

**INDEX OF SHEETS**

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	INDEX OF SHEETS

**STATE OF TEXAS  
DEPARTMENT OF TRANSPORTATION**

**PLANS OF PROPOSED  
STATE HIGHWAY IMPROVEMENT**

FEDERAL AID PROJECT:                     F 2025 (088)

**HILL COUNTY**

**SH 31**

CSJ 0162-13-002: FROM SH 31C SOUTH OF HUBBARD TO SH 31C NORTH OF HUBBARD

CSJ 0162-02-046: FROM HCR 3266 TO SH 31C SOUTH OF HUBBARD

CSJ 0162-02-047: FROM SH 31C NORTH OF HUBBARD TO NAVARRO COUNTY LINE

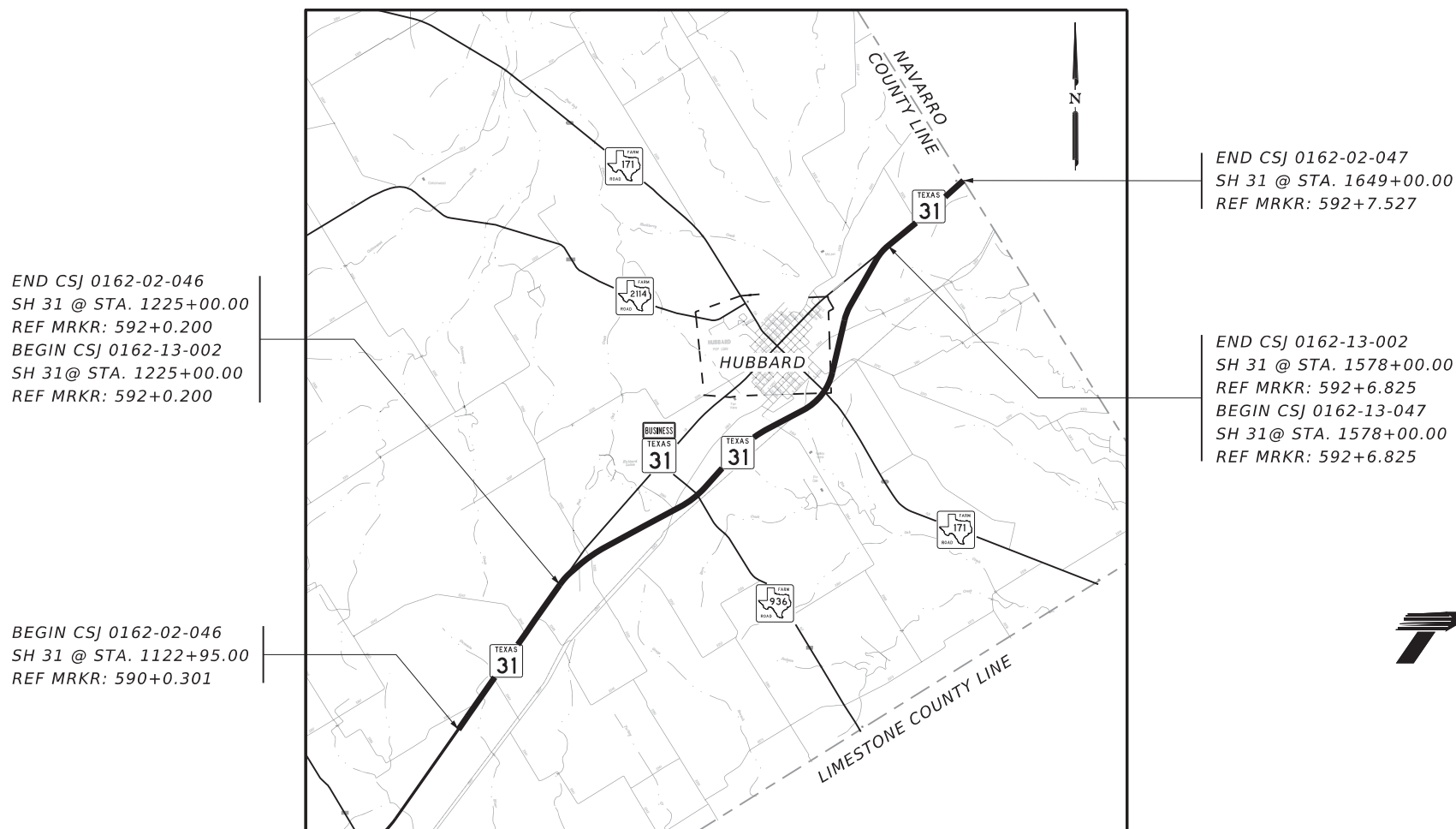
FOR THE CONSTRUCTION OF SURFACING/ROADWAY RESTORATION PROJECT  
CONSISTING OF BASE REPAIR, MILL AND INLAY OF MAIN LANES.

	ROADWAY		BRIDGE		PROJECT NET	
CSJ 0162-13-002:	FT= 34,010.00	MI.= 6.441	FT= 1,290.00	MI.= 0.244	FT= 35,300.00	MI.= 6.686
CSJ 0162-02-046:	FT= 10,146.00	MI.= 1.922	FT= 59.00	MI.= 0.011	FT= 10,205.00	MI.= 1.933
CSJ 0162-02-047:	FT= 7,100.00	MI.= 1.345	FT= 0.00	MI.= 0.000	FT= 7,100.00	MI.= 1.345
PROJECT TOTAL:	FT= 51,256.00	MI.= 9.708	FT= 1,349.00	MI.= 0.255	FT= 52,605.00	MI.= 9.964

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	F 2025(088)		SH 31
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	WACO	HILL	1
CHECK	CONTROL	SECTION	JOB	
	0162	13	002, ETC.	

DESIGN SPEED = 70 MPH

YEAR	ADT
2022	6,387
2042	8,942



END CSJ 0162-02-046  
SH 31 @ STA. 1225+00.00  
REF MRKR: 592+0.200  
BEGIN CSJ 0162-13-002  
SH 31 @ STA. 1225+00.00  
REF MRKR: 592+0.200

BEGIN CSJ 0162-02-046  
SH 31 @ STA. 1122+95.00  
REF MRKR: 590+0.301

END CSJ 0162-02-047  
SH 31 @ STA. 1649+00.00  
REF MRKR: 592+7.527

END CSJ 0162-13-002  
SH 31 @ STA. 1578+00.00  
REF MRKR: 592+6.825  
BEGIN CSJ 0162-13-047  
SH 31 @ STA. 1578+00.00  
REF MRKR: 592+6.825

EXCEPTIONS: NONE  
EQUATIONS: NONE  
RR CROSSINGS: NONE  
SCALE: 1" = 10,000'

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, SEPTEMBER 1, 2024 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, WILL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL - AID CONSTRUCTION CONTRACTS ( FORM FHWA 1273, OCTOBER 2023).

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Recommended for Letting **6/27/2024**  
DocuSigned by: *Josh Vorles*  
AC8604F84EC2483 Area Engineer

Recommended for Letting **7/1/2024**  
DocuSigned by: *Christina Stahl, P.E.*  
BAD9C743F95E4E3 Transportation Planning & Development

Approved for Letting **7/1/2024**  
DocuSigned by: *Stanley Swiatek*  
B68B0796D0564C9 Engineer

1:58:56 AM

6/27/2024

- GENERAL**
- 1 TITLE SHEET
  - 2 INDEX OF SHEETS
  - 3 PROJECT LAYOUT
  - 4 TYPICAL SECTIONS
  - 5, 5A-5C GENERAL NOTES
  - 6 ESTIMATE & QUANTITY
  - 7-10 CONSOLIDATED SUMMARIES

- TRAFFIC CONTROL PLAN**
- 11 SEQUENCE OF CONSTRUCTION

- TRAFFIC CONTROL PLAN STANDARDS**
- 12-23 \* BC (1)-21 THRU BC (12)-21
  - 24 \* TCP (1-5)-18
  - 25 \* TCP (2-6)-18
  - 26 \* TCP (3-2)-13
  - 27 \* TCP (3-3)-14
  - 28 \* WZ (STPM)-23
  - 29 \* WZ-(UL)-13

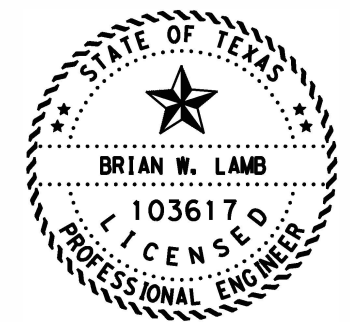
- PAVEMENT MARKINGS & DELINEATION**
- 30-60 PAVEMENT MARKING LAYOUTS

- PAVEMENT MARKINGS & DELINEATION STANDARDS**
- 61 \* PM (1)-22
  - 62 \* PM (2)-22
  - 63 \* FPM (2)-22
  - 64-69 \* D&OM (1)-20 THRU D&OM (6)-20
  - 70 \* D&OM (VIA)-20

- ENVIRONMENTAL ISSUES**
- 71-72 STORMWATER POLLUTION PREVENTION PLAN (SW3P)
  - 73 ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

- ENVIRONMENTAL ISSUES STANDARDS**
- 74 \* EC (1)-16
  - 75-84 \* TA-BMP (WACO DISTRICT STANDARD)

\* THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY DIRECT SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.



*Brian W. Lamb* P.E. 7/1/2024  
SIGNATURE OF REGISTRANT & DATE

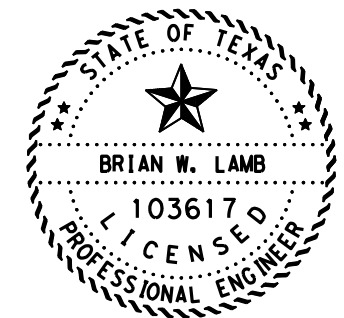
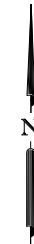
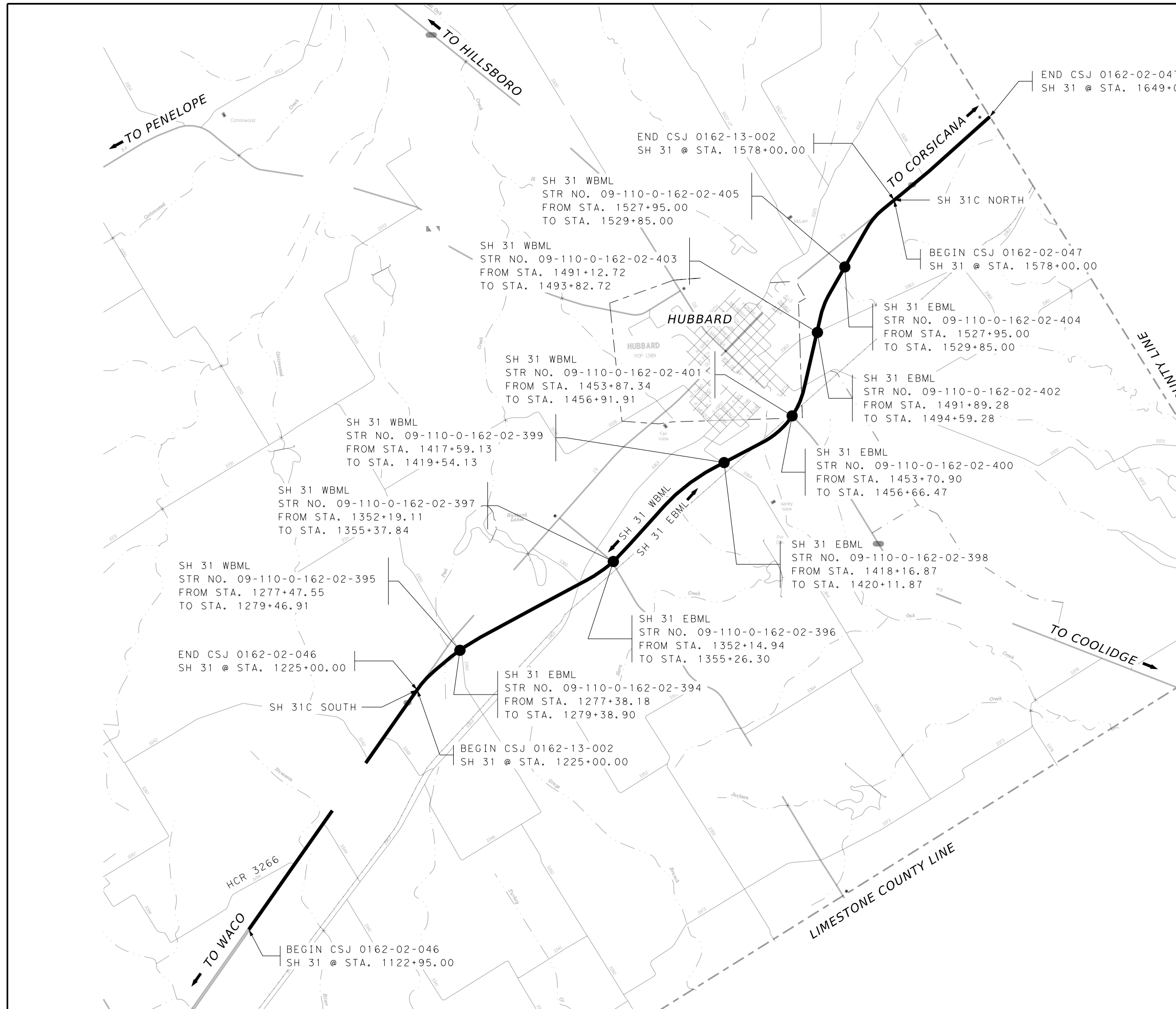


# INDEX OF SHEETS

SHEET: 1 OF 1

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		2

11:34:45 AM  
7/1/2024



*Brian W. Lamb* P.E.

7/1/2024

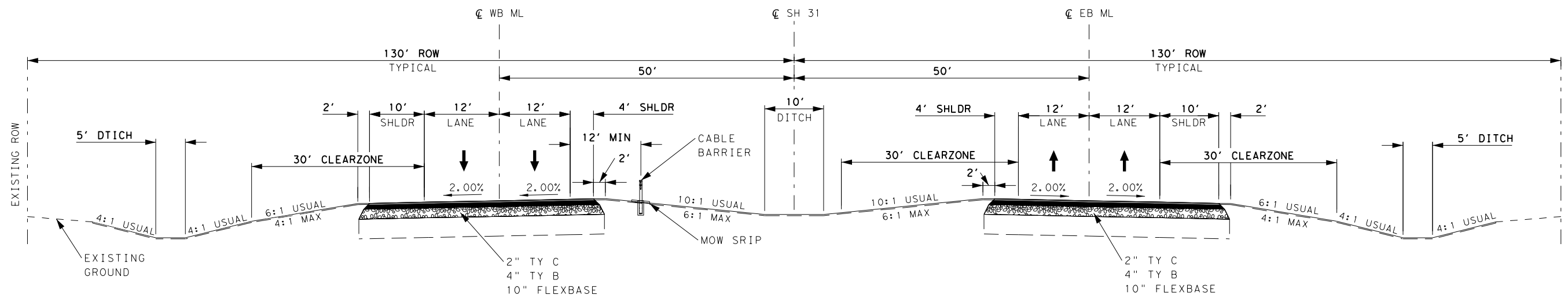
SIGNATURE OF REGISTRANT & DATE



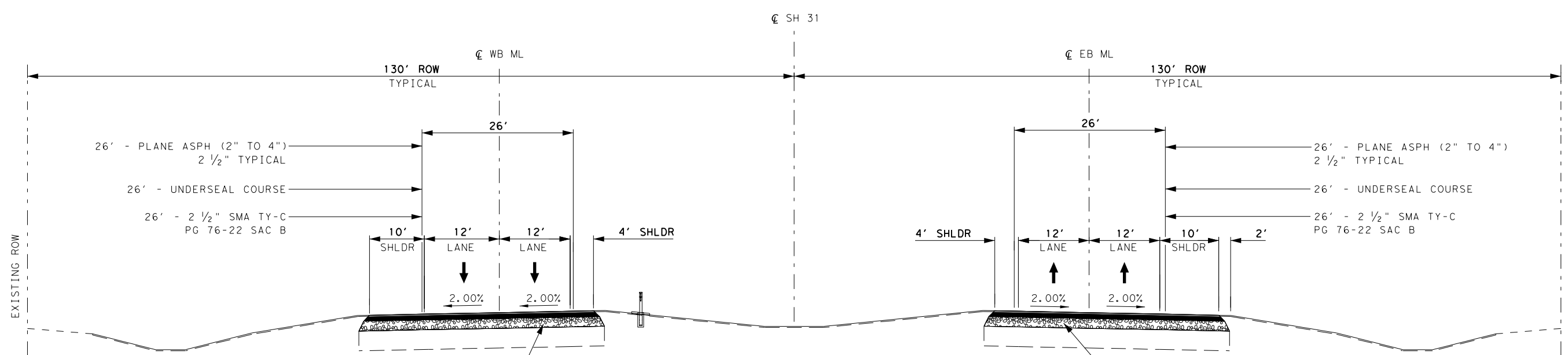
**PROJECT LAYOUT**

SHEET: 1 OF 1

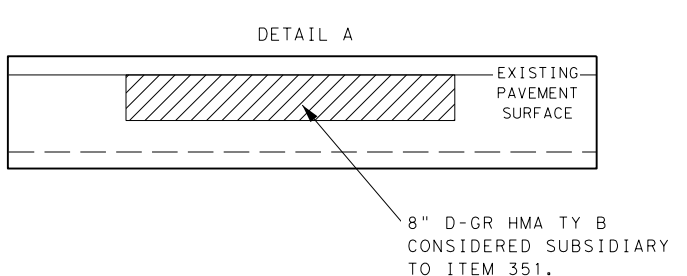
CHANGE ORDER	FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
	6	0162	13	002, ETC.	SH 31
	STATE	DIST	COUNTY	SHEET NO.	
	TEXAS	WACO	HILL	3	



EXISTING SH 31 TYPICAL SECTION  
 CSJ 0162-02-046: FROM STA. 1122+95.00 TO STA. 1225+00.00  
 CSJ 0162-13-002: FROM STA. 1225+00.00 TO STA. 1578+00.00  
 CSJ 0162-02-047: FROM STA. 1578+00.00 TO STA. 1649+00.00



PROPOSED SH 31 TYPICAL SECTION  
 CSJ 0162-02-046: FROM STA. 1122+95.00 TO STA. 1225+00.00  
 CSJ 0162-13-002: FROM STA. 1225+00.00 TO STA. 1578+00.00  
 CSJ 0162-02-047: FROM STA. 1578+00.00 TO STA. 1649+00.00



STATE OF TEXAS  
 BRIAN W. LAMB  
 103617  
 LICENSED PROFESSIONAL ENGINEER

*B. W. Lamb*  
 SIGNATURE OF REGISTRANT & DATE 7/1/2024

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 Texas Department of Transportation

**TYPICAL SECTIONS**

SHEET: 1 OF 1

NO SCALE

CHANGE ORDER	FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
	6	0162	13	002	SH 31
	STATE	DIST	COUNTY	SHEET NO.	
	TEXAS	WACO	HILL	4	

11:35:06 AM  
 7/1/2024

Table 6: Basis of Estimate for Asphalt Pavements				
Item	Description	Rate	Basis	Quantities
346	<b>STONE-MATRIX ASPHALT (SMA)</b>			
	STONE-MTRX-ASPH SMA-C SAC-B PG76-22	110 LB / SY/IN	203,956 SY	28,040 TON
3006	UNDERSEAL COURSE	0.2 GAL/SY/LIFT OF HMAC	203,956 SY	40,792 GAL

**GENERAL**

**PRE-BID QUESTIONS**

Contractor questions on this project are to be emailed to the Waco District at the following address:

Bill Compton - [Wacoprebid@txdot.gov](mailto:Wacoprebid@txdot.gov), 254-867-2770, 100 S. Loop Dr., Waco, TX  
 Carmen Chau - [Wacoprebid@txdot.gov](mailto:Wacoprebid@txdot.gov), 254-867-2794, 100 S. Loop Dr., Waco, TX

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

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

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

Questions may also be submitted via email, phone, and in person by the following individuals.

Area Engineer's: [Josh Volies, P.E. \(254\)582-5432](tel:2545825432)  
 Assistant Area Engineer's: [Anel Rivera Rosado, P.E. \(254\)582-5432](tel:2545825432)

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

The construction, operation and maintenance of the proposed project will be consistent with the state implementation plan as prepared by the Texas Commission on Environmental Quality.

The disturbed area for this project, as shown on the plans is 0 acres. However, the Total Disturbed Area (TDA) will establish the required authorization for storm water discharges. The TDA of this project will be determined by the sum of the disturbed area in all project locations in the contract, and all disturbed area on all Project-Specific Locations (PSL) located in the project limits and/or within 1 mile of the project limits. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans, according to the TDA of the project. The Contractor will obtain any required authorization from the TCEQ for the discharge of storm water from any PSL for construction support activities on or off of the project row according to the TDA of the project. When the TDA for the project exceeds 1 acre, provide a copy of the appropriate application of permit (NOI, or Construction Site Notice) to the Engineer, for any PSL located in the project limits or within 1 mile of the project limits. Follow the directives and adhere to all requirements set forth in the TCEQ, Texas Pollution Discharge Elimination System, Construction General Permit (TPDES, CGP).

**GENERAL NOTES**

**ITEM 5: CONTROL OF THE WORK**

Provide the Engineer with a weekly work schedule of planned activities including anticipated quantities of materials to be placed daily (CY of each concrete placement, tons of HMAC to be placed daily, etc.). Schedules will be provided for the following week as part of each week's project meetings or by 5PM on Thursday as approved by the Engineer. Failure to provide notifications are required here may be deemed as insufficient notice per item 5.10.

Provide the Engineer Daily by 3PM the planned activities for the following day including location, quantities of materials to be placed, etc. in a format acceptable to the Engineer.

Submit all fabrication and shop drawings per TxDOT's online shop drawing submittal system and copy the Area Engineer on the email submittal, unless otherwise directed.

Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way on this project. For signal, illumination, surveillance, and communications & control maintained by TxDOT, call the TxDOT Traffic Signal Office (254)867-2808 for locates a minimum of 48 hours in advance of excavation. For irrigation systems, call TxDOT Landscape Office (254)867-2726 for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of

excavation. The Contractor is liable for all damages when utilities are damaged due to Contractor's negligence including, but not limited to, repair or replacement at the Contractor's expense.

#### **ITEM 6: CONTROL OF MATERIALS**

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

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

The Buy America Material Classification Sheet is located at the below link.  
<https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html> for clarification on material categorization.

References to manufacturer's trade name or catalog numbers are for the purpose of identification only and the Contractor will be permitted to furnish like materials of other manufacturers provided they are of equal quality and comply with specifications for this project.

#### **ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES**

No significant traffic generator events identified.

#### **ITEM 8: PROSECUTION AND PROGRESS**

This Project will be a Standard Workweek in accordance with Article 8.3.1.4.

Nighttime work is allowed in accordance with Article 8.3.3.

Meet bi-weekly or at intervals as agreed upon with the Engineer to notify him or her of planned work for the upcoming 3-week period.

For this project, provide a Bar Chart progress schedule.

#### **ITEM 346: STONE-MATRIX ASPHALT**

Use aggregate that meets the Surface Aggregate Classification (SAC) requirement of Class B.

No Recycled Asphalt Shingles (RAS) will be allowed.

#### **ITEM 351: FLEXIBLE PAVEMENT STRUCTURE REPAIR**

For this project, a laydown machine will be required during the construction & placement of this item.

Locations and Quantities will vary as directed.

#### **ITEM 354: PLANING AND TEXTURING PAVEMENT**

Saw existing asphalt along neat lines where portions are to be left in place temporarily or permanently. Sawing is not paid for directly but is subsidiary to this item.

#### **ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING**

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

Access will be provided to all business and residences at all times. Where turning radii are limited during phased construction at intersections, provide all weather surfaces such as RAP or base in turning movements to accommodate and to protect the traffic from edge drop-offs. Materials, labor, maintenance and removal for these temporary accesses and radii will not be paid for directly but will be considered subsidiary to the various bid items.

A meeting between the Contractor and Engineer to discuss upcoming changes in construction phasing and traffic switches is required at least fourteen (14) days prior to the phase change. Items to be discussed at this meeting include temporary signing, traffic control, pavement markings, the processes necessary for the phase change and subcontractor scheduling.

Place barricades and signs in locations that do not obstruct the sight distance of drivers entering the highway from driveways or side streets.

The Contractor Responsible Person(s) (CRP) for Work Zone Traffic Controls will inspect and ensure any deficiencies are corrected each and every day throughout the duration of this contract. Any misaligned or damaged traffic control devices will be repaired as soon as practical after deficiency is discovered.

In addition to providing a Contractor's Responsible Person and a phone number for emergency contact, have an employee(s) available to respond on the project for emergencies and for taking corrective measures within One (1) Hour.

Lane Closures will be limited to one (1) lane per direction at any time.

**ITEM 503: PORTABLE CHANGEABLE MESSAGE SIGN**

This project will require "full matrix" type portable changeable message signs. Ensure that the Contractor's Responsible Person for traffic control can revise messages within thirty (30) minutes of notification.

Furnish 4 portable changeable message signs. The portable changeable message sign(s) will be used for all lane closures and freeway closures as shown on the traffic control plan standard sheets.

Supply portable changeable message sign(s) in accordance with the Traffic Control Plan standard sheets and Article 6f.55 of the Texas Manual on Uniform Traffic Control Devices for Streets and Highways Part VI.

**ITEM 505: TRUCK MOUNTED ATTENUATORS**

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 total number of truck mounted attenuators (TMA) required when utilizing the traffic control standards are shown in the tables below.

TCP 1 Series	Scenario	Required TMA
(1-5)-18		1

TCP 2 Series	Scenario	Required TMA
(2-6)-18	All	1

TCP 3 Series	Scenario			Required TMA
(3-2)-13	All			3
(3-3)-14	A	B	D	2
	C			3

Shadow vehicles equipped for truck mounted attenuators (TMA) for stationary operations will be paid for by the day and must be available for use at any time as determined by the Engineer.

Mobile operations will be paid for by the hour, per specifications. For mobile operations, payment will be made only while the TMA is in use.

For mobile operations requiring multiple TMA's, judgement may be applied in lower speed, urban / in town traffic environments to reduce the numbers of TMA in use where the added TMA may pose a hazard for traffic entering and exiting driveways, side streets, etc.

The Contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA needed for the project for those times per plan requirements. Additional TMAs used that are not specified in the plans in which the Contractor expects compensation will require prior approval from the Engineer.

**ITEM 506: TEMPORARY EROSION, SEDIMENTATION AND ENVIRONMENTAL CONTROLS**

The Storm Water Pollution Prevention Plan (SWP3) consists of temporary erosion control measures needed and provided for under this Item. The disturbed area is less than one acre and use of erosion control measures is not anticipated. If physical conditions encountered at the job site require necessary controls, BMP installation, maintenance, and removal will be paid as extra work on a force account basis per Articles 4.4 and 9.7

**ITEM 585: RIDE QUALITY FOR PAVEMENT SURFACES**

Use Surface Test Type B pay Table 1 adjustment schedule 2 on the travel lanes.

**ITEM 662: WORK ZONE PAVEMENT MARKINGS**

Lane lines for transitions and detours will consist of raised pavement markers as shown for solid lines on the Barricade and Construction Standards Work Zone Pavement Marking Details.

**ITEM 666: RETROREFLECTORIZED PAVEMENT MARKINGS**

The Contractor will layout the proposed striping in accordance with TxDOT Traffic Control Plan Standards and latest version Texas Manual on Uniform Traffic Control Devices (TMUTCD), TxDOT Pavement Markings Standards, and project striping layout sheets. The Engineer will verify proposed striping layout prior to the beginning of striping operations.

COUNTY: HILL

SHEET

COUNTY: HILL

SHEET 5C

HIGHWAY: SH 31

CSJ: 0612-13-002, ETC.

HIGHWAY: SH 31

CSJ: 0612-13-002, ETC.

**ITEM 668: PREFABRICATED PAVEMENT MARKINGS**

Use Type C prefabricated pavement markings.

**ITEM 672: RAISED PAVEMENT MARKERS**

Existing raised pavement markers to be replaced will be removed at the same time that the new markers are placed (i.e., remove and replace in one operation). Existing raised pavement markers replaced by new markers will be removed in accordance with Item 677, "Eliminating Existing Pavement Markings and Markers". Immediately fill the damaged area in the pavement due to the removal of existing markers with an approved bituminous material. This removal and backfill work will not be paid for directly, but will be subsidiary to Item 672, "Raised Pavement Markers".

**ITEM 677: ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS**

Water blasting method will be used on all final pavement surfaces for removal of temporary or permanent pavement markings.

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# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0162-13-002

DISTRICT Waco  
HIGHWAY SH 31

COUNTY Hill


CONTROL SECTION JOB				0162-02-046		0162-02-047		0162-13-002		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00211361		A00211362		A00210531			
COUNTY				Hill		Hill		Hill			
HIGHWAY				SH 31		SH 31		SH 31			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	346-7004	STONE-MTRX-ASPH SMA-C SAC-B PG76-22	TON	6,486.000		4,514.000		21,497.000		32,497.000	
	351-7007	FLEXIBLE PAVEMENT STRUCTURE REPAIR(8")	SY	1,184.000		824.000		3,934.000		5,942.000	
	354-7039	PLANE ASPH CONC PAV(2" TO 4")	SY	58,962.000		41,022.000		195,459.000		295,443.000	
	500-7001	MOBILIZATION	LS	0.200		0.100		0.700		1.000	
	502-7001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO					4.000		4.000	
	503-7002	PORTABLE CHANGEABLE MESSAGE SIGN	EA					4.000		4.000	
	505-7001	TMA (STATIONARY)	DAY	18.000		12.000		58.000		88.000	
	505-7002	TMA (MOBILE OPERATION)	HR	34.000		20.000		98.000		152.000	
	662-7112	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	15,839.000		10,887.000		54,361.000		81,087.000	
	662-7113	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	1,041.000		722.000		3,542.000		5,305.000	
	666-7018	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	LF	2,210.000		780.000		696.000		3,686.000	
	666-7024	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	3,120.000		1,578.000		12,821.000		17,519.000	
	666-7036	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF					600.000		600.000	
	666-7290	TY I HIGH PERF PM (W)6"(BRK)(100MIL)	LF	5,102.000		3,550.000		17,650.000		26,302.000	
	666-7293	TY I HIGH PERF PM (W)6"(SLD)(100MIL)	LF	20,110.000		14,200.000		70,525.000		104,835.000	
	666-7305	TY I HIGH PERF PM (Y)6"(SLD)(100MIL)	LF	20,830.000		14,440.000		70,840.000		106,110.000	
	666-7347	PAVEMENT SLER 6"	LF					6,802.000		6,802.000	
	668-7111	PREFAB PM TY C (W)(36")(YLD TRI)	EA	112.000		64.000		64.000		240.000	
	672-7004	REFL PAV MRKR TY II-A-A	EA	21.000		12.000		12.000		45.000	
	672-7006	REFL PAV MRKR TY II-C-R	EA	412.000		257.000		1,554.000		2,223.000	
	677-7001	ELIM EXT PM & MRKS (4")	LF					6,574.000		6,574.000	
	677-7004	ELIM EXT PM & MRKS (8")	LF					228.000		228.000	
	678-7035	PAV SURF PREP FOR MRK (BLAST CLN)(6")	LF					6,802.000		6,802.000	
	3006-7001	UNDERSEAL COURSE	GAL	14,746.000		10,260.000		48,885.000		73,891.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS					1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS					1.000		1.000	

1:09:50 PM

7/1/2024

EB ROADWAY SUMMARY		346 7004	351 7007	354 7039	3006 7001
FROM STATION	TO STATION	STONE-MTRX- ASPH SMA-C SAC-B PG76-22	FLEXIBLE PAVEMENT STRUCTURE REPAIR (8")	PLANE ASPH CONC PAV (2" TO 4")	UNDERSEAL COURSE
		TON	SY	DAY	MI
1122+95.00	1146+00.00	732	134	6,659	1,665
1146+00.00	1170+00.00	763	139	6,933	1,734
1170+00.00	1194+00.00	763	139	6,933	1,734
1194+00.00	1218+00.00	763	139	6,933	1,734
1218+00.00	1225+00.00	222	41	2,022	506
CSJ 0162-02-046:		3,243	592	29,481	7,373
1225+00.00	1242+00.00	540	99	4,911	1,228
1242+00.00	1266+00.00	763	139	6,933	1,734
1266+00.00	1278+00.00	317	58	2,886	722
1278+00.00	1290+00.00	381	70	3,467	867
1290+00.00	1314+00.00	763	139	6,933	1,734
1314+00.00	1326+00.00	381	70	3,467	867
1326+00.00	1338+00.00	381	70	3,467	867
1338+00.00	1350+00.00	381	70	3,467	867
1350+00.00	1362+00.00	283	52	2,568	643
1362+00.00	1386+00.00	763	139	6,933	1,734
1386+00.00	1410+00.00	763	139	6,933	1,734
1410+00.00	1434+00.00	701	128	6,370	1,593
1434+00.00	1446+00.00	381	70	3,467	867
1446+00.00	1458+00.00	287	53	2,612	653
1458+00.00	1470+00.00	381	70	3,467	867
1470+00.00	1482+00.00	381	70	3,467	867
1482+00.00	1506+00.00	677	124	6,153	1,539
1506+00.00	1518+00.00	381	70	3,467	867
1518+00.00	1530+00.00	321	59	2,918	730
1530+00.00	1542+00.00	381	70	3,467	867
1542+00.00	1556+00.00	445	81	4,044	1,012
1556+00.00	1578+00.00	699	128	6,356	1,589
CSJ 162-13-002:		10,751	1,968	97,751	24,448
1578+00.00	1590+00.00	381	70	3,467	867
1590+00.00	1614+00.00	763	139	6,933	1,734
1614+00.00	1638+00.00	763	139	6,933	1,734
1638+00.00	1649+00.00	350	64	3,178	795
CSJ 162-02-047:		2,257	412	20,511	5,130
EBML SUB-TOTAL:		16,251	2,972	147,744	36,951

EB TCP SUMMARY		0662 7112	0662 7113	0503 7001	0505 7001	0505 7002
FROM STATION	TO STATION	WK ZN PAV MRK SHT TERM (TAB) TY W	WK ZN PAV MRK SHT TERM (TAB) TY Y	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
		EA	EA	DAY	DAY	HR
1122+95.00	1146+00.00	1,813	121		2	4
1146+00.00	1170+00.00	1,847	120		2	4
1170+00.00	1194+00.00	1,847	123		2	4
1194+00.00	1218+00.00	1,803	120		2	4
1218+00.00	1225+00.00	551	35		1	1
CSJ 0162-02-046:		7,861	519		9	17
1225+00.00	1242+00.00	1,293	88		1	4
1242+00.00	1266+00.00	1,862	120		2	4
1266+00.00	1278+00.00	900	60		1	1
1278+00.00	1290+00.00	905	60		1	1
1290+00.00	1314+00.00	1,878	120		2	4
1314+00.00	1326+00.00	900	60		1	1
1326+00.00	1338+00.00	938	60		1	1
1338+00.00	1350+00.00	966	60		1	1
1350+00.00	1362+00.00	900	60		1	1
1362+00.00	1386+00.00	1,900	120		2	4
1386+00.00	1410+00.00	1,800	120		2	4
1410+00.00	1434+00.00	1,800	120		2	4
1434+00.00	1446+00.00	944	60		1	1
1446+00.00	1458+00.00	900	60		1	1
1458+00.00	1470+00.00	940	60		1	1
1470+00.00	1482+00.00	939	60		1	1
1482+00.00	1506+00.00	1,800	120		2	4
1506+00.00	1518+00.00	952	60		1	1
1518+00.00	1530+00.00	900	60		1	1
1530+00.00	1542+00.00	984	60		1	1
1542+00.00	1556+00.00	1,050	70		1	4
1556+00.00	1578+00.00	1,697	113		2	4
CSJ 162-13-002:		27,148	1,771	2	29	49
1578+00.00	1590+00.00	904	60		1	1
1590+00.00	1614+00.00	1,844	123		2	4
1614+00.00	1638+00.00	1,800	120		2	4
1638+00.00	1649+00.00	855	58		1	1
CSJ 162-02-047:		5,403	361		6	10
EBML SUB-TOTAL:		40,412	2,651	2	44	76



## CONSOLIDATED SUMMARIES


SHEET: 1 OF 4

CHANGE ORDER	FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
	6	0162	13	002, ETC.	SH 31
	STATE	DIST	COUNTY		SHEET NO.
	TEXAS	WACO	HILL		7

1:10:12 PM

7/1/2024

EB PAV MRKR SUMMARY		666 7018	666 7024	666 7290	666 7293	666 7305	666 7347	668 7111	672 7004	672 7006	677 7001	677 7004	678 7035
FROM STATION	TO STATION	REFL PAV MRK TY I (W) 8" (DOT) (100MIL)	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	TY I HIGH PERF PM (W) 6" (BRK) (100MIL)	TY I HIGH PERF PM (W) 6" (SLD) (100MIL)	TY I HIGH PERF PM (Y) 6" (SLD) (100MIL)	PAVEMENT SLER 6"	PREFAB PM TY C (W) (36") (YLD TRI)	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY II-C-R	ELIM EXT PM & MRKS (4")	ELIM EXT PM & MRKS (8")	PAV SURF PREP FOR MRK (BLAST CLN) (6")
		LF	LF	LF	LF	LF	LF	EA	EA	EA	LF	LF	EA
1122+95.00	1146+00.00	251	600	576	2,230	2,425		32	6	59			
1146+00.00	1170+00.00	171	300	600	2,400	2,400				45			
1170+00.00	1194+00.00	171	300	600	2,325	2,460		16	3	45			
1194+00.00	1218+00.00	30		600	2,400	2,400				30			
1218+00.00	1225+00.00	144	120	175	700	700				15			
CSJ 0162-02-046:		767	1,320	2,551	10,055	10,385		48	9	194			
1225+00.00	1242+00.00		180	425	1,700	1,760		16	3	30			
1242+00.00	1266+00.00		620	600	2,400	2,400				61			
1266+00.00	1278+00.00			300	1,200	1,200	120			15	120		120
1278+00.00	1290+00.00		45	300	1,200	1,200	318			17	318		318
1290+00.00	1314+00.00		780	600	2,400	2,400				69			
1314+00.00	1326+00.00			300	1,200	1,200				15			
1326+00.00	1338+00.00		382	300	1,200	1,200				34			
1338+00.00	1350+00.00		664	300	1,200	1,200				48			
1350+00.00	1362+00.00			300	1,200	1,200	710			15	710		710
1362+00.00	1386+00.00		1,004	600	2,400	2,400				80			
1386+00.00	1410+00.00			600	2,400	2,400				30			
1410+00.00	1434+00.00			600	2,400	2,400	460			30	460		460
1434+00.00	1446+00.00		438	300	1,200	1,200				37			
1446+00.00	1458+00.00			300	1,200	1,200	670			15	670		670
1458+00.00	1470+00.00		404	300	1,200	1,200				35			
1470+00.00	1482+00.00		386	300	1,200	1,200				34			
1482+00.00	1506+00.00			600	2,400	2,400	610			30	610		610
1506+00.00	1518+00.00		516	300	1,200	1,200				41			
1518+00.00	1530+00.00			300	1,200	1,200	450			15	450		450
1530+00.00	1542+00.00		840	300	1,200	1,200				57			
1542+00.00	1556+00.00			350	1,400	1,400				18			
1556+00.00	1578+00.00	171	300	550	2,200	2,260		16	3	43			
CSJ 162-13-002:		171	6,559	8,825	35,300	35,420	3,338	32	6	769	3,338		3,338
1578+00.00	1590+00.00	36		300	1,200	1,200				15			
1590+00.00	1614+00.00	138	300	600	2,400	2,460		16	3	45			
1614+00.00	1638+00.00			600	2,400	2,400				30			
1638+00.00	1649+00.00	39	260	275	1,100	1,160		16	3	27			
CSJ 162-02-047:		213	560	1,775	7,100	7,220		32	6	117			
EBML SUB-TOTAL:		1,151	8,439	13,151	52,455	53,025	3,338	112	21	1,080	3,338		3,338



**CONSOLIDATED SUMMARIES**

SHEET: 2 OF 4


CHANGE ORDER	FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
	6	0162	13	002, ETC.	SH 31
	STATE	DIST	COUNTY		SHEET NO.
	TEXAS	WACO	HILL		8

1:10:31 PM

7/1/2024

WB ROADWAY SUMMARY		346 7004	351 7007	354 7039	3006 7001
FROM STATION	TO STATION	STONE-MTRX- ASPH SMA-C SAC-B PG76-22	FLEXIBLE PAVEMENT STRUCTURE REPAIR (8")	PLANE ASPH CONC PAV (2" TO 4")	UNDERSEAL COURSE
		TON	SY	DAY	MI
1122+95.00	1146+00.00	732	134	6,659	1,665
1146+00.00	1170+00.00	763	139	6,933	1,734
1170+00.00	1194+00.00	763	139	6,933	1,734
1194+00.00	1218+00.00	763	139	6,933	1,734
1218+00.00	1225+00.00	222	41	2,022	506
CSJ 0162-02-046:		3,243	592	29,481	7,373
1225+00.00	1242+00.00	540	99	4,911	1,228
1242+00.00	1266+00.00	763	139	6,933	1,734
1266+00.00	1278+00.00	318	58	2,892	723
1278+00.00	1290+00.00	381	70	3,467	867
1290+00.00	1314+00.00	763	139	6,933	1,734
1314+00.00	1326+00.00	381	70	3,467	867
1326+00.00	1338+00.00	381	70	3,467	867
1338+00.00	1350+00.00	381	70	3,467	867
1350+00.00	1362+00.00	280	51	2,545	637
1362+00.00	1386+00.00	763	139	6,933	1,734
1386+00.00	1410+00.00	763	139	6,933	1,734
1410+00.00	1434+00.00	701	128	6,370	1,593
1434+00.00	1446+00.00	381	70	3,467	867
1446+00.00	1458+00.00	284	52	2,586	647
1458+00.00	1470+00.00	381	70	3,467	867
1470+00.00	1482+00.00	381	70	3,467	867
1482+00.00	1506+00.00	677	124	6,153	1,539
1506+00.00	1518+00.00	381	70	3,467	867
1518+00.00	1530+00.00	321	59	2,918	730
1530+00.00	1542+00.00	381	70	3,467	867
1542+00.00	1556+00.00	445	81	4,044	1,012
1556+00.00	1578+00.00	699	128	6,356	1,589
CSJ 0162-13-002:		10,746	1,966	97,708	24,437
1578+00.00	1590+00.00	381	70	3,467	867
1590+00.00	1614+00.00	763	139	6,933	1,734
1614+00.00	1638+00.00	763	139	6,933	1,734
1638+00.00	1649+00.00	350	64	3,178	795
CSJ 0162-02-047:		2,257	412	20,511	5,130
WBML SUB-TOTAL:		16,246	2,970	147,700	36,940
EBML SUB-TOTAL:		16,251	2,972	147,744	36,951
PROJECT TOTAL:		32,497	5,942	295,444	73,891

WB TCP SUMMARY		0662 7112	0662 7113	0503 7001	0505 7001	0505 7002
FROM STATION	TO STATION	WK ZN PAV MRK SHT TERM (TAB) TY W	WK ZN PAV MRK SHT TERM (TAB) TY Y	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
		EA	EA	DAY	DAY	HR
1122+95.00	1146+00.00	1,805	121		2	4
1146+00.00	1170+00.00	1,961	123		2	4
1170+00.00	1194+00.00	1,847	123		2	4
1194+00.00	1218+00.00	1,800	120		2	4
1218+00.00	1225+00.00	565	35		1	1
CSJ 0162-02-046:		7,978	522		9	17
1225+00.00	1242+00.00	1,330	88		1	4
1242+00.00	1266+00.00	1,896	120		2	4
1266+00.00	1278+00.00	932	60		1	1
1278+00.00	1290+00.00	935	60		1	1
1290+00.00	1314+00.00	1,800	120		2	4
1314+00.00	1326+00.00	900	60		1	1
1326+00.00	1338+00.00	952	60		1	1
1338+00.00	1350+00.00	975	60		1	1
1350+00.00	1362+00.00	900	60		1	1
1362+00.00	1386+00.00	1,884	120		2	4
1386+00.00	1410+00.00	1,800	120		2	4
1410+00.00	1434+00.00	1,800	120		2	4
1434+00.00	1446+00.00	996	60		1	1
1446+00.00	1458+00.00	900	60		1	1
1458+00.00	1470+00.00	948	60		1	1
1470+00.00	1482+00.00	900	60		1	1
1482+00.00	1506+00.00	1,800	120		2	4
1506+00.00	1518+00.00	900	60		1	1
1518+00.00	1530+00.00	905	60		1	1
1530+00.00	1542+00.00	994	60		1	1
1542+00.00	1556+00.00	1,098	70		1	4
1556+00.00	1578+00.00	1,668	113		2	4
CSJ 0162-13-002:		27,213	1,771	2	29	49
1578+00.00	1590+00.00	977	60		1	1
1590+00.00	1614+00.00	1,847	123		2	4
1614+00.00	1638+00.00	1,800	120		2	4
1638+00.00	1649+00.00	860	58		1	1
CSJ 0162-02-047:		5,484	361		6	10
WBML SUB-TOTAL:		40,675	2,654	2	44	76
EBML SUB-TOTAL:		40,412	2,651	2	44	76
PROJECT TOTAL:		81,087	5,305	4	88	152



**CONSOLIDATED SUMMARIES**


SHEET: 3 OF 4

CHANGE ORDER	FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
	6	0162	13	002, ETC.	SH 31
	STATE	DIST	COUNTY		SHEET NO.
	TEXAS	WACO	HILL		9

1:10:50 PM

7/1/2024

WB PAV MRKR SUMMARY		666 7018	666 7024	666 7036	666 7290	666 7293	666 7305	666 7347	668 7111	672 7004	672 7006	677 7001	677 7004	678 7035
FROM STATION	TO STATION	REFL PAV MRK TY I (W) 8" (DOT) (100MIL)	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	TY I HIGH PERF PM (W) 6" (BRK) (100MIL)	TY I HIGH PERF PM (W) 6" (SLD) (100MIL)	TY I HIGH PERF PM (Y) 6" (SLD) (100MIL)	PAVEMENT SLER 6"	PREFAB PM TY C (W) (36") (YLD TRI)	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY II-C-R	ELIM EXT PM & MRKS (4")	ELIM EXT PM & MRKS (8")	PAV SURF PREP FOR MRK (BLAST CLN) (6")
		LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	LF	LF	EA
1122+95.00	1146+00.00	171	600		576	2,305	2,425		32	6	59			
1146+00.00	1170+00.00	1,005	600		600	2,325	2,460		16	3	60			
1170+00.00	1194+00.00	171	300		600	2,400	2,460		16	3	45			
1194+00.00	1218+00.00				600	2,325	2,400				30			
1218+00.00	1225+00.00	96	300		175	700	700				24			
CSJ 0162-02-046:		1,443	1,800		2,551	10,055	10,445		64	12	218			
1225+00.00	1242+00.00	249	300		425	1,700	1,760		16	3	36			
1242+00.00	1266+00.00	63	600	300	600	2,400	2,400				75			
1266+00.00	1278+00.00		320		300	1,200	1,200	220			31	120	100	220
1278+00.00	1290+00.00	126	220		300	1,200	1,200	295			26	167	128	295
1290+00.00	1314+00.00				600	2,400	2,400				30			
1314+00.00	1326+00.00				300	1,200	1,200				15			
1326+00.00	1338+00.00		524		300	1,200	1,200				41			
1338+00.00	1350+00.00		754		300	1,200	1,200				53			
1350+00.00	1362+00.00				300	1,200	1,200	690			15	690		690
1362+00.00	1386+00.00		840		600	2,400	2,400				72			
1386+00.00	1410+00.00				600	2,400	2,400				30			
1410+00.00	1434+00.00				600	2,400	2,400	460			30	460		460
1434+00.00	1446+00.00		958		300	1,200	1,200				63			
1446+00.00	1458+00.00				300	1,200	1,200	688			15	688		688
1458+00.00	1470+00.00		480		300	1,200	1,200				39			
1470+00.00	1482+00.00				300	1,200	1,200				15			
1482+00.00	1506+00.00				600	2,400	2,400	610			30	610		610
1506+00.00	1518+00.00				300	1,200	1,200				15			
1518+00.00	1530+00.00	51			300	1,200	1,200	501			15	501		501
1530+00.00	1542+00.00	36	600	300	300	1,200	1,200				60			
1542+00.00	1556+00.00		484		350	1,400	1,400				42			
1556+00.00	1578+00.00		182		550	2,125	2,260		16	3	37			
CSJ 0162-13-002:		525	6,262	600	8,825	35,225	35,420	3,464	32	6	785	3,236	228	3,464
1578+00.00	1590+00.00	348	418		300	1,200	1,200				36			
1590+00.00	1614+00.00	171	300		600	2,400	2,460		16	3	45			
1614+00.00	1638+00.00				600	2,400	2,400				30			
1638+00.00	1649+00.00	48	300		275	1,100	1,160		16	3	29			
CSJ 0162-02-047:		567	1,018		1,775	7,100	7,220		32	6	140			
WBML SUB-TOTAL:		2,535	9,080	600	13,151	52,380	53,085	3,464	128	24	1,143	3,236	228	3,464
EBML SUB-TOTAL:		1,151	8,439		13,151	52,455	53,025	3,338	112	21	1,080	3,338		3,338
PROJECT TOTAL:		3,686	17,519	600	26,302	104,835	106,110	6,802	240	45	2,223	6,574	228	6,802



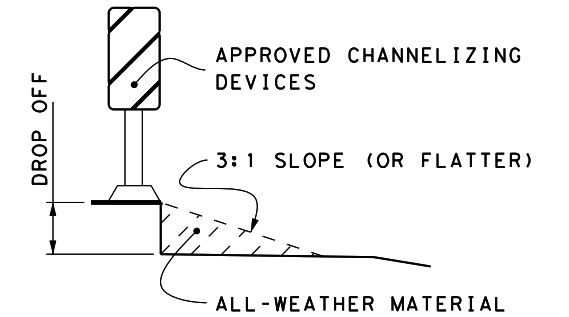
## CONSOLIDATED SUMMARIES

SHEET: 4 OF 4

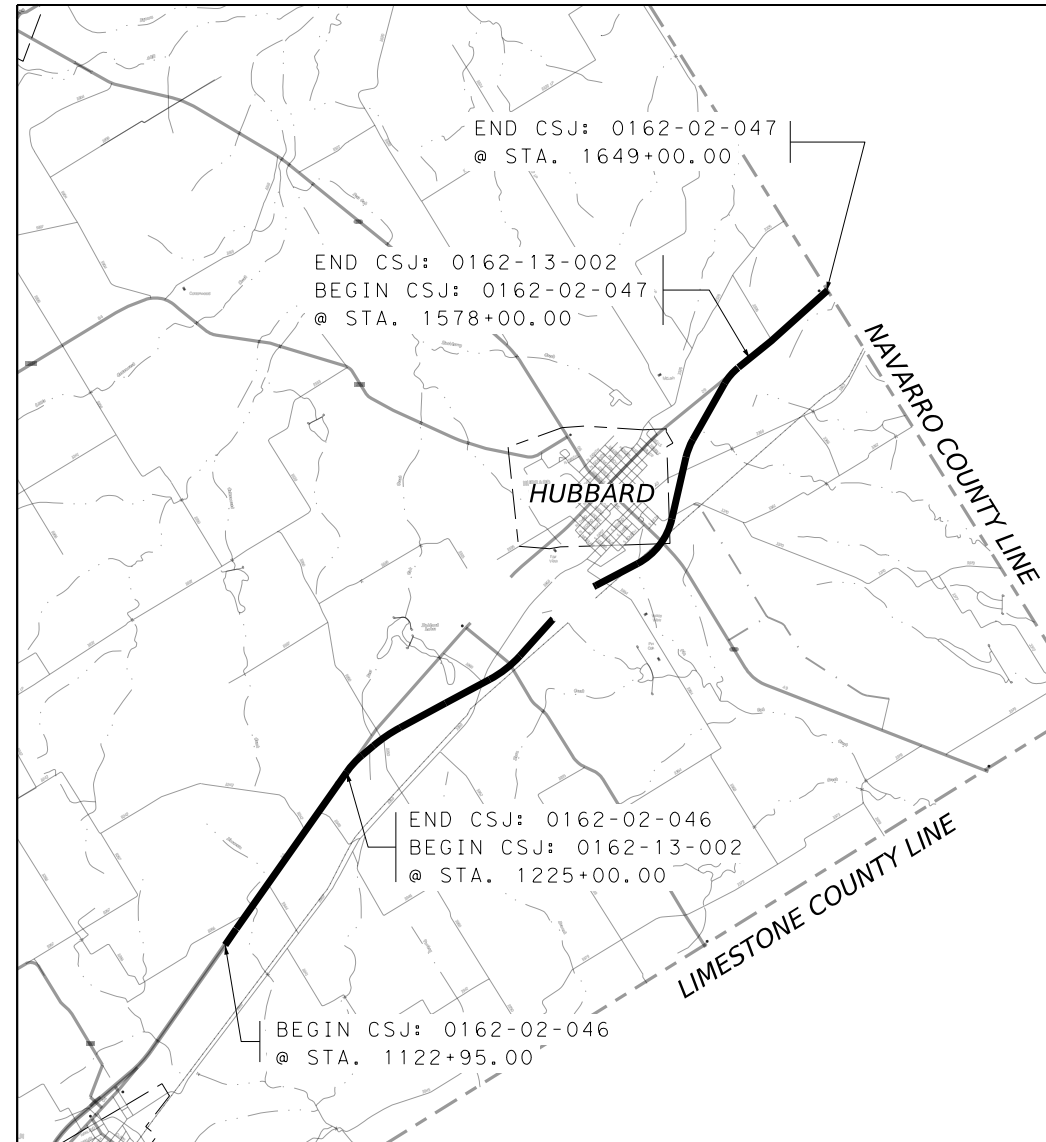
CHANGE ORDER	FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
	6	0162	13	002, ETC.	SH 31
	STATE	DIST	COUNTY		SHEET NO.
	TEXAS	WACO	HILL		10

**GENERAL**

- A. INSTALL ALL SIGNS, BARRICADES AND TRAFFIC CONTROL DEVICES AS SHOWN AND IN ACCORDANCE WITH THE STANDARD BC SHEETS AND AS DIRECTED.
- B. ADDITIONAL SIGNS, BARRICADES OR TRAFFIC CONTROL DEVICES OTHER THAN THOSE SPECIFIED MAY BE REQUIRED FOR THE SAFE MOVEMENT OF TRAFFIC THROUGH THE PROJECT. PAYMENT FOR ALL SUCH SIGNS, BARRICADES OR TRAFFIC CONTROL DEVICES WILL BE CONSIDERED SUBSIDIARY TO THE ITEM "BARRICADES, SIGNS AND TRAFFIC HANDLING".
- C. WORK SITES SHOULD BE CAREFULLY MONITORED TO ENSURE THAT TRAFFIC CONTROL MEASURES ARE OPERATING EFFECTIVELY AND THAT ALL DEVICES USED ARE CLEARLY VISIBLE, CLEAN AND IN GOOD REPAIR.
- D. THE CONTRACTOR WILL PROVIDE SAFE ACCESS TO AND FROM ALL PRIVATE PROPERTY AT ALL TIMES AND IN ALL WEATHER CONDITIONS.
- E. THE CONTRACTOR WILL BE REQUIRED TO SUBMIT A DETAILED SCHEDULE OF WORK PRIOR TO THE BEGINNING OF CONSTRUCTION WHICH GENERALLY CONFORMS TO THE SEQUENCE SHOWN ON THE TCP SEQUENCE OF OPERATION BELOW.
- F. COMPLETE ALL WORK ON PROJECT AS SHOWN ON THE VARIOUS PLAN SHEETS AND IN COMPLIANCE WITH THE GENERAL NOTES OF THIS CONTRACT.
- G. ANY REQUEST TO ALTER THE SEQUENCE OF OPERATION OR TRAFFIC CONTROL PLAN WILL BE SUBMITTED TO THE ENGINEER FOR WRITTEN APPROVAL.



**PAV EDGE DROP-OFF  
DETAIL**



**VICINITY MAP**

**1 IN = 10,000'**

**NOTES:**

- 1. ALL TRAFFIC CONTROL DEVICES WILL CONFORM WITH THE TEXAS "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" (TMUTCD), AND WILL BE MAINTAINED AS DIRECTED. ADDITIONAL GUIDELINES FOR TRAFFIC CONTROL DEVICES MAY BE FOUND IN THE TMUTCD.
- 2. FOR CHANNELING DEVICE PLACEMENT AND SPACING FOR ALL PHASES, REFER TO THE TCP STANDARDS.
- 3. SEE BC STANDARD SHEETS FOR REQUIRED PROJECT LIMITS AND CROSSROAD SIGNING

**SEQUENCE OF CONSTRUCTION**

- A. THIS PROJECT CONSISTS OF WORK AREAS AS DEFINED BY THESE CSJ'S:

**LIMITS:**

- 1. CSJ 0162-02-046: FROM HCR 366 TO SH 31C SOUTH OF HUBBARD
- 2. CSJ 0162-03-002: FROM SH 31 C SOUTH OF HUBBARD TO SH 31 C NORTH OF HUBBARD
- 3. CSJ 0162-02-047: FROM SH 31C NORTH OF HUBBARD TO NAVARRO COUNTY LINE

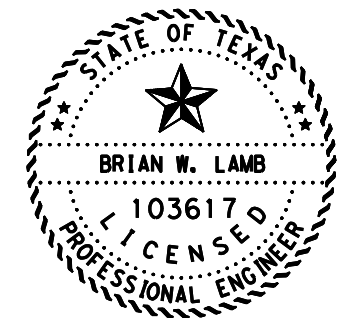
- B. SCHEDULE PROPOSED WORK IN ONLY ONE WORK AREA AT A TIME. THERE WILL BE NO WORK PERFORMED IN MORE THAN ONE WORK AREA AT A TIME. THE WORK AREA WILL BE LIMITED A SINGLE LANE UP TO 2 MILES AT A TIME.

- C. FINISH PROPOSED WORK IN EACH WORK AREA BEFORE PROCEEDING TO PERFORM WORK IN ANOTHER WORK AREA. OBTAIN APPROVAL BEFORE PROCEEDING TO BEGIN WORK IN ANOTHER WORK AREA.

- D. THE CONTRACTOR WILL BE REQUIRED TO SUBMIT A DETAILED SCHEDULE OF WORK TO THE AREA ENGINEER PRIOR TO THE BEGINNING OF CONSTRUCTION, WHICH GENERALLY CONFORMS TO THE FOLLOWING SEQUENCE:

- 1. SET PROJECT BARRICADES
- 2. PLANE ASPH PAVEMENT
- 3. PERFORM FULL-DEPTH REPAIR AS INSTRUCTED
- 4. DISTRIBUTE UNDERSEAL AND SMA OVERLAY.
- 5. INSTALL PAVEMENT MARKINGS
- 6. PERFORM FINAL CLEANUP

- 1. LESS THAN 2 INCHES: CW 8-11 SIGNS ARE REQUIRED.
- 2. GREATER THAN 2 INCHES BUT LESS THAN 24 INCHES: VERTICAL PANELS AND EITHER CW 8-9a OR CW 8-11 SIGNS ARE REQUIRED.
- 3. GREATER THAN 24 INCHES: POSITIVE BARRIER REQUIRED.
- 4. THE SAFETY SLOPE WILL BE CONSTRUCTED WITH AN ALL-WEATHER MATERIAL SUCH AS RAP, WHICH IS CLEAN AND FREE OF DEBRIS AND LARGE ROCKS.



*Brian W. Lamb* P.E.  
SIGNATURE OF REGISTRANT & DATE 7/1/2024



**SEQUENCE OF CONSTRUCTION**

SHEET: 1 OF 1

CHANGE ORDER	FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
	6	0162	13	002, ETC.	SH 31
	STATE	DIST	COUNTY	SHEET NO.	
	TEXAS	WACO	HILL	11	

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7/1/2024

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DATE: 7/1/2024 11:36:42 AM  
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**BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:**

- 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).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Traffic control devices should be in place only while work is actually in progress or a definite need exists.
- The Engineer has the final decision on the location of all traffic control devices.
- 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:**


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

**COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES**

- Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
- Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

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

SHEET 1 OF 12

 Texas Department of Transportation		Traffic Safety Division Standard
<b>BARRICADE AND CONSTRUCTION          GENERAL NOTES          AND REQUIREMENTS</b>		
<b>BC (1) - 21</b>		
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT: 0162	SECT: 13
	JOB: 032, ETC.	
4-03 7-13	HIGHWAY: SH 31	
9-07 8-14	DIST: WAC	COUNTY: HILL
5-10 5-21	SHEET NO.: 12	

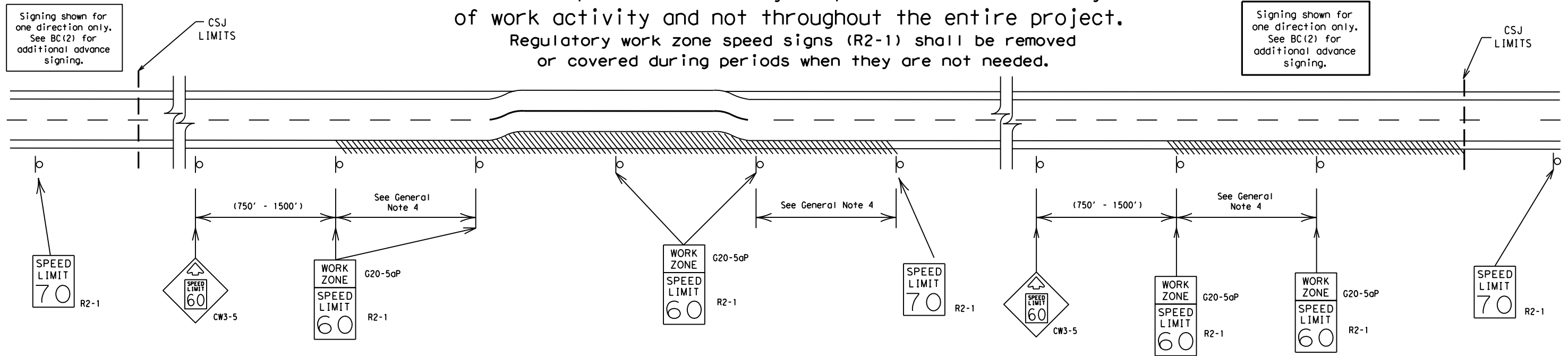




# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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:

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- 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

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 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
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- 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.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
  - Law enforcement.
  - Flagger stationed next to sign.
  - Portable changeable message sign (PCMS).
  - Low-power (drone) radar transmitter.
  - Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

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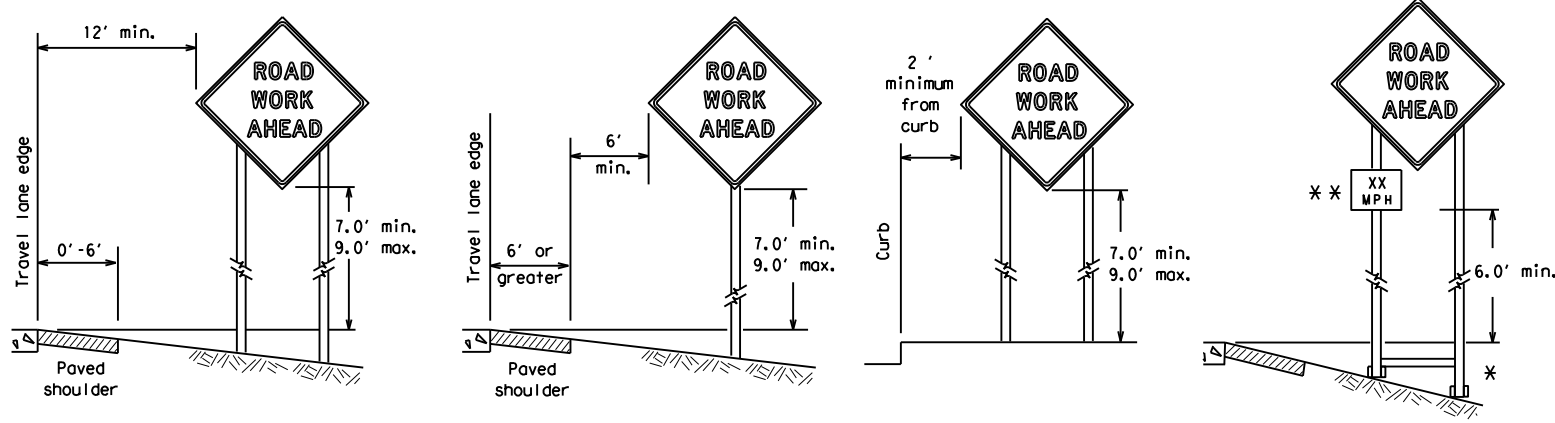
SHEET 3 OF 12

		Traffic Safety Division Standard	
<h2>BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT</h2>			
<h3>BC (3) - 21</h3>			
FILE:	bc-21.dgn	DW:	TxDOT
© TxDOT	November 2002	CONT:	0162
REVISIONS		SECT:	13
9-07	8-14	JOB:	032, ETC.
7-13	5-21	HIGHWAY:	SH 31
		DIST:	WAC
		COUNTY:	HILL
		SHEET NO.:	14

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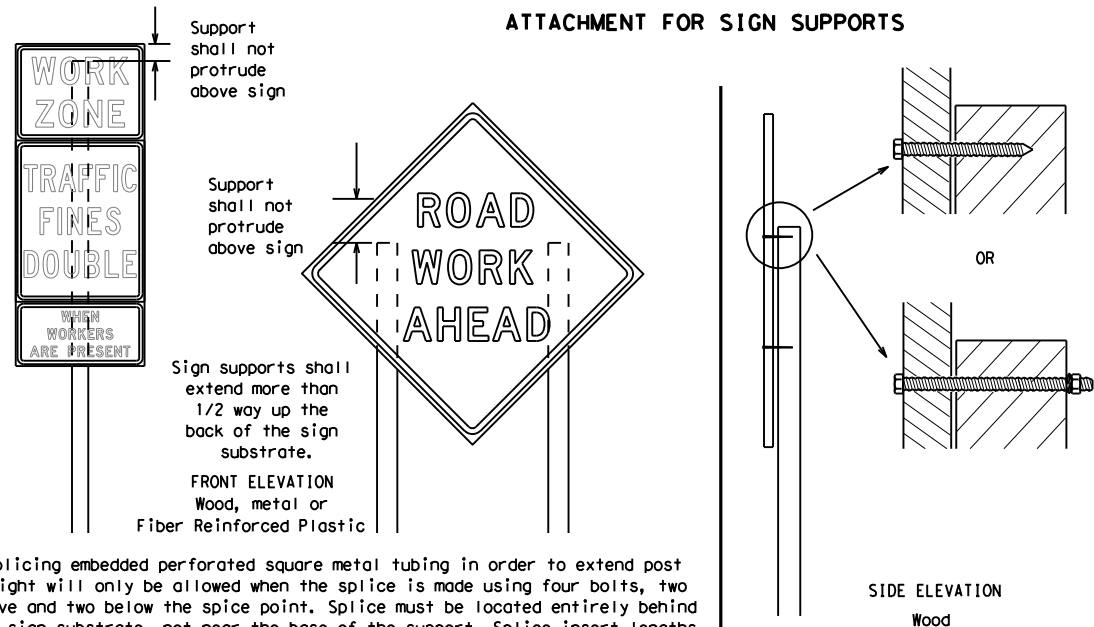
**TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS**



\* 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**



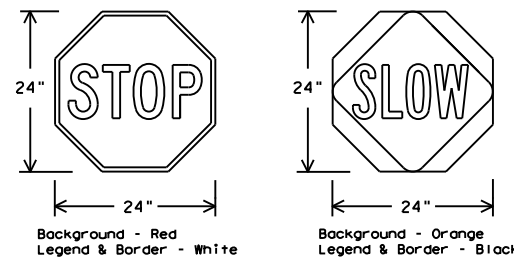
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

**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 splice 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 <sub>FL</sub> OR C <sub>FL</sub> 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 CWZTC 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" (CWZTC) 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 CWZTC 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<sub>FL</sub> or Type C<sub>FL</sub>, 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 CWZTC 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.

SHEET 4 OF 12



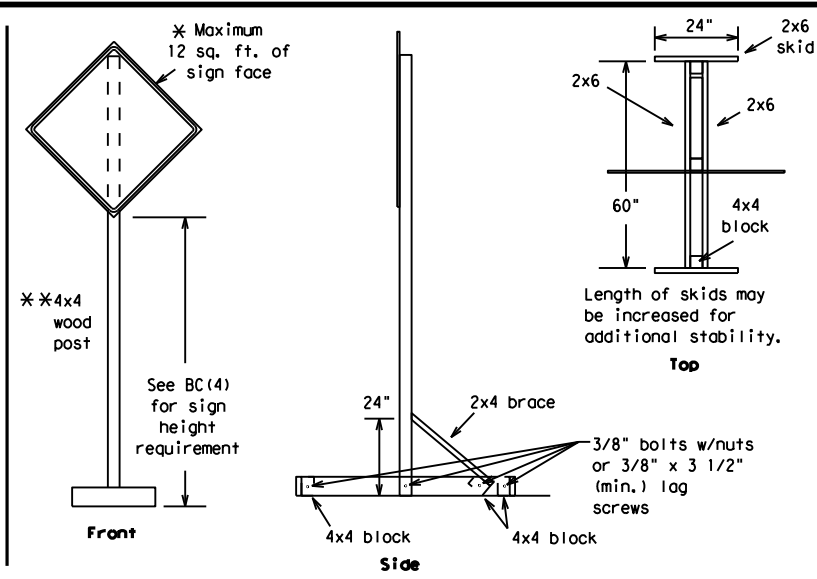
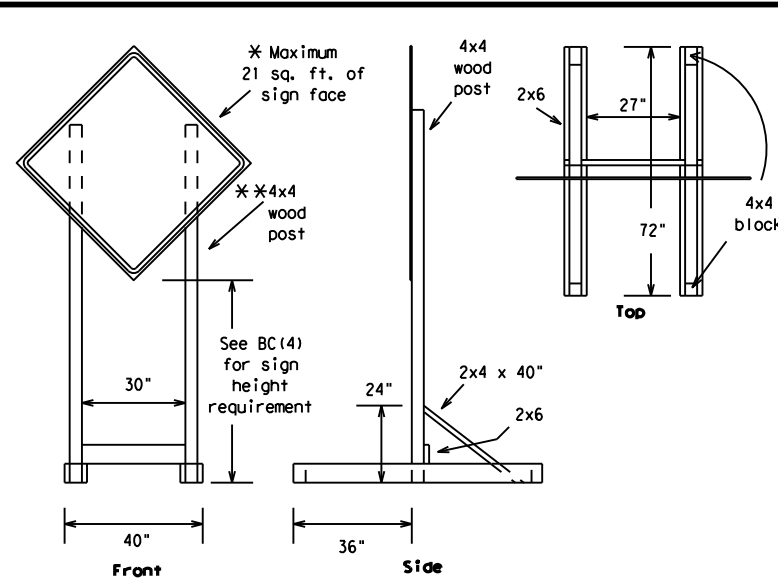
**BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES**

BC (4) -21

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9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	WAC	HILL	15	

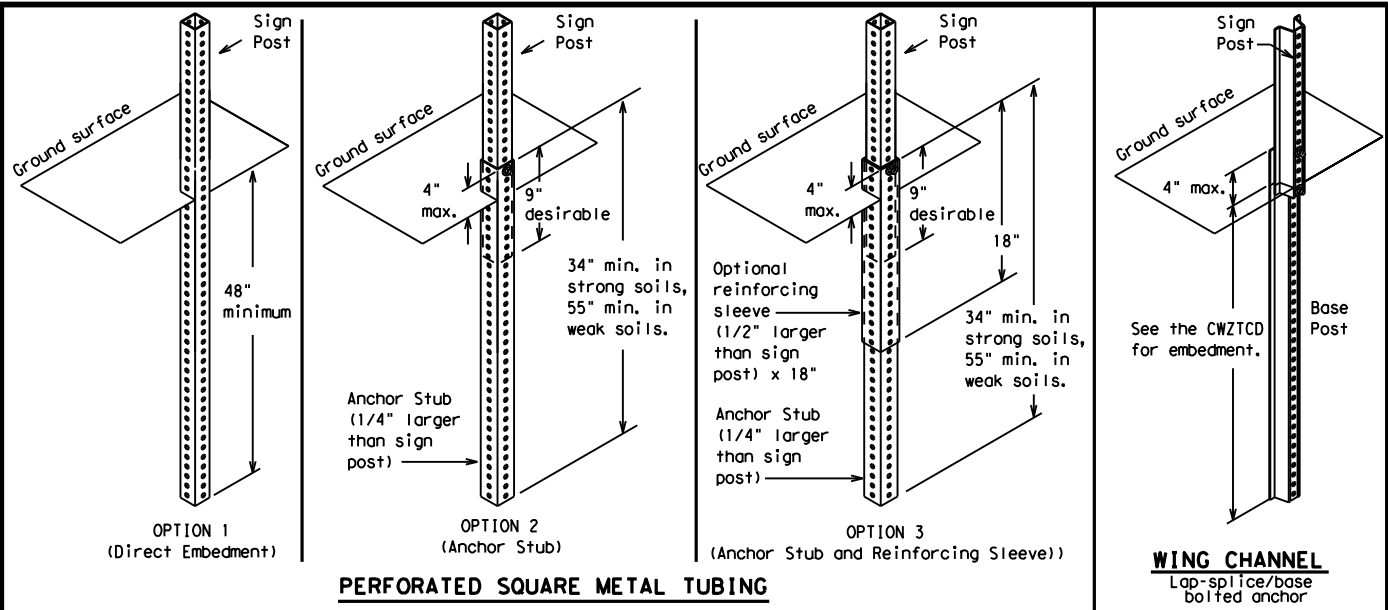
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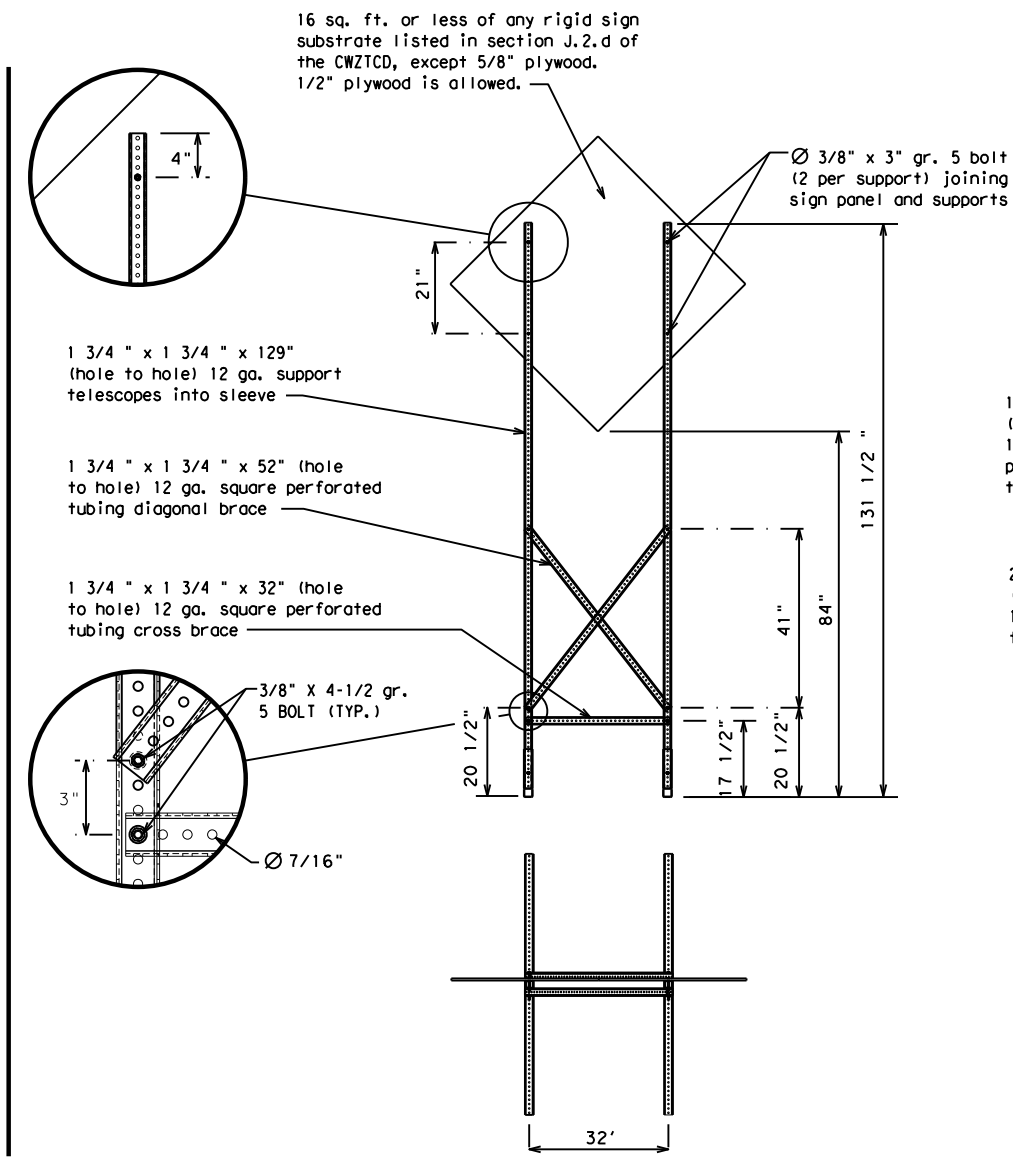
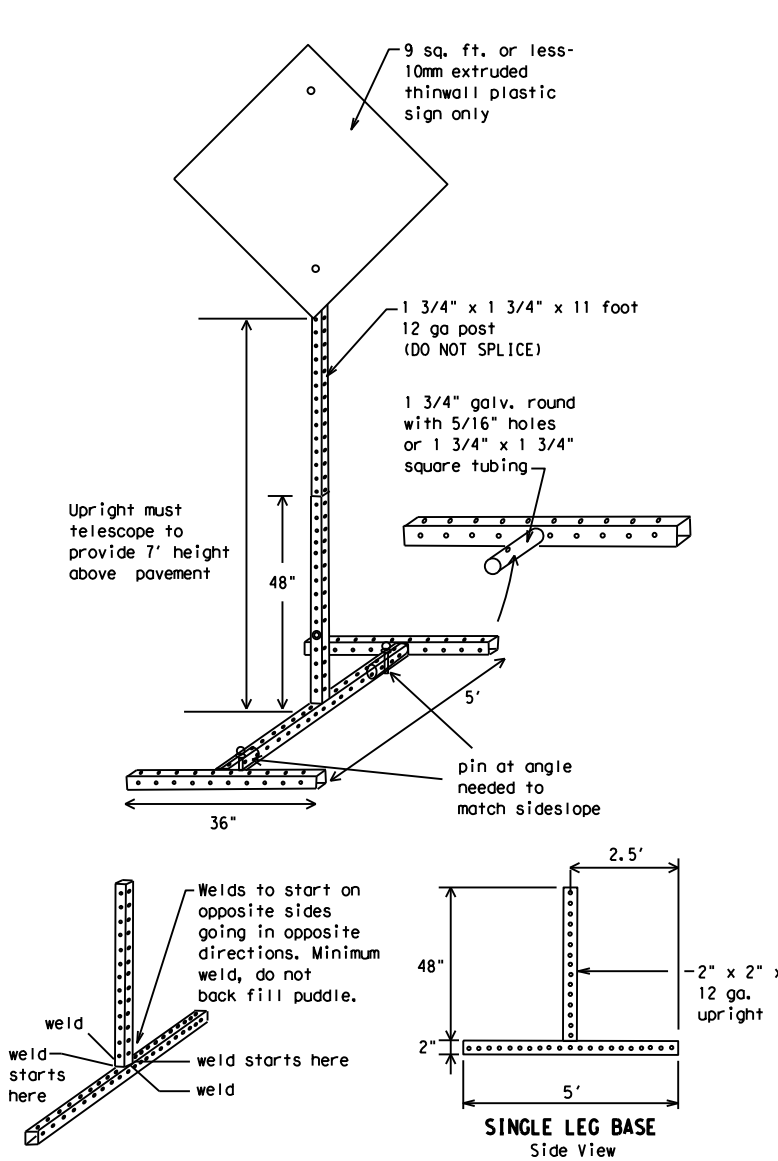
**SKID MOUNTED WOOD SIGN SUPPORTS**

\* 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**
- 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.
  - No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
  - 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.

**BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT**

**BC(5) - 21**

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9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	WAC	HILL	16					

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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

## PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- 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.
- 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.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- 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.
- 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.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 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.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- 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.
- 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.
- Each line of text should be centered on the message board rather than left or right justified.
- 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.

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WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Cannot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLR
High-Occupancy Vehicle	HOV	Tuesday	TUES
Hour(s)	HR, HRS	Time Minutes	TIME MIN
Information	INFO	Upper Level	UPR LEVEL
It Is	ITS	Vehicles (s)	VEH, VEHS
Junction	JCT	Warning	WARN
Left	LFT	Wednesday	WED
Left Lane	LFT LN	Weight Limit	WT LIMIT
Lane Closed	LN CLOSED	West	W
Lower Level	LWR LEVEL	Westbound	(route) W
Maintenance	MAINT	Wet Pavement	WET PVMT
		Will Not	WONT

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

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE
ROAD CLOSED AT SH XXX
ROAD CLSD AT FM XXXX
RIGHT X LANES CLOSED
CENTER LANE CLOSED
NIGHT LANE CLOSURES
VARIOUS LANES CLOSED
EXIT CLOSED
MALL DRIVEWAY CLOSED
XXXXXXXX BLVD CLOSED

### Other Condition List

FRONTAGE ROAD CLOSED
SHOULDER CLOSED XXX FT
RIGHT LN CLOSED XXX FT
RIGHT X LANES OPEN
DAYTIME LANE CLOSURES
I-XX SOUTH EXIT CLOSED
EXIT XXX CLOSED X MILE
RIGHT LN TO BE CLOSED
X LANES CLOSED TUE - FRI

\* 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
DETOUR NEXT X EXITS
USE EXIT XXX
STAY ON US XXX SOUTH
TRUCKS USE US XXX N
WATCH FOR TRUCKS
EXPECT DELAYS
REDUCE SPEED XXX FT
USE OTHER ROUTES
STAY IN LANE

### Location List

AT FM XXXX
BEFORE RAILROAD CROSSING
NEXT X MILES
PAST US XXX EXIT
XXXXXXXX TO XXXXXX
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

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- 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.
- 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

- The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- Highway names and numbers replaced as appropriate.
- ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- FT and MI, MILE and MILES interchanged as appropriate.
- AT, BEFORE and PAST interchanged as needed.
- 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

- 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.
- 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.
- 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.
- 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.

SHEET 6 OF 12

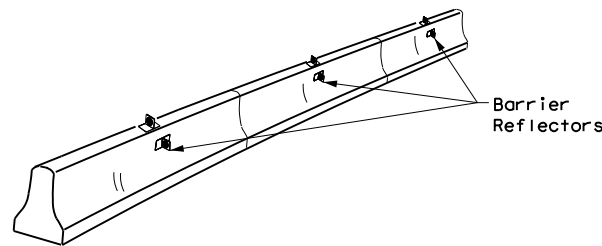
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© TxDOT	November 2002	CONT:	0162
REVISIONS		SECT:	13
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7-13	5-21	HIGHWAY:	SH 31
		DIST:	WAC
		COUNTY:	HILL
		SHEET NO.:	17

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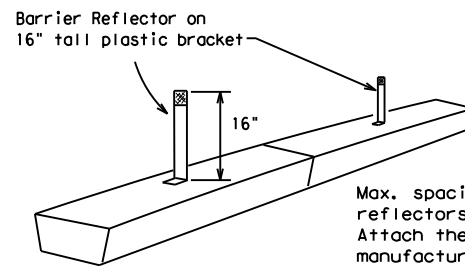
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



**CONCRETE TRAFFIC BARRIER (CTB)**

- 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.
- 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.
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- Maximum spacing of Barrier Reflectors is forty (40) feet.
- Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
- Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
- Single slope barriers shall be delineated as shown on the above detail.

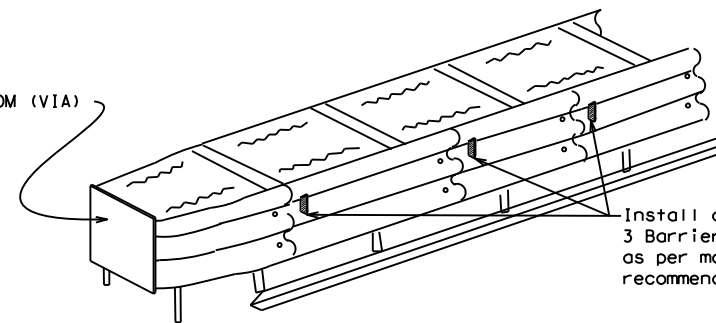


**LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES**

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

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

**LOW PROFILE CONCRETE BARRIER (LPCB)**



Install a minimum of 3 Barrier Reflectors as per manufacturer's recommendations.

**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 appropriate 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**

**WARNING LIGHTS**

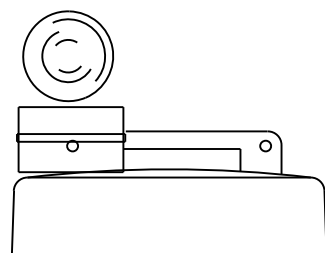
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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<sub>FL</sub> or C<sub>FL</sub> Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- 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".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- 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.
- 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.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

**WARNING LIGHTS MOUNTED ON PLASTIC DRUMS**

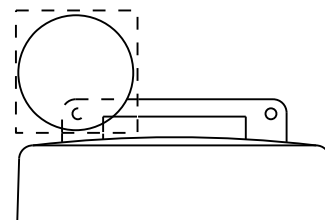
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing 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.
- 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.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- 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**

- 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.
- 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.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 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.
- 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.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.



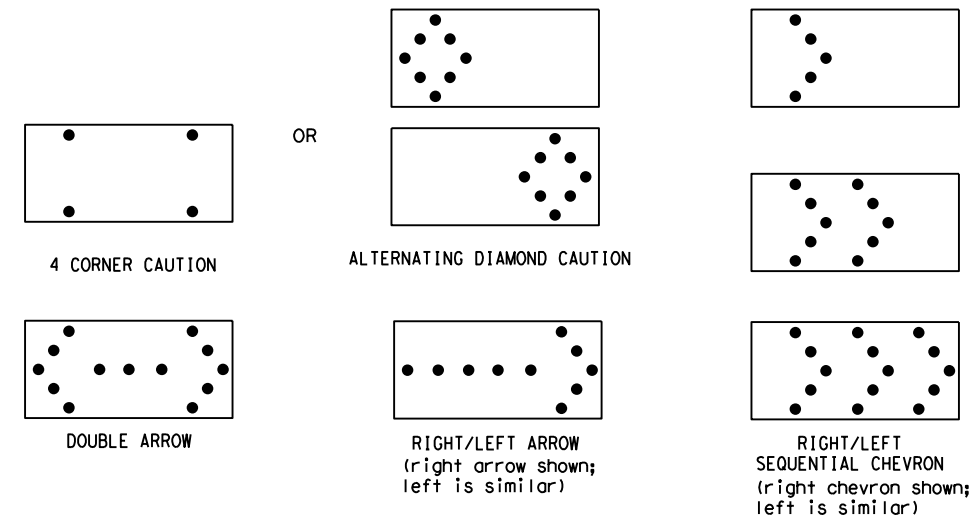
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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

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.

- 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.
- 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.
- 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.
- The Flashing Arrow Board should be able to display the following symbols:



- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- 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.
- 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.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- 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.
- 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**

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- 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.
- 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**

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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**GENERAL NOTES**

- For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- 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.
- 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.
- 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).
- 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.
- 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**

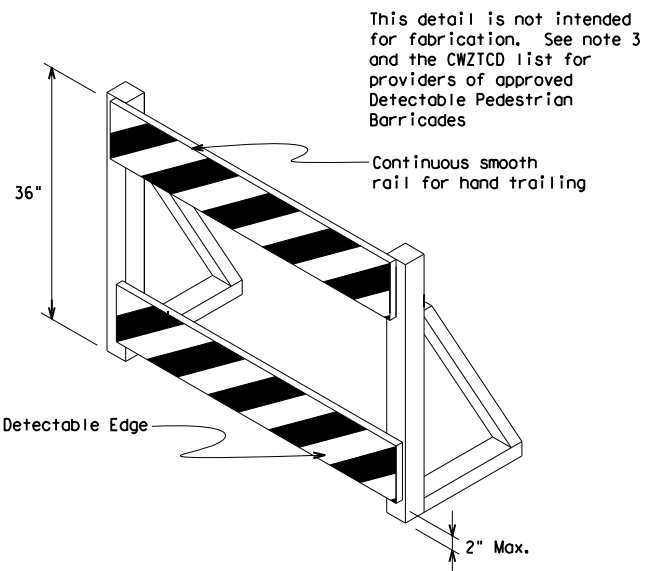
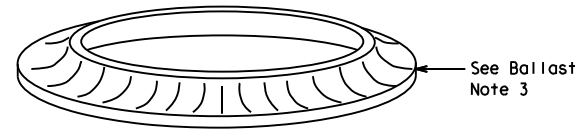
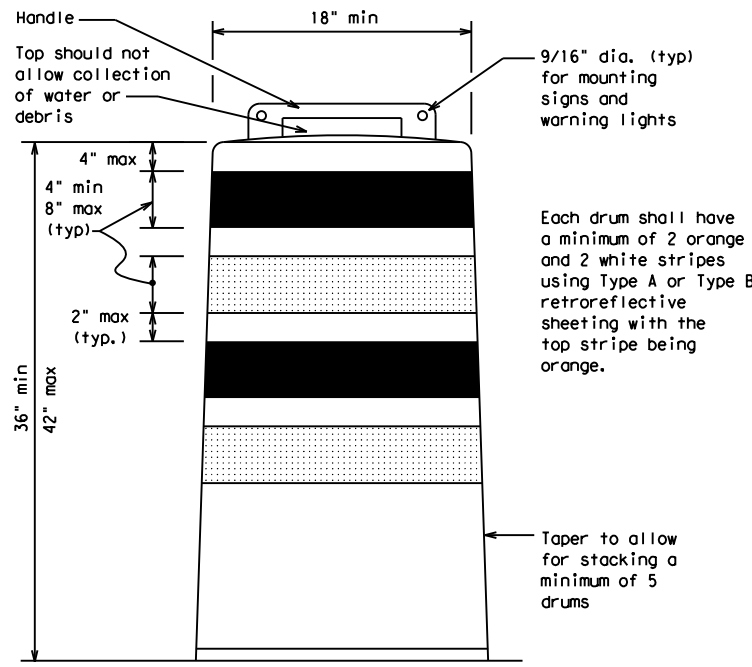
- Pre-qualified plastic drums shall meet the following requirements:
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
  - The body and base shall lock together in such a manner that the body separates from the base when impacted 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.
  - 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.
  - 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.
  - 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.
  - 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.
  - 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.
  - Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
  - Drum body shall have a maximum unballasted weight of 11 lbs.
  - Drum and base shall be marked with manufacturer's name and model number.

**RETROREFLECTIVE SHEETING**

- 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.
- 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.

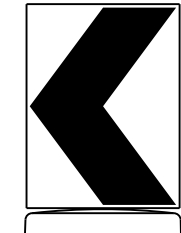
**BALLAST**

- 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.
- 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.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- 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.
- 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.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.

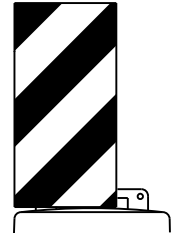


**DETECTABLE PEDESTRIAN BARRICADES**

- 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.
- 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.
- 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.
- 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.
- Warning lights shall not be attached to detectable pedestrian barricades.
- 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**

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- Chevrons and other work zone signs with an orange background shall be manufactured with Type B<sub>FL</sub> or Type C<sub>FL</sub> Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- 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.
- 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.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- 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.
- 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.

SHEET 8 OF 12



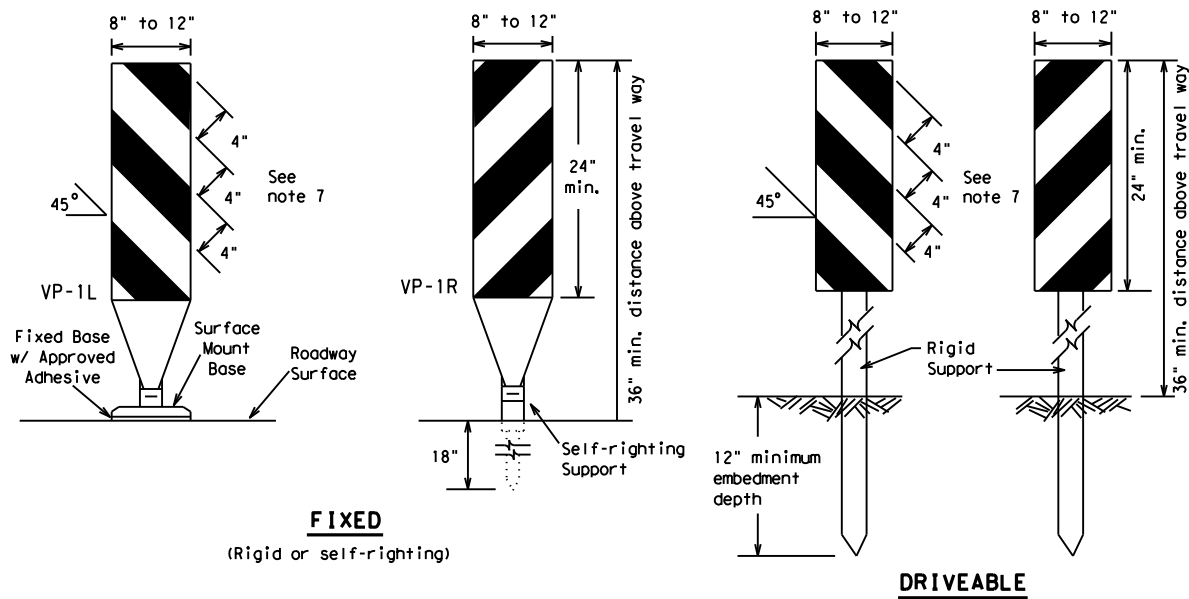
**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (8) - 21**

FILE:	bc-21.dgn	DN:	TxDOT	CR:	TxDOT	OW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0162	13	032, ETC.		SH 31			
4-03	8-14	DIST	COUNTY		SHEET NO.				
9-07	5-21	WAC	HILL		19				
7-13									

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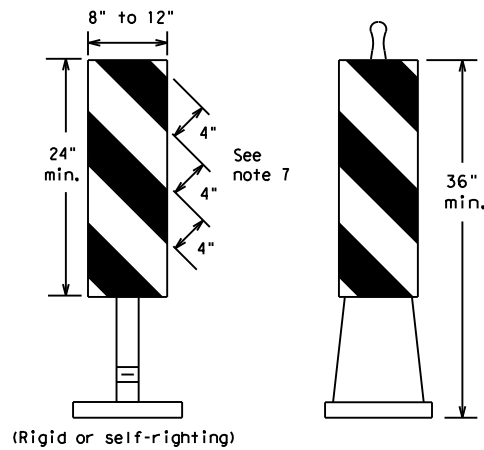
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**FIXED**  
(Rigid or self-righting)

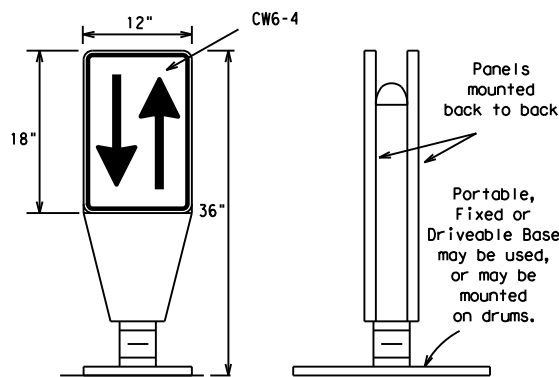
**DRIVEABLE**

- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- 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.
- 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.
- VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
- Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
- Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



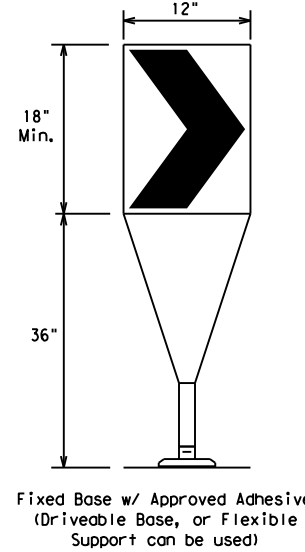
**PORTABLE**

**VERTICAL PANELS (VPs)**



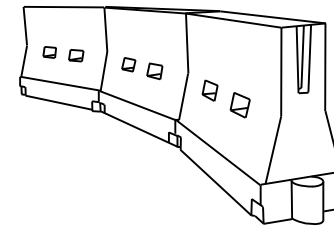
**OPPOSING TRAFFIC LANE DIVIDERS (OTLD)**

- 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.
- The OTLD may be used in combination with 42" cones or VPs.
- Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
- The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B<sub>FL</sub> or Type C<sub>FL</sub> conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.



- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- 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.
- 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.
- To be effective, the chevron should be visible for at least 500 feet.
- Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B<sub>FL</sub> or Type C<sub>FL</sub> conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
- For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

**CHEVRONS**



**LONGITUDINAL CHANNELIZING DEVICES (LCD)**

- 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.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- 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**

- 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.
- 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.
- 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.
- 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.
- When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

**GENERAL NOTES**

- 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).
- 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.
- 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).
- 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.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- 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.
- The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.

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

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

**SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS**

SHEET 9 OF 12



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

BC (9) - 21

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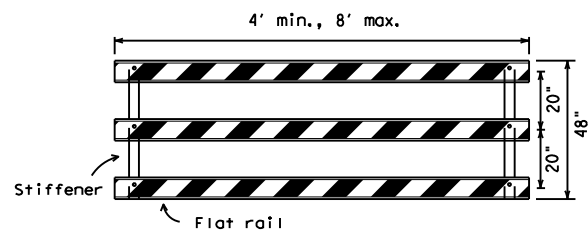
**TYPE 3 BARRICADES**

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

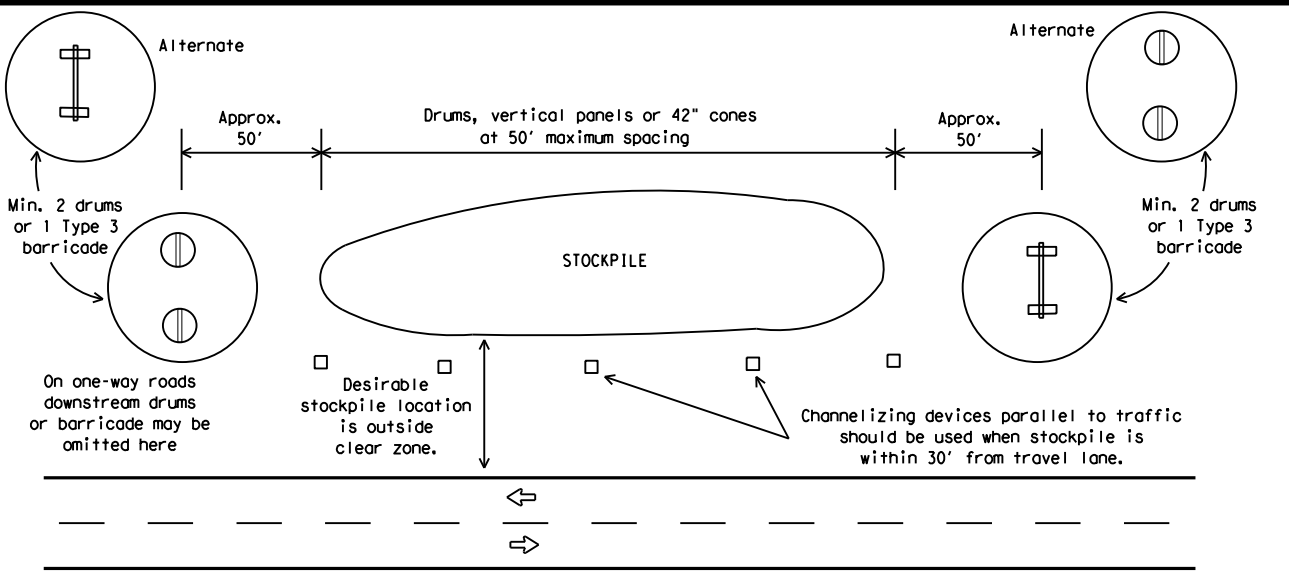
Barricades shall NOT be used as a sign support.



**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**

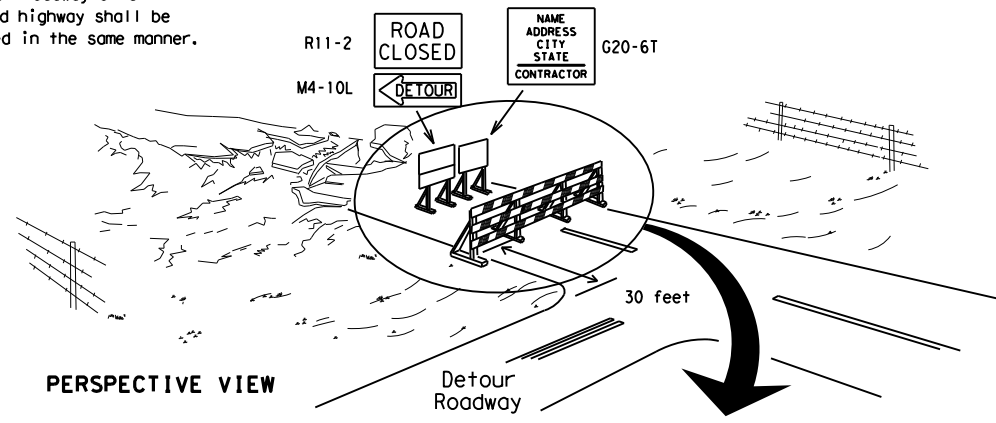


**TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES**



**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**

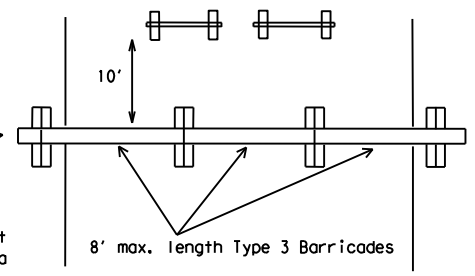
Each roadway of a divided highway shall be barricaded in the same manner.



**PERSPECTIVE VIEW**

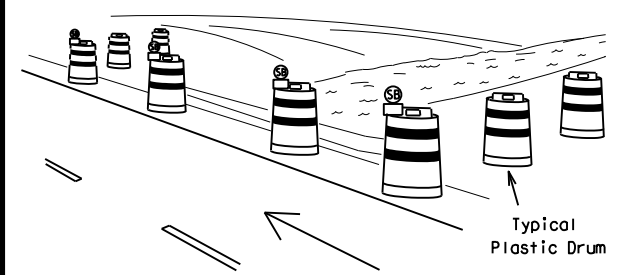
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.

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.

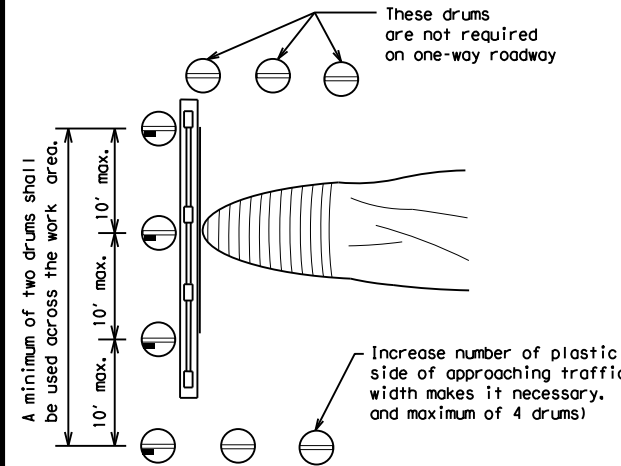


**PLAN VIEW**

**TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION**



**PERSPECTIVE VIEW**

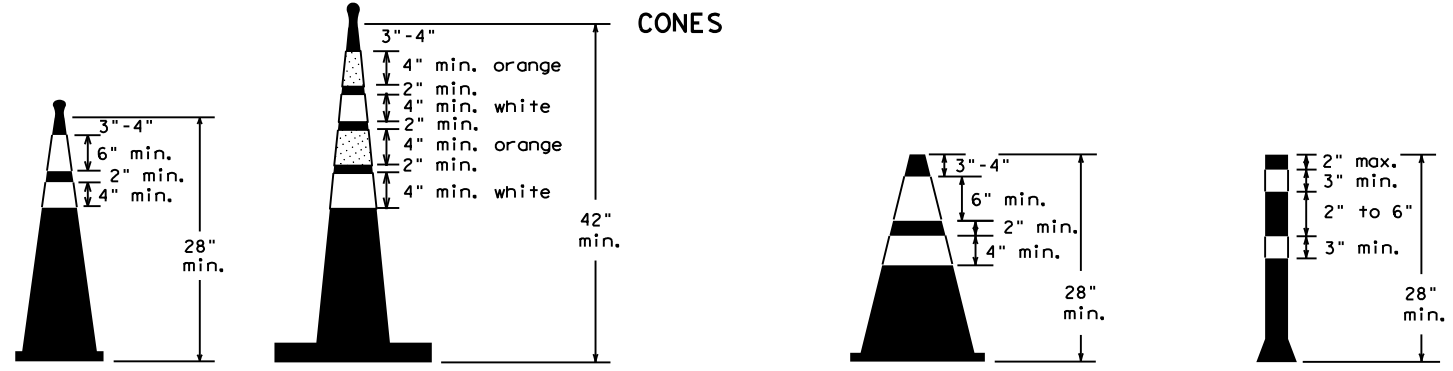


**PLAN VIEW**

**CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS**

1. Where positive redirection 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
	Steady burn warning light or yellow warning reflector



**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.



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (10) - 21**

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## WORK ZONE PAVEMENT MARKINGS

### GENERAL

- 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.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- 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).
- 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.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

### RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(12).
- 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

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

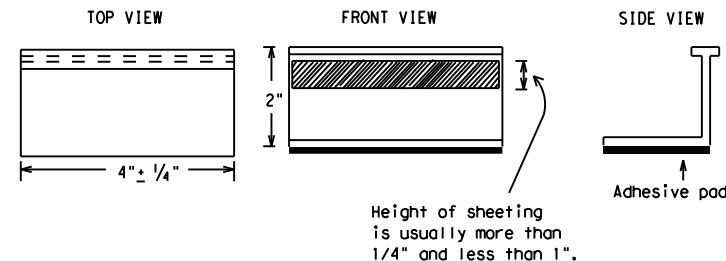
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- 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.
- 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.
- 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

- 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.
- 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.
- 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".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- 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.
- 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**

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- 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.
  - 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.
  - 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.
- Small design variances may be noted between tab manufacturers.
- 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

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- 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).

SHEET 11 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

**BC(11)-21**

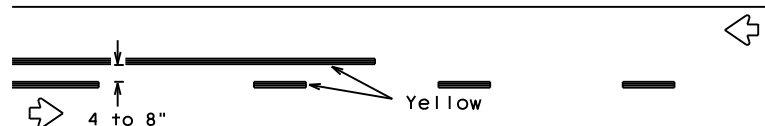
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## PAVEMENT MARKING PATTERNS

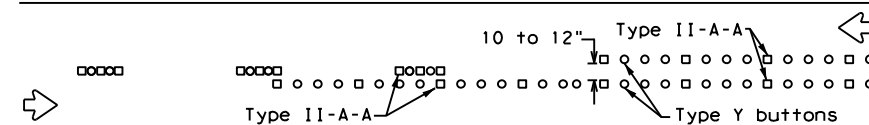


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

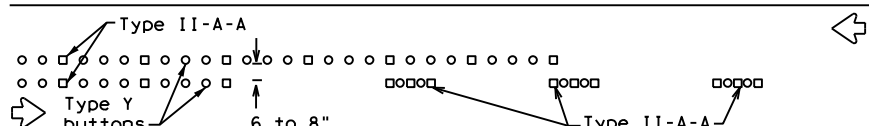


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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.

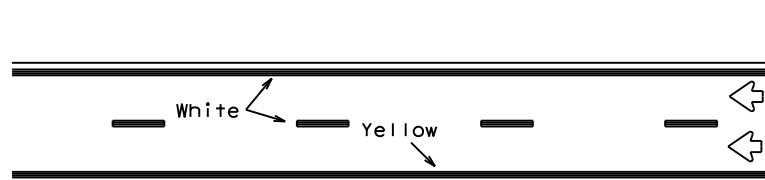


RAISED PAVEMENT MARKERS - PATTERN A



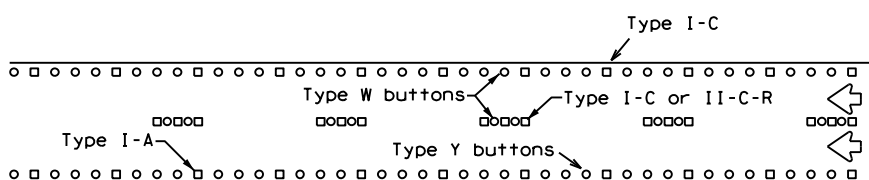
RAISED PAVEMENT MARKERS - PATTERN B

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



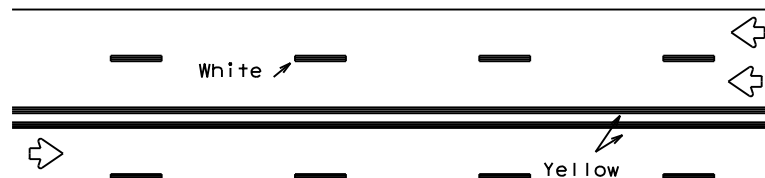
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



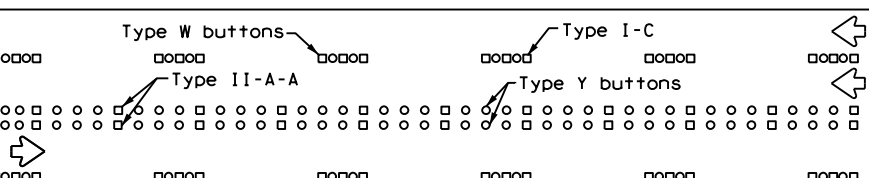
RAISED PAVEMENT MARKERS

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



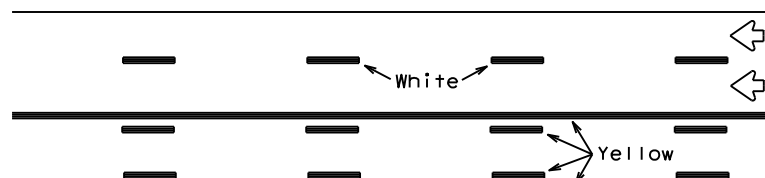
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



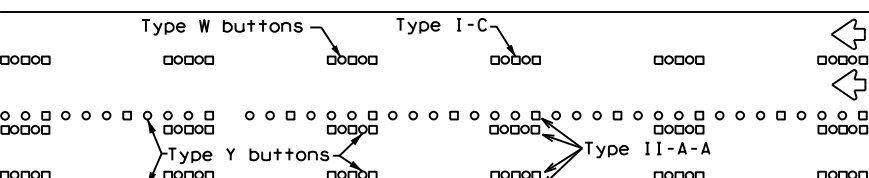
RAISED PAVEMENT MARKERS

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

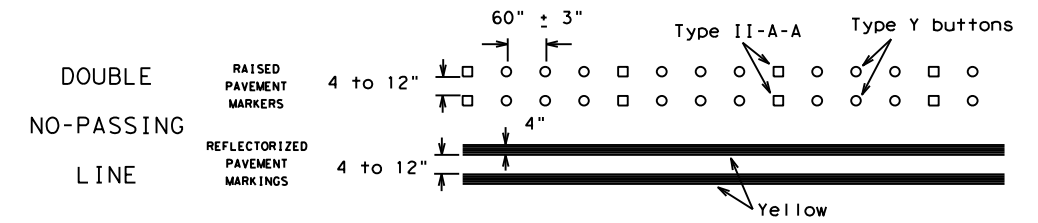
Prefabricated markings may be substituted for reflectorized pavement markings.



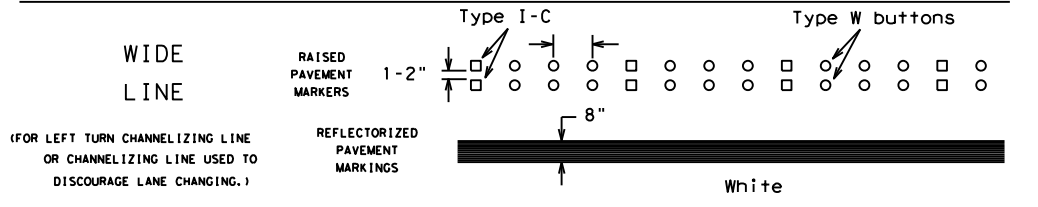
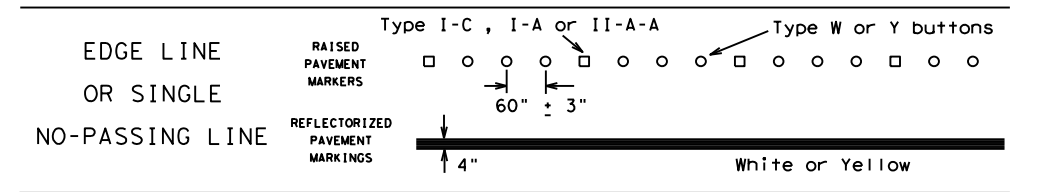
RAISED PAVEMENT MARKERS

## TWO-WAY LEFT TURN LANE

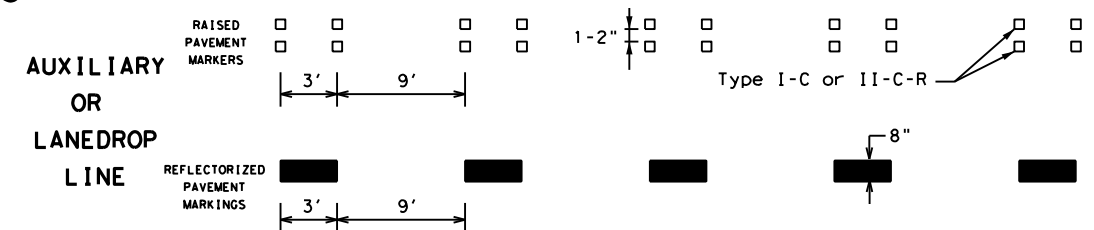
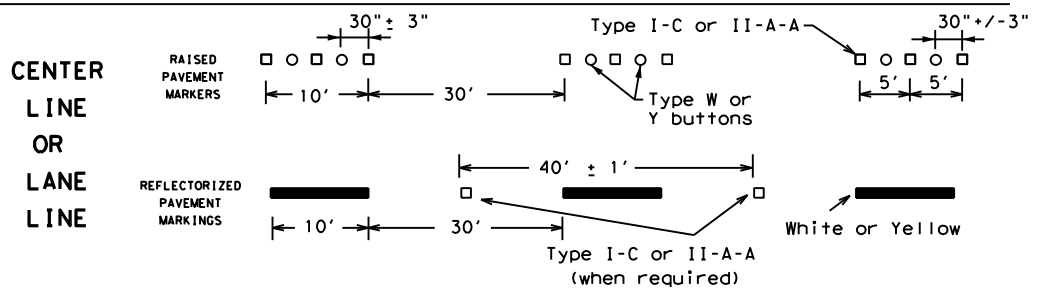
## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



### SOLID LINES

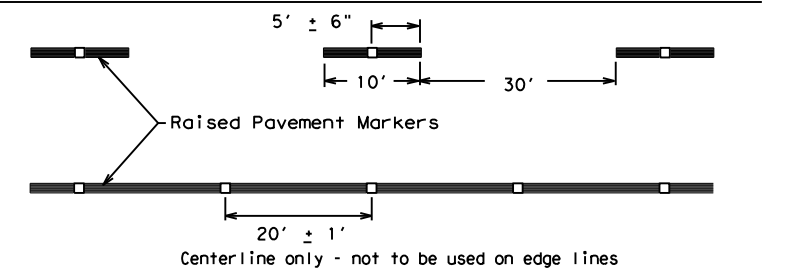


### BROKEN LINES



### 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.



SHEET 12 OF 12



## 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	0162	13	032, ETC.	SH 31
1-97 9-07 5-21	DIST	COUNTY	SHEET NO.	
2-98 7-13	WAC	HILL	23	
11-02 8-14				

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 DATE: 7/1/2024 11:36:45 AM  
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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."







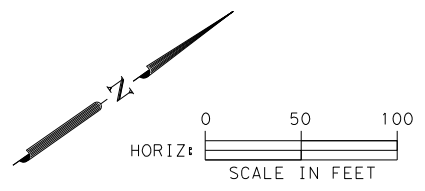
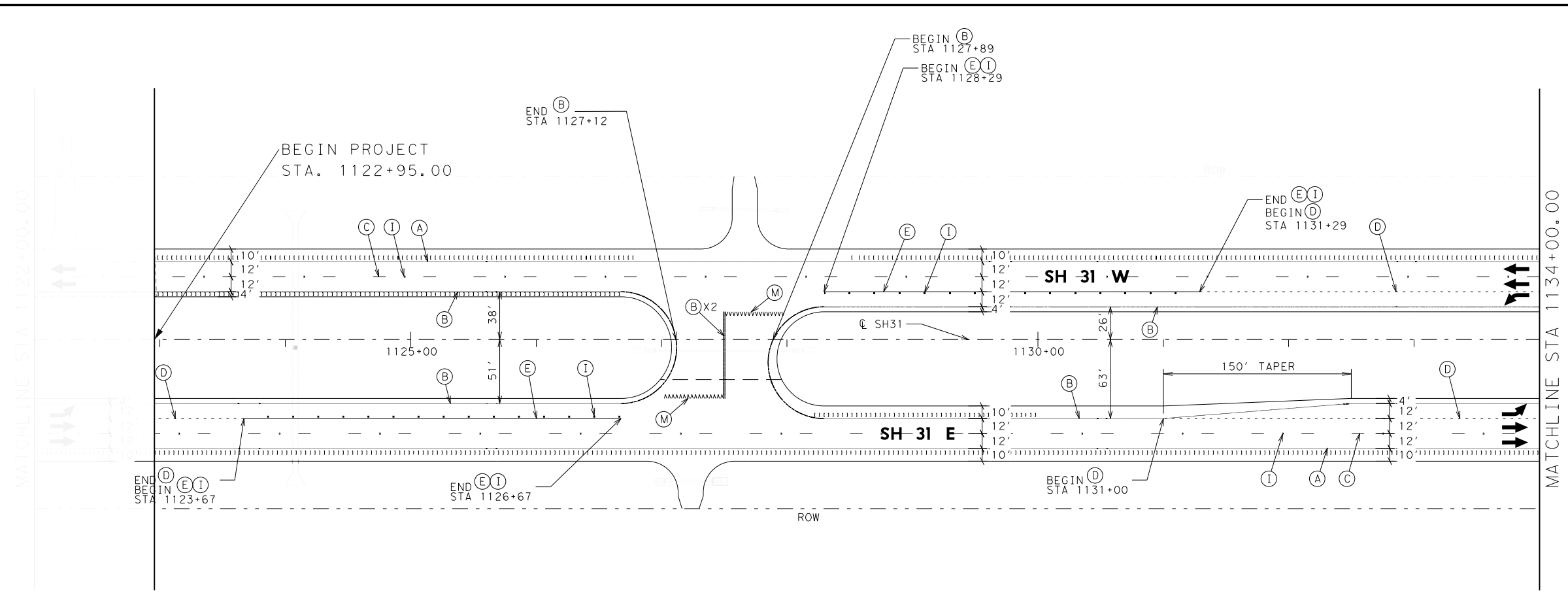




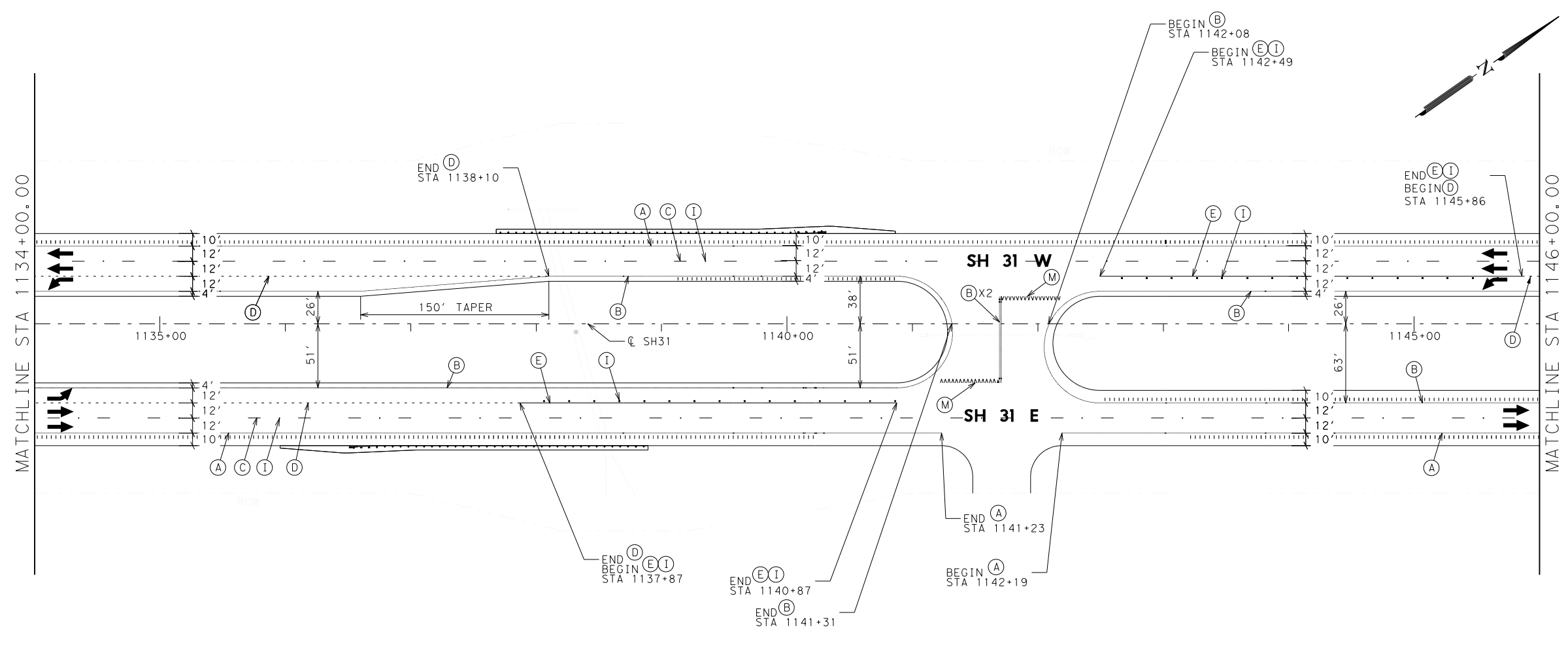




7/1/2024 11:38:56 AM



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



**BRIAN W. LAMB**  
103617  
LICENSED  
PROFESSIONAL ENGINEER

*Brian W. Lamb* PE

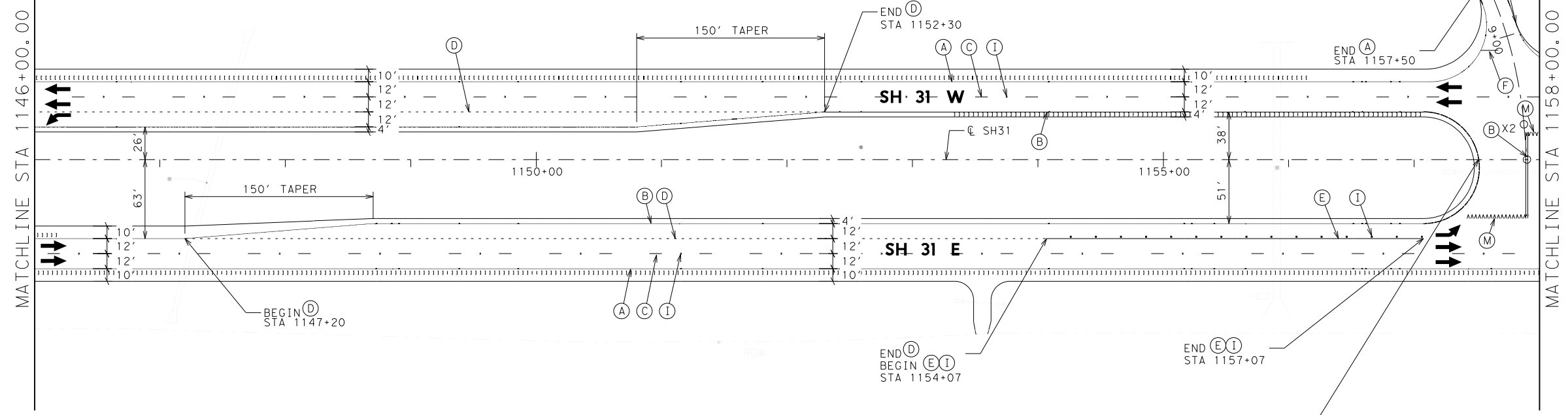
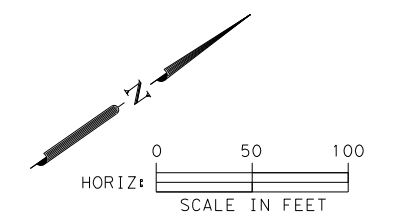
7/1/2024

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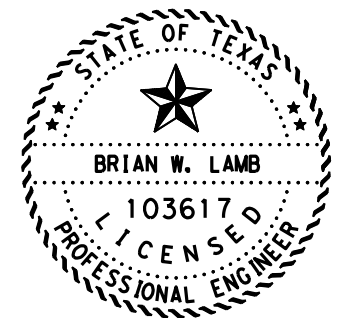
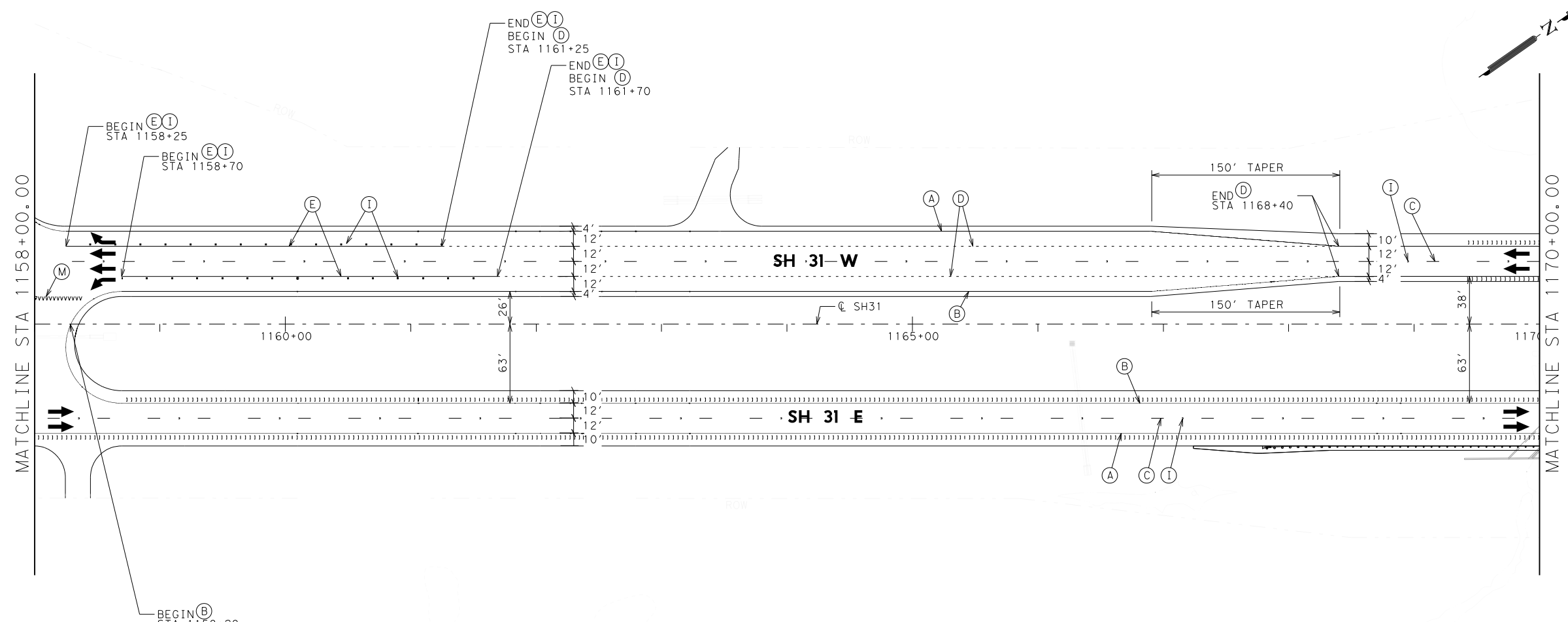
**PAVEMENT MARKING LAYOUTS**  
CSJ: 0162-02-046

SHEET: 1 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		30



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



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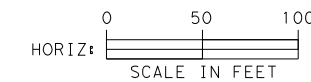
**PAVEMENT MARKING LAYOUTS**  
 CSJ: 0162-02-046

SHEET: 2 OF 31

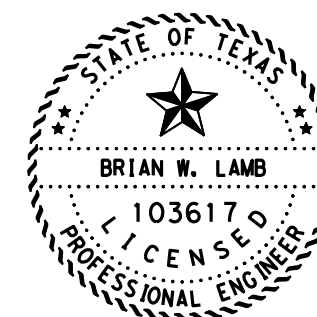
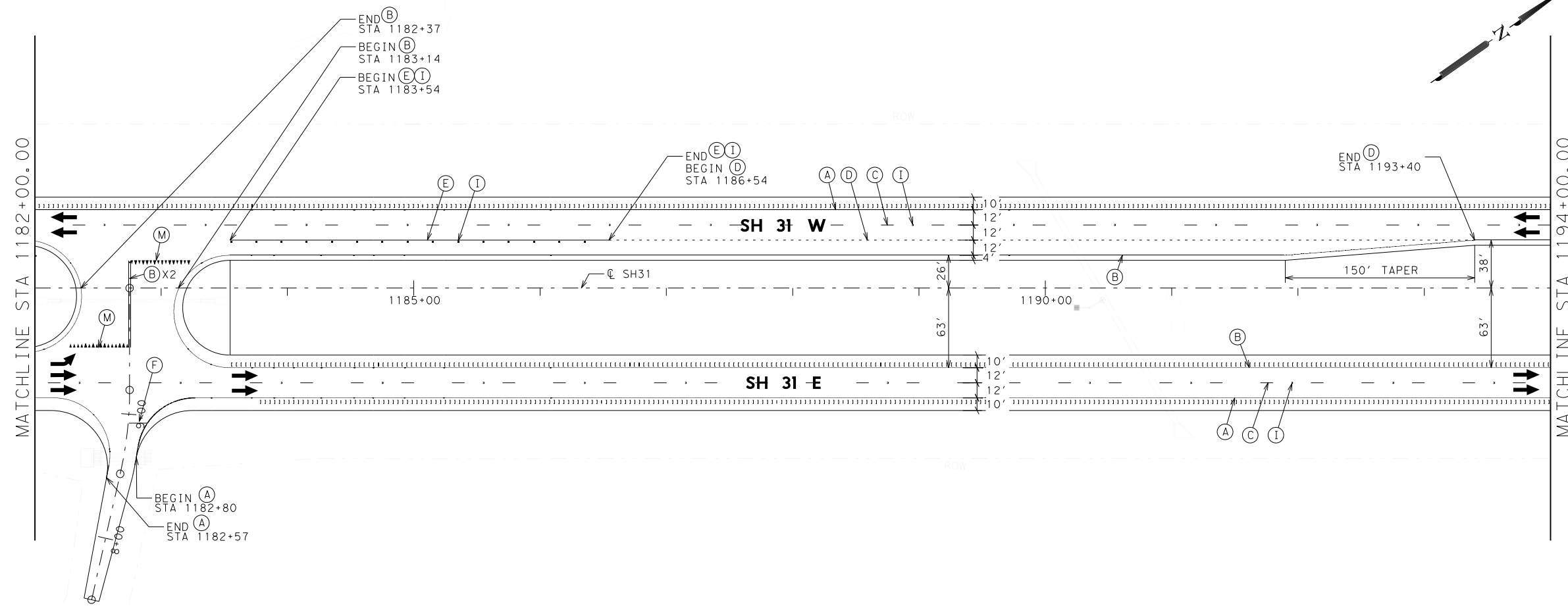
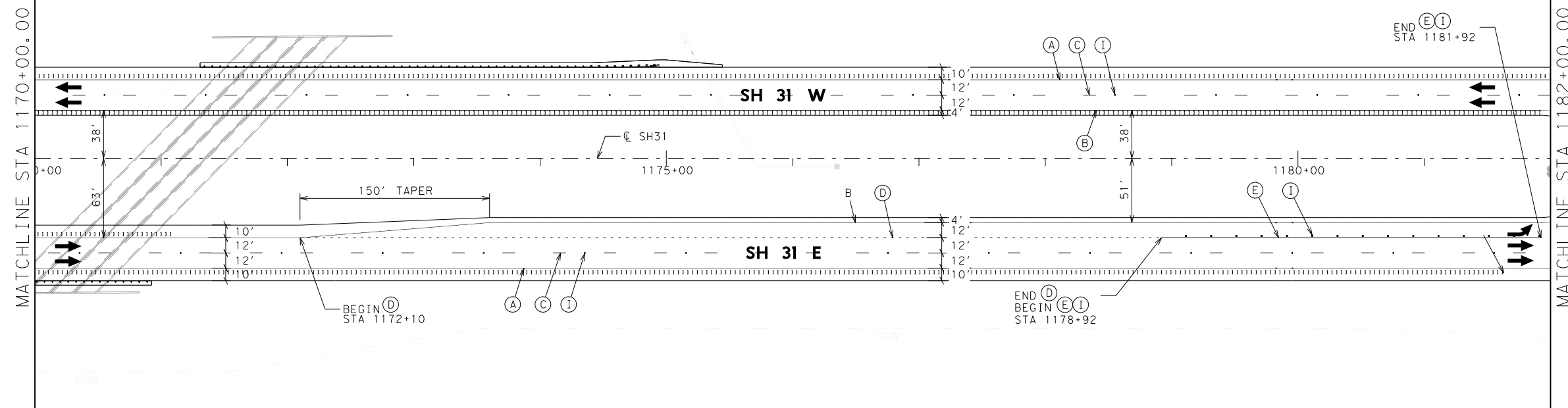
FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		31

11:38:58 AM

7/1/2024



- LEGEND:
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  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
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  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAV MARK (TY II-C-R)
  - (J) RAISED PAV MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
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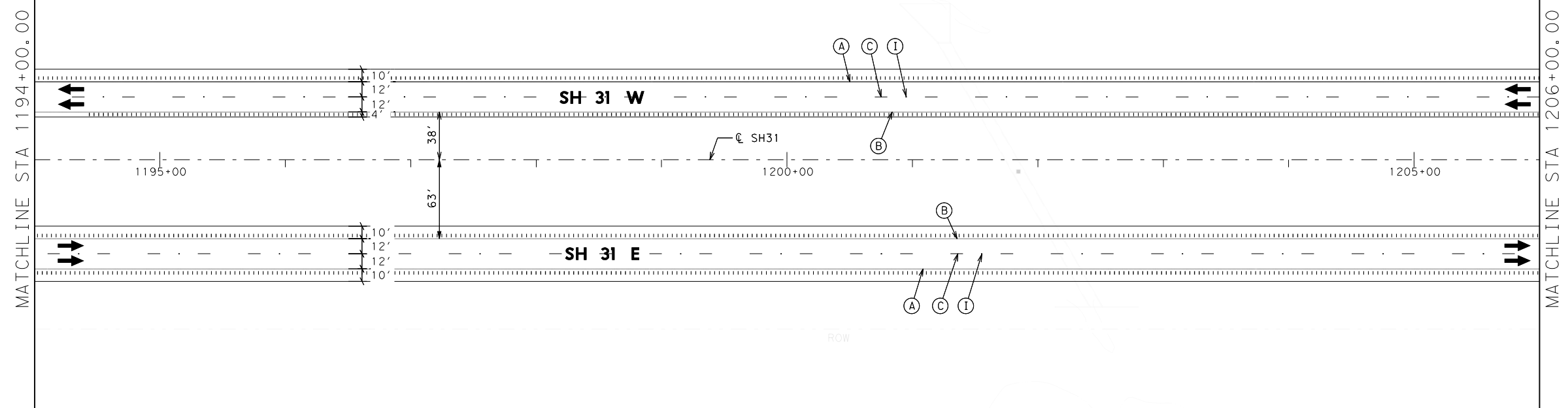
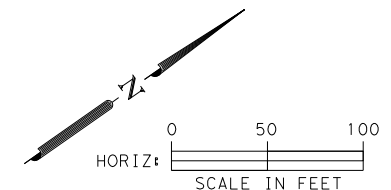


**PAVEMENT MARKING LAYOUTS**  
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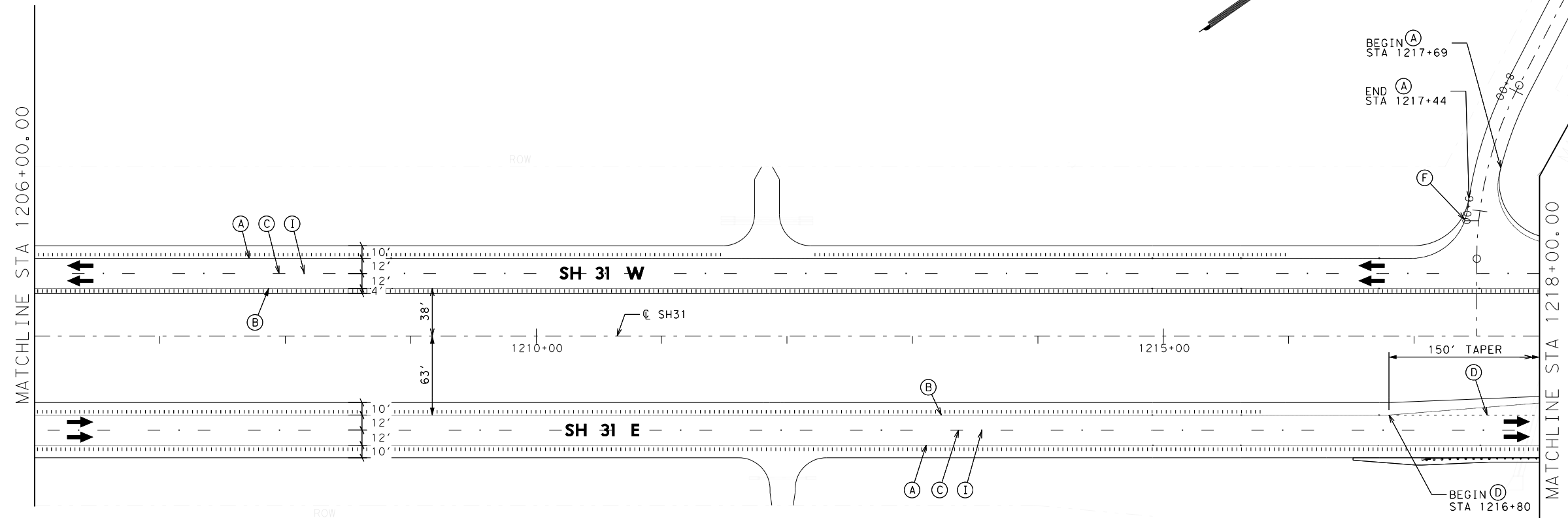
SHEET: 3 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY	SHEET NO.	
TEXAS	WACO	HILL	32	

7/1/2024 11:38:59 AM



- LEGEND:
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  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



**BRIAN W. LAMB**  
103617  
LICENSED  
PROFESSIONAL ENGINEER

*Brian W. Lamb, P.E.*

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7/1/2024

Texas Department of Transportation

## PAVEMENT MARKING LAYOUTS

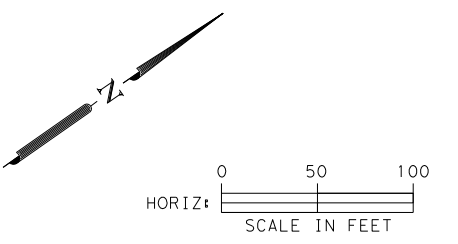
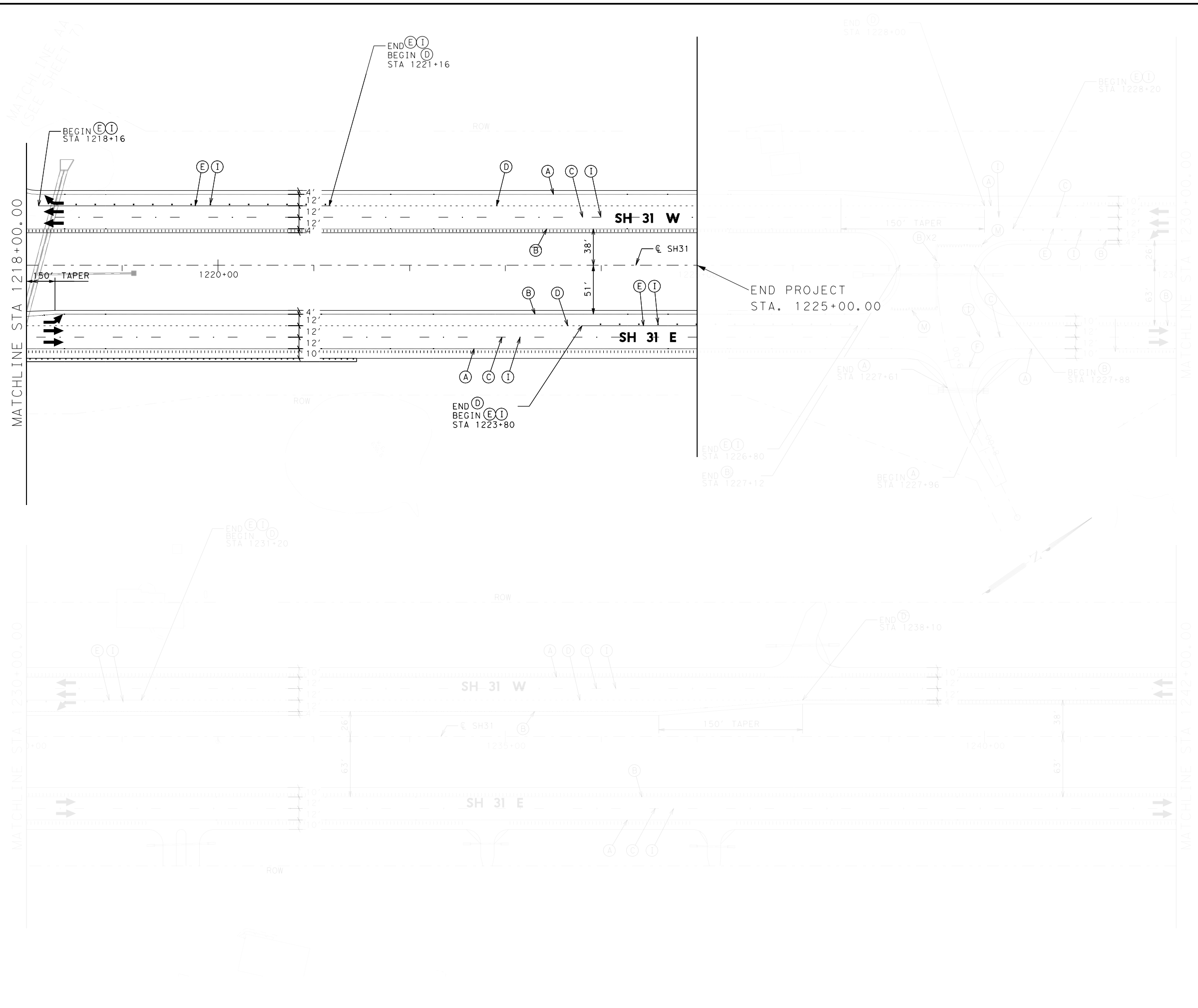
**CSJ: 0162-02-046**

SHEET: 4 OF 31

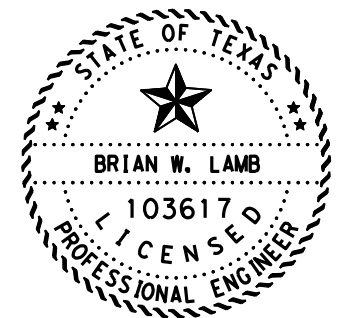
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6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		33

7/1/2024 11:39:00 AM

7/1/2024 11:39:02 AM



- LEGEND:
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  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



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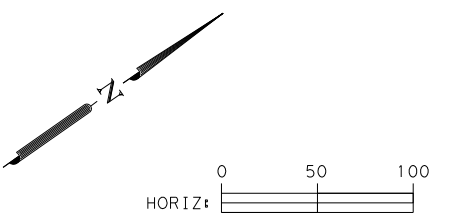
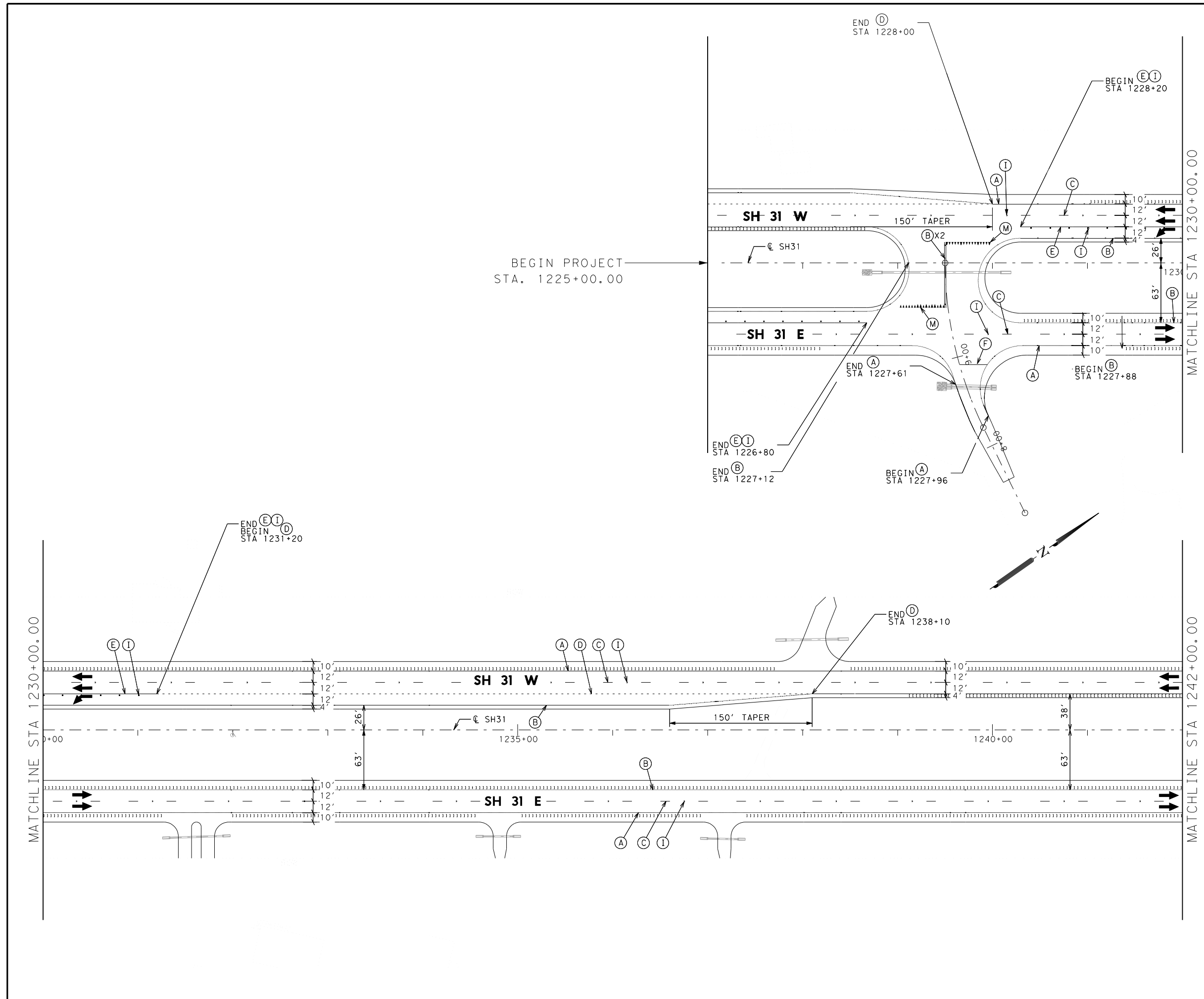


**PAVEMENT MARKING LAYOUTS**  
 CSJ: 0162-02-046

SHEET: 5 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		34

7/1/2024 11:39:03 AM



- LEGEND:
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  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
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  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI

Brian W. Lamb  
103617  
LICENSED PROFESSIONAL ENGINEER

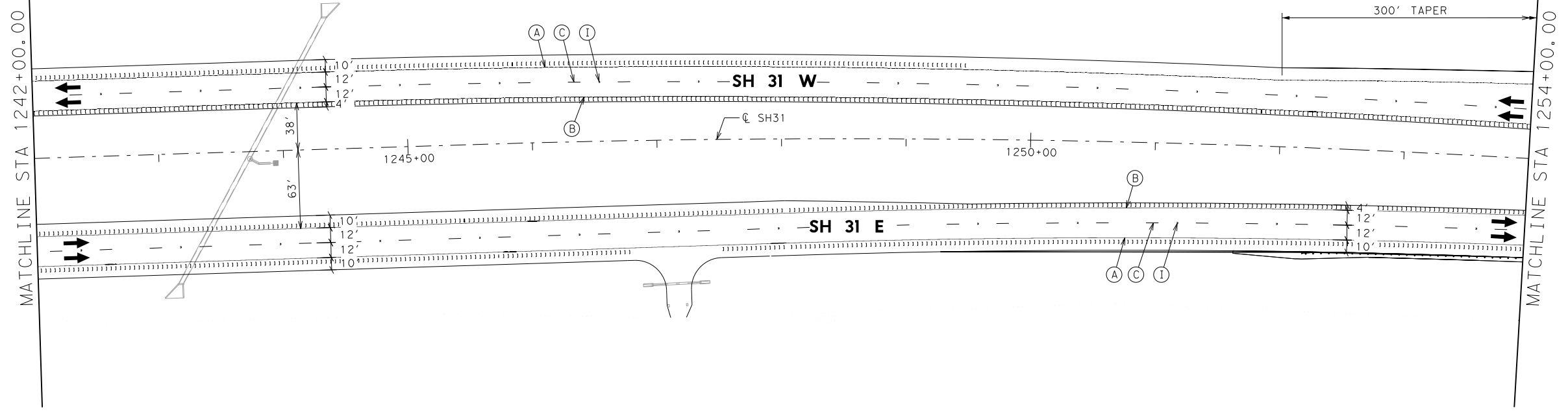
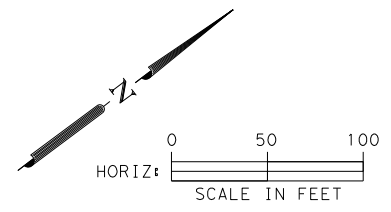
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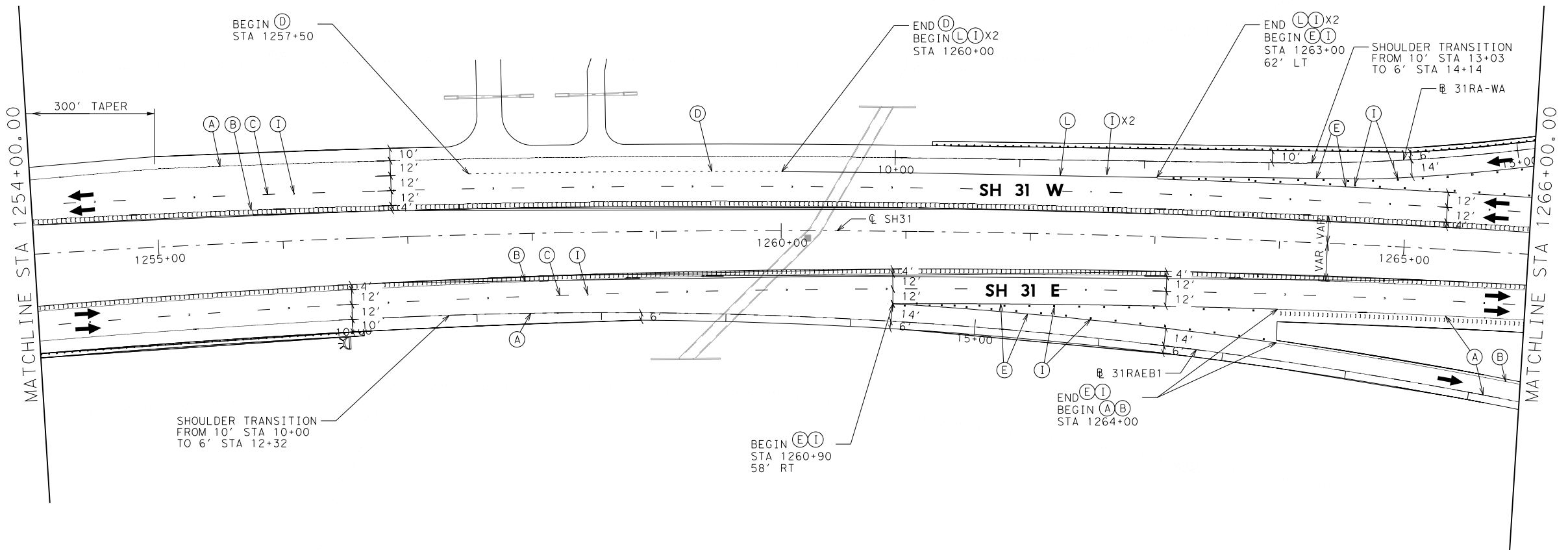
**PAVEMENT MARKING LAYOUTS**  
CSJ: 0162-13-002

SHEET: 6 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		35



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



**BRIAN W. LAMB**  
103617  
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PROFESSIONAL ENGINEER

*Brian W. Lamb* P.E.

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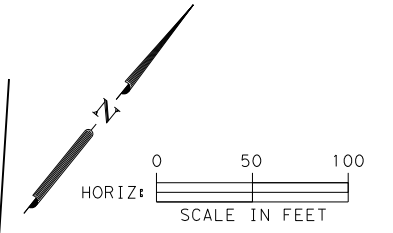
## PAVEMENT MARKING LAYOUTS

### CSJ: 0162-13-002

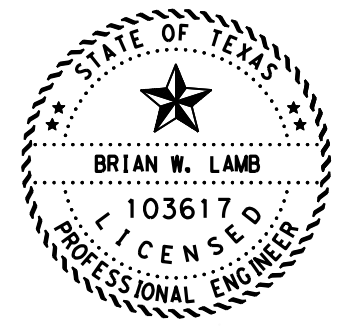
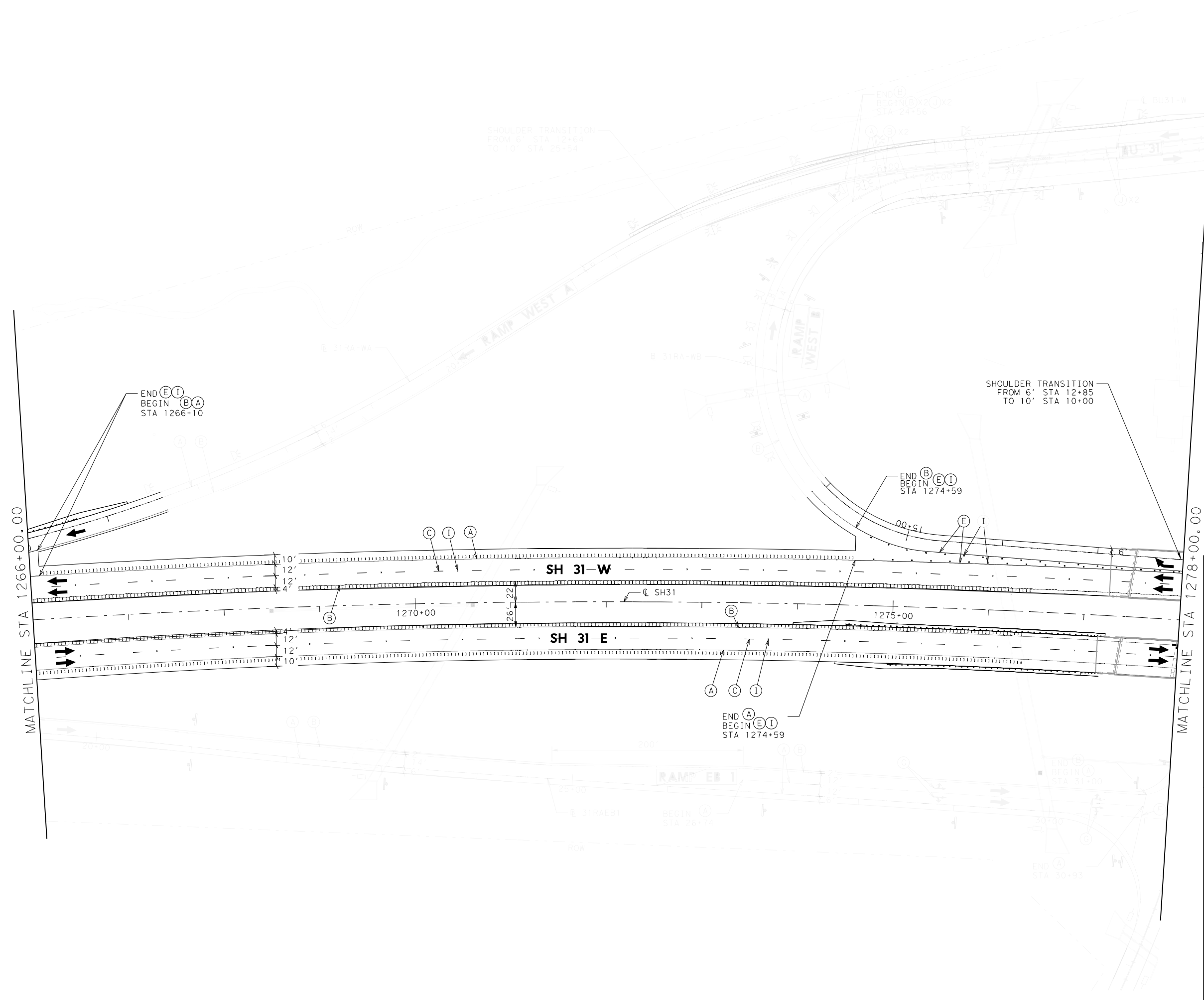
SHEET: 7 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY	SHEET NO.	
TEXAS	WACO	HILL	36	

7/1/2024 11:39:04 AM



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb* P.E.  
 SIGNATURE OF REGISTRANT & DATE 7/1/2024



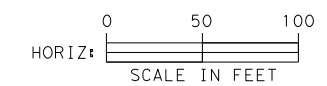
**PAVEMENT MARKING LAYOUTS**  
**CSJ: 0162-13-002**

SHEET: 8 OF 31

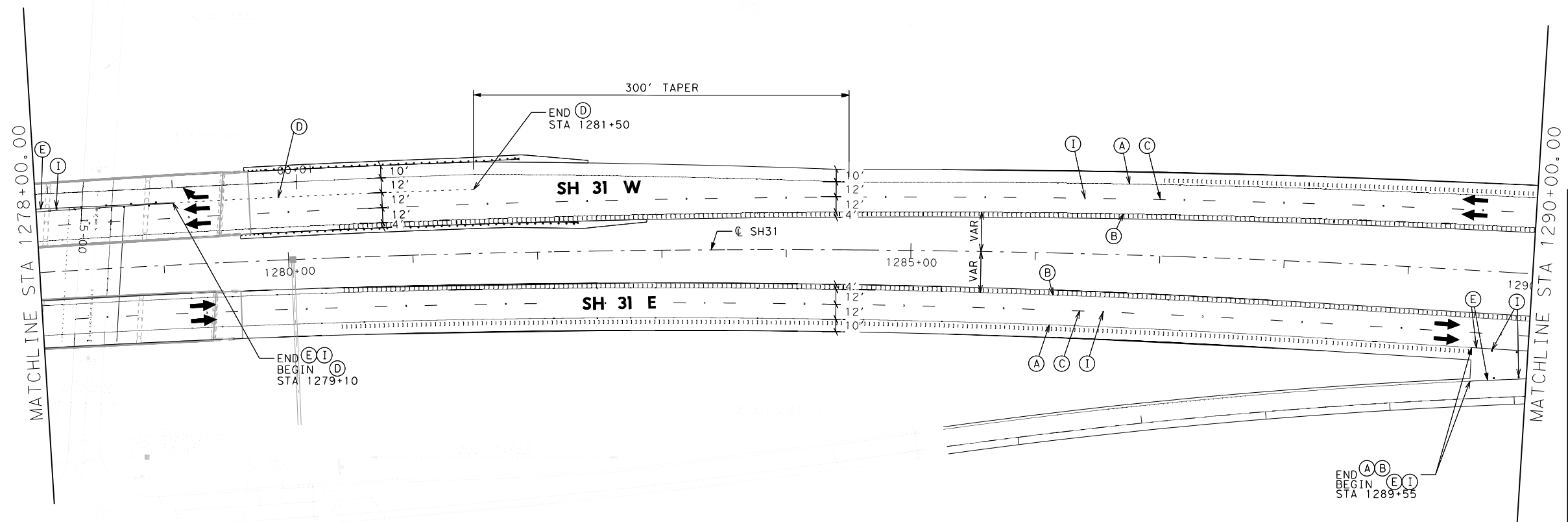
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TEXAS	DIST	COUNTY	SHEET NO.	
	WACO	HILL	37	

7/1/2024 11:39:06 AM

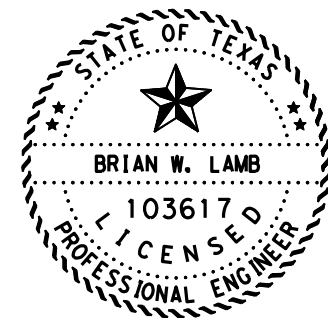




- LEGEND:
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  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
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11:39:07 AM  
7/1/2024



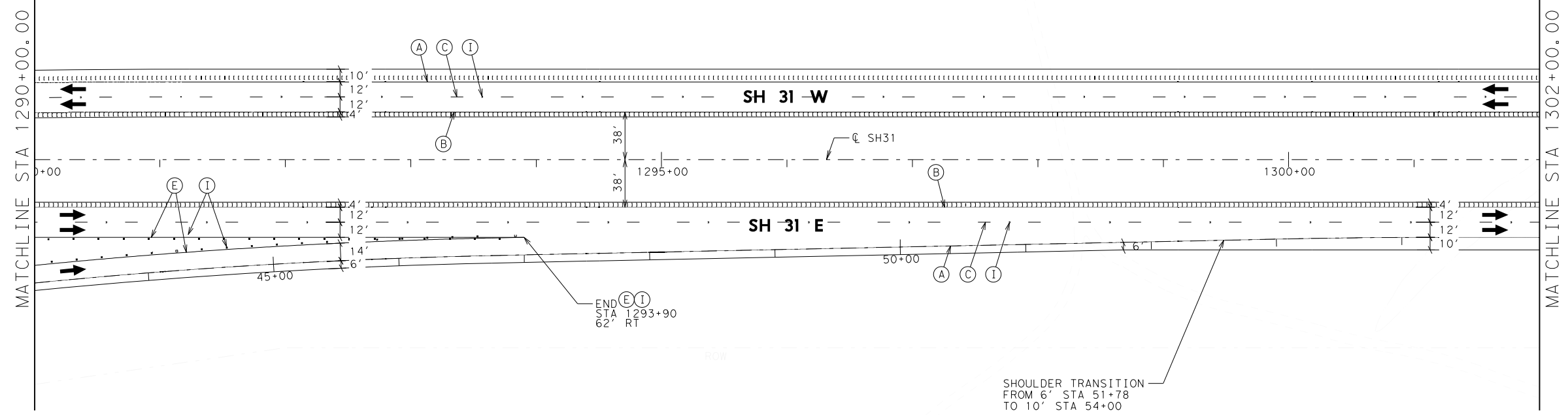
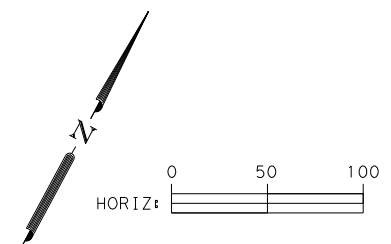
*Brian W. Lamb*, P.E.  
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7/1/2024



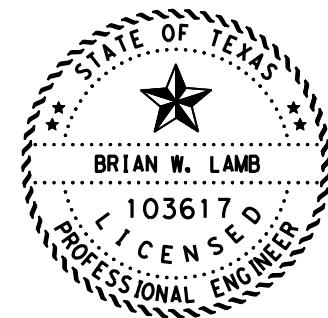
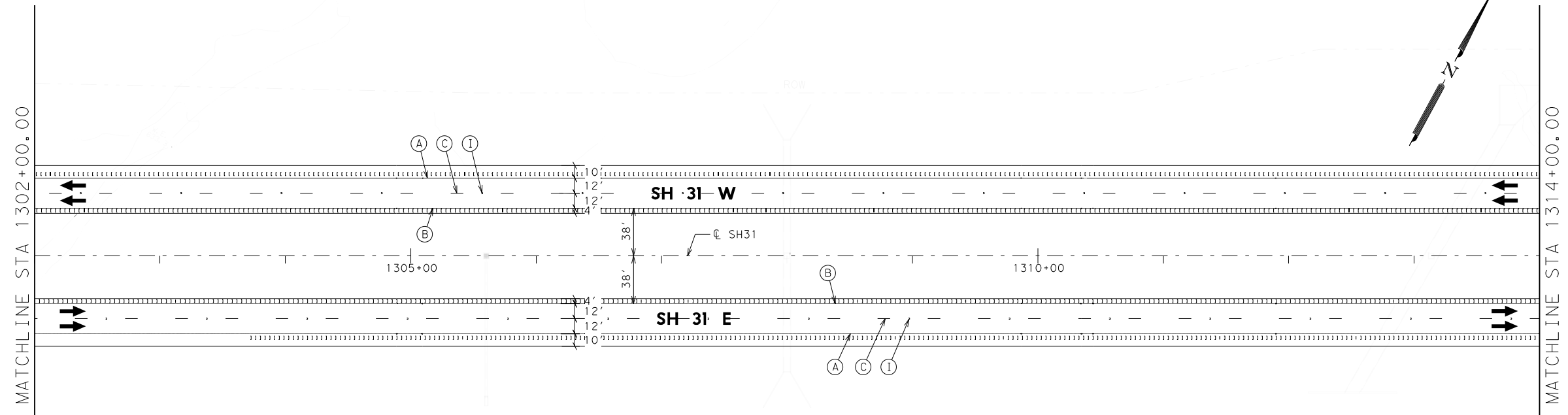
**PAVEMENT MARKING LAYOUTS**  
CSJ: 0162-13-002

SHEET: 9 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		38



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb* P.E.  
 SIGNATURE OF REGISTRANT & DATE 7/1/2024

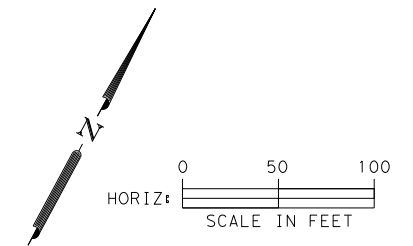


**PAVEMENT MARKING LAYOUTS**  
**CSJ: 0162-13-002**

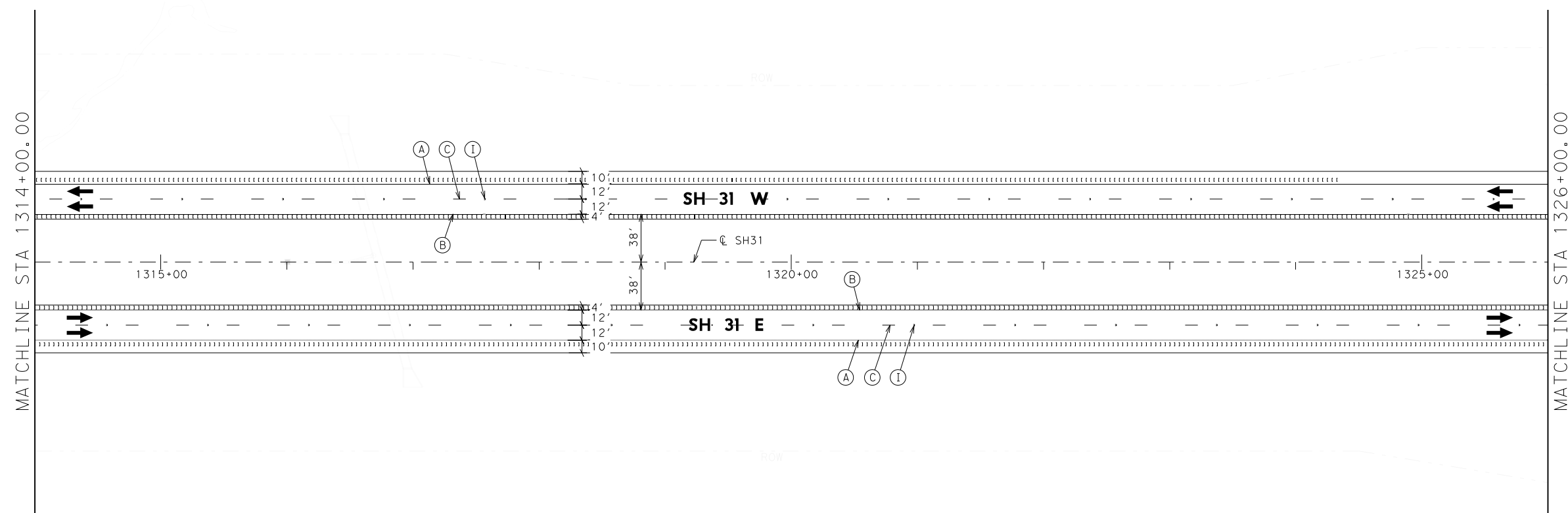
SHEET: 10 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		39

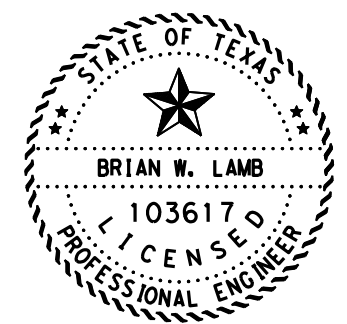
7/1/2024 11:39:08 AM



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



7/1/2024 11:39:10 AM



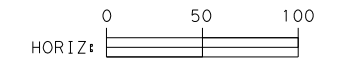
*Brian W. Lamb* P.E. 7/1/2024  
SIGNATURE OF REGISTRANT & DATE



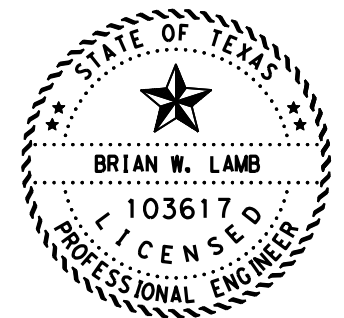
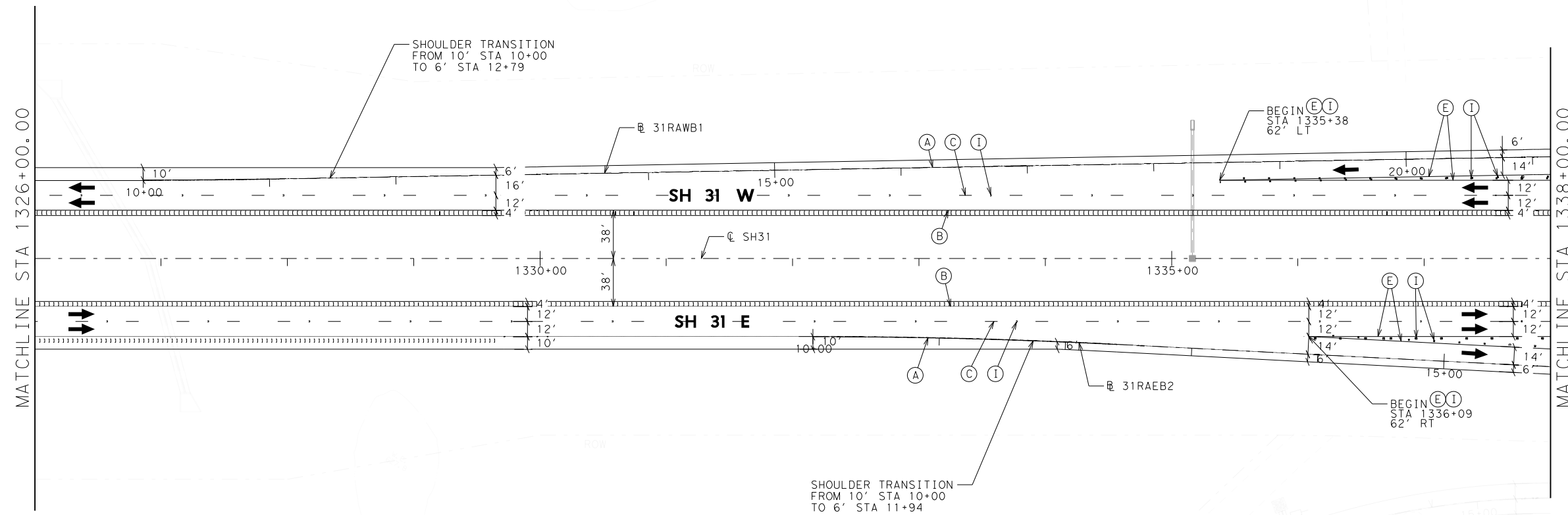
**PAVEMENT MARKING LAYOUTS**  
**CSJ: 0162-13-002**

SHEET: 11 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		40



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb* P.E. 7/1/2024  
 SIGNATURE OF REGISTRANT & DATE

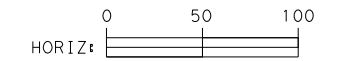


**PAVEMENT MARKING LAYOUTS**  
**CSJ: 0162-13-002**

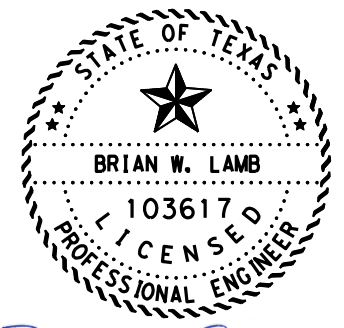
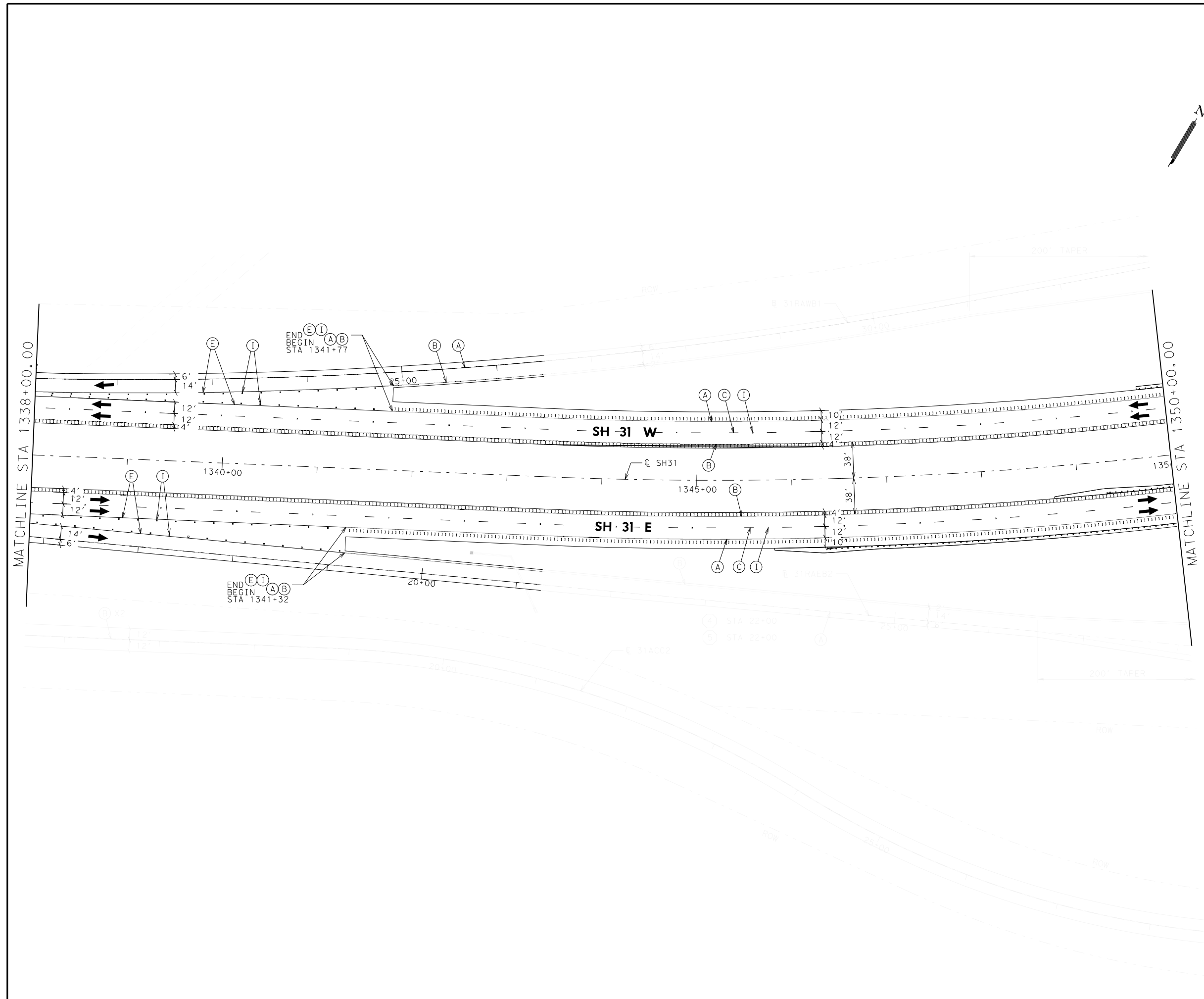
SHEET: 12 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		41

7/1/2024 11:39:11 AM



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb*  
 SIGNATURE OF REGISTRANT & DATE 7/1/2024

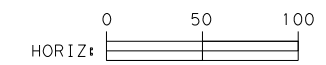


**PAVEMENT MARKING LAYOUTS**  
**CSJ: 0162-13-002**

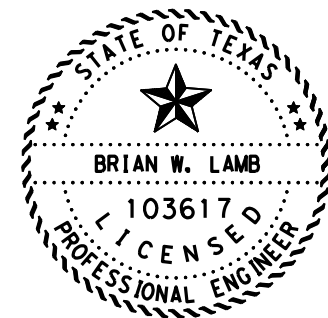
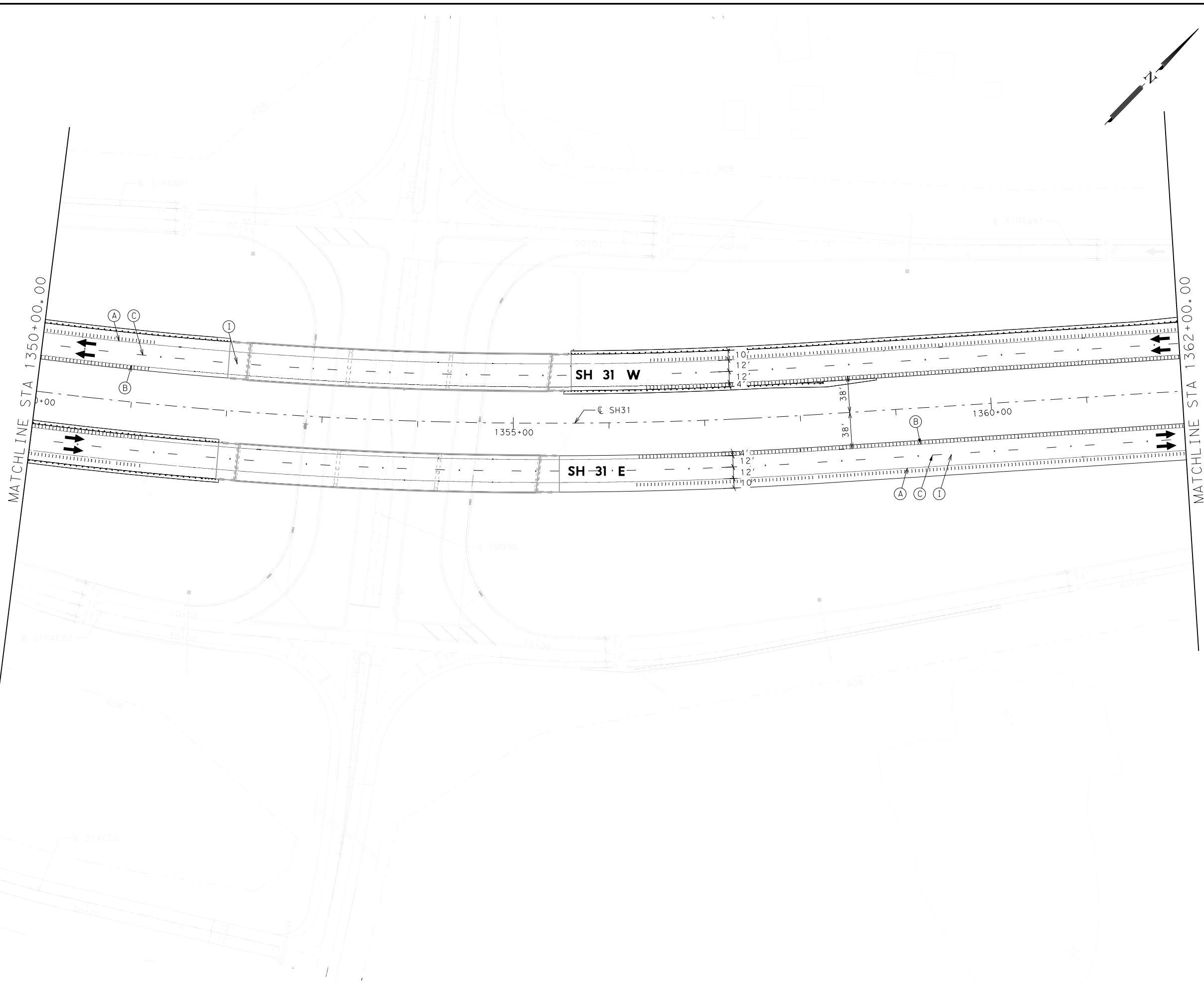
SHEET: 13 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		42

7/1/2024 11:39:12 AM



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb* P.E. 7/1/2024  
 SIGNATURE OF REGISTRANT & DATE



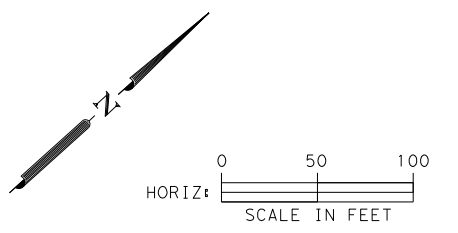
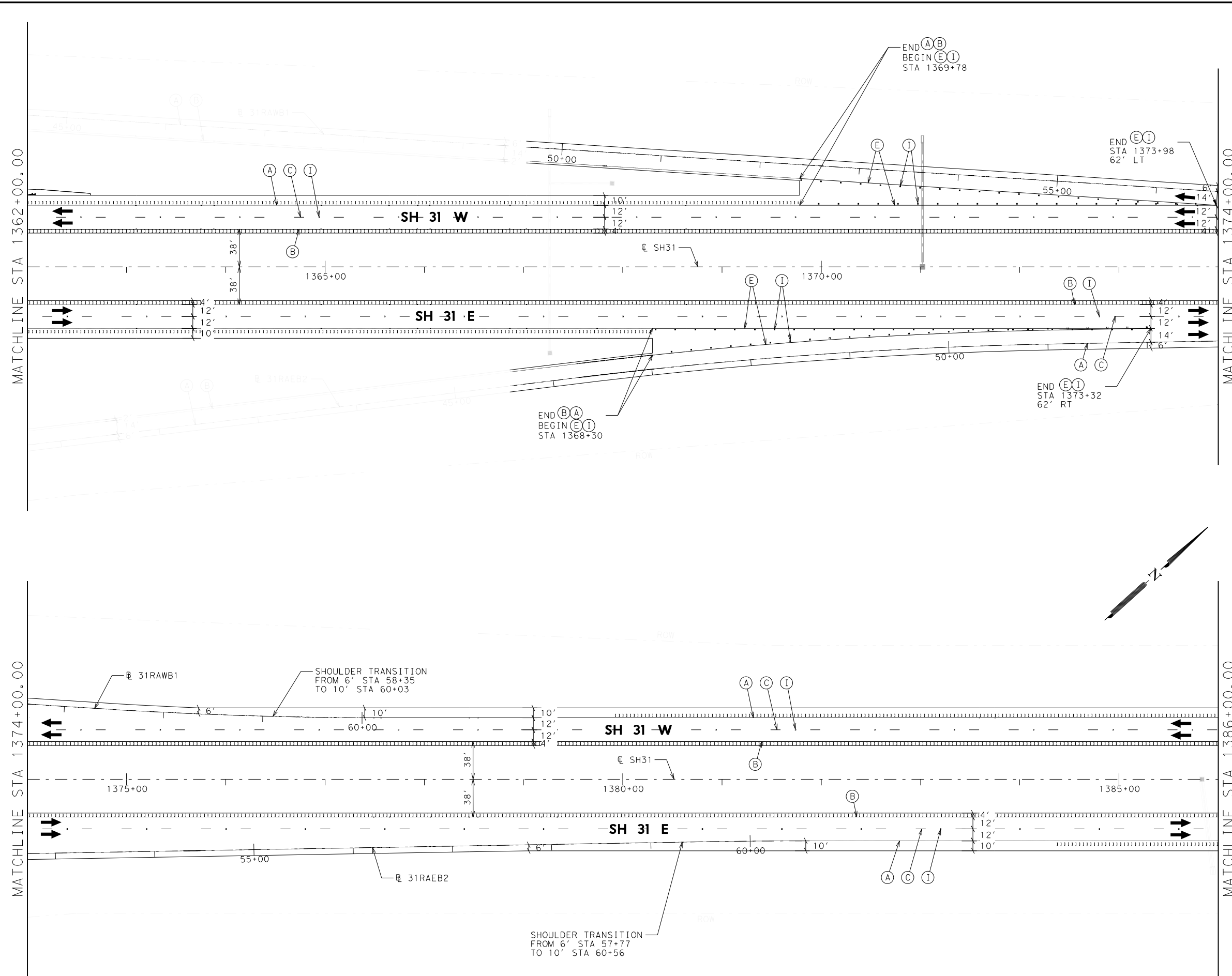
**PAVEMENT MARKING LAYOUTS**  
**CSJ: 0162-13-002**

SHEET: 14 OF 31

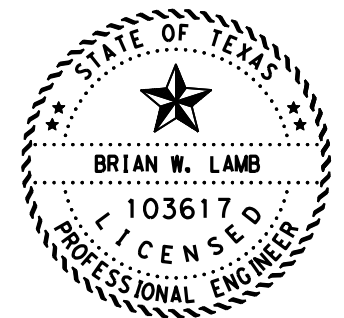
FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		43

7/1/2024 11:39:13 AM

7/1/2024 11:39:15 AM



- LEGEND:**
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



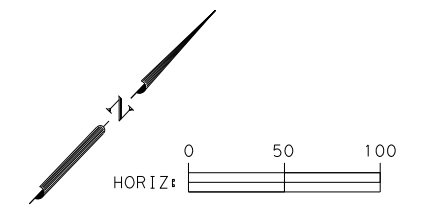
*Brian W. Lamb, P.E.* 7/1/2024  
 SIGNATURE OF REGISTRANT & DATE



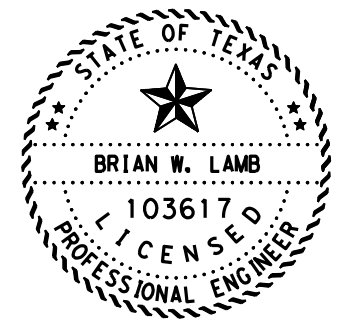
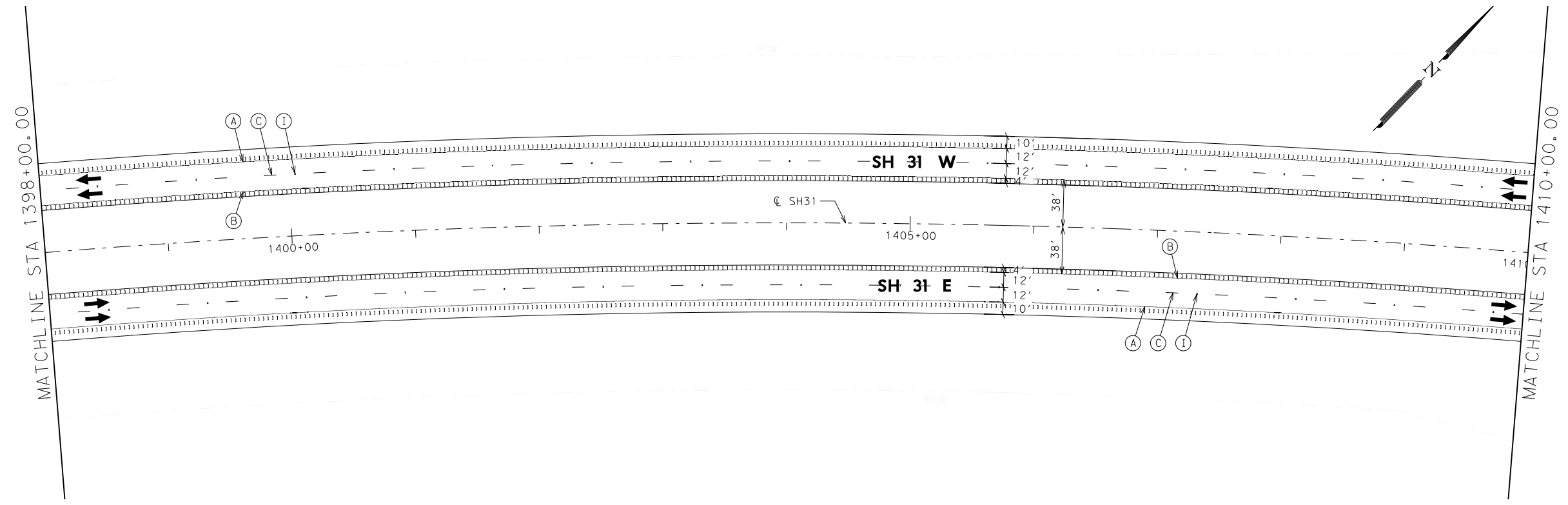
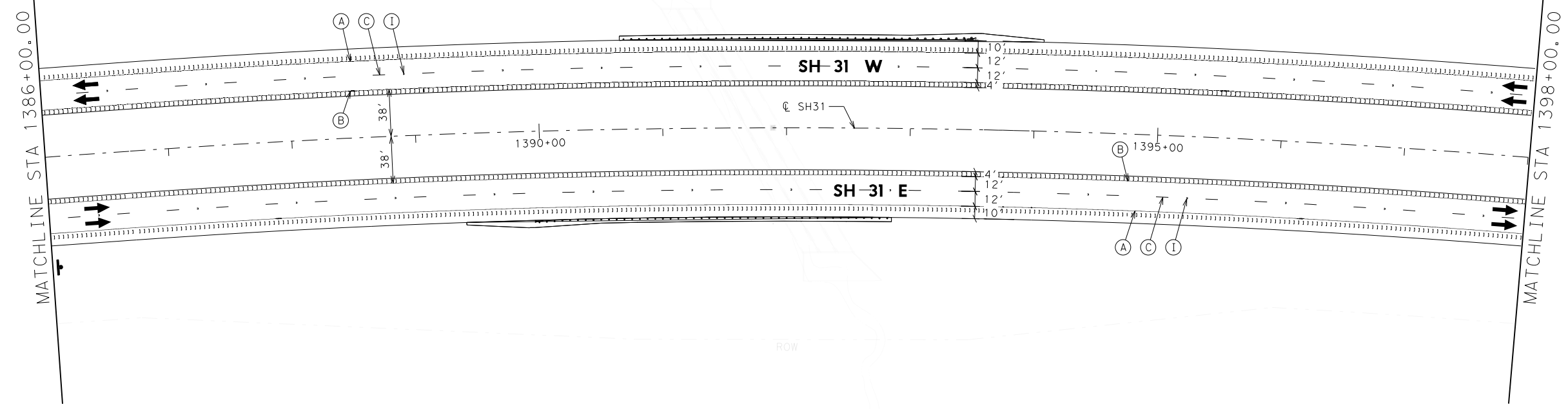
**PAVEMENT MARKING LAYOUTS**  
**CSJ: 0162-13-002**

SHEET: 15 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		44



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb* P.E.  
 SIGNATURE OF REGISTRANT & DATE 7/1/2024



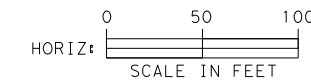
**PAVEMENT MARKING LAYOUTS**  
**CSJ: 0162-13-002**

SHEET: 16 OF 31

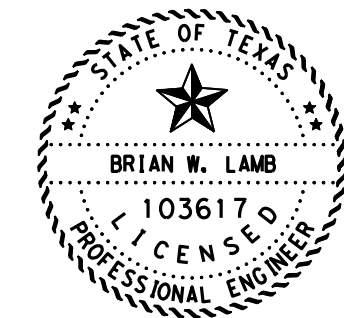
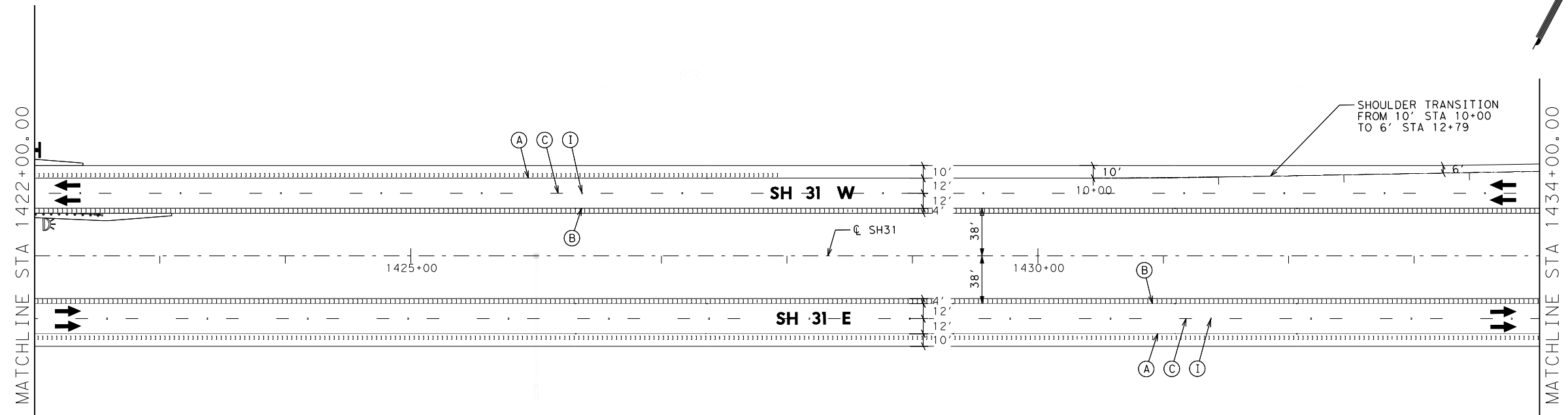
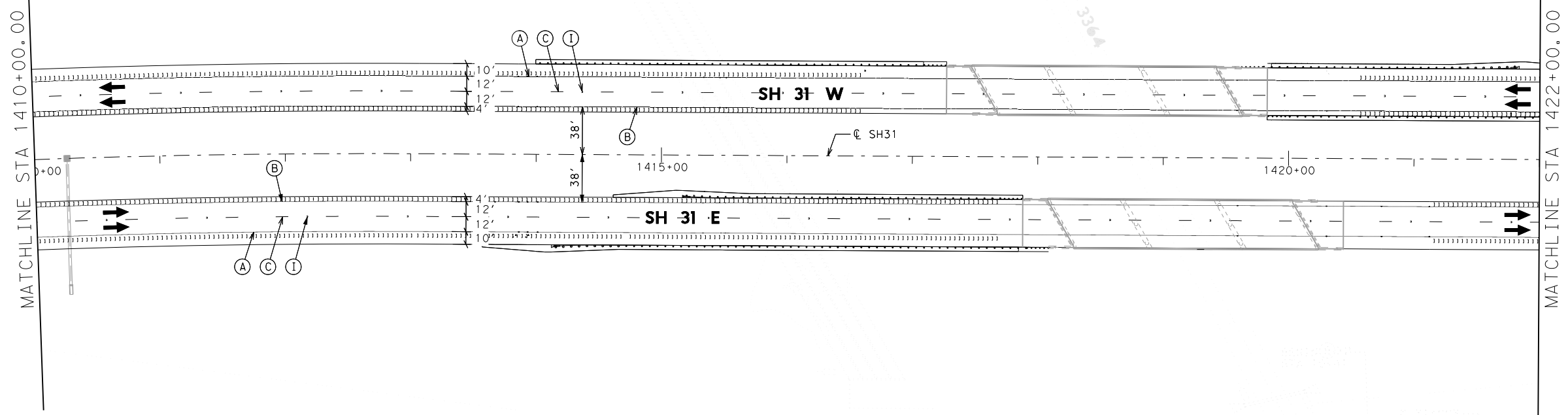
FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		45

7/1/2024 11:39:16 AM





- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (L) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb* P.E.  
SIGNATURE OF REGISTRANT & DATE  
7/1/2024

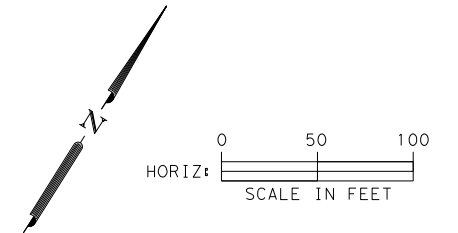


**PAVEMENT MARKING LAYOUTS**  
CSJ: 0162-13-002

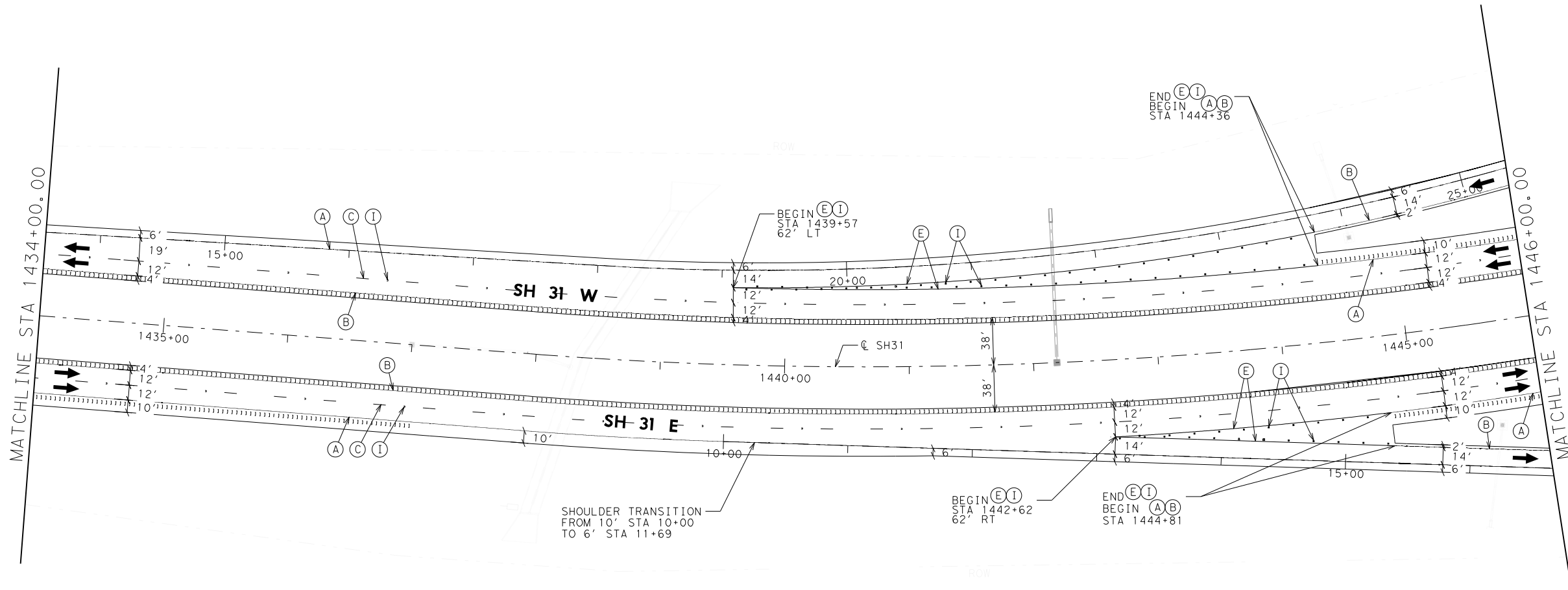
SHEET: 17 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		46

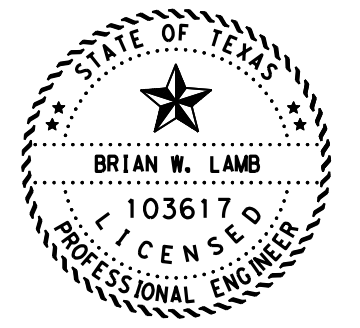
11:39:17 AM  
7/1/2024



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



7/1/2024 11:39:18 AM



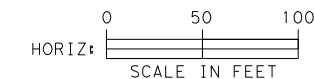
*Brian W. Lamb* PE  
 SIGNATURE OF REGISTRANT & DATE 7/1/2024



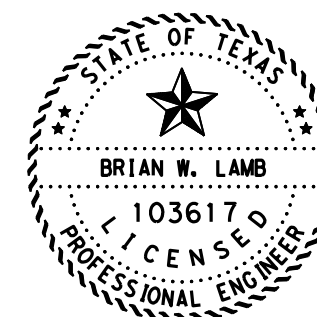
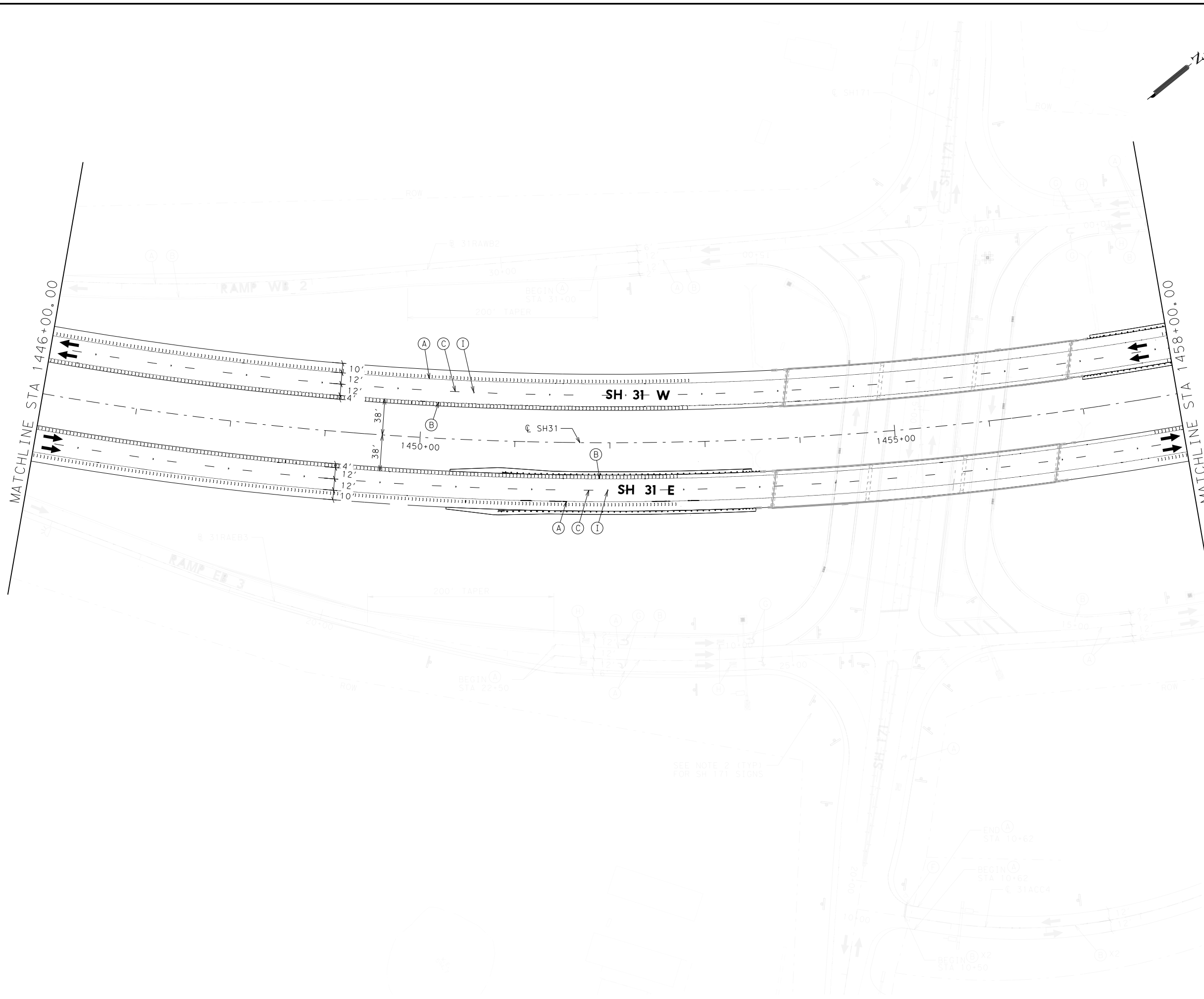
**PAVEMENT MARKING LAYOUTS**  
**CSJ: 0162-13-002**

SHEET: 18 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		47



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb* P.E.

7/1/2024

SIGNATURE OF REGISTRANT & DATE



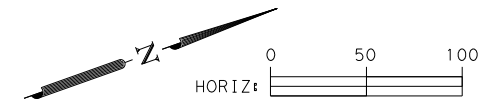
**PAVEMENT MARKING LAYOUTS**  
CSJ: 0162-13-002

SHEET: 19 OF 31

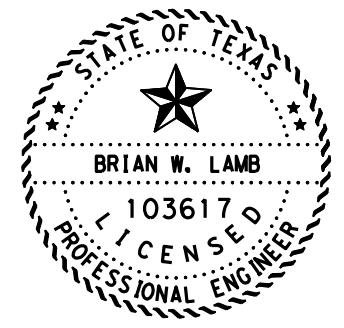
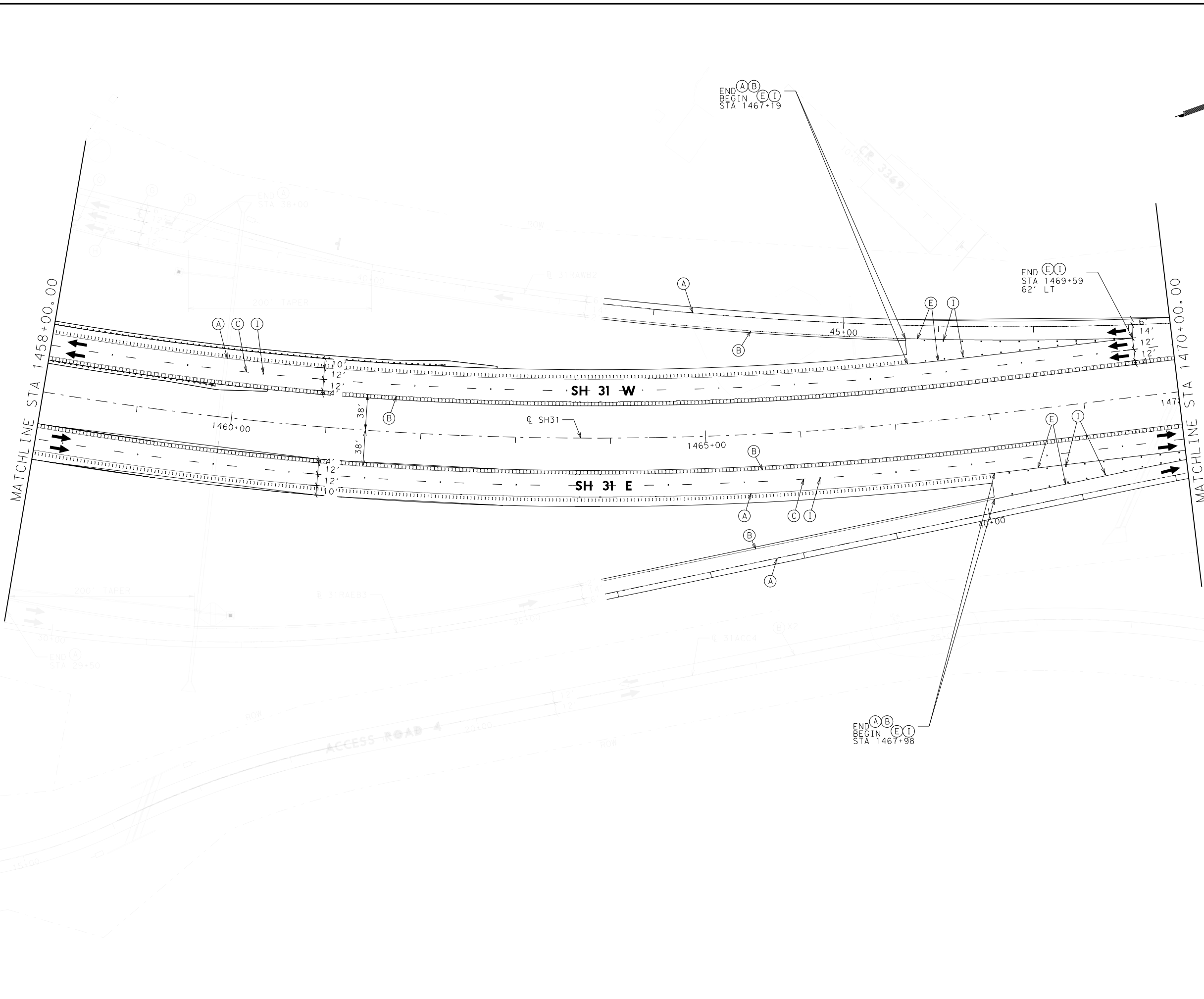
FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		48

11:39:20 AM

7/1/2024



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb* P.E. 7/1/2024  
 SIGNATURE OF REGISTRANT & DATE

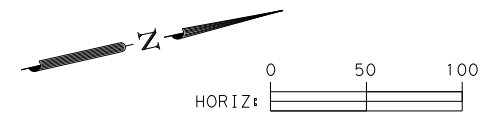


**PAVEMENT MARKING LAYOUTS**  
**CSJ: 0162-13-002**

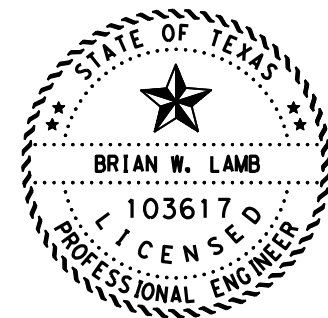
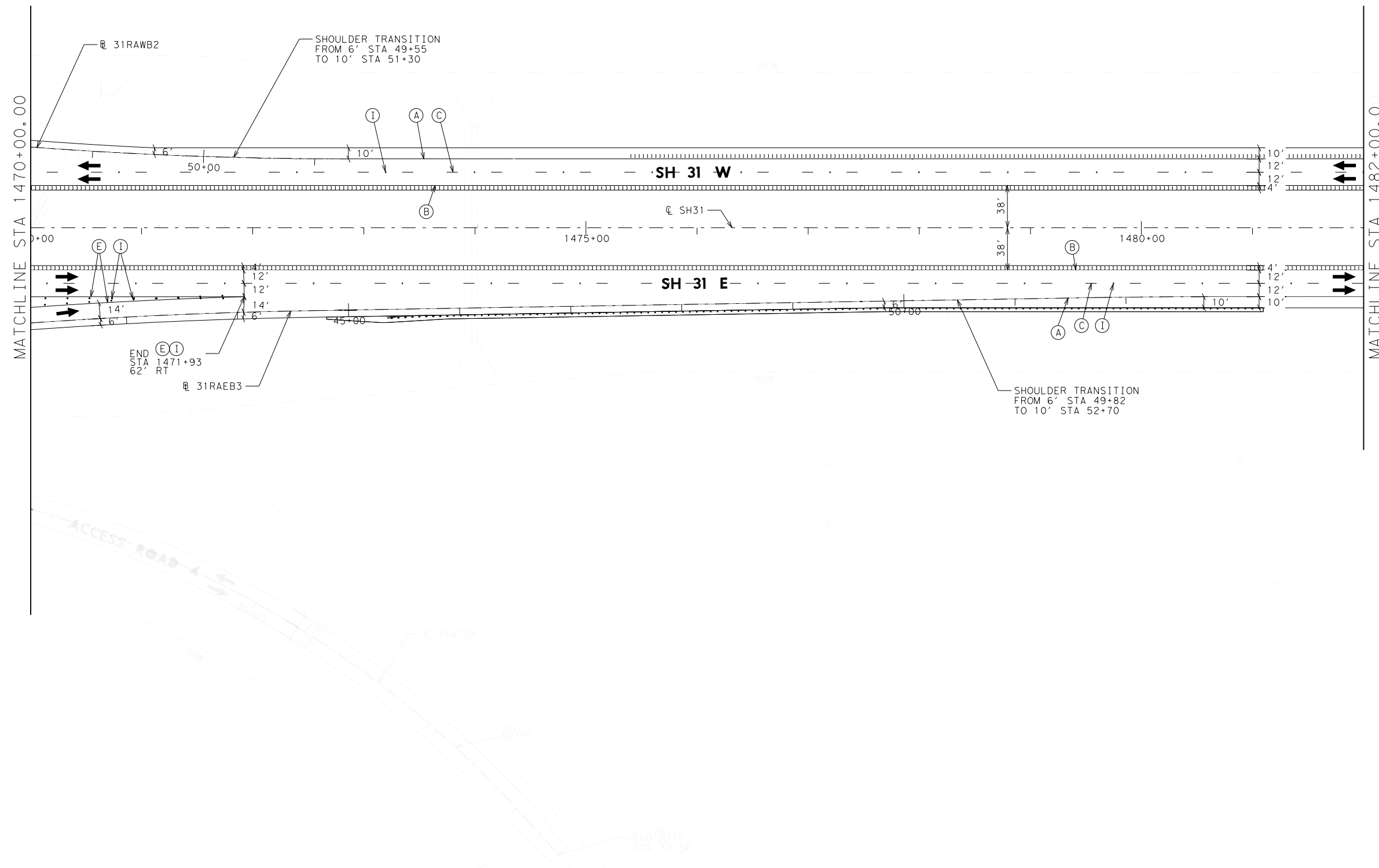
SHEET: 20 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		49

7/1/2024 11:39:21 AM



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb* P.E.  
 SIGNATURE OF REGISTRANT & DATE 7/1/2024

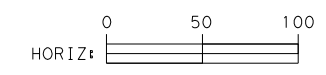
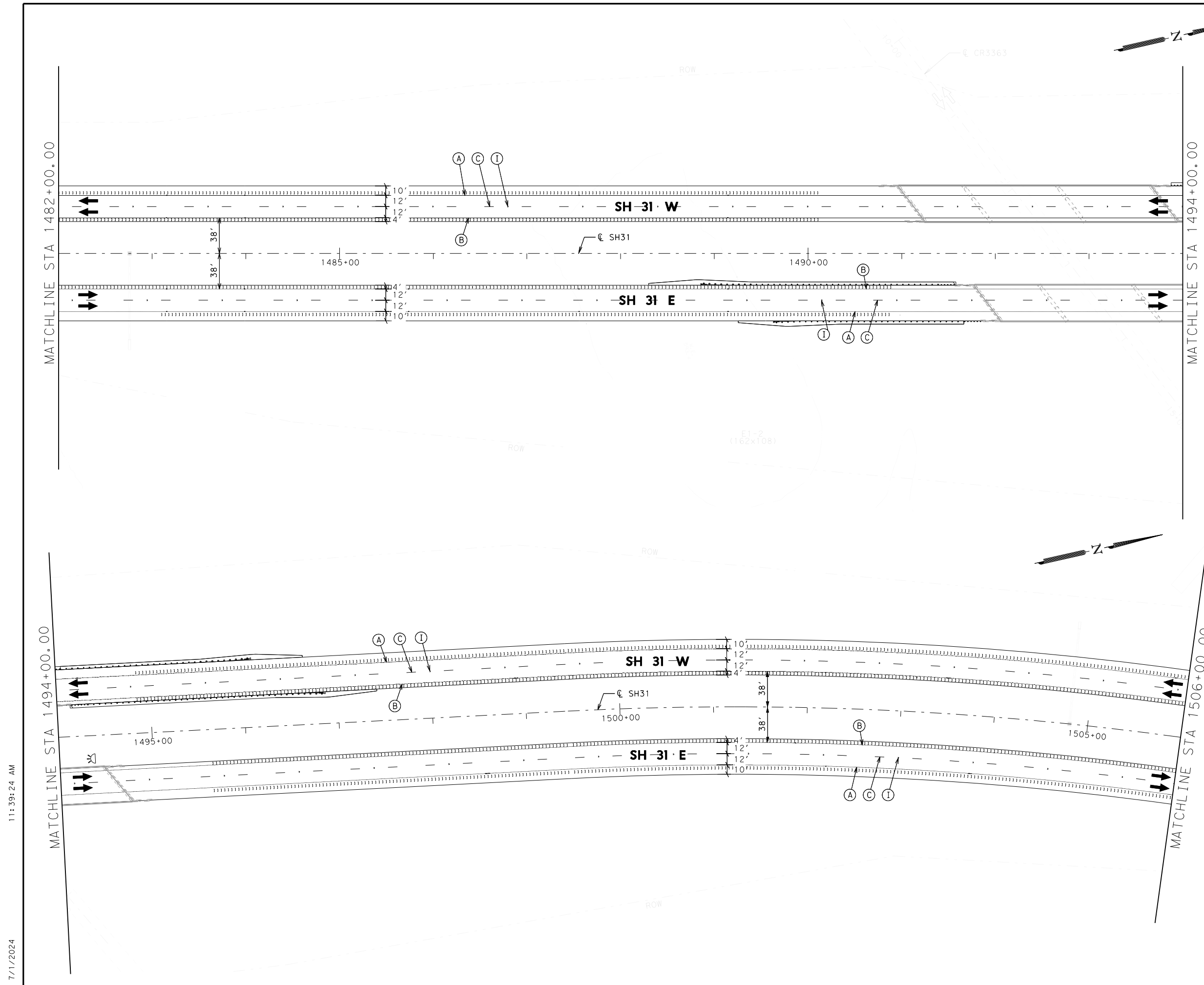


**PAVEMENT MARKING LAYOUTS**  
 CSJ: 0162-13-002

SHEET: 21 OF 31

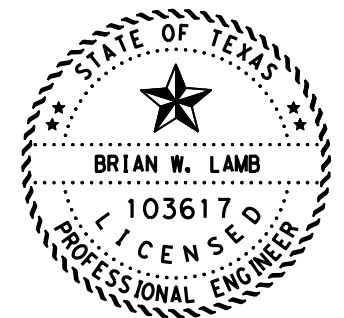
FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		50

7/1/2024 11:39:22 AM



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (L) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (M) REFL PAV MARK TYI W 12" (SLD)
  - (N) PREFAB PAV MARK TYC W 36" YLD TRI

7/1/2024 11:39:24 AM



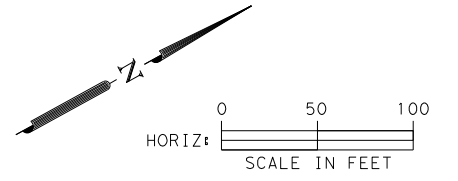
*Brian W. Lamb* P.E.  
 SIGNATURE OF REGISTRANT & DATE 7/1/2024



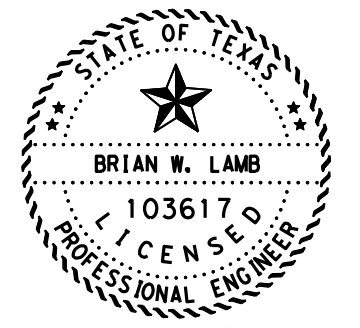
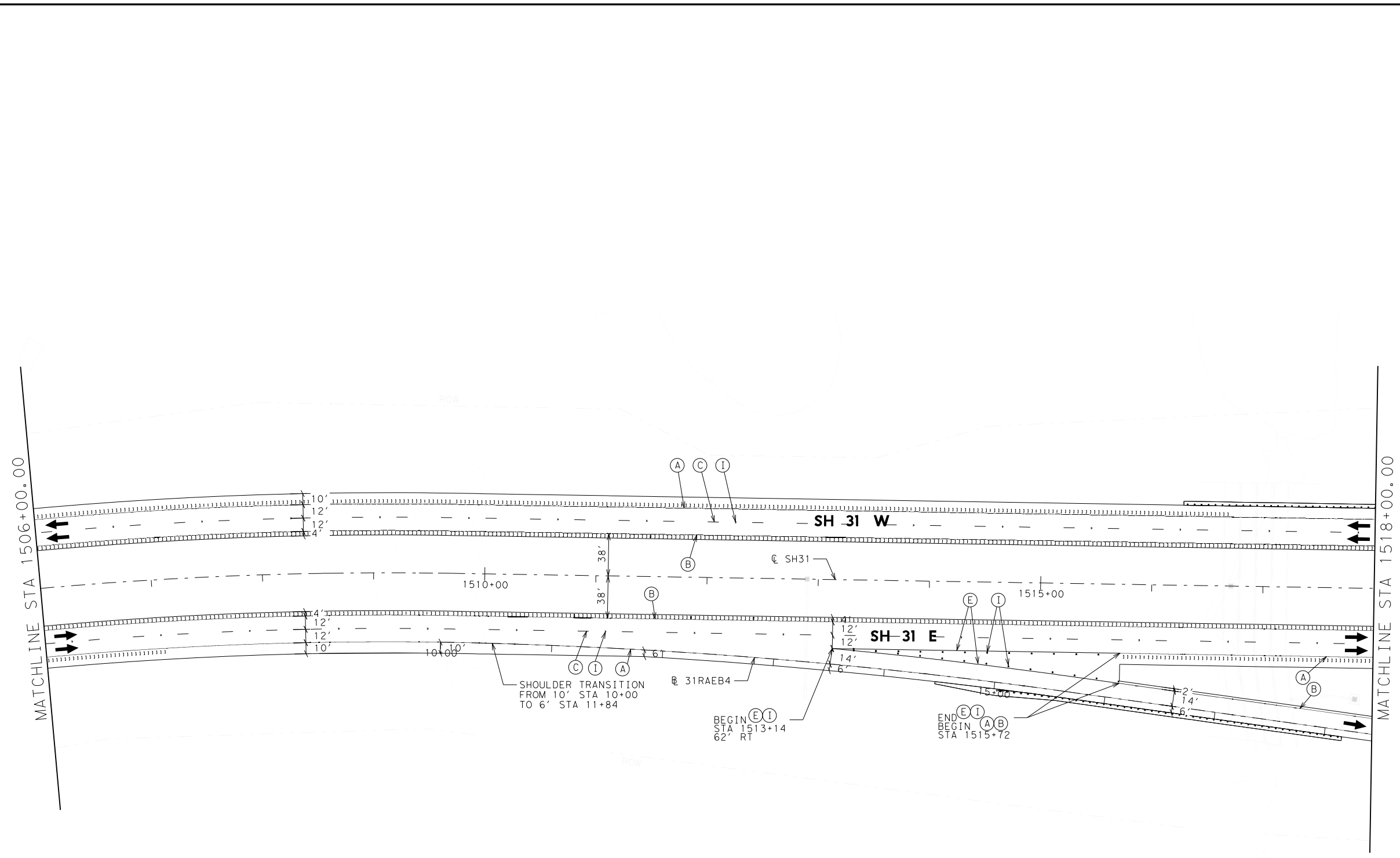
**PAVEMENT MARKING LAYOUTS**  
 CSJ: 0162-13-002

SHEET: 22 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		51



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb* P.E. 7/1/2024  
 SIGNATURE OF REGISTRANT & DATE

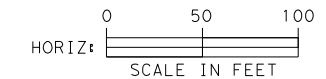


**PAVEMENT MARKING LAYOUTS**  
**CSJ: 0162-13-002**

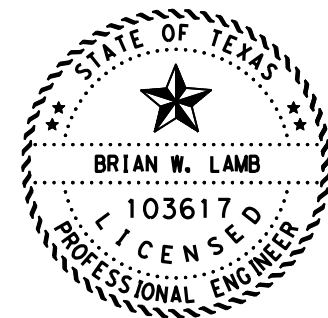
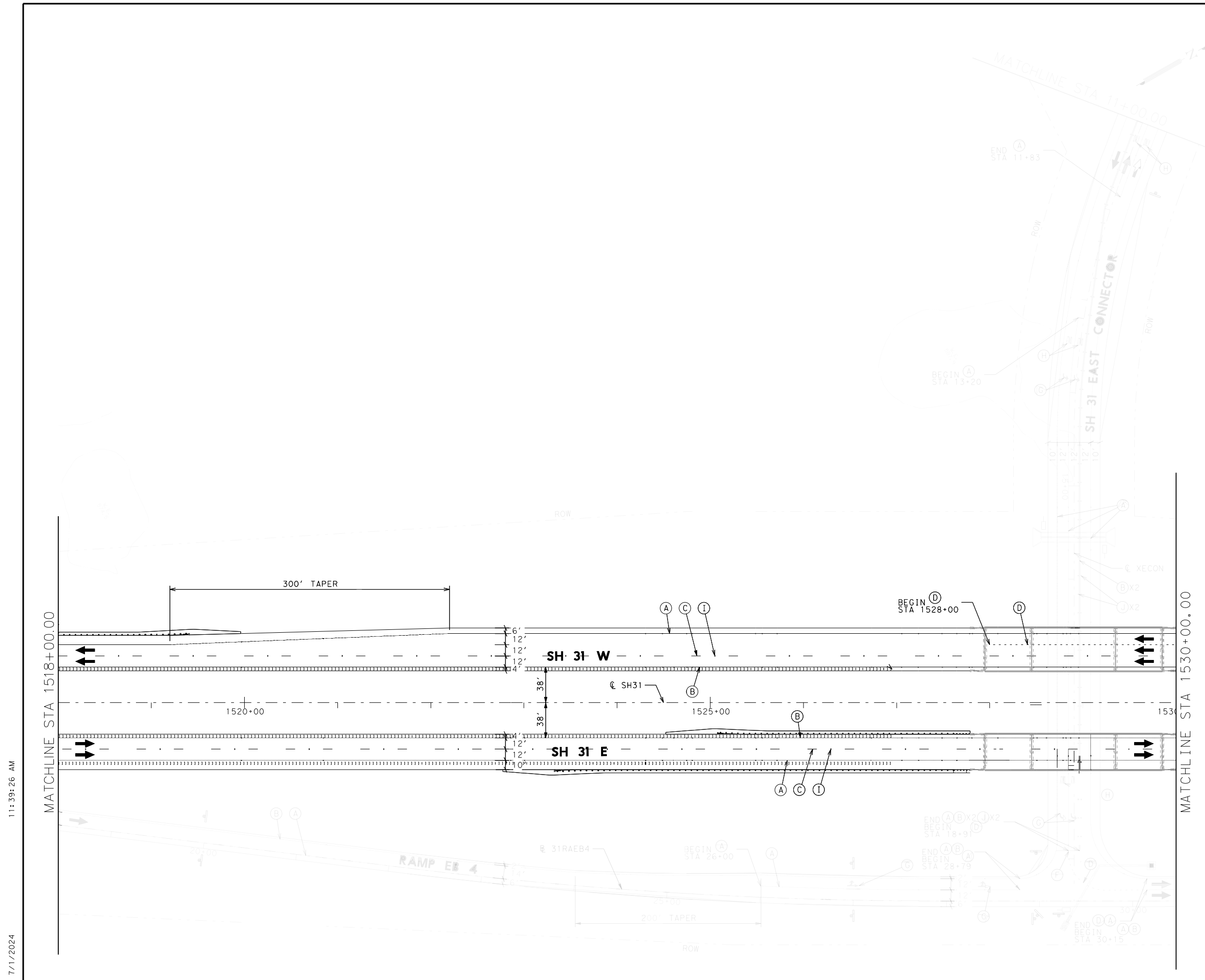
SHEET: 23 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		52

7/1/2024 11:39:25 AM



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb* P.E.  
 SIGNATURE OF REGISTRANT & DATE 7/1/2024



**PAVEMENT MARKING LAYOUTS**  
**CSJ: 0162-13-002**

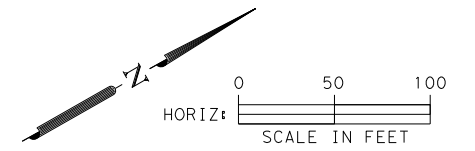
SHEET: 24 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		53

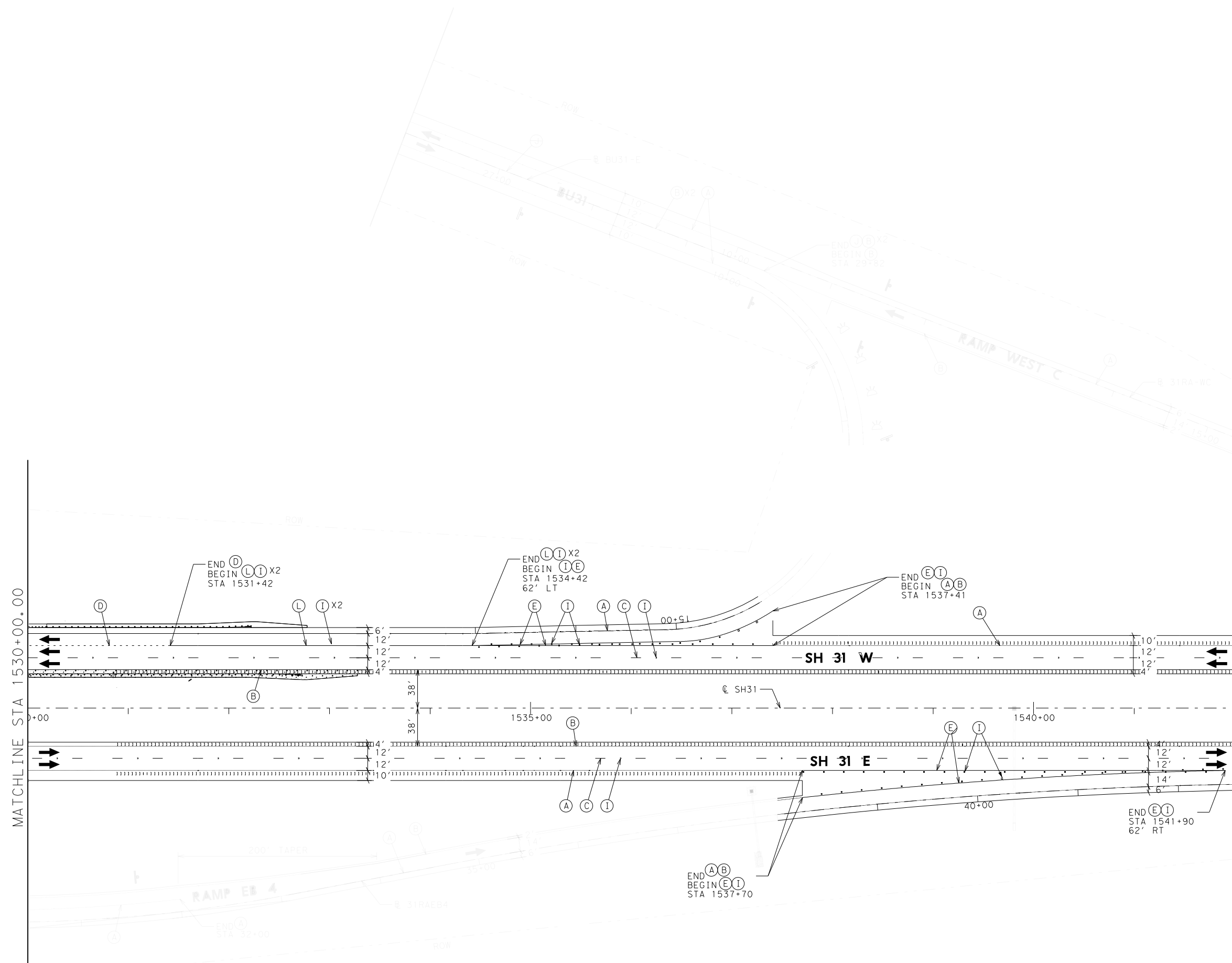
11:39:26 AM

7/1/2024





- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



7/1/2024 11:39:27 AM

**BRIAN W. LAMB**  
103617  
LICENSED PROFESSIONAL ENGINEER

*B. W. Lamb* P.E.  
SIGNATURE OF REGISTRANT & DATE 7/1/2024

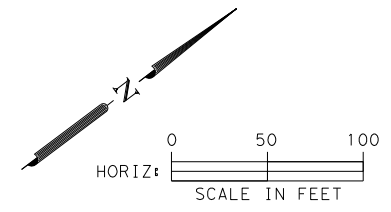
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## PAVEMENT MARKING LAYOUTS

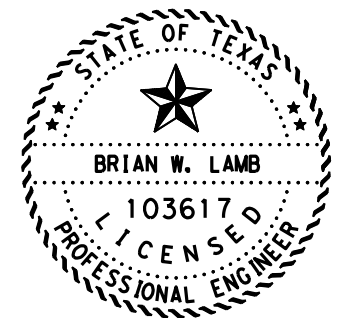
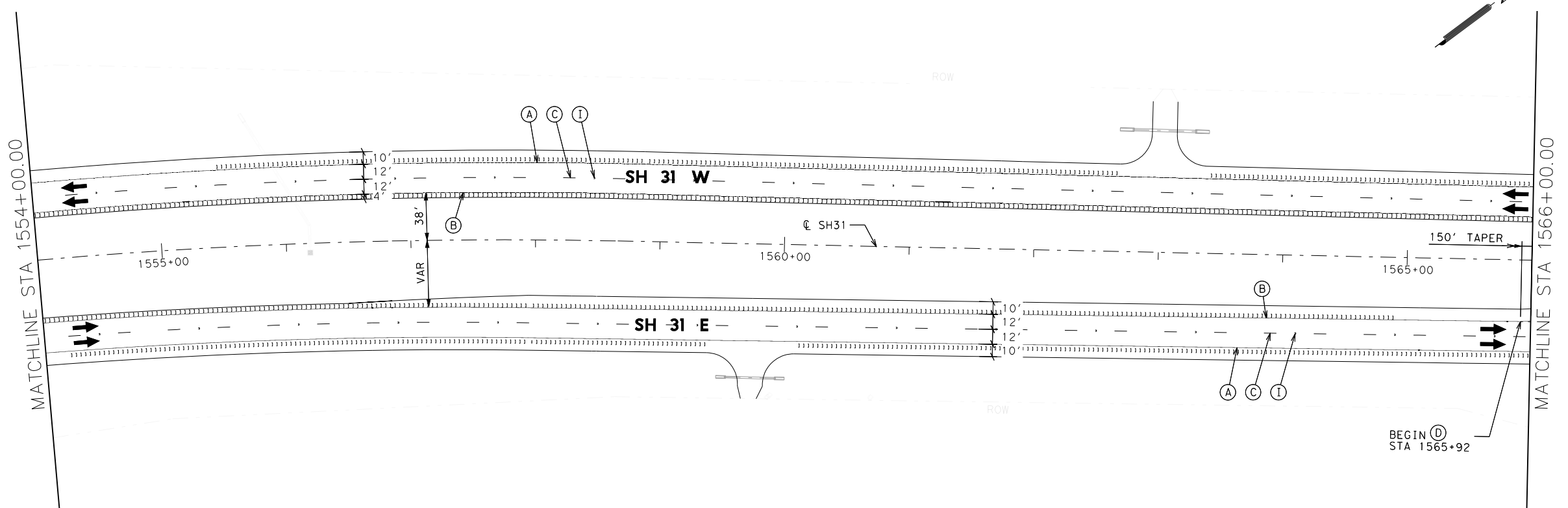
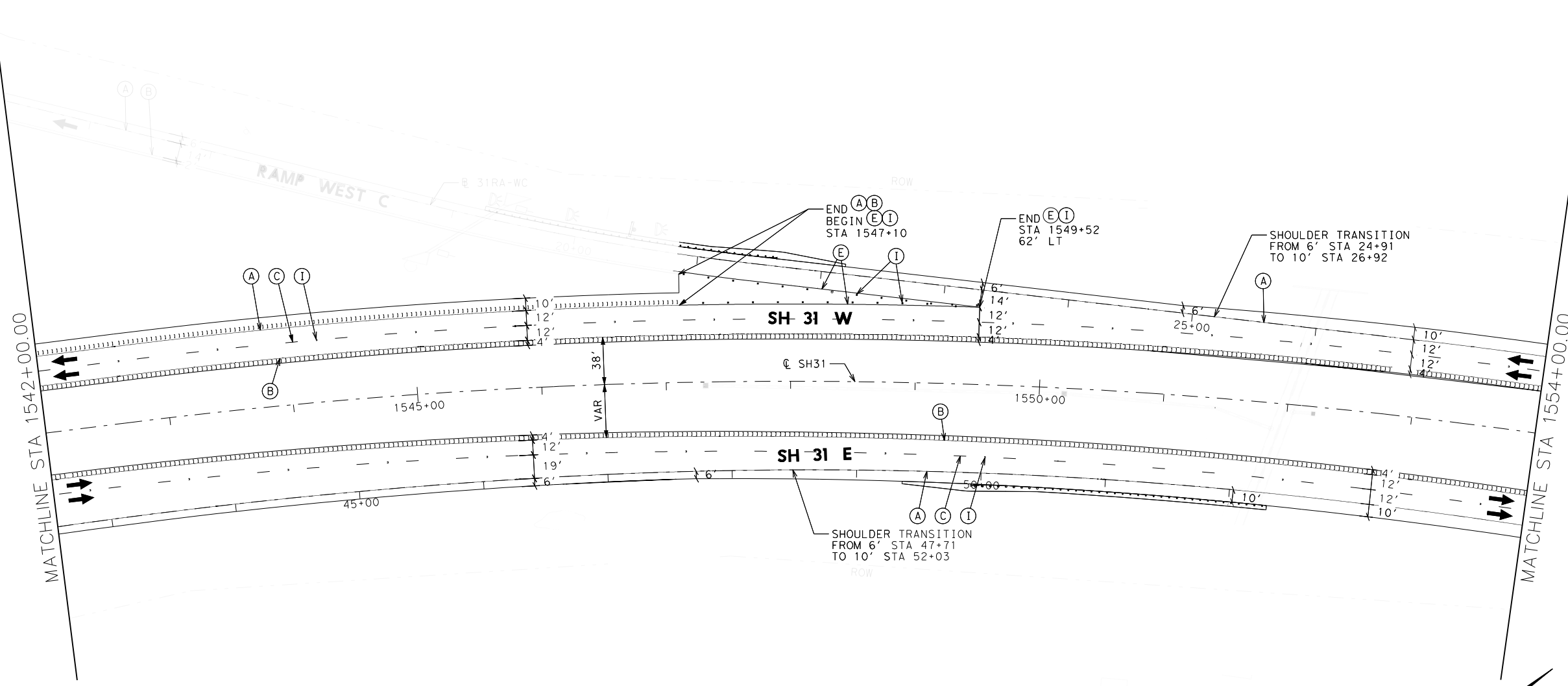
CSJ: 0162-13-002

SHEET: 25 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		54



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb* P.E.  
 SIGNATURE OF REGISTRANT & DATE 7/1/2024



**PAVEMENT MARKING LAYOUTS**  
**CSJ: 0162-13-002**

SHEET: 26 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		55

7/1/2024 11:39:28 AM

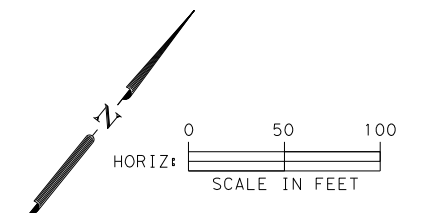
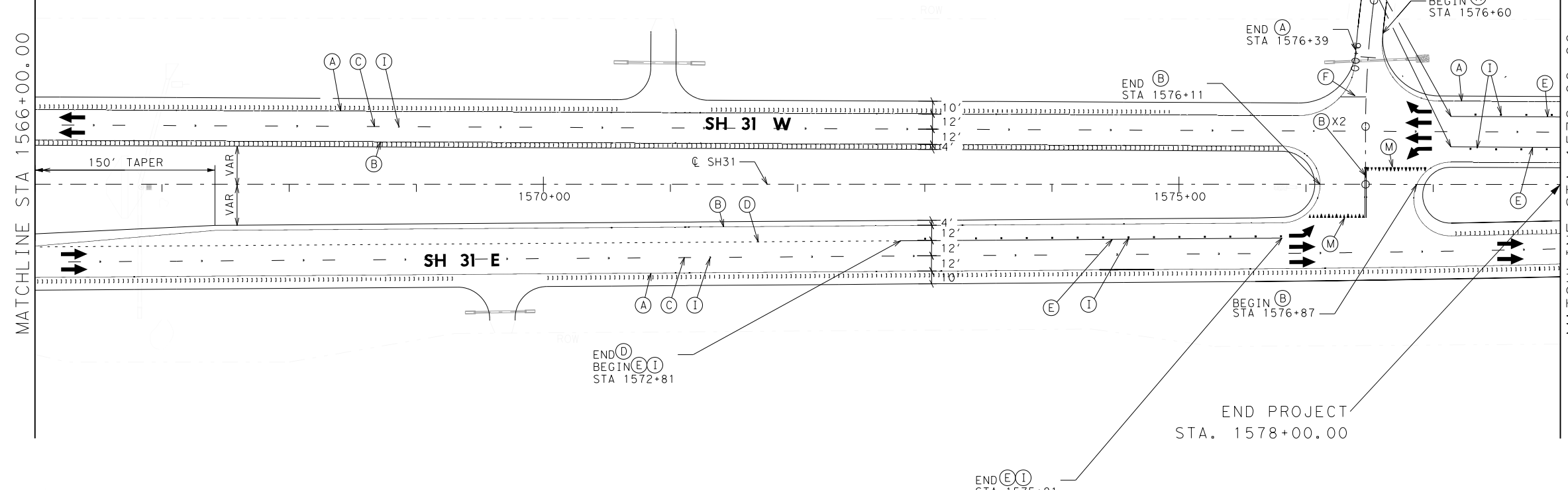
7/1/2024

MATCHLINE STA 1566+00.00

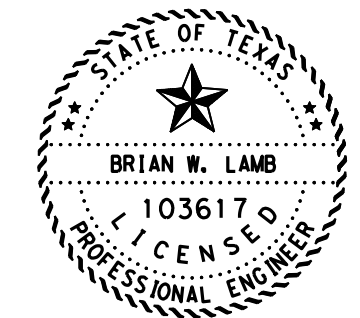
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MATCHLINE STA 1578+00.00

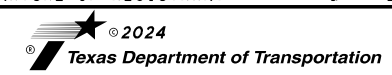
MATCHLINE STA 1590+00.00



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb* PE  
 SIGNATURE OF REGISTRANT & DATE 7/1/2024

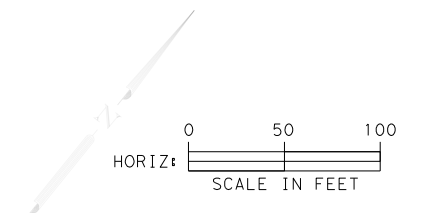


**PAVEMENT MARKING LAYOUTS**  
 CSJ: 0162-13-002

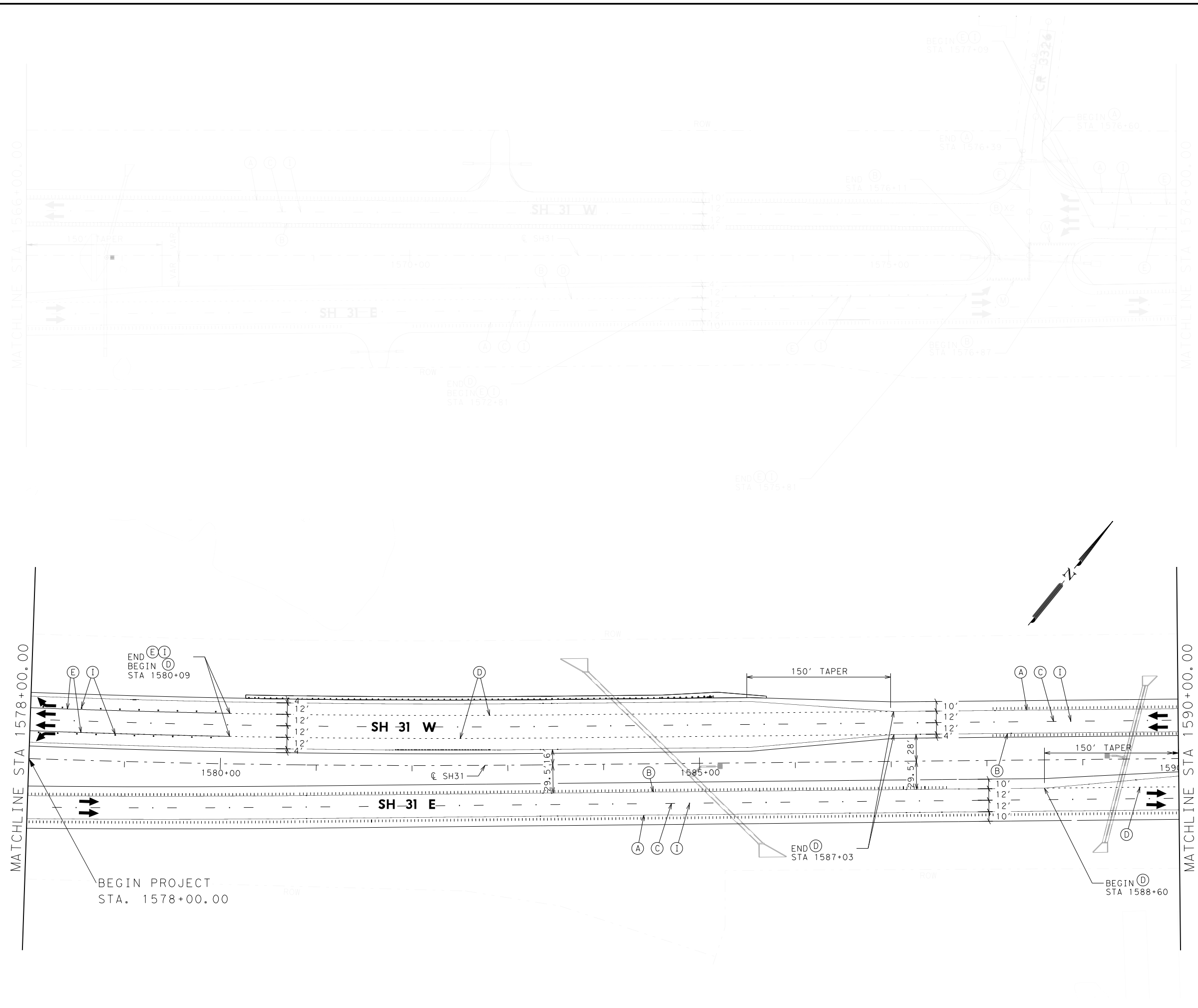
SHEET: 27 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		56

7/1/2024 11:39:30 AM



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



**BRIAN W. LAMB**  
103617  
LICENSED  
PROFESSIONAL ENGINEER

*Brian W. Lamb* PE.      7/1/2024  
SIGNATURE OF REGISTRANT      &      DATE

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## PAVEMENT MARKING LAYOUTS

**CSJ: 0162-02-047**

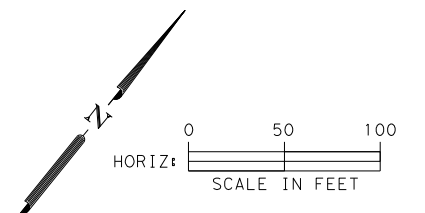
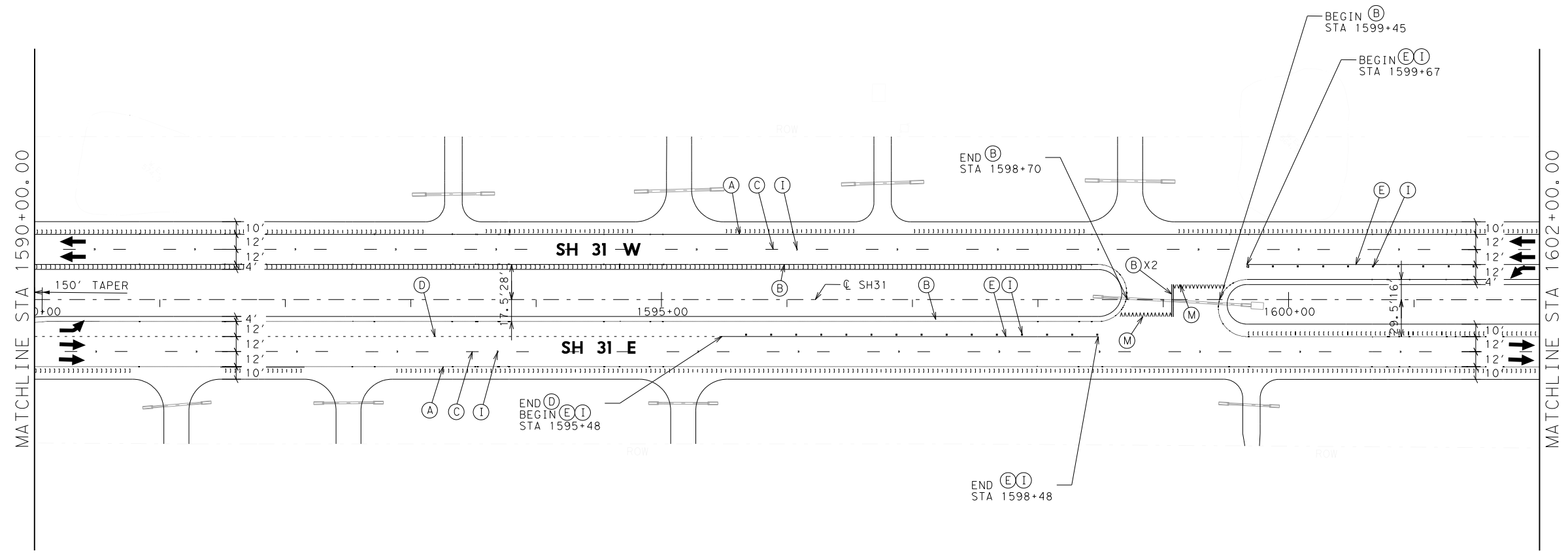
SHEET: 28 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		57

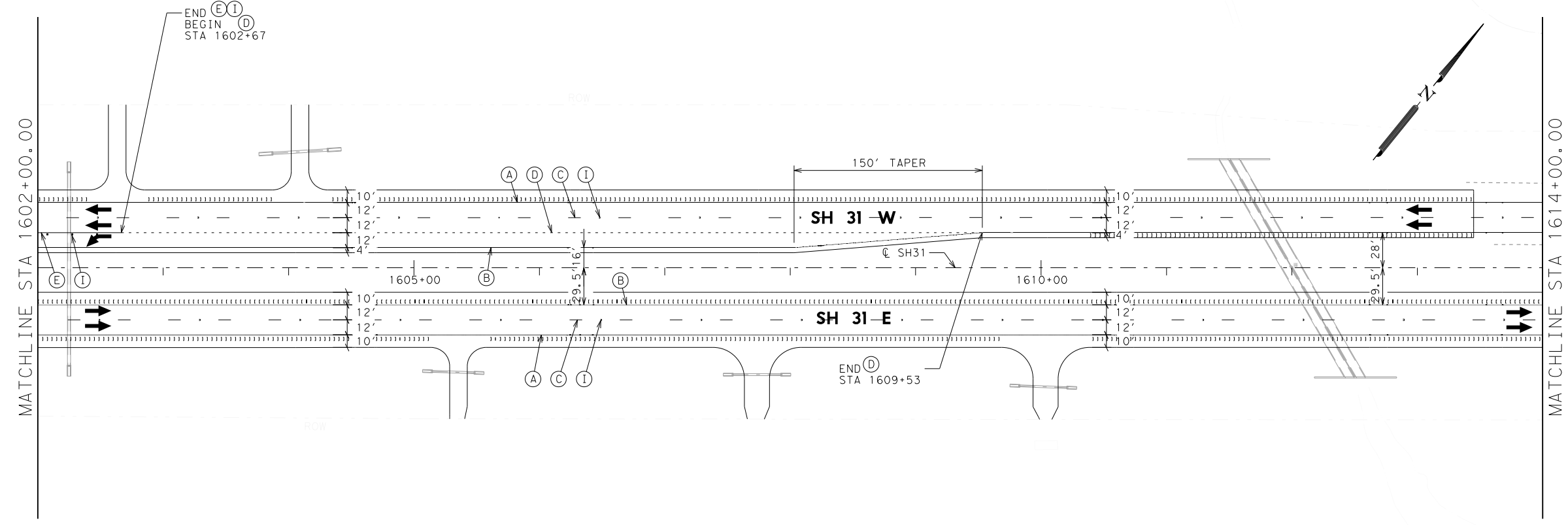
7/1/2024 11:39:31 AM

11:39:32 AM

7/1/2024



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



**BRIAN W. LAMB**  
103617  
LICENSED PROFESSIONAL ENGINEER

*Brian W. Lamb* 7/1/2024  
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**PAVEMENT MARKING LAYOUTS**  
CSJ: 0162-02-047

SHEET: 29 OF 31

FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		58

11:39:33 AM

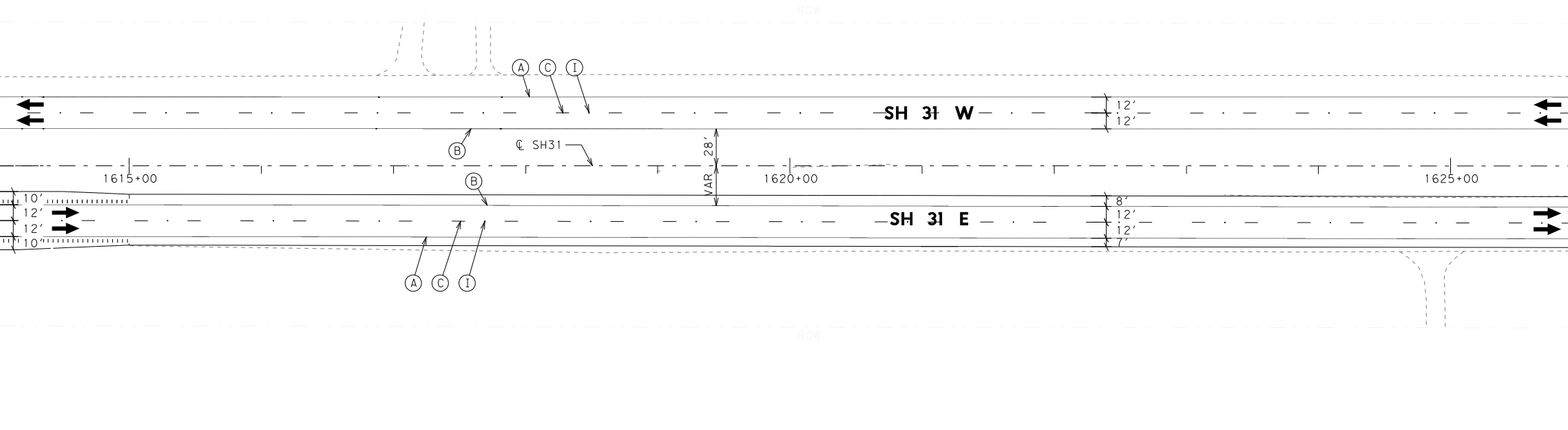
7/1/2024

MATCHLINE STA 1614+00.00

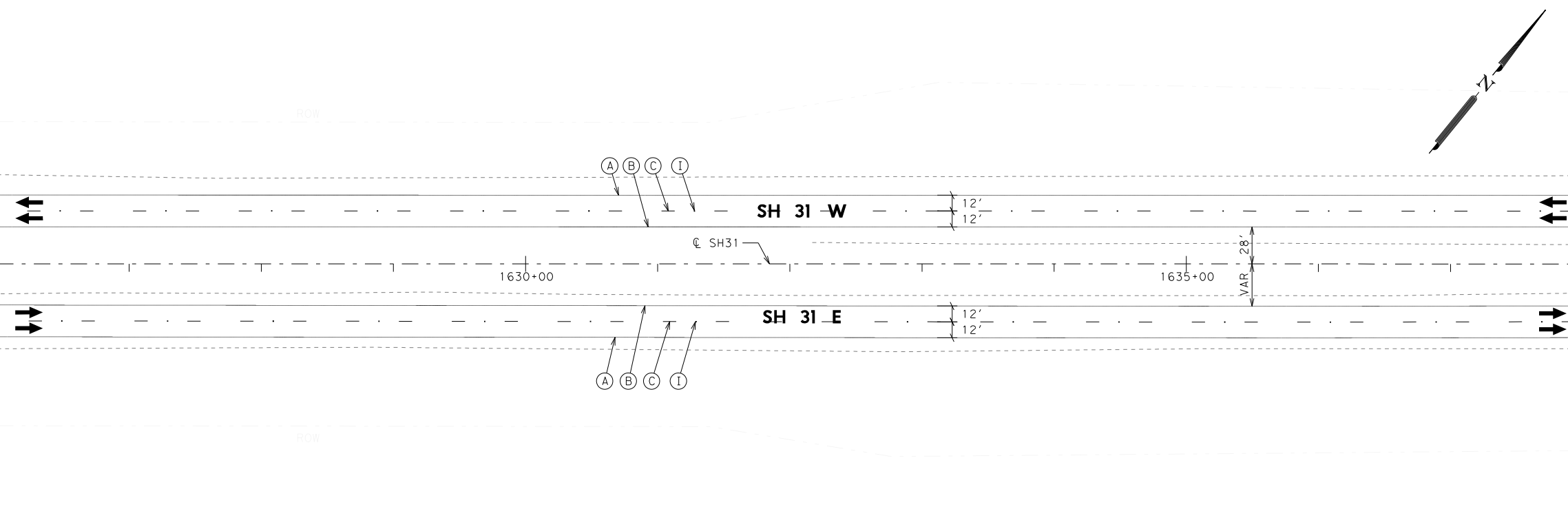
MATCHLINE STA 1626+00.00

MATCHLINE STA 1626+00.00

MATCHLINE STA 1638+00.00



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



**BRIAN W. LAMB**  
103617  
LICENSED PROFESSIONAL ENGINEER

7/1/2024

SIGNATURE OF REGISTRANT & DATE

**PAVEMENT MARKING LAYOUTS**  
CSJ: 0162-02-047

SHEET: 30 OF 31

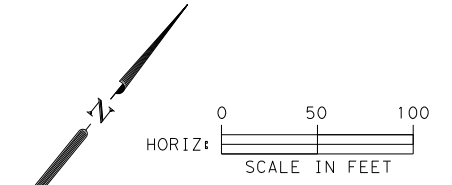
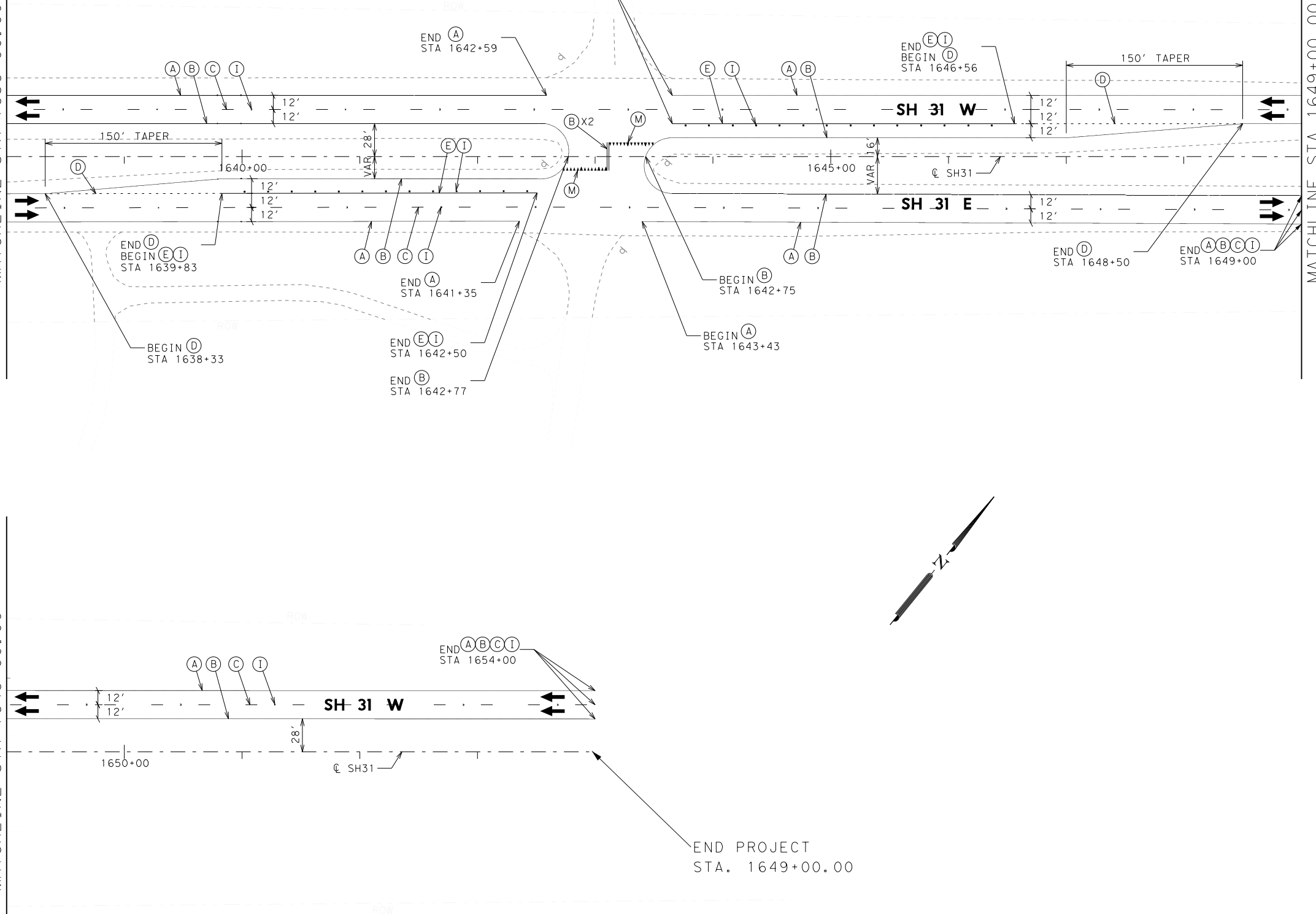
FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		59

11:39:35 AM

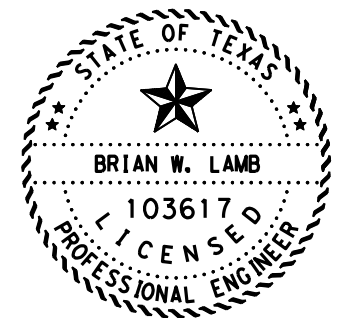
7/1/2024

MATCHLINE STA 1638+00.00

MATCHLINE STA 1649+00.00



- LEGEND:
- (A) RE PM W/RET REQ TYI W 6" (SLD)
  - (B) RE PM W/RET REQ TYI Y 6" (SLD)
  - (C) RE PM W/RET REQ TYI W 6" (BRK)
  - (D) REFL PAV MARK TYI W 8" (DOT)
  - (E) REFL PAV MARK TYI W 8" (SLD)
  - (F) REFL PAV MARK TYI W 24" (SLD)
  - (G) REFL PAV MARK TYI W (ARROW)
  - (H) REFL PAV MARK TYI W (WORD)
  - (I) RAISED PAVE MARK (TY II-C-R)
  - (J) RAISED PAVE MARK (TY II-A-A)
  - (K) RE PM W/RET REQ TYI Y 6" (BRK)
  - (L) REFL PAV MARK TYI W 12" (SLD)
  - (M) PREFAB PAV MARK TYC W 36" YLD TRI



*Brian W. Lamb*  
SIGNATURE OF REGISTRANT & DATE  
7/1/2024



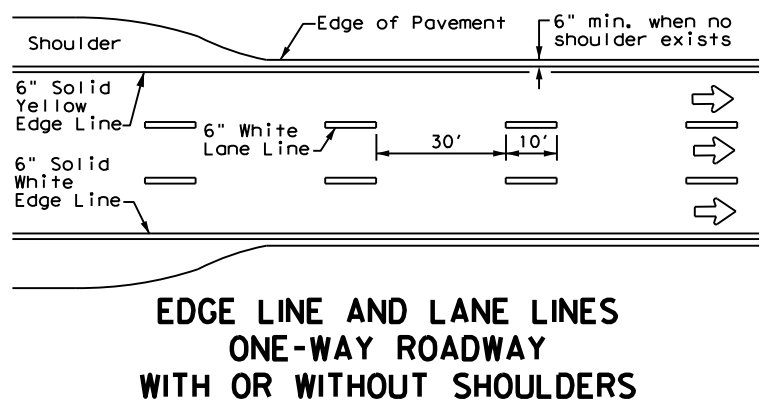
**PAVEMENT MARKING LAYOUTS**  
CSJ: 0162-02-047

SHEET: 31 OF 31

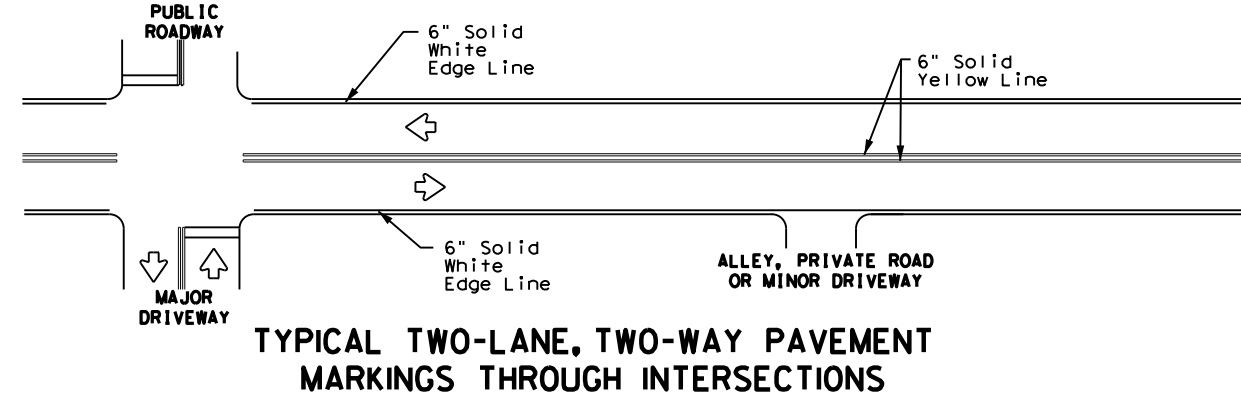
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6	0162	13	002, ETC.	SH 31
STATE	DIST	COUNTY		SHEET NO.
TEXAS	WACO	HILL		60

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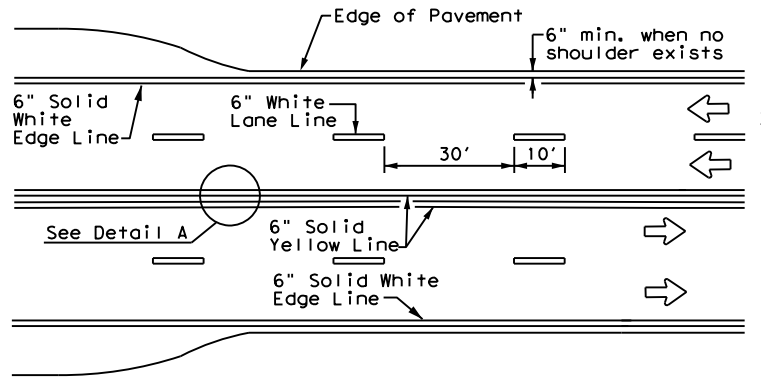
DATE: 7/1/2024 11:39:55 AM  
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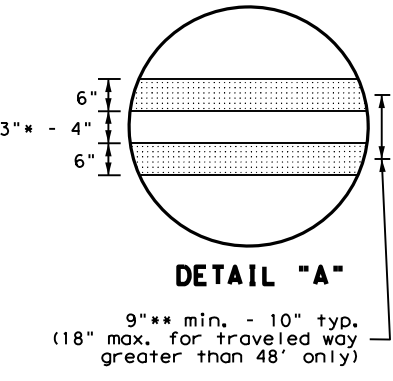
**EDGE LINE AND LANE LINES  
ONE-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



**TYPICAL TWO-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**

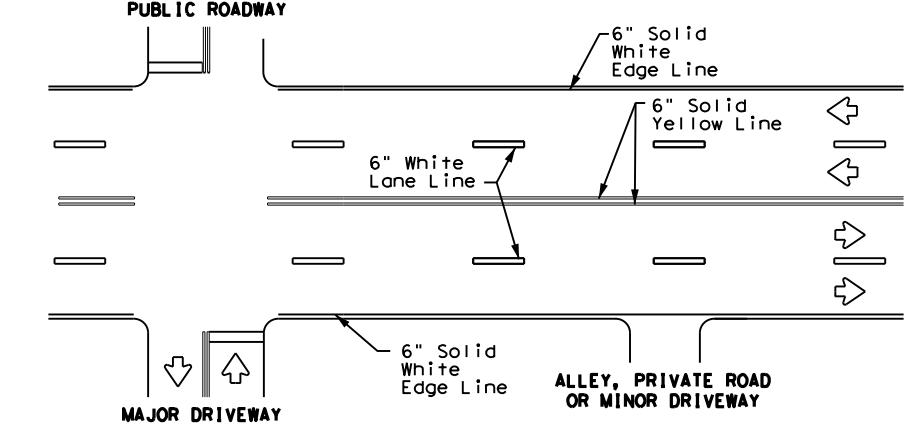


**CENTERLINE AND LANE LINES  
FOUR LANE TWO-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**

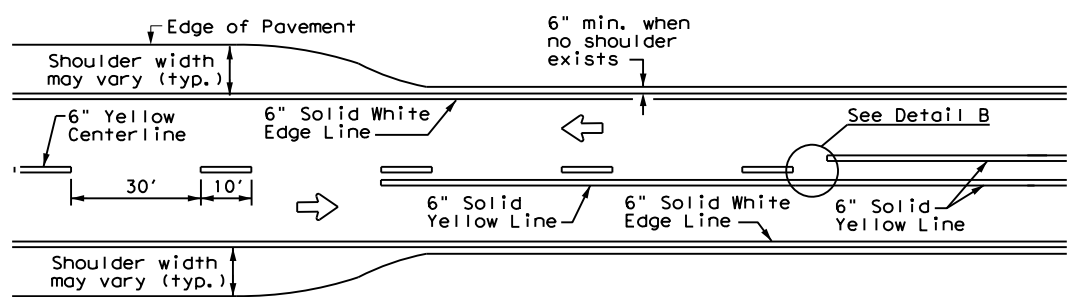


**DETAIL "A"**  
9" min. - 10" typ.  
(18" max. for traveled way  
greater than 48' only)

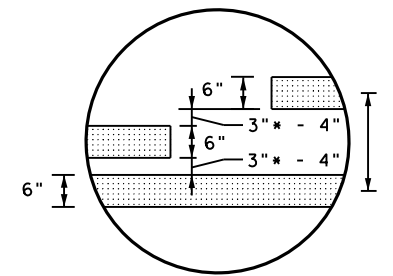
\* 2" minimum for restripe projects when approved by the Engineer.  
\*\* 8" minimum for restripe projects when approved by the Engineer.



**TYPICAL MULTI-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**

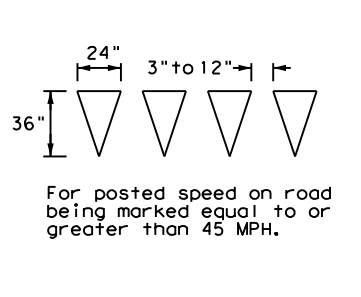


**TWO LANE TWO-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**

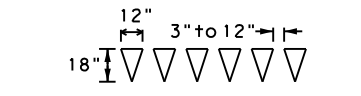


**DETAIL "B"**

\* 2" minimum for restripe projects when approved by the Engineer.



**YIELD LINES**



For posted speed on road being marked equal to or less than 40 MPH.

**NOTES**

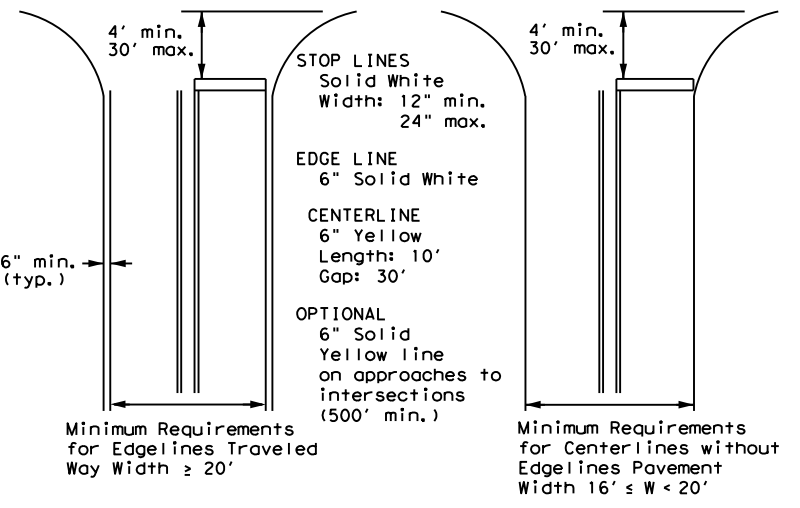
- Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling 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.
- 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.
- 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**

- 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.
- 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

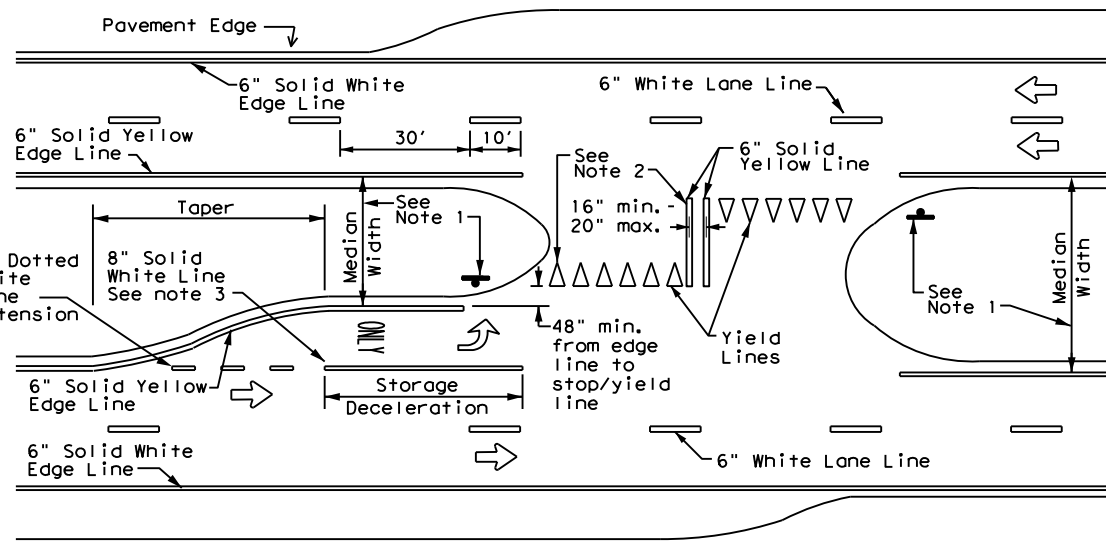
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



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



**FOUR LANE DIVIDED ROADWAY CROSSOVERS**

**TYPICAL STANDARD  
PAVEMENT MARKINGS**

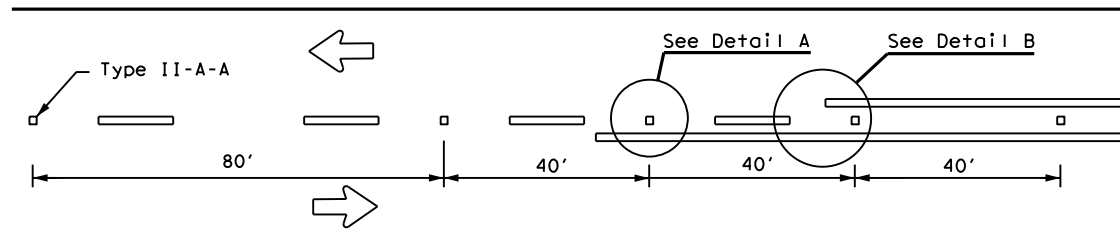
**PM(1) - 22**

FILE:	pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT	December 2022	CONT	SECT	JOB	HIGHWAY
11-78	8-00 6-20	0162	13	032, ETC.	SH 31
8-95	3-03 12-22	DIST	COUNTY	SHEET NO.	
5-00	2-12	WAC	HILL		61

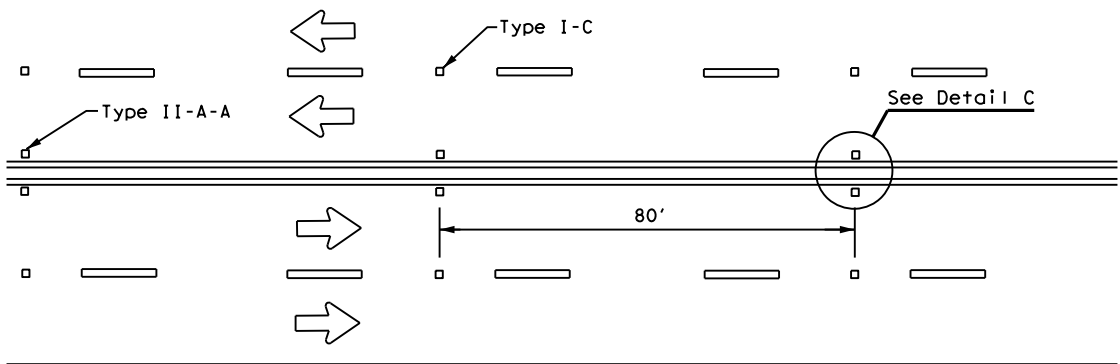


# REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

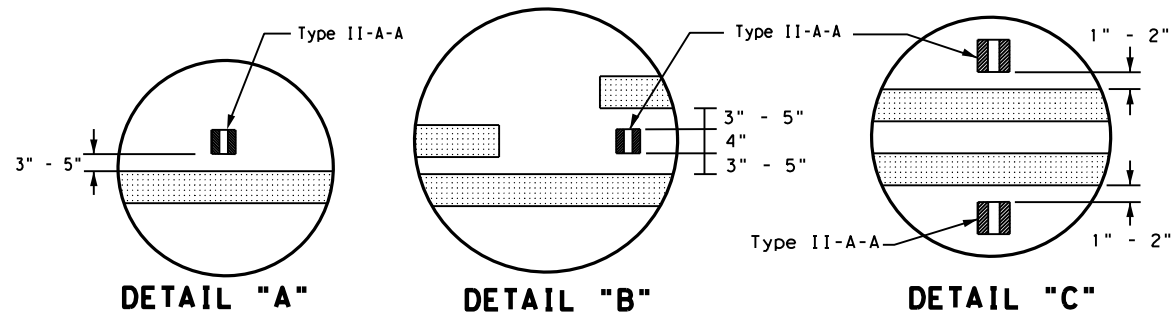
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to metric units or for any changes to this standard.



**CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS**



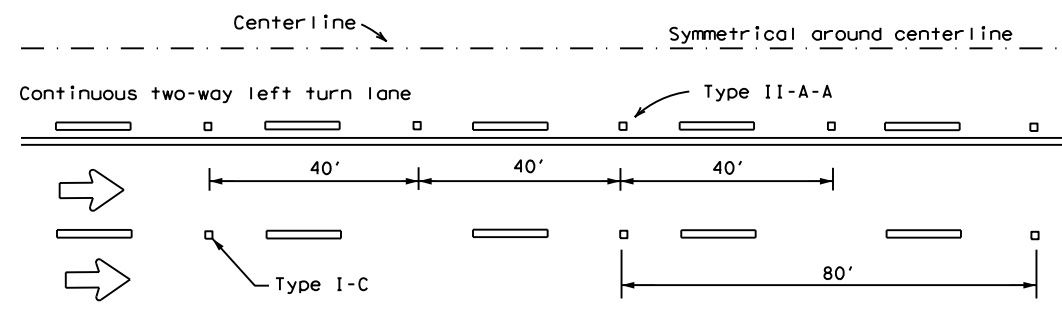
**CENTERLINE & LANE LINES  
FOR FOUR LANE TWO-WAY ROADWAYS**



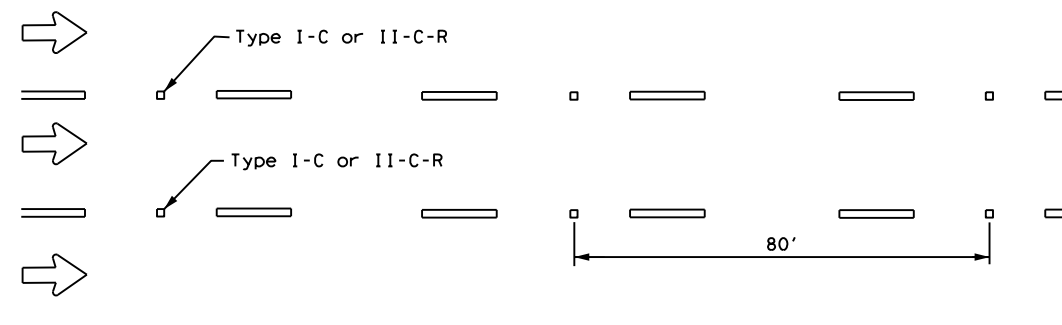
**DETAIL "A"**

**DETAIL "B"**

**DETAIL "C"**

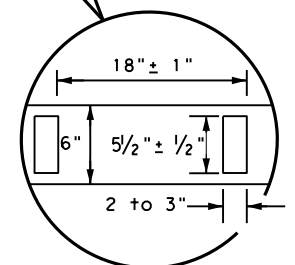
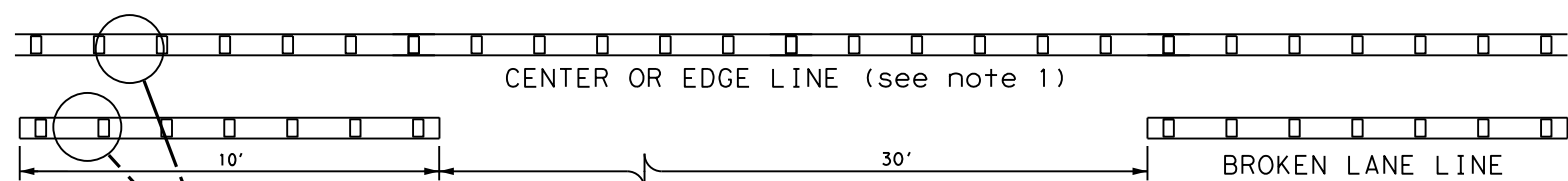


**CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE**



**LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)**

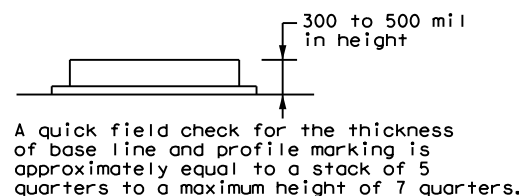
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.  
 See Note 3.



**REFLECTORIZED PROFILE  
PATTERN DETAIL**

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

6" EDGE LINE, 6" CENTERLINE  
OR 6" LANE LINE



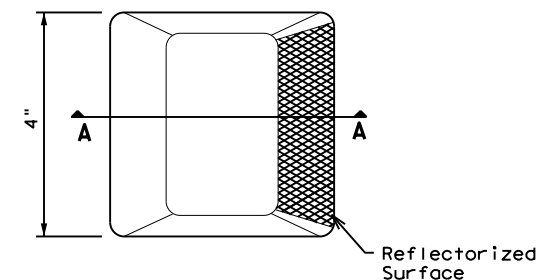
A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

**NOTES**

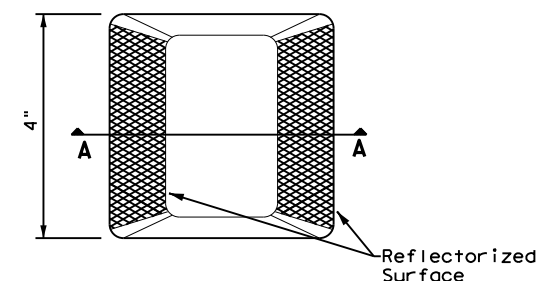
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

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

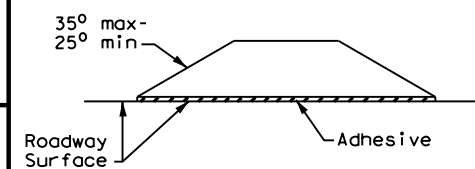
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



**Type I (Top View)**



**Type II (Top View)**



**SECTION A**

**RAISED PAVEMENT MARKERS**

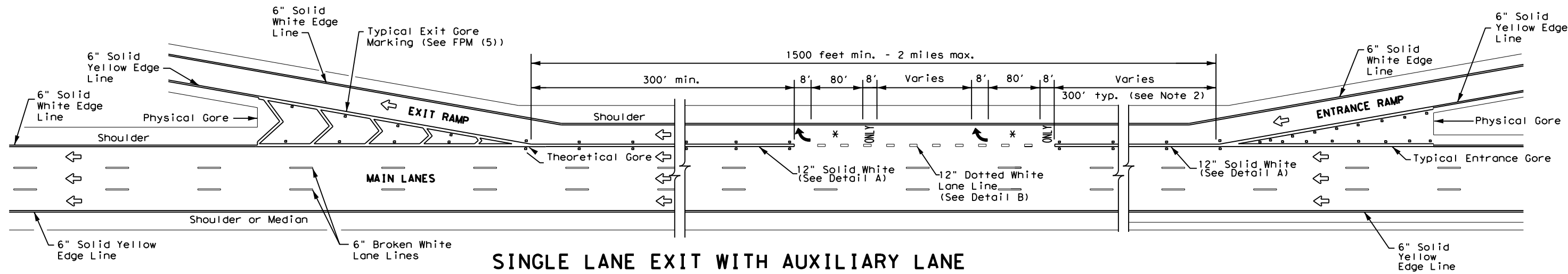


**POSITION GUIDANCE USING  
RAISED MARKERS  
REFLECTORIZED PROFILE  
MARKINGS  
PM(2) - 22**

FILE: pm2-22.dgn	DWG:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0162	13	032, ETC.	SH 31
4-77 8-00 6-20	DIST	COUNTY	SHEET NO.	
4-92 2-10 12-22	WAC	HILL	62	
5-00 2-12				

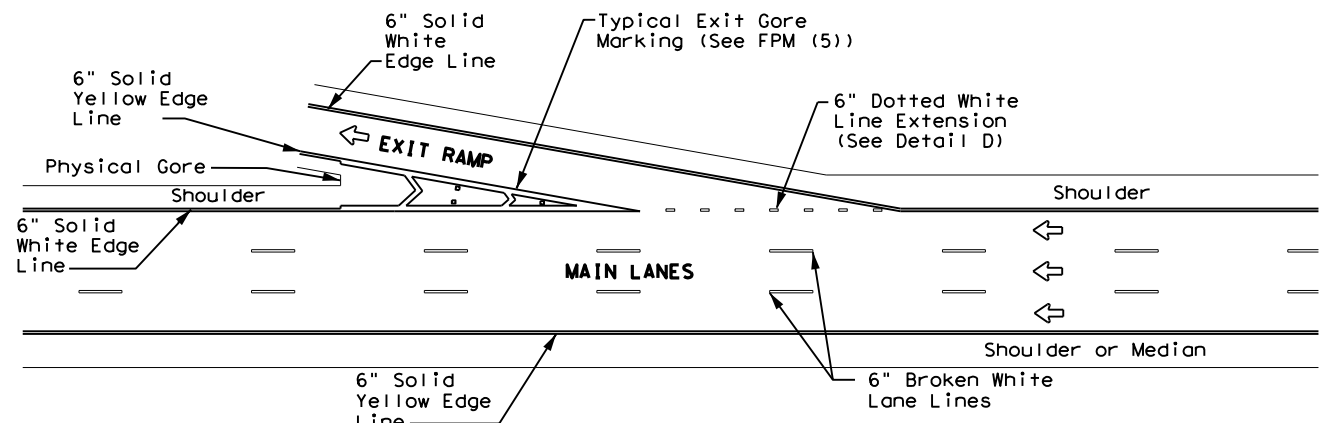
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DATE: 7/1/2024 11:40:29 AM  
 FILE: \\txdot.projectwiseonline.com:txdot13\Documents\09 - WAC\Design Projects\09-0022\09-0022.dgn



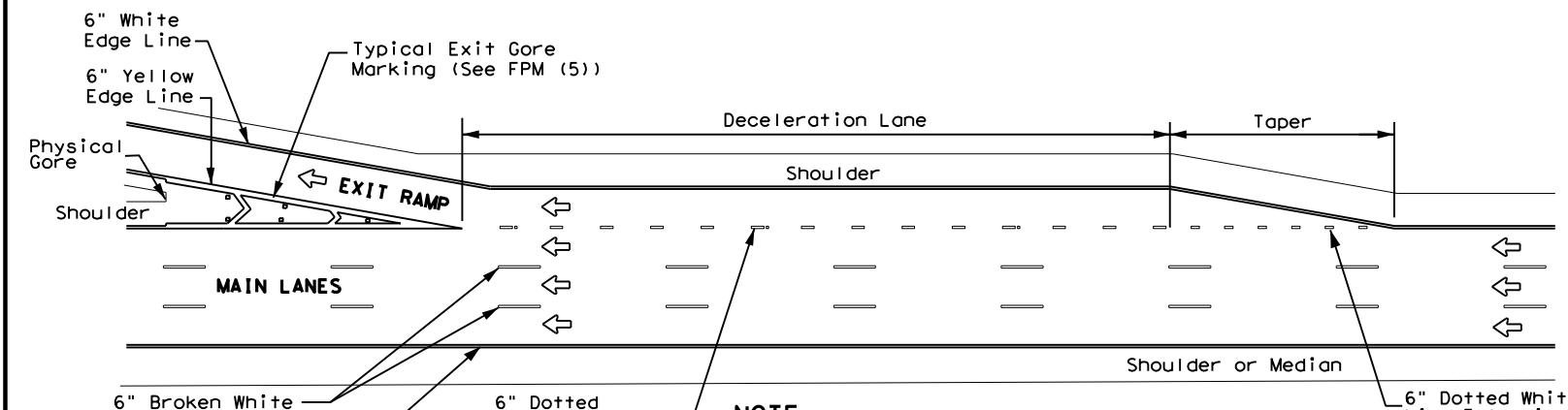
**SINGLE LANE EXIT WITH AUXILIARY LANE**

(See Note 2)



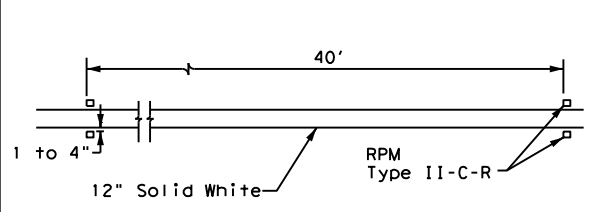
**TAPERED DECELERATION LANE**

**NOTE**  
 Reference Roadway Design Manual Chapter 3 to determine if tapered deceleration lane may be used.

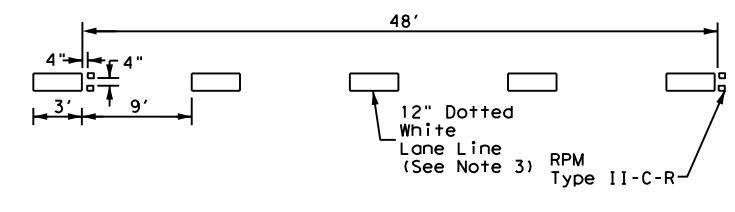


**PARALLEL DECELERATION LANE**

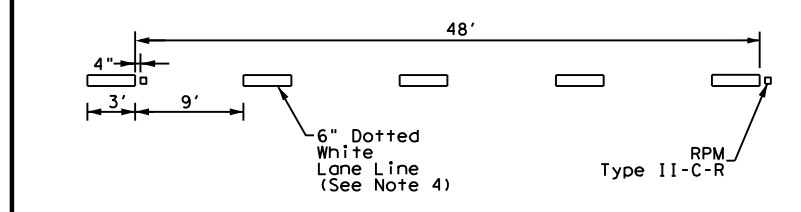
**NOTE**  
 Reference Roadway Design Manual Chapter 3 to determine length of deceleration lane and taper.



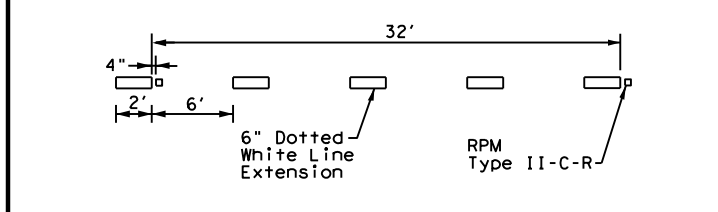
**DETAIL A**



**DETAIL B**



**DETAIL C**



**DETAIL D**

**GENERAL NOTES**

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Normal (6") dotted lane line (see Detail C) is used at parallel acceleration and deceleration lanes.
5. See FPM(1) for traffic lane line pavement marking details.

LEGEND	
←	Traffic flow
↩	Pavement marking arrows (white)
□	Reflectorized Raised Markers (RPM) Type II-C-R
✱	Arrow markings are optional, however "ONLY" is required if arrow is used

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



**TYPICAL STANDARD  
 FREEWAY PAVEMENT MARKINGS  
 ENTRANCE AND EXIT RAMP**

**FPM(2) - 22**

FILE: fpm(2)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0162	13	032, ETC.	SH 31
2-77 5-00 2-12	DIST	COUNTY	SHEET NO.	
4-92 8-00 10-22	WAC	HILL	63	
8-95 2-10				





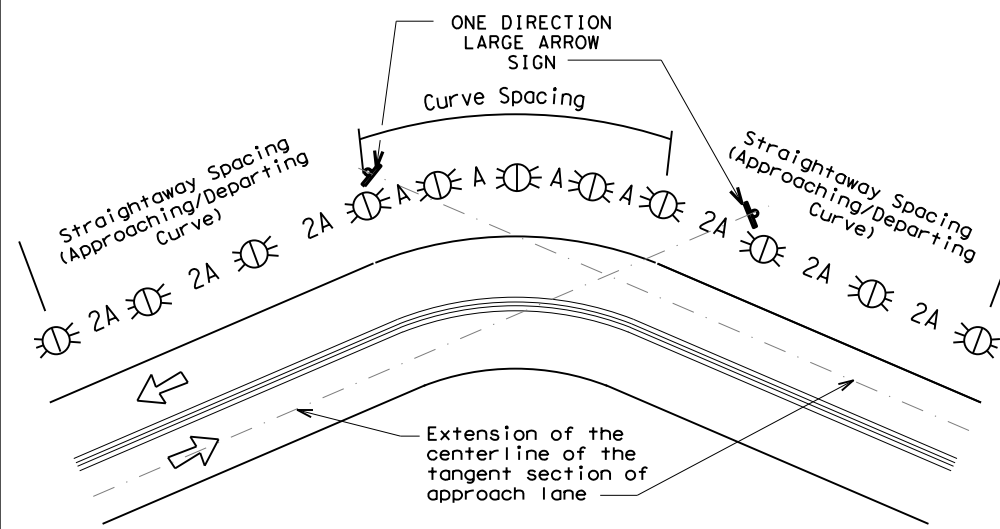
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### MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

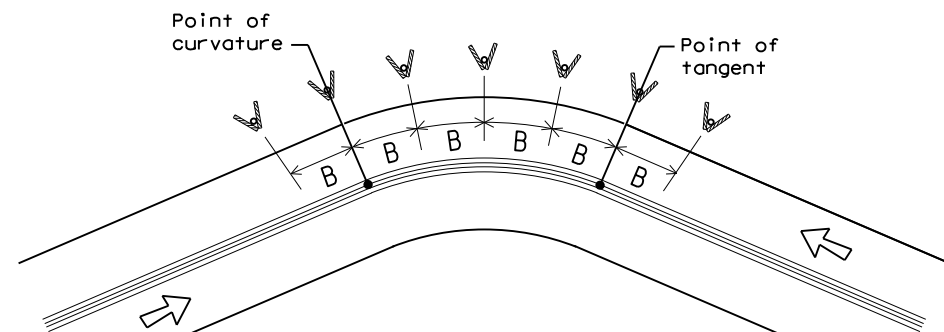
### SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



**NOTE**

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

### SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



**NOTE**

At least one chevron pair is installed beyond the point of tangent in tangent section.

### DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN				
Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

### DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN			
Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

### DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp. Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete) and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100' max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100' max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

**NOTES**

- 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.
- Barrier reflectors may be used to replace required delineators.
- Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Traffic Safety Division Standard

## DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

### D & OM(3)-20

FILE: dom3-20.dgn	DW: TXDOT	CK: TXDOT	OW: TXDOT	CR: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0162	13	032, ETC.	SH 31
3-15 8-15	DIST	COUNTY	SHEET NO.	
8-15 7-20	WAC	HILL	66	

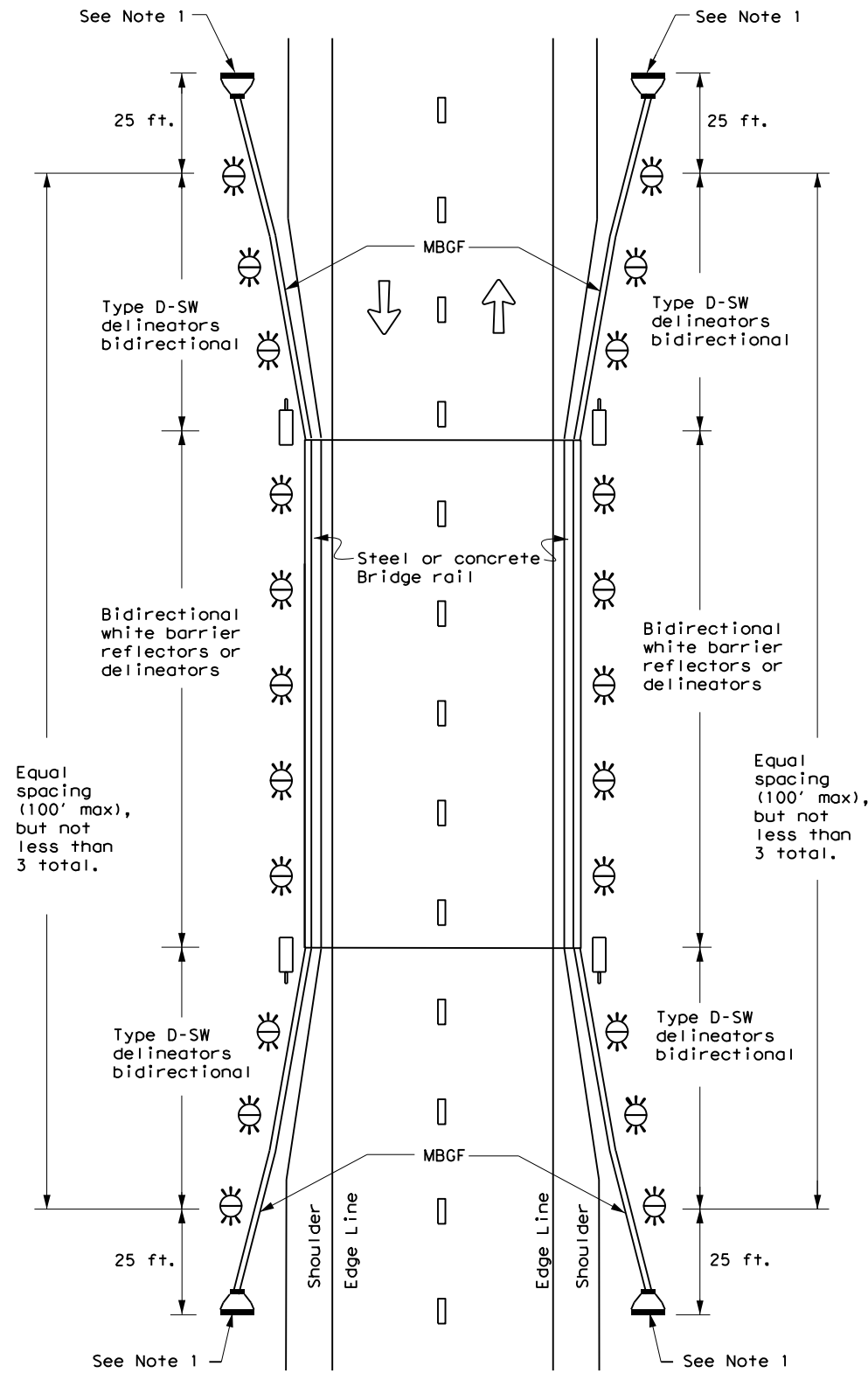
20C



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DATE: 7/1/2024 11:42:02 AM  
 FILE: \\txdotprojectwiseonline.com:txdot13\Documents\09 - WAC\Design Projects\092200227201 at the intersection of FM 2774 and FM 1020 near the intersection of FM 2774 and FM 1020.dgn

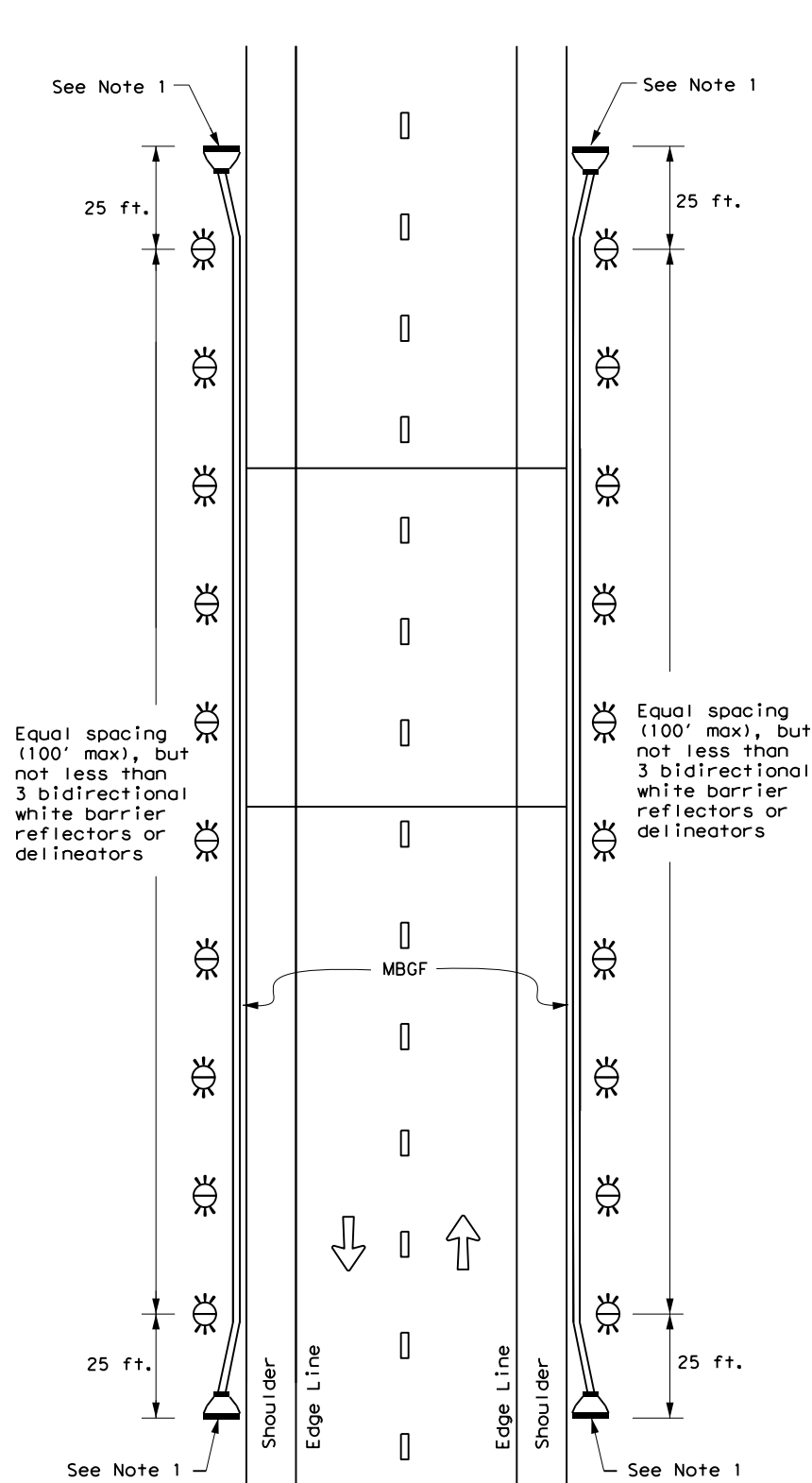
### TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



**NOTE:**

- Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

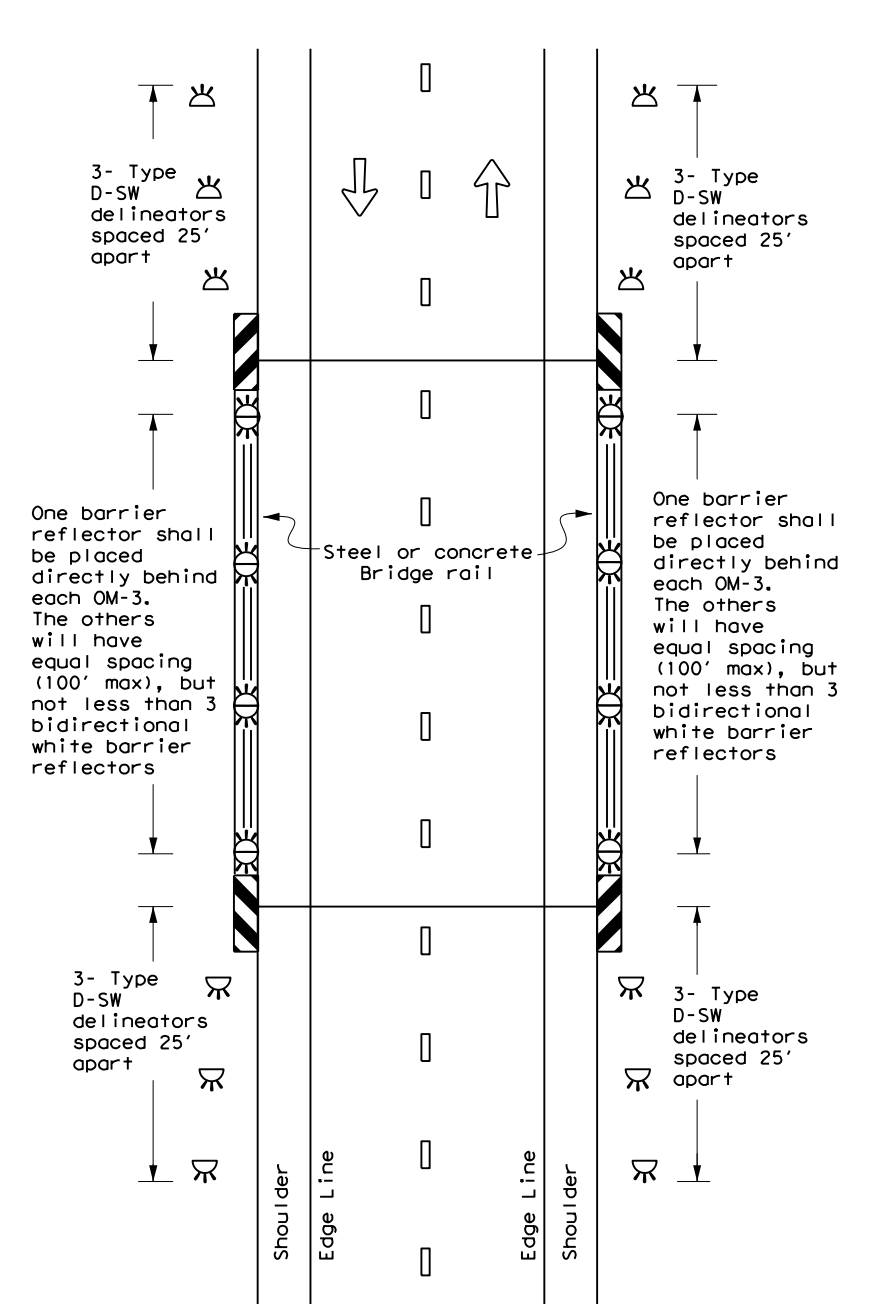
### TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



**NOTE:**

- Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

### TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



**LEGEND**

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation  
 Traffic Safety Division Standard

**DELINEATOR & OBJECT MARKER PLACEMENT DETAILS**

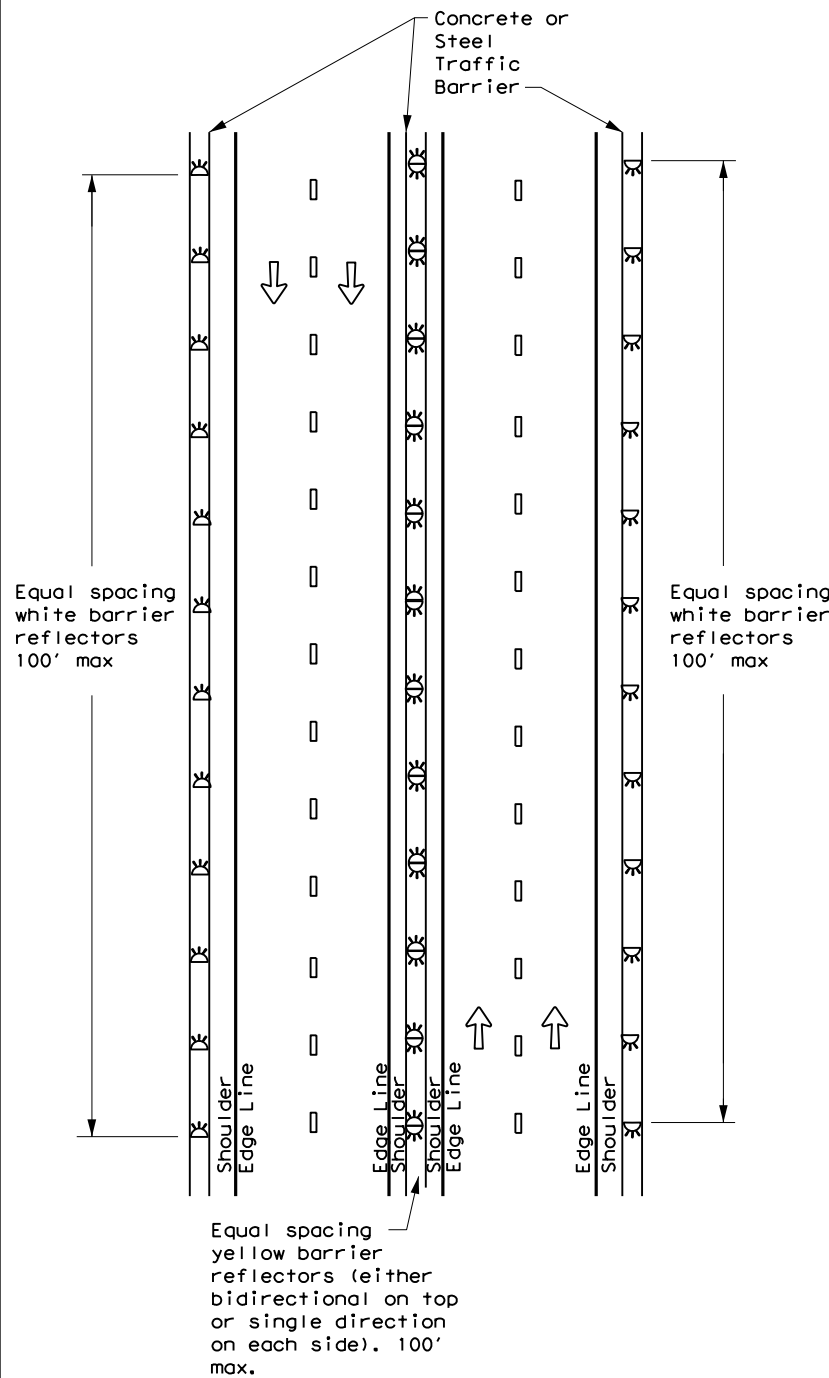
**D & OM(5) -20**

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT: 0162	SECT: 13	JOB: 032, ETC.	HIGHWAY: SH 31
7-20	DIST: WAC	COUNTY: HILL	SHEET NO. 68	

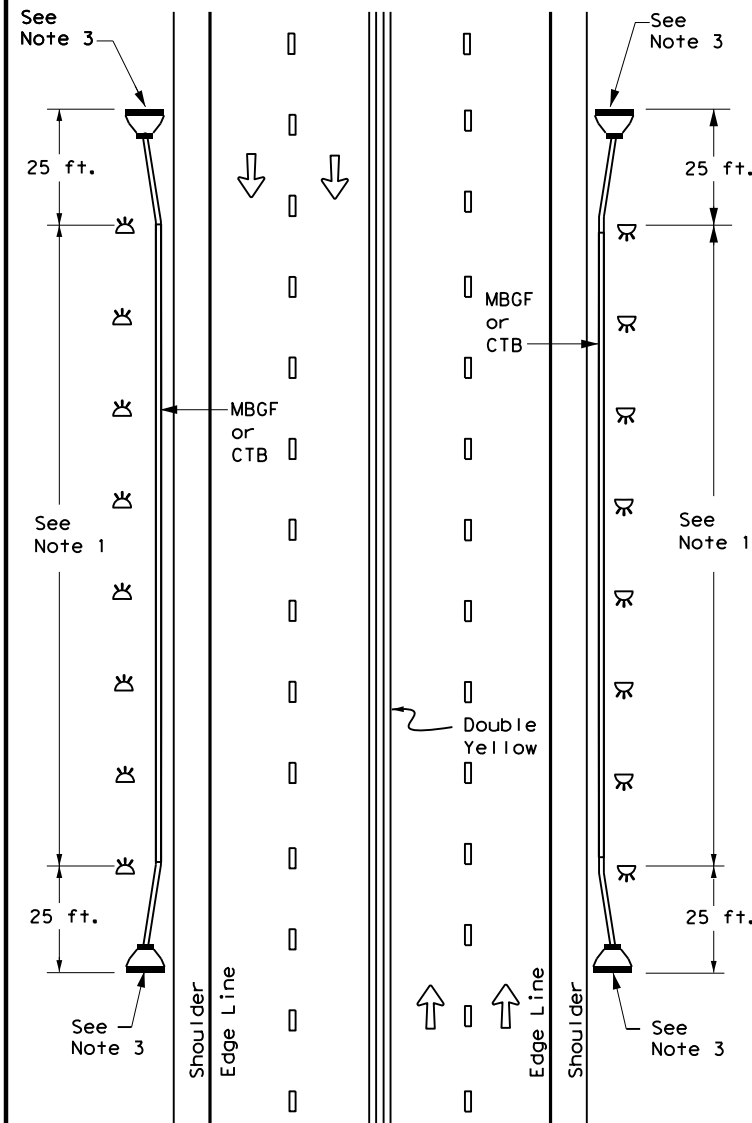
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DATE: 7/1/2024 11:42:22 AM  
 FILE: \\txdot.projectwiseonline.com:txdot13\Documents\09 - WAC\Design Projects\090924\090924.dwg

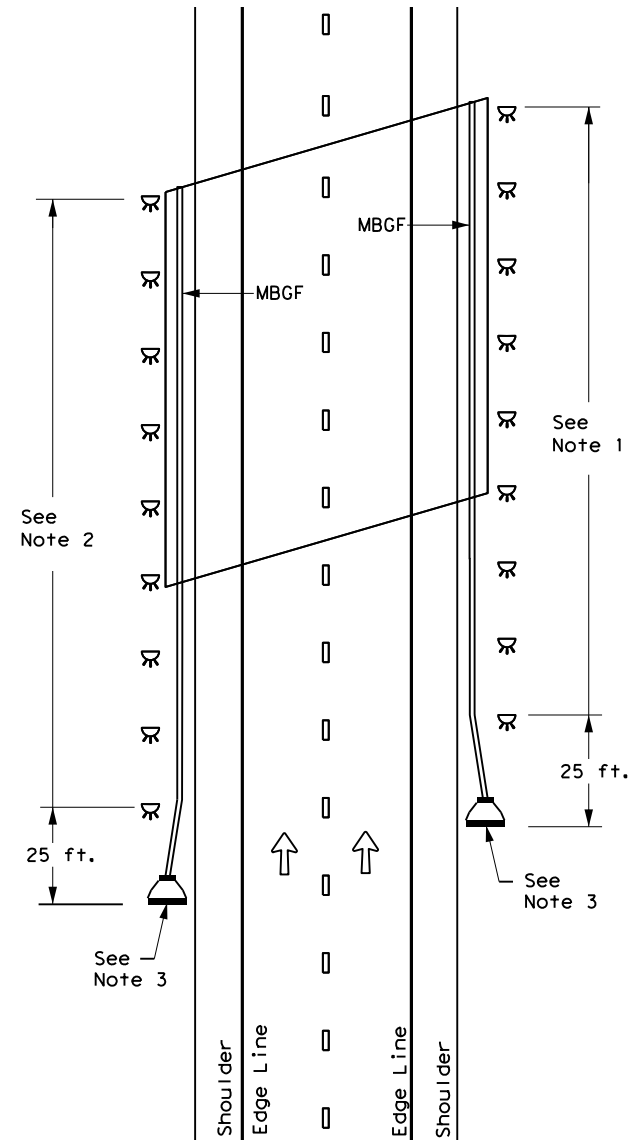
### CONTINUOUS CONCRETE OR STEEL BARRIER



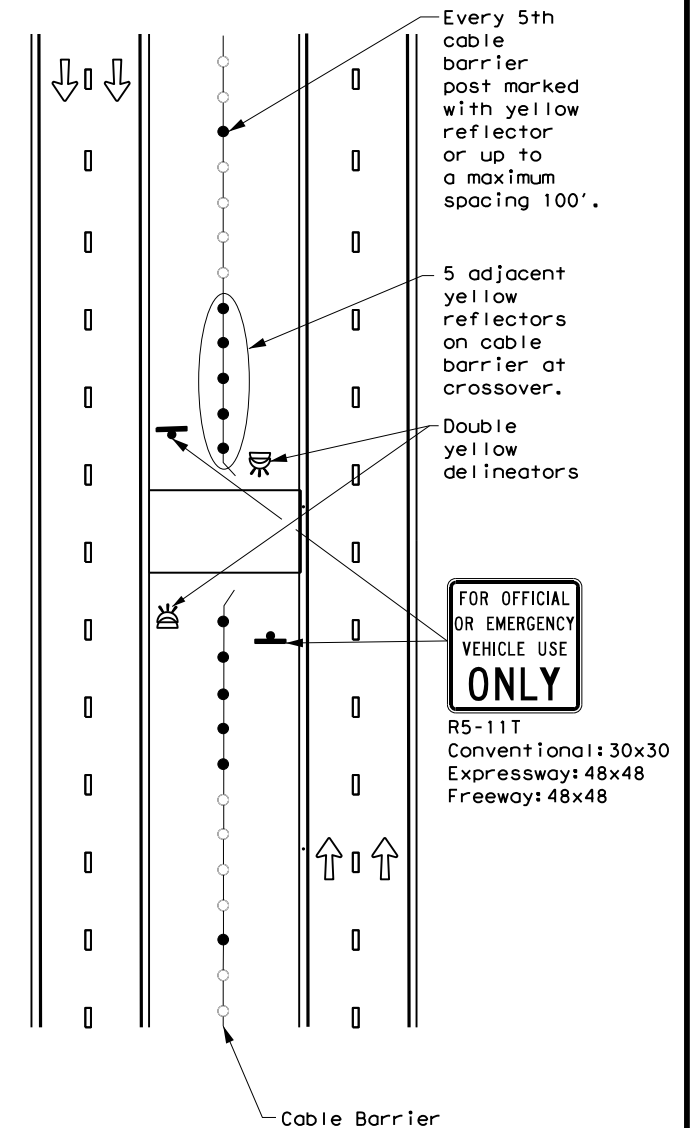
### MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



### 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 Continuous 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



## DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

### D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0162	13	032, ETC.	SH 31
7-20	DIST	COUNTY	SHEET NO.	
	WAC	HILL	69	





**STORMWATER POLLUTION PREVENTION PLAN (SWP3):**

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

**1.0 SITE/PROJECT DESCRIPTION** OV - OVERLAY

**1.1 PROJECT CONTROL SECTION JOB (CSJ):**

0162-13-002

**1.2 PROJECT LIMITS:**

From: SH 31 C South of Hubbard  
To: SH 31C North of Hubbard

**1.3 PROJECT COORDINATES:**

BEGIN: (Lat) 31.8113167, (Long) -96.8393319  
END: (Lat) 31.8631650, (Long) -96.7765683

**1.4 TOTAL PROJECT AREA (Acres): 3438.72**

**1.5 TOTAL AREA TO BE DISTURBED (Acres): 0 Acres**

**1.6 NATURE OF CONSTRUCTION ACTIVITY:**

PLANE ASPH, SMA OVERLAY

**1.7 MAJOR SOIL TYPES:**

Soil Type	Description
Based on 0 AC to be disturbed, identification of existing soil types is not applicable to this project.	

**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 2.3.)

- 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
- Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities
- 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
Based on 0 AC to be disturbed, identification of receiving waters is not applicable to this project.	

\* Add (\*) for impaired waterbodies with pollutant in ( ).

**1.12 ROLES AND RESPONSIBILITIES: TxDOT**

- Development of plans and specifications
- Perform SWP3 inspections
- Maintain SWP3 records and update to reflect daily operations
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR**

- Day To Day Operational Control
- Maintain schedule of major construction activities
- Install, maintain and modify BMPs
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)**

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
6				71
STATE	STATE DIST.	COUNTY		
TEXAS	WAC	HILL		
CONT.	SECT.	JOB	HIGHWAY NO.	
0162	13	002	SH 31	

**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

**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
- Daily street sweeping
- 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: \_\_\_\_\_

**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
Based on 0 AC to be disturbed, identification of vegetative buffer zones is not applicable to this project.		

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 DEWATERING:**

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

**2.9 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 2.3 of this SWP3 .

**2.10 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 2.3 of this SWP3.

**STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)**

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
6				72
STATE	STATE DIST.	COUNTY		
TEXAS	WAC	HILL		
CONT.	SECT.	JOB	HIGHWAY NO.	
0162	13	002	SH 31	

DATE: 7/1/2024  
 FILE: p:\w\txdot.projectwiseonline.com\txdot3\Documents\09 - WAC\Design Projects\016213002\4 - Design\Plan Set\9. Environmental\EPIC.dgn  
 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.

**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.

- Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
- Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
- Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
- 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
<input type="checkbox"/> Temporary Vegetation	<input type="checkbox"/> Silt Fence	<input type="checkbox"/> Vegetative Filter Strips
<input type="checkbox"/> Blankets/Matting	<input type="checkbox"/> Rock Berm	<input type="checkbox"/> Retention/Irrigation Systems
<input type="checkbox"/> Mulch	<input type="checkbox"/> Triangular Filter Dike	<input type="checkbox"/> Extended Detention Basin
<input type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Interceptor Swale	<input type="checkbox"/> Straw Bale Dike	<input type="checkbox"/> Wet Basin
<input type="checkbox"/> Diversion Dike	<input type="checkbox"/> Brush Berms	<input type="checkbox"/> Erosion Control Compost
<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Mulch Filter Berm and Socks
<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks
<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Vegetation Lined Ditches
	<input type="checkbox"/> Stone Outlet Sediment Traps	<input type="checkbox"/> Sand Filter Systems
	<input type="checkbox"/> Sediment Basins	<input type="checkbox"/> 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. SEE ABOVE  
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. SEE ABOVE  
2.  
3.  
4.

**V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.**

- No Action Required     Required Action

Action No.

1. SEE BELOW  
2.  
3.  
4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

**LIST OF ABBREVIATIONS**

BMP: Best Management Practice	SPCC: Spill Prevention Control and Countermeasure
CGP: Construction General Permit	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.)

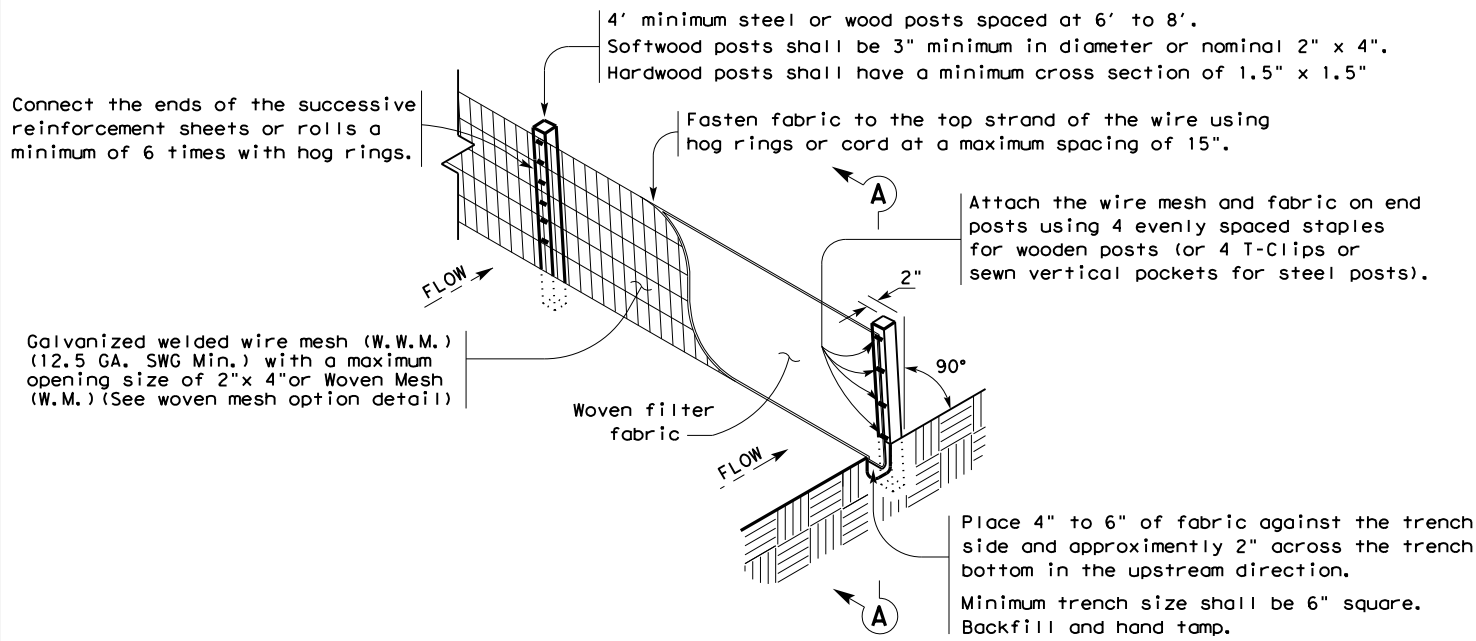
- No Action Required     Required Action

Action No.

1.  
2.  
3.

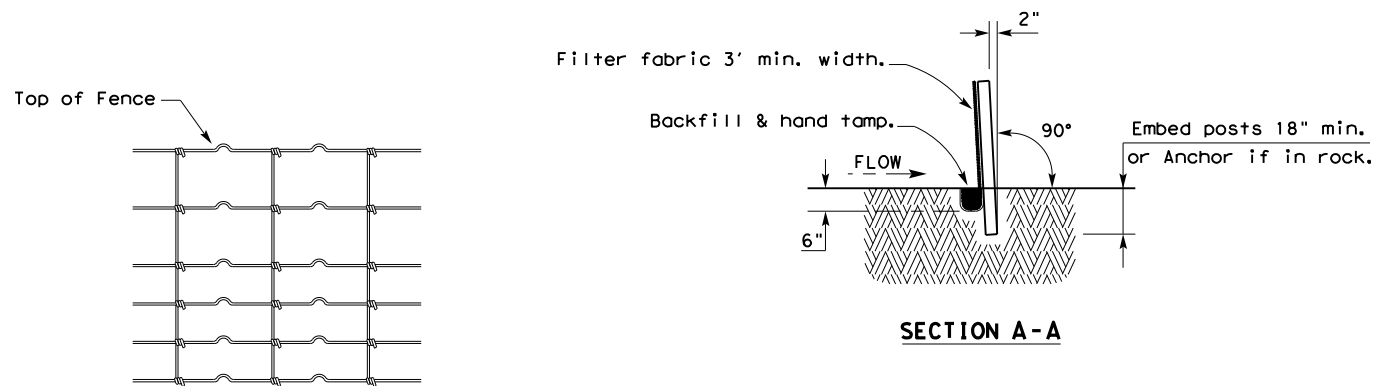
 <b>Texas Department of Transportation</b>		<b>Design Division Standard</b>			
<h2 style="margin: 0;">ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</h2> <h1 style="margin: 0;">EPIC</h1>					
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015		CONT	SECT	JOB	HIGHWAY
12-12-2011 (DS) REVISIONS		0162	13	032, ETC.	SH 31
05-07-14 ADDED NOTE SECTION IV.		DIST	COUNTY	SHEET NO.	
01-23-2015 SECTION I CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.		WAC	HILL	73	

70A7E024  
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**TEMPORARY SEDIMENT CONTROL FENCE**

SCF



**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<sup>2</sup>. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

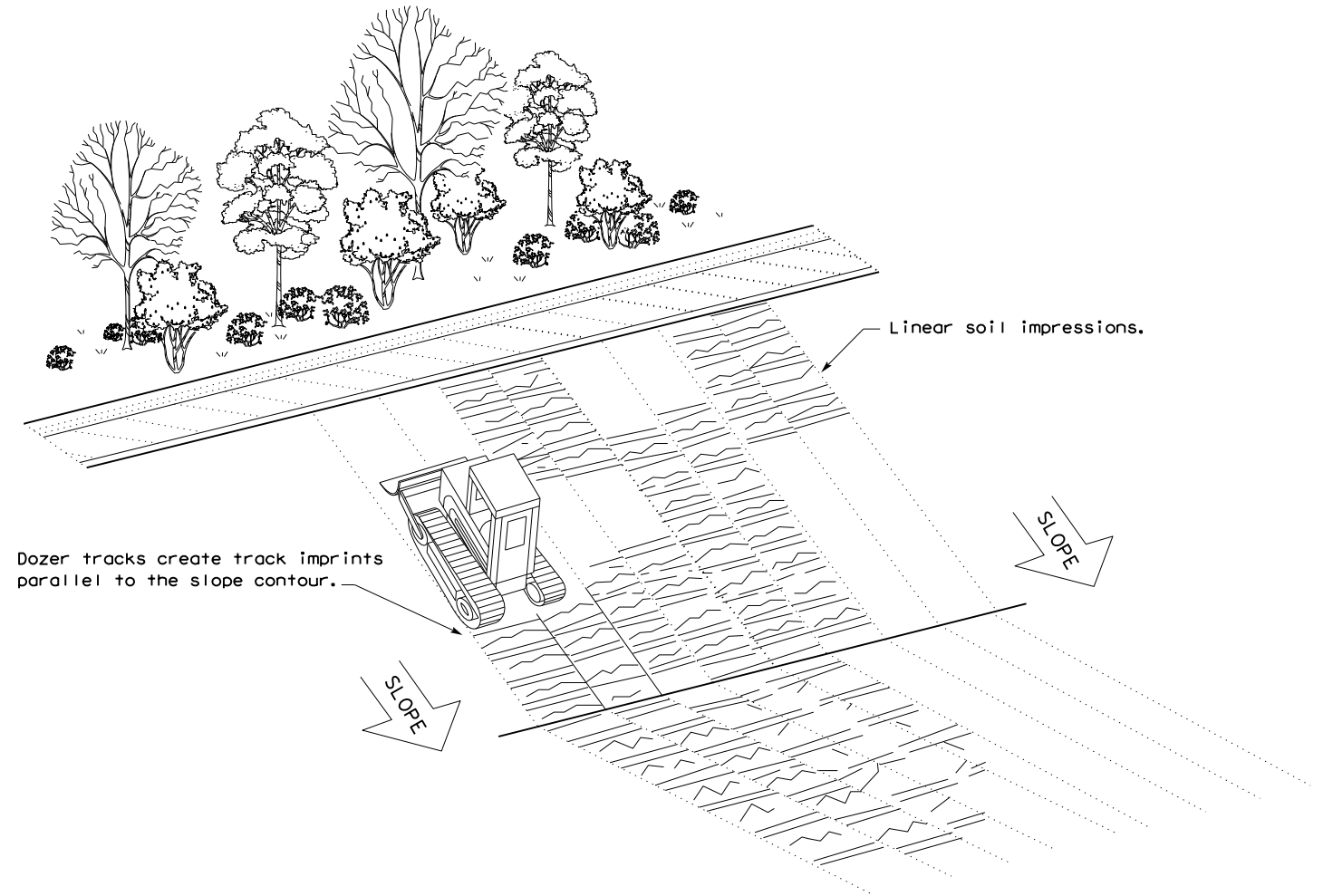
**LEGEND**

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 continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



**VERTICAL TRACKING**

				Design Division Standard	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE &amp; VERTICAL TRACKING</b> <b>EC(1)-16</b>					
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0162	13	032, ETC.	SH 31	
	DIST	COUNTY		SHEET NO.	
	WAC	HILL		74	

## BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

1. Prior to TxDOT allowing the Contractor to start construction, the Contractor will provide the required storm water and 404 permit documentation and support activities, including but not limited to the following:
  - Provide a list of all chemicals, construction and waste products that will be generated, stored or brought upon TxDOT ROW. The list includes expected construction debris, sanitary wastes, construction chemicals and petroleum products used or generated by the Contractor and sub-contractors. Along with the list, the Contractor will supply a spill prevention plan and clean up procedures that will include each of these chemical products or generated waste.
  - Provide in the construction schedule the necessary line items that will comply with the schedule and planning requirements of the storm water permit.
  - Post the TxDOT storm water permit and any Contractor permits, per permit requirements.
  - Provide copies of storm water permits for Contractor PSL(s). As new PSL(s) may be obtained for the project, provide copies of new or amended permits to TxDOT. The Contractor will not disturb soil without the proper permits.
  - Provide scale drawings of off ROW PSL's within one mile of the project, for field offices, borrow sources, plant sites or other uses.
  - Provide permit information on any Contractor batch plants or concrete crushing plants to be located at a Contractor PSL(s) within one mile of the project limits or boundaries. Copies of the air and water permits are to be provided to TxDOT before materials will be used on the project. No asphalt or concrete batch plants or concrete crushing plants will be located on TxDOT ROW.
  - Provide a letter indicating a Contractor Responsible Person for environmental compliance (CRP) for the project, and maintain a CRP throughout the project duration.
  - Provide all environmental documentation including certification of compliance and EMS training documents/certificates prior to starting work. The Contractor is to provide daily BMP inspection reports that document all field BMPs needing repair or replacement. The Contractor is to clearly document specific BMPs needing repair and location each work day. The Contractor is encouraged to be proactive in fixing BMPs without TxDOT direction.
  - Provide documentation required for Waters of the US, Note #3 and submittals for Item 496 bridge removal. Bridge removal methods submitted will follow all Waters of the US note requirements. The Contractor is not to start construction within the Ordinary High Water Marks of any stream until receiving approval for stream channel construction methods from TxDOT.
  - Provide a written procedure for managing all chemicals and construction items placed in vertical containment structures. Also, provide methods to be used for the treatment, disposal, collection or release of storm water.
  - Provide an estimated date by letter, for the submittal of marked up bridge drawings, indicating cut locations for any structural steel requiring cutting or torching of steel, coated with lead containing paints.
2. Place and maintain trash cans and portable sanitary facilities at locations where there is active construction. Worker generated trash and construction debris will be kept from being transported by storm water and will be collected daily from the ground and routinely hauled from the work area.
3. Contractor will provide TxDOT copies of all correspondence with MS4s, TCEQ, EPA, DSHS and Corps of Engineers regarding activities on this project.
4. Contractor to conduct storm water inspections and develop SWPPP documents to support Contractor permits obtained for the project including PSL(s).
5. Contractor will maintain written documentation of locations of all portable sanitary facilities. The Contractor is required to document the location and disposition of all spills and cleanups from portable sanitary facilities.
6. Contractor will not store chemicals on TxDOT ROW, unless chemicals are stored following all environmental and safety regulations. Fuels for construction equipment will not be stored on TxDOT ROW.
7. The Contractor will store fuels and bulk chemicals on Contractor PSL(s) using a secondary containment method, such as double lined tanks and/or free standing containment reservoirs made of plastic or steel designed to hold bulk chemicals or drums.
8. The Contractor will not remove sediment controls without the prior approval of TxDOT, except for a sediment control that may back up water and cause safety or traffic problems.

SCALE = NTS SHEET 1 OF 10

 **Texas Department of Transportation**  
Waco District Standard

### TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

**TA-BMP**

FILE: BMPLAYOUTS.dgn	DN:	CK:	DW:	CK:
© TxDOT 2009	CONT	SECT	JOB	HIGHWAY
REVISIONS	0162	13	032, ETC.	SH 31
DEC 2013	DIST	COUNTY	SHEET NO.	
FEB 2015	WAC	HILL	75	

## BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

9. Any sediment controls removed by the Contractor must be re-installed before the next rainfall event or by the end of day, as approved in advance.
10. Vegetative buffer strips may be used in place of temporary sediment controls such as silt fences and rock filter dams. The amount of disturbed soil area will be limited to 1/3 of an acre or less for a minimum of 50 feet of grassed ditch and 2/3 of an acre of disturbed soil for a minimum of 100 feet of grassed ditch.
11. Construction equipment found to be leaking oil, fuel or coolant will be immediately stopped, the leaking fluid collected and the equipment fixed. Equipment continuing to leak will be removed from the project at no cost to TxDOT. Leaking fluids from equipment will be collected and removed from the project or PSL.
12. Earth berms or mounds typically used to stockpile topsoil and used in place of boundary silt fence will be seeded upon being constructed. Long term use of earth berms or mounds will not be continued without establishing grass on the control.
13. The Contractor will inform TxDOT of new areas where soil will be disturbed to facilitate planning for new sediment controls. Areas of vegetated soil will not be disturbed by the Contractor, unless adequate sediment controls can be installed before the next rainfall event. The Contractor will assist TxDOT in keeping an accurate set of working SWPPP drawings that show the locations of all temporary sediment and erosion controls.
14. The Contractor will maintain an adequate amount of temporary sediment controls on hand at the field office or project staging area for critical SWPPP maintenance, including silt fence (minimum of 200 feet) and rock / fabric for rock filter dams (minimum for 100 feet of Type III dams).  
  
The requirement for BMP rock quantities on hand is waived for small projects for on and off system bridge installations. The Contractor having a BMP Subcontractor does not eliminate the requirement for the Contractor to have the required silt fence and rock on hand, typically stored at the Contractor PSL.
15. Failure of a sub-contractor to complete storm water work on time will require the Contractor to start storm water sediment control work immediately and complete the work with high priority, or be subject to stop work on the entire project.
16. Earth materials on roads as a result of soil tracking will not be allowed to be transported off ROW in storm water. Soil or rock material found on roadways deposited from Contractor equipment will be removed daily.
17. Unless approved, completed concrete curb inlets will not be blocked by sediment controls. The contractor will frequently sweep the completed or partially completed roadway to keep sediment out of drainage pipes.
18. The Contractor will be responsible for proper dust control and will route construction traffic in a manner that minimizes dust generation.
19. Water for dust control will contain no pollutants, but may be non-potable from upland stock ponds. No quantity of water to be used for construction purposes may be taken from a 404 stream, prior to the proper authorizations or permits being obtained by the Contractor.
20. Contractor is to direct workers and sub-contractors to use portable sanitary facilities provided by the Contractor and not to trespass off ROW.
21. Contractor will provide written verification to TxDOT that earth borrow pits and disposal sources meet environmental and regulatory requirements, prior to use. Excavations will meet all OSHA requirements and the current safety guidelines established for TxDOT Quarries and Pits.
22. Boundary silt fences that are terminated down slope, with one end being at the lowest elevation, will be installed with an L - hook to contain sediment. Boundary silt fences that are installed on flat ground will have L-hooks on both ends.
23. Rock filter dams across ditches will be constructed where the rock filter dam ends are embedded within the ditch side slopes and ditch bottom. The top center elevation of the rock filter dam will be at least 6 inches lower than the elevations on the rock filter dam ends.
24. Silt fence will be constructed in a U or V pattern across ditch lines and up the ditch side slope to keep storm water from flowing around the ends of the silt fence. Small silt fences that do not adequately span the ditch and allows storm water around the end(s) will not be used. Where there is adequate space, large U pattern silt fences are preferred to facilitate sediment collection and sediment removal with equipment.
25. Sediment controls (RFDs or silt fences) will be located along road ditches as marked on the SWPPP drawings. Modifications to the sediment control spacing will be adjusted during the project based on sediment control effectiveness. The installation and maintenance of sediment controls at or near outfalls, where storm water leaves TxDOT ROW, takes persistent over ditch line sediment controls.

SCALE = NTS SHEET 2 OF 10

 **Texas Department of Transportation**  
Waco District Standard

### TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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DEC 2013	DIST	COUNTY	SHEET NO.	
FEB 2015	WAC	HILL	76	

## BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

26. Storm water draining sheet flow over disturbed soil sloped towards the ROW property line, will be intercepted by a boundary silt fence typically installed with L-shaped ends.
27. For ditch grading and shoulder up work, the Contractor is limited during good weather to remove up to one mile (limited to five acres of disturbed soil) of ditch line sediment controls; on one side of the roadway. Outfall controls cannot be removed during this activity. Ditch line controls must be replaced upon completion of work and before the next rain event.
28. Sediment controls damaged by the Contractor, as defined by permit, must be fixed or replaced immediately upon discovery.
29. Notches in silt fences are not typically allowed. Specific silt fences that back up water onto lanes of traffic may be notched if approved.
30. For silt fence maintenance, the Contractor will leave approximately 4 inches of deposited sediment up stream of silt fences and not over excavate around silt fences or rock filter dams.
31. The Contractor will inform TxDOT of new construction areas and where soil is planned to be disturbed. Sediment controls will be installed at outfalls prior to the Contractor beginning soil disturbing activities up slope from the outfall.
32. Water from concrete saw cutting, concrete grinding and concrete coring activities; or fine materials from concrete chipping and salvage will not be allowed to enter storm drains or enter streams.
33. Storm water containing suspended sediment and turbidity needing to be removed from excavations or low areas will be pumped or gravity drained through vegetated buffer strips (50 foot minimum) or placed in ditches with temporary sediment controls, prior to the water being discharged into a stream.
34. Uncontaminated water from natural groundwater seepage, springs, foundations and drains that does not contain suspended sediment or any pollutants may be discharged without storm water controls.
35. Lime or cement if spilled in ditches or outside the defined limits of application is considered a pollutant and will be excavated and removed the same day, to avoid contaminating streams.
36. If located along the project ROW, RAP stockpiles will be located where there is a minimum 100 feet of vegetative buffer strip before storm water will reach a stream. RAP will not be used as a construction material within the Ordinary High Water Marks of a stream channel of a 404 designated stream.
37. If allowed on the project, concrete truck wash out areas will have adequate volume to allow 12 inch freeboard for rain and will be lined with 6 mils of plastic. No concrete will be stored higher than the 12 inch freeboard. Cleaning of truck chutes and equipment does not constitute concrete truck wash out and this activity may be completed at the concrete placement location. Wash out areas will not be located closer than 50 ft from down slope inlets or stream channels.
38. For outfalls near stock ponds closer than 50 foot from disturbed soil at the ROW line, redundant sediment controls will be provided, typically a combination of rock filter dam and a silt fence constructed in line of the flow.
39. Earth stockpiles will utilize silt fence sediment controls, positioned on the low end of the stockpile drainage area with L-hooks or silt fence installed around the entire stockpile.
40. Sediment controls including rock filter dams and silt fences will not be installed across any 404 streams. Sediment controls at 404 streams will be positioned to limit sediment entering the stream from the banks and around structures/culverts, and will allow free flow of storm water to pass through the ROW without being dammed by any sediment controls. Remove loose materials from stream channels prior to each rain event.
41. Sediment controls for non-404 streams may be constructed across the drainage channel in unlimited locations. It is appropriate to use sediment control details typically used for 404 streams for non-404 streams when flow velocities are high. Remove loose material from stream channels prior to each rain event.
42. Incomplete drainage pipe installation across the roadway does not remove the requirement for having sediment controls around the ends of the pipe. To stay within permit requirements, sediment controls should be installed over and around the terminated end and along each side of the banks as soon as construction on the pipe has been completed. Remove loose material from stream channels prior to each rain event.
43. Safety end / headwall construction temporarily will require the removal of part of the sediment control placed over and around the pipe end. Retain in place as much functioning sediment control as possible. Replace the silt fence over and around the top of the pipe, immediately upon concrete placement and form removal. Do not remove culvert sediment controls that cannot be replaced before the next rain event. Sediment control at the ends of culverts must be in place and available for any rain event until the disturbed soil areas are re-vegetated.

SCALE = NTS SHEET 3 OF 10

 **Texas Department of Transportation**  
Waco District Standard

### TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

**TA-BMP**

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REVISIONS	0162	13	032, ETC.	SH 31
DEC 2013	DIST	COUNTY		SHEET NO.
FEB 2015	WAC	HILL		77



## BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

44. Between the Ordinary High Water Marks of a 404 stream channel, the Contractor will disturb only the minimum amount of stream channel that is necessary to complete the work.
45. Rock riprap for erosion control does not replace the requirements to maintain sediment control until vegetation is re-established. Replace sediment controls immediately after installing erosion rock.
46. At the direction of TxDOT, sediment deposited into existing and new culverts will be removed subsidiary to Item 506. Sediment to be removed is either pre-existing material before construction starts or sediment generated as a part of this project.
47. Provide treated 2X4 cross bracing for rectangular inlet silt fence, subsidiary to Item 506.
48. Loose or granular earth materials will not be used to repair silt fence undercuts. Silt fence undercut repairs will be conducted with well compacted soils or the silt fence will be reset in a nearby location.
49. Silt fence steel T posts of approximately 1.25 pounds per foot are allowed at a spacing of 8 feet or less. Silt fence steel T posts between approximately 1.25 pounds per foot and 0.85 pounds per foot are allowed for T post spacing of 5 feet or less.
50. Silt fence to be used to slow the flow of storm water down slopes will be positioned approximately horizontal (on the contour) with L hooks on the ends and limited to approximately 200 feet in length. Multiple sections and levels of silt fence may be required in addition to temporary / permanent erosion control flumes.
51. Soil retention blankets will be installed rolled down the slope with the small dimension side embedded at the top of slope, unless recommended otherwise by the manufacturer. Excess grass, rocks, trash, debris or clods will be removed before seeding and installing soil retention blankets. All installations will be by the manufacturer recommendations. Contractor equipment, including tractor mowers will be kept off areas with soil retention blankets until the grass is established.

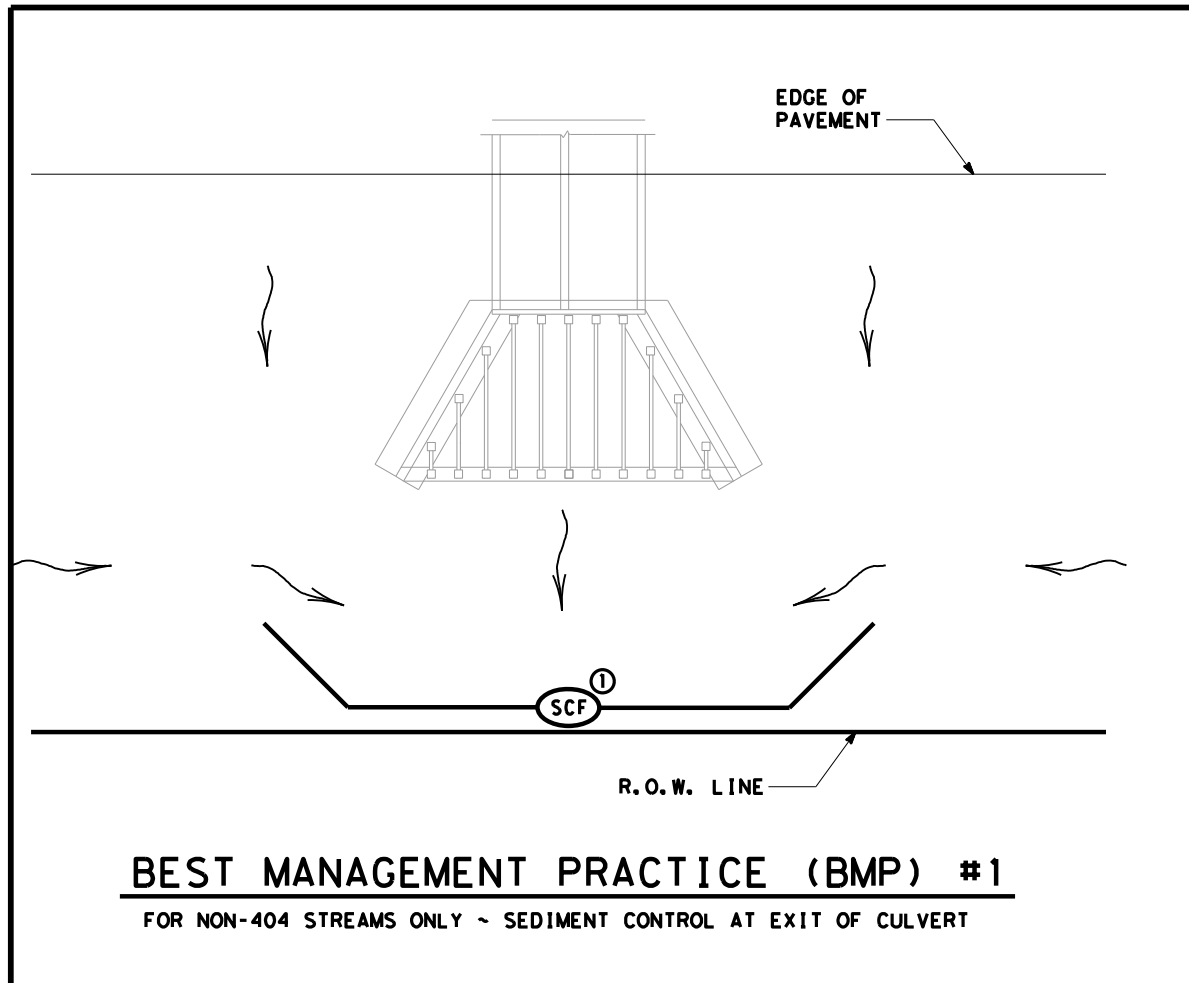
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 **Texas Department of Transportation**  
Waco District Standard

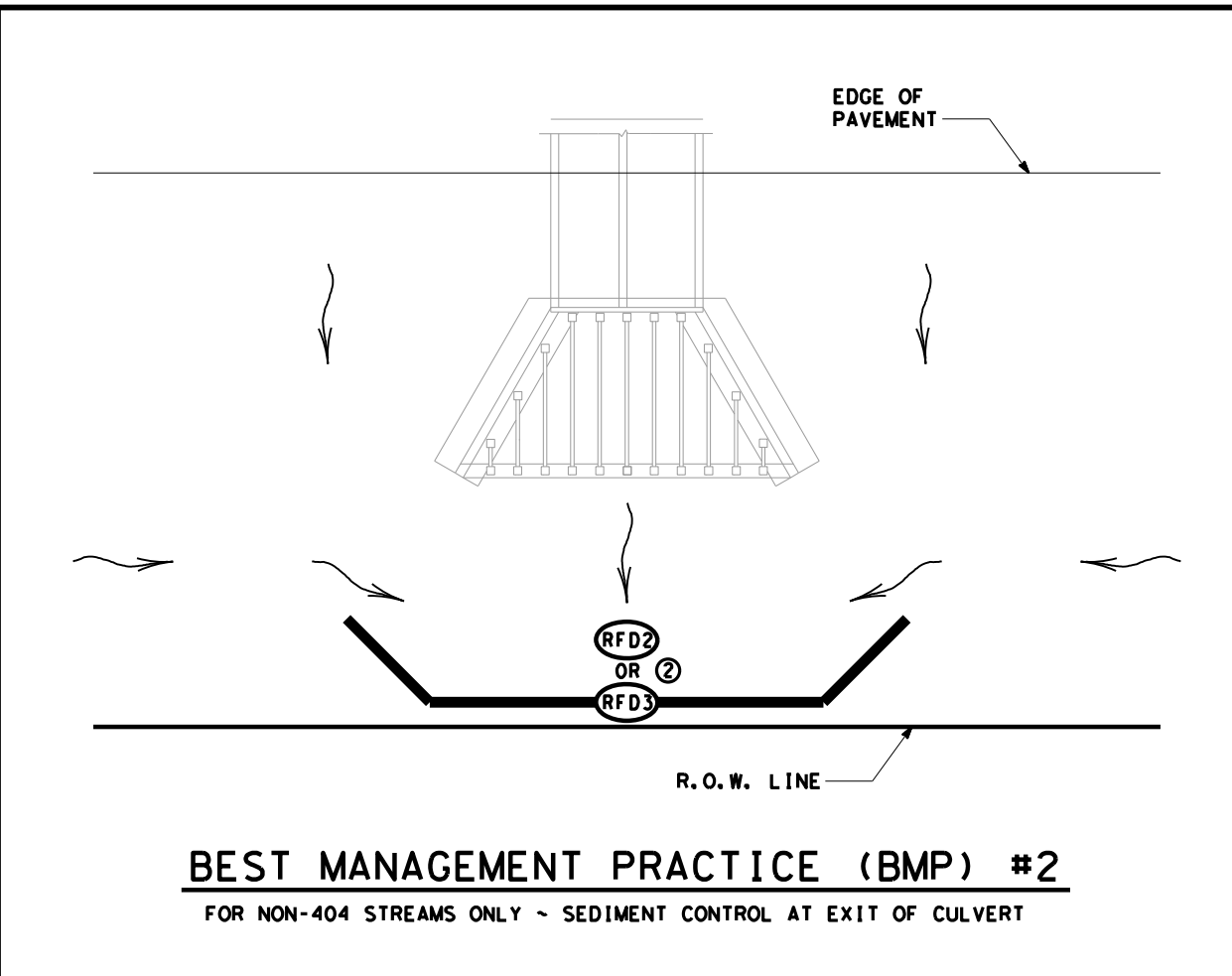
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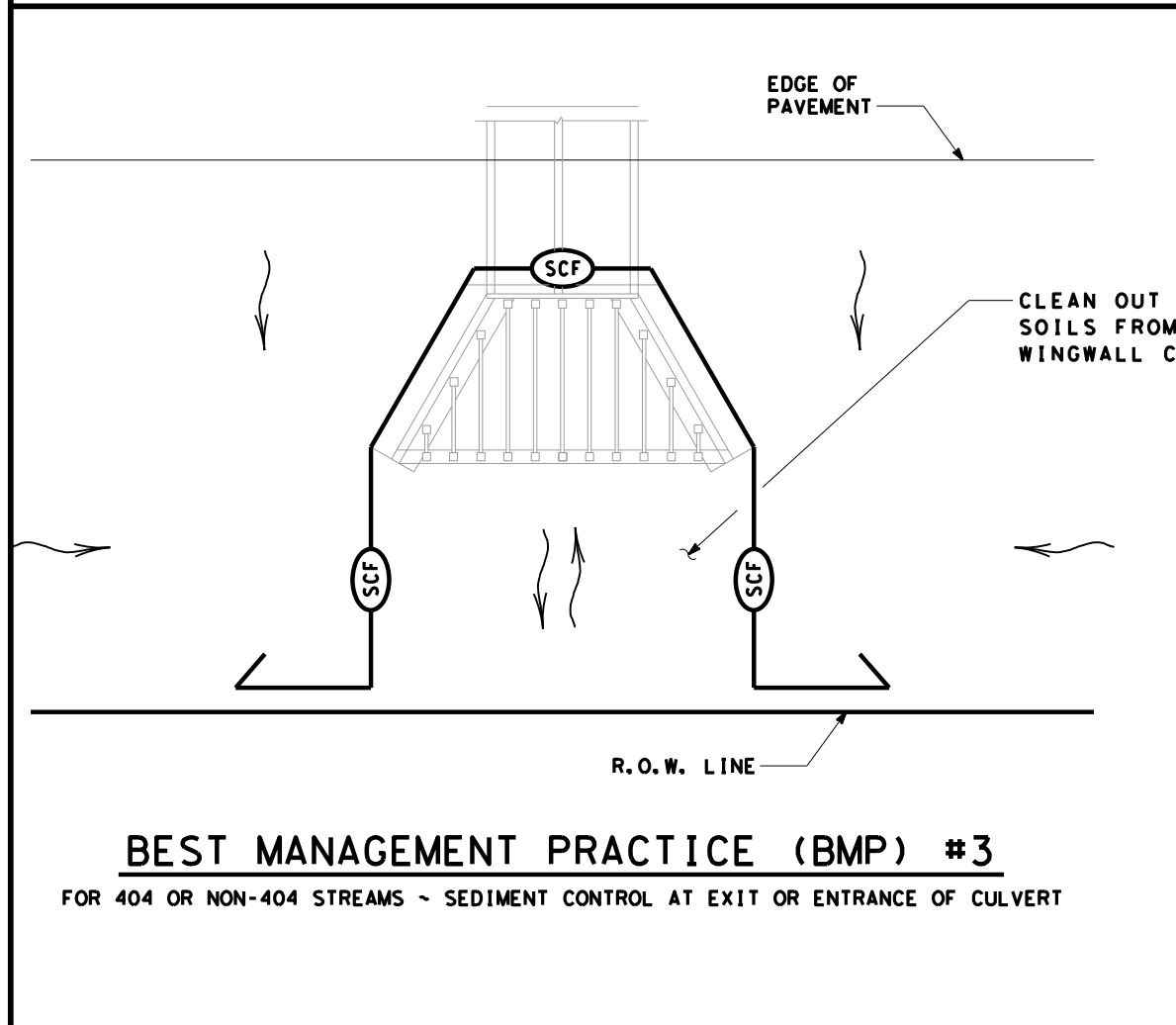
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FEB 2015	WAC	HILL	78	



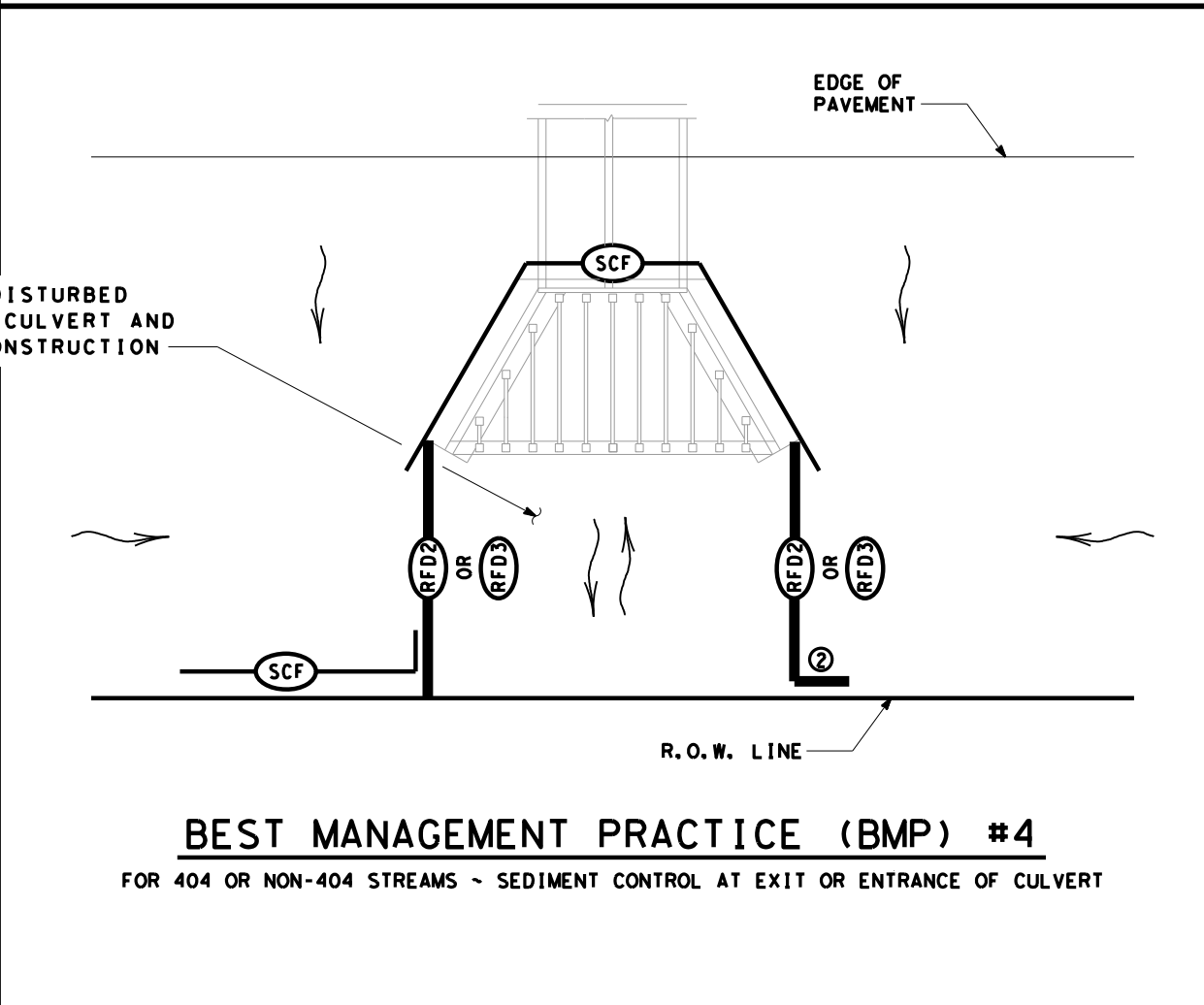
**BEST MANAGEMENT PRACTICE (BMP) #1**  
FOR NON-404 STREAMS ~ SEDIMENT CONTROL AT EXIT OF CULVERT



**BEST MANAGEMENT PRACTICE (BMP) #2**  
FOR NON-404 STREAMS ~ SEDIMENT CONTROL AT EXIT OF CULVERT



**BEST MANAGEMENT PRACTICE (BMP) #3**  
FOR 404 OR NON-404 STREAMS ~ SEDIMENT CONTROL AT EXIT OR ENTRANCE OF CULVERT



**BEST MANAGEMENT PRACTICE (BMP) #4**  
FOR 404 OR NON-404 STREAMS ~ SEDIMENT CONTROL AT EXIT OR ENTRANCE OF CULVERT

	SEDIMENT CONTROL FENCE
	ROCK FILTER DAM (TY 2)
	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

- NOTES:
- ① EXTEND SILT FENCE SO STORM WATER DOES NOT GO AROUND THE ENDS. USE L-HOOKS ON ENDS AS REQUIRED.
  - ② EXTEND ROCK FILTER DAM SO STORM WATER DOES NOT GO AROUND THE ENDS.

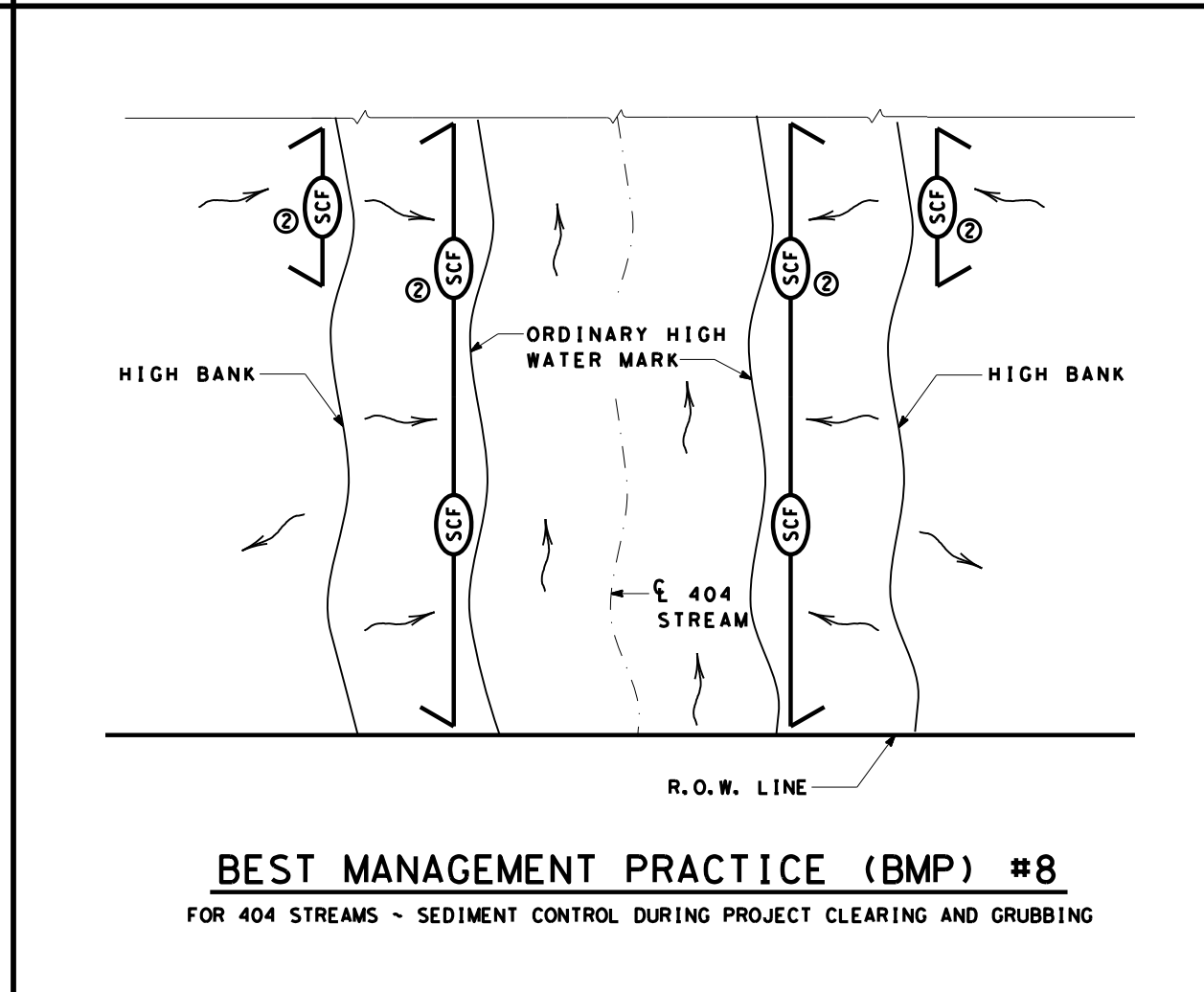
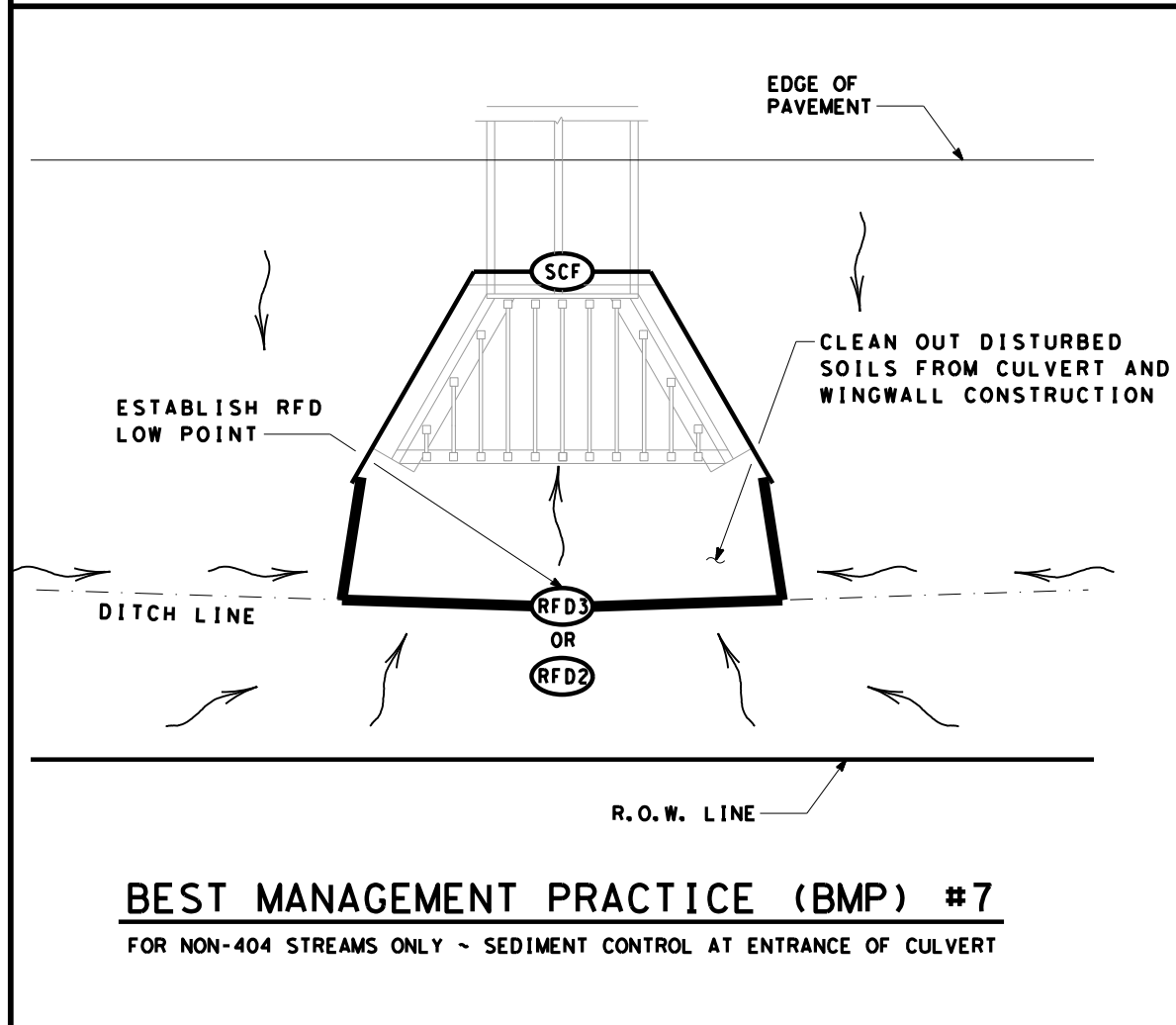
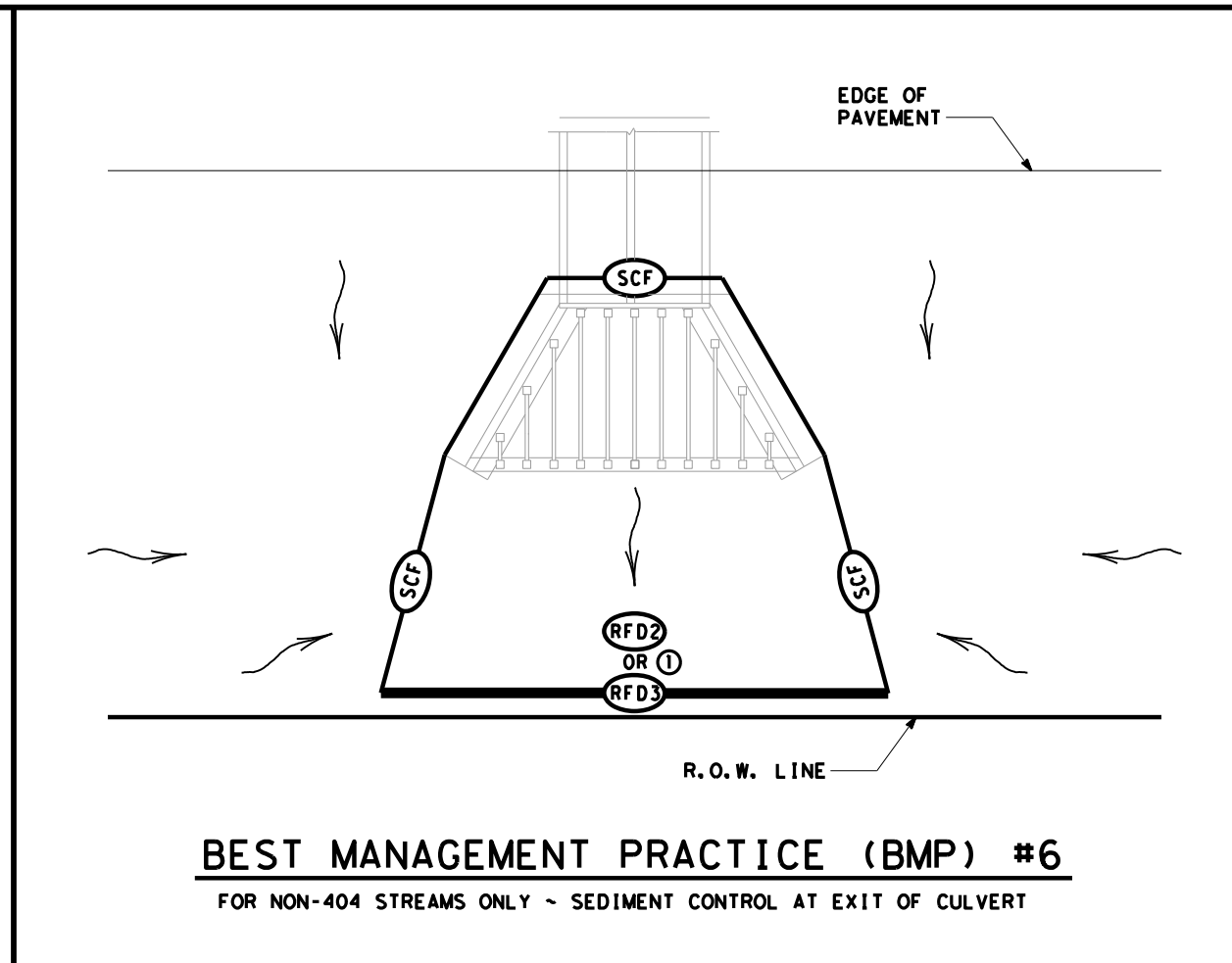
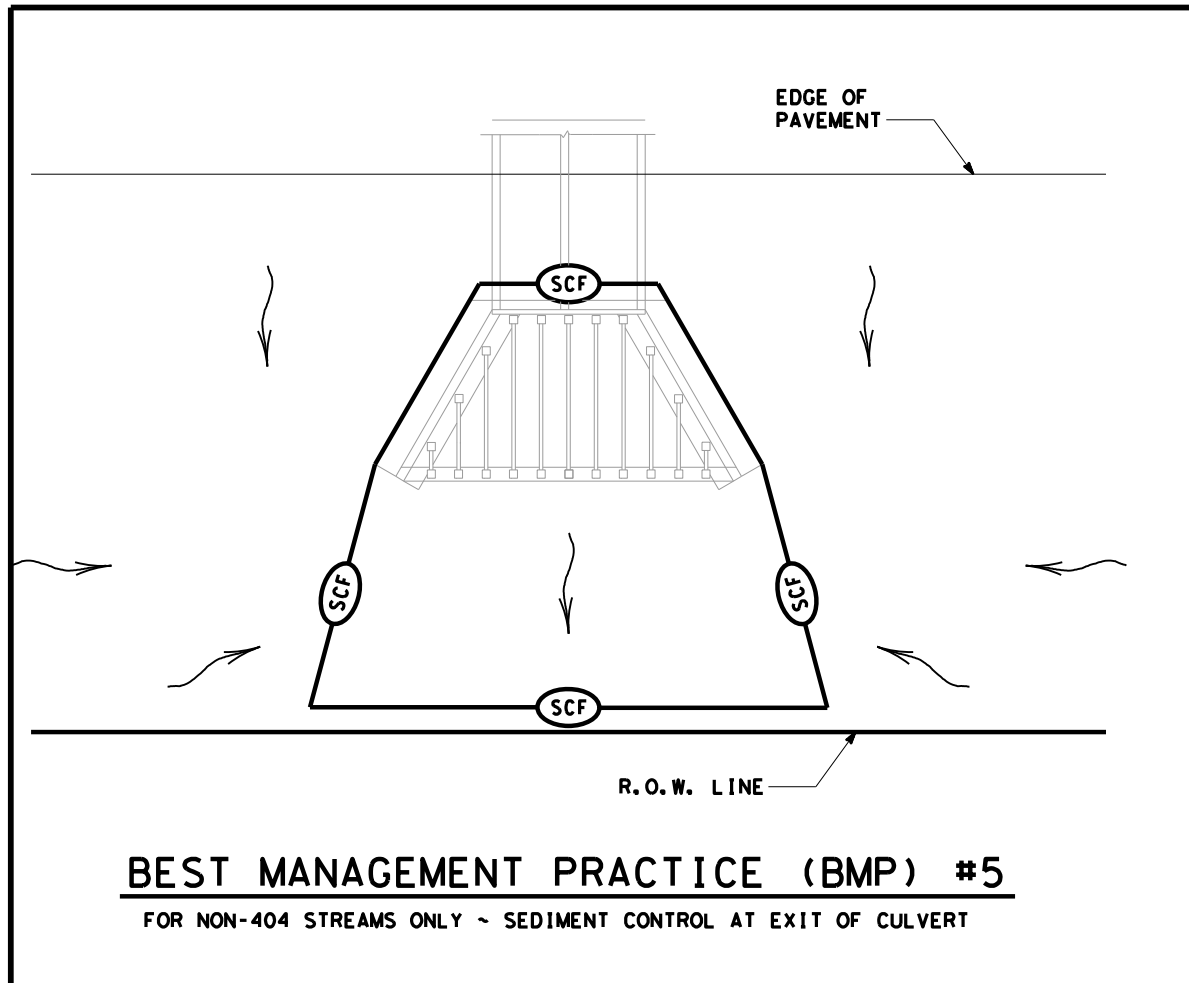
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**TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES**

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DEC 2013	DIST	COUNTY	SHEET NO.	
FEB 2015	WAC	HILL	79	



	SEDIMENT CONTROL FENCE
	ROCK FILTER DAM (TY 2)
	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

- NOTES:
- ① PROVIDE OVERLAP OF SILT FENCE WITH ROCK FILTER DAM.
  - ② USE SILT FENCE L-HOOKS ON ENDS TO BLOCK STORM WATER SEDIMENT

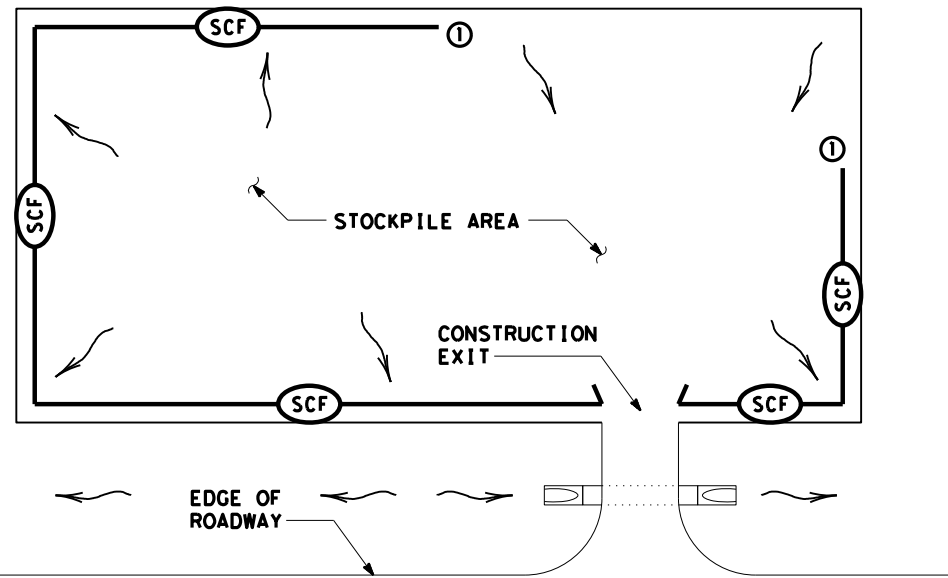
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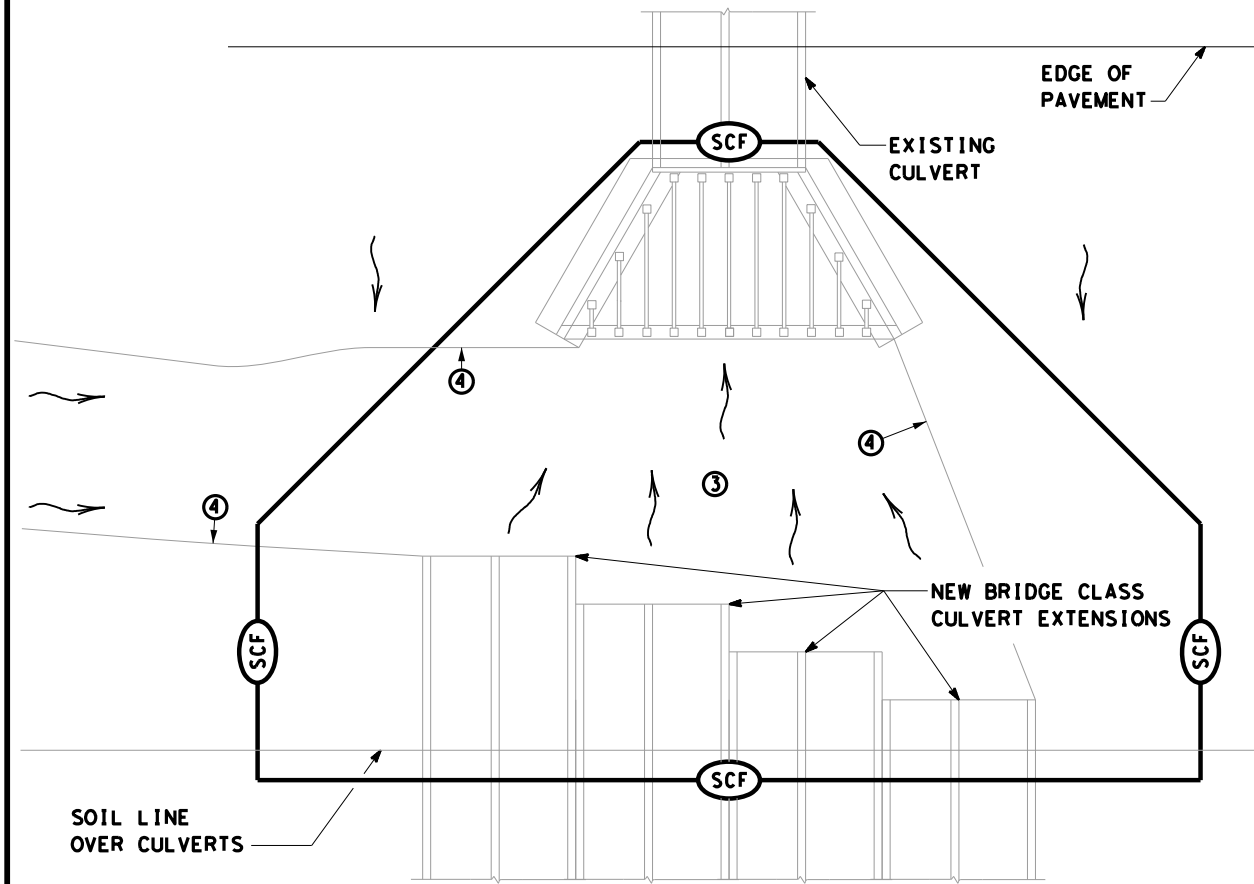
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FEB 2015	WAC	HILL	80	



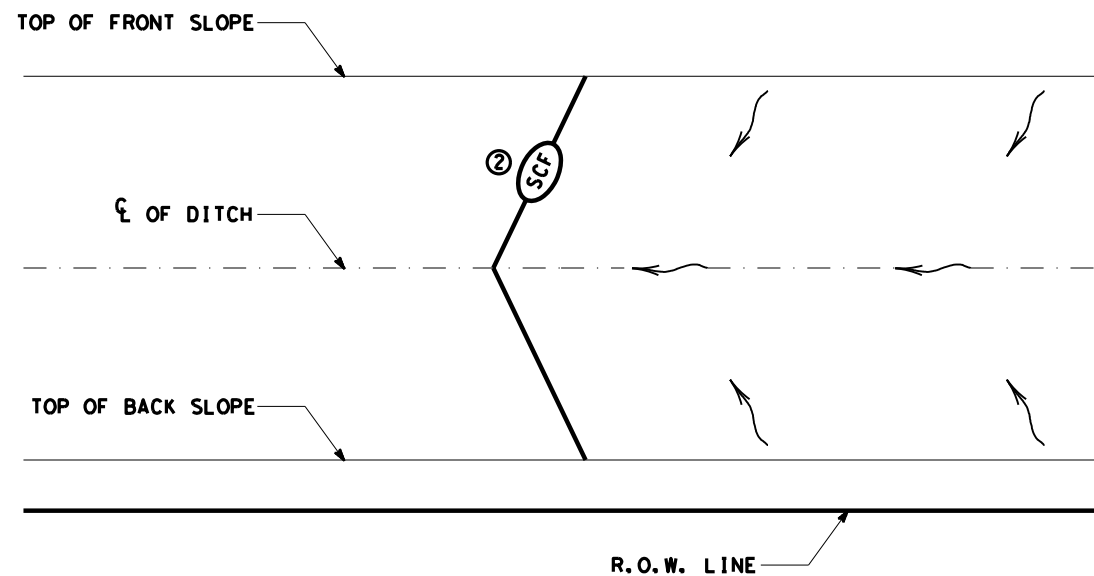
**BEST MANAGEMENT PRACTICE (BMP) #9**  
STOCKPILE SEDIMENT CONTROL



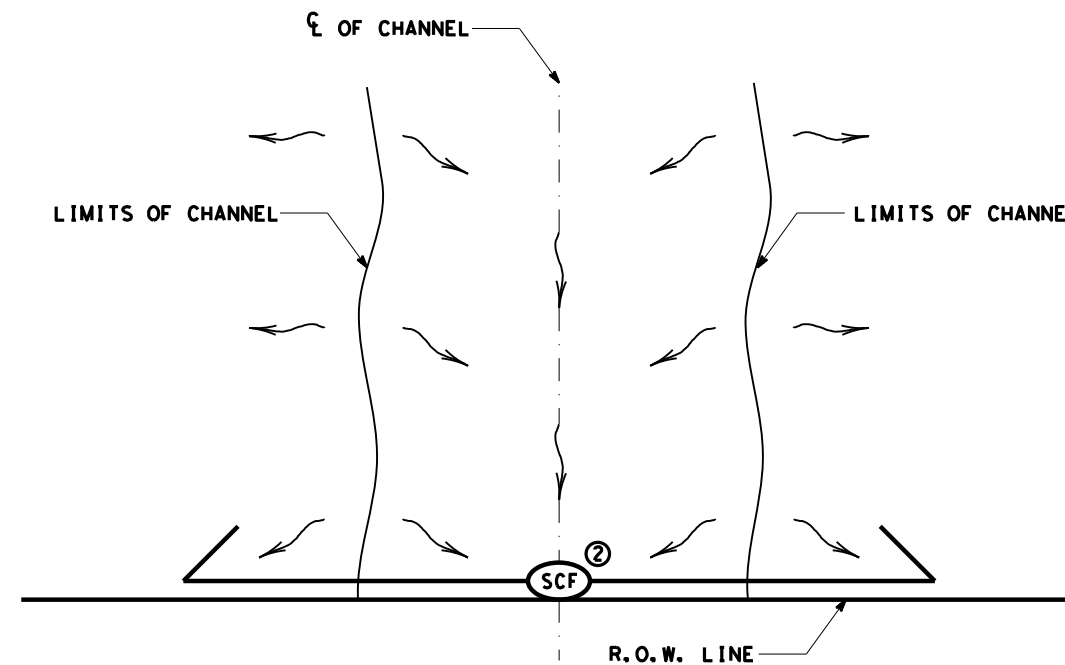
**BEST MANAGEMENT PRACTICE (BMP) #10**  
FOR 404 OR NON-404 STREAMS ONLY ~  
SEDIMENT CONTROL AT PHASED CONSTRUCTION OF BRIDGE CLASS CULVERTS

	SEDIMENT CONTROL FENCE
	ROCK FILTER DAM (TY 2)
	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

- NOTES:
- START SEDIMENT CONTROL AT LOCATION SO ALL STORM WATER WITH SEDIMENT IS COLLECTED
  - ROCK FILTER DAMS OR EARTH/GRASSED EMBANKMENTS CAN BE SUBSTITUTED AS DIRECTED.
  - PROVIDE A SMOOTH TRANSITION FROM THE INVERT ELEVATIONS BETWEEN CULVERTS. REMOVE LOOSE SOIL FROM EXCAVATED AREA BETWEEN CULVERTS.
  - PROVIDE AND INSTALL PNEUMATICALLY PLACED CONCRETE ON THE DITCH BOTTOM AND SIDE SLOPES BETWEEN TEMPORARY TERMINATIONS BETWEEN OLD AND NEW CULVERTS. PNEUMATICALLY PLACED CONCRETE WILL BE PLACED TO THE HEIGHT OF THE LARGEST CULVERT ON THE DITCH SIDE SLOPES; AND TO A LIMIT 10 FEET OUTSIDE THE LOCATION OF BMPs ALONG THE DITCH BOTTOM. CEMENT STABILIZED SAND MAY BE SUBSTITUTED FOR PNEUMATICALLY PLACED CONCRETE, IN AREAS WHERE INSTALLATION WORKS AND AT THE OPTION OF TXDOT.



**BEST MANAGEMENT PRACTICE (BMP) #11**  
BOUNDRY SEDIMENT CONTROL ~ BOTH ENDS OF CONTROL TERMINATED UP SLOPE



**BEST MANAGEMENT PRACTICE (BMP) #12**  
BOUNDRY SEDIMENT CONTROL ~ BOTH ENDS OF CONTROL TERMINATED DOWN SLOPE

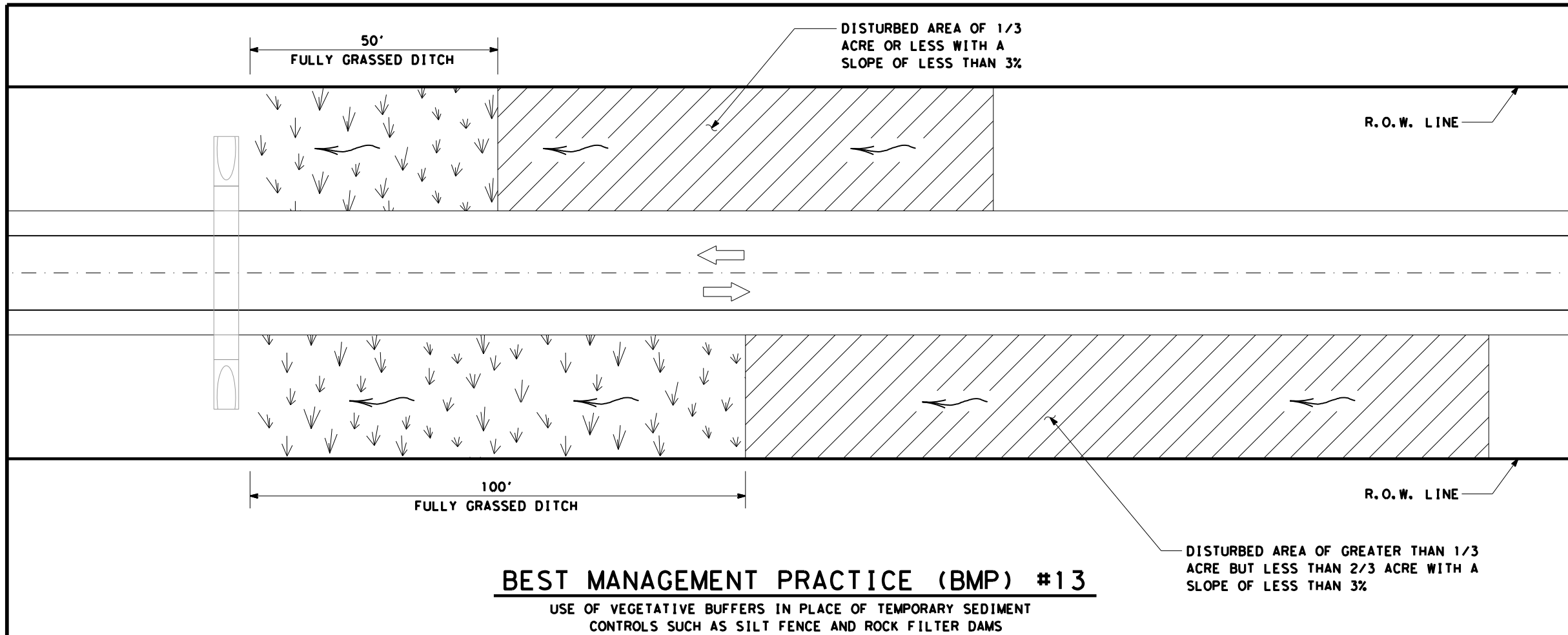
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Texas Department of Transportation  
Waco District Standard

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DEC 2013	DIST	COUNTY	SHEET NO.	
FEB 2015	WAC	HILL	81	



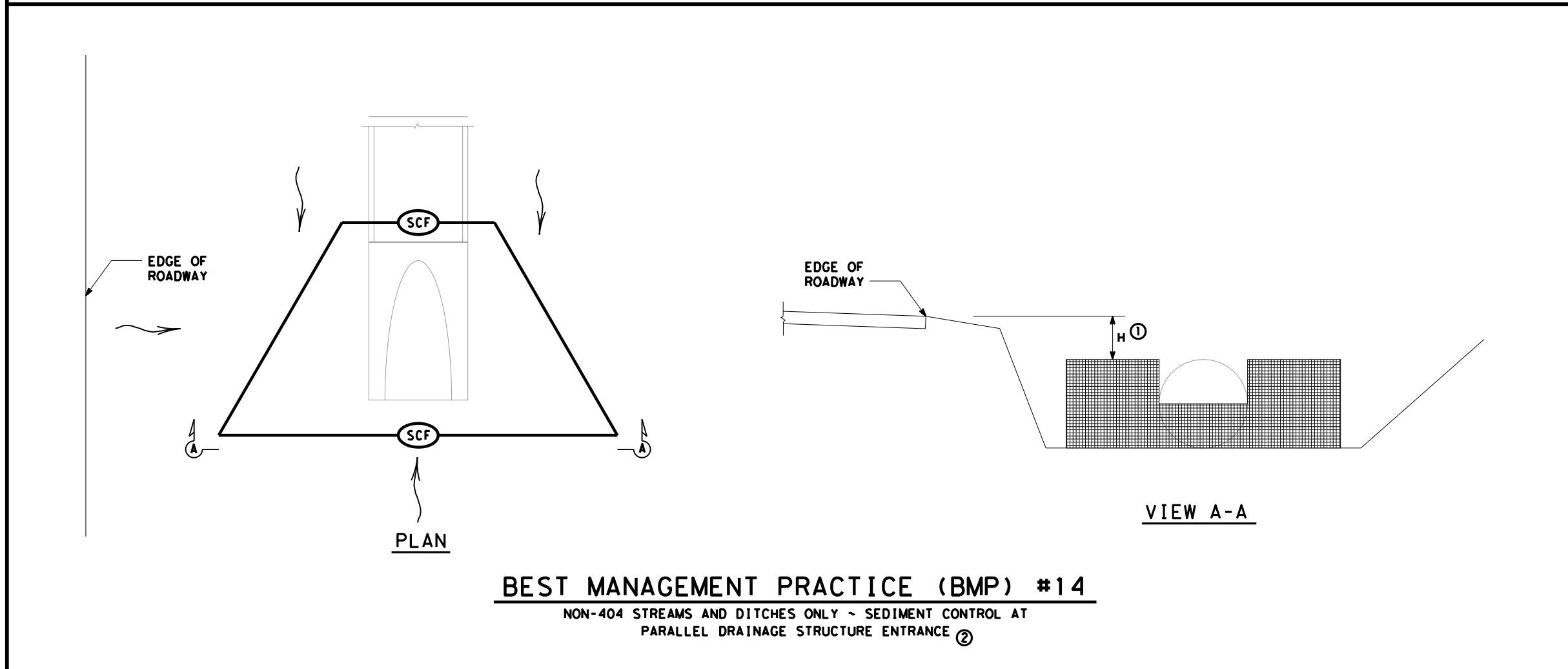
**BEST MANAGEMENT PRACTICE (BMP) #13**

USE OF VEGETATIVE BUFFERS IN PLACE OF TEMPORARY SEDIMENT CONTROLS SUCH AS SILT FENCE AND ROCK FILTER DAMS

DISTURBED AREA OF GREATER THAN 1/3 ACRE BUT LESS THAN 2/3 ACRE WITH A SLOPE OF LESS THAN 3%

	FULLY GRASSED DITCH
	DISTURBED AREA
	DIRECTION OF FLOW
	SEDIMENT CONTROL FENCE

- ① FOR H DIMENSIONS LESS THAN 1.5' SILT FENCE MAY NEED TO BE NOTCHED AS SHOWN IN VIEW A-A. ADD EXTRA POSTS AT NOTCH.
- ② BMP #14 MAY BE USED AT CROSS DRAINAGE STRUCTURES AS DIRECTED.



**BEST MANAGEMENT PRACTICE (BMP) #14**

NON-404 STREAMS AND DITCHES ONLY - SEDIMENT CONTROL AT PARALLEL DRAINAGE STRUCTURE ENTRANCE ②

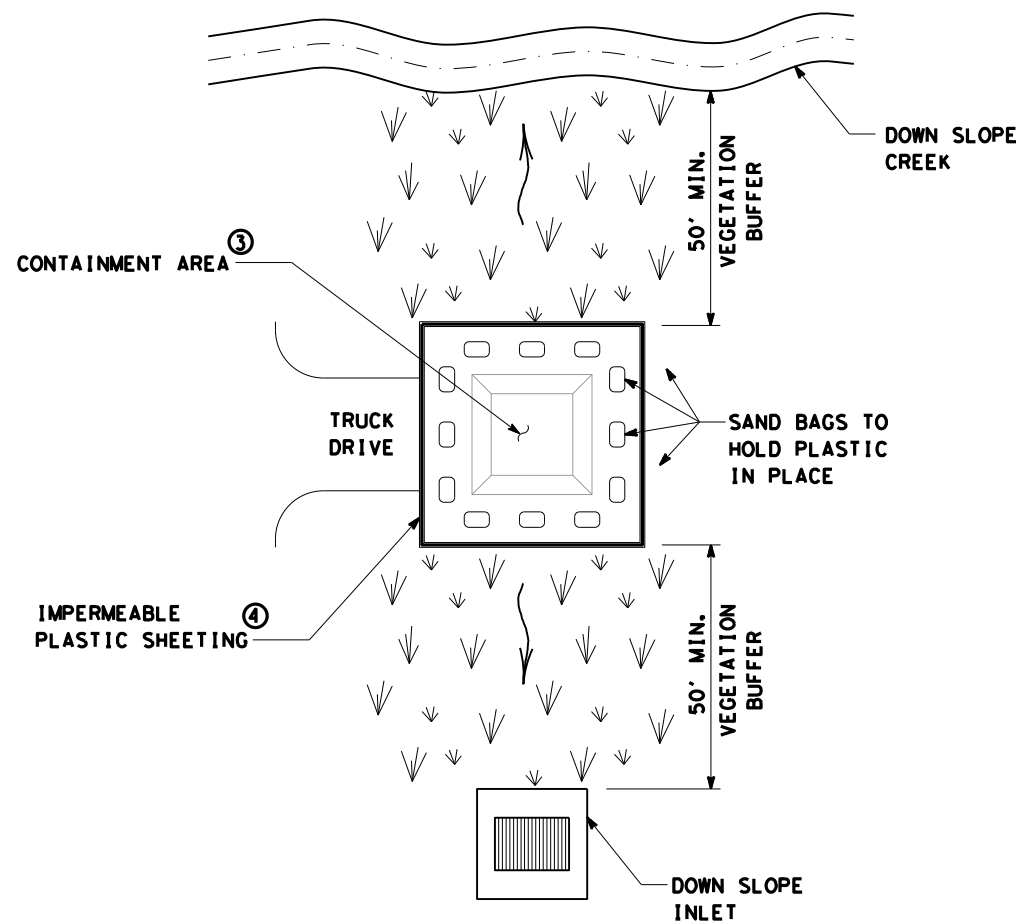
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Texas Department of Transportation  
Waco District Standard

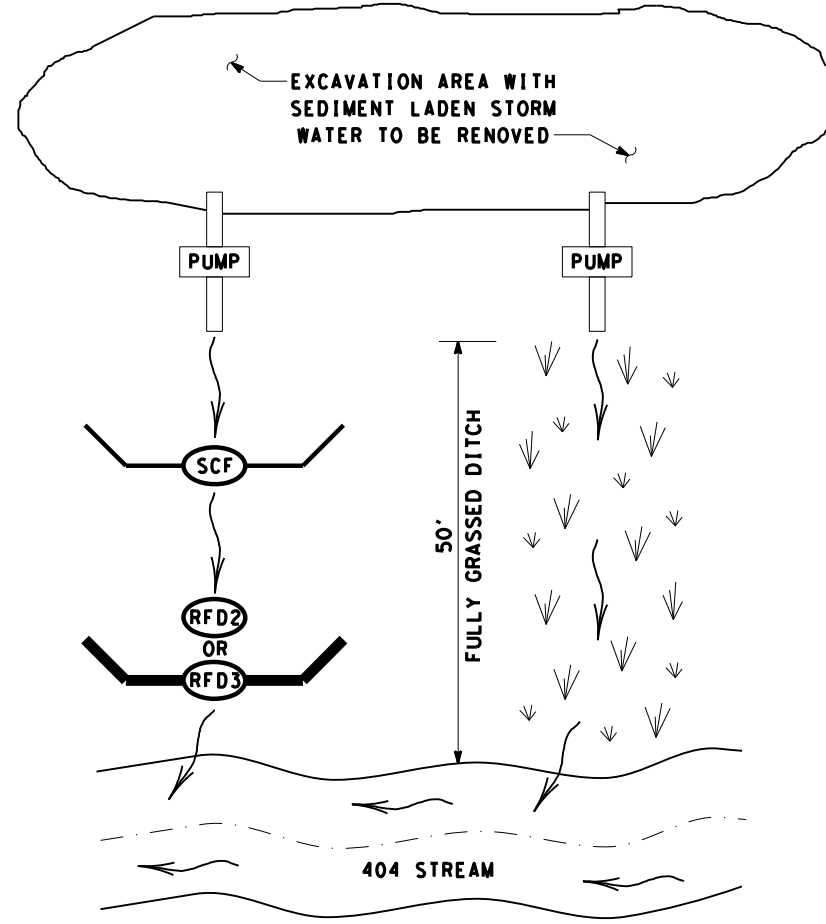
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FEB 2015	WAC	HILL		82



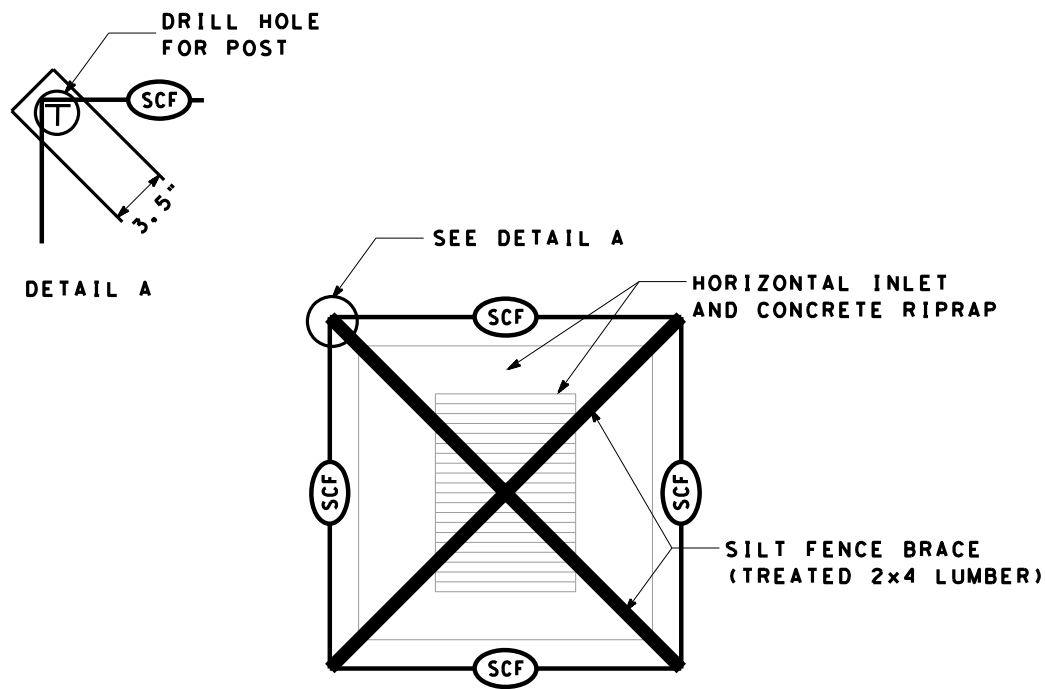
**BEST MANAGEMENT PRACTICE (BMP) #15**  
CONCRETE TRUCK WASHOUT AREA



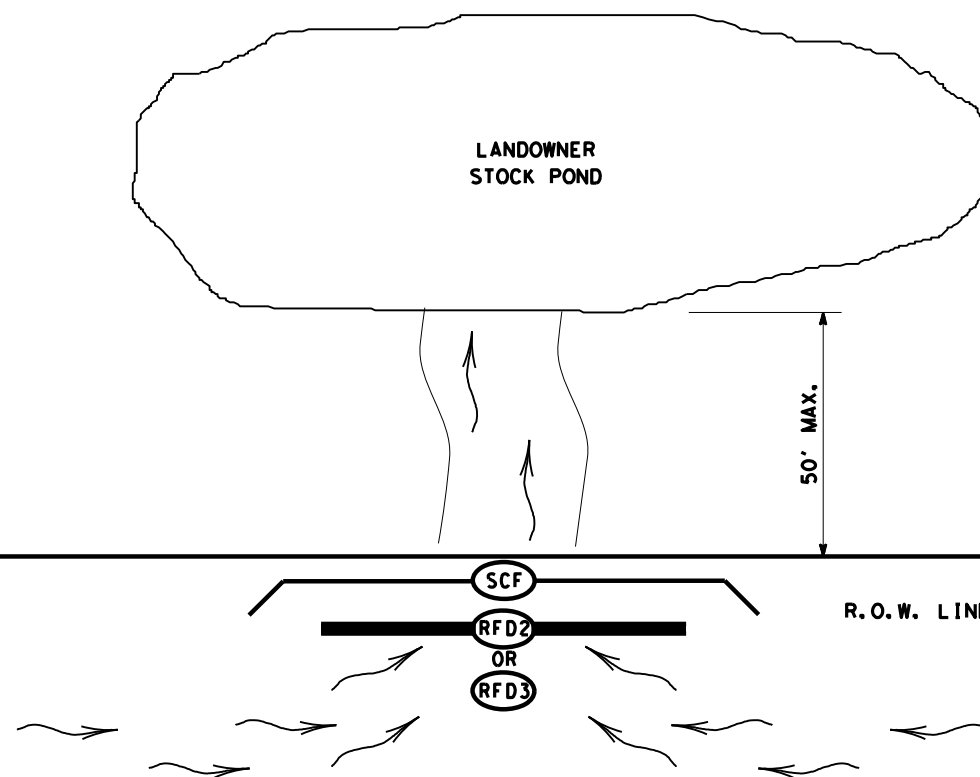
**BEST MANAGEMENT PRACTICE (BMP) #16**  
PUMPED STORM WATER SEDIMENT CONTROLS ①

	FULLY GRASSED DITCH
	DIRECTION OF FLOW
	SEDIMENT CONTROL FENCE
	ROCK FILTER DAM (TY 2)
	ROCK FILTER DAM (TY 3)

- ① PUMPED STORM WATER FROM AN EXCAVATION AREA SHOULD BE DISCHARGED IN A 50' VEGETATIVE BARRIER OR THROUGH TWO TEMPORARY SEDIMENT CONTROLS BEFORE ENTERING A 404 STREAM.
- ② FOR LANDOWNER STOCKPONDS WITHIN 50' OF THE RIGHT OF WAY LINE, PROVIDE REDUNDANT SEDIMENT CONTROLS AT THE CONVEYANCE OF THE POND. MINIMUM OF TWO SEDIMENT CONTROLS.
- ③ WHEN CONTAINMENT AREA REACHES 1' FREEBOARD, DISCONTINUE WASHOUT PLACEMENT AND REMOVE MATERIAL UPON SOLIDIFICATION.
- ④ EACH TIME SOLIDIFIED MATERIAL IS REMOVED REPLACE PLASTIC SHEETING.



**BEST MANAGEMENT PRACTICE (BMP) #17**  
HORIZONTAL INLET SEDIMENT CONTROL



**BEST MANAGEMENT PRACTICE (BMP) #18**  
LANDOWNER STOCKPOND SEDIMENT CONTROL ②

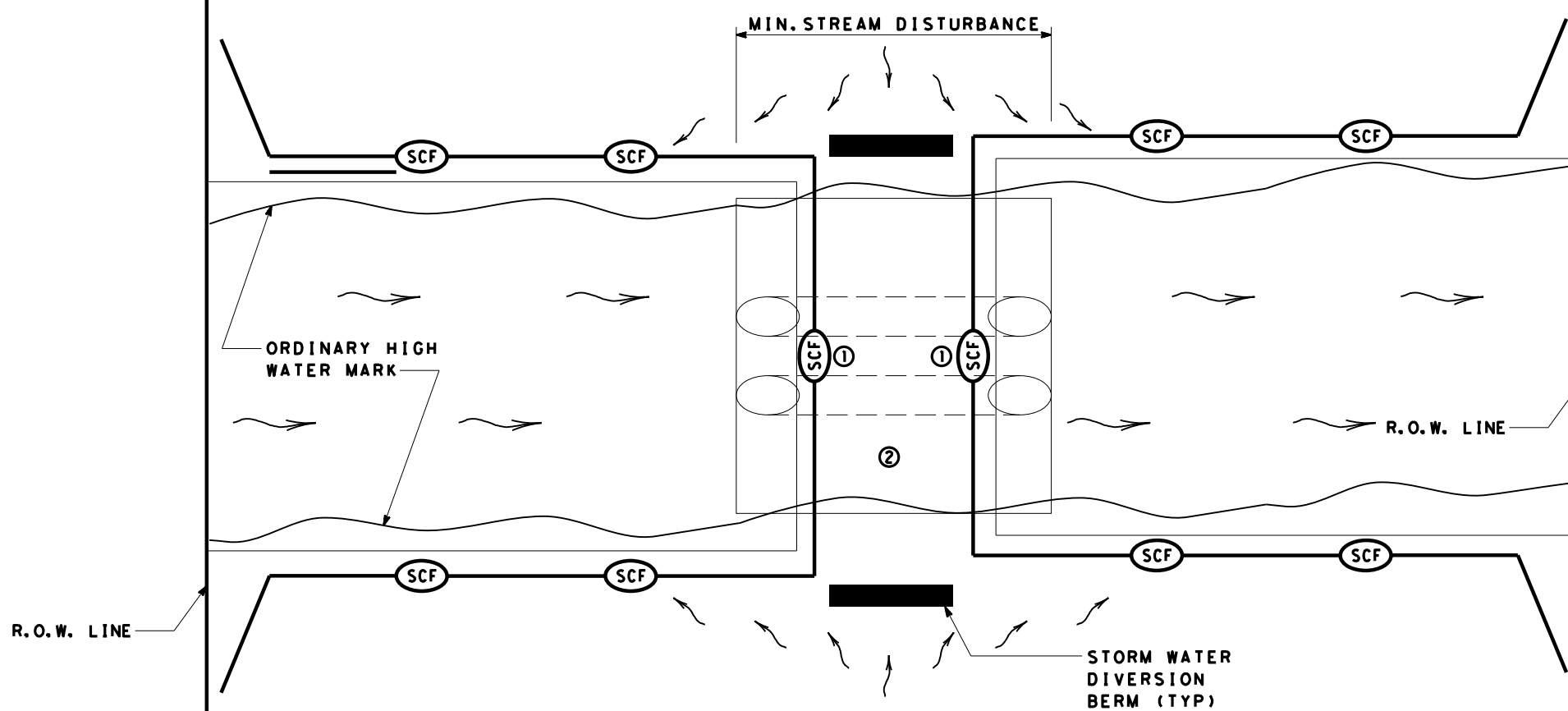
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Texas Department of Transportation  
Waco District Standard

**TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES**

TA-BMP

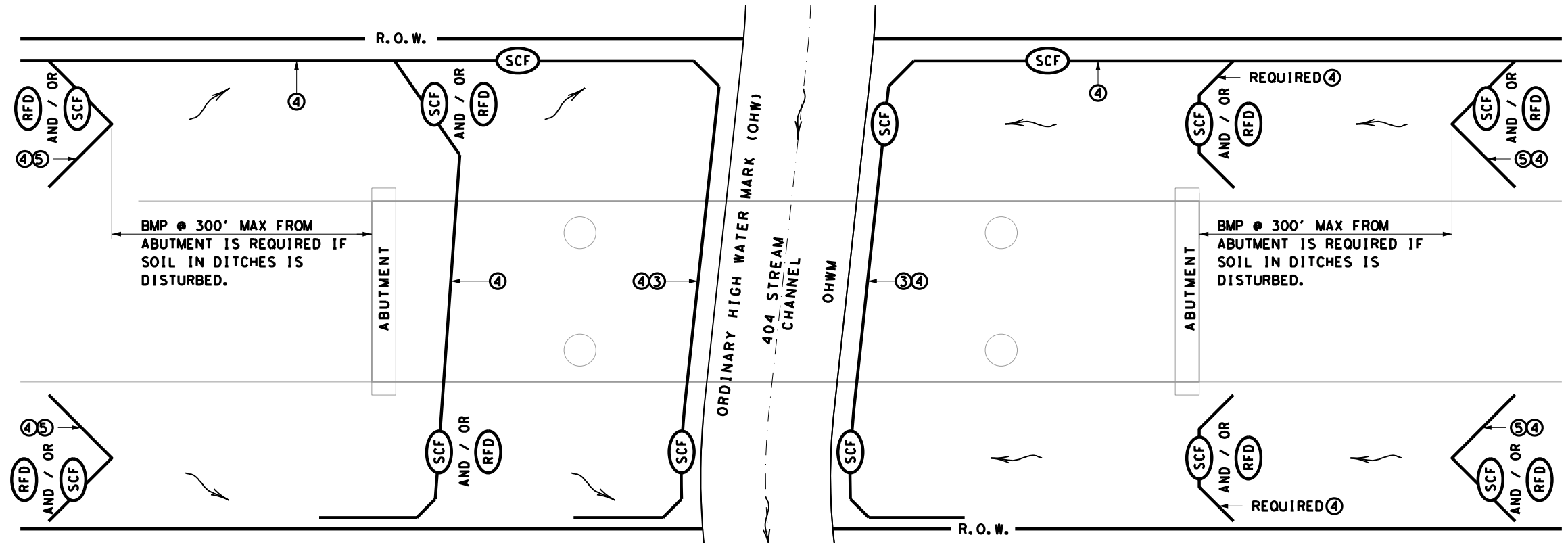
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DEC 2013	DIST	COUNTY	SHEET NO.	
FEB 2015	WAC	HILL	7	



**BEST MANAGEMENT PRACTICE (BMP) #19**  
TYPICAL 404 STREAM CROSSING (SEDIMENT CONTROL AT CROSSING)

	DIRECTION OF FLOW
	SEDIMENT CONTROL FENCE
	ROCK FILTER DAM
	SECURITY FENCING

- ① HAY BALES MAY BE SUBSTITUTED FOR SILT FENCE OVER THE STREAM CROSSING.
- ② CROSSING WILL BE AS PER REQUIREMENTS OF THE WATERS OF THE US GENERAL NOTES.
- ③ INSTALL SILT FENCE SLIGHTLY UP FROM OHW MARK FROM R.O.W. TO R.O.W.
- ④ USE SILT FENCE L-HOOKS ON LEVEL OR DOWN SLOPING ENDS TO BLOCK STORM WATER SEDIMENT
- ⑤ INSTALL LARGE V OR U SHAPED BMP'S FROM ABUTMENT AS SHOWN. IF THERE IS STEEP DITCH CONDITIONS DECREASE SPACING AND CONSIDER RFD'S. ADD ADDITIONAL BMP'S IF GRADE IS STEEP OR IF FLOW IS HIGH.



**BEST MANAGEMENT PRACTICE (BMP) #20**  
FOR 404 STREAMS - BMP'S AT BRIDGES

SCALE = NTS SHEET 10 OF 10



**TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES**

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DEC 2013	DIST	COUNTY	SHEET NO.	
FEB 2015	WAC	HILL	8	