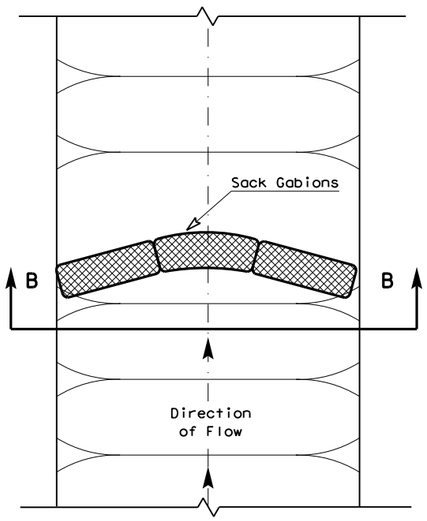
DATE
FILE

DATE:
FILE:

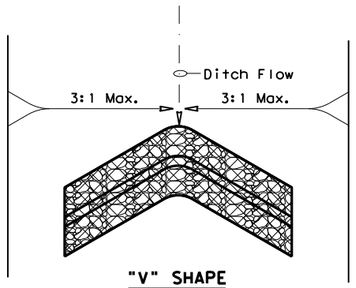


FILTER DAM AT TOE OF SLOPE

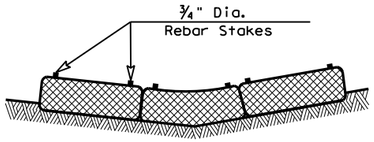
RFD1



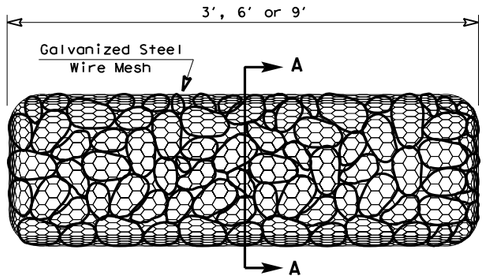
PLAN VIEW



"V" SHAPE PLAN VIEW

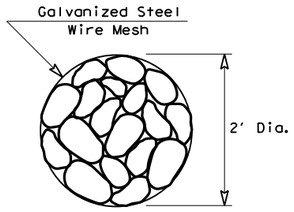


SECTION B-B

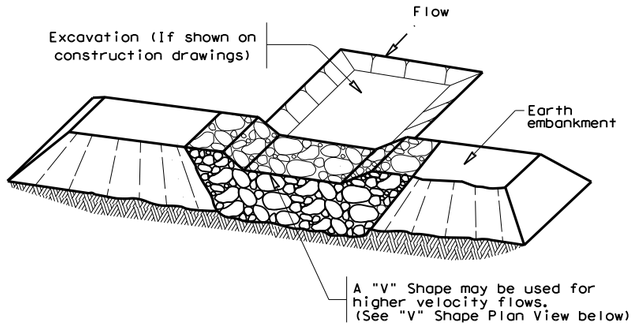


TYPE 4 (SACK GABIONS)

RFD4

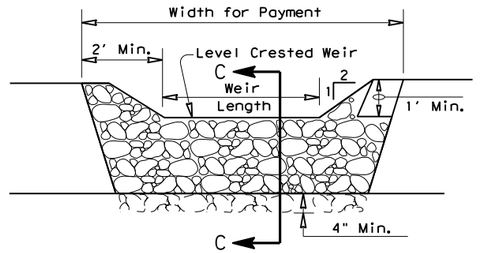


SECTION A-A

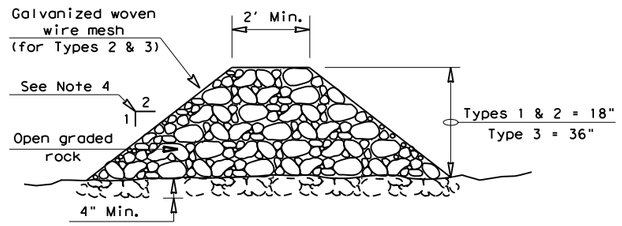


FILTER DAM AT SEDIMENT TRAP

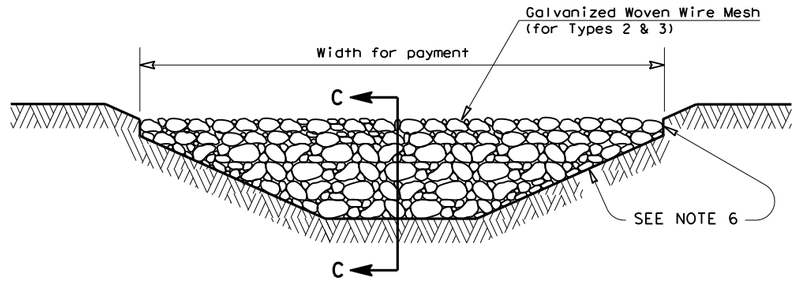
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation

Design Division Standard

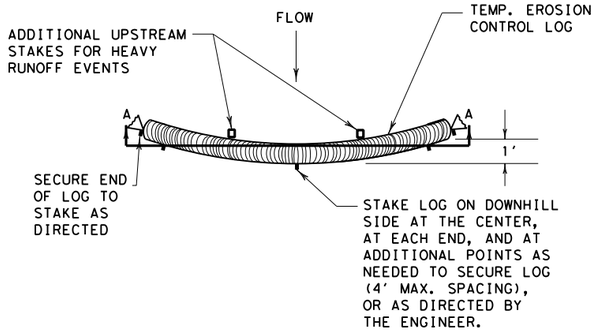
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

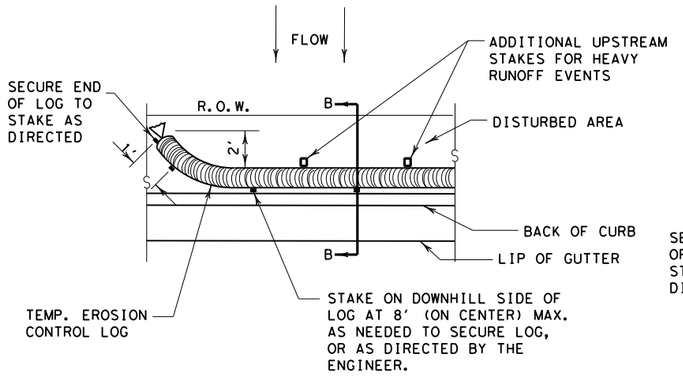
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1378	01	050		RM 1431	
	DIST	COUNTY			SHEET NO.	
	AUS	TRAVIS			139	

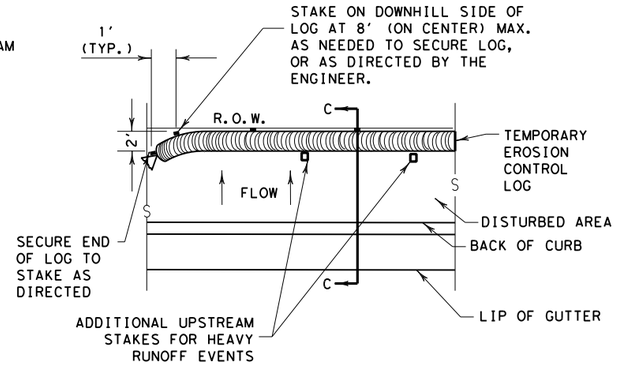
DATE:
FILE:



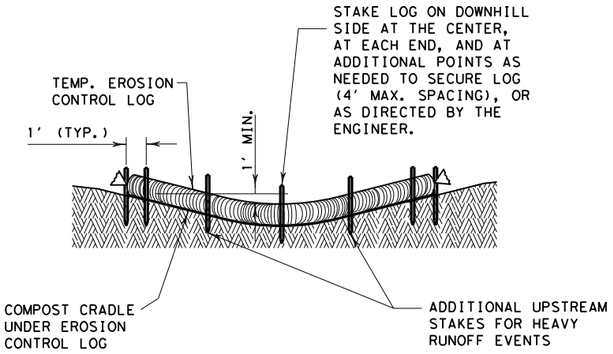
PLAN VIEW



PLAN VIEW



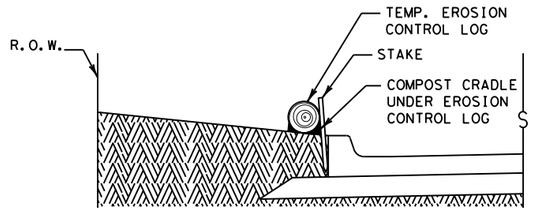
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

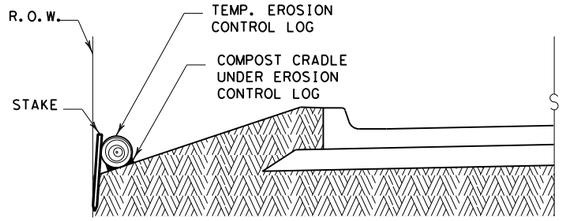
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



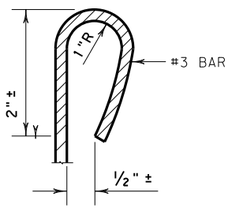
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

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



REBAR STAKE DETAIL

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.

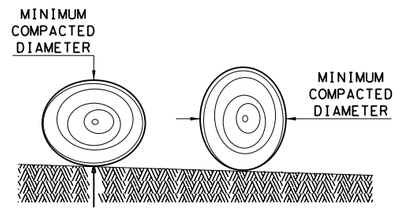
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

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

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		1378	01	050		RM 1431	
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		AUS		TRAVIS			140

DATE:
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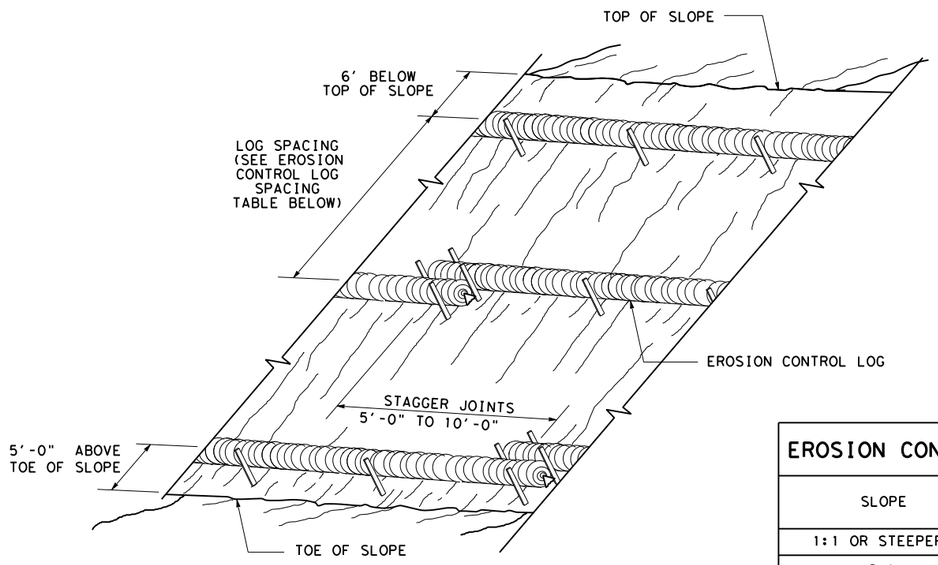
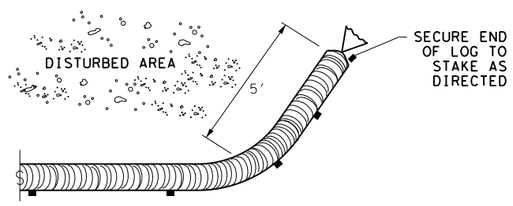


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

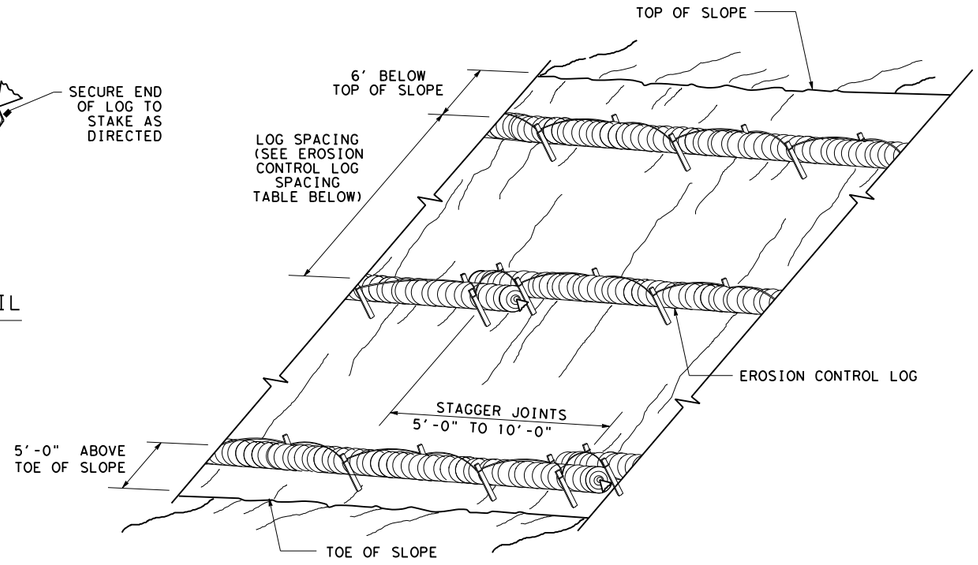
CL-SST



END SECTION RAP DETAIL

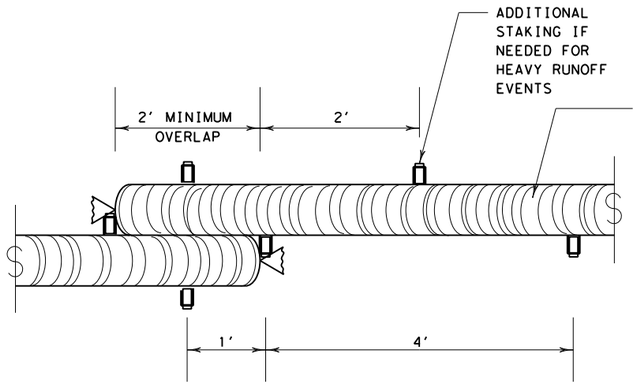
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

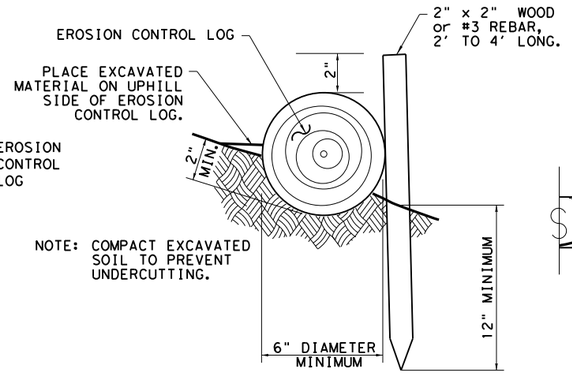
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

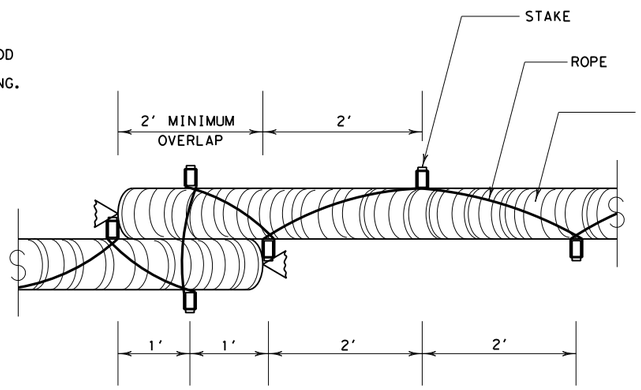


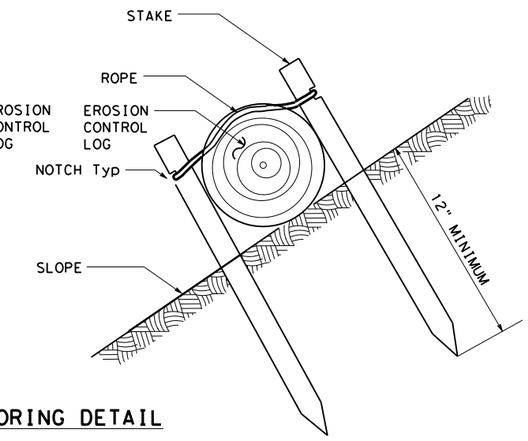


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

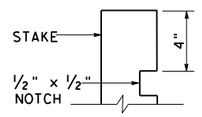
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





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
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	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		141

DATE:
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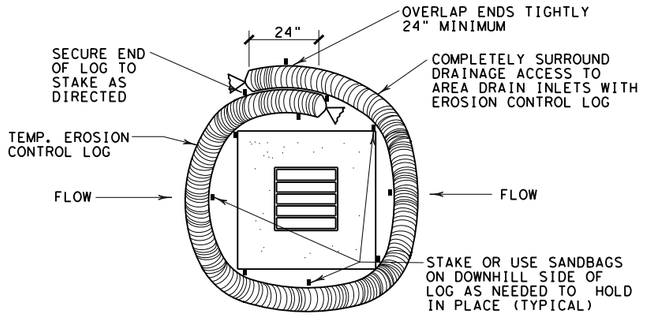
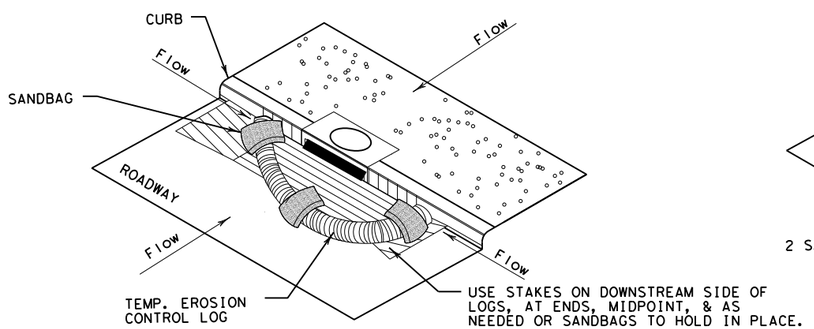


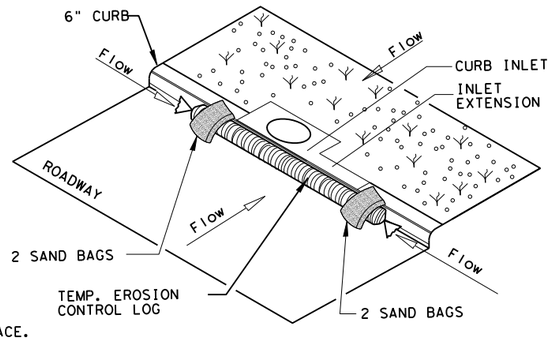
EROSION CONTROL LOG AT DROP INLET

CL-DI



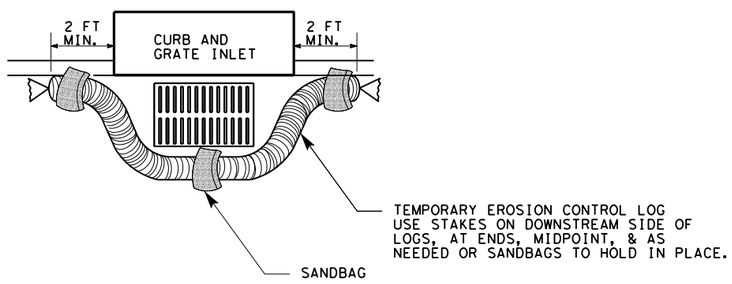
EROSION CONTROL LOG AT CURB INLET

CL-CI



EROSION CONTROL LOG AT CURB INLET

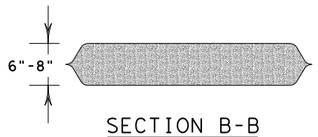
CL-CI



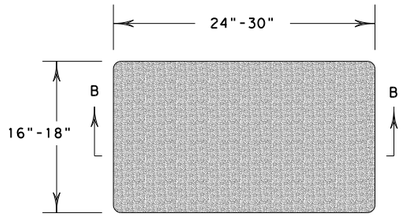
EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

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.



SECTION B-B



SANDBAG DETAIL

SHEET 3 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	1378	01	050		RM 1431		
	DIST	COUNTY				SHEET NO.	
	AUS	TRAVIS				142	

...\RM1431*050*PENTABLE,TBUSOFFICE$
$MODELNAME$
$CLIENT$
pw://hglff-pw.bentley.com:hglff-pw-01/Documents/37547.003 RM 1431 W
11/9/2023 1:19:56 PM

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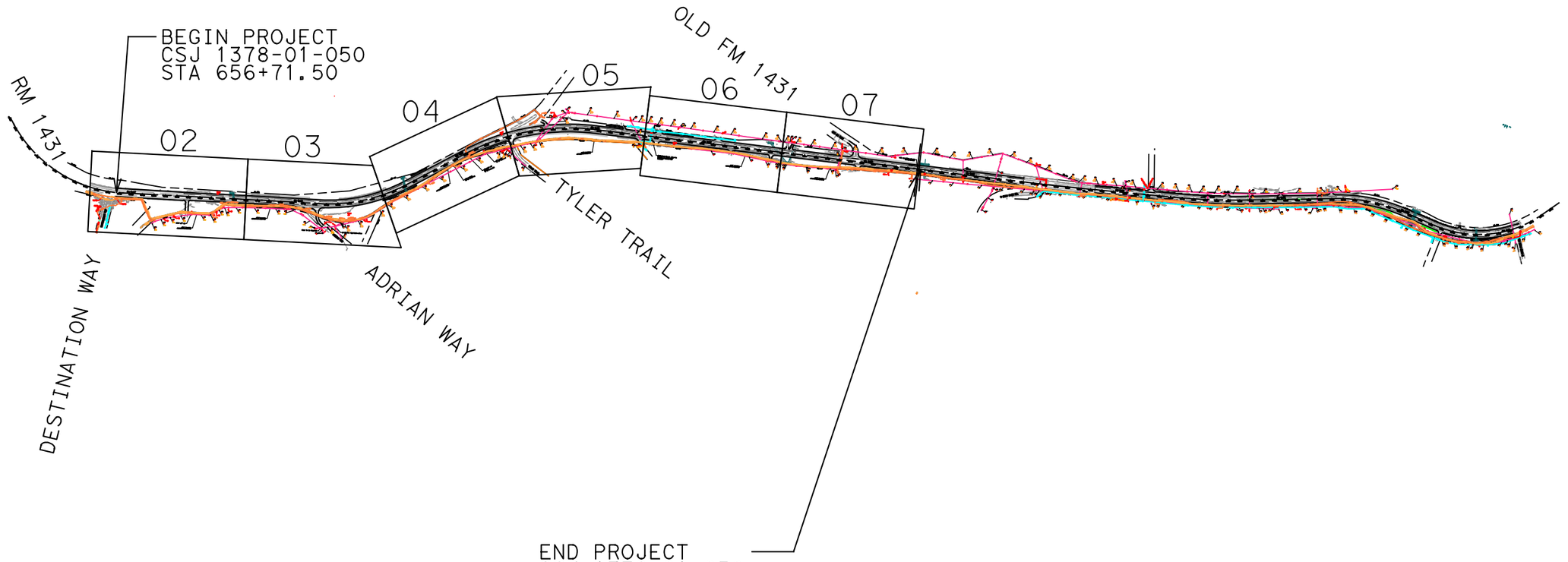
LEVEL "C/D"= 21,534'
TOTAL= 43,458'



HORIZONTAL
0 500 1000 2000 FT

SURVEY CONTROL					
C.P. No.	NORTHING	EASTING	ELEVATION	DESC.	SHT No.
54	10146533.04	3046254.61	1000.47'	IRS	06
55	10146025.13	3044842.30	1032.42'	IRS	04
56	10144858.96	3043896.26	982.33'	IRS	03
57	10144581.63	3042778.02	961.96'	IRS	02

LEGEND:

LEVEL "A"	LEVEL "B"	LEVEL "C" & "D"	
			TEST HOLE
	-T(B)-	-T(D)-	TELEPHONE LINE
	-FOC(B)-	-FOC(D)-	FIBER OPTIC LINE
	-C(B)-	-C(D)-	CABLE TV LINE
	-W(B)-	-W(D)-	WATER LINE
	-WW(B)-	-WW(D)-	WASTEWATER LINE
	-E(B)-	-E(D)-	ELECTRIC LINE
			OVERHEAD UTILITY LINE
			PROPOSED UTILITY ABANDONMENT

T	TELEPHONE PEDESTAL	PP	POWER POLE W/RISER
T	TELEPHONE MANHOLE	EB	ELECTRIC BOX
T	TELEPHONE CABINET	EV	ELECTRIC VAULT
T	TELEPHONE SPLICE	EM	ELECTRIC METER
F	FIBER OPTIC MANHOLE		LIGHT POLE
C	CABLE TV PEDESTAL	TRANS	ELECTRIC TRANSFORMER
CH	CABLE TV HANDHOLE		TRAFFIC SIGNAL POLE
	FIRE HYDRANT		GUY WIRE
	WATER VALVE		UTILITY CONTINUATION/ QUALITY LEVEL CHANGE
WM	WATER METER		UTILITY END POINT
	WATER VENT PIPE	ABN.	ABANDONED UTILITY
WW	WASTEWATER MANHOLE	OH	OVERHEAD UTILITIES
PP	POWER POLE	CP	CONTROL POINT

OWNERSHIP LEGEND:	OWNER:	CONTACT:	PHONE:
TELEPHONE(T)	= AT&T	DUSTIN PILAT	737-255-4874
FIBER OPTIC CABLE(FOC)	= AT&T	DUSTIN PILAT	737-255-4874
FIBER OPTIC CABLE(FOC1)	= SPECTRUM	JULIO FRANCO	512-539-1832
CABLE TV(C)	= SPECTRUM	JULIO FRANCO	512-539-1832
WATER(W)	= JONESTOWN WSC	JOHN TICHI	512-636-8147
WATER(W1)	= CITY OF LAGO VISTA	TAYLOR WHICHARD	512-599-4179
WASTEWATER(WW)	= CITY OF LAGO VISTA	TAYLOR WHICHARD	512-599-4179
ELECTRIC(E)	= PEDERNALES ELECTRIC COOP.	CYNTHIA HUFF	830-868-5177

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Jason S. Alst, PE 130789 ON 11/9/2023
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PRINT DATE	REVISION DATE
11/9/2023	-

Texas Department of Transportation
Austin District

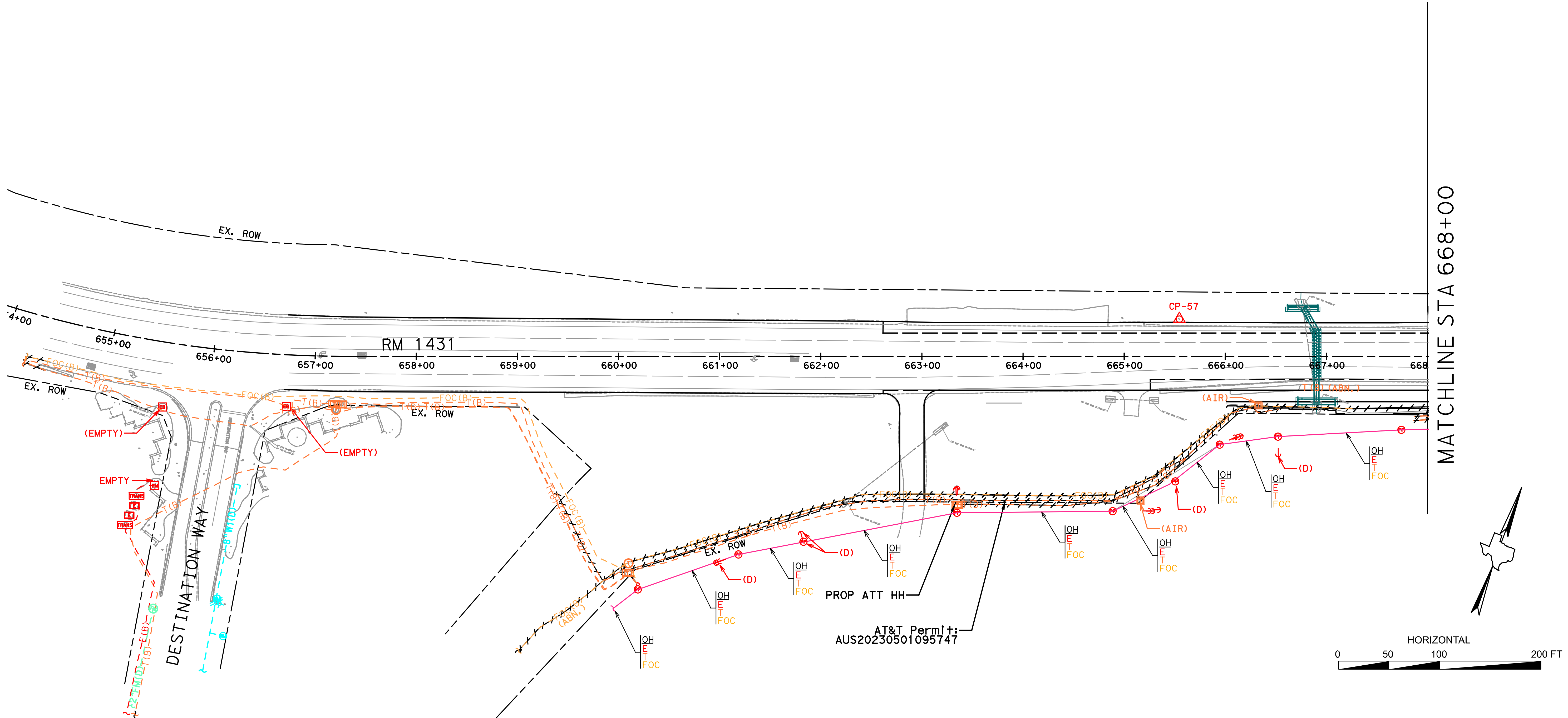
halff
13620 BRIARWICK
DR#E. STE 100
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

RM 1431

EXISTING UTILITY LAYOUT

SHEET 01 OF 07

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	SEE TITLE SHEET	RM 1431
STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS
CONTROL	SECTION	JOB / SHEET NO.
1378	01	050 / 143



LEGEND:

LEVEL "A"	LEVEL "B"	LEVEL "C" & "D"	
(test hole symbol)			TEST HOLE
	T(B)	T(D)	TELEPHONE LINE
	FOC(B)	FOC(D)	FIBER OPTIC LINE
	C(B)	C(D)	CABLE TV LINE
	W(B)	W(D)	WATER LINE
	WW(B)	WW(D)	WASTEWATER LINE
	E(B)	E(D)	ELECTRIC LINE
			OVERHEAD UTILITY LINE
			PROPOSED UTILTY ABANDONMENT

- TELEPHONE PEDESTAL
- TELEPHONE MANHOLE
- TELEPHONE CABINET
- TELEPHONE SPLICE
- FIBER OPTIC MANHOLE
- CABLE TV PEDESTAL
- CABLE TV HANDHOLE
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- WATER VENT PIPE
- WASTEWATER MANHOLE
- POWER POLE
- POWER POLE W/RISER
- ELECTRIC BOX
- ELECTRIC VAULT
- ELECTRIC METER
- LIGHT POLE
- ELECTRIC TRANSFORMER
- TRAFFIC SIGNAL POLE
- GUY WIRE
- UTILITY CONTINUATION/ QUALITY LEVEL CHANGE
- UTILITY END POINT
- ABN. ABANDONED UTILITY
- OH OVERHEAD UTILITIES
- CP CONTROL POINT

OWNERSHIP LEGEND:	OWNER:	CONTACT:	PHONE:
TELEPHONE (T)	= AT&T	DUSTIN PILAT	737-255-4874
FIBER OPTIC CABLE (FOC)	= AT&T	DUSTIN PILAT	737-255-4874
FIBER OPTIC CABLE (FOC1)	= SPECTRUM	JULIO FRANCO	512-539-1832
CABLE TV (C)	= SPECTRUM	JULIO FRANCO	512-539-1832
WATER (W)	= JONESTOWN WSC	JOHN TICHI	512-636-8147
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WASTEWATER (WW)	= CITY OF LAGO VISTA	TAYLOR WHICHARD	512-599-4179
ELECTRIC (E)	= PEDERNALES ELECTRIC COOP.	CYNTHIA HUFF	830-868-5177

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PRINT DATE	REVISION DATE
11/9/2023	.

Texas Department of Transportation
Austin District

halff
13620 BRIARWICK DRIVE, STE 100
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

RM 1431

EXISTING UTILITY LAYOUT

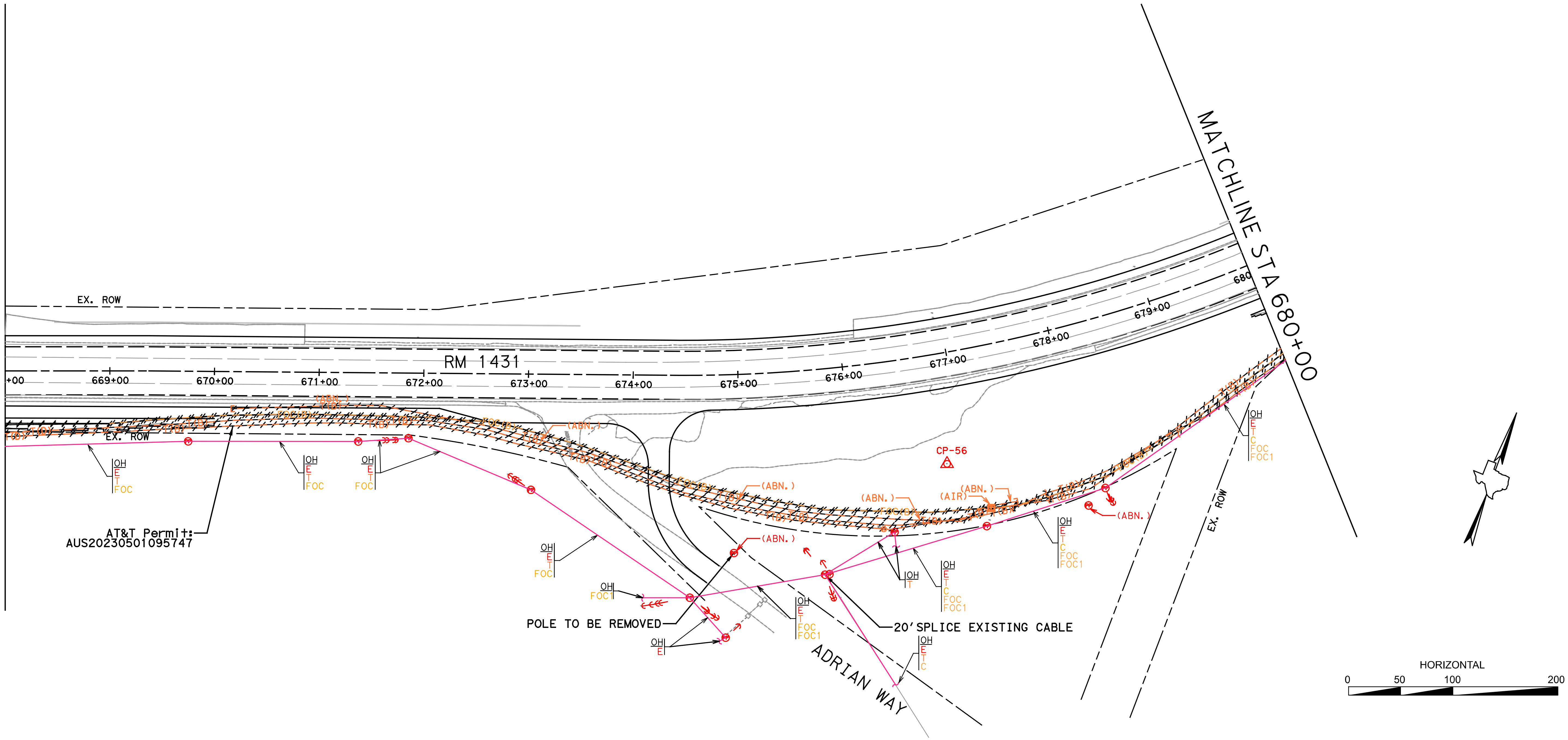
STA 664+00 TO STA 668+00

SHEET 02 OF 07

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS

CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	144



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$CLIENT$
11/9/2023 2:20:19 PM

LEGEND:

LEVEL "A" LEVEL "B" LEVEL "C" & "D"

LEVEL "B"	LEVEL "C" & "D"	
		TEST HOLE
T(B)	T(D)	TELEPHONE LINE
FOC(B)	FOC(D)	FIBER OPTIC LINE
C(B)	C(D)	CABLE TV LINE
W(B)	W(D)	WATER LINE
WW(B)	WW(D)	WASTEWATER LINE
E(B)	E(D)	ELECTRIC LINE
		OVERHEAD UTILITY LINE
		PROPOSED UTILTY ABANDONMENT

TELEPHONE PEDESTAL
TELEPHONE MANHOLE
TELEPHONE CABINET
TELEPHONE SPLICE
FIBER OPTIC MANHOLE
CABLE TV PEDESTAL
CABLE TV HANDHOLE
FIRE HYDRANT
WATER VALVE
WATER METER
WATER VENT PIPE
WASTEWATER MANHOLE
POWER POLE
POWER POLE W/RISER
ELECTRIC BOX
ELECTRIC VAULT
ELECTRIC METER
LIGHT POLE
ELECTRIC TRANSFORMER
TRAFFIC SIGNAL POLE
GUY WIRE
UTILITY CONTINUATION/ QUALITY LEVEL CHANGE
UTILITY END POINT
ABN. ABANDONED UTILITY
OH OVERHEAD UTILITIES
CP CONTROL POINT

OWNERSHIP LEGEND:	OWNER:	CONTACT:	PHONE:
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FIBER OPTIC CABLE (FOC1)	= SPECTRUM	JULIO FRANCO	512-539-1832
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11/9/2023	.

Texas Department of Transportation
Austin District

halff
13620 BRIARWICK DRIVE, STE 100
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

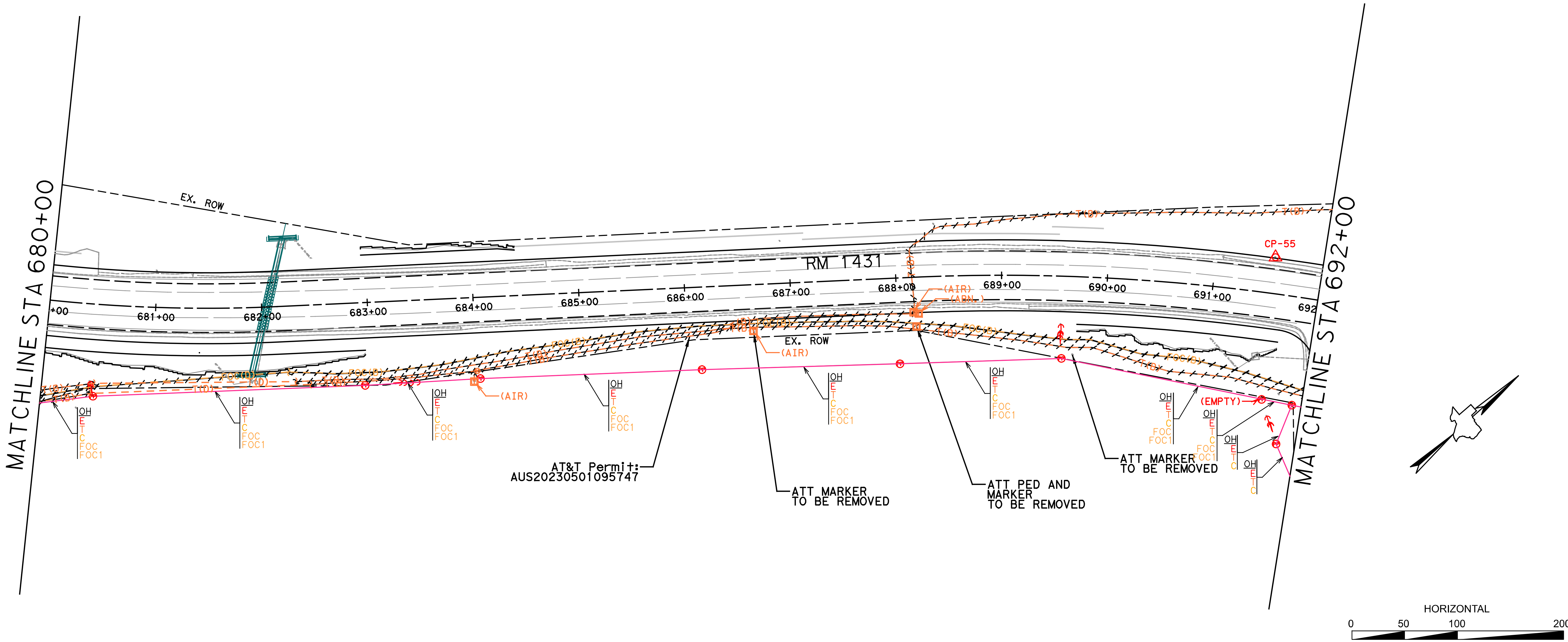
RM 1431

EXISTING UTILITY LAYOUT

STA 668+00 TO STA 680+00

SHEET 03 OF 07

FED. RD. DIV. NO.	PROJECT NUMBER		HIGHWAY NUMBER
6	SEE TITLE SHEET		RM 1431
STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	145



LEGEND:

LEVEL "A"	LEVEL "B"	LEVEL "C" & "D"	
			TEST HOLE
	—T(B)—	—T(D)—	TELEPHONE LINE
	—FOC(B)—	—FOC(D)—	FIBER OPTIC LINE
	—C(B)—	—C(D)—	CABLE TV LINE
	—W(B)—	—W(D)—	WATER LINE
	—WW(B)—	—WW(D)—	WASTEWATER LINE
	—E(B)—	—E(D)—	ELECTRIC LINE
			OVERHEAD UTILITY LINE
			PROPOSED UTILTY ABANDONMENT

TELEPHONE PEDESTAL	POWER POLE W/RISER
TELEPHONE MANHOLE	ELECTRIC BOX
TELEPHONE CABINET	ELECTRIC VAULT
TELEPHONE SPLICE	ELECTRIC METER
FIBER OPTIC MANHOLE	LIGHT POLE
CABLE TV PEDESTAL	ELECTRIC TRANSFORMER
CABLE TV HANDHOLE	TRAFFIC SIGNAL POLE
FIRE HYDRANT	GUY WIRE
WATER VALVE	UTILITY CONTINUATION/ QUALITY LEVEL CHANGE
WATER METER	UTILITY END POINT
WATER VENT PIPE	ABN. ABANDONED UTILITY
WASTEWATER MANHOLE	OH OVERHEAD UTILITIES
POWER POLE	CP CONTROL POINT

OWNERSHIP LEGEND:	OWNER:	CONTACT:	PHONE:
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Texas Department of Transportation
Austin District

halff
13620 BRIARWICK DRIVE, STE 100
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

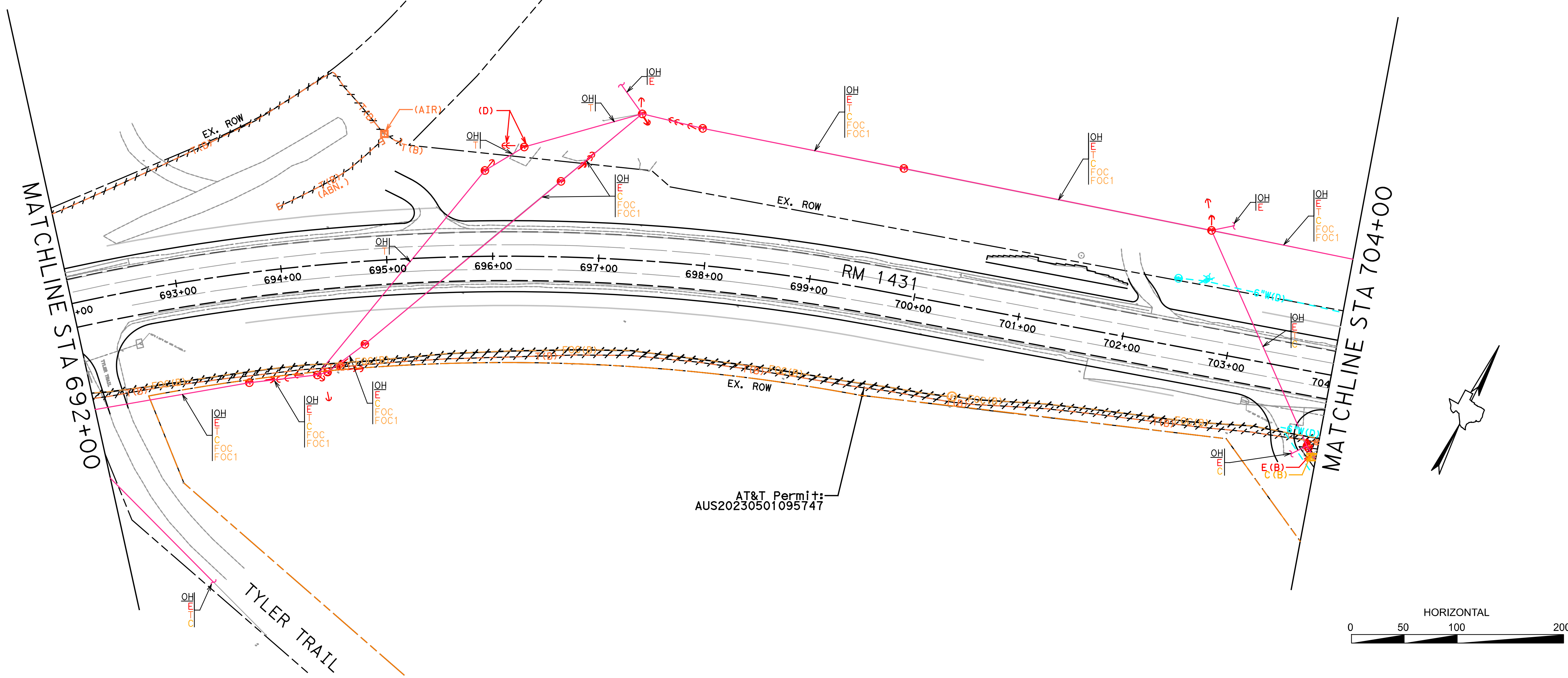
RM 1431

EXISTING UTILITY LAYOUT

STA 680+00 TO STA 692+00

SHEET 04 OF 07

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6	SEE TITLE SHEET	RM 1431	
STATE	DISTRICT	COUNTY	
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	146



PRINT DATE	REVISION DATE
11/9/2023	.

LEGEND:

LEVEL "A" LEVEL "B" LEVEL "C" & "D"

LEVEL "A"	LEVEL "B"	LEVEL "C" & "D"	
(symbol)			TEST HOLE
	T(B)	T(D)	TELEPHONE LINE
	FOC(B)	FOC(D)	FIBER OPTIC LINE
	C(B)	C(D)	CABLE TV LINE
	W(B)	W(D)	WATER LINE
	WW(B)	WW(D)	WASTEWATER LINE
	E(B)	E(D)	ELECTRIC LINE
			OVERHEAD UTILITY LINE
			PROPOSED UTILTY ABANDONMENT

- TELEPHONE PEDESTAL
- TELEPHONE MANHOLE
- TELEPHONE CABINET
- TELEPHONE SPLICE
- FIBER OPTIC MANHOLE
- CABLE TV PEDESTAL
- CABLE TV HANDHOLE
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- WATER VENT PIPE
- WASTEWATER MANHOLE
- POWER POLE
- POWER POLE W/RISER
- ELECTRIC BOX
- ELECTRIC VAULT
- ELECTRIC METER
- LIGHT POLE
- ELECTRIC TRANSFORMER
- TRAFFIC SIGNAL POLE
- GUY WIRE
- UTILITY CONTINUATION/ QUALITY LEVEL CHANGE
- UTILITY END POINT
- ABN. ABANDONED UTILITY
- OH OVERHEAD UTILITIES
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Texas Department of Transportation
Austin District

halff

13620 BRIARWICK DRIVE, STE 100
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

RM 1431

EXISTING UTILITY LAYOUT

STA 692+00 TO STA 704+00

SHEET 05 OF 07

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS

CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	147

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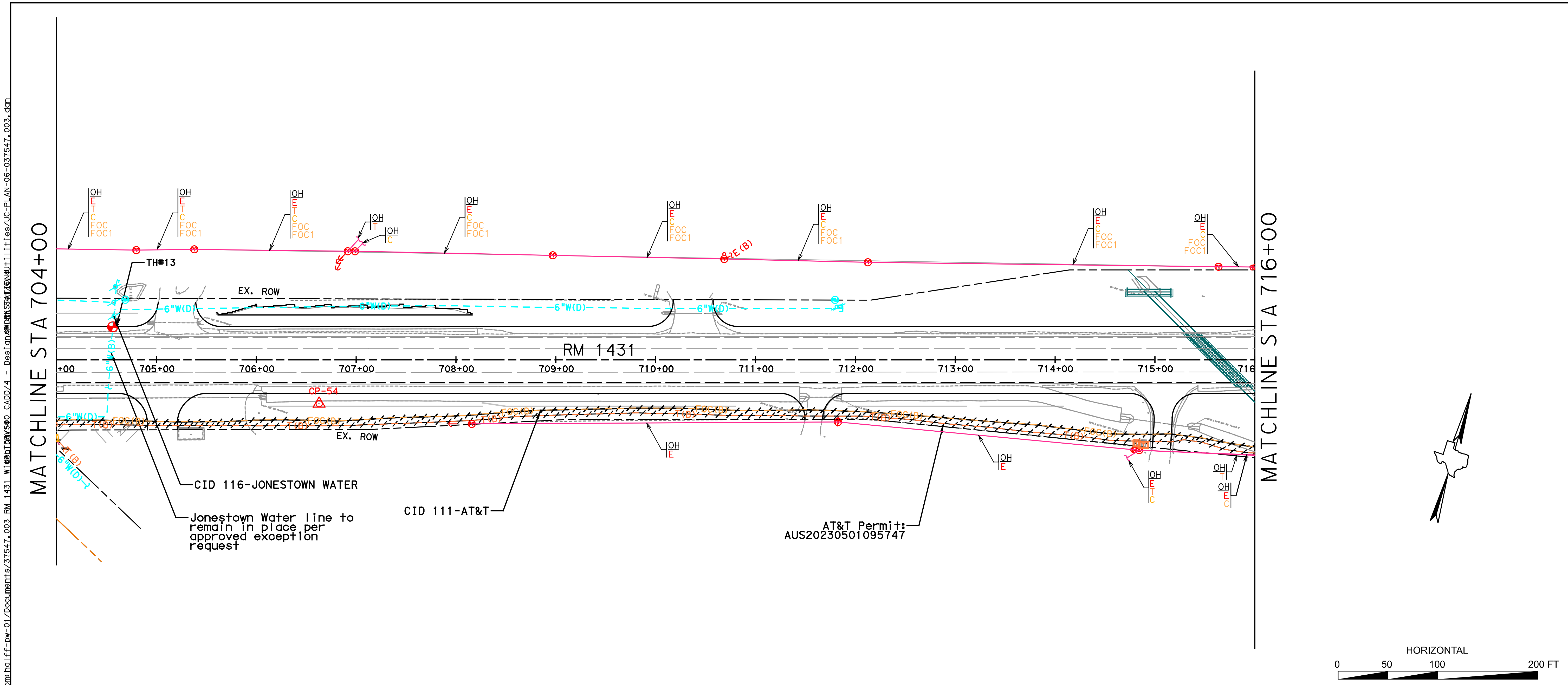
11/9/2023 2:20:40 PM



LEGEND:

LEVEL "A"	LEVEL "B"	LEVEL "C" & "D"	
(symbol)			TEST HOLE
	T(B)	T(D)	TELEPHONE LINE
	FOC(B)	FOC(D)	FIBER OPTIC LINE
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			OVERHEAD UTILITY LINE
			PROPOSED UTILTY ABANDONMENT

- TELEPHONE PEDESTAL
- TELEPHONE MANHOLE
- TELEPHONE CABINET
- TELEPHONE SPLICE
- FIBER OPTIC MANHOLE
- CABLE TV PEDESTAL
- CABLE TV HANDHOLE
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- WATER VENT PIPE
- WASTEWATER MANHOLE
- POWER POLE
- POWER POLE W/RISER
- ELECTRIC BOX
- ELECTRIC VAULT
- ELECTRIC METER
- LIGHT POLE
- ELECTRIC TRANSFORMER
- TRAFFIC SIGNAL POLE
- GUY WIRE
- UTILITY CONTINUATION/ QUALITY LEVEL CHANGE
- UTILITY END POINT
- ABN. ABANDONED UTILITY
- OH OVERHEAD UTILITIES
- CP CONTROL POINT

OWNERSHIP LEGEND:	OWNER:	CONTACT:	PHONE:
TELEPHONE(T)	= AT&T	DUSTIN PILAT	737-255-4874
FIBER OPTIC CABLE(FOC)	= AT&T	DUSTIN PILAT	737-255-4874
FIBER OPTIC CABLE(FOC1)	= SPECTRUM	JULIO FRANCO	512-539-1832
CABLE TV(C)	= SPECTRUM	JULIO FRANCO	512-539-1832
WATER(W)	= JONESTOWN WSC	JOHN TICHI	512-636-8147
WATER(W1)	= CITY OF LAGO VISTA	TAYLOR WHICHARD	512-599-4179
WASTEWATER(WW)	= CITY OF LAGO VISTA	TAYLOR WHICHARD	512-599-4179
ELECTRIC(E)	= PEDERNALES ELECTRIC COOP.	CYNTHIA HUFF	830-868-5177

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LEVEL "C" (C) DEPICTED ACCORDING TO RECORD INFORMATION AND EXISTING ASSOCIATED UTILITY STRUCTURES. NO ELECTRONIC INFORMATION WAS OBTAINED

LEVEL "D" (D) DEPICTED ACCORDING TO RECORD INFORMATION. NO ELECTRONIC INFORMATION WAS OBTAINED.

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Jason S. Aist, PE 130789 ON 11/9/2023
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PRINT DATE	REVISION DATE
11/9/2023	.

Texas Department of Transportation
Austin District

halff
13620 BRIARWICK DRIVE, STE 100
AUSTIN, TX 78729
(512) 777-4600
TBPELS FIRM NO. F-312

RM 1431

EXISTING UTILITY LAYOUT

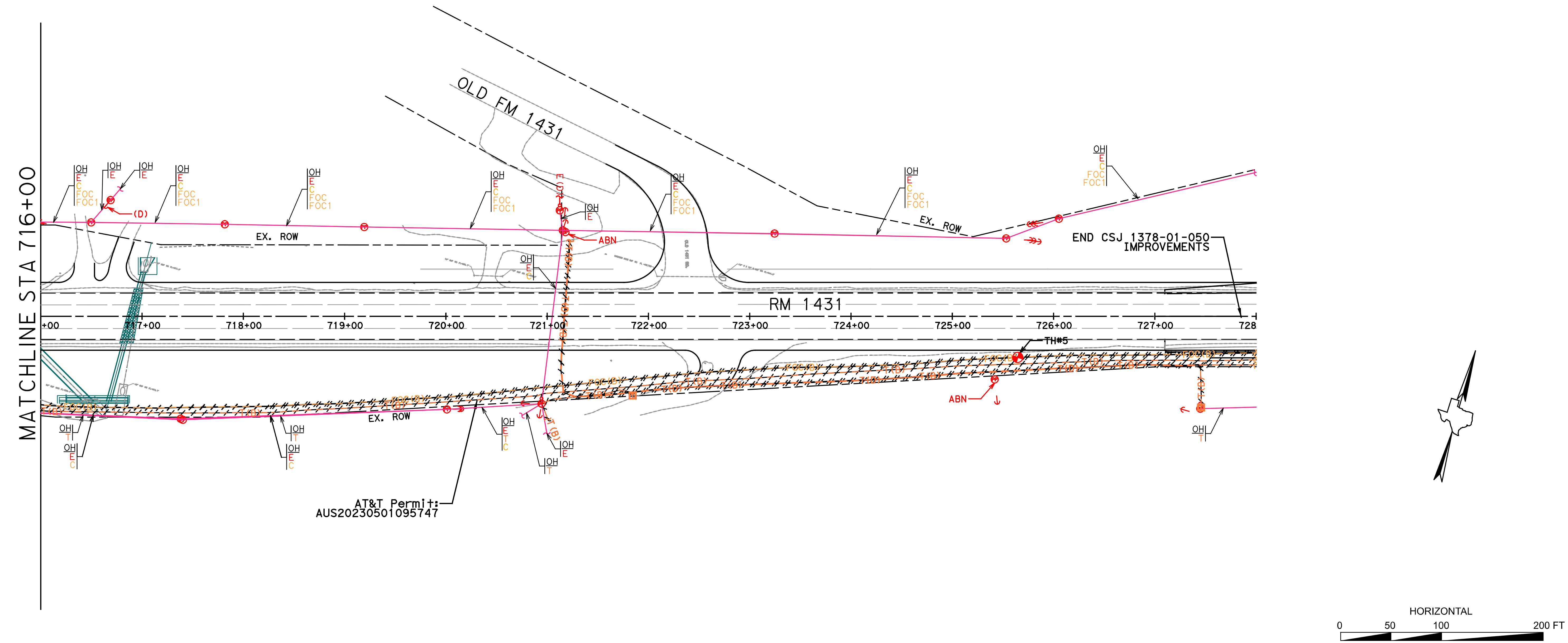
STA 704+00 TO STA 716+00

SHEET 06 OF 07

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	SEE TITLE SHEET	RM 1431

STATE	DISTRICT	COUNTY
TEXAS	AUS	TRAVIS

CONTROL	SECTION	JOB	SHEET NO.
1378	01	050	148



LEGEND:

LEVEL "A" LEVEL "B" LEVEL "C" & "D"

LEVEL "B"	LEVEL "C" & "D"	
		TEST HOLE
T(B)	T(D)	TELEPHONE LINE
FOC(B)	FOC(D)	FIBER OPTIC LINE
C(B)	C(D)	CABLE TV LINE
W(B)	W(D)	WATER LINE
WW(B)	WW(D)	WASTEWATER LINE
E(B)	E(D)	ELECTRIC LINE
		OVERHEAD UTILITY LINE
		PROPOSED UTILTY ABANDONMENT

TELEPHONE PEDESTAL	POWER POLE W/RISER
TELEPHONE MANHOLE	ELECTRIC BOX
TELEPHONE CABINET	ELECTRIC VAULT
TELEPHONE SPLICE	ELECTRIC METER
FIBER OPTIC MANHOLE	LIGHT POLE
CABLE TV PEDESTAL	ELECTRIC TRANSFORMER
CABLE TV HANDHOLE	TRAFFIC SIGNAL POLE
FIRE HYDRANT	GUY WIRE
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