INDEX OF SHEETS
See sheet 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	STP 2023(593)HES		IH 20,ETC
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	ODA	MARTIN,ETC	1
CONTROL	SECTION	JOB	
0005	04	082,ETC	

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL PROJECT NUMBER: STP 2023(593)HES

CSJ 0005-04-082 AND 0292-04-71

ODESSA DISTRICT

IH 20 AND SH 18
MARTIN COUNTY AND WARD COUNTY

LIMITS: (IH 20) FROM SH 137 TO BI 20
(SH 18) FROM 45TH STREET IN MONAHANS TO FM 1776

TOTAL LENGTH OF PROJECT = IH 20: 12,761 FT = 2.42 MI
SH 18: 24,557 FT = 4.65 MI

FOR THE CONSTRUCTION OF SAFETY IMPROVEMENT PROJECTS CONSISTING OF INSTALLATION OF CABLE BARRIER

FUNCTIONAL CLASSIFICATION = IH 20: PRINCIPAL ARTERIAL
SH 18: MINOR ARTERIAL

A.D.T. = IH 20 (2021): 23,511
IH 20 (2041): 32,915
SH 18 (2021): 7,023
SH 18 (2041): 9,832

FINAL PLANS

CONTRACTOR : _____

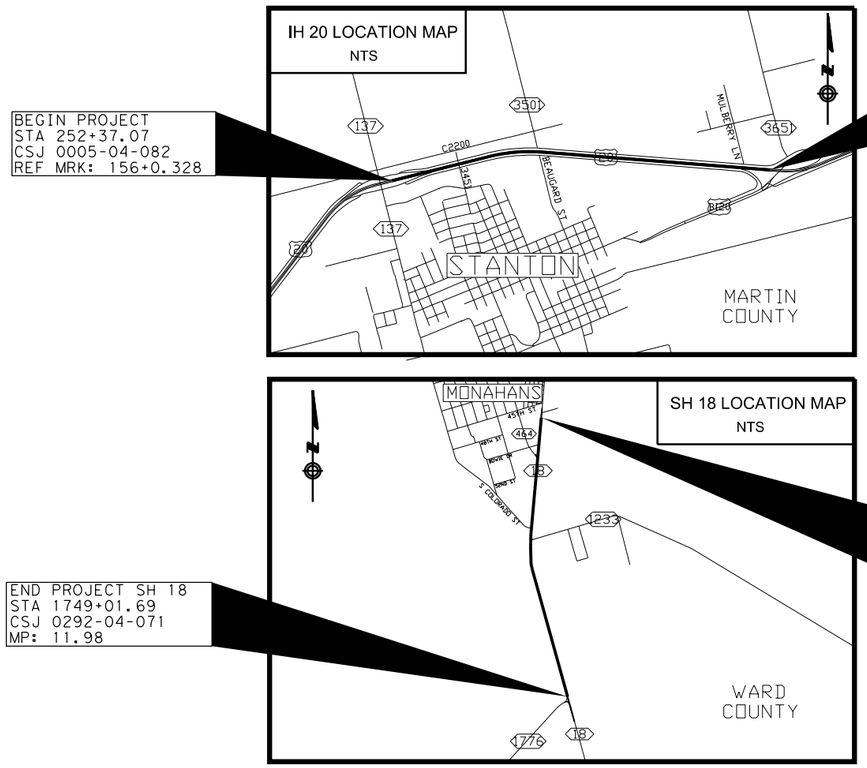
LETTING DATE: _____

DATE WORK BEGAN: _____

DATE WORK COMPLETED: _____

DATE WORK ACCEPTED: _____

SUMMARY OF CHANGE ORDERS:



NOTE:

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

REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH BC (1)-21 THRU BC (12)-21 AND THE "TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES

EXCEPTIONS: NONE

EQUATIONS: NONE

RAILROADS: NONE

STATE OF TEXAS
DALE A. VEHLEWALD
116649
LICENSED
PROFESSIONAL ENGINEER

Dale Vehlewald

03/27/2023

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SUBMITTED FOR LETTING: _____

_____, P.E.
PROJECT ENGINEER

Texas Department of Transportation
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RECOMMENDED FOR LETTING: 3/30/2023
DocuSigned by:
_____, P.E.
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AREA ENGINEER

RECOMMENDED FOR LETTING: 3/30/2023
DocuSigned by:
_____, P.E.
381F75A6AD0A8...
DIRECTOR OF TRANSPORTATION
PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 3/30/2023
DocuSigned by:
_____, P.E.
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DISTRICT ENGINEER

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GENERAL

TRAFFIC CONTROL PLAN

TCP STANDARDS

ROADWAY DETAILS

ROADWAY STANDARDS

ENVIRONMENTAL ITEMS

ENVIRONMENTAL STANDARDS

GEOTECHNICAL

STATE OF TEXAS
MARK R. RICHARDSON
143771
LICENSED
PROFESSIONAL ENGINEER

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

MARK R. RICHARDSON, P.E. — 03/27/2023 DATE

NO.	DATE	REVISION	APPROVED

Texas Department of Transportation

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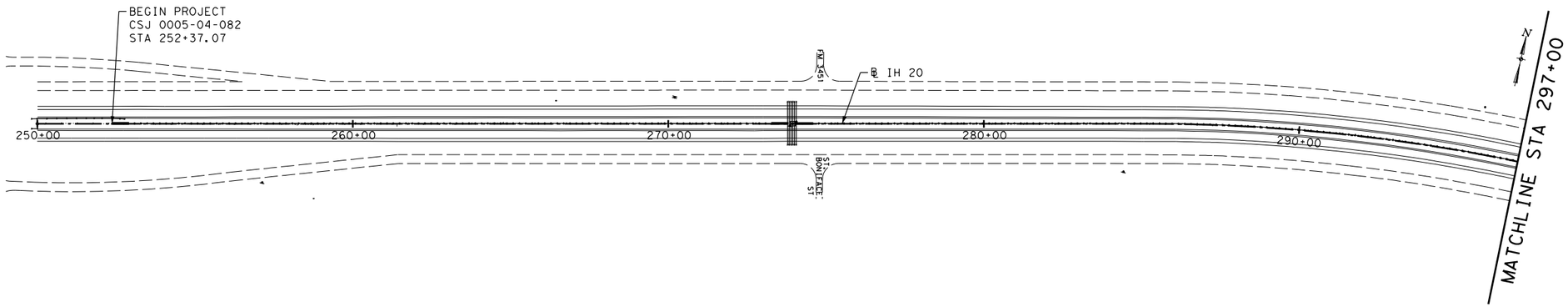
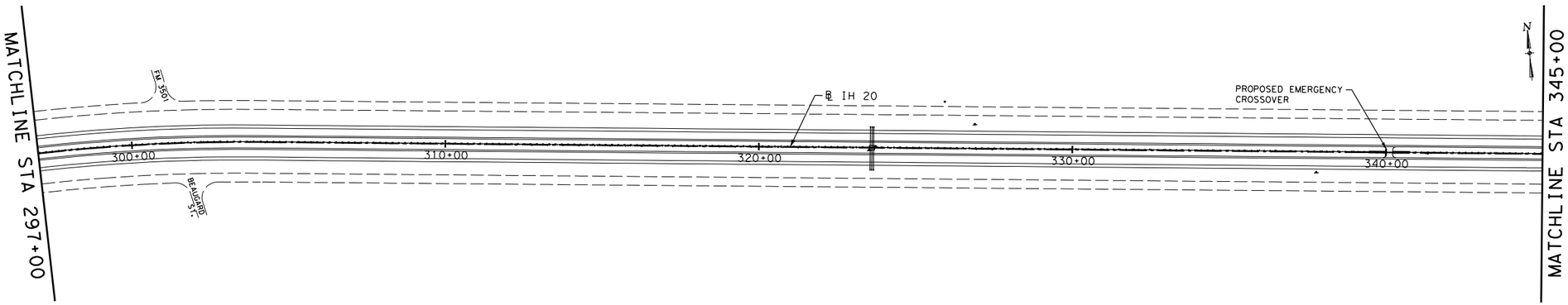
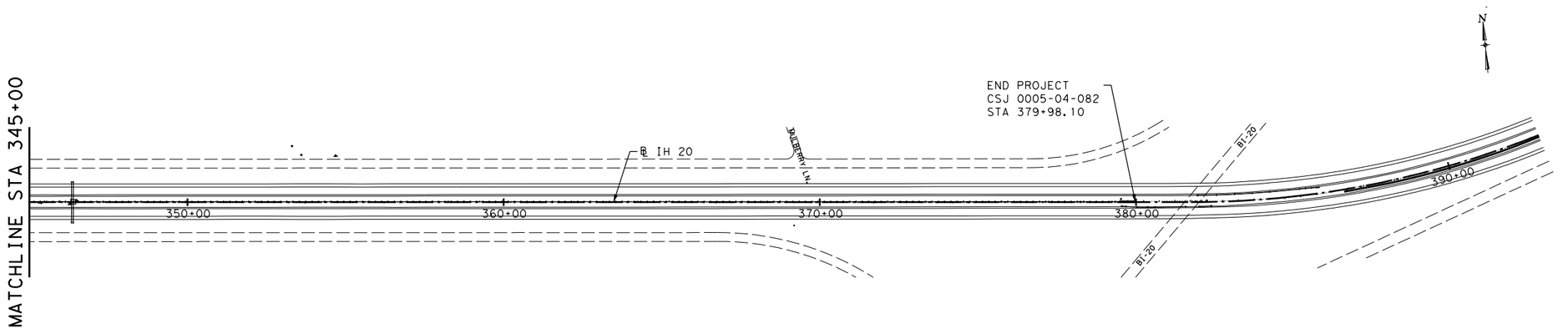
IH 20 & SH 18
INDEX

SHEET 1 OF 1

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	2
	005	04	082	







NOTES:
1. DRIVEWAY AND CROSS STREET LOCATIONS ARE APPROXIMATE

0' 100' 200' 400'
SCALE: 1"=400'

NO.	DATE	REVISION	APPROVED

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IH 20
PROJECT LAYOUT

SHEET 1 OF 1

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				
	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	3
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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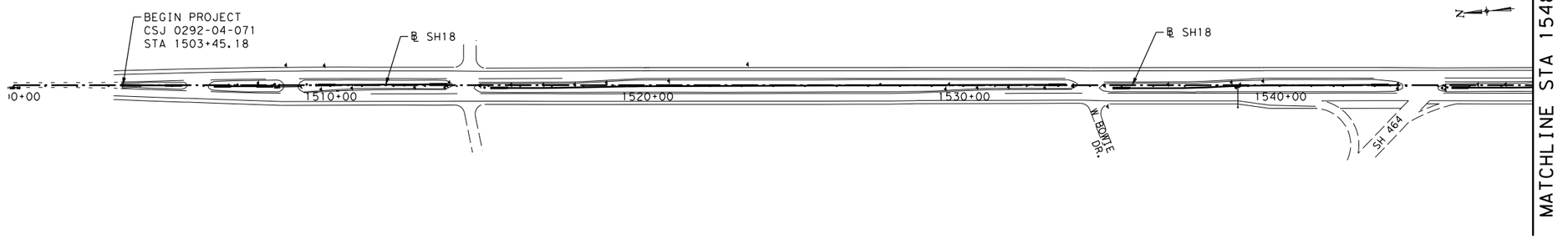

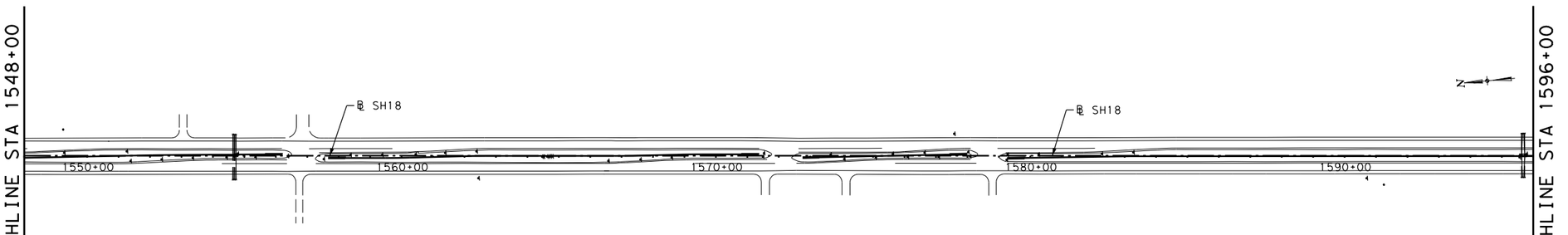

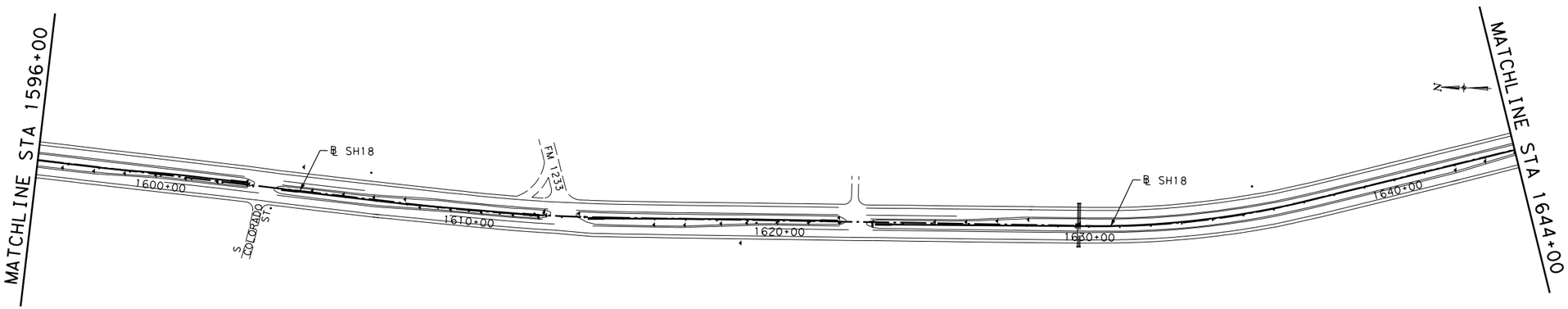

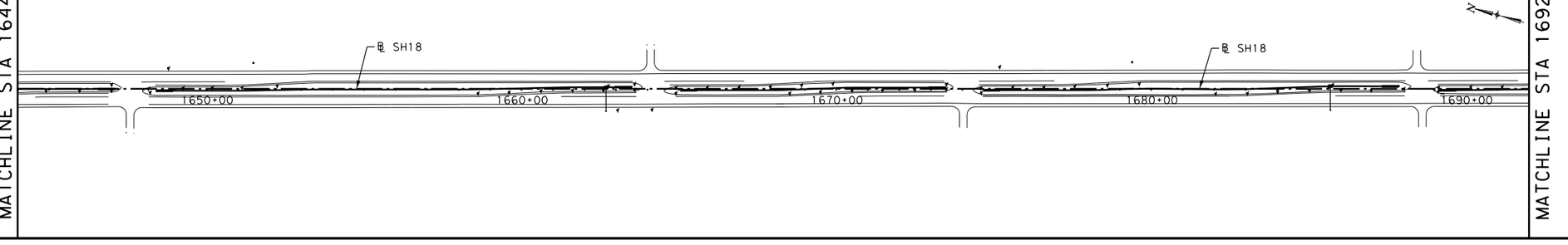

NOTES:
1. DRIVEWAY AND CROSS STREET LOCATIONS ARE APPROXIMATE

0' 100' 200' 400'
SCALE: 1"=400'

NO.	DATE	REVISION	APPROVED

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SH 18
PROJECT LAYOUT
BEGIN TO STA 1692+00

SHEET 1 OF 2

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	4
	005	04	082	

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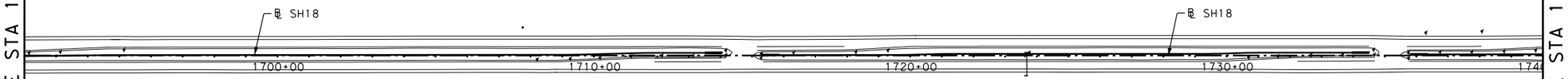
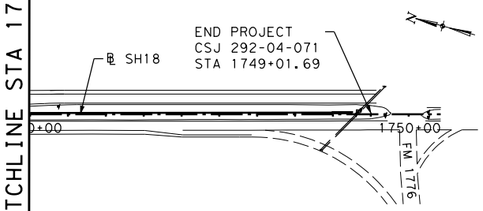
MATCHLINE STA 1692+00



MATCHLINE STA 1740+00



MATCHLINE STA 1740+00

NOTES:
1. DRIVEWAY AND CROSS STREET LOCATIONS ARE APPROXIMATE

0′ 100′ 200′ 400′
SCALE: 1"=400′

NO.	DATE	REVISION	APPROVED

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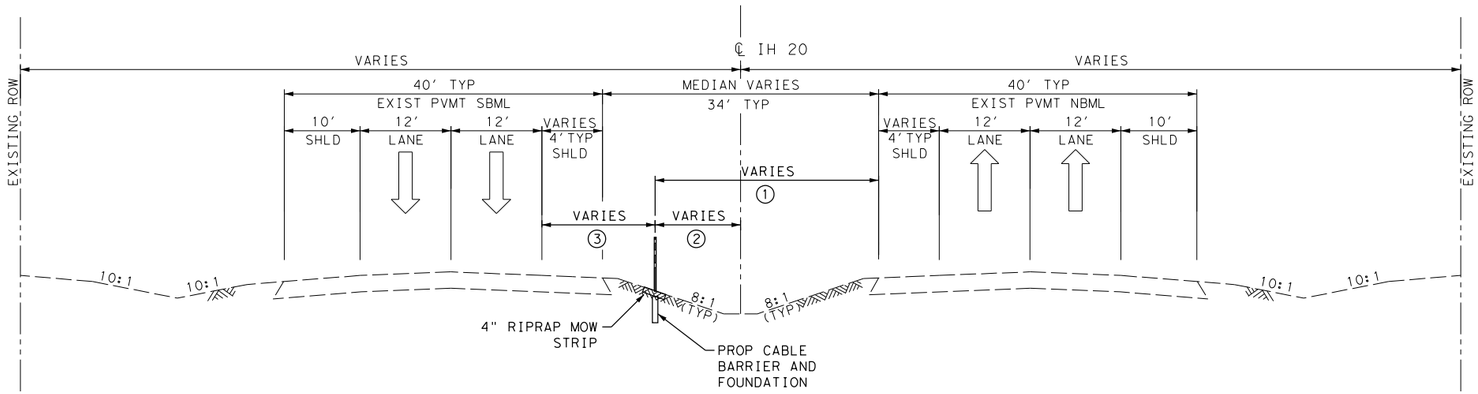
SH 18
PROJECT LAYOUT
STA 1692+00 TO END

SHEET 2 OF 2

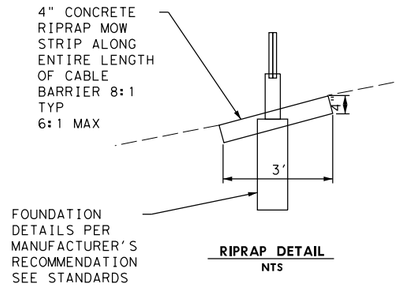
DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	5
APPROVED	CONT.	SECT.	JOB	
	005	04	082	



PROPOSED IH 20

STA 252+88.32 - STA 273+26.69
STA 274+56.71 - STA 339+47.39
STA 340+74.35 - STA 379+46.86

CABLE BARRIER LEFT OF CL				
BEGIN STA	END STA	①	②	③
252+88.32	273+26.69	23'	1'	20'-21'
274+56.71	339+47.39	22'-24'	1'	20'-22'
340+74.35	379+46.86	23'-24'	1'	20'-22'



RIPRAP DETAIL
NTS

NO.	DATE	REVISION	APPROVED

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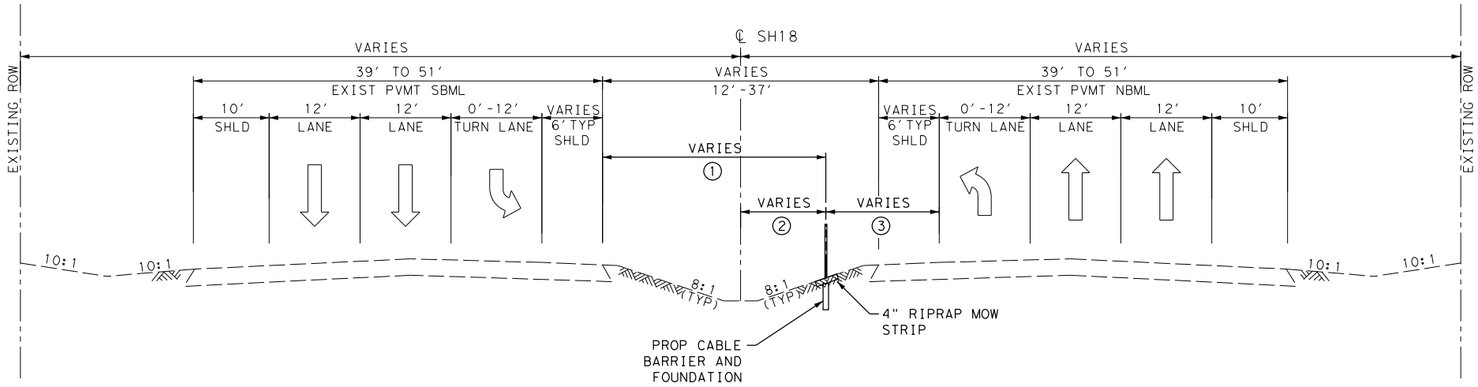
IH 20
PROPOSED
TYPICAL SECTION

SHEET 1 OF 1

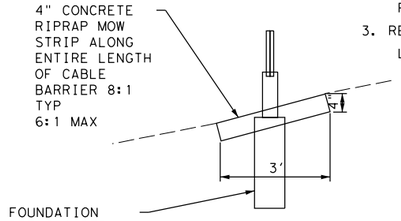
DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	6
	005	04	082	



CABLE BARRIER RIGHT OF CL				
BEGIN STA	END STA	1	2	3
1503+96.43	1504+80.57	10'	1'	15'
1506+86.33	1507+69.22	22.50'	3.50'	21'
1515+59.46	1530+07.03	14'	9'	18'
1535+25.54	1542+19.50	15'	9.5'	16.50'
1545+96.16	1551+30.67	13'	8'	18'
1558+20.24	1567+42.99	20'	7'	18'
1573+29.58	1575+61.26	12'	5'	18'
1579+81.87	1598+70.58	14'	7'	17'
1604+45.01	1608+79.07	12'	2.50'	20'
1614+37.93	1617+12.51	18'	3.40'	20'
1623+63.99	1630+50.42	23'	2'	21'
1636+57.02	1646+57.85	18'	1'	13.50'
1648+92.42	1659+45.11	21'	2.50'	23.50'
1665+57.81	1669+36.63	18'	4.75'	19'
1675+19.88	1683+35.74	19'	4.50'	23'
1689+68.71	1693+70.70	14'	4.50'	18'

PROPOSED SH18

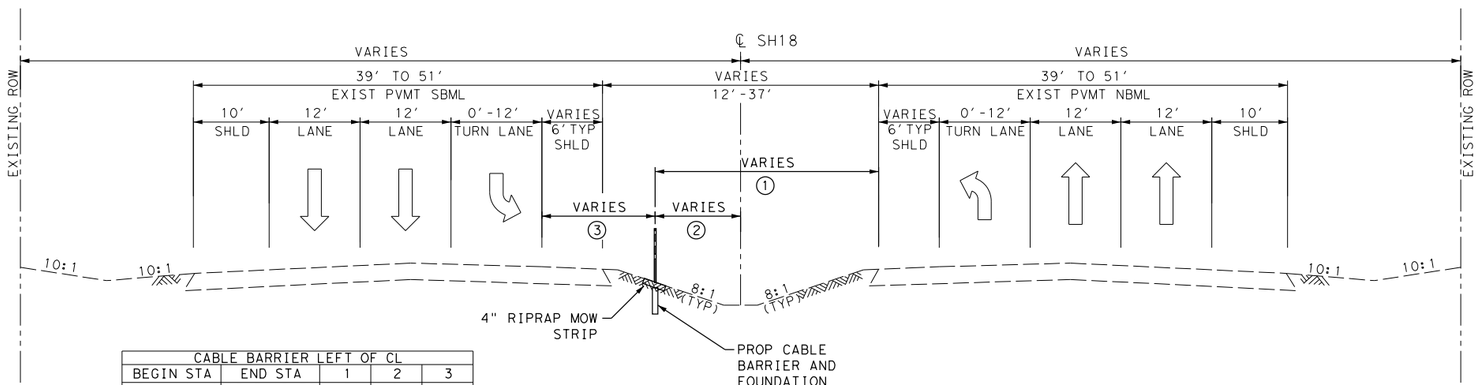
STA 1503+96.43 TO STA 1504+80.57
STA 1506+86.33 TO STA 1507+69.22
STA 1515+59.46 TO STA 1530+07.03
STA 1535+25.54 TO STA 1542+19.50
STA 1545+96.16 TO STA 1551+30.67
STA 1558+20.24 TO STA 1567+42.99
STA 1573+29.58 TO STA 1575+61.26
STA 1579+81.87 TO STA 1598+70.58
STA 1604+45.01 TO STA 1608+79.07
STA 1614+37.93 TO STA 1617+12.51
STA 1623+63.99 TO STA 1630+50.42
STA 1636+57.02 TO STA 1646+57.85
STA 1648+92.42 TO STA 1659+45.11
STA 1665+57.81 TO STA 1669+36.63
STA 1675+19.88 TO STA 1683+35.74
STA 1689+68.71 TO STA 1693+70.70



RIPRAP DETAIL
NTS

NOTES:

1. DIMENSIONS SHOWN IN THE TABLES ON THE TYPICAL SECTIONS REFLECT DISTANCES FROM THE CENTERLINE ALIGNMENT TO THE BARRIER LOCATION. THE MEDIAN DITCH FLOWLINE DOES NOT ALWAYS FOLLOW THE CENTERLINE ALIGNMENT FOR SH 18.
2. THE PLACEMENT OF THE BARRIER IS IN RELATION TO THE ACCEPTABLE DISTANCES FROM EDGE OF TRAVELED WAY AND DITCH FLOWINES AS REFLECTED IN THE DESIGN CRITERIA SHOWN IN SECTION 8 OF THE ROADWAY DESIGN MANUAL.
3. REFER TO PLAN SHEETS 50 TO 60 TO SEE BARRIER LOCATION IN RELATION TO THE SH 18 DITCH FLOWLINES.



CABLE BARRIER LEFT OF CL				
BEGIN STA	END STA	1	2	3
1510+14.44	1513+15.79	15'	2'	20'
1530+07.03	1532+71.74	11.50'	1'	20'
1542+19.50	1542+90.63	21'	0.30'	22'
1551+30.67	1555+68.30	13'	4.30'	18'
1567+42.99	1570+83.45	18'	4.50'	15'
1575+61.26	1577+45.84	11.38'	4'	18.50'
1598+70.58	1602+27.63	13'	6'	19'
1608+79.07	1611+75.99	9'	2'	24'
1617+12.51	1621+37.74	11.50'	2'	20'
1630+50.42	1636+57.02	20'	2'	24'
1659+45.11	1662+98.58	21'	5'	23'
1669+36.63	1672+95.34	16.50'	3.50'	15'
1683+35.74	1687+35.17	17.50'	7.50'	19'
1693+70.70	1713+53.47	18'	2.50'	25'
1715+85.11	1733+98.98	19'	5'	24'
1736+33.37	1747+99.19	22.30'	4'	25.50'

PROPOSED SH18

STA 1510+14.44 TO STA 1513+15.79
STA 1530+07.03 TO STA 1532+71.74
STA 1542+19.50 TO STA 1542+90.63
STA 1551+30.67 TO STA 1555+68.30
STA 1567+42.99 TO STA 1570+83.45
STA 1575+61.26 TO STA 1577+45.84
STA 1598+70.58 TO STA 1602+27.63
STA 1608+79.07 TO STA 1611+75.99
STA 1617+12.51 TO STA 1621+37.74
STA1630+50.42 TO STA 1636+57.02
STA 1659+45.11 TO STA 1662+98.58
STA 1669+36.63 TO STA 1672+95.34
STA 1683+35.74 TO STA 1687+35.17
STA 1693+70.70 TO STA 1713+53.47
STA 1715+85.11 TO STA 1733+98.98
STA 1736+33.37 TO STA 1747+99.19

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARK R. RICHARDSON
143771
LICENSED
PROFESSIONAL ENGINEER

03/27/2023

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SH 18
PROPOSED
TYPICAL SECTION

SHEET 1 OF 1

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	7
	005	04	082	

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Contractor questions on this project are to be addressed to the following individual(s):
ODA-PreLettingQuestions@txdot.gov

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:
https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

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

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

Item 5: Control of the Work

The existing alignment is the control for the Contractor staking. Establish reference points for the control prior to removing the existing surface.

Use Method C for construction surveying.

In the event the finished surface does not conform to the typical sections or does not meet the required IRI, rework the non-conforming area to the limits necessary and employ additional survey control as directed.

Item 6: Control of Materials

Restrict storage of equipment and materials to approved areas. The Engineer will not approve storage in any TxDOT yard.

Promptly and properly dispose of any waste generated from servicing equipment on the project.

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

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

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

County: Martin / Ward **Sheet: 8**
Highway: IH 20 / SH 18 **Control: 0005-04-082 / 0292-04-071**

Item 7: Legal Relations and Responsibilities

Utilities (public, private and TxDOT) exist throughout the project. Prior to any excavation, investigate to determine the utility locations within the project right of way. Contact the TxDOT Odessa Traffic Operations shop at 432-498-4690 to investigate and determine the location of any TxDOT utility that may exist within the project right of way. Exercise caution when excavating in areas where investigations have determined that utilities exist. The contractor is responsible for maintaining utility markings

No significant traffic generator events identified.

As an element of ensuring public safety and convenience under Article 7.2.4, the Contractor is hereby directed to open all closed lanes and shoulder and remove all traffic control devices from any areas where work is not being actively performed unless overnight traffic control is required and approved by the engineer. Removed devices must be stored outside of the clear zones near the right of way line or removed from the right of way line entirely.

At any time during construction that a previously installed crash cushion is damaged by the traveling public and is requested to be repaired by the Engineer, the repair will be paid at the same unit cost as the original installation.

Item 8: Prosecution and Progress

The following portions of the plans may affect the Contractor's planned construction sequencing. The Contractor’s attention is directed to the appropriate plan sheet or standard sheet.

-Traffic Control Plan

-Storm Water Pollution Prevention Plan

-Environmental Permit, Issues And Commitments (EPIC)

Maintain ingress and egress to side streets and private property at all times.

Maintain ingress and egress to the frontage roads at all times.

Working days will be computed and charged in accordance with Article 8. 3.1.4. “Standard Workweek.”

The road-user cost liquidated damages are $2,722 per day.

90 day lead time is needed to allow for sufficient time to obtain and produce materials needed for various bid items in this project.

Item 110: Excavation

Broom the existing base or subgrade to remove any loose material dropped during excavation operations. This work is considered subsidiary to this item.

Before excavation and embankment operations begin, windrow all topsoil (approx. 4 inches) to be reused on side slopes or behind the proposed curb and gutter. This work is subsidiary to Item 110, "Excavation" and Item 132, "Embankment".

Item 132: Embankment

For all material with a plasticity index of less than 20, use test method Tex-113-E in lieu of test method Tex-114-E for determining the percent of density

Material quality test requirements will be waived for material excavated from the right of way on this project and utilized in embankment.

Item 150: Blading

Use blading to construct and remove side road turnouts, rebuild existing dikes, ditch blocks, and other work as directed.

When directed, fill and grade low areas outside the embankment areas to drain.

Preserve the top 4" of topsoil outside of the work area. Preserve this material in windrows until topsoil can be replaced and seeded to stabilize all exposed terrain.

Item 432: Riprap

Reinforce all riprap on this project with no. 3 bars spaced 12 inches O.C.B.W. or no. 4 bars spaced at 18 inches O.C.B.W.

Broom finish all riprap on this project unless otherwise directed.

Polypropylene fiber may not be used in lieu of reinforcing steel.

In addition to reinforcing steel, polypropylene fiber is required at a rate of 1.5 lbs. /cy.

Item 502: Barricades, Signs, and Traffic Handling

Stop work immediately if any major traffic control element such as an advanced warning flashing panel or TMA or PCMS is not in good working order or control setup.

Place orange fencing around sidewalk, wheelchair ramps and other pedestrian areas that pose a hazard to pedestrian traffic as directed.

Use Shoulder Drop-Off (CW8-9A) signs during construction when shoulder drop-off conditions are 3 inches or greater or as directed. Placement shall be in accordance with the “Texas Manual on Uniform Traffic Control Devices”.

This project has a regulatory work zone speed reduction within the project limits. The work zone speed limit is reduced from 75 mph to 60 mph. Placement of speed reduction zone signs shall comply with BC (3)-21. Speed resumption sign(s) is required at the end of a speed reduction zone.

County: Martin / Ward **Sheet: 9**
Highway: IH 20 / SH 18 **Control: 0005-04-082 / 0292-04-071**

This project has an advisory work zone speed plaque of 60 mph to be placed on the G20-5ap/R2-1 warning sign. This advisory plaque will be used to supplement the warning sign and to indicate speed for the condition indicated. The warning sign and advisory speed plaque will be removed by the State once the condition or need for the sign no longer exists.

Place chevrons, at a minimum, on every other drum used for outsides of curves, merging tapers and shifting tapers.

Vertical panels shall be self-righting.

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.

When construction operations result in a drop-off of more than 2 inches, a 3:1 or flatter slope will be required. The slope must be constructed with a compacted material capable of supporting vehicles as approved by the Engineer. This work shall be done expeditiously during daylight hours. Flaggers and appropriate signing to safely guide traffic through the work area will be required as directed by the Engineer. This shall be considered subsidiary to Item 502.

Item 506: Temporary Erosion, Sedimentation, and Environmental Controls

In accordance with the Construction General Permit (CGP), erosion control and stabilization measures should be initiated as soon as practicable to include (list what our stabilization measures are – for example, replacing topsoil from windrow, erosion control blankets, seeding, etc.)

It is not anticipated that erosion control devices will be needed on this project. In the event that devices are needed, the Storm Water Pollution Prevention Plan shall consist of using the following items and/or items as directed by the Engineer. Payment for the work may be determined in accordance with Item 4, Article 4. "Changes in the Work".

-Biodegradable Erosion Control Logs

The total disturbed area for this project is 2.74 Acres. The disturbed area in this project, all project locations in the contract, and Contractor Project Specific Locations (PSLS), within 1 mile of the project limits, for the contract will further establish the authorization requirements for storm water discharges. The department will obtain an authorization to discharge storm water from the Texas Commission On Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain any required authorization from the TCEQ for any Contractor PSLS for construction support activities on or off the right of way. When the total area disturbed for all projects in the contract and PSLS within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLS on the right of way, to the Engineer (or to the appropriate MS4 operator when on an off-state system route).

Upon acceptance of the project, all SW3P devices will become property of the State and maintenance responsibility is transferred to the State until final stabilization is attained.

When applying cement for emulsion, asphalt treatment, or any other soil stabilization, sprinkle water as needed to control cement from blowing and contaminating adjacent vegetation and waters. Provide a minimum of two SW3P Signs. Obtain from the Engineer a copy of the project's completed TPDES Storm Water Program Construction Site Notice (TxDOT) and Contractor's copy of the Construction Site Notice. Laminate the sheets and bond with adhesive to 36" X 36" plywood sign blanks. Ensure the sheets remain dry. Apply Type C Blue reflective sheeting as the background and add the text "SW3P" in 5" white lettering, centered at the top. Attach the signs to approved temporary mounts and locate at each of the project limits just inside the right of way line at a readable height or as directed by the Engineer. If the sign cannot be placed outside the clear zone, it must adhere to the TMUTCD. SW3P signs, maintenance, and reposting (for replacement or as needed to ensure readability) will be subsidiary to Item 502.

Item 644: Small Roadside Sign Assemblies

For standard small sign details and dimensions, refer to the "Standard Highway Sign Designs for Texas (SHSD)"; a supplement to the Texas Manual on Uniform Traffic Control Devices (TMUTCD)".

Locate and mark existing reference marker(s) perpendicular to the road and along the right of way, or as directed, prior to removal. Erect new reference marker(s) at the original location, upon completion of construction.

Only bolt clamp style slip bases will be allowed for sign assemblies. Set screws will not be allowed.

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

General Note 5 of TCP (1-5)-18 provides for additional shadow vehicle(s) with truck mounted attenuator (TMA); one (1) additional shadow vehicle with TMA is included in the basis of estimate for this operation. The shadow vehicle(s) with TMA specified on the traffic control plan as "required" plus the 'additional shadow vehicle' is the quantity that has been estimated for this operation.

General Note 7 of TCP (2-6)-18 provides for additional shadow vehicle(s) with truck mounted attenuator (TMA); one (1) additional shadow vehicle with TMA is included in the basis of estimate for this operation. The shadow vehicle(s) with TMA specified on the traffic control plan as "required" plus the 'additional shadow vehicle' is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (5-1)-18; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-1)-12; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

County: Martin / Ward **Sheet: 10**
Highway: IH 20 / SH 18 **Control: 0005-04-082 / 0292-04-071**

The Contractor will be responsible for determining if one or more operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

BASIS OF ESTIMATE FOR TMA'S			
	TMA (STATIONARY) (DAY)		
STANDARD	REQUIRED	OPTIONAL	TOTAL
TCP (1-5) – 18 TCP (2-6) - 18 TCP (6-1) – 12 TCP (6-9) – 14	80	0	80

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0005-04-082 **DISTRICT** Odessa **COUNTY** Martin, Ward
HIGHWAY IH 20, SH 18

				CONTROL SECTION JOB	0005-04-082		0292-04-071		TOTAL EST.	TOTAL FINAL
				PROJECT ID	A00188401		A00188403			
				COUNTY	Martin		Ward			
				HIGHWAY	IH 20		SH 18			
ALT	BID CODE	DESCRIPTION	UNIT		EST.	FINAL	EST.	FINAL		
	110-6001	EXCAVATION (ROADWAY)	CY		513.000		898.000		1,411.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY		106.000				106.000	
	150-6002	BLADING	HR		12.000		22.000		34.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY		21,174.000		36,788.000		57,962.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY		472.000		824.000		1,296.000	
	500-6001	MOBILIZATION	LS		1.000				1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO		2.000		2.000		4.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF		330.000		555.000		885.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF		330.000		555.000		885.000	
	543-6002	CABLE BARRIER SYSTEM (TL-4)	LF		12,402.000		16,801.000		29,203.000	
	543-6006	CABLE BARRIER SYSTEM (TL-4) (10'-0")	LF				3,460.000		3,460.000	
	543-6020	CABLE BARRIER TERMINAL SECTION (TL-4)	EA		6.000		36.000		42.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA		4.000				4.000	
	658-6060	REMOVE DELIN & OBJECT MARKER ASSMS	EA				1.000		1.000	
	772-6001	POST AND CABLE FENCE (REMOVAL)	LF				3,134.000		3,134.000	
	772-6002	POST AND CABLE FENCE (REMV CONC ANCHOR)	EA				12.000		12.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA		2.000		2.000		4.000	
	6185-6002	TMA (STATIONARY)	DAY		30.000		50.000		80.000	
	11	STATE FORCE ACCOUNT WORK (PARTICIPATING)	LS		1.000				1.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS		1.000				1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS		1.000				1.000	

Station Range	Sheet Number	110 6001 EXCAVATION (ROADWAY)	132 6003 EMBANKMENT (FINAL)(ORD COMP)(TY B)	150 6002 BLADING	164 6001 BROADCAST SEED (PERM) (RURAL) (SANDY)	432 6045 RIPRAP (MOW STRIP)(4 IN)	506 6042 BIODEG EROSN CONT LOGS (INSTL) (18")	506 6043 BIODEG EROSN CONT LOGS (REMOVE)	543 6002 CABLE BARRIER SYSTEM (TL-4)	543 6006 CABLE BARRIER SYSTEM (TL-4) (10'-0")	543 6020 CABLE BARRIER TERMINAL SECTION (TL-4)	644 6004 IN SM RD SN SUP&AM TY10BWG(1)SA(T)	658 6060 REMOVE DELIN & OBJECT MARKER ASSMS
		CY	CY	HR	SY	CY	LF	LF	LF	LF	EA	EA	EA
IH 20 (0005-04-082)													
BEGIN TO STA 273+00	SHEET 1 OF 6	86	20	2	3438	77	60	60	2012	0	1	0	0
STA 273+00 TO STA 297+00	SHEET 2 OF 6	95	30	2	3951	88	65	65	2270	0	2	0	0
STA 297+00 TO STA 321+00	SHEET 3 OF 6	96	0	2	4000	89	0	0	2400	0	0	1	0
STA 321+00 TO STA 345+00	SHEET 4 OF 6	96	56	2	3956	88	65	65	2273	0	2	2	0
STA 345+00 TO STA 369+00	SHEET 5 OF 6	96	0	2	4000	89	70	70	2400	0	0	1	0
STA 369+00 TO END	SHEET 6 OF 6	44	0	2	1829	41	70	70	1047	0	1	0	0
Total (IH 20)		513	106	12	21174	472	330	330	12402	0	6	4	0
SH 18 (0292-04-071)													
BEGIN TO STA 1523+00	SHEET 1 OF 11	68	0	2	2770	62	135	135	1208	102	7	0	0
STA 1523+00 TO STA 1547+00	SHEET 2 OF 11	88	0	2	3405	76	50	50	1497	345	4	0	0
STA 1547+00 TO STA 1571+00	SHEET 3 OF 11	88	0	2	3640	81	50	50	1684	349	3	0	0
STA 1571+00 TO STA 1595+00	SHEET 4 OF 11	88	0	2	3642	82	70	70	1988	46	3	0	0
STA 1595+00 TO STA 1619+00	SHEET 5 OF 11	85	0	2	3537	79	0	0	1568	353	4	0	0
STA 1619+00 TO STA 1643+00	SHEET 6 OF 11	92	0	2	3790	85	50	50	1407	766	2	0	0
STA 1643+00 TO STA 1667+00	SHEET 7 OF 11	84	0	2	3515	79	50	50	1505	403	4	0	0
STA 1667+00 TO STA 1691+00	SHEET 8 OF 11	88	0	2	3570	80	50	50	1396	545	4	0	1
STA 1691+00 TO STA 1715+00	SHEET 9 OF 11	92	0	2	3781	85	0	0	1965	203	2	0	0
STA 1715+00 TO STA 1739+00	SHEET 10 OF 11	91	0	2	3720	83	50	50	1783	348	2	0	0
STA 1739+00 TO END	SHEET 11 OF 11	34	0	2	1418	32	50	50	800	0	1	0	0
Total (SH 18)		898	0	22	36788	824	555	555	16801	3460	36	0	1
Grand Total		1411	106	34	57962	1296	885	885	29203	3460	42	4	1

Station Range	Sheet Number	772 6001 POST AND CABLE FENCE (REMOVAL)	772 6002 POST AND CABLE FENCE (REMV CONC ANCHOR)	6001 6002 PORTABLE CHANGEABLE MESSAGE SIGN	6185 6002 TMA (STATIONARY)
		LF	EA	EA	DAY
IH 20 (0005-04-082)					
BEGIN TO STA 273+00	SHEET 1 OF 6	0	0	2	4
STA 273+00 TO STA 297+00	SHEET 2 OF 6	0	0	0	6
STA 297+00 TO STA 321+00	SHEET 3 OF 6	0	0	0	6
STA 321+00 TO STA 345+00	SHEET 4 OF 6	0	0	0	5
STA 345+00 TO STA 369+00	SHEET 5 OF 6	0	0	0	6
STA 369+00 TO END	SHEET 6 OF 6	0	0	0	3
Total (IH 20)		0	0	2	30
SH 18 (0292-04-071)					
BEGIN TO STA 1523+00	SHEET 1 OF 11	833	5	2	3
STA 1523+00 TO STA 1547+00	SHEET 2 OF 11	948	2	0	5
STA 1547+00 TO STA 1571+00	SHEET 3 OF 11	305	1	0	4
STA 1571+00 TO STA 1595+00	SHEET 4 OF 11	836	2	0	5
STA 1595+00 TO STA 1619+00	SHEET 5 OF 11	212	2	0	5
STA 1619+00 TO STA 1643+00	SHEET 6 OF 11	0	0	0	6
STA 1643+00 TO STA 1667+00	SHEET 7 OF 11	0	0	0	4
STA 1667+00 TO STA 1691+00	SHEET 8 OF 11	0	0	0	5
STA 1691+00 TO STA 1715+00	SHEET 9 OF 11	0	0	0	6
STA 1715+00 TO STA 1739+00	SHEET 10 OF 11	0	0	0	5
STA 1739+00 TO END	SHEET 11 OF 11	0	0	0	2
Total (SH 18)		3134	12	2	50
Grand Total		3134	12	4	80

DESCRIPTION	FROM STA	TO STA	RT/LT	LENGTH (FT)
IH-20				
CABLE BARRIER 1	252+88.32	273+26.69	LT	2038
CABLE BARRIER 2	274+56.71	339+47.39	LT	6491
CABLE BARRIER 3	340+74.35	379+46.85	LT	3873
SH-18				
CABLE BARRIER 4	1503+96.43	1504+80.58	RT	84
CABLE BARRIER 5	1506+86.33	1507+69.22	RT	83
CABLE BARRIER 6	1510+14.44	1513+15.69	LT	302
CABLE BARRIER 7	1515+59.46	1532+71.74	RT & LT	1713
CABLE BARRIER 8	1535+25.54	1542+90.63	RT & LT	766
CABLE BARRIER 9	1545+96.16	1555+68.30	RT & LT	973
CABLE BARRIER 10	1558+20.33	1570+83.45	RT & LT	1264
CABLE BARRIER 11	1573+29.59	1577+45.84	RT & LT	417
CABLE BARRIER 12	1579+81.87	1602+27.63	RT & LT	2246
CABLE BARRIER 13	1604+45.01	1611+75.98	RT & LT	731
CABLE BARRIER 14	1614+37.93	1621+37.74	RT & LT	700
CABLE BARRIER 15	1623+64.00	1646+57.85	RT & LT	2294
CABLE BARRIER 16	1648+92.42	1662+98.58	RT & LT	1407
CABLE BARRIER 17	1665+57.51	1672+95.34	RT & LT	738
CABLE BARRIER 18	1675+19.88	1687+35.16	RT & LT	1216
CABLE BARRIER 19	1689+68.71	1713+53.47	RT & LT	2385
CABLE BARRIER 20	1715+85.11	1733+98.99	LT	1814
CABLE BARRIER 21	1736+33.37	1747+99.19	LT	1166

NO.	DATE	REVISION	APPROVED

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IH 20 & SH 18 SUMMARY OF QUANTITIES

SHEET 1 OF 1

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
CHECKED	STATE	DIST.	COUNTY	SHEET NO.
	TEXAS	ODA	MARTIN, ETC	12
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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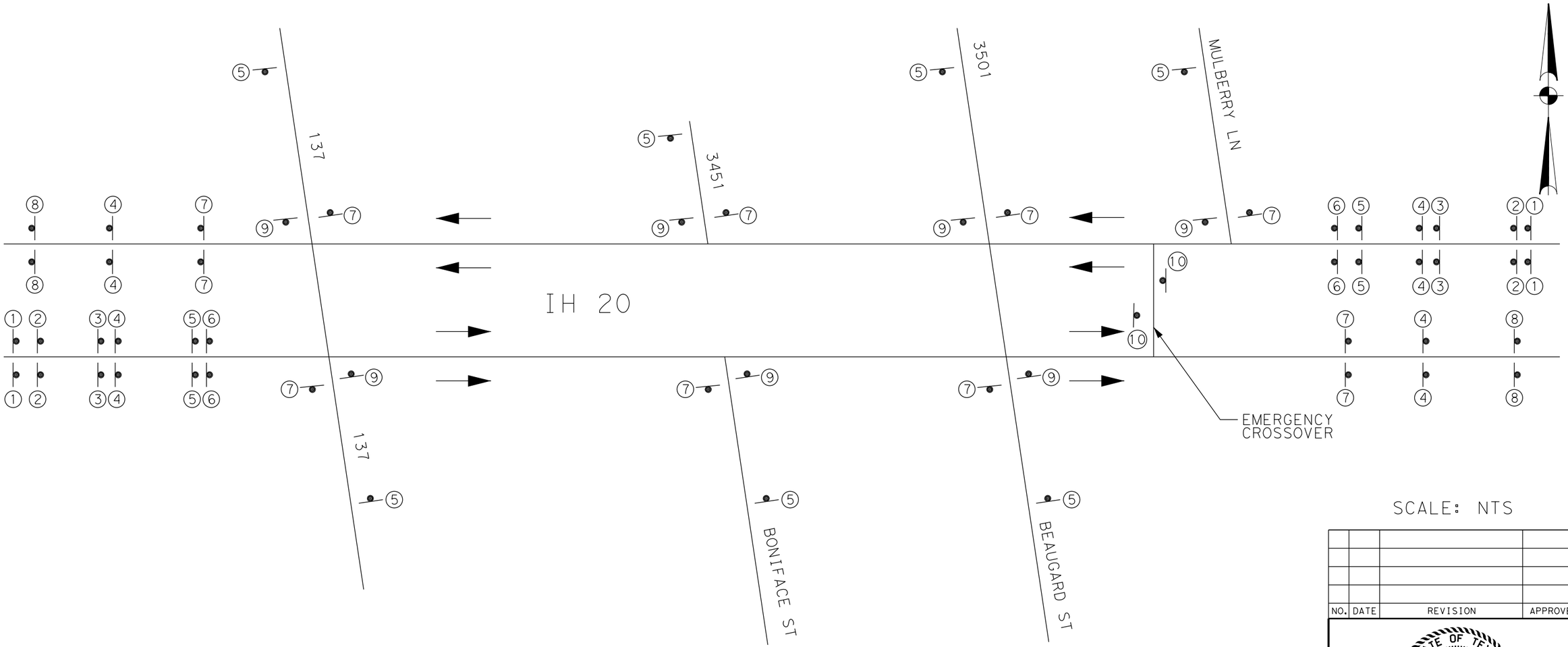

SCALE: NTS

NOTES:

1. FOR ADDITIONAL INFORMATION ON THE PLACEMENT OF WORK ZONE SPEED LIMIT SIGNS, REFER TO BC(3)-21
2. WORK ZONE SPEED LIMIT SIGNS SHALL BE PLACED ON BOTH SIDES OF THE ROADWAY
3. SEE BC(1-12)-21 FOR SIGN SPACING AND ADDITIONAL INFORMATION

① OBEY WARNING SIGNS / STATE LAW — R20-3T

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

③ BEGIN WORK ZONE — G20-9TP
TRAFFIC FINES DOUBLE — R20-5T
WHEN WORKERS ARE PRESENT — R520-5aTP

④ SPEED LIMIT XX — R2-1

⑤ ROAD WORK AHEAD — CW20-1D

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

⑦ END ROAD WORK — G20-2a

⑧ END WORK ZONE — G20-2bT

⑨ ROAD WORK ← NEXT XX MILES NEXT XX MILES → — G20-1aT

⑩ AUTHORIZED VEHICLES ONLY — R5-11+

NO.	DATE	REVISION	APPROVED

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03/27/2023

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IH 20 ADVANCE WARNING SIGN LAYOUT

SHEET 1 OF 1

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
CHECKED	STATE	DIST.	COUNTY	SHEET NO.
APPROVED	TEXAS	ODA	MARTIN, ETC	13
	CONT.	SECT.	JOB	
	005	04	082	

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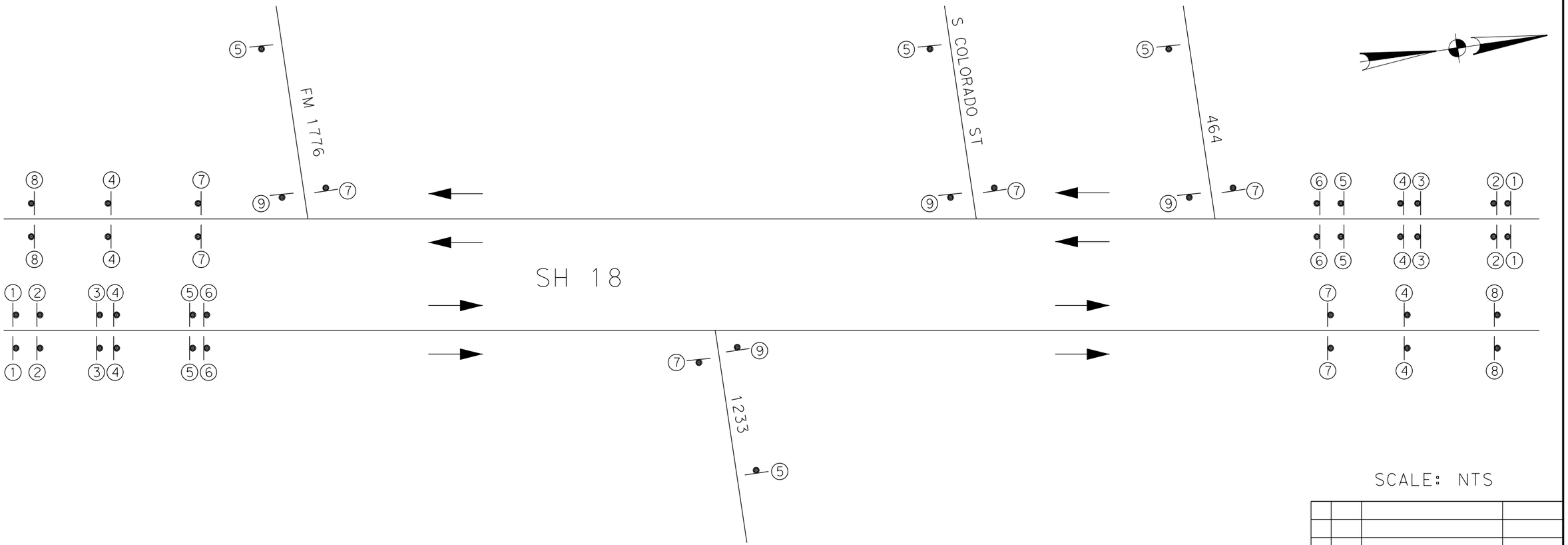

SCALE: NTS

NOTES:

1. FOR ADDITIONAL INFORMATION ON THE PLACEMENT OF WORK ZONE SPEED LIMIT SIGNS, REFER TO BC(3)-21
2. WORK ZONE SPEED LIMIT SIGNS SHALL BE PLACED ON BOTH SIDES OF THE ROADWAY
3. SEE BC(1-12)-21 FOR SIGN SPACING AND ADDITIONAL INFORMATION

① OBEY WARNING SIGNS / STATE LAW — R20-3T

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

③ BEGIN WORK ZONE — G20-9TP
TRAFFIC FINES DOUBLE — R20-5T
WHEN WORKERS ARE PRESENT — R520-5aTP

④ SPEED LIMIT XX — R2-1

⑤ ROAD WORK AHEAD — CW20-1D

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

⑦ END ROAD WORK — G20-2a

⑧ END WORK ZONE — G20-2bT

⑨ ROAD WORK ← NEXT XX MILES / NEXT XX MILES → — G20-1aT

NO.	DATE	REVISION	APPROVED

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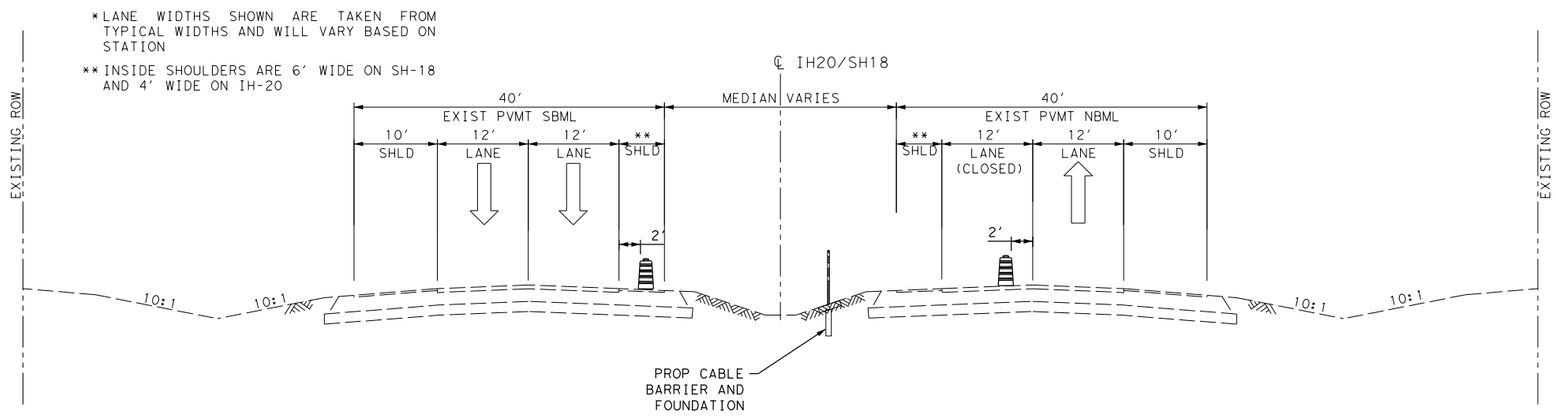
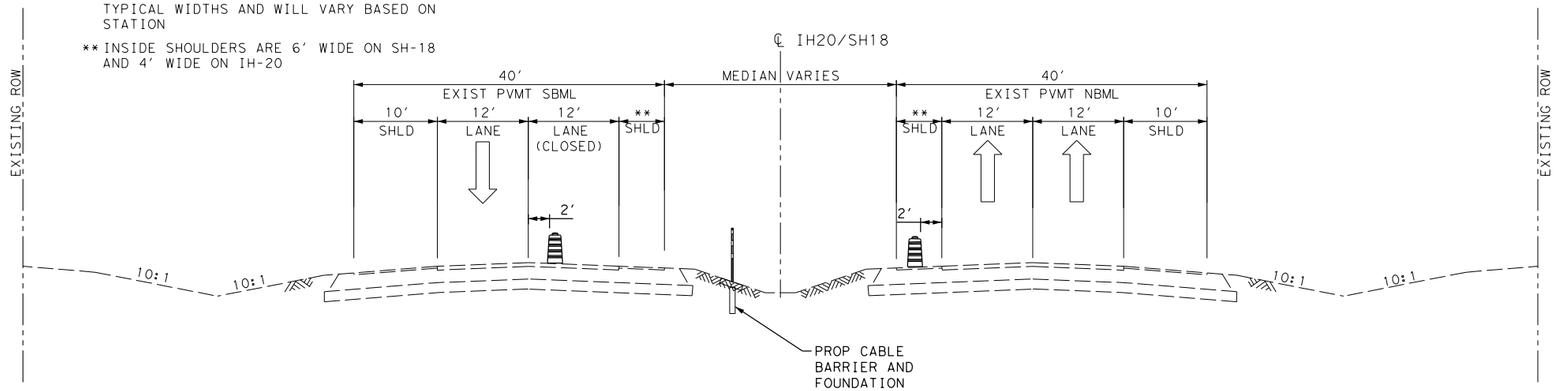
SH 18 ADVANCE WARNING SIGN LAYOUT

SHEET 1 OF 1

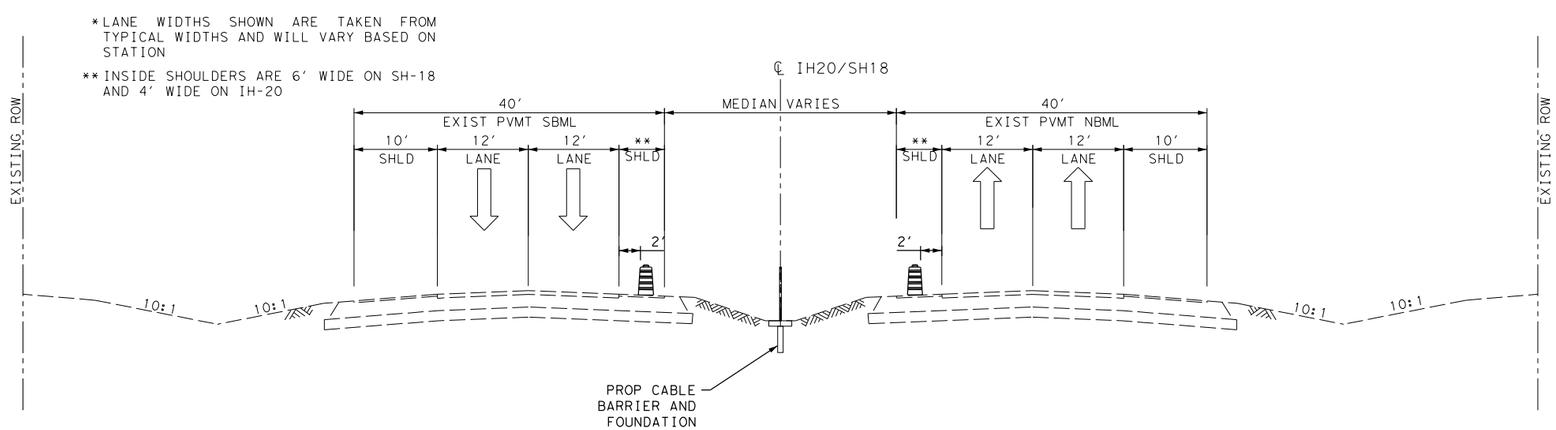
DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	14
APPROVED	CONT.	SECT.	JOB	
	005	04	082	



PROPOSED TCP TYPICAL SECTION (RT SIDE CONSTRUCTION)



PROPOSED TCP TYPICAL SECTION (LT SIDE CONSTRUCTION)



PROPOSED TCP TYPICAL SECTION (CENTER CONSTRUCTION)

LEGEND:

DIRECTION OF TRAVEL

CHANNELIZATION DEVICE

SEQUENCE OF CONSTRUCTION

1. PLACE ADVANCED PROJECT WARNING SIGNS IN ACCORDANCE WITH THE ADVANCED WARNING SIGN LAYOUT SHEETS AND BC(1-12)-21 SHEETS.
2. PLACE EROSION CONTROL LOGS AND OTHER SWPPP ITEMS IN ACCORDANCE WITH SWPPP SHEETS.
3. WINDROW THE EXISTING TOPSOIL IN ACCORDANCE WITH THE SW3P SITE PLAN
4. GRADE SIDESLOPES AND MEDIAN DITCHES AS NEEDED TO MEET CASS(TL4)-14 CRITERIA OR AS DIRECTED BY THE ENGINEER
5. INSTALL MEDIAN CABLE BARRIER SYSTEM INCLUDING FOUNDATION AND RIPRAP MOW STRIP ACCORDING TO CASS(TL4)-14 CRITERIA. USE TCP(1-5)-18, TCP(2-6)-18, AND TCP(6-1)-12 FOR LANE CLOSURES AS NEEDED. PLACE CHANNELIZATION DEVICES AS DIRECTED IN TCP TYPICALS.
6. REGRADE SOIL AS NEEDED AND SEED ANY DISTURBED AREAS

NOTES:

1. MULTIPLE NON-CONSECUTIVE PROJECT LOCATIONS CAN BE COMPLETED CONCURRENTLY
2. LANE CLOSURES SHALL BE LIMITED TO THE LENGTH NEEDED TO COMPLETE ONE DAY'S WORK.
3. LANE CLOSURES SHALL BE BETWEEN 7:00 A.M. AND 5:00 P.M. ON SH 18 AND BETWEEN 9:00 A.M. AND 4:00 P.M. ON IH 20
4. EQUIPMENT SHALL NOT BE STORED IN MEDIANS OVERNIGHT, ON WEEKENDS, OR ON NON-WORKING DAYS
5. EQUIPMENT STORED WITHIN PROJECT ROW SHALL BE LOCATED OUTSIDE OF CLEAR ZONE AND APPROVED BY THE ENGINEER

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARK R. RICHARDSON
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LICENSED
PROFESSIONAL ENGINEER

03/27/2023

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IH 20 & SH 18
TRAFFIC CONTROL PLAN
TYPICALS AND NARRATIVE

SHEET 1 OF 1

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	15
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

DATE:
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

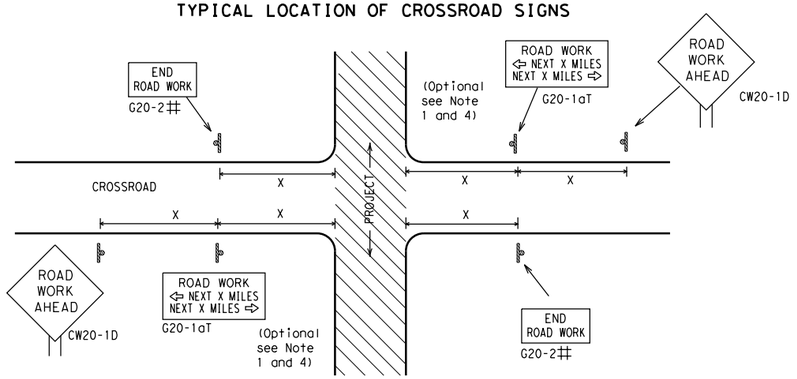
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	005	04	082	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	MARTIN, ETC		16

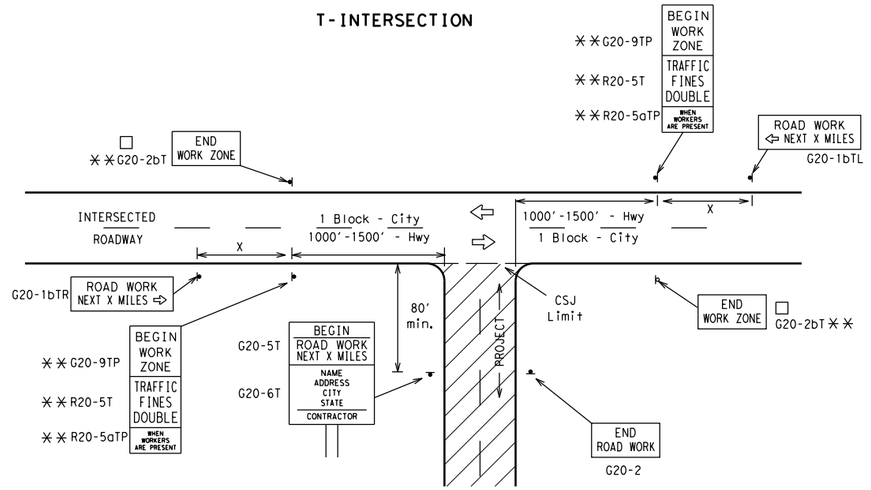
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

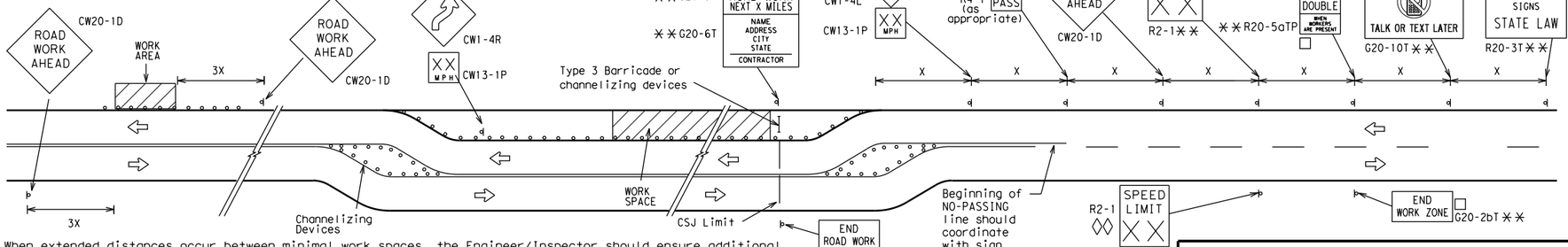
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

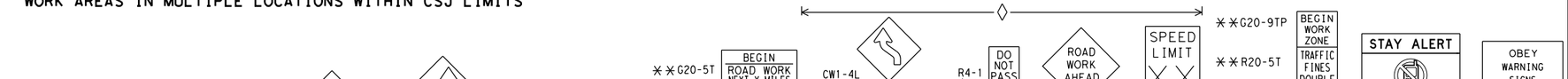
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

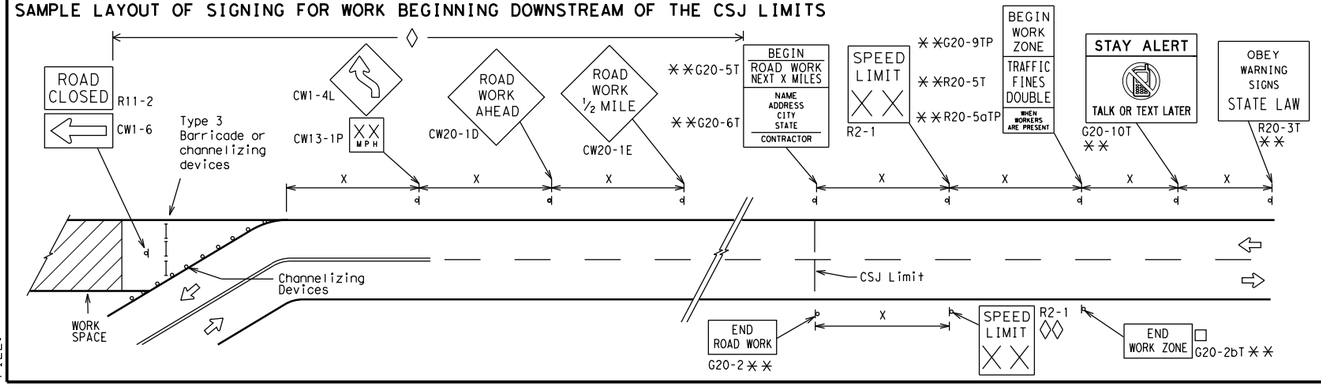


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

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

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

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	005	04	082	IH 20, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	MARTIN, ETC		17

DATE:
FILE:

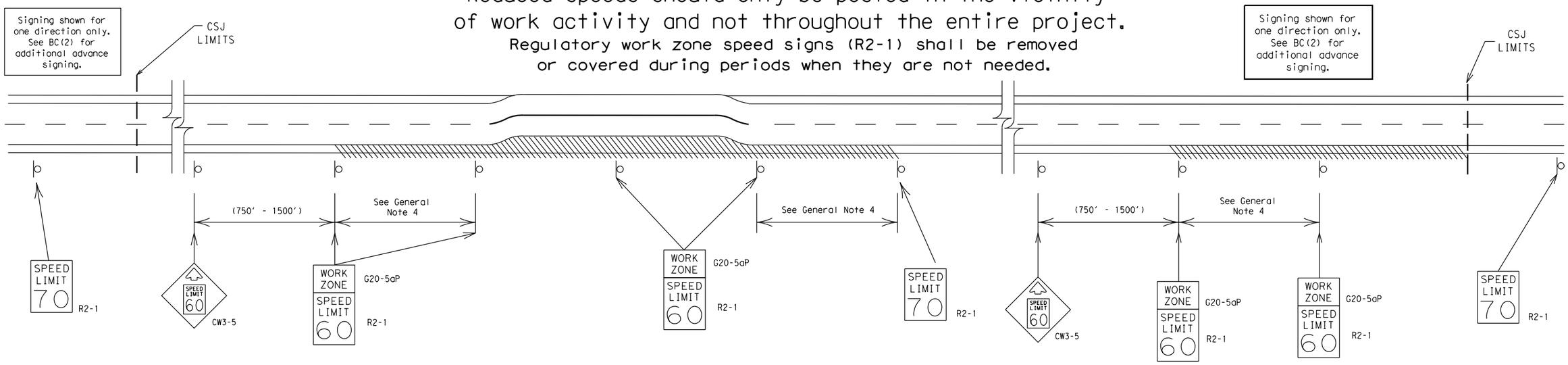
DATE:
FILE:

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

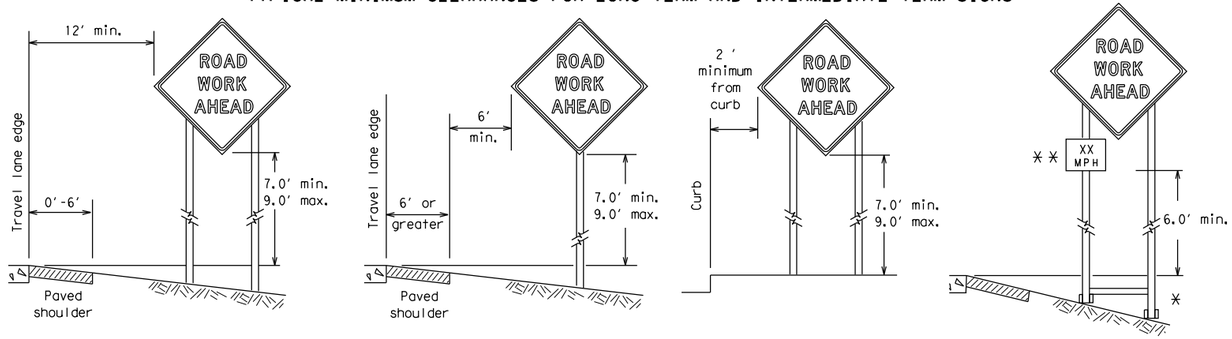
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	005	04	082	IH 20, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21		MARTIN, ETC		18

DATE:
FILE:

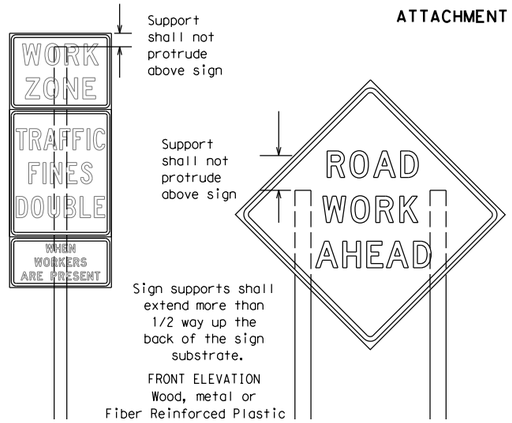
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

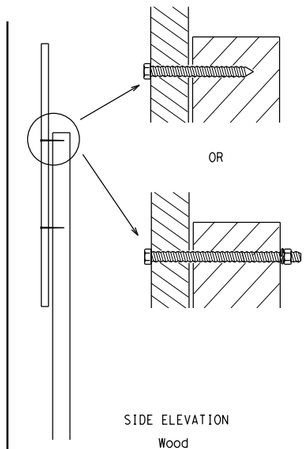


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





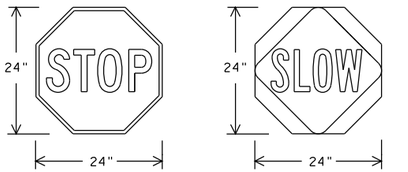
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	005	04	082	IH 20, ETC
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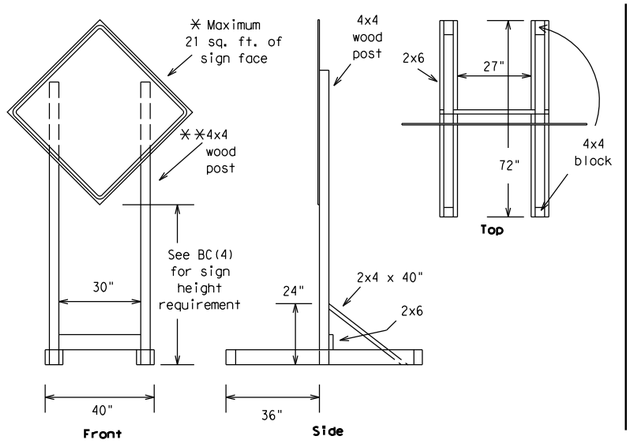
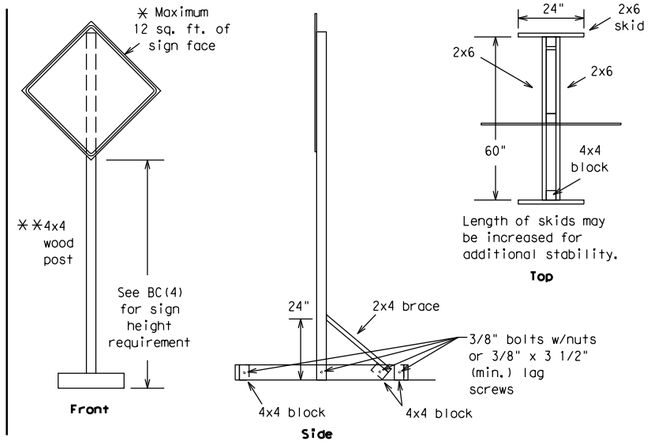
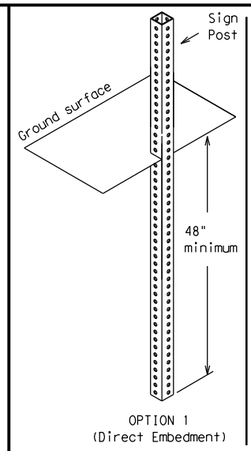
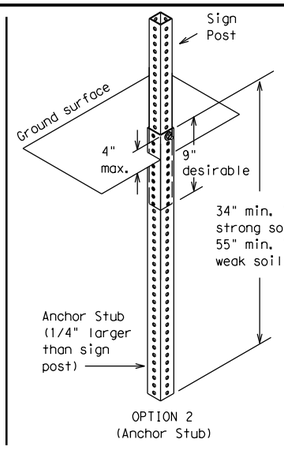


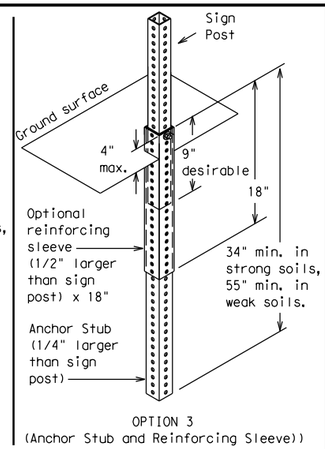


SKID MOUNTED WOOD SIGN SUPPORTS

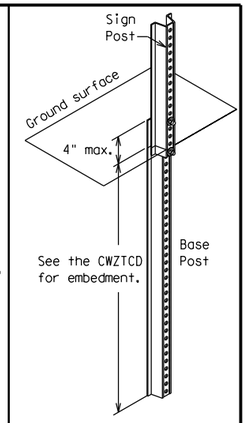
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







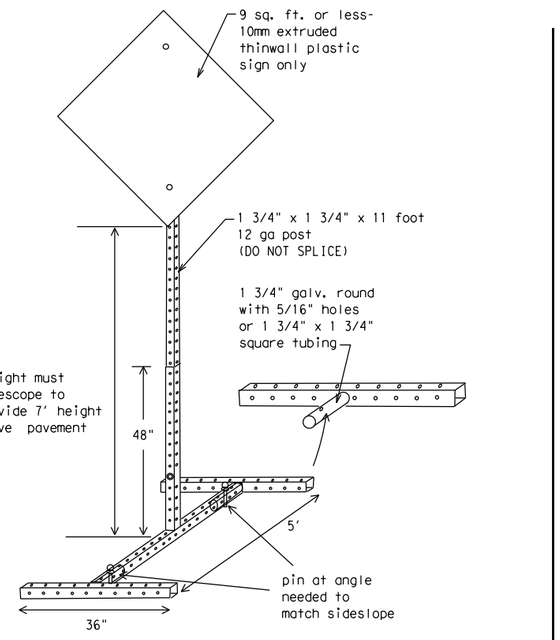
PERFORATED SQUARE METAL TUBING

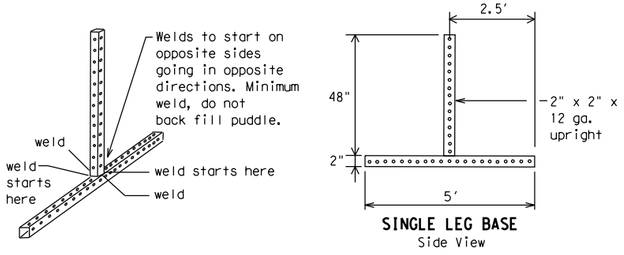


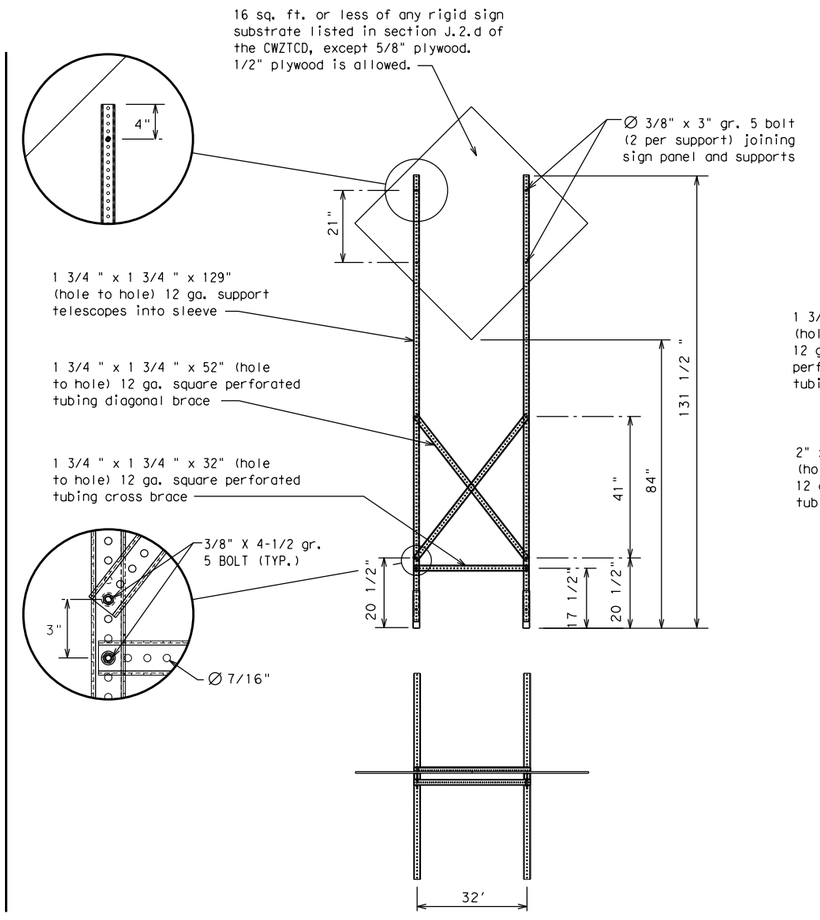
WING CHANNEL
Lap-splice/base bolted anchor

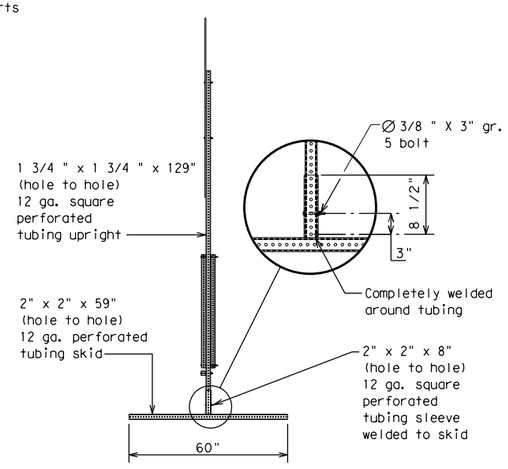
GROUND MOUNTED SIGN SUPPORTS

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









SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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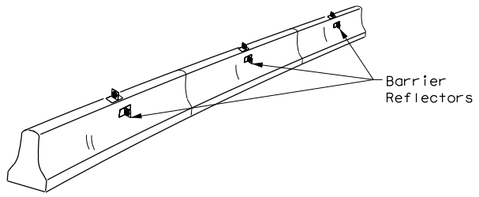
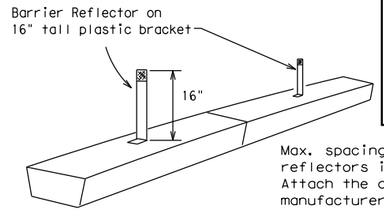
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



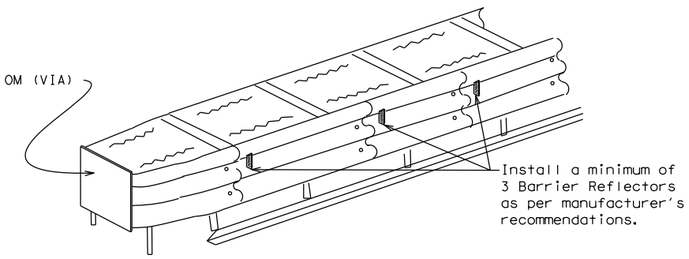
CONCRETE TRAFFIC BARRIER (CTB)

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



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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

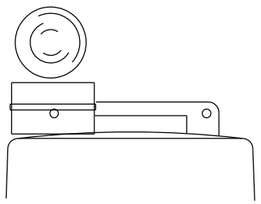
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

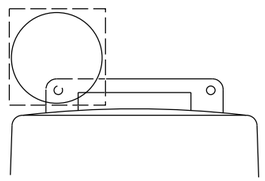
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

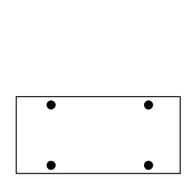
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

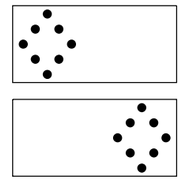
Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

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

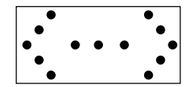


4 CORNER CAUTION

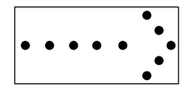
OR



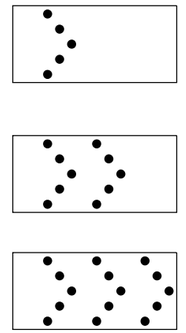
ALTERNATING DIAMOND CAUTION



DOUBLE ARROW



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



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

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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	005	04	082	IH 20, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	MARTIN, ETC		22

101

DATE:
FILE:

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

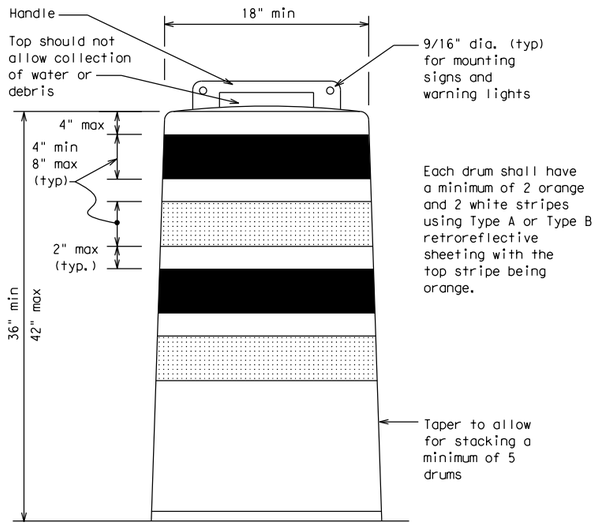
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

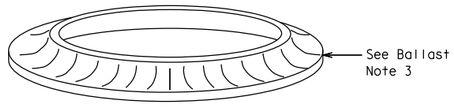
RETROREFLECTIVE SHEETING

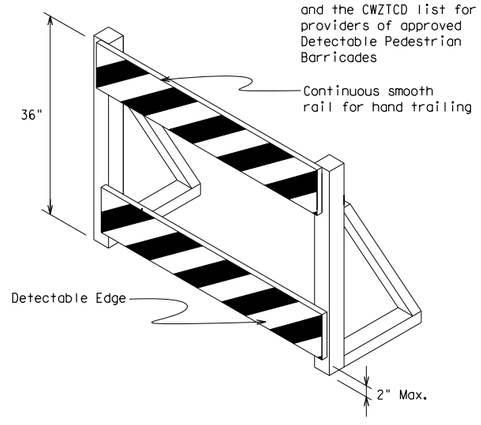
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

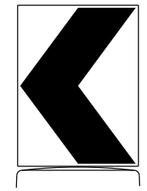




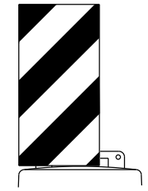


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	005	04	082	IH 20, ETC
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	ODA	MARTIN, ETC		23
7-13				

DATE:
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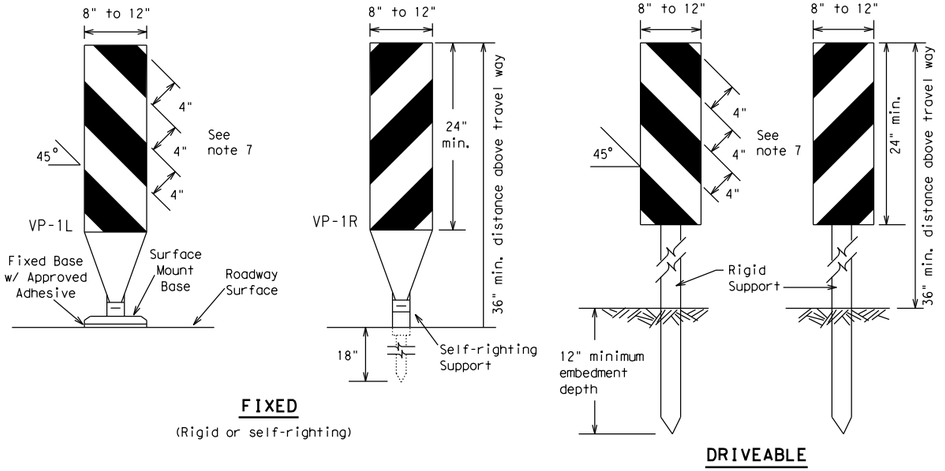
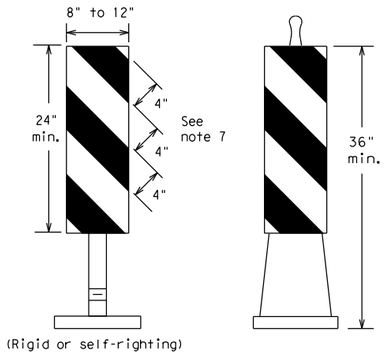


FIXED
(Rigid or self-righting)

DRIVEABLE

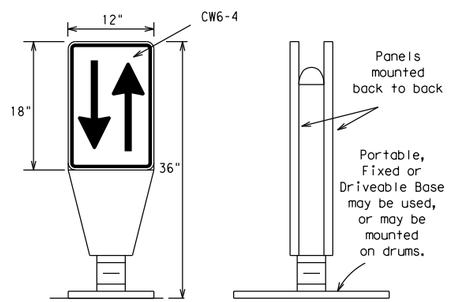


(Rigid or self-righting)

PORTABLE

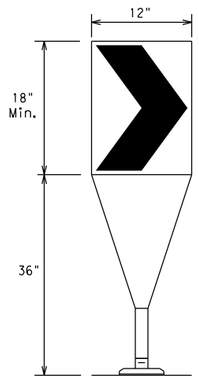
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



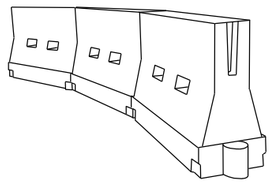
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

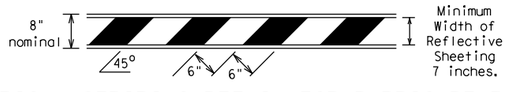
BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	005	04	082	IH 20, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	MARTIN, ETC		24

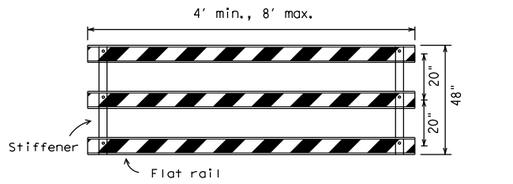
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



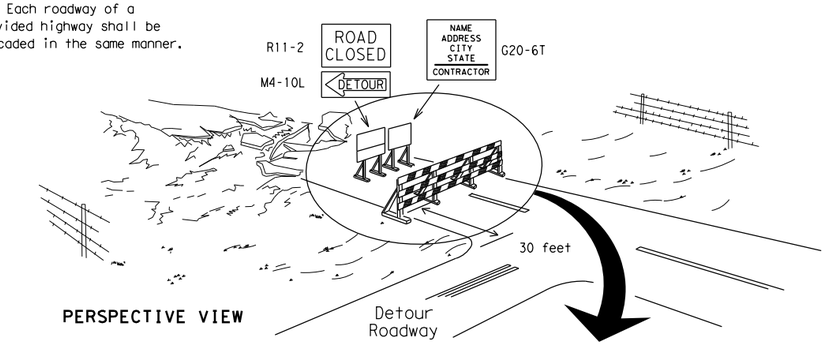
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

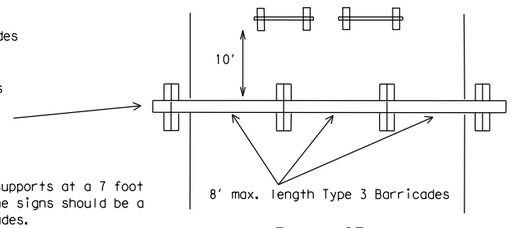
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

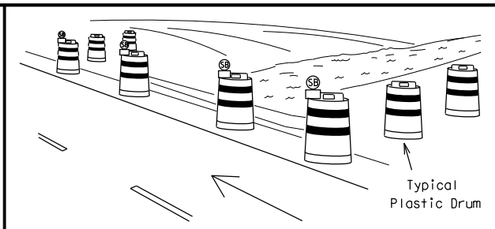
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

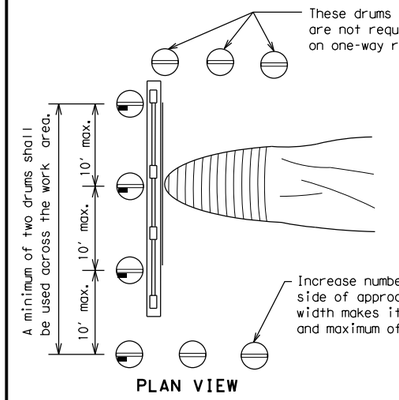
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

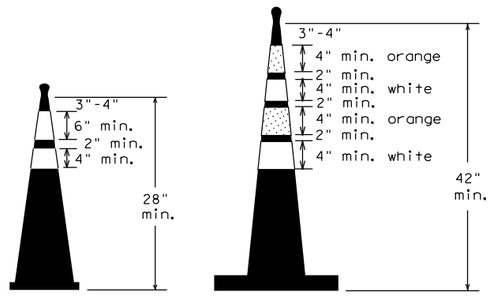
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



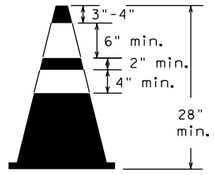
PLAN VIEW

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

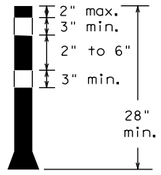
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

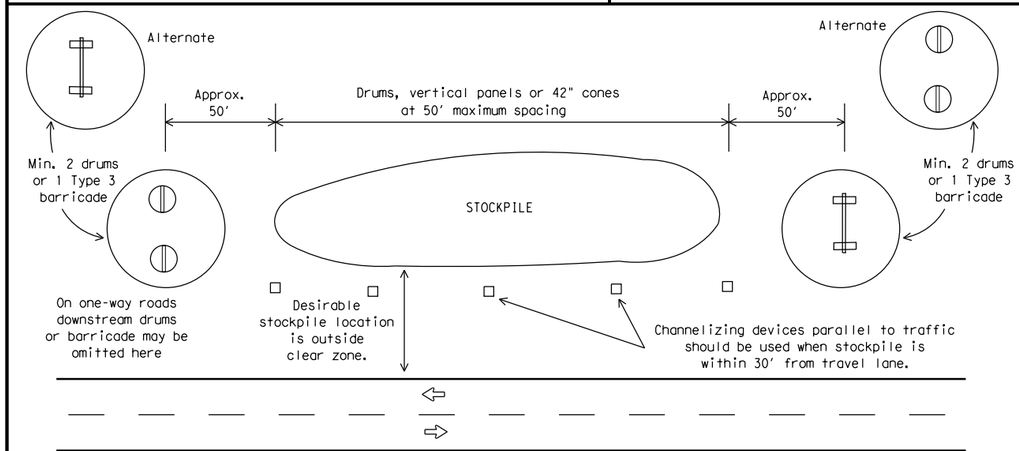


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

DATE:
FILE:

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	005	04	082	IH 20, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	MARTIN, ETC		25

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

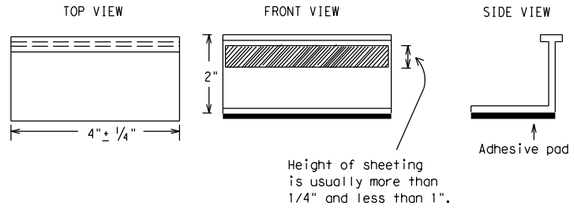
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	005	04	082	IH 20, ETC
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	ODA	MARTIN, ETC		26
11-02 8-14				

DATE:
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DATE:
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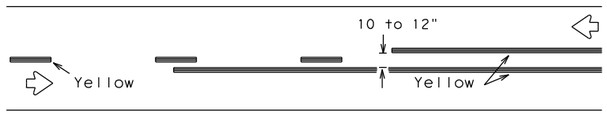
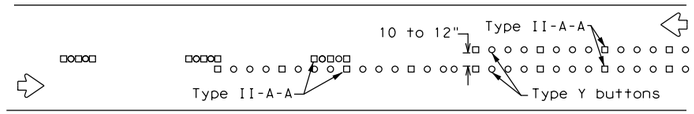
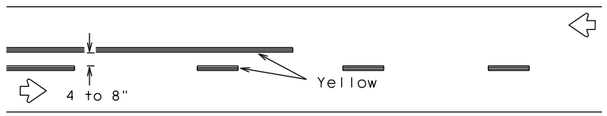
PAVEMENT MARKING PATTERNS



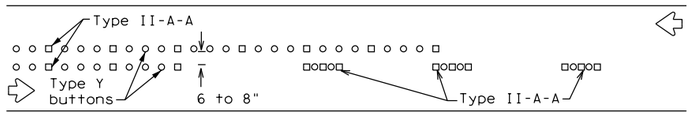
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



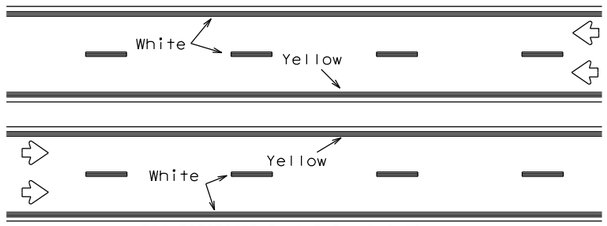
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



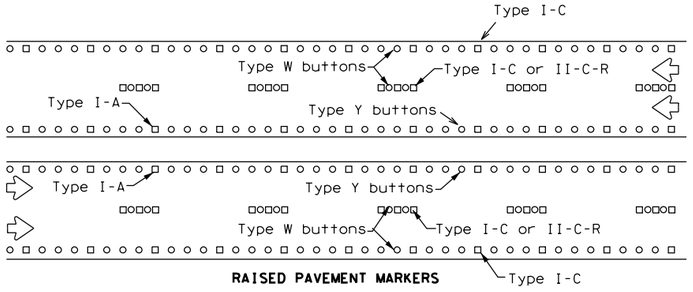
RAISED PAVEMENT MARKERS - PATTERN B

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

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



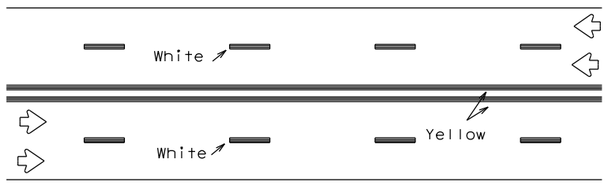
REFLECTORIZED PAVEMENT MARKINGS



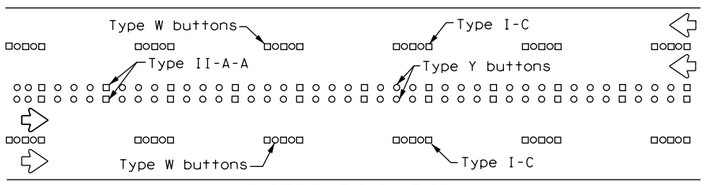
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



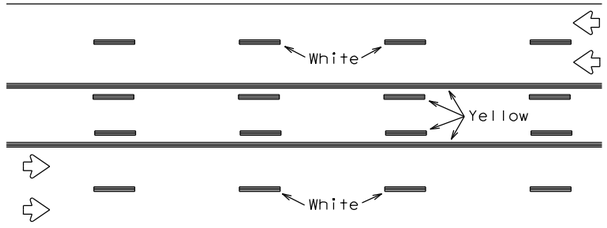
REFLECTORIZED PAVEMENT MARKINGS



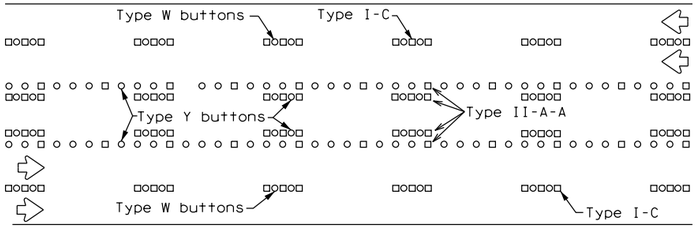
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

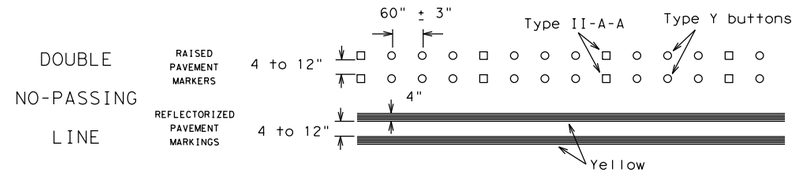
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

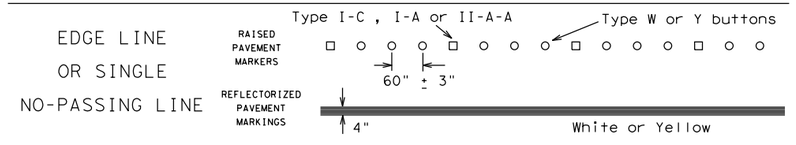
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

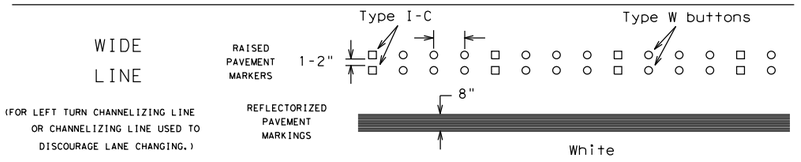


EDGE LINE OR SINGLE NO-PASSING LINE



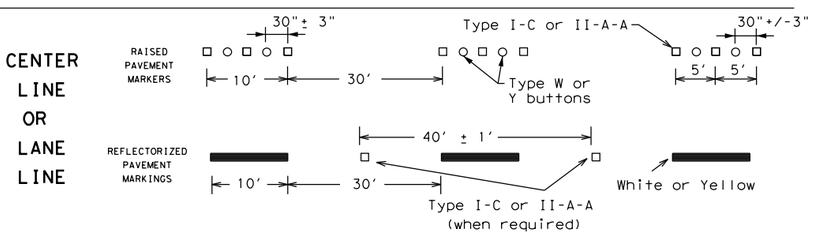
WIDE LINE

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

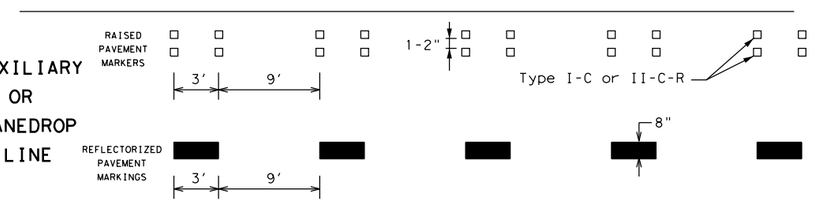


BROKEN LINES

CENTER LINE OR LANE LINE

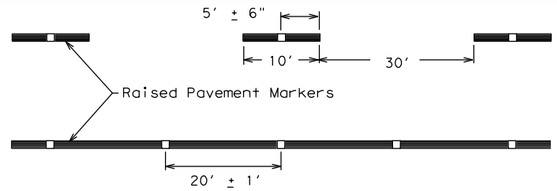


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

SHEET 12 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	005	04	082	IH 20, ETC
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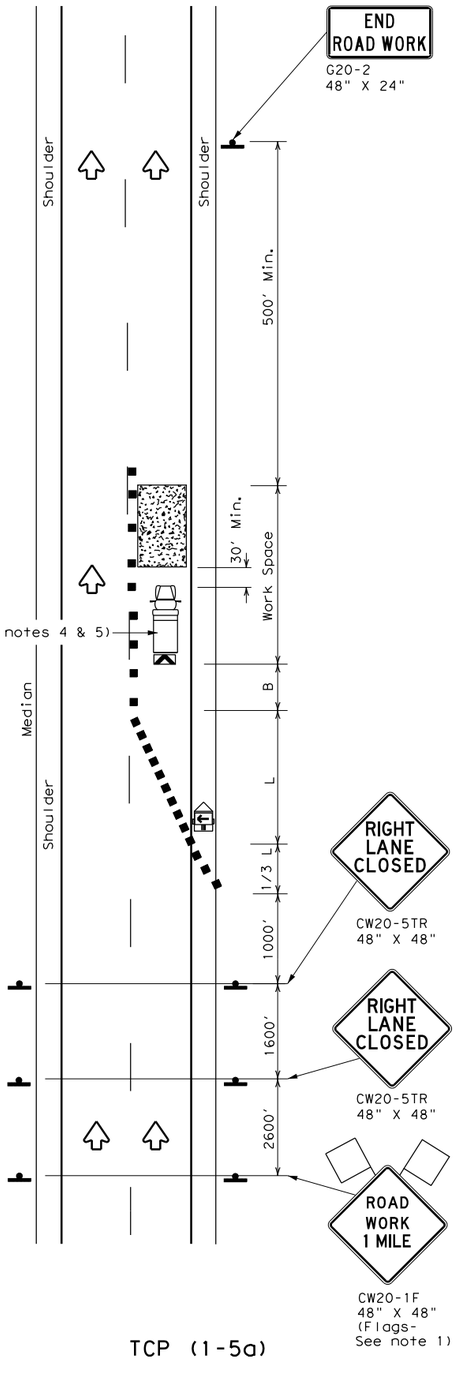
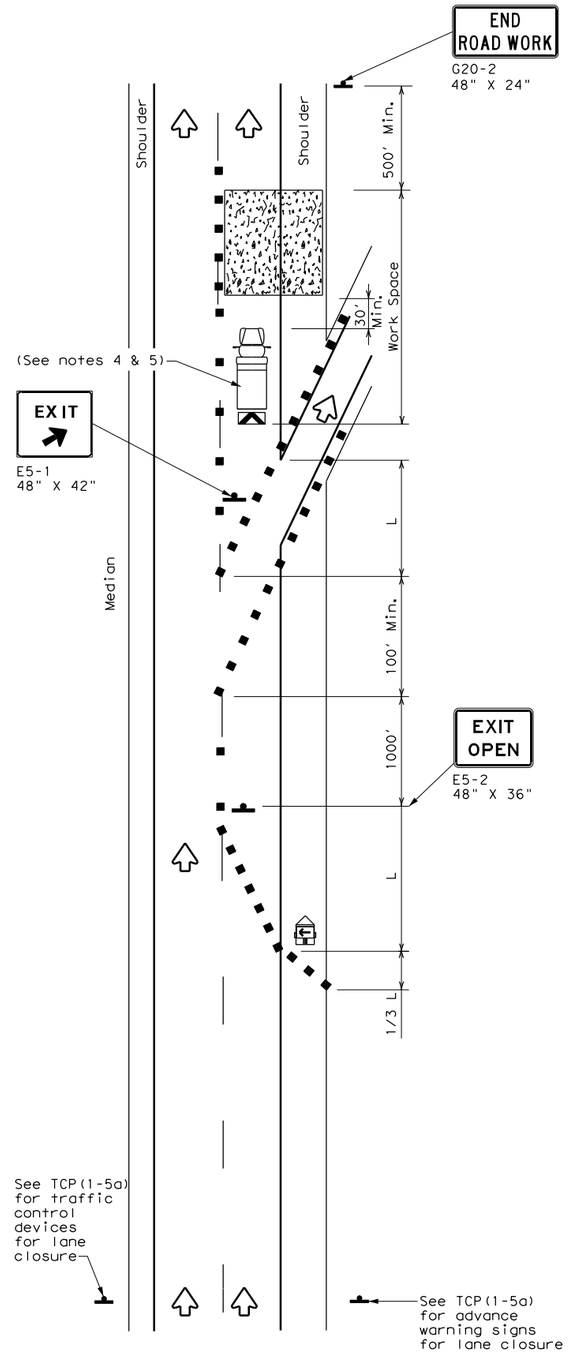


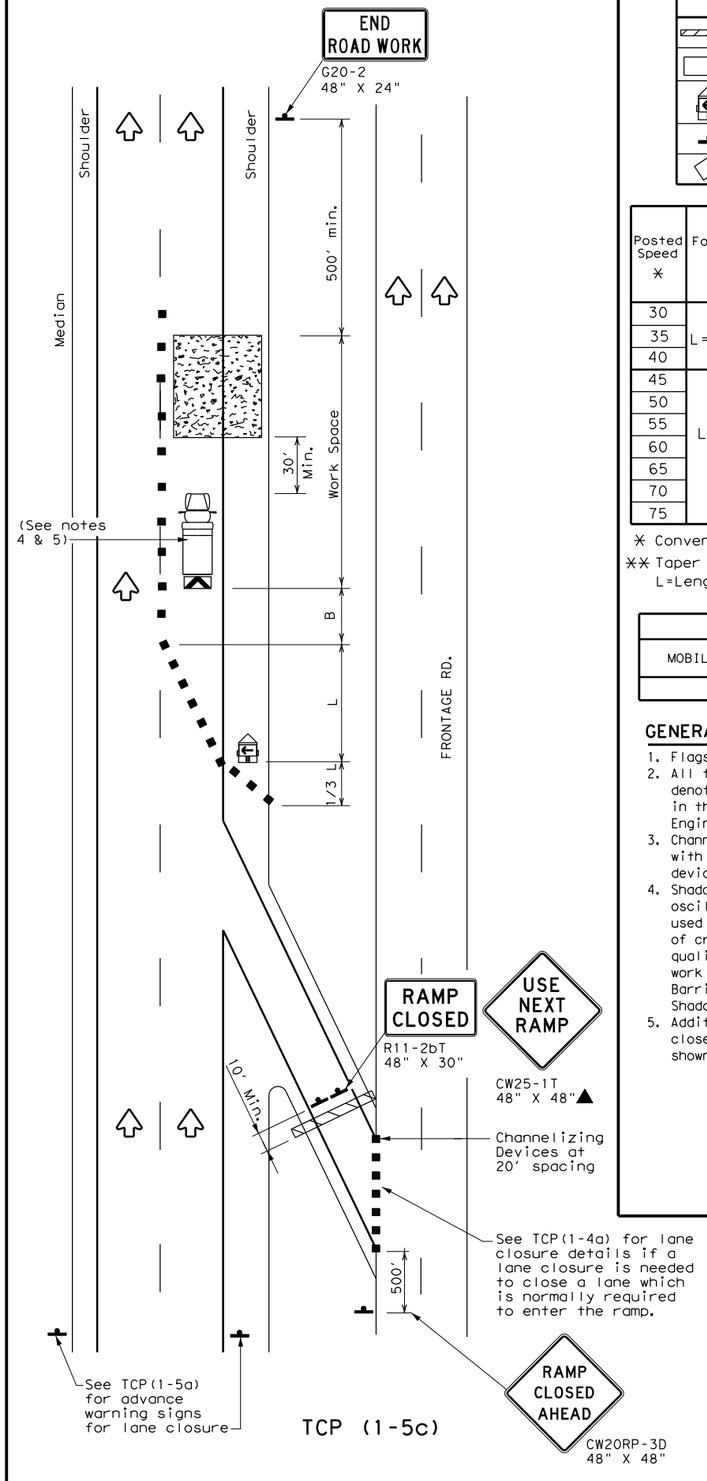
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	005	04	082	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	MARTIN, ETC		28

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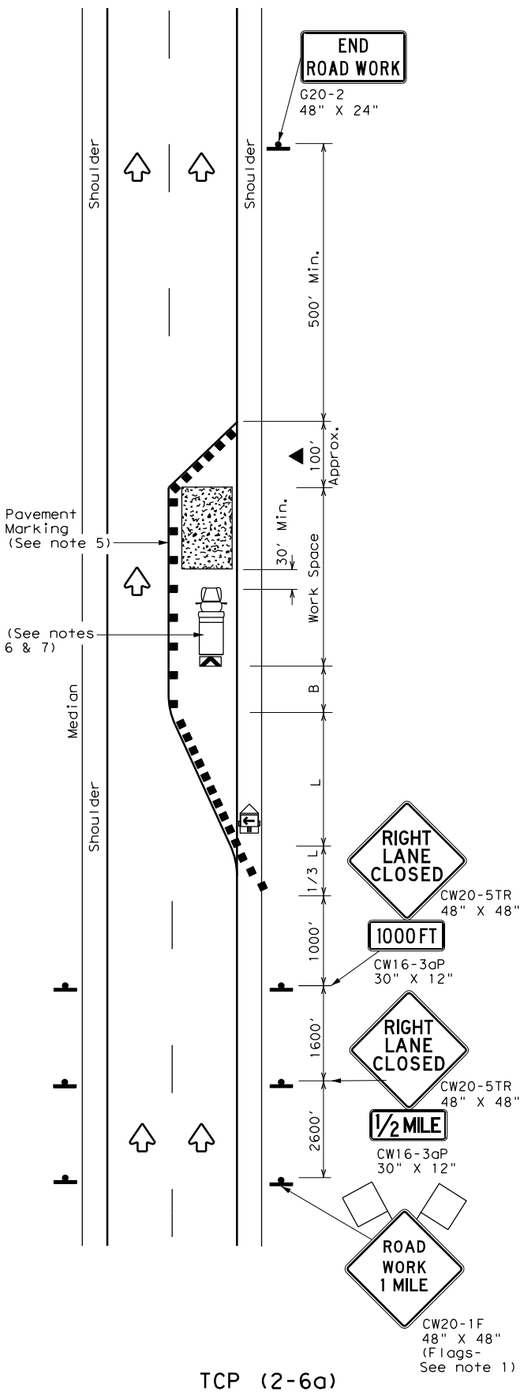
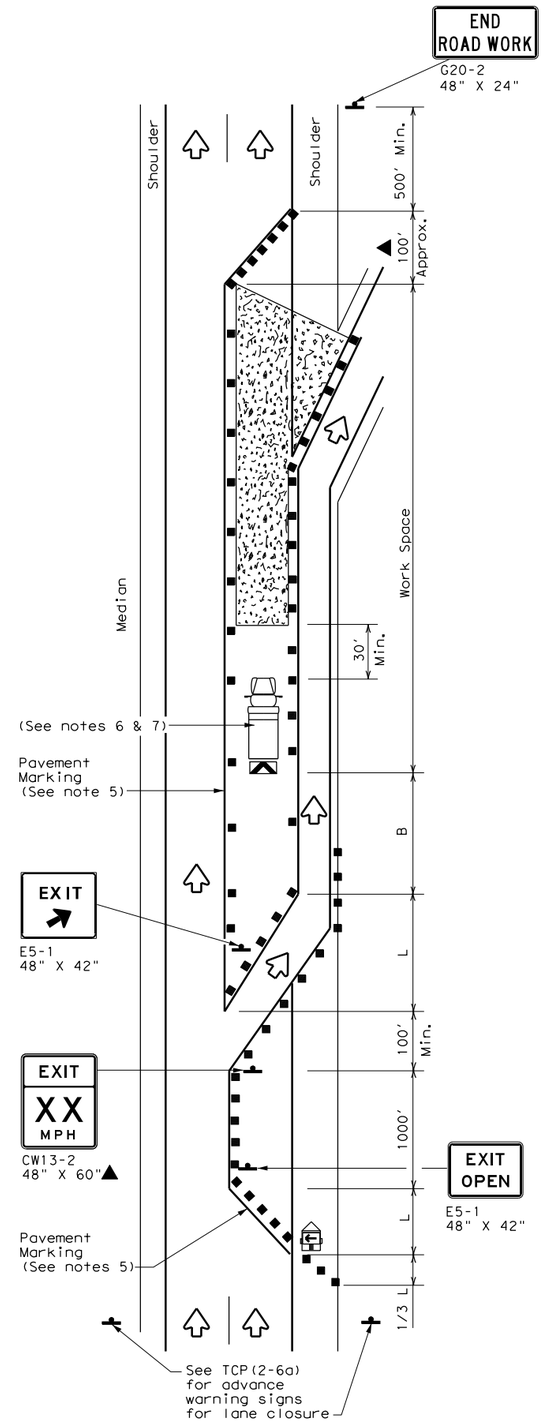


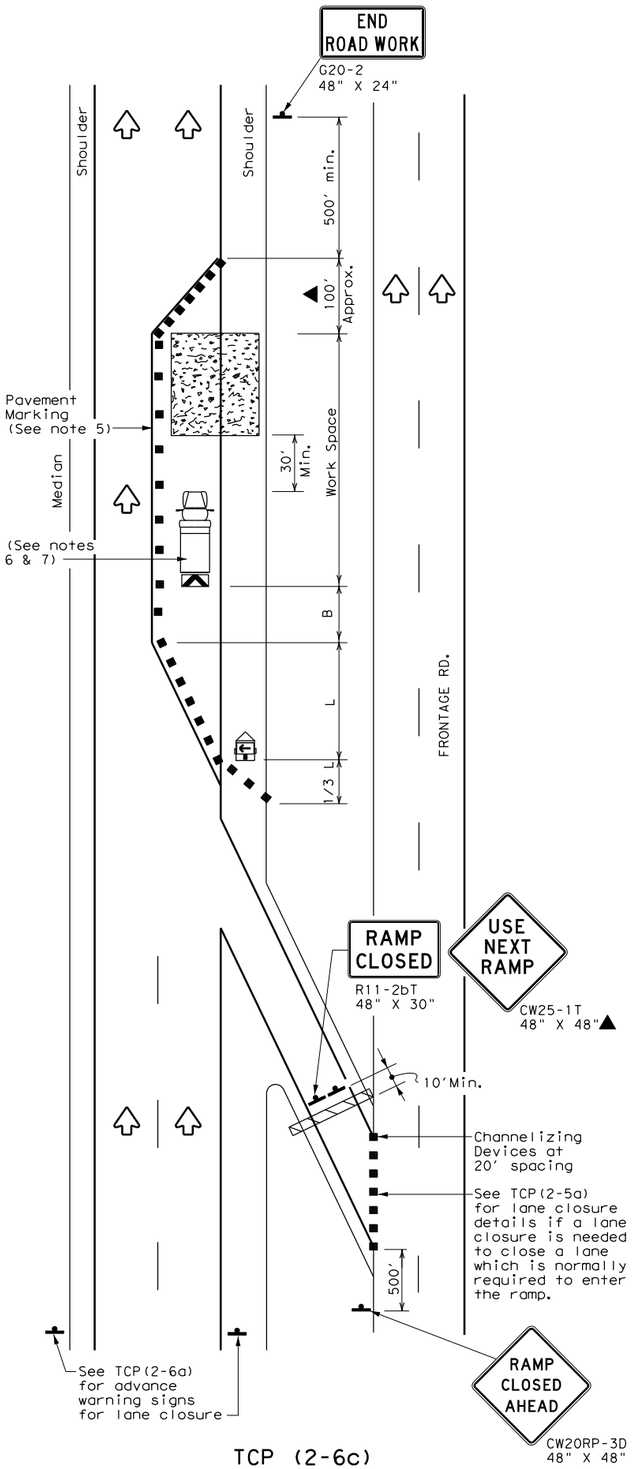
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on everyother channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
5. The placement of pavement markings may be omitted on Intermediate-term stationary work zones with the approval of the Engineer.
6. Shadow Vehicle with TMA and high intensity rotating, flashing,oscillating or strobe lights. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

Traffic Operations Division Standard

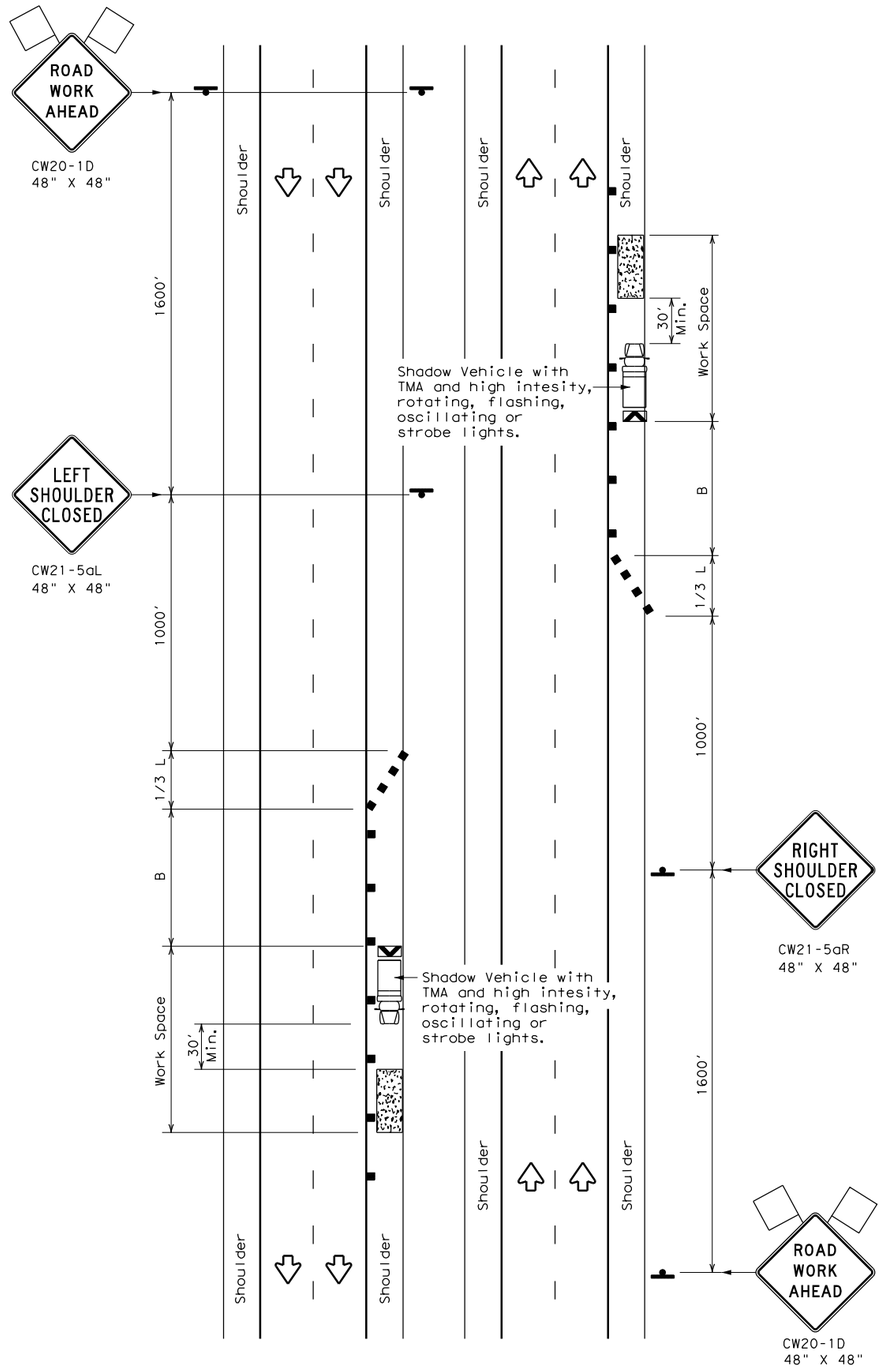
TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	005	04	082	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	MARTIN, ETC		29

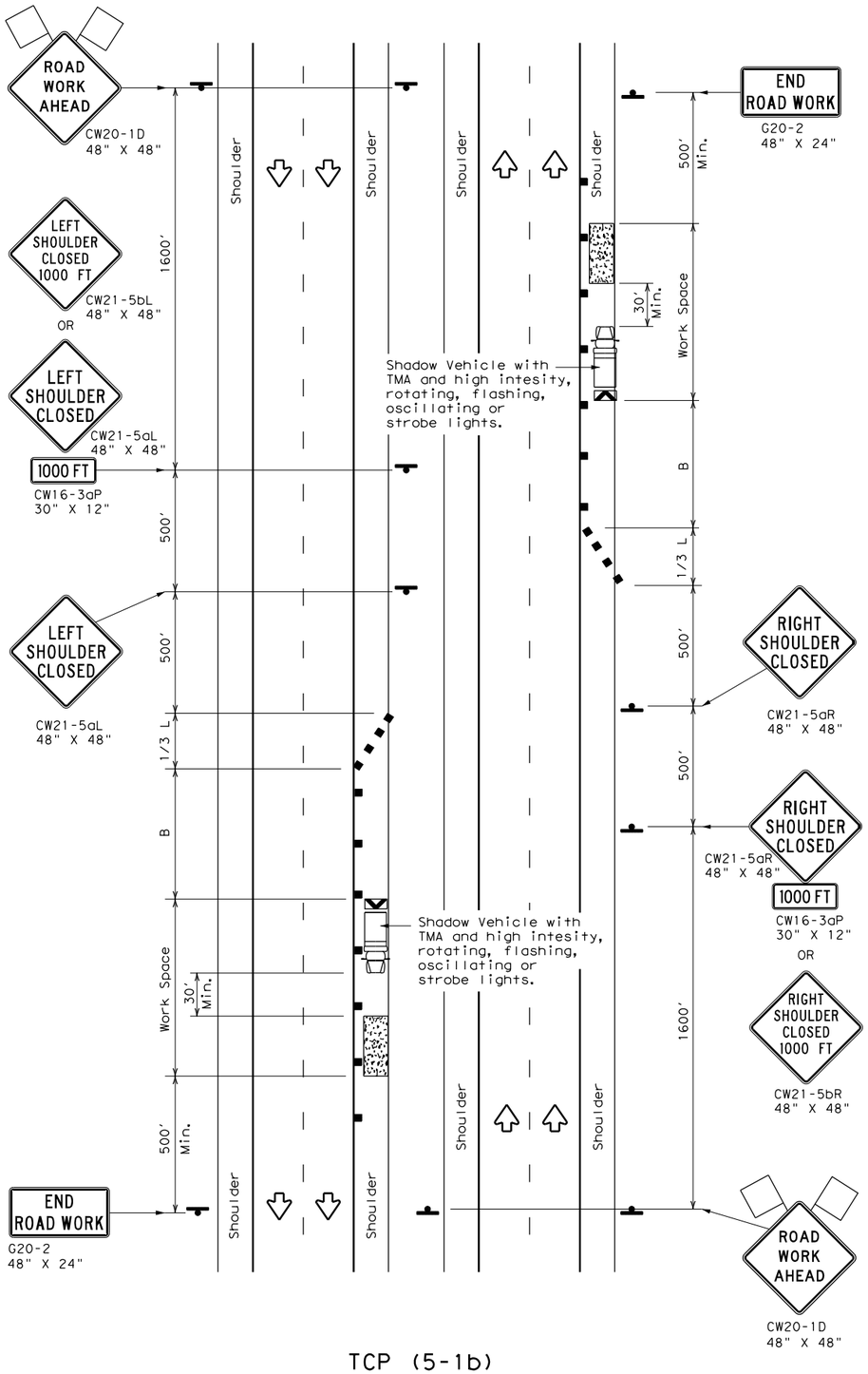
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	90'
35		205'	225'	245'	35'	70'	120'
40		265'	295'	320'	40'	80'	155'
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

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

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	TCP(5-1a)	TCP(5-1b)	TCP(5-1b)	

GENERAL NOTES

1. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely effecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.
2. 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.

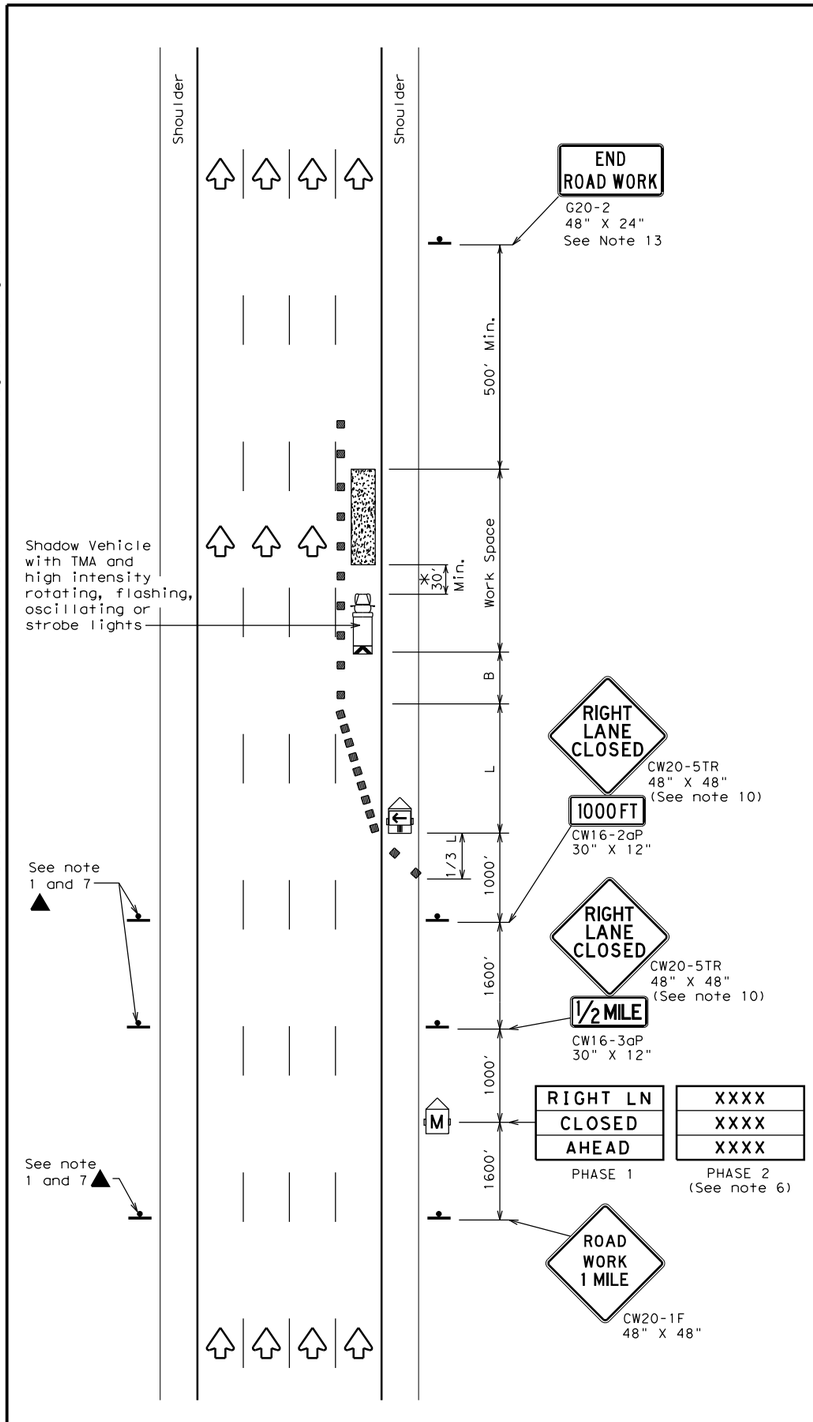
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

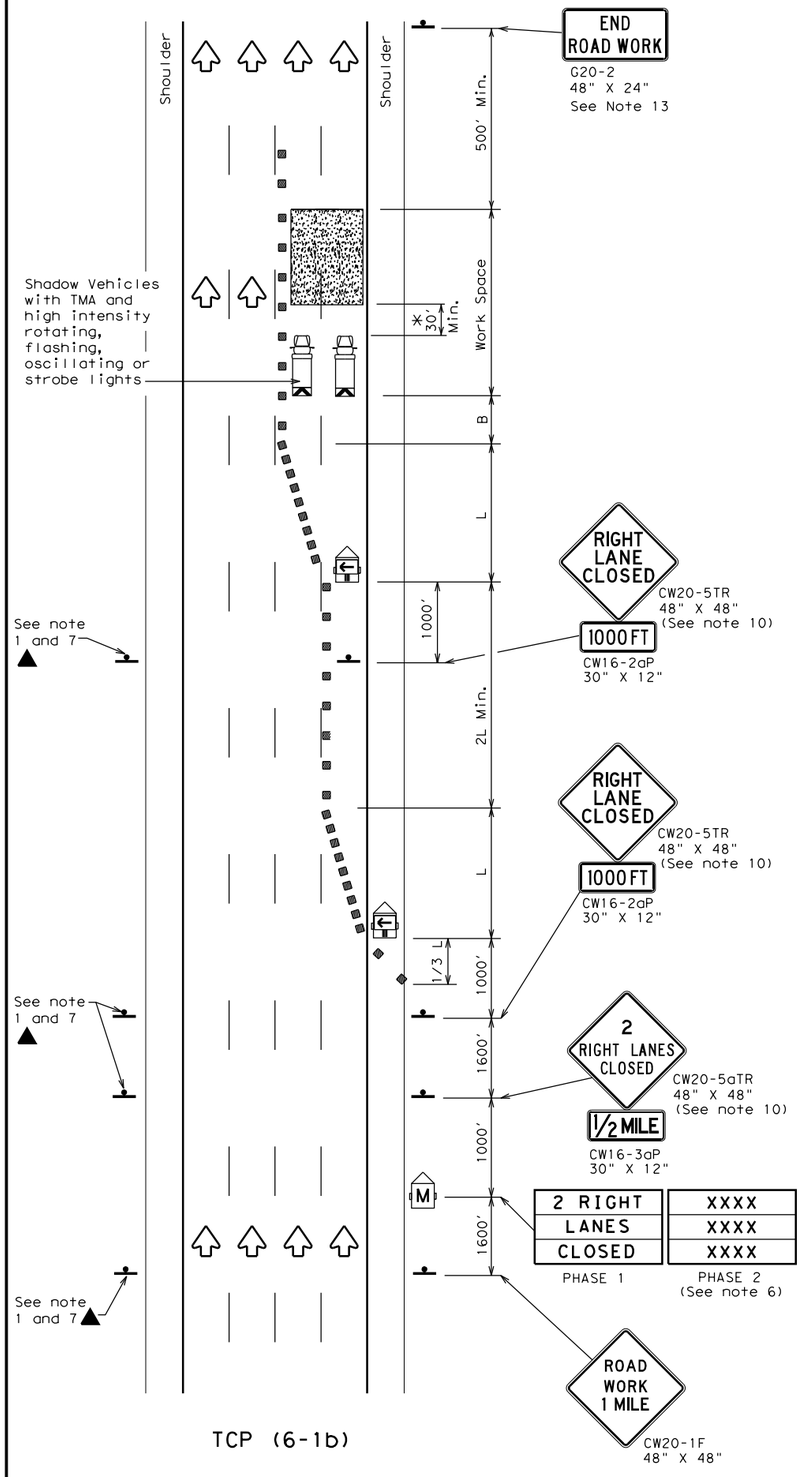
TCP(5-1)-18

FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	005	04	082	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	MARTIN, ETC		30



TCP (6-1a)

TYPICAL FREEWAY ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY TWO LANE CLOSURE

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

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

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

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

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. Drums or 42"cones are the typical channelizing devices. For Intermediate Term Stationary work, drums shall be used on tapers with drums or 42" cones used on tangent sections. Other channelizing devices may be used as directed by the Engineer.
3. All construction signs and barricades placed during any phase of work shall remain in place until removal is approved by the Engineer.
4. The Engineer may direct the Contractor to furnish additional signs and barricades as required to maintain traffic flow, detours and motorist safety during construction.
5. Static message boards or changeable message signs stating the date and duration of ramp or freeway lane closures shall be placed a minimum of seven (7) calendar days in advance of the actual closure.
6. Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE LEFT," recommended advisory speed, delay information, or other specific warnings.
7. Duplicate construction warning signs should be erected on the medians side of freeways where median width will permit and traffic volume justifies the signing.
8. The number of closed lanes may be increased provided the spacing of traffic control devices, taper lengths and tangent lengths meet the requirements of the TMUTCD.
9. Warning signs for intermediate term stationary work should be mounted at 7' to the bottom of the sign.
10. Warning signs shown shall be appropriately altered for left lane closures. When signs are mounted at 1' height for short term stationary or short duration work, sign versions shown in the SHSD for Texas with distances on the sign face rather than mounted on a plaque below the sign may be used.
11. When possible, PCMS units should be located in advance of the last available exit ramp prior to the lane closure to allow motorists an alternate route. They may also be relocated to improve advance warning in case of unanticipated queuing or congestion.
12. For Intermediate Term Stationary work at night, floodlights should be used to illuminate the work area and equipment crossings. Floodlights shall not produce a disabling glare condition for road users or workers.
13. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

TCP(6-1)-12

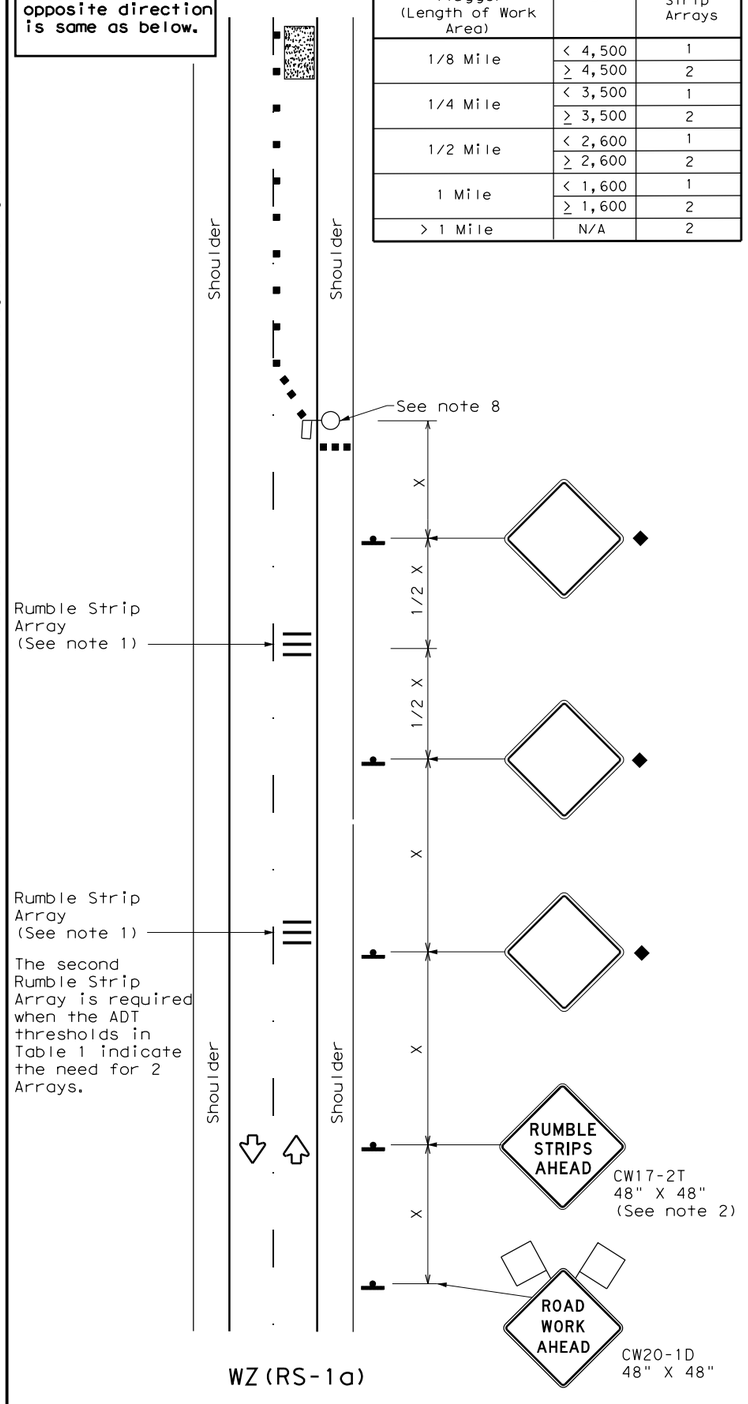
FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	005	04	082	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	MARTIN, ETC		31

DATE:
FILE:

DATE:
FILE:

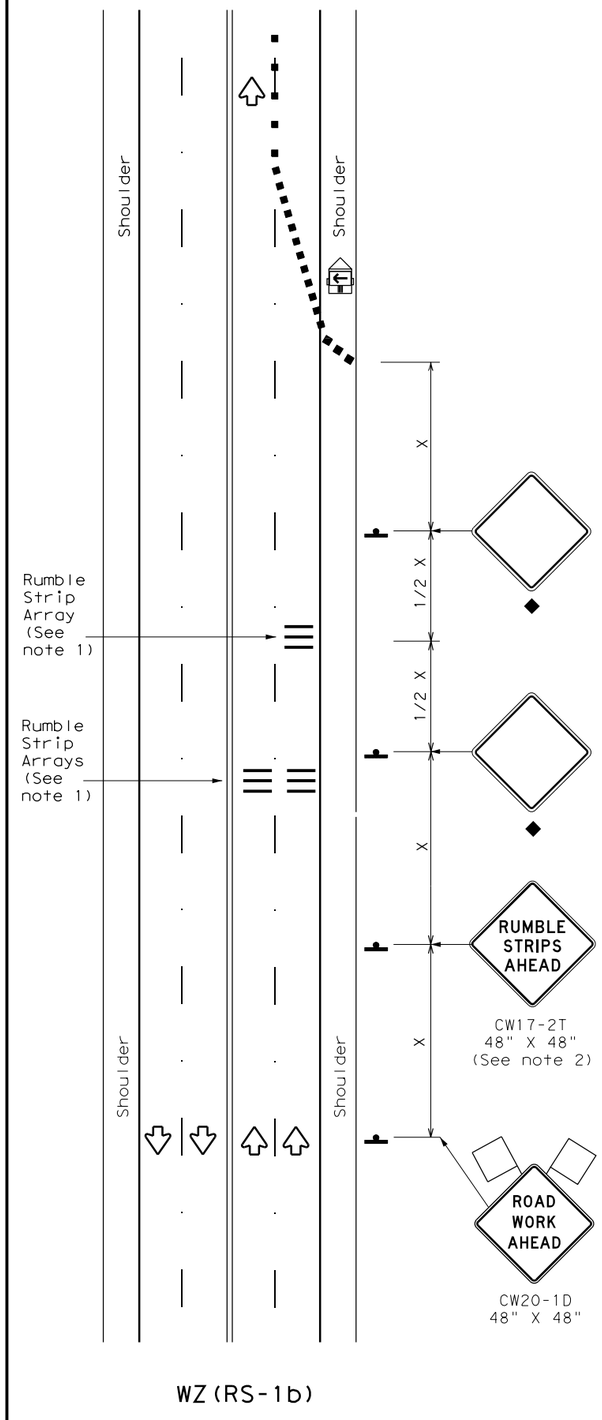
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

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

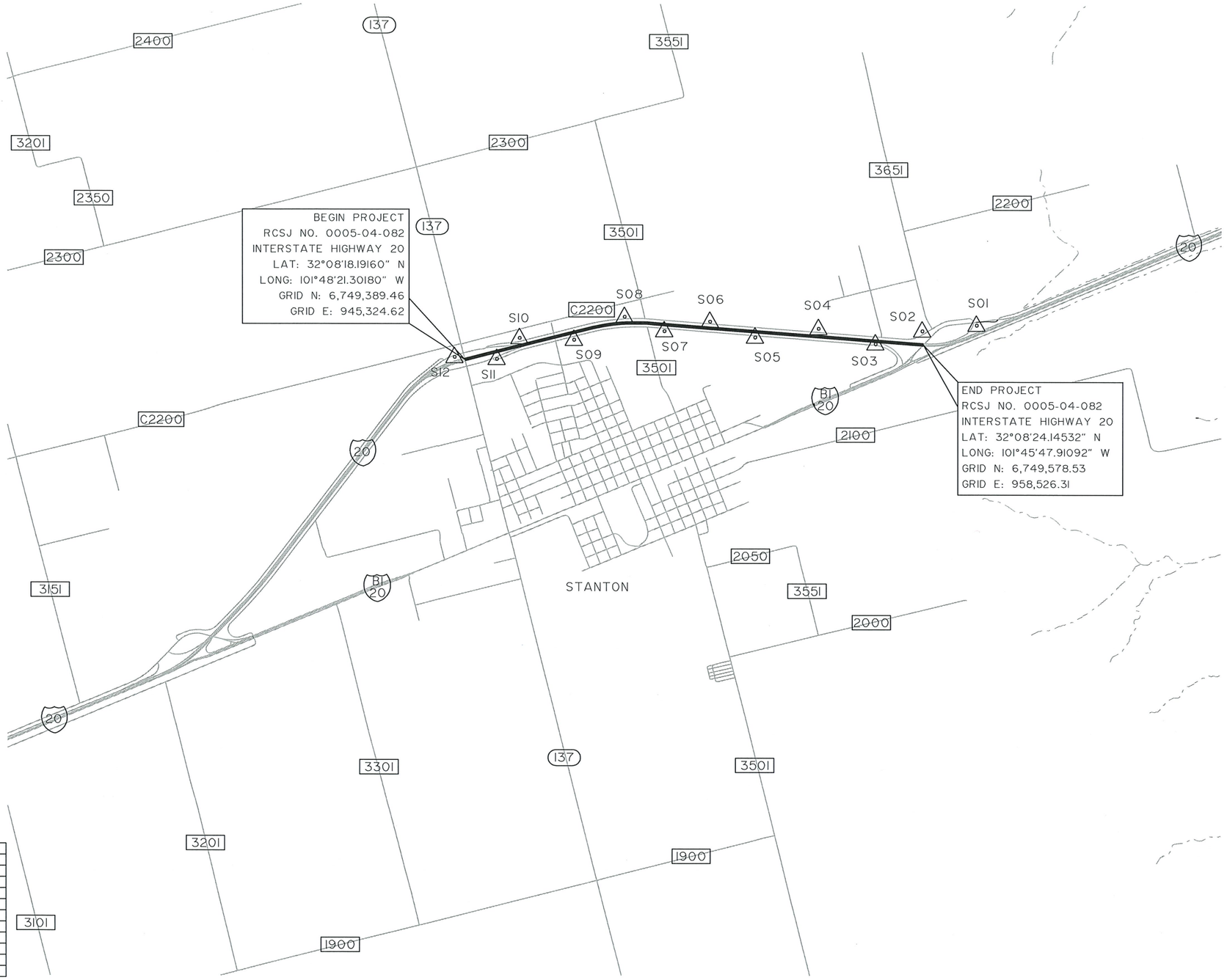
Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	005	04	082	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	MARTIN, ETC		32



NOTES:

1. ALL BEARINGS ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (NAD83, 2011 ADJUSTMENT, EPOCH 2010.00). ESTABLISHED BY TXDOT RTN, HELD HORIZONTAL MONUMENTS "STANTON BASE STATION".

2. ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TxDOT SURFACE ADJUSTMENT FACTOR OF 1.000210.

3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B. ESTABLISHED BY TXDOT RTN, HELD VERTICAL MONUMENT "STANTON BASE STATION".

TRAVERSE TABLE

FROM	TO	BEARING	DISTANCE
S01	S02	S 81°47'19" W	1,480.12'
S02	S03	S 76°35'56" W	1,480.55'
S03	S04	N 75°10'55" W	1,463.41'
S04	S05	S 84°05'10" W	1,458.10'
S05	S06	N 72°56'01" W	1,457.09'
S06	S07	S 84°11'35" W	1,473.97'
S07	S08	N 74°49'22" W	1,456.31'
S08	S09	S 70°33'10" W	1,496.32'
S09	S10	S 88°23'33" W	1,461.31'
S10	S11	S 57°51'00" W	1,087.25'
S11	S12	N 86°22'08" W	1,217.99'

POINT INFO TABLE

POINT No.	LATITUDE (N)	LONGITUDE (W)	GRID NORTHING	GRID EASTING	SURFACE NORTHING	SURFACE EASTING	ELEVATION	DESCRIPTION
S01	32°08'30.4758"	101°45'30.3110"	6,750,171.00	960,058.74	6,751,588.53	960,260.35	2,656.67'	CP-2" TXDOT DISK IN DIRT
S02	32°08'27.9356"	101°45'47.2607"	6,749,959.64	958,594.09	6,751,377.13	958,795.40	2,676.36'	CP-2" TXDOT DISK IN DIRT
S03	32°08'24.0996"	101°46'03.8752"	6,749,616.57	957,154.16	6,751,033.99	957,355.16	2,694.78'	CP-2" TXDOT DISK IN DIRT
S04	32°08'27.3650"	101°46'20.4528"	6,749,990.76	955,739.71	6,751,408.26	955,940.42	2,698.28'	CP-2" TXDOT DISK IN DIRT
S05	32°08'25.4322"	101°46'37.2541"	6,749,840.56	954,289.66	6,751,256.03	954,490.06	2,694.57'	CP-2" TXDOT DISK IN DIRT
S06	32°08'29.2307"	101°46'53.5980"	6,750,268.10	952,897.05	6,751,685.66	953,097.15	2,689.65'	CP-2" TXDOT DISK IN DIRT
S07	32°08'27.3027"	101°47'10.5865"	6,750,119.01	951,430.94	6,751,536.53	951,630.74	2,694.64'	CP-2" TXDOT DISK IN DIRT
S08	32°08'30.6376"	101°47'27.0604"	6,750,500.20	950,025.71	6,751,917.80	950,225.22	2,691.82'	CP-2" TXDOT DISK IN DIRT
S09	32°08'25.2739"	101°47'43.2768"	6,750,002.12	948,615.06	6,751,419.62	948,814.27	2,681.74'	CP-2" TXDOT DISK IN DIRT
S10	32°08'24.4150"	101°48'00.2384"	6,749,961.14	947,154.63	6,751,378.63	947,353.54	2,680.69'	CP-2" TXDOT DISK IN DIRT
S11	32°08'16.4078"	101°48'10.7251"	6,749,382.69	946,234.30	6,750,800.06	946,433.01	2,689.35'	CP-2" TXDOT DISK IN DIRT
S12	32°08'18.7923"	101°48'24.8799"	6,749,459.81	945,019.02	6,750,877.20	945,217.47	2,695.46'	CP-2" TXDOT DISK IN DIRT

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

STATE OF TEXAS
REGISTERED
DAVID H. SPRADLEY
6035
PROFESSIONAL
LAND SURVEYOR
2/22/23

David H. Spradley

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION IN FEBRUARY 2023.

11x17 - SCALE: 1" = NOT TO SCALE
22x34 - SCALE: 1" = NOT TO SCALE

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. 10046100
2322 W. Grand Parkway North, Suite 150 • Katy, Texas 77469 • 832.913.4000

SURVEY
CONTROL INDEX SHEET
INTERSTATE HIGHWAY 20

1 OF 1

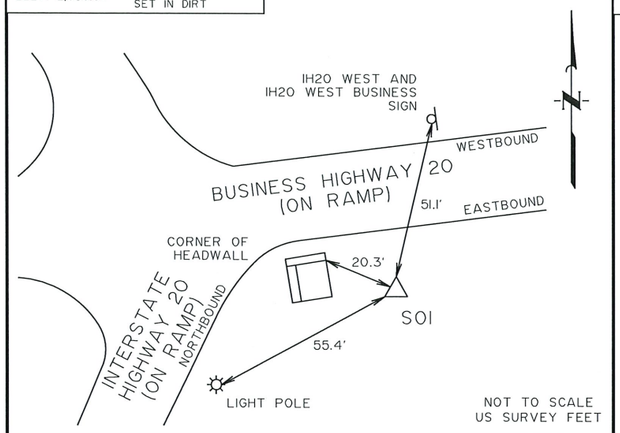
FED. RD. DIV. NO.	FEDERAL AID PROJECT	SHEET NO.
06		33

STATE	DIST.	COUNTY	
TEXAS	6	MARTIN	
CONT.	SECT.	JOB	HIGHWAY
0005	04	082	IH 20

S01

N: 6,751,588.53
E: 960,260.35
ELEV: 2,656.67'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

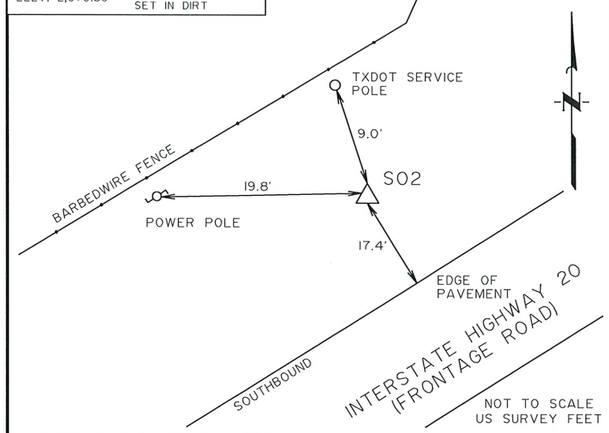


CONTROL POINT S01 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE SOUTH SIDE OF BUSINESS HIGHWAY 20 (ON RAMP), LOCATED APPROXIMATELY 100' EAST OF INTERSTATE HIGHWAY 20 (ON RAMP).

S02

N: 6,751,377.13
E: 958,795.40
ELEV: 2,676.36'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

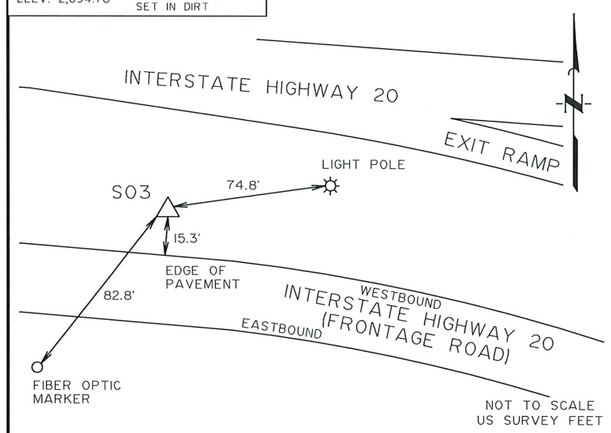


CONTROL POINT S02 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE NORTH SIDE OF INTERSTATE HIGHWAY 20 (FRONTAGE ROAD), LOCATED APPROXIMATELY 200' SOUTHWEST OF FARM TO MARKET 3501.

S03

N: 6,751,033.99
E: 957,355.16
ELEV: 2,694.78'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT



CONTROL POINT S03 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE SOUTH SIDE OF INTERSTATE HIGHWAY 20, LOCATED APPROXIMATELY 6,600' SOUTHEAST OF FARM TO MARKET 3501 (BEAUGARD STREET).

NOTES:

1. ALL BEARINGS ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (NAD83, 2011 ADJUSTMENT, EPOCH 2010.00). ESTABLISHED BY TXDOT RTN, HELD HORIZONTAL MONUMENTS "STANTON BASE STATION".

2. ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TxDOT SURFACE ADJUSTMENT FACTOR OF 1.000210.

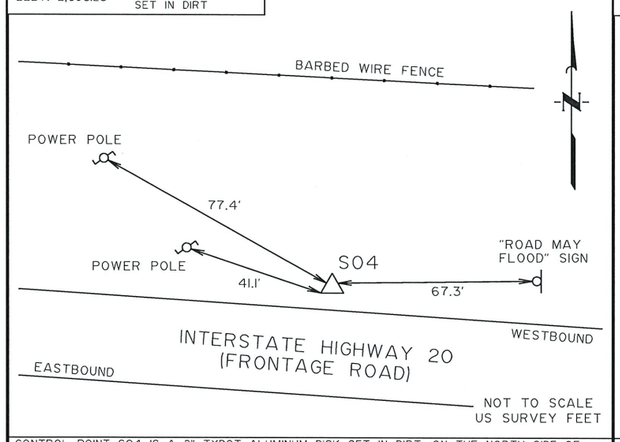
3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B. ESTABLISHED BY TXDOT RTN, HELD VERTICAL MONUMENT "STANTON BASE STATION".

THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PSAE.

S04

N: 6,751,408.26
E: 955,940.42
ELEV: 2,698.28'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

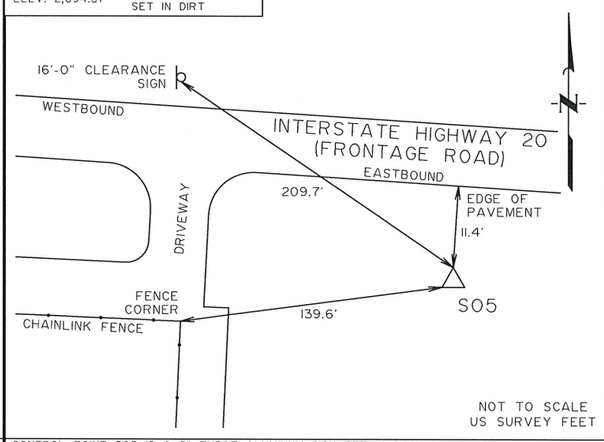


CONTROL POINT S04 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE NORTH SIDE OF INTERSTATE HIGHWAY 20 (FRONTAGE ROAD), LOCATED APPROXIMATELY 1,500' NORTHWEST OF MULBERRY LANE.

S05

N: 6,751,258.03
E: 954,490.08
ELEV: 2,694.57'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

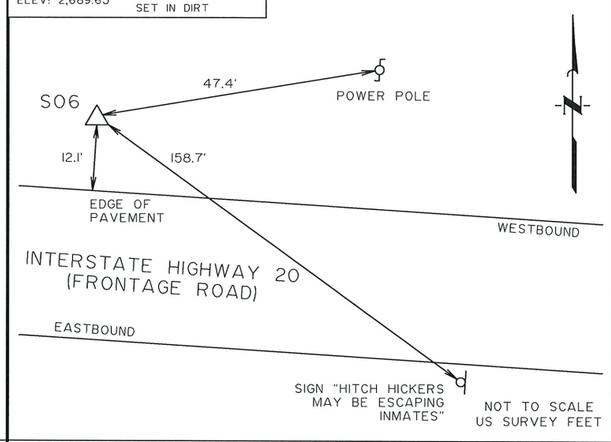


CONTROL POINT S05 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE SOUTH SIDE OF INTERSTATE HIGHWAY 20 (FRONTAGE ROAD), LOCATED APPROXIMATELY 3,700' SOUTHEAST OF FARM TO MARKET 3501 (BEAUGARD STREET).

S06

N: 6,751,685.66
E: 953,097.15
ELEV: 2,689.65'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

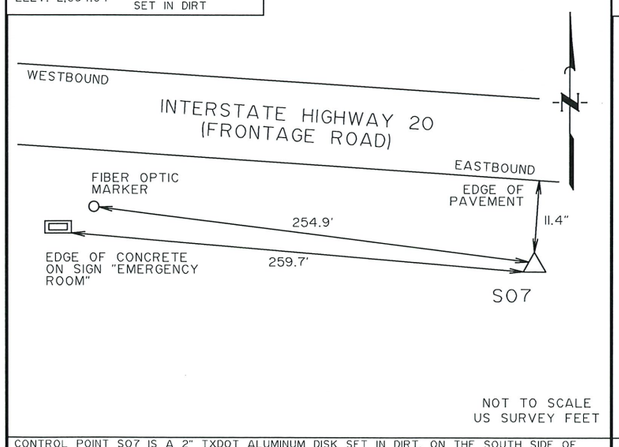


CONTROL POINT S06 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE NORTH SIDE OF INTERSTATE HIGHWAY 20 (FRONTAGE ROAD), LOCATED APPROXIMATELY 2,300' SOUTHEAST OF FARM TO MARKET 3501 (BEAUGARD STREET).

S07

N: 6,751,536.53
E: 951,630.74
ELEV: 2,694.64'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

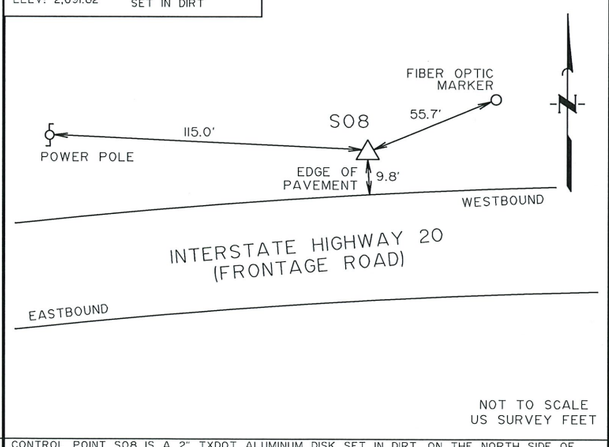


CONTROL POINT S07 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE SOUTH SIDE OF INTERSTATE HIGHWAY 20 (FRONTAGE ROAD), LOCATED APPROXIMATELY 850' SOUTHEAST OF FARM TO MARKET 3501 (BEAUGARD STREET).

S08

N: 6,751,917.80
E: 950,225.22
ELEV: 2,691.82'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

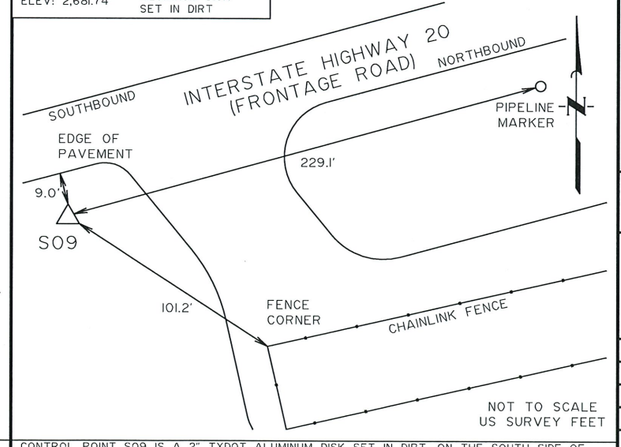


CONTROL POINT S08 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE NORTH SIDE OF INTERSTATE HIGHWAY 20 (FRONTAGE ROAD), LOCATED APPROXIMATELY 500' WEST OF FARM TO MARKET 3501 (BEAUGARD STREET).

S09

N: 6,751,419.62
E: 948,814.27
ELEV: 2,681.74'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT



CONTROL POINT S09 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE SOUTH SIDE OF INTERSTATE HIGHWAY 20 (FRONTAGE ROAD), LOCATED APPROXIMATELY 650' NORTHEAST OF FARM TO MARKET 3451 IN ST BONIFACE STREET).

STATE OF TEXAS
REGISTERED
DAVID H. SPRADLEY
6035
PROFESSIONAL
LAND SURVEYOR
2/22/23

David H. Spradley

THE CONTROL POINTS HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION IN FEBRUARY 2023.

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. 10046100
2322 W. Grand Parkway North, Suite 150 • Katy, Texas 77449 • 832.913.4000

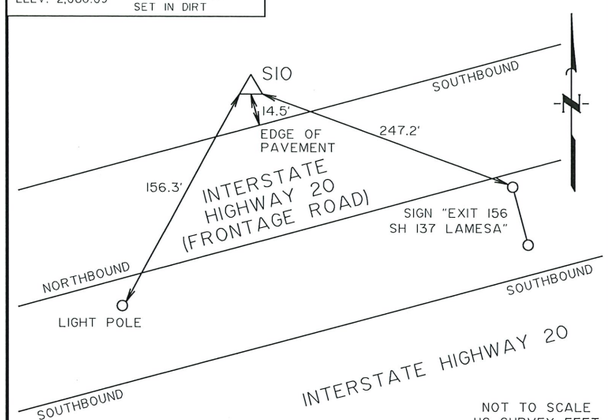
HORIZONTAL & VERTICAL CONTROL SHEET INTERSTATE HIGHWAY 20

1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
06			34
STATE	DIST.	COUNTY	
TEXAS	6	MARTIN	
CONT.	SECT.	JOB	HIGHWAY
0005	04	082	IH 20

S10

N: 6,751,378.63 E: 947,353.54 ELEV: 2,680.69	DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

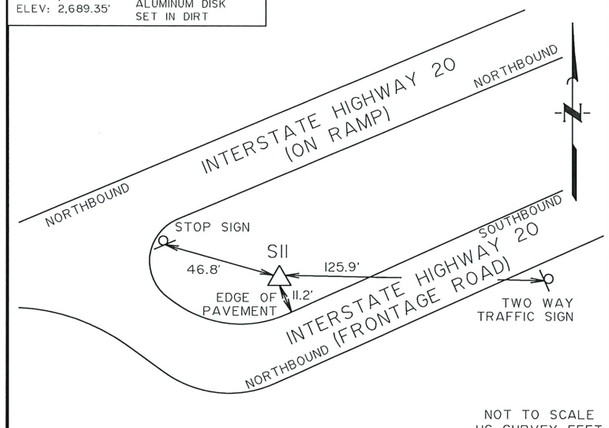


NOT TO SCALE
US SURVEY FEET

CONTROL POINT S10 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE NORTH SIDE OF INTERSTATE HIGHWAY 20 (FRONTAGE ROAD), LOCATED APPROXIMATELY 750' SOUTHWEST OF FARM TO MARKET 345I.

S11

N: 6,750,800.06 E: 946,433.01 ELEV: 2,689.35'	DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

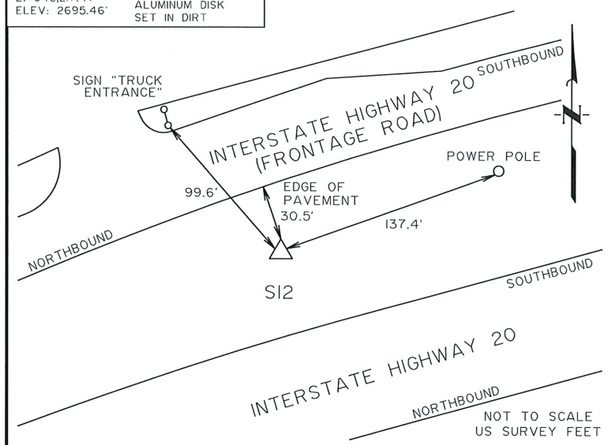


NOT TO SCALE
US SURVEY FEET

CONTROL POINT S11 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE NORTH SIDE OF INTERSTATE HIGHWAY 20 (FRONTAGE ROAD), LOCATED APPROXIMATELY 60' SOUTHEAST OF INTERSTATE HIGHWAY 20 (ON RAMP).

S12

N: 6,750,877.20 E: 945,217.47 ELEV: 2695.46'	DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT



NOT TO SCALE
US SURVEY FEET

CONTROL POINT S12 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE SOUTH SIDE OF INTERSTATE HIGHWAY 20 (FRONTAGE ROAD), LOCATED APPROXIMATELY 300' NORTH OF STATE HIGHWAY 137.

NOTES:

1. ALL BEARINGS ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (NAD83, 2011 ADJUSTMENT, EPOCH 2010.00). ESTABLISHED BY TXDOT RTN, HELD HORIZONTAL MONUMENTS "STANTON BASE STATION".

2. ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TxDOT SURFACE ADJUSTMENT FACTOR OF 1.000210.

3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B. ESTABLISHED BY TXDOT RTN, HELD VERTICAL MONUMENT "STANTON BASE STATION".

THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PSAE.

STATE OF TEXAS
REGISTERED
DAVID H. SPRADLEY
6035
PROFESSIONAL
LAND SURVEYOR

2/22/23

David H. Spradley

THE CONTROL POINTS HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION IN FEBRUARY 2023.

QUIDDITY
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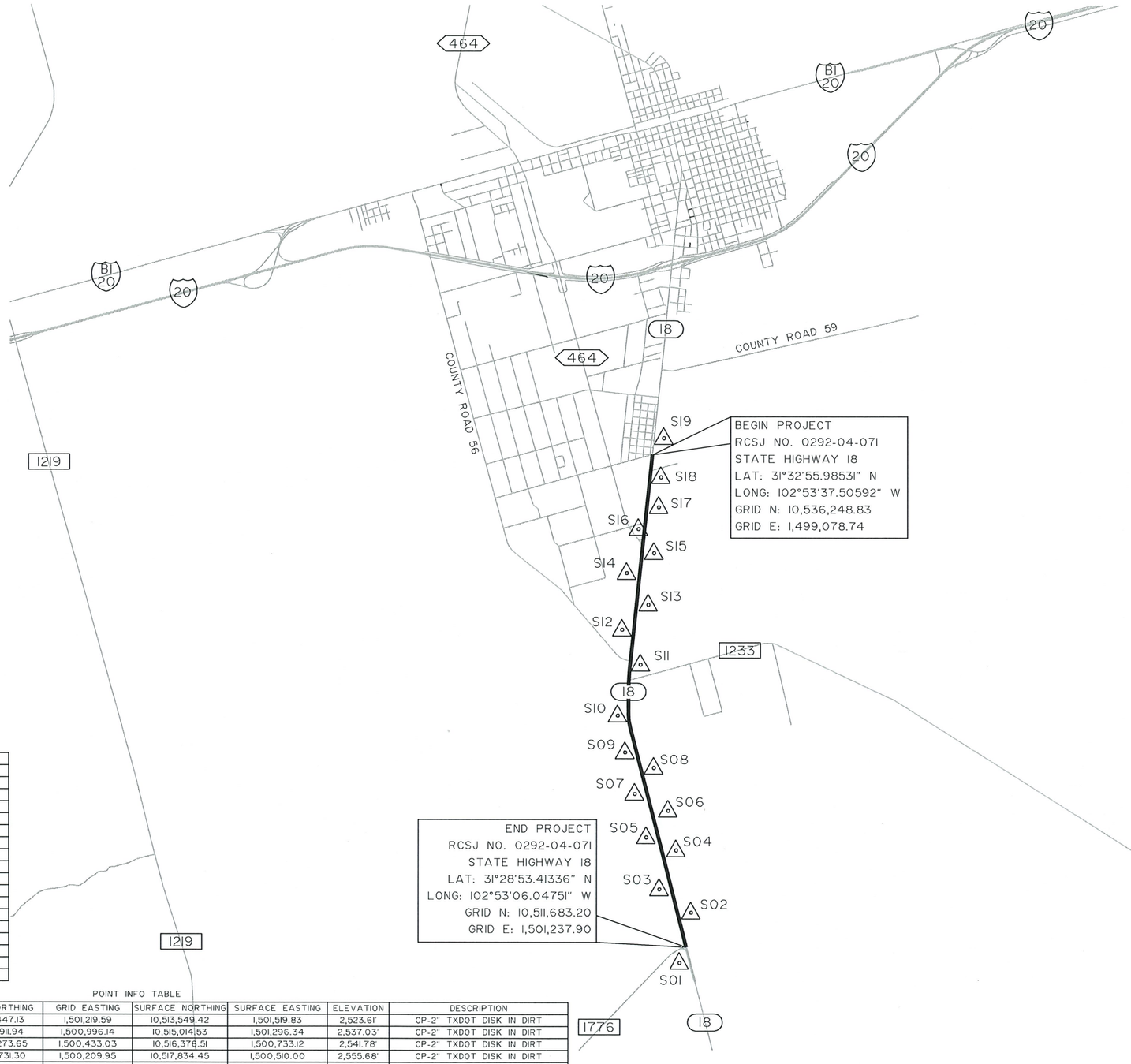
2322 W. Grand Parkway North, Suite 150 • Katy, Texas 77449 • 832.913.4000

HORIZONTAL & VERTICAL CONTROL SHEET INTERSTATE HIGHWAY 20

2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
06			35
STATE	DIST.	COUNTY	
TEXAS	6	MARTIN	
CONT.	SECT.	JOB	HIGHWAY
0005	04	082	IH 20



BEGIN PROJECT
RCSJ NO. 0292-04-071
STATE HIGHWAY 18
LAT: 31°32'55.98531" N
LONG: 102°53'37.50592" W
GRID N: 10,536,248.83
GRID E: 1,499,078.74

END PROJECT
RCSJ NO. 0292-04-071
STATE HIGHWAY 18
LAT: 31°28'53.41336" N
LONG: 102°53'06.04751" W
GRID N: 10,511,683.20
GRID E: 1,501,237.90

TRAVERSE TABLE

FROM	TO	BEARING	DISTANCE
S01	S02	N 08°40'23" W	1,482.06'
S02	S03	N 22°28'00" W	1,473.84'
S03	S04	N 08°42'03" W	1,474.91'
S04	S05	N 22°17'26" W	1,485.10'
S05	S06	N 08°47'22" W	1,473.34'
S06	S07	N 22°21'29" W	1,472.84'
S07	S08	N 08°29'48" W	1,425.68'
S08	S09	N 22°18'00" W	1,447.91'
S09	S10	N 03°04'40" W	1,495.71'
S10	S11	N 08°03'16" E	1,480.30'
S11	S12	N 01°31'21" W	1,470.14'
S12	S13	N 11°36'54" E	1,468.80'
S13	S14	N 01°50'12" W	1,449.68'
S14	S15	N 11°56'50" E	1,437.74'
S15	S16	N 01°55'31" W	1,365.59'
S16	S17	N 12°32'40" E	1,239.90'
S17	S18	N 05°02'09" E	1,302.93'
S18	S19	N 05°01'05" E	1,461.46'

POINT INFO TABLE

POINT No.	LATITUDE (N)	LONGITUDE (W)	GRID NORTHING	GRID EASTING	SURFACE NORTHING	SURFACE EASTING	ELEVATION	DESCRIPTION
S01	31°28'51.0734"	102°53'06.1964"	10,511,447.13	1,501,219.59	10,513,549.42	1,501,519.83	2,523.61'	CP-2" TXDOT DISK IN DIRT
S02	31°29'05.5163"	102°53'09.1644"	10,512,911.94	1,500,996.14	10,515,014.53	1,501,296.34	2,537.03'	CP-2" TXDOT DISK IN DIRT
S03	31°29'18.8618"	102°53'16.0272"	10,514,273.65	1,500,433.03	10,516,376.51	1,500,733.12	2,541.78'	CP-2" TXDOT DISK IN DIRT
S04	31°29'33.2338"	102°53'18.9897"	10,515,731.30	1,500,209.95	10,517,834.45	1,500,510.00	2,555.68'	CP-2" TXDOT DISK IN DIRT
S05	31°29'46.6993"	102°53'25.8575"	10,517,105.15	1,499,646.77	10,519,208.57	1,499,946.70	2,562.58'	CP-2" TXDOT DISK IN DIRT
S06	31°30'01.0520"	102°53'28.8433"	10,518,560.90	1,499,421.69	10,520,664.61	1,499,721.57	2,566.28'	CP-2" TXDOT DISK IN DIRT
S07	31°30'14.3992"	102°53'35.6738"	10,519,922.74	1,498,861.54	10,522,026.73	1,499,161.31	2,563.62'	CP-2" TXDOT DISK IN DIRT
S08	31°30'28.2999"	102°53'38.4809"	10,521,332.49	1,498,650.93	10,523,436.76	1,498,950.66	2,569.39'	CP-2" TXDOT DISK IN DIRT
S09	31°30'41.4269"	102°53'45.1811"	10,522,671.84	1,498,101.62	10,524,776.38	1,498,401.24	2,571.60'	CP-2" TXDOT DISK IN DIRT
S10	31°30'56.1834"	102°53'46.5059"	10,524,165.09	1,498,021.33	10,526,269.93	1,498,320.93	2,570.63'	CP-2" TXDOT DISK IN DIRT
S11	31°31'10.7301"	102°53'44.5008"	10,525,630.51	1,498,228.70	10,527,735.63	1,498,528.34	2,575.33'	CP-2" TXDOT DISK IN DIRT
S12	31°31'25.2592"	102°53'45.3428"	10,527,099.83	1,498,189.64	10,529,205.25	1,498,489.28	2,573.44'	CP-2" TXDOT DISK IN DIRT
S13	31°31'39.5590"	102°53'42.3104"	10,528,538.26	1,498,485.31	10,530,643.97	1,498,785.00	2,577.10'	CP-2" TXDOT DISK IN DIRT
S14	31°31'53.8819"	102°53'43.2325"	10,529,986.91	1,498,438.85	10,532,092.91	1,498,738.54	2,579.45'	CP-2" TXDOT DISK IN DIRT
S15	31°32'07.8643"	102°53'40.1691"	10,531,393.23	1,498,736.42	10,533,499.51	1,499,036.17	2,580.01'	CP-2" TXDOT DISK IN DIRT
S16	31°32'21.3552"	102°53'41.0621"	10,532,757.78	1,498,690.55	10,534,864.33	1,498,990.29	2,582.79'	CP-2" TXDOT DISK IN DIRT
S17	31°32'33.3893"	102°53'38.2734"	10,533,967.84	1,498,959.79	10,536,074.63	1,499,259.59	2,588.97'	CP-2" TXDOT DISK IN DIRT
S18	31°32'46.2546"	102°53'37.2975"	10,535,265.48	1,499,074.14	10,537,372.53	1,499,373.96	2,600.24'	CP-2" TXDOT DISK IN DIRT
S19	31°33'00.6856"	102°53'36.2079"	10,536,721.05	1,499,201.95	10,538,828.39	1,499,501.79	2,602.62'	CP-2" TXDOT DISK IN DIRT

N

NOTES:

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2. ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TxDOT SURFACE ADJUSTMENT FACTOR OF 1.000200.

3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B. ESTABLISHED BY TXDOT RTN, HELD VERTICAL MONUMENT "MONAHANS BASE STATION".

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

STATE OF TEXAS
REGISTERED
DAVID H. SPRADLEY
6035
PROFESSIONAL
LAND SURVEYOR

2/22/23
David H. Spradley

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION IN FEBRUARY 2023.

11x17 - SCALE: 1" = NOT TO SCALE
22x34 - SCALE: 1" = NOT TO SCALE

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. 10016100
2322 W. Grand Parkway North, Suite 150 • Katy, Texas 77449 • 832.913.4000

SURVEY
CONTROL INDEX SHEET
STATE HIGHWAY 18

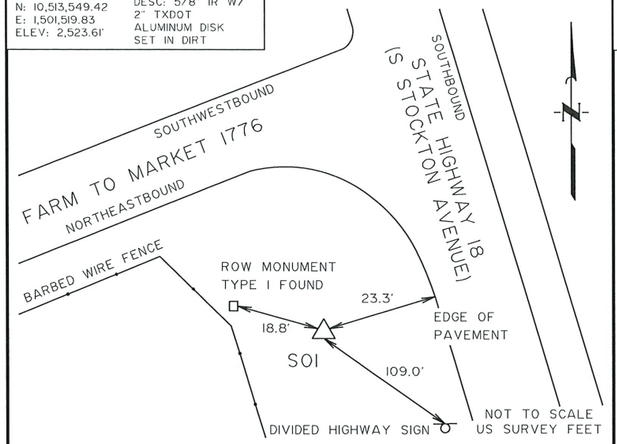
1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
06			36
STATE	DIST.	COUNTY	
TEXAS	6	WARD	
CONT.	SECT.	JOB	HIGHWAY
0292	04	071	SH 18

S01

N: 10,513,549.42
E: 1,501,519.83
ELEV: 2,523.61'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

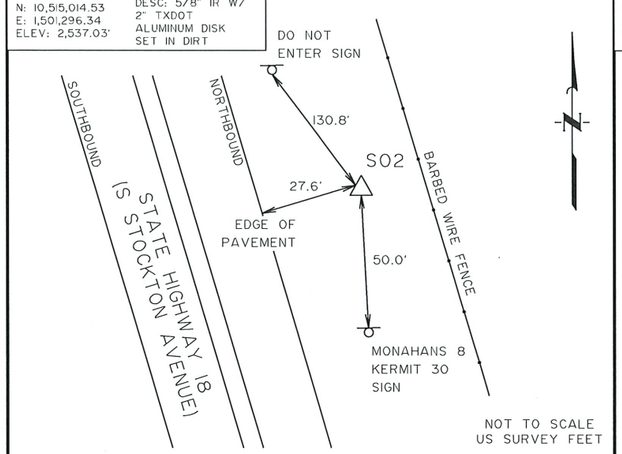


CONTROL POINT S01 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE WEST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 230' SOUTHEAST OF FARM TO MARKET 1776.

S02

N: 10,515,014.53
E: 1,501,296.34
ELEV: 2,537.03'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

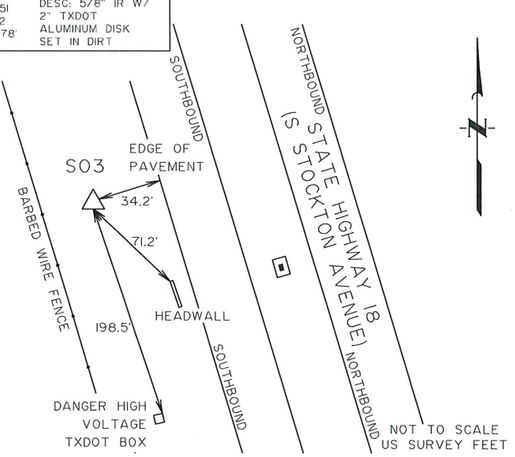


CONTROL POINT S02 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE EAST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 1,200' NORTH OF FARM TO MARKET 1776.

S03

N: 10,516,376.51
E: 1,500,733.12
ELEV: 2,541.778'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

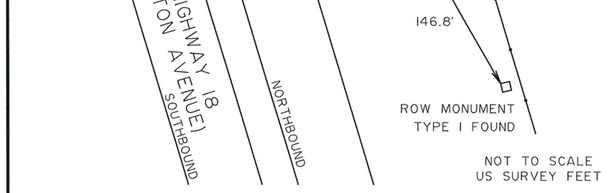


CONTROL POINT S03 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE WEST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 2,700' NORTHWEST OF FARM TO MARKET 1776.

S04

N: 10,517,834.45
E: 1,500,510.00
ELEV: 2,555.68'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

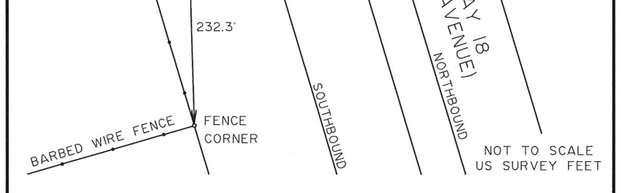


CONTROL POINT S04 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE EAST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 4,100' NORTHWEST OF FARM TO MARKET 1776.

S05

N: 10,519,208.57
E: 1,499,946.70
ELEV: 2,562.58'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT



CONTROL POINT S05 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE WEST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 5,600' NORTHWEST OF FARM TO MARKET 1776.

S06

N: 10,520,664.61
E: 1,499,721.57
ELEV: 2,566.28'

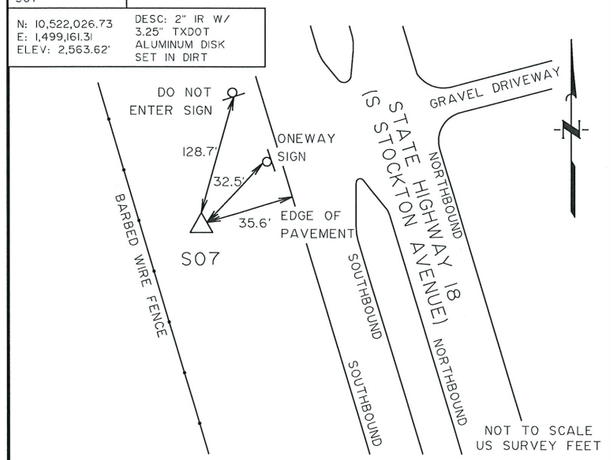
DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

CONTROL POINT S06 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE EAST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 7,100' NORTHWEST OF FARM TO MARKET 1776.

S07

N: 10,522,026.73
E: 1,499,161.31
ELEV: 2,563.62'

DESC: 2" IR W/ 3.25" TXDOT ALUMINUM DISK SET IN DIRT

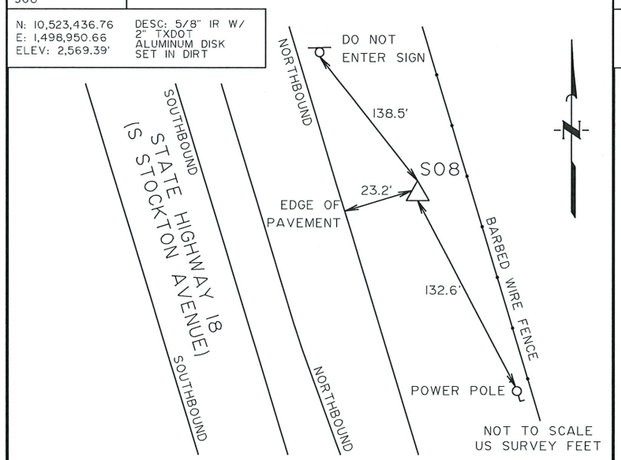


CONTROL POINT S07 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE WEST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 5,000' SOUTHEAST OF FARM TO MARKET 1233.

S08

N: 10,523,436.76
E: 1,498,950.66
ELEV: 2,569.39'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

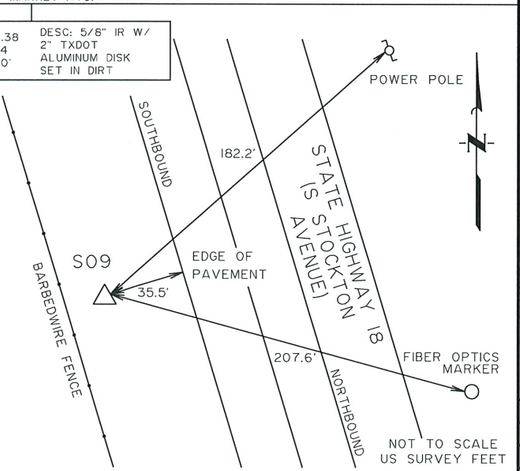


CONTROL POINT S08 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE EAST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 3,600' SOUTHEAST OF FARM TO MARKET 1233.

S09

N: 10,524,776.38
E: 1,498,401.24
ELEV: 2,571.60'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT



CONTROL POINT S09 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE WEST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 2,200' SOUTH OF FARM TO MARKET 1233.

NOTES:

1. ALL BEARINGS ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE (NAD83, 2011 ADJUSTMENT, EPOCH 2010.00). ESTABLISHED BY TXDOT RTN, HELD HORIZONTAL MONUMENTS "MONAHANS BASE STATION".

2. ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TxDOT SURFACE ADJUSTMENT FACTOR OF 1.000200.

3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B. ESTABLISHED BY TXDOT RTN, HELD VERTICAL MONUMENT "MONAHANS BASE STATION".

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

STATE OF TEXAS
REGISTERED
DAVID H. SPRADLEY
6035
PROFESSIONAL
LAND SURVEYOR

2/22/23

David H. Spradley

THE CONTROL POINTS HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION IN FEBRUARY 2023.

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. 10046100
2322 W. Grand Parkway North, Suite 150 • Katy, Texas 77449 • 832.913.4000

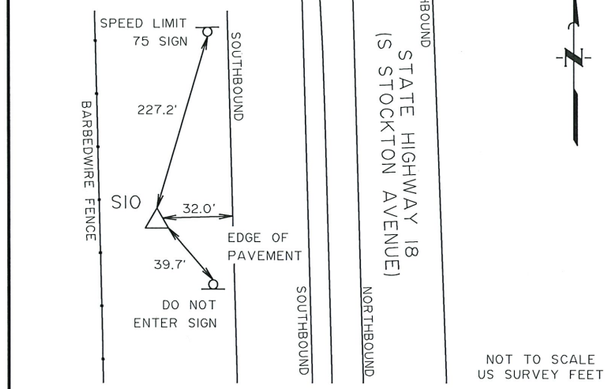
HORIZONTAL & VERTICAL CONTROL SHEET STATE HIGHWAY 18

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
06			37
STATE	DIST.	COUNTY	
TEXAS	6	WARD	
CONT.	SECT.	JOB	HIGHWAY
0292	04	071	SH 18

S10

N: 10,526,269.93
E: 1,498,320.93
ELEV: 2,570.63'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

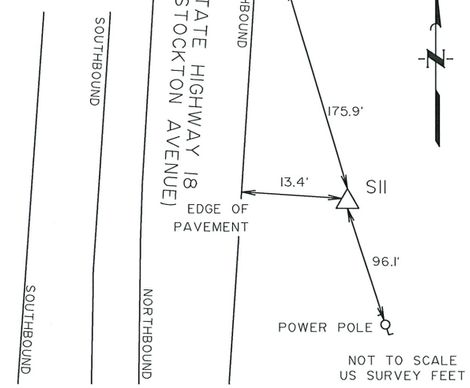


CONTROL POINT S10 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE WEST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 750' SOUTH OF FARM TO MARKET 1233.

S11

N: 10,527,735.63
E: 1,498,528.34
ELEV: 2,575.33'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

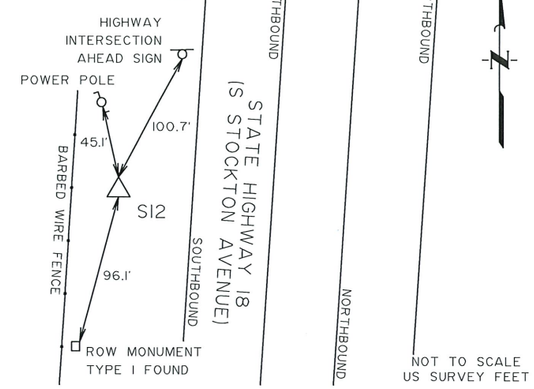


CONTROL POINT S11 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE EAST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 600' NORTH OF FARM TO MARKET 1233.

S12

N: 10,529,205.25
E: 1,498,489.28
ELEV: 2,573.44'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

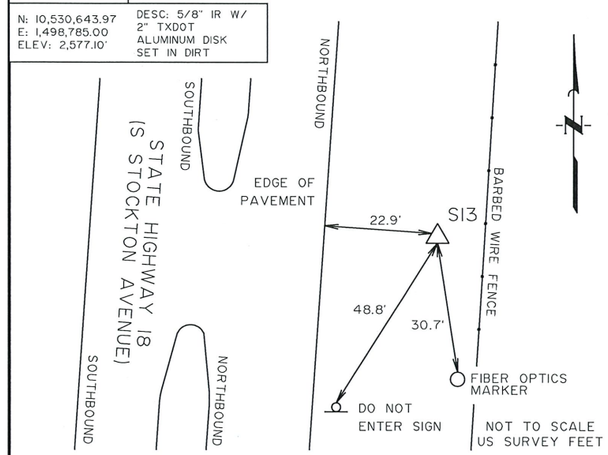


CONTROL POINT S12 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE WEST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 1,100' NORTH OF S COLORADO STREET.

S13

N: 10,530,643.97
E: 1,498,785.00
ELEV: 2,577.10'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

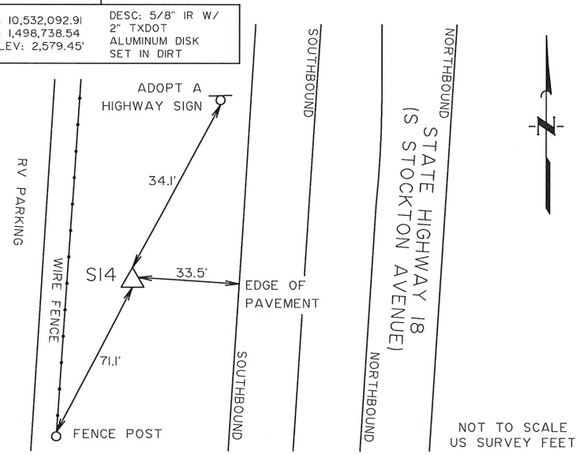


CONTROL POINT S13 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE EAST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 2,500' NORTH OF S COLORADO STREET.

S14

N: 10,532,092.91
E: 1,498,738.54
ELEV: 2,579.45'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

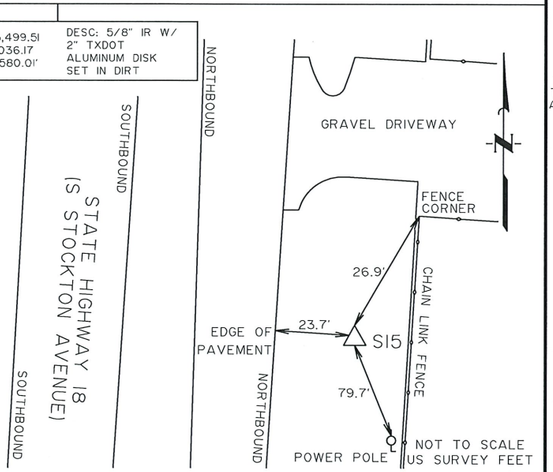


CONTROL POINT S14 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE WEST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 1,800' SOUTH OF STATE HIGHWAY 464 (LOOP ROAD).

S15

N: 10,533,499.51
E: 1,499,036.17
ELEV: 2,580.01'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

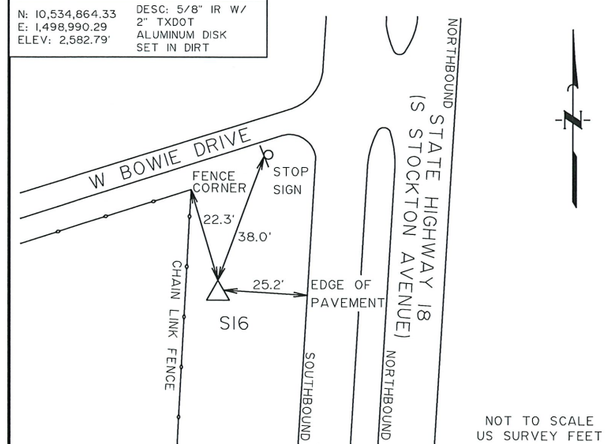


CONTROL POINT S15 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE EAST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELTY 400' SOUTH OF STATE HIGHWAY 464 (LOOP ROAD).

S16

N: 10,534,864.33
E: 1,498,990.29
ELEV: 2,582.79'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

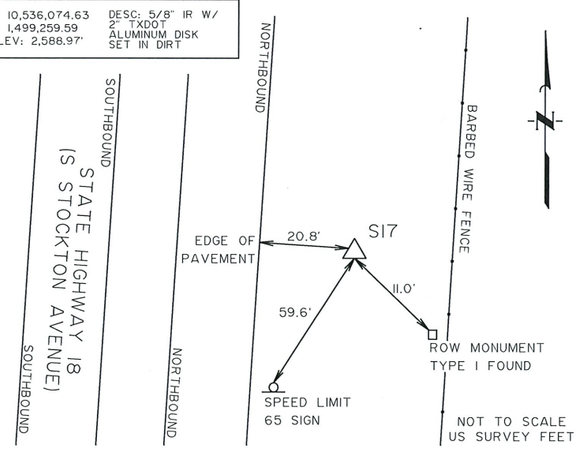


CONTROL POINT S16 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, AT THE INTERSECTION OF STATE HIGHWAY 18 (S STOCKTON AVENUE) AND W BOWIE DRIVE.

S17

N: 10,536,074.63
E: 1,499,259.59
ELEV: 2,588.97'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT

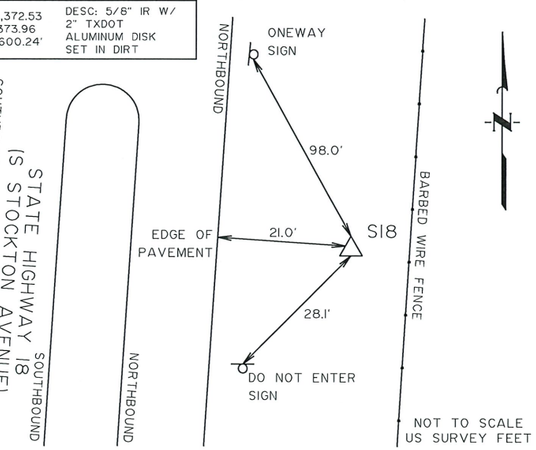


CONTROL POINT S17 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE EAST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 1,100' NORTH OF W BOWIE DRIVE.

S18

N: 10,537,372.53
E: 1,499,373.96
ELEV: 2,600.24'

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT



CONTROL POINT S18 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE EAST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 200' SOUTH OF E 46TH STREET.

NOTES:

1. ALL BEARINGS ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE (NAD83, 2011 ADJUSTMENT, EPOCH 2010.00). ESTABLISHED BY TXDOT RTN, HELD HORIZONTAL MONUMENTS "MONAHANS BASE STATION".

2. ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TxDOT SURFACE ADJUSTMENT FACTOR OF 1.000200.

3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B. ESTABLISHED BY TXDOT RTN, HELD VERTICAL MONUMENT "MONAHANS BASE STATION".

THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PSAE.

STATE OF TEXAS
REGISTERED
DAVID H. SPRADLEY
6035
PROFESSIONAL
LAND SURVEYOR

2/22/23

David H. Spradley

THE CONTROL POINTS HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION IN FEBRUARY 2023.

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. 10046100
2322 W. Grand Parkway North, Suite 150 • Katy, Texas 77449 • 832.913.4000

HORIZONTAL & VERTICAL CONTROL SHEET STATE HIGHWAY 18

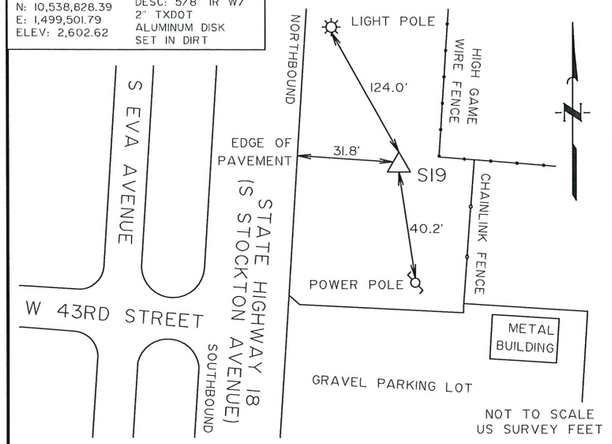
FED. RD. DIV. NO.	FEDERAL AID PROJECT	SHEET NO.
06		38

STATE	DIST.	COUNTY	
TEXAS	6	WARD	
CONT.	SECT.	JOB	HIGHWAY
0292	04	071	SH 18

S19

N: 10,538,828.39
E: 1,499,501.79
ELEV: 2,602.62

DESC: 5/8" IR W/ 2" TXDOT ALUMINUM DISK SET IN DIRT



CONTROL POINT S10 IS A 2" TXDOT ALUMINUM DISK SET IN DIRT, ON THE EAST SIDE OF STATE HIGHWAY 18 (S STOCKTON AVENUE), LOCATED APPROXIMATELY 100' NORTH OF W 43RD STREET

NOTES:

1. ALL BEARINGS ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE (NAD83, 2011 ADJUSTMENT, EPOCH 2010.00), ESTABLISHED BY TXDOT RTN, HELD HORIZONTAL MONUMENTS "MONAHANS BASE STATION".

2. ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TxDOT SURFACE ADJUSTMENT FACTOR OF 1.000200.

3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B. ESTABLISHED BY TXDOT RTN, HELD VERTICAL MONUMENT "MONAHANS BASE STATION".

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

STATE OF TEXAS
REGISTERED
DAVID H. SPRADLEY
6035
PROFESSIONAL
LAND SURVEYOR

2/22/23

David H. Spradley

THE CONTROL POINTS HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION IN FEBRUARY 2023.

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. 10046100
2322 W. Grand Parkway North, Suite 150 • Katy, Texas 77449 • 832.913.4000

HORIZONTAL & VERTICAL CONTROL SHEET STATE HIGHWAY 18

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
06			39
STATE	DIST.	COUNTY	
TEXAS	6	WARD	
CONT.	SECT.	JOB	HIGHWAY
0292	04	071	SH 18

Beginning chain IH20 description

Point 92 N 6,750,832.4111 E 945,651.6073 Sta 250+00.00

Course from 92 to PC IH201 N 76° 57′ 32.17" E Dist 3,518.2392

Curve Data					
Curve IH201					
P.I. Station	294+71.53	N	6,751,841.4094	E	950,007.8131
Delta =	18° 37′ 12.61" (RT)				
Degree =	0° 59′ 07.12"				
Tangent =	953.2937				
Length =	1,889.7776				
Radius =	5,815.0000				
External =	77.6220				
Long Chord =	1,881.4724				
Mid. Ord. =	76.5995				
P.C. Station	285+18.24	N	6,751,626.2993	E	949,079.1061
P.T. Station	304+08.02	N	6,751,748.7302	E	950,956.5909
C.C.		N	6,745,961.2763	E	950,391.2568
Back = N	76° 57′ 32.17" E				
Ahead = S	84° 25′ 15.22" E				
Chord Bear = N	86° 16′ 08.48" E				

Course from PT IH201 to PC IH202 S 84° 25′ 15.22" E Dist 7,765.2991

Curve Data					
Curve IH202					
P.I. Station	388+88.69	N	6,750,924.2392	E	959,397.0934
Delta =	27° 10′ 24.90" (LT)				
Degree =	1° 56′ 08.41"				
Tangent =	715.3771				
Length =	1,403.8347				
Radius =	2,960.0000				
External =	85.2199				
Long Chord =	1,390.7148				
Mid. Ord. =	82.8351				
P.C. Station	381+73.32	N	6,750,993.7881	E	958,685.1051
P.T. Station	395+77.15	N	6,751,187.5230	E	960,062.2596
C.C.		N	6,753,939.7664	E	958,972.8762
Back = S	84° 25′ 15.22" E				
Ahead = N	68° 24′ 19.88" E				
Chord Bear = N	81° 59′ 32.33" E				

Course from PT IH202 to 93 N 68° 24′ 19.88" E Dist 1,031.7499

Point 93 N 6,751,567.2429 E 961,021.5930 Sta 406+08.90

Ending chain IH20 description

Beginning chain SH18_REV_ description

Point 94 N 10,538,331.6802 E 1,499,382.8108 Sta 1500+00.00

Course from 94 to PC SH18_REV_1 S 5° 02′ 54.98" W Dist 10,838.5550

Curve Data					
Curve SH18_REV_1					
P.I. Station	1611+37.93	N	10,527,236.9625	E	1,498,402.6643
Delta =	5° 42′ 46.34" (LT)				
Degree =	0° 57′ 17.75"				
Tangent =	299.3733				
Length =	598.2504				
Radius =	6,000.0000				
External =	7.4641				
Long Chord =	598.0027				
Mid. Ord. =	7.4548				
P.C. Station	1608+38.55	N	10,527,535.1744	E	1,498,429.0094
P.T. Station	1614+36.81	N	10,526,937.6094	E	1,498,406.1350
C.C.		N	10,527,007.1696	E	1,504,405.7318
Back = S	5° 02′ 54.98" W				
Ahead = S	0° 39′ 51.36" E				
Chord Bear = S	2° 11′ 31.81" W				

Course from PT SH18_REV_1 to PC SH18_REV_2 S 0° 39′ 51.36" E Dist 1,574.9570

Curve Data					
Curve SH18_REV_2					
P.I. Station	1633+49.91	N	10,525,024.6284	E	1,498,428.3144
Delta =	14° 49′ 13.56" (LT)				
Degree =	2° 12′ 13.26"				
Tangent =	338.1525				
Length =	672.5299				
Radius =	2,600.0000				
External =	21.8976				
Long Chord =	670.6566				
Mid. Ord. =	21.7147				
P.C. Station	1630+11.76	N	10,525,362.7582	E	1,498,424.3941
P.T. Station	1636+84.29	N	10,524,698.7503	E	1,498,518.5947
C.C.		N	10,525,392.9010	E	1,501,024.2193
Back = S	0° 39′ 51.36" E				
Ahead = S	15° 29′ 04.92" E				
Chord Bear = S	8° 04′ 28.14" E				

Course from PT SH18_REV_2 to 95 S 15° 29′ 04.92" E Dist 11,400.0547

Point 95 N 10,513,712.4972 E 1,501,562.1931 Sta 1750+84.35

Ending chain SH18_REV_ description

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARK R. RICHARDSON
143771
LICENSED
PROFESSIONAL ENGINEER

03/27/2023

Texas Department of Transportation
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QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

I20 & SH18
HORIZONTAL
ALIGNMENT DATA

SHEET 1 OF 1

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
CHECKED	STATE	DIST.	COUNTY	SHEET NO.
APPROVED	TEXAS	ODA	MARTIN, ETC	40
	CONT.	SECT.	JOB	
	005	04	082	

PLOTDRIVER: BW_HALF_PDF.plt PENTABLE: ODA SHIP.tbl

DATE:3/27/2023 2:31:49 PM USER:mr1
FILE:c:\bms\pwe101-01\mark,richardson\dms27273\WA8_ODA_HALN.dgn

SUMMARY OF EARTHWORK QUANTITIES

STATION	END AREA		DISTANCE BETWEEN X-S	VOLUME 110 6001 EXCAVATION ROADWAY	VOLUME 132 6003 EMBANKMENT (FINAL) (ORD COMP)	CUMULATIVE VOLUME EXCAVATION	CUMULATIVE VOLUME EMBANKMENT
	EXCAVATION	EMBANKMENT					
	SF	SF	FT	CY	CY	CY	CY
IH 20							
252+00	0.5	0	100	2	0	2	0
253+00	1	0	100	4	0	6	0
254+00	1	0	100	4	0	10	0
255+00	1	0	100	4	0	14	0
256+00	1	0	100	4	0	18	0
257+00	1	0	100	4	0	22	0
258+00	1	0	100	4	0	26	0
259+00	1	0	100	4	0	30	0
260+00	1	0	100	4	0	34	0
261+00	1	0	100	4	0	38	0
262+00	1	0	100	4	0	42	0
263+00	1	0	100	4	0	46	0
264+00	1	0	100	4	0	50	0
265+00	1	0	100	4	0	54	0
266+00	1	0	100	4	0	58	0
267+00	1	0	100	4	0	62	0
268+00	1	0	100	4	0	66	0
269+00	1	0	100	4	0	70	0
270+00	1	0	100	4	0	74	0
271+00	1	0	100	4	0	78	0
272+00	1	0	100	4	0	82	0
273+00	1	5	100	4	20	86	20
274+00	0.75	5	100	3	20	89	40
275+00	1	2.5	100	4	10	93	50
276+00	1	0	100	4	0	97	50
277+00	1	0	100	4	0	101	50
278+00	1	0	100	4	0	105	50
279+00	1	0	100	4	0	109	50
280+00	1	0	100	4	0	113	50
281+00	1	0	100	4	0	117	50
282+00	1	0	100	4	0	121	50
283+00	1	0	100	4	0	125	50
284+00	1	0	100	4	0	129	50
285+00	1	0	100	4	0	133	50
286+00	1	0	100	4	0	137	50
287+00	1	0	100	4	0	141	50
288+00	1	0	100	4	0	145	50
289+00	1	0	100	4	0	149	50
290+00	1	0	100	4	0	153	50
291+00	1	0	100	4	0	157	50
292+00	1	0	100	4	0	161	50
293+00	1	0	100	4	0	165	50
294+00	1	0	100	4	0	169	50
295+00	1	0	100	4	0	173	50
296+00	1	0	100	4	0	177	50
297+00	1	0	100	4	0	181	50
298+00	1	0	100	4	0	185	50
299+00	1	0	100	4	0	189	50
300+00	1	0	100	4	0	193	50
301+00	1	0	100	4	0	197	50
302+00	1	0	100	4	0	201	50
303+00	1	0	100	4	0	205	50
304+00	1	0	100	4	0	209	50
305+00	1	0	100	4	0	213	50
306+00	1	0	100	4	0	217	50
307+00	1	0	100	4	0	221	50
308+00	1	0	100	4	0	225	50
309+00	1	0	100	4	0	229	50
310+00	1	0	100	4	0	233	50
311+00	1	0	100	4	0	237	50
312+00	1	0	100	4	0	241	50
313+00	1	0	100	4	0	245	50
314+00	1	0	100	4	0	249	50
315+00	1	0	100	4	0	253	50
316+00	1	0	100	4	0	257	50
317+00	1	0	100	4	0	261	50
318+00	1	0	100	4	0	265	50
319+00	1	0	100	4	0	269	50
320+00	1	0	100	4	0	273	50
321+00	1	0	100	4	0	277	50
322+00	1	0	100	4	0	281	50
323+00	1	5	100	4	20	285	70
324+00	1	5	100	4	20	289	90
325+00	1	0	100	4	0	293	90
326+00	1	0	100	4	0	297	90
327+00	1	0	100	4	0	301	90
328+00	1	0	100	4	0	305	90
329+00	1	0	100	4	0	309	90
330+00	1	0	100	4	0	313	90
331+00	1	0	100	4	0	317	90
332+00	1	0	100	4	0	321	90
333+00	1	0	100	4	0	325	90
334+00	1	0	100	4	0	329	90
335+00	1	0	100	4	0	333	90
336+00	1	0	100	4	0	337	90

SUMMARY OF EARTHWORK QUANTITIES

STATION	END AREA		DISTANCE BETWEEN X-S	VOLUME 110 6001 EXCAVATION ROADWAY	VOLUME 132 6003 EMBANKMENT (FINAL) (ORD COMP)	CUMULATIVE VOLUME EXCAVATION	CUMULATIVE VOLUME EMBANKMENT
	EXCAVATION	EMBANKMENT					
	SF	SF	FT	CY	CY	CY	CY
337+00	1	0	100	4	0	341	90
338+00	1	0	100	4	0	345	90
339+00	1	0	100	4	0	349	90
340+00	1	2	100	4	8	353	98
341+00	1	2	100	4	8	357	106
342+00	1	0	100	4	0	361	106
343+00	1	0	100	4	0	365	106
344+00	1	0	100	4	0	369	106
345+00	1	0	100	4	0	373	106
346+00	1	0	100	4	0	377	106
347+00	1	0	100	4	0	381	106
348+00	1	0	100	4	0	385	106
349+00	1	0	100	4	0	389	106
350+00	1	0	100	4	0	393	106
351+00	1	0	100	4	0	397	106
352+00	1	0	100	4	0	401	106
353+00	1	0	100	4	0	405	106
354+00	1	0	100	4	0	409	106
355+00	1	0	100	4	0	413	106
356+00	1	0	100	4	0	417	106
357+00	1	0	100	4	0	421	106
358+00	1	0	100	4	0	425	106
359+00	1	0	100	4	0	429	106
360+00	1	0	100	4	0	433	106
361+00	1	0	100	4	0	437	106
362+00	1	0	100	4	0	441	106
363+00	1	0	100	4	0	445	106
364+00	1	0	100	4	0	449	106
365+00	1	0	100	4	0	453	106
366+00	1	0	100	4	0	457	106
367+00	1	0	100	4	0	461	106
368+00	1	0	100	4	0	465	106
369+00	1	0	100	4	0	469	106
370+00	1	0	100	4	0	473	106
371+00	1	0	100	4	0	477	106
372+00	1	0	100	4	0	481	106
373+00	1	0	100	4	0	485	106
374+00	1	0	100	4	0	489	106
375+00	1	0	100	4	0	493	106
376+00	1	0	100	4	0	497	106
377+00	1	0	100	4	0	501	106
378+00	1	0	100	4	0	505	106
379+00	1	0	100	4	0	509	106
380+00	1	0	100	4	0	513	106

IH 20 TOTAL VOLUME	
110	132
6001	6003
EXCAVATION ROADWAY	EMBANKMENT (FINAL) (ORD COMP)
CY	CY
513	106

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARK R. RICHARDSON
143771
LICENSED
PROFESSIONAL ENGINEER

03/27/2023

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SUMMARY OF EARTHWORK QUANTITIES IH 20

SHEET 1 OF 1

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	41
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

SUMMARY OF EARTHWORK QUANTITIES

STATION	END AREA		DISTANCE BETWEEN X-S	VOLUME 110 6001 EXCAVATION ROADWAY	VOLUME 132 6003 EMBANKMENT (FINAL) (ORD COMP)	CUMULATIVE VOLUME	
	EXCAVATION	EMBANKMENT				EXCAVATION	EMBANKMENT
	SF	SF	FT	CY	CY	CY	CY
SH 18							
1503+00	0.5	0	100	2	0	2	0
1504+00	1	0	100	4	0	6	0
1505+00	0.5	0	100	2	0	8	0
1506+00	0.5	0	100	2	0	10	0
1507+00	1	0	100	4	0	14	0
1508+00	0.25	0	100	1	0	15	0
1509+00	0.5	0	100	2	0	17	0
1510+00	1	0	100	4	0	21	0
1511+00	1	0	100	4	0	25	0
1512+00	1	0	100	4	0	29	0
1513+00	0.75	0	100	3	0	32	0
1514+00	0	0	100	0	0	32	0
1515+00	1	0	100	4	0	36	0
1516+00	1	0	100	4	0	40	0
1517+00	1	0	100	4	0	44	0
1518+00	1	0	100	4	0	48	0
1519+00	1	0	100	4	0	52	0
1520+00	1	0	100	4	0	56	0
1521+00	1	0	100	4	0	60	0
1522+00	1	0	100	4	0	64	0
1523+00	1	0	100	4	0	68	0
1524+00	1	0	100	4	0	72	0
1525+00	1	0	100	4	0	76	0
1526+00	1	0	100	4	0	80	0
1527+00	1	0	100	4	0	84	0
1528+00	1	0	100	4	0	88	0
1529+00	1	0	100	4	0	92	0
1530+00	1	0	100	4	0	96	0
1531+00	1	0	100	4	0	100	0
1532+00	1	0	100	4	0	104	0
1533+00	0.5	0	100	2	0	106	0
1534+00	0	0	100	0	0	106	0
1535+00	1	0	100	4	0	110	0
1536+00	1	0	100	4	0	114	0
1537+00	1	0	100	4	0	118	0
1538+00	1	0	100	4	0	122	0
1539+00	1	0	100	4	0	126	0
1540+00	1	0	100	4	0	130	0
1541+00	1	0	100	4	0	134	0
1542+00	1	0	100	4	0	138	0
1543+00	1	0	100	4	0	142	0
1544+00	1	0	100	4	0	146	0
1545+00	0.5	0	100	2	0	148	0
1546+00	1	0	100	4	0	152	0
1547+00	1	0	100	4	0	156	0
1548+00	1	0	100	4	0	160	0
1549+00	1	0	100	4	0	164	0
1550+00	1	0	100	4	0	168	0
1551+00	1	0	100	4	0	172	0
1552+00	1	0	100	4	0	176	0
1553+00	1	0	100	4	0	180	0
1554+00	1	0	100	4	0	184	0
1555+00	1	0	100	4	0	188	0
1556+00	0.25	0	100	1	0	189	0
1557+00	0.5	0	100	2	0	191	0
1558+00	1	0	100	4	0	195	0
1559+00	1	0	100	4	0	199	0
1560+00	1	0	100	4	0	203	0
1561+00	1	0	100	4	0	207	0
1562+00	1	0	100	4	0	211	0
1563+00	1	0	100	4	0	215	0
1564+00	1	0	100	4	0	219	0
1565+00	1	0	100	4	0	223	0
1566+00	1	0	100	4	0	227	0
1567+00	1	0	100	4	0	231	0
1568+00	1	0	100	4	0	235	0
1569+00	1	0	100	4	0	239	0
1570+00	1	0	100	4	0	243	0
1571+00	0.25	0	100	1	0	244	0
1572+00	0.25	0	100	1	0	245	0
1573+00	1	0	100	4	0	249	0
1574+00	1	0	100	4	0	253	0
1575+00	1	0	100	4	0	257	0
1576+00	1	0	100	4	0	261	0
1577+00	1	0	100	4	0	265	0
1578+00	0	0	100	0	0	265	0
1579+00	0.75	0	100	3	0	268	0
1580+00	1	0	100	4	0	272	0
1581+00	1	0	100	4	0	276	0
1582+00	1	0	100	4	0	280	0
1583+00	1	0	100	4	0	284	0
1584+00	1	0	100	4	0	288	0
1585+00	1	0	100	4	0	292	0
1586+00	1	0	100	4	0	296	0
1587+00	1	0	100	4	0	300	0
1588+00	1	0	100	4	0	304	0
1589+00	1	0	100	4	0	308	0

SUMMARY OF EARTHWORK QUANTITIES

STATION	END AREA		DISTANCE BETWEEN X-S	VOLUME 110 6001 EXCAVATION ROADWAY	VOLUME 132 6003 EMBANKMENT (FINAL) (ORD COMP)	CUMULATIVE VOLUME	
	EXCAVATION	EMBANKMENT				EXCAVATION	EMBANKMENT
	SF	SF	FT	CY	CY	CY	CY
1590+00	1	0	100	4	0	312	0
1591+00	1	0	100	4	0	316	0
1592+00	1	0	100	4	0	320	0
1593+00	1	0	100	4	0	324	0
1594+00	1	0	100	4	0	328	0
1595+00	1	0	100	4	0	332	0
1596+00	1	0	100	4	0	336	0
1597+00	1	0	100	4	0	340	0
1598+00	1	0	100	4	0	344	0
1599+00	1	0	100	4	0	348	0
1600+00	1	0	100	4	0	352	0
1601+00	1	0	100	4	0	356	0
1602+00	1	0	100	4	0	360	0
1603+00	0	0	100	0	0	360	0
1604+00	1	0	100	4	0	364	0
1605+00	1	0	100	4	0	368	0
1606+00	1	0	100	4	0	372	0
1607+00	1	0	100	4	0	376	0
1608+00	1	0	100	4	0	380	0
1609+00	1	0	100	4	0	384	0
1610+00	1	0	100	4	0	388	0
1611+00	1	0	100	4	0	392	0
1612+00	0.25	0	100	1	0	393	0
1613+00	0	0	100	0	0	393	0
1614+00	1	0	100	4	0	397	0
1615+00	1	0	100	4	0	401	0
1616+00	1	0	100	4	0	405	0
1617+00	1	0	100	4	0	409	0
1618+00	1	0	100	4	0	413	0
1619+00	1	0	100	4	0	417	0
1620+00	1	0	100	4	0	421	0
1621+00	1	0	100	4	0	425	0
1622+00	0	0	100	0	0	425	0
1623+00	1	0	100	4	0	429	0
1624+00	1	0	100	4	0	433	0
1625+00	1	0	100	4	0	437	0
1626+00	1	0	100	4	0	441	0
1627+00	1	0	100	4	0	445	0
1628+00	1	0	100	4	0	449	0
1629+00	1	0	100	4	0	453	0
1630+00	1	0	100	4	0	457	0
1631+00	1	0	100	4	0	461	0
1632+00	1	0	100	4	0	465	0
1633+00	1	0	100	4	0	469	0
1634+00	1	0	100	4	0	473	0
1635+00	1	0	100	4	0	477	0
1636+00	1	0	100	4	0	481	0
1637+00	1	0	100	4	0	485	0
1638+00	1	0	100	4	0	489	0
1639+00	1	0	100	4	0	493	0
1640+00	1	0	100	4	0	497	0
1641+00	1	0	100	4	0	501	0
1642+00	1	0	100	4	0	505	0
1643+00	1	0	100	4	0	509	0
1644+00	1	0	100	4	0	513	0
1645+00	1	0	100	4	0	517	0
1646+00	1	0	100	4	0	521	0
1647+00	0	0	100	0	0	521	0
1648+00	0.5	0	100	2	0	523	0
1649+00	1	0	100	4	0	527	0
1650+00	1	0	100	4	0	531	0
1651+00	1	0	100	4	0	535	0
1652+00	1	0	100	4	0	539	0
1653+00	1	0	100	4	0	543	0
1654+00	1	0	100	4	0	547	0
1655+00	1	0	100	4	0	551	0
1656+00	1	0	100	4	0	555	0
1657+00	1	0	100	4	0	559	0
1658+00	1	0	100	4	0	563	0
1659+00	1	0	100	4	0	567	0
1660+00	1	0	100	4	0	571	0
1661+00	1	0	100	4	0	575	0
1662+00	1	0	100	4	0	579	0
1663+00	0.5	0	100	2	0	581	0
1664+00	0	0	100	0	0	581	0
1665+00	1	0	100	4	0	585	0
1666+00	1	0	100	4	0	589	0
1667+00	1	0	100	4	0	593	0
1668+00	1	0	100	4	0	597	0
1669+00	1	0	100	4	0	601	0
1670+00	1	0	100	4	0	605	0
1671+00	1	0	100	4	0	609	0
1672+00	1	0	100	4	0	613	0
1673+00	0.5	0	100	2	0	615	0
1674+00	0.5	0	100	2	0	617	0
1675+00	1	0	100	4	0	621	0
1676+00	1	0	100	4	0	625	0
1677+00	1	0	100	4	0	629	0

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARK R. RICHARDSON
143771
LICENSED
PROFESSIONAL ENGINEER

03/27/2023

Texas Department of Transportation

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. F-23290
6330 West Loop South, Suite 150 • Bellaire, TX 77401 • 713.777.5337

SUMMARY OF EARTHWORK QUANTITIES SH 18

SHEET 1 OF 2

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	42
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

SUMMARY OF EARTHWORK QUANTITIES

STATION	END AREA		DISTANCE BETWEEN X-S	VOLUME 110 6001	VOLUME 132 6003	CUMULATIVE VOLUME	
	EXCAVATION	EMBANKMENT		EXCAVATION ROADWAY	EMBANKMENT (FINAL) (ORD COMP)	EXCAVATION	EMBANKMENT
	SF	SF	FT	CY	CY	CY	CY
1678+00	1	0	100	4	0	633	0
1679+00	1	0	100	4	0	637	0
1680+00	1	0	100	4	0	641	0
1681+00	1	0	100	4	0	645	0
1682+00	1	0	100	4	0	649	0
1683+00	1	0	100	4	0	653	0
1684+00	1	0	100	4	0	657	0
1685+00	1	0	100	4	0	661	0
1686+00	1	0	100	4	0	665	0
1687+00	1	0	100	4	0	669	0
1688+00	0	0	100	0	0	669	0
1689+00	1	0	100	4	0	673	0
1690+00	1	0	100	4	0	677	0
1691+00	1	0	100	4	0	681	0
1692+00	1	0	100	4	0	685	0
1693+00	1	0	100	4	0	689	0
1694+00	1	0	100	4	0	693	0
1695+00	1	0	100	4	0	697	0
1696+00	1	0	100	4	0	701	0
1697+00	1	0	100	4	0	705	0
1698+00	1	0	100	4	0	709	0
1699+00	1	0	100	4	0	713	0
1700+00	1	0	100	4	0	717	0
1701+00	1	0	100	4	0	721	0
1702+00	1	0	100	4	0	725	0
1703+00	1	0	100	4	0	729	0
1704+00	1	0	100	4	0	733	0
1705+00	1	0	100	4	0	737	0
1706+00	1	0	100	4	0	741	0
1707+00	1	0	100	4	0	745	0
1708+00	1	0	100	4	0	749	0
1709+00	1	0	100	4	0	753	0
1710+00	1	0	100	4	0	757	0
1711+00	1	0	100	4	0	761	0
1712+00	1	0	100	4	0	765	0
1713+00	1	0	100	4	0	769	0
1714+00	0	0	100	0	0	769	0
1715+00	1	0	100	4	0	773	0
1716+00	1	0	100	4	0	777	0
1717+00	1	0	100	4	0	781	0
1718+00	1	0	100	4	0	785	0
1719+00	1	0	100	4	0	789	0
1720+00	1	0	100	4	0	793	0
1721+00	1	0	100	4	0	797	0
1722+00	1	0	100	4	0	801	0
1723+00	1	0	100	4	0	805	0
1724+00	1	0	100	4	0	809	0
1725+00	1	0	100	4	0	813	0
1726+00	1	0	100	4	0	817	0
1727+00	1	0	100	4	0	821	0
1728+00	1	0	100	4	0	825	0
1729+00	1	0	100	4	0	829	0
1730+00	1	0	100	4	0	833	0
1731+00	1	0	100	4	0	837	0
1732+00	1	0	100	4	0	841	0
1733+00	1	0	100	4	0	845	0
1734+00	0.5	0	100	2	0	847	0
1735+00	0.25	0	100	1	0	848	0
1736+00	1	0	100	4	0	852	0
1737+00	1	0	100	4	0	856	0
1738+00	1	0	100	4	0	860	0
1739+00	1	0	100	4	0	864	0
1740+00	1	0	100	4	0	868	0
1741+00	1	0	100	4	0	872	0
1742+00	1	0	100	4	0	876	0
1743+00	1	0	100	4	0	880	0
1744+00	1	0	100	4	0	884	0
1745+00	1	0	100	4	0	888	0
1746+00	1	0	100	4	0	892	0
1747+00	1	0	100	4	0	896	0
1748+00	0.5	0	100	2	0	898	0
1749+00	0	0	100	0	0	898	0

SH 18 TOTAL VOLUME	
110	132
6001	6003
EXCAVATION ROADWAY	EMBANKMENT (FINAL) (ORD COMP)
CY	CY
898	0

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARK R. RICHARDSON
143771
LICENSED
PROFESSIONAL ENGINEER

03/27/2023

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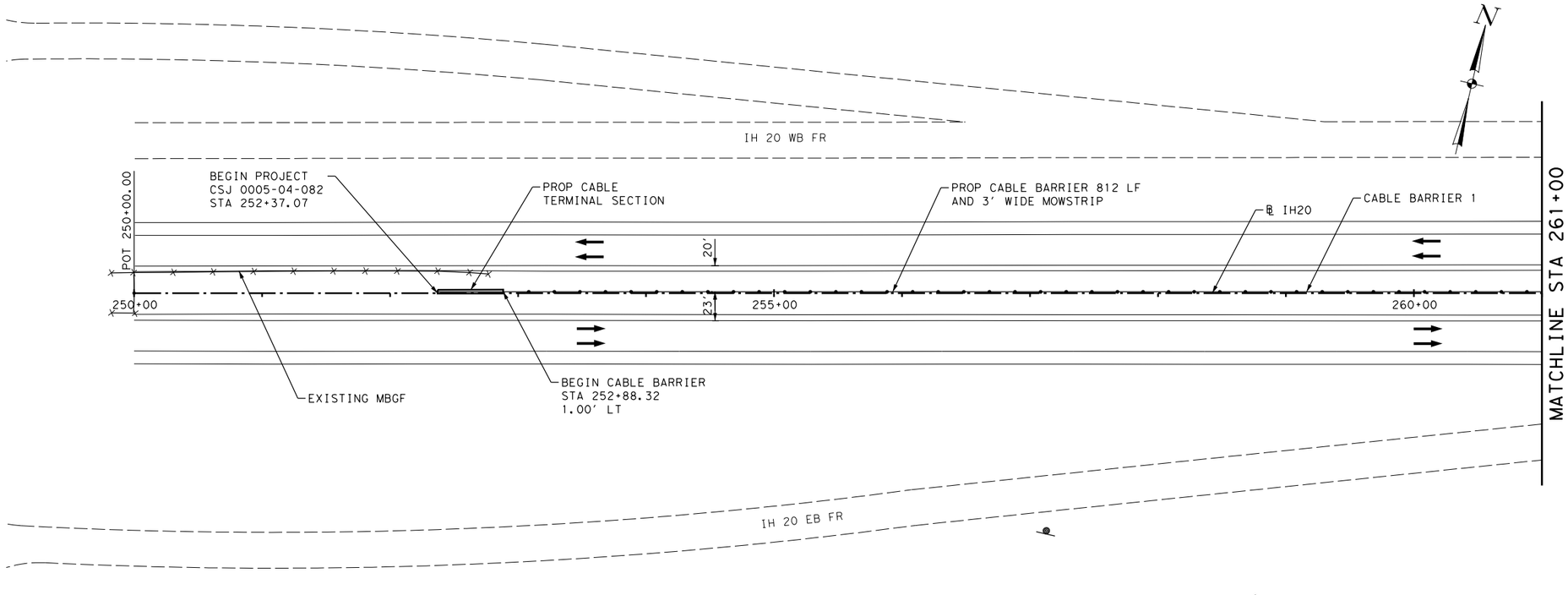
SUMMARY OF EARTHWORK QUANTITIES SH 18

SHEET 2 OF 2

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	43
APPROVED	CONT.	SECT.	JOB	
	005	04	082	



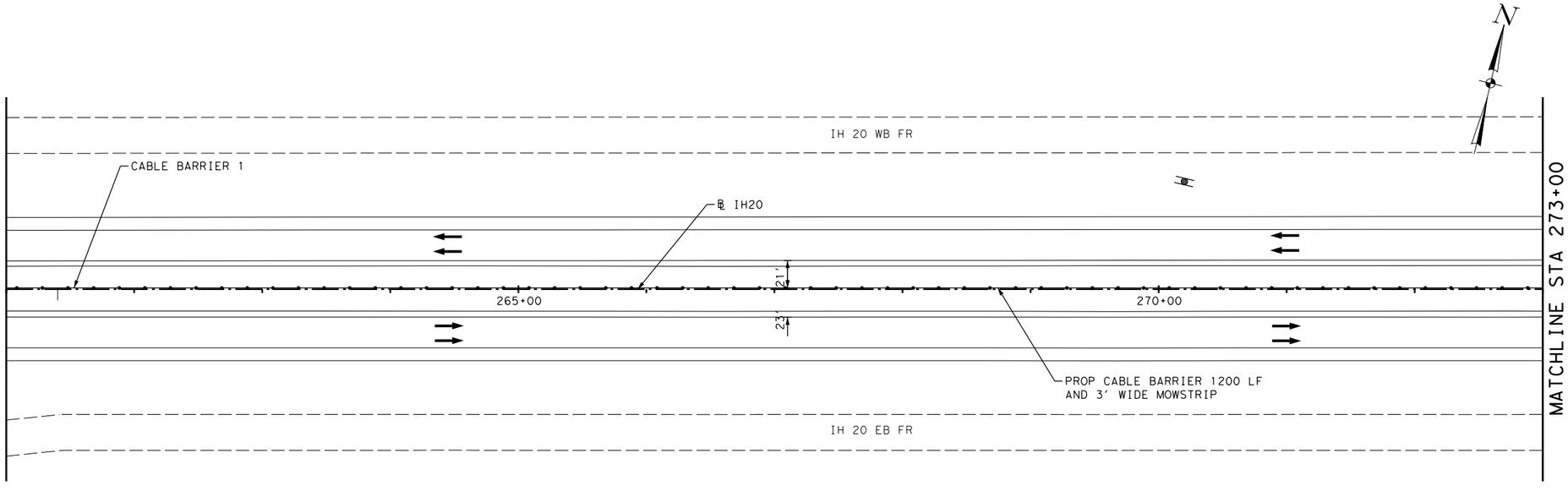
LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
3. ADJUST POST SPACING AND RIPRAP LIMITS AS NECESSARY AVOIDING DRAINAGE FEATURES, SIGNS, AND OTHER FEATURES. REVIEW ADJUSTMENTS WITH THE ENGINEER.

0' 25' 50' 100'
SCALE: 1"=100'



NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARK R. RICHARDSON
143771
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PROFESSIONAL ENGINEER

03/27/2023

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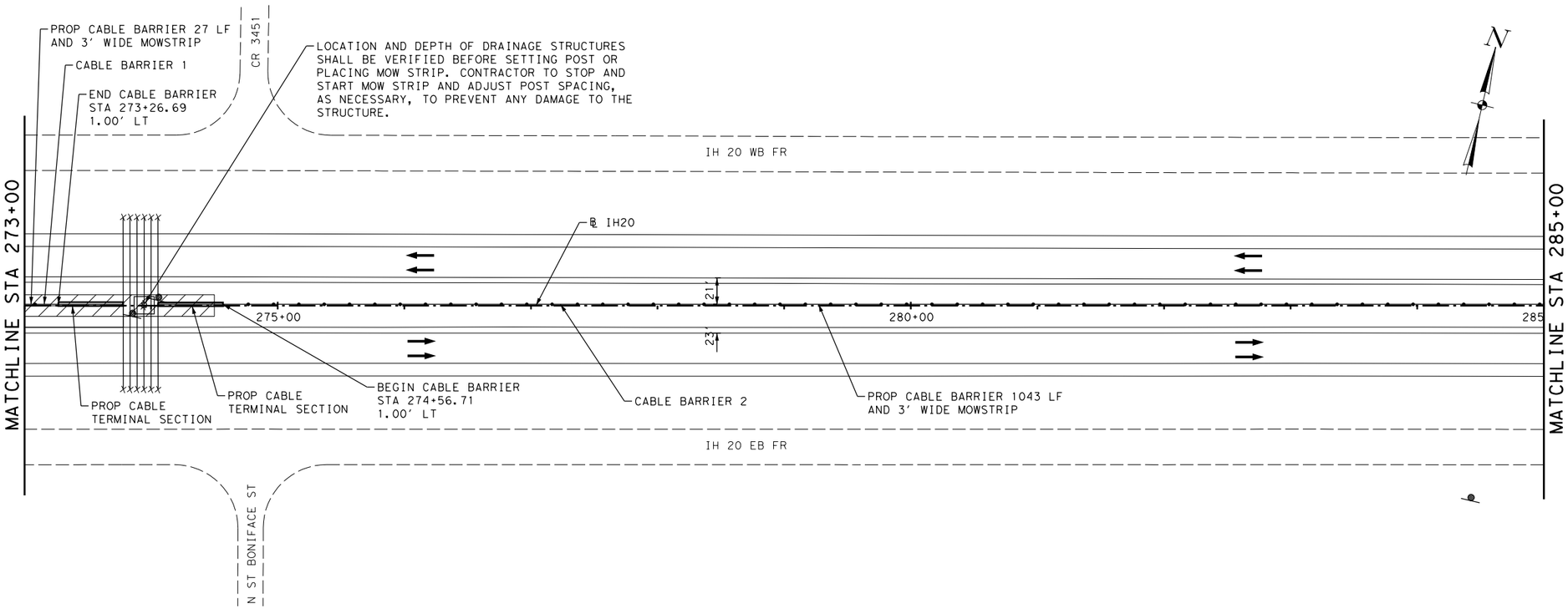
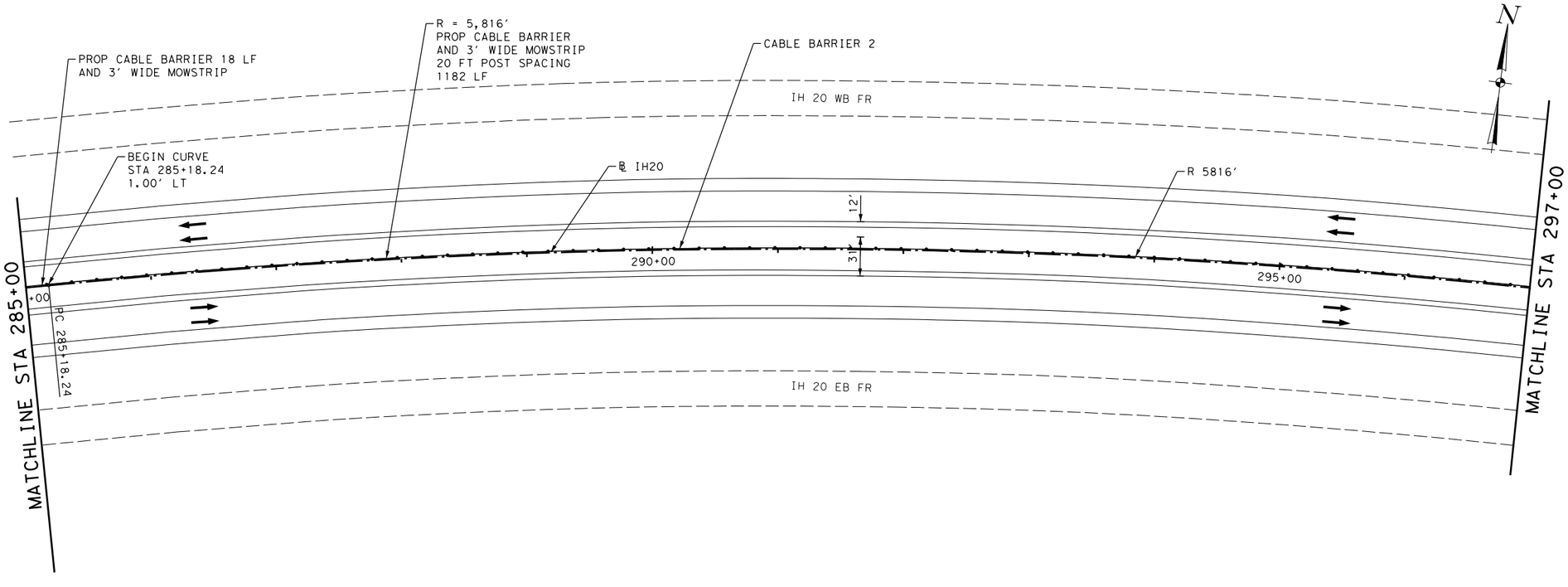
IH 20
PROPOSED PLAN
STA 249+00 TO STA 273+00

SHEET 1 OF 6

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	44
	005	04	082	





LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
3. ADJUST POST SPACING AND RIPRAP LIMITS AS NECESSARY AVOIDING DRAINAGE FEATURES, SIGNS, AND OTHER FEATURES. REVIEW ADJUSTMENTS WITH THE ENGINEER.

0' 25' 50' 100'
SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARK R. RICHARDSON
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03/27/2023

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IH 20
PROPOSED PLAN
STA 273+00 TO STA 297+00

SHEET 2 OF 6

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	45
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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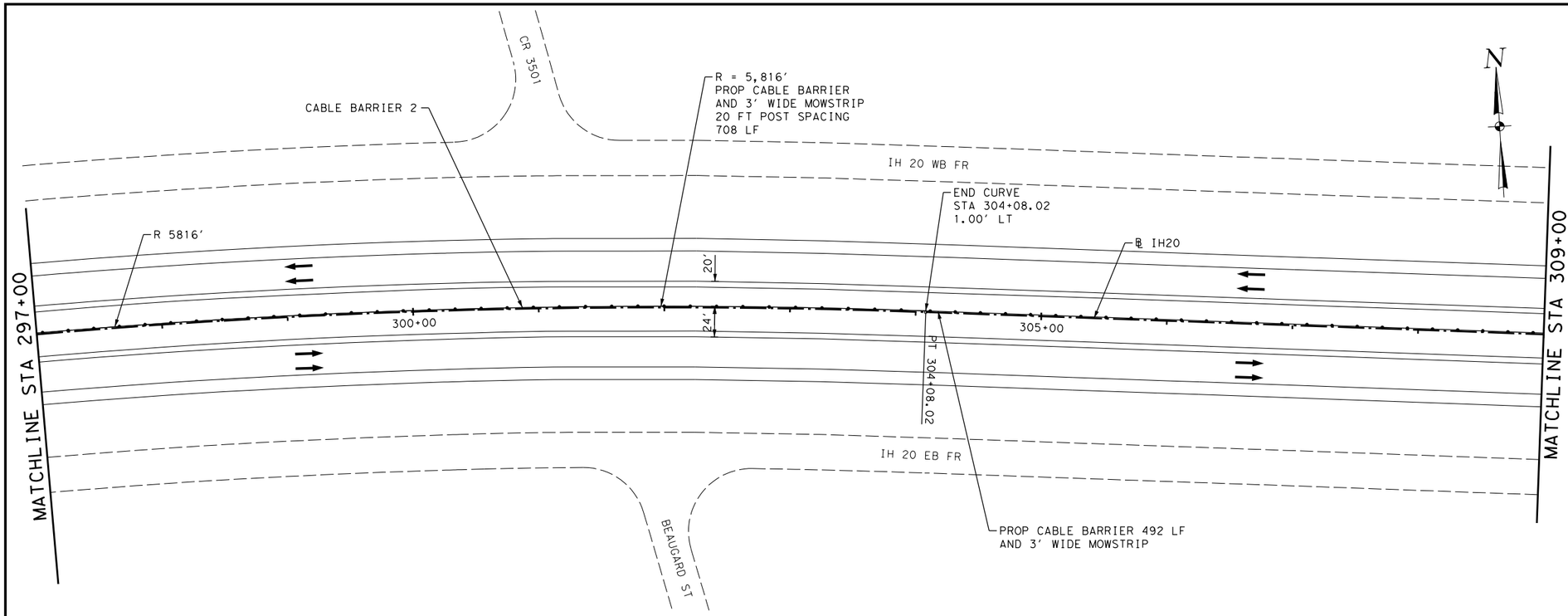

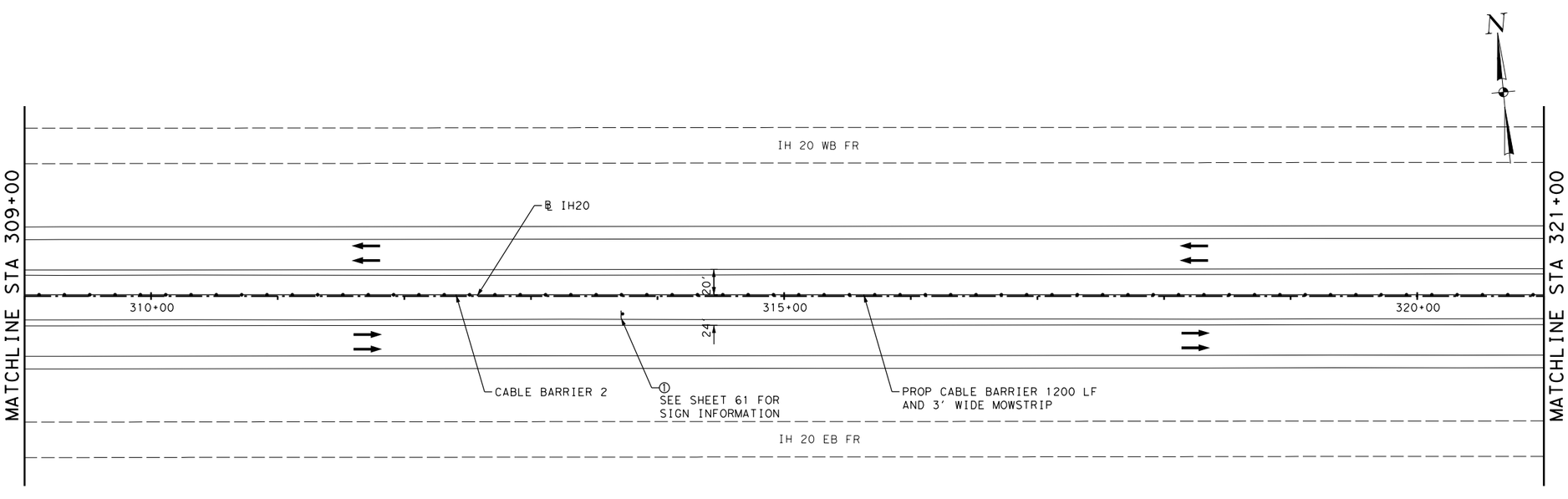

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
3. ADJUST POST SPACING AND RIPRAP LIMITS AS NECESSARY AVOIDING DRAINAGE FEATURES, SIGNS, AND OTHER FEATURES. REVIEW ADJUSTMENTS WITH THE ENGINEER.

0' 25' 50' 100'
SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARK R. RICHARDSON
143771
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03/27/2023

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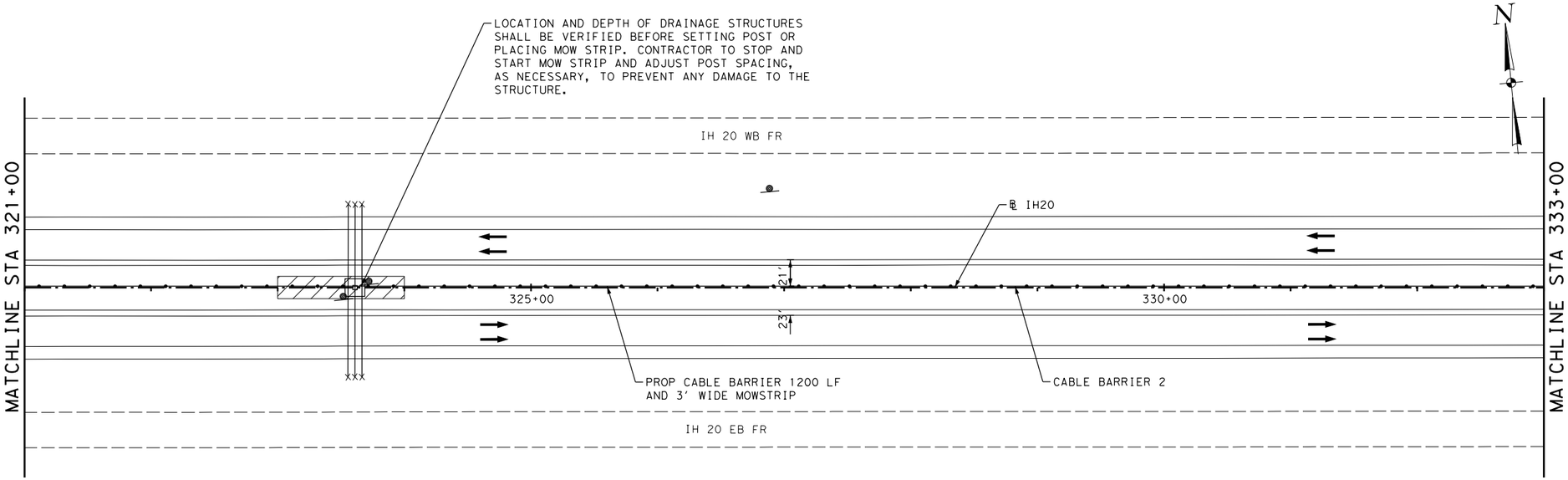
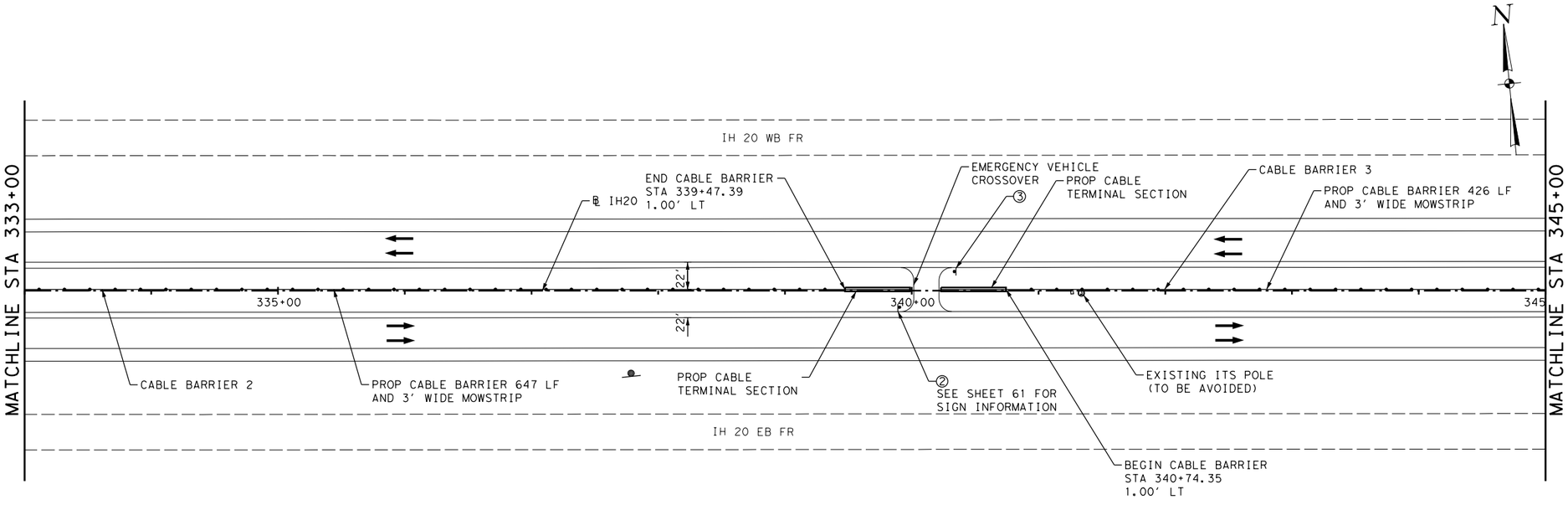
IH 20
PROPOSED PLAN
STA 297+00 TO STA 321+00

SHEET 3 OF 6

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	46
APPROVED	CONT.	SECT.	JOB	
	005	04	082	





LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
3. ADJUST POST SPACING AND RIPRAP LIMITS AS NECESSARY AVOIDING DRAINAGE FEATURES, SIGNS, AND OTHER FEATURES. REVIEW ADJUSTMENTS WITH THE ENGINEER.

0' 25' 50' 100'
SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

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IH 20
PROPOSED PLAN
STA 321+00 TO STA 345+00

SHEET 4 OF 6

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	47
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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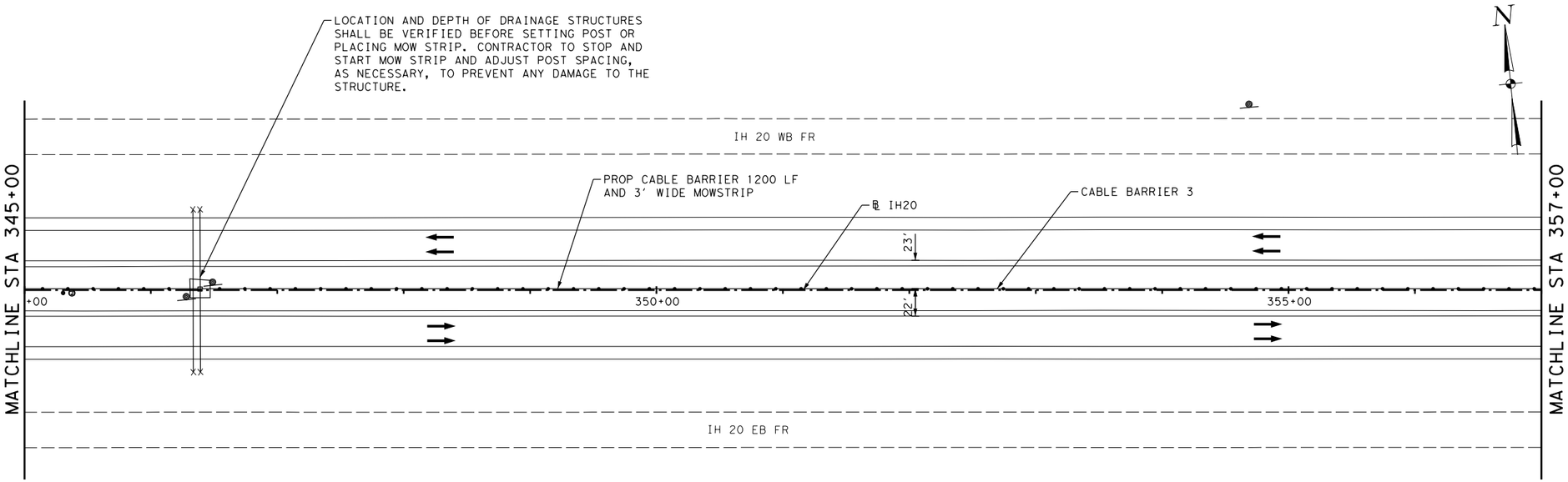

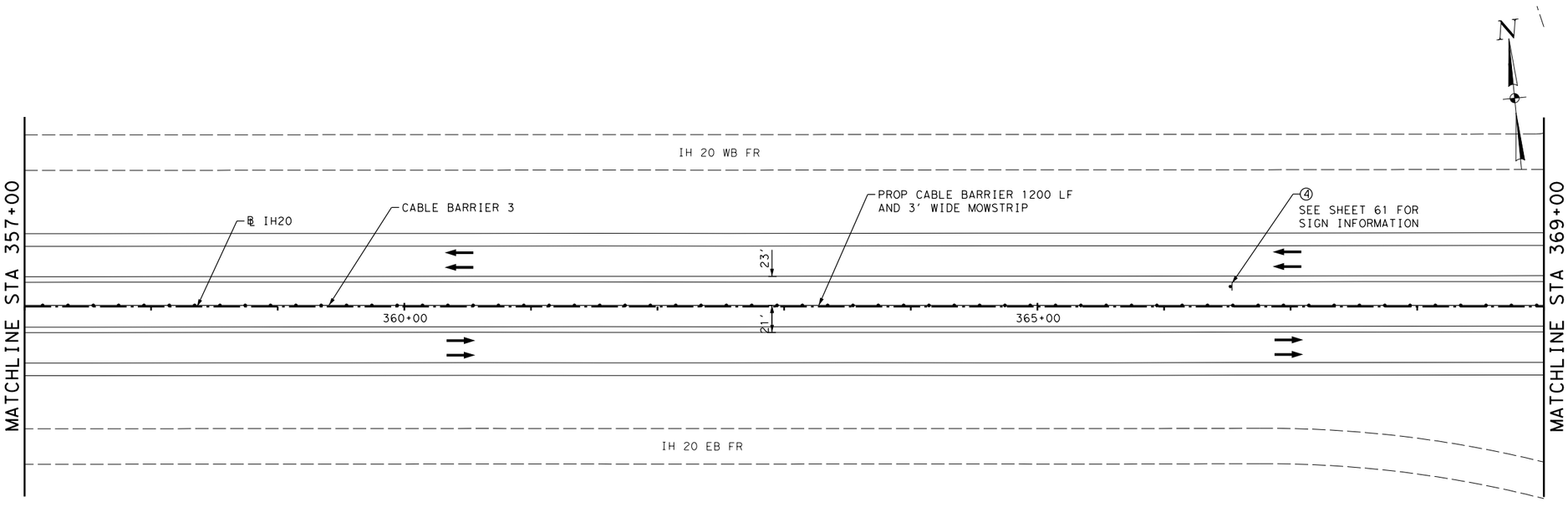

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
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NO.	DATE	REVISION	APPROVED

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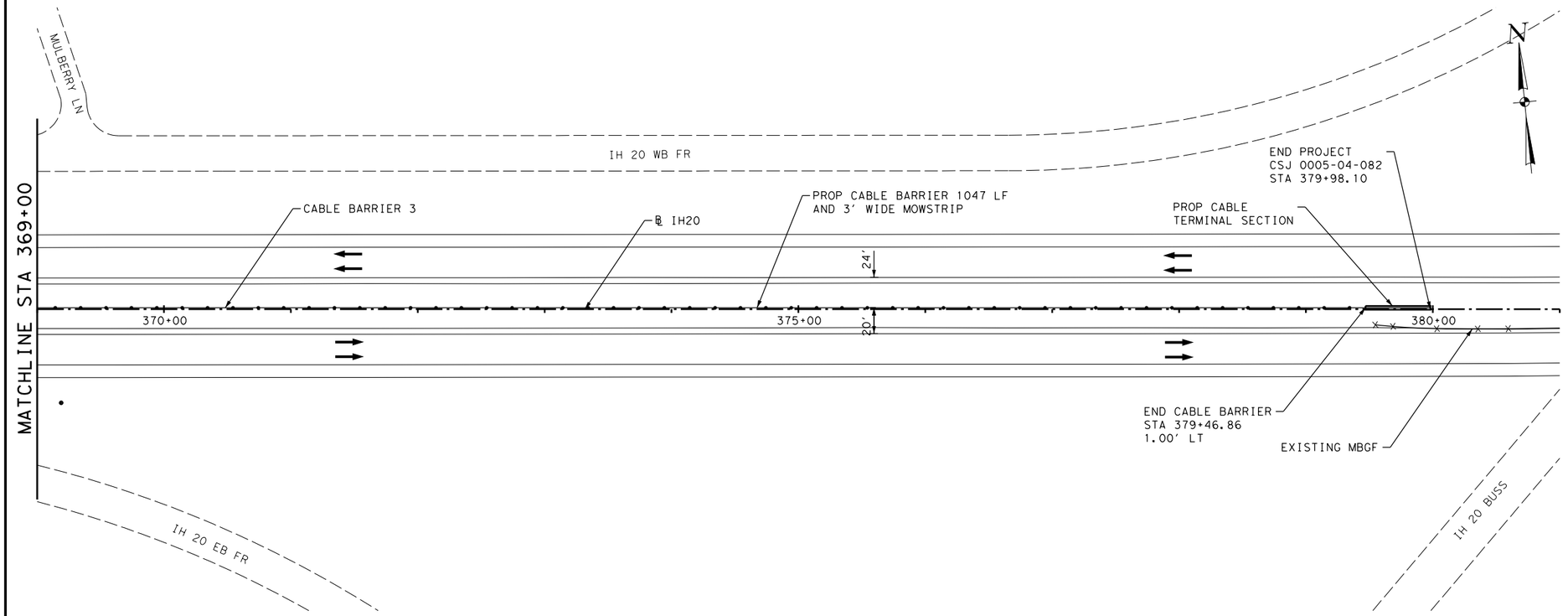
IH 20
PROPOSED PLAN
STA 345+00 TO STA 369+00

SHEET 5 OF 6

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	48
APPROVED	CONT.	SECT.	JOB	
	005	04	082	



LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
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IH 20
PROPOSED PLAN
STA 345+00 TO END

SHEET 6 OF 6

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
CHECKED	STATE	DIST.	COUNTY	SHEET NO.
APPROVED	TEXAS	ODA	MARTIN, ETC	49
	CONT.	SECT.	JOB	
	005	04	082	

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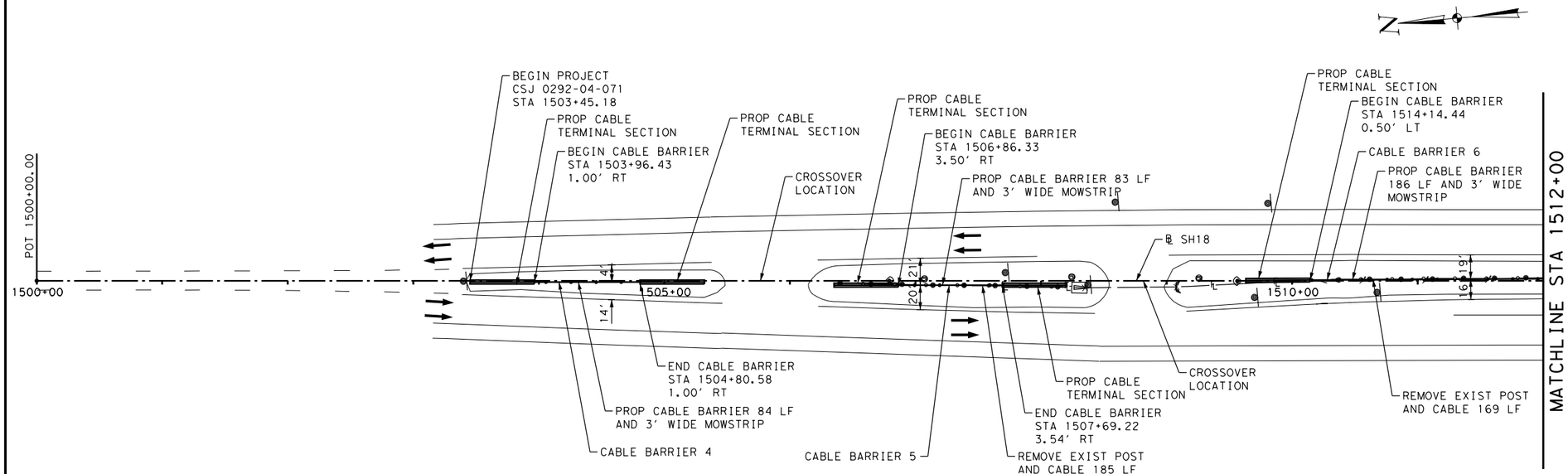

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
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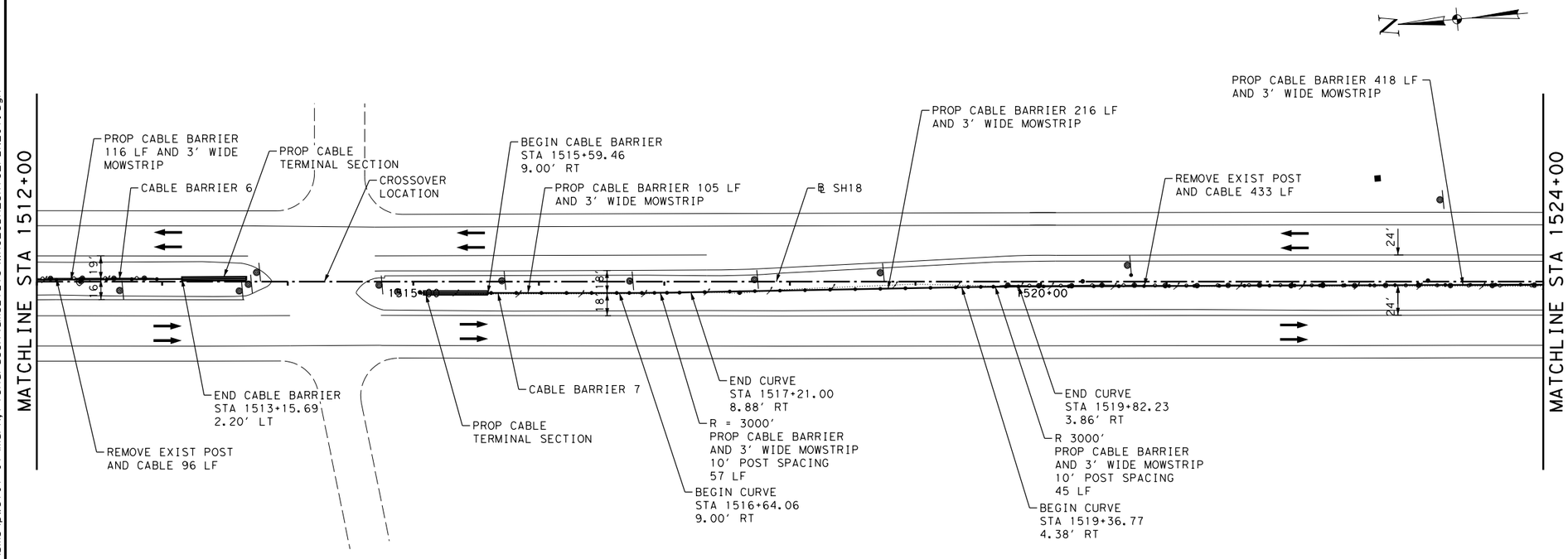
0' 25' 50' 100'
SCALE: 1"=100'



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SH 18
PROPOSED PLAN
BEGIN TO STA 1524+00

SHEET 1 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	50
	005	04	082	

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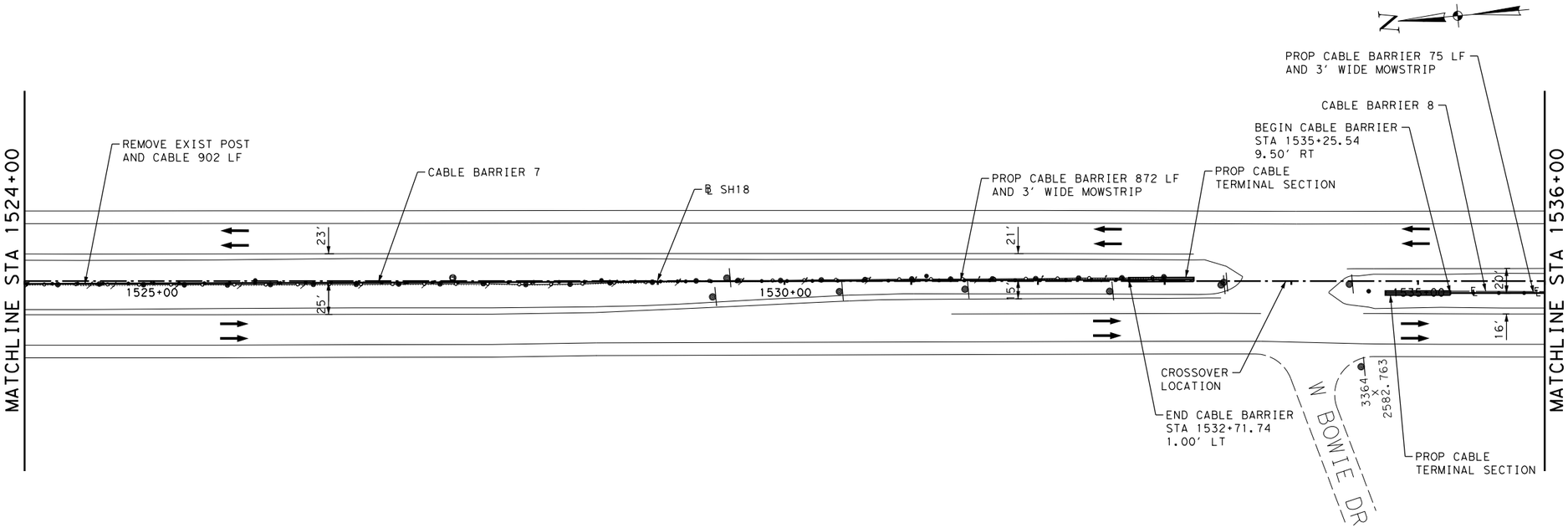

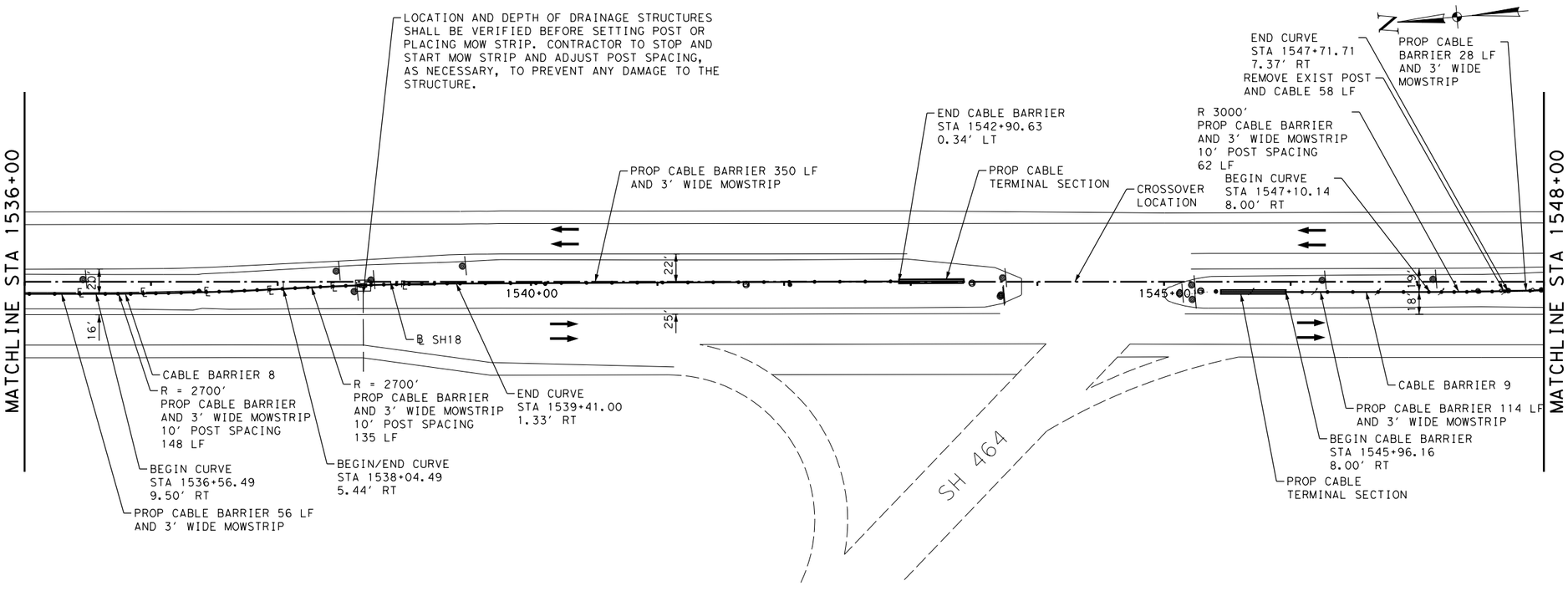

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
3. ADJUST POST SPACING AND RIPRAP LIMITS AS NECESSARY AVOIDING DRAINAGE FEATURES, SIGNS, AND OTHER FEATURES. REVIEW ADJUSTMENTS WITH THE ENGINEER.

0' 25' 50' 100'
SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

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SH 18
PROPOSED PLAN
STA 1524+00 TO STA 1548+00

SHEET 2 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	51
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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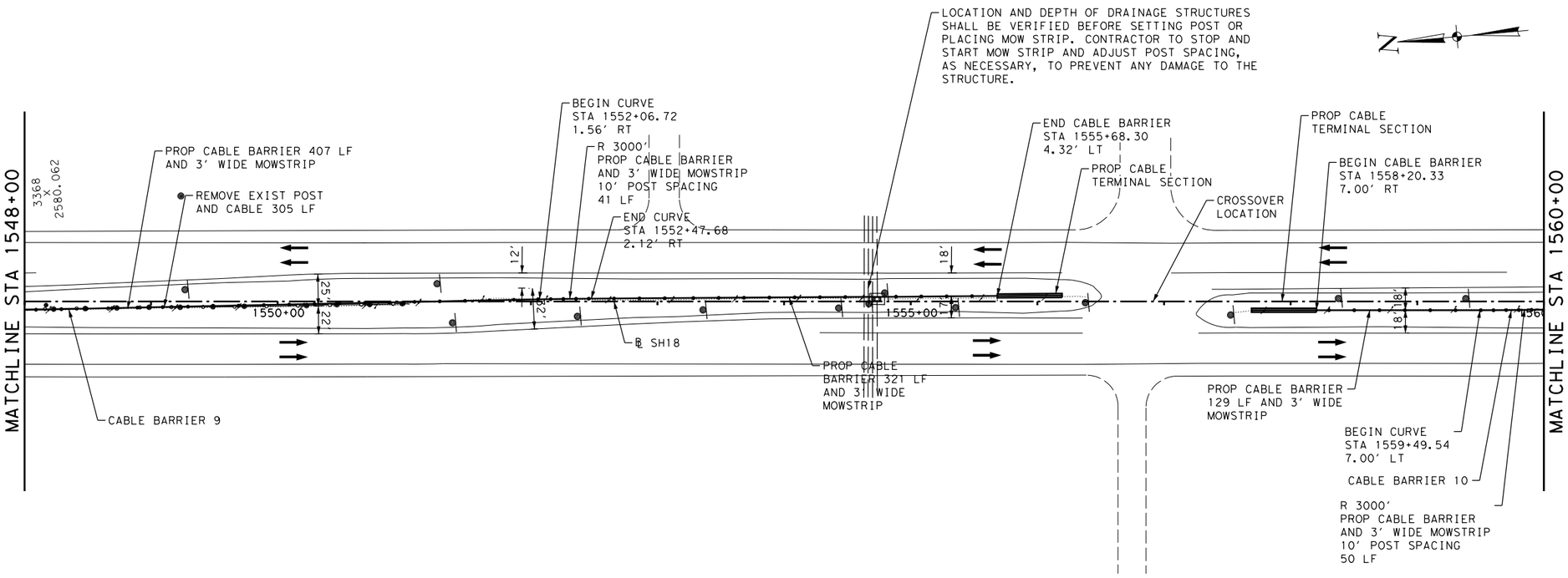

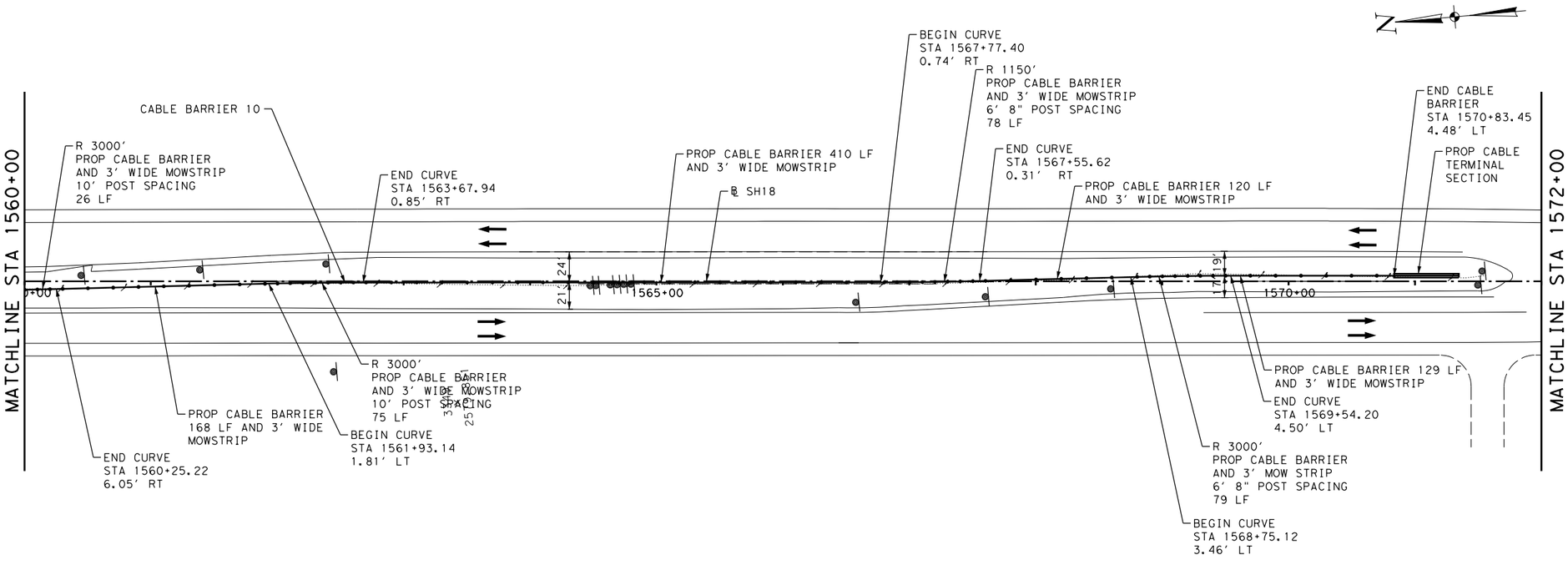

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
3. ADJUST POST SPACING AND RIPRAP LIMITS AS NECESSARY AVOIDING DRAINAGE FEATURES, SIGNS, AND OTHER FEATURES. REVIEW ADJUSTMENTS WITH THE ENGINEER.

0' 25' 50' 100'
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NO.	DATE	REVISION	APPROVED

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SH 18
PROPOSED PLAN
STA 1548+00 TO STA 1572+00

SHEET 3 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
CHECKED	STATE	DIST.	COUNTY	SHEET NO.
	TEXAS	ODA	MARTIN, ETC	52
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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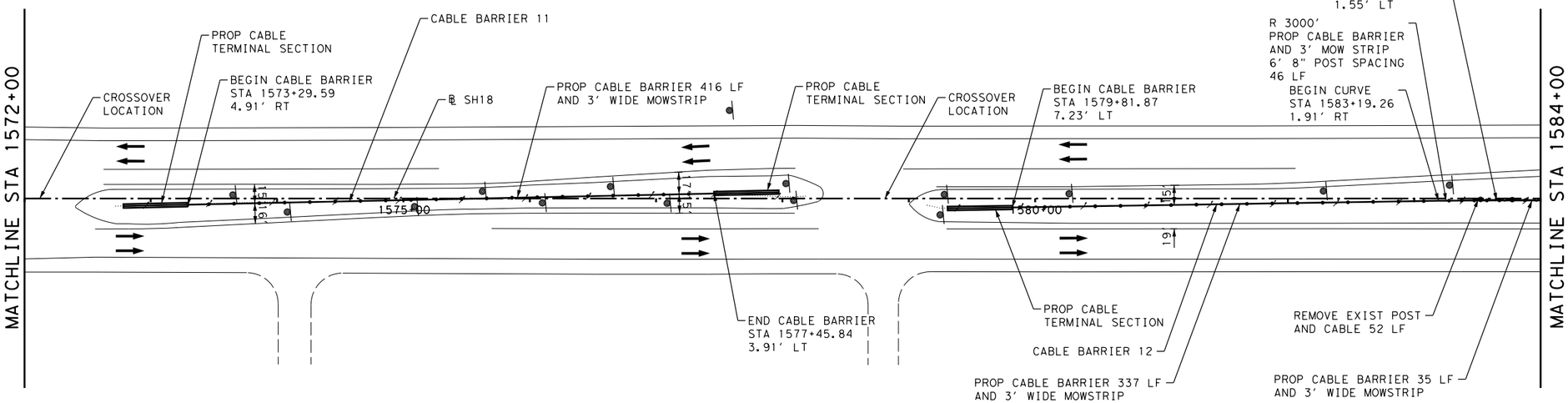

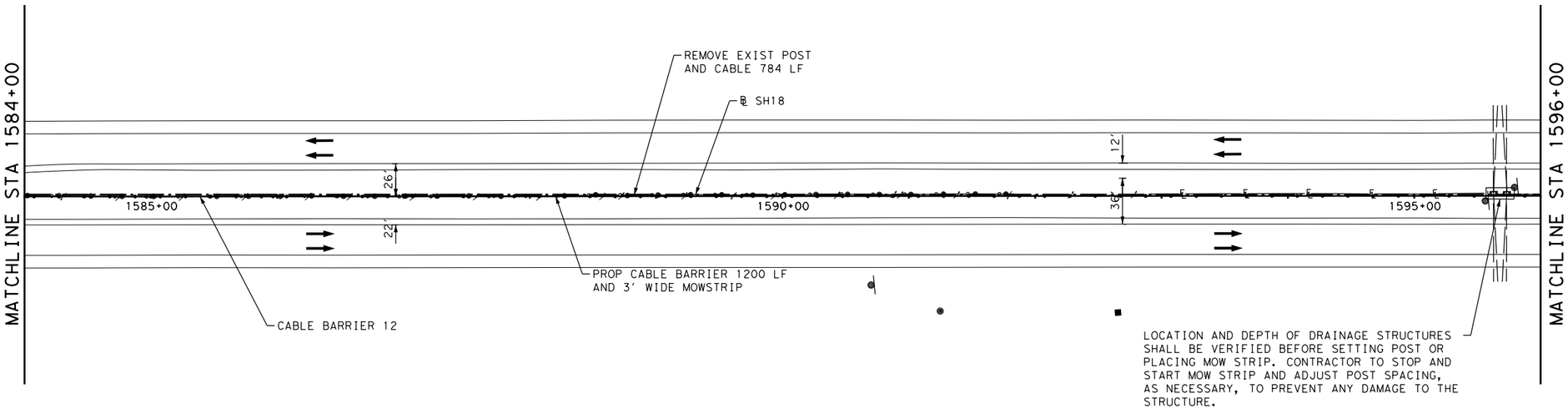

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
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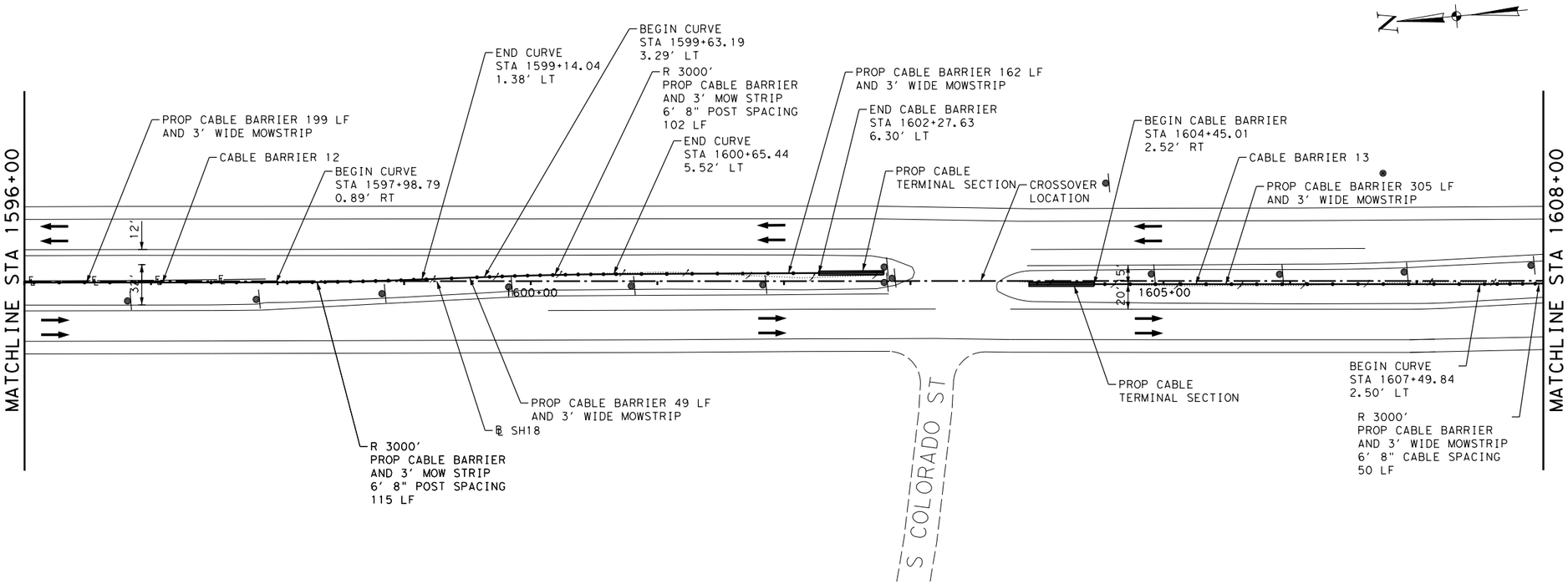
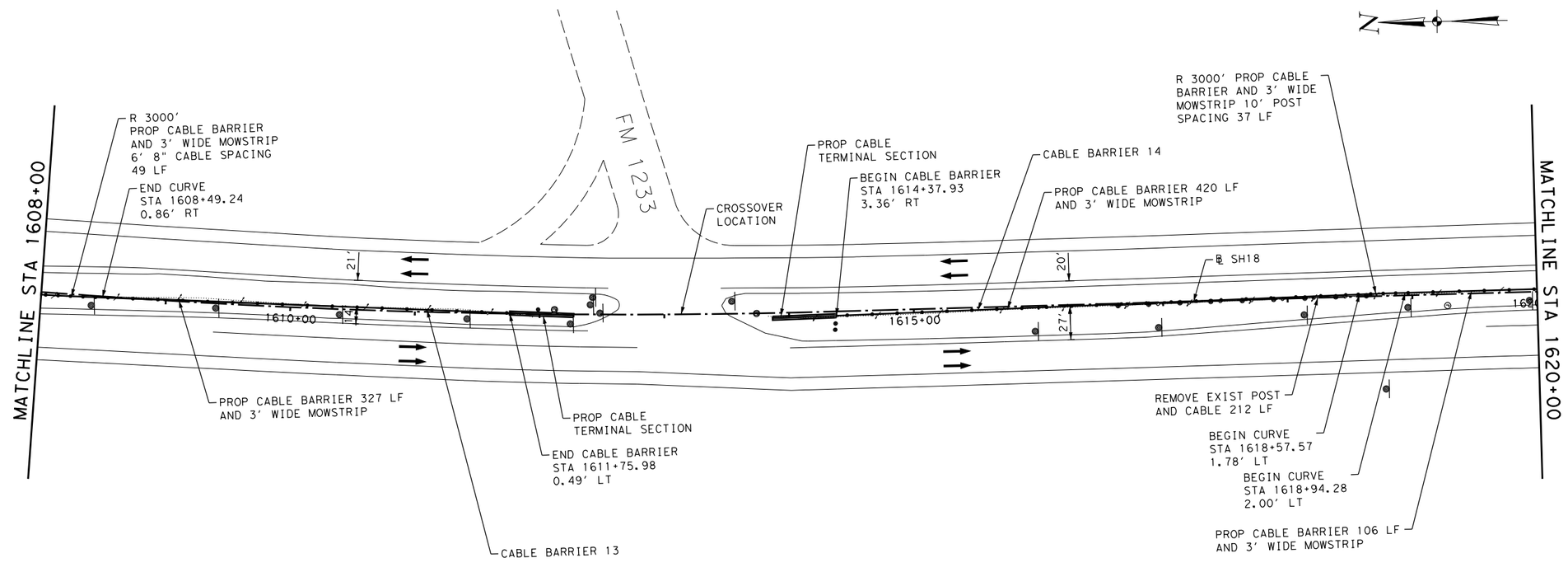
SH 18
PROPOSED PLAN
STA 1572+00 TO STA 1596+00

SHEET 4 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	53
APPROVED	CONT.	SECT.	JOB	
	005	04	082	





LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
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SH 18
PROPOSED PLAN
STA 1596+00 TO STA 1620+00

SHEET 5 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	54
	005	04	082	

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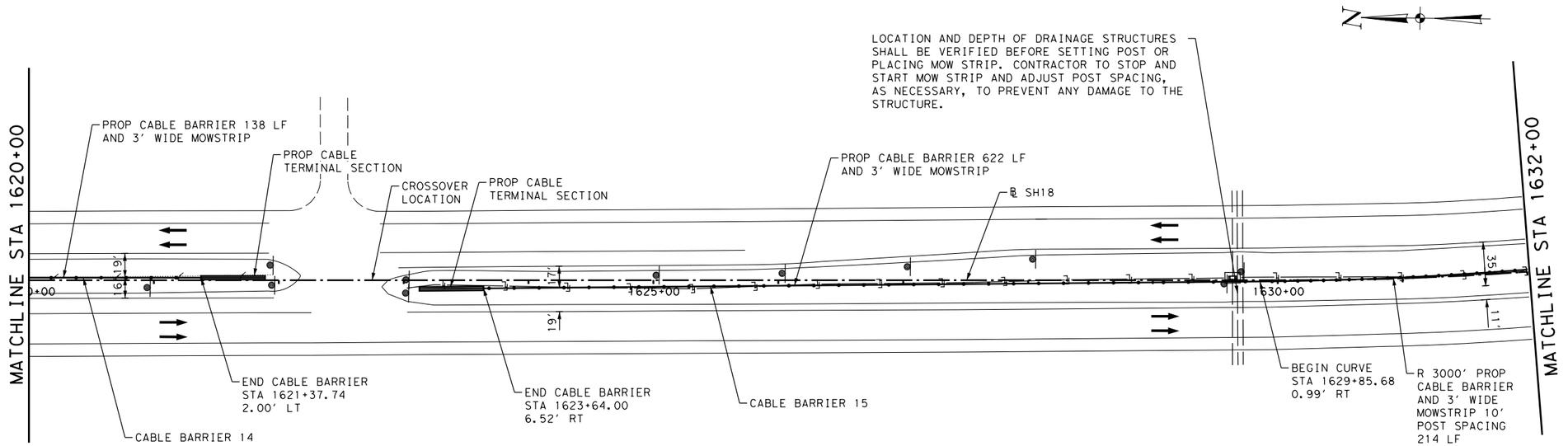

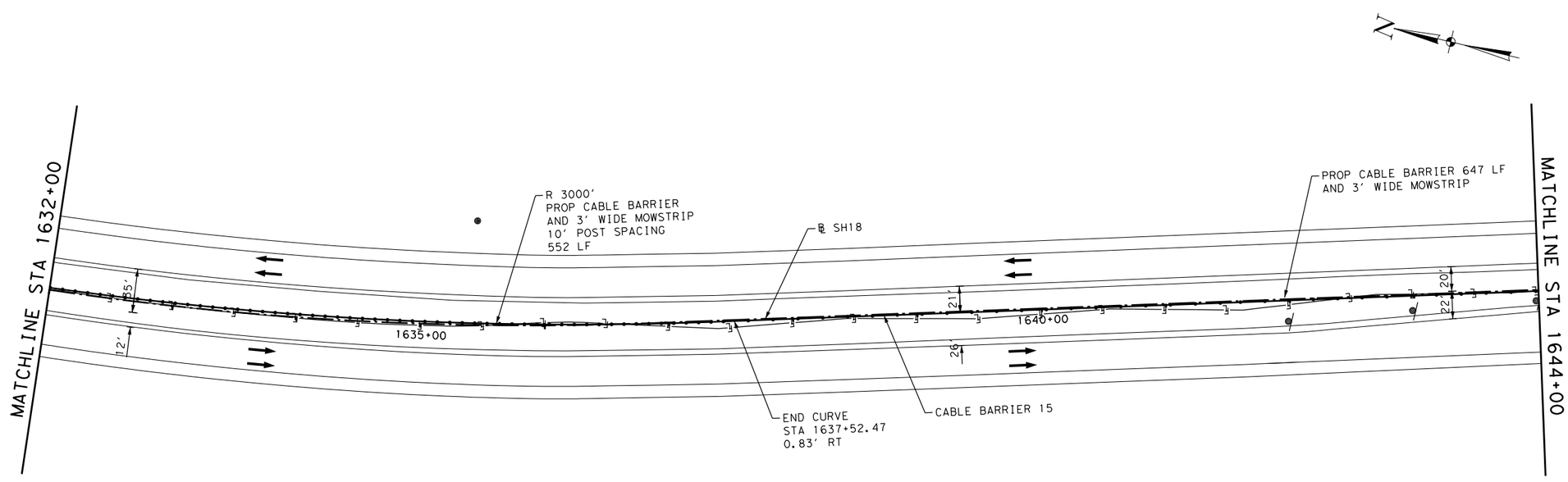

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
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SH 18
PROPOSED PLAN
STA 1620+00 TO STA 1644+00

SHEET 6 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	55
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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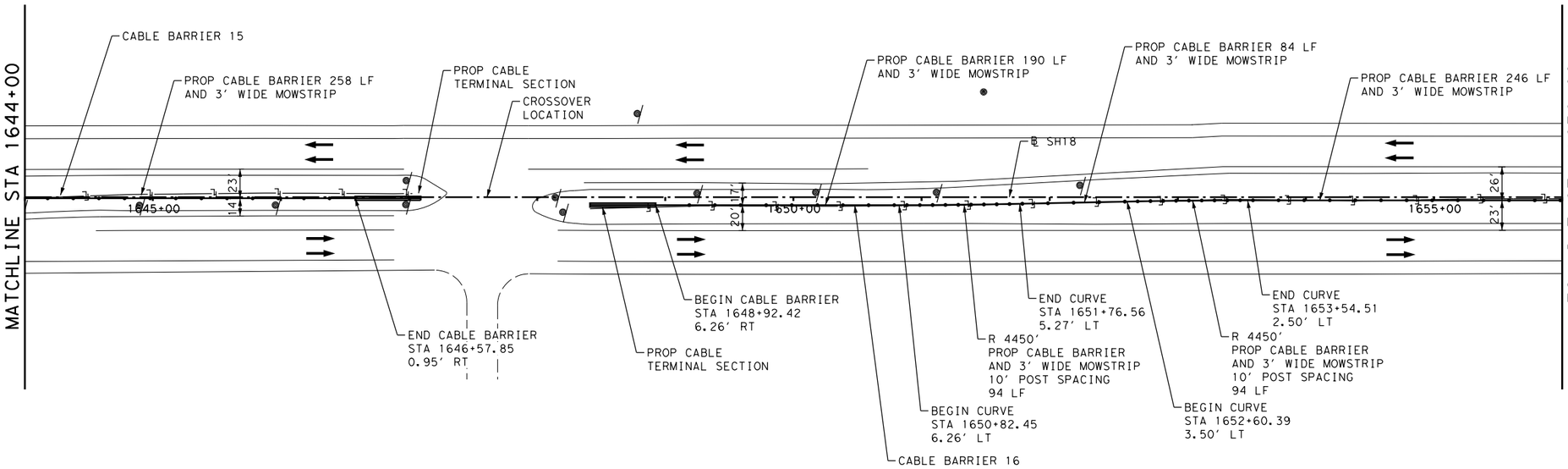

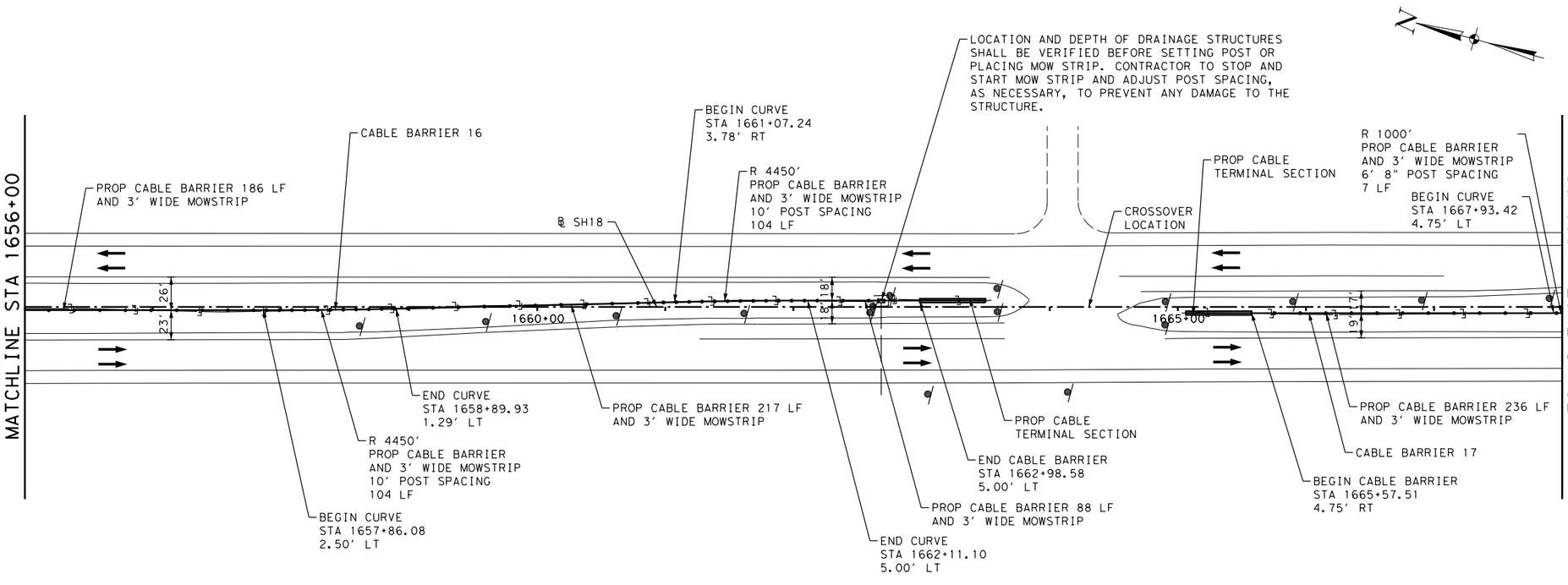

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
3. ADJUST POST SPACING AND RIPRAP LIMITS AS NECESSARY AVOIDING DRAINAGE FEATURES, SIGNS, AND OTHER FEATURES. REVIEW ADJUSTMENTS WITH THE ENGINEER.

0' 25' 50' 100'
SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARK R. RICHARDSON
143771
LICENSED
PROFESSIONAL ENGINEER
03/27/2023

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SH 18
PROPOSED PLAN
STA 1644+00 TO STA 1668+00

SHEET 7 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	56
	005	04	082	

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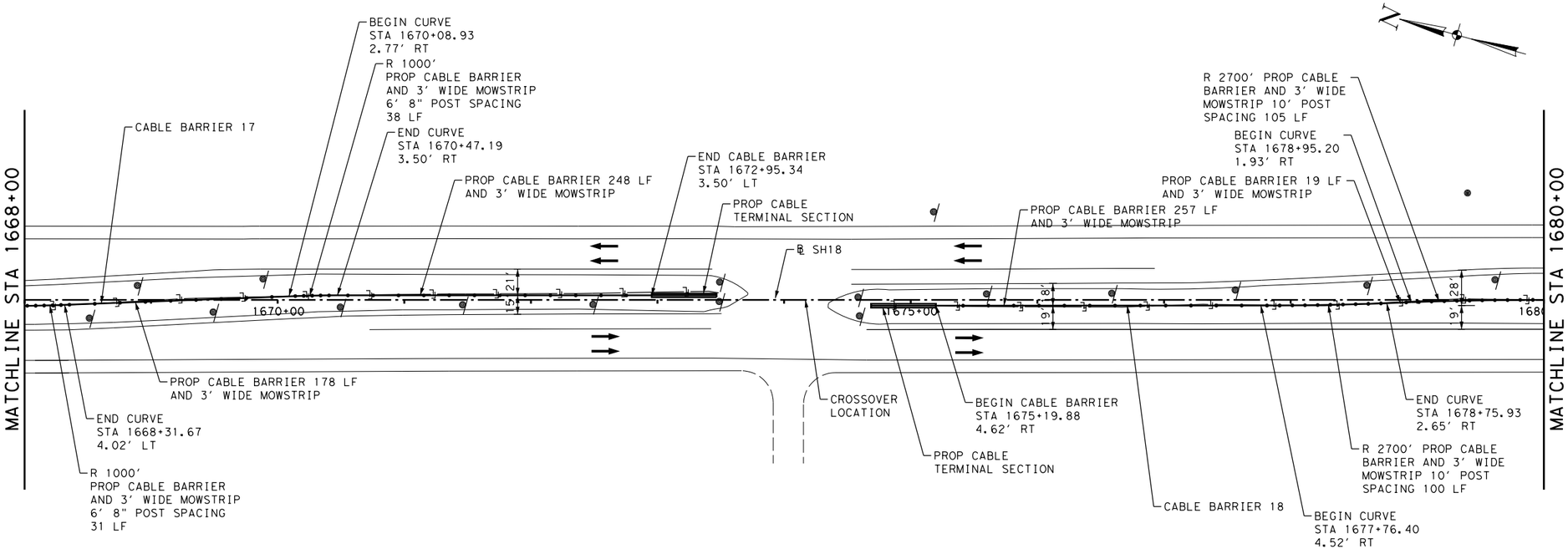

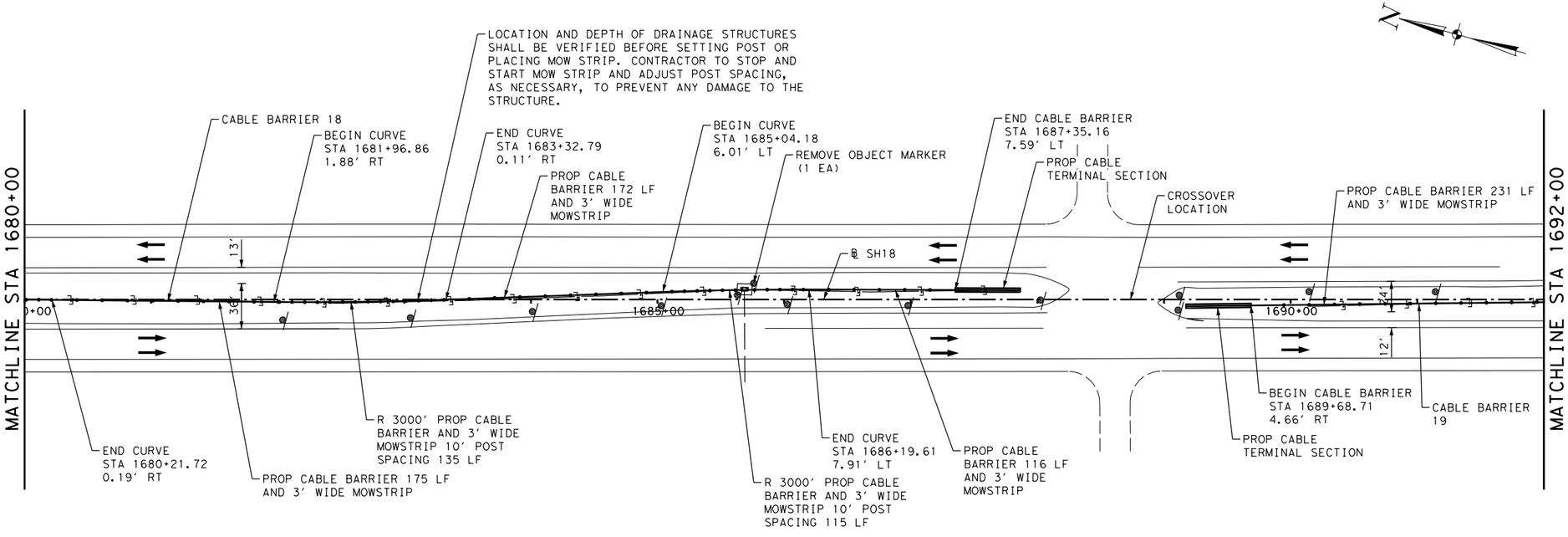

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

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SCALE: 1"=100'

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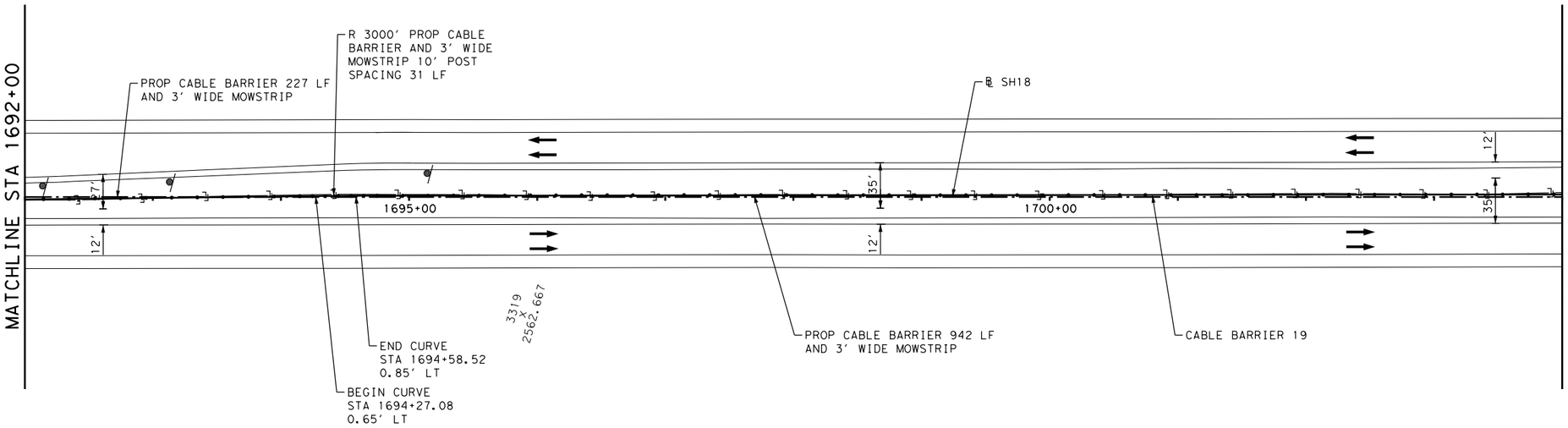
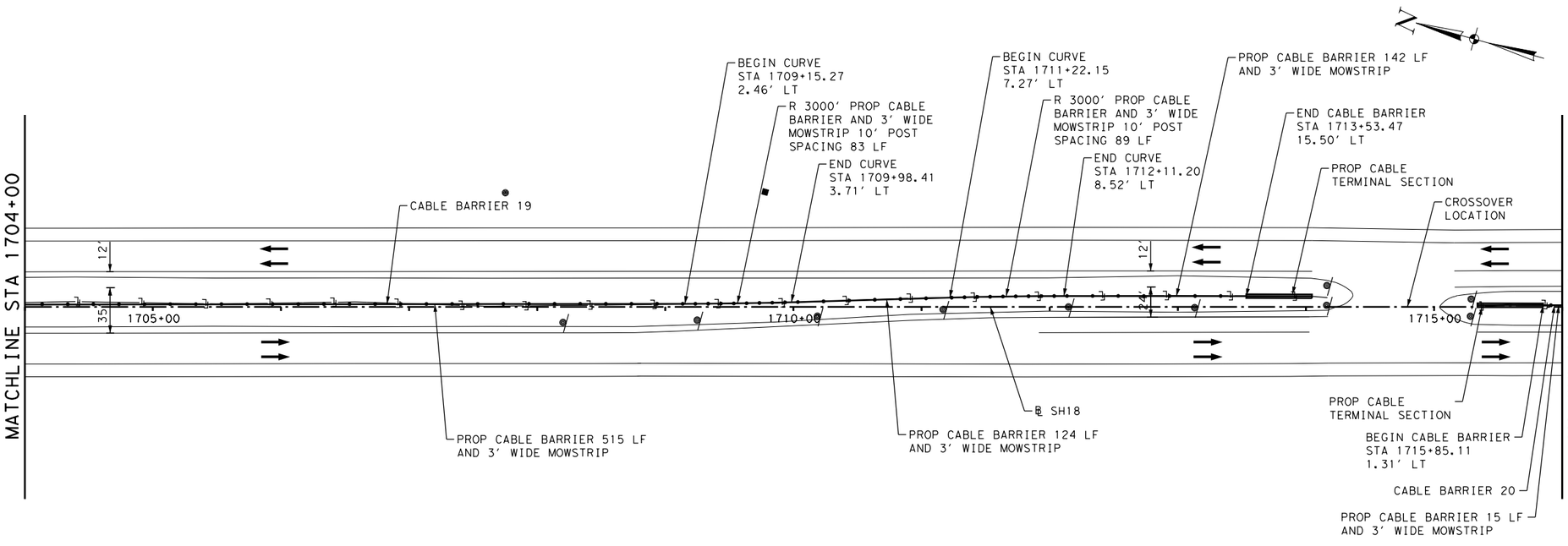
SH 18
PROPOSED PLAN
STA 1668+00 TO STA 1692+00

SHEET 8 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	57
	005	04	082	





LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

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0' 25' 50' 100'
SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

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SH 18
PROPOSED PLAN
STA 1692+00 TO STA 1716+00

SHEET 9 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	58
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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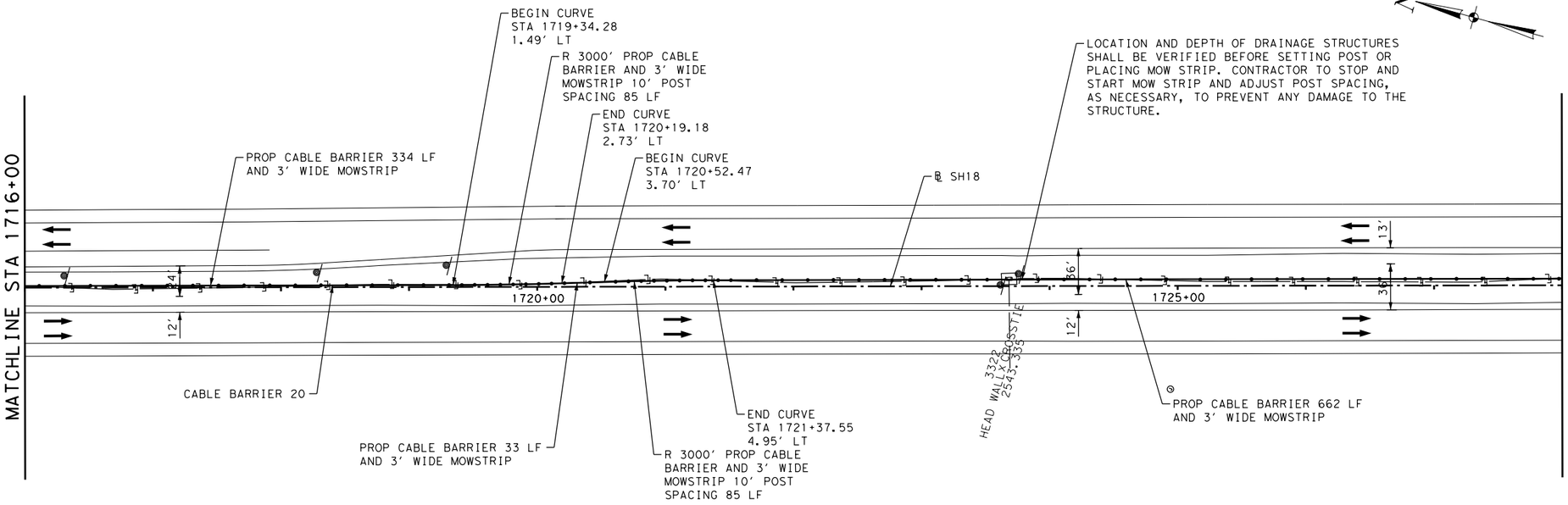

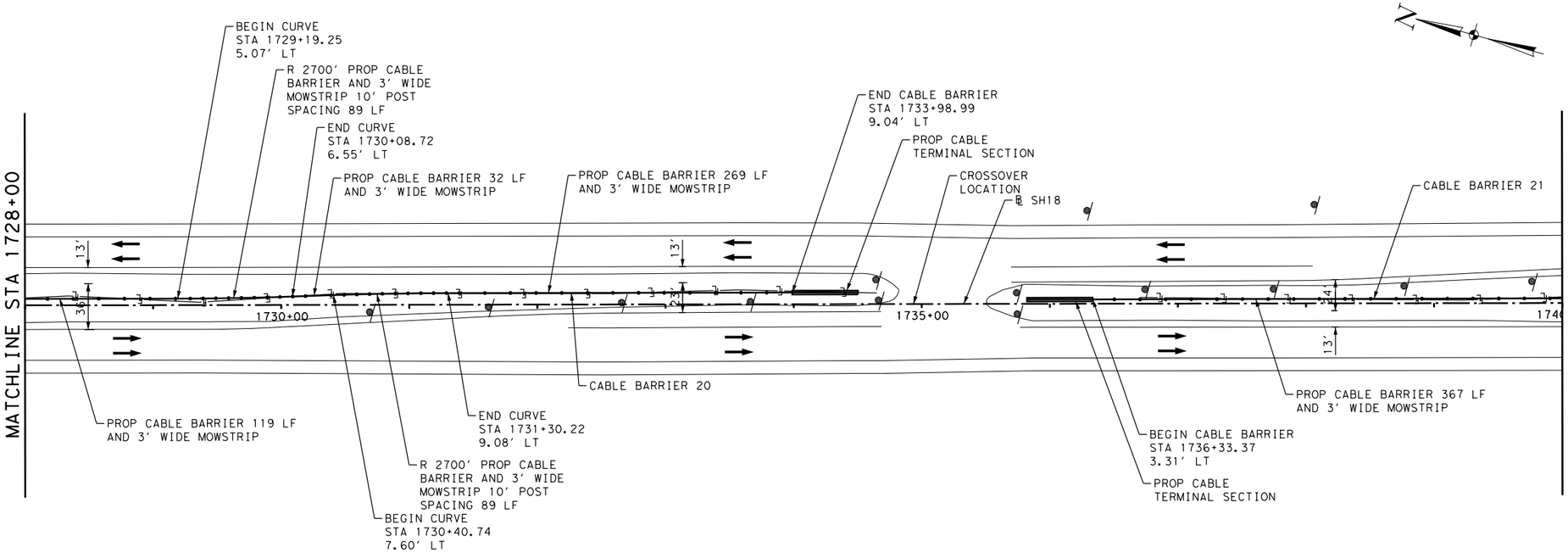

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

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SCALE: 1"=100'

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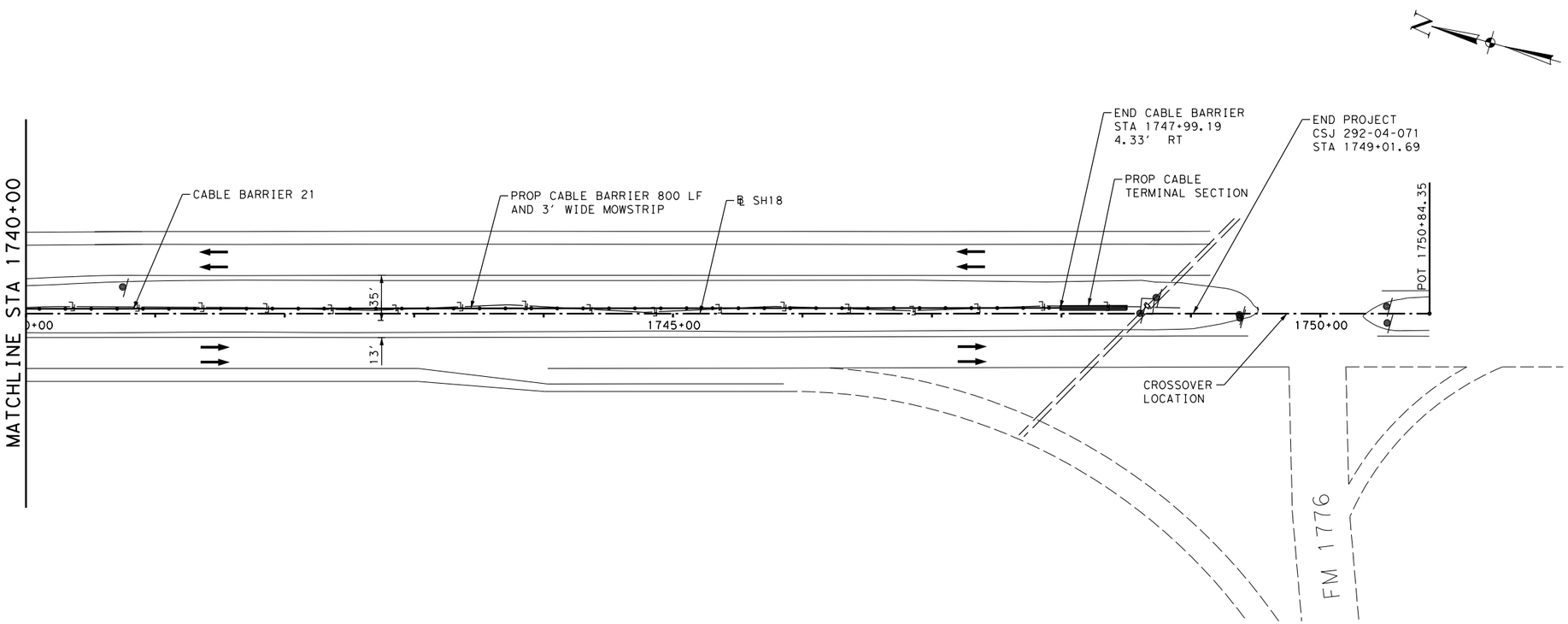
SH 18
PROPOSED PLAN
STA 1716+00 TO STA 1740+00

SHEET 10 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	59
	005	04	082	



LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
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0' 25' 50' 100'
SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

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SH 18
PROPOSED PLAN
STA 1740+00 TO END

SHEET 11 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	60
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
46	1	R5-11†	FOR OFFICIAL OR EMERGENCY VEHICLE USE ONLY	30x30	X		10BWG	1	SA	T		
		W16-3aTP(1)	1/2 MILE	30X12	X							
47	2	R5-11†	FOR OFFICIAL OR EMERGENCY VEHICLE USE ONLY	30x30	X		10BWG	1	SA	T		
47	3	R5-11†	FOR OFFICIAL OR EMERGENCY VEHICLE USE ONLY	30x30	X		10BWG	1	SA	T		
48	4	R5-11†	FOR OFFICIAL OR EMERGENCY VEHICLE USE ONLY	30x30	X		10BWG	1	SA	T		
		W16-3aTP(1)	1/2 MILE	30X12	X							

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		005	04	082	IH 20, ETC
4-16		DIST	COUNTY		SHEET NO.
8-16		ODA	MARTIN, ETC		61

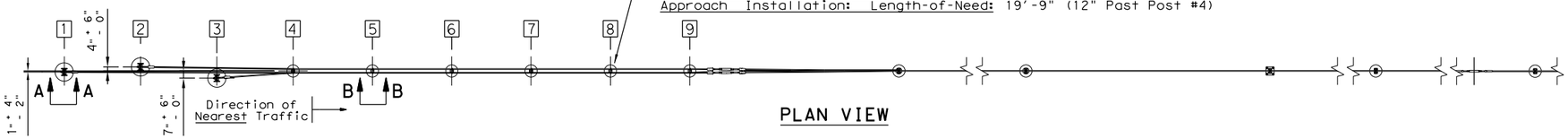
DATE:
FILE:

T8

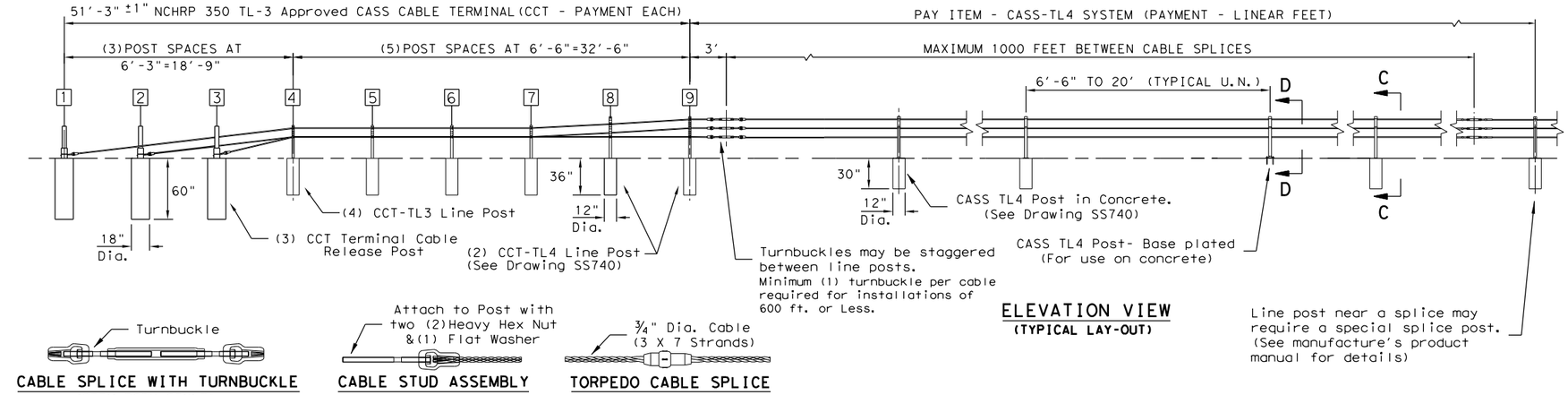
DATE:
FILE:

Preferred Installation: Locate post #2 away from nearest traffic.
System has been succesfully tested with opposite installation.

Length-of-Need Cass Cable Terminal (CCT):
Departure Installation: Length-of-Need: 44'-9" (At Post #8)
Approach Installation: Length-of-Need: 19'-9" (12" Past Post #4)



PLAN VIEW

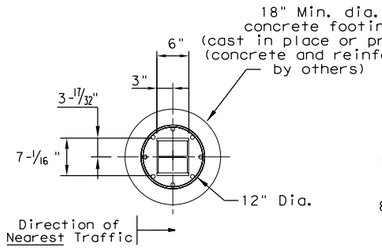


ELEVATION VIEW
(TYPICAL LAY-OUT)

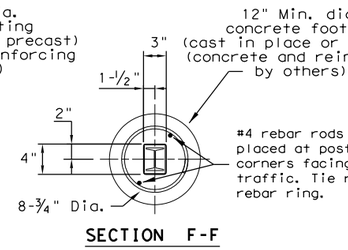
CABLE SPLICE WITH TURNBUCKLE
(OPEN BODY STYLE)

CABLE STUD ASSEMBLY

TORPEDO CABLE SPLICE



SECTION E-E



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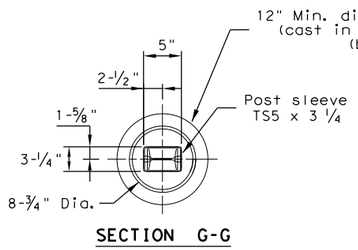
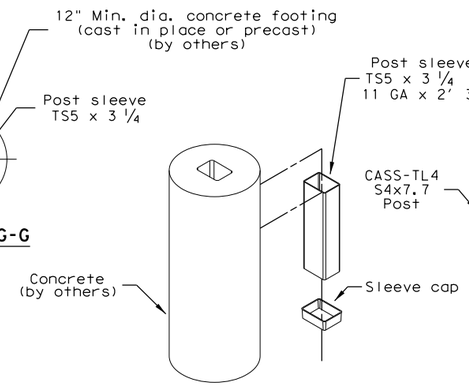
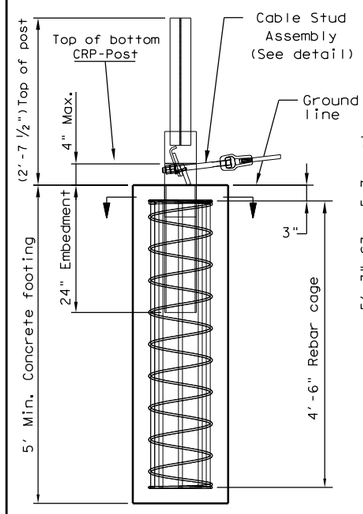


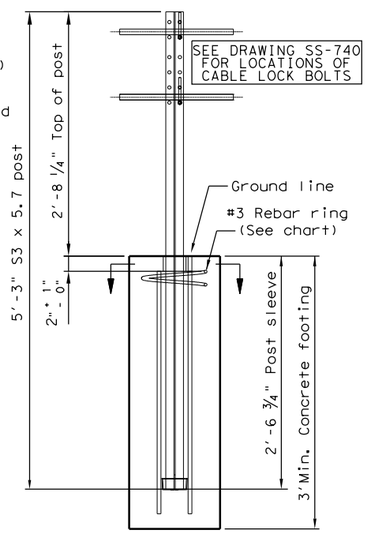
SECTION G-G



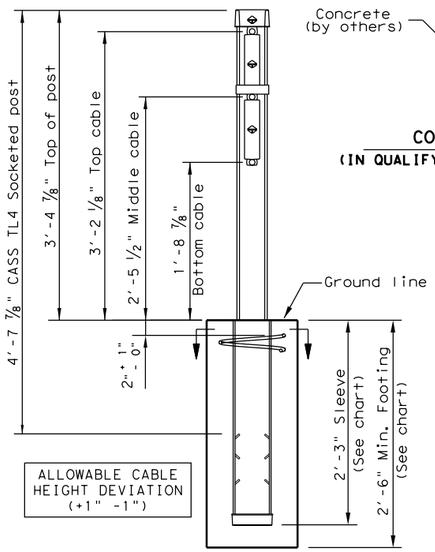
CONCRETE FOOTING
(IN QUALIFYING MOW STRIP SEE CHART)



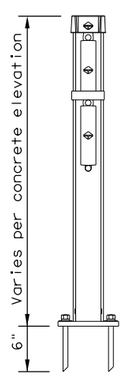
VIEW A-A
(CABLE RELEASE POST 1-3)



VIEW B-B
(TERMINAL LINE POST 4-7)



SECTION C-C
(SOCKETED POST)



SECTION D-D
(BASE PLATED POST)

STANDARD POST & CONCRETE FOOTING
(SOCKETED POST)

GENERAL NOTES

1. This drawing is a general overview of CASS TL-4 Barrier System. See SS-740 (latest version) for specific details of CASS cable terminal (CCT) and cable safety system (CASS) requirements, proper installation, options and specification.
2. CASS is designed for bi-directional traffic flows and can be installed on either side of the median. Contact Trinity (800-527-6050) or consult the design, installation, or repair manual(s) for additional information.
3. All concrete for CASS footings shall be TxDOT class A. If class A or stronger concrete is utilized for the mowstrip, please see chart below for allowable footing depth and sleeve deviations.
4. All posts shall be socketed unless otherwise specified. All cables shall be pre-stretched unless otherwise specified.
5. For payment see Special Specification "Cable Barrier System".
6. CASS-TL4 shall be installed on shoulders or medians with slopes of 6:1 or flatter without obstructions, depressions, etc. That may significantly affect the stability of an errant vehicle. Grading of site and/or appropriate fill materials may be required. The designer/installer shall "Flatten" or "Round" various topographical inconsistencies that could interfere with the ability of the installer to consistently maintain the design height (in relation to the terrain) of the cables. Please consult manual(s) and / or TxDOT Memo(s) for installations in "Ditch Sections".
7. CASS TL-4 post spacing may be modified to avoid obstacles that conflict with the installation of cass-tl4 line posts or to reduce deflection on radiuses. No post space can exceed the maximum post TxDOT space limit of 20'. Reducing or increasing post spacing affects deflection. CASS TL-4 may be laterally transferred at a rate not to exceed 30:1.
8. Post foundations may be drilled through existing pavement. Please see line post foundation chart for minimum footing requirements in various applications.
9. For aesthetic purposes Trinity recommends all sleeves, driven posts, and lower cable release posts to be installed reasonably plumb (approximately 1/8" per foot).
10. CASS TL-4 shall be installed in well-drained, compacted, NCHRP Report 350 Standard soil. If soil does not meet this classification, if solid rock/concrete is encountered below grade or if soil is susceptable to severe freeze/thaw cycles, please contact Trinity about alternate footing design(s). Trinity suggests the use of "Mow strips" for erosion prevention and ease of maintenance / installation.
11. See the Texas MUTCD for proper "Barrier" Delineation.

MOW STRIP DETAIL*			CONCRETE FOOTING CHART		
MOW STRIP	DEPTH	WIDTH	FOOTING	TUBE SLEEVE	REBAR RING
NONE			30" Min.	27" Min.	YES
HMA	6" Min.	3' Min.	27" Min.	15" Min.	NO
HMA	8" Min.	3' Min.	24" Min.	15" Min.	NO
RC	3" Min.	3' Min.	24" Min.	15" Min.	NO

Chart does not apply to Terminal Posts 1 thru 9.
* Mow strip or pavement.
HMA = Hot Mix Asphalt (Not Recycled Asphalt Pavement).
RC = Reinforced Concrete (TxDOT Class A Minimum).

CABLE TENSION CHART	
FAHRENHEIT DEGREES	PRE-STRETCHED LB / FORCE
-10	7300
0	7000
10	6600
20	6300
30	6000
40	5600
50	5300
60	5000
70	4600
80	4300
90	4000
100	3600
110	3300
120	3000
130	2700
140	2500
150	2300

Allowable deviation from chart in tangent sections: +800, -200 pounds/force. Cable tension readings are typically higher in curved cable sections.

Trinity Highway Products, LLC.
2525 Stemmons Freeway
Dallas, TX 75207
Phone: (800) 644-7976

Product.INFO@TRIN.NET

Texas Department of Transportation

Design Division Standard

TRINITY CABLE SAFETY SYSTEM (TL-4)

CASS(TL4)-14

FILE: casst1414.dgn	DN: TxDOT	CK: RM	DW: VP	CK:
©TxDOT: March 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	005	04	082	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	MARTIN, ETC		62

DATE:
FILE:

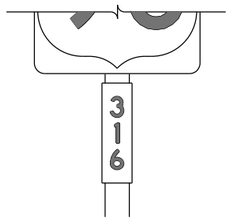
REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

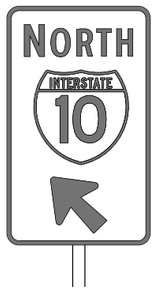
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING

TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING





TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

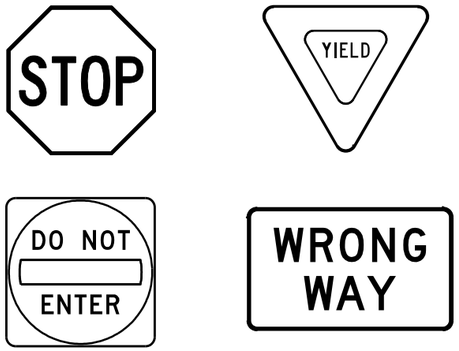
TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	005	04	082	IH 20, ETC
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ODA	MARTIN, ETC		63

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

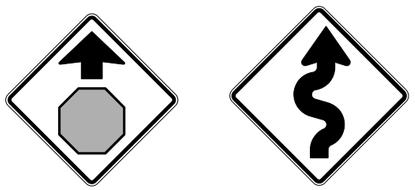
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	005	04	082	IH 20, ETC
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ODA	MARTIN, ETC		64

DATE:
FILE:

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

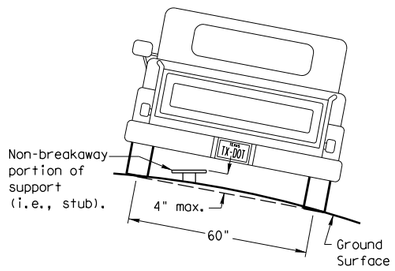
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

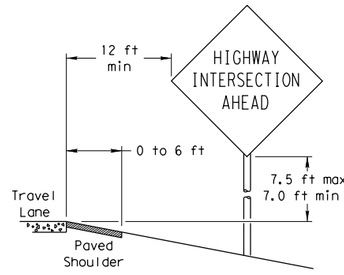
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

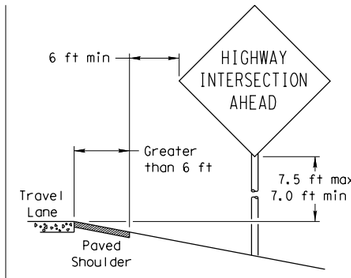
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

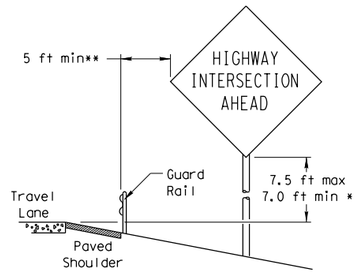
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



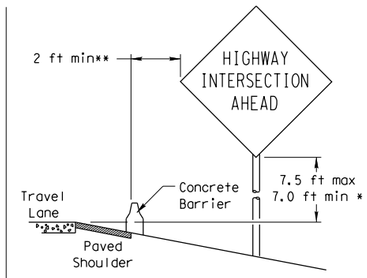
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



BEHIND GUARDRAIL

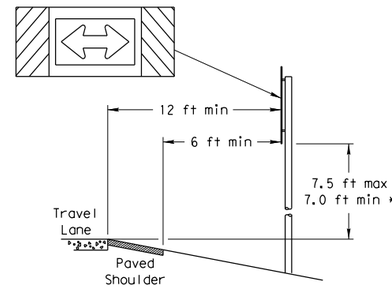


BEHIND CONCRETE BARRIER

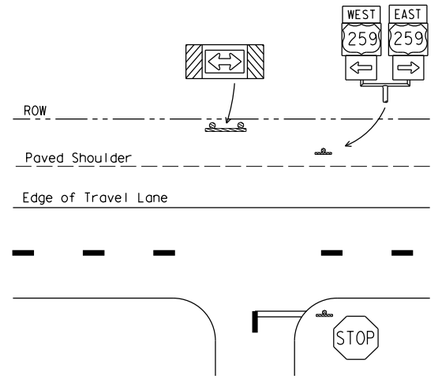
**BEHIND GUARDRAIL

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

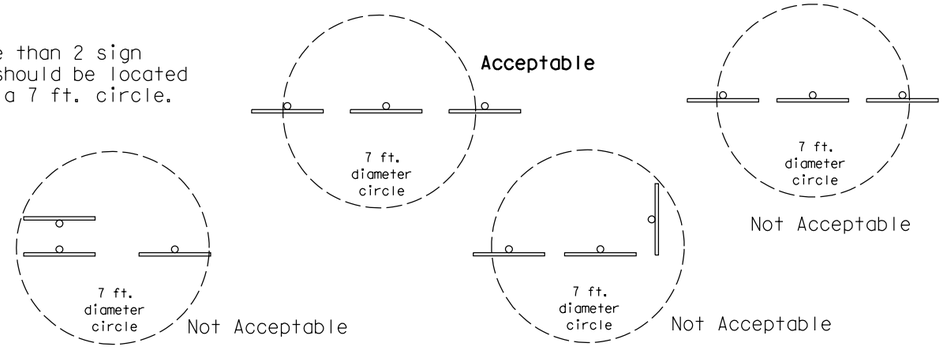
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

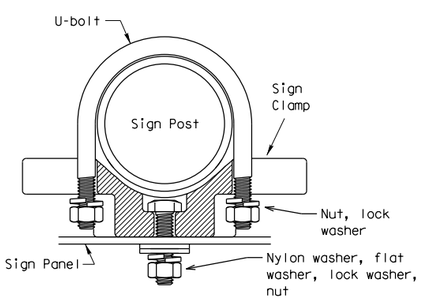
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

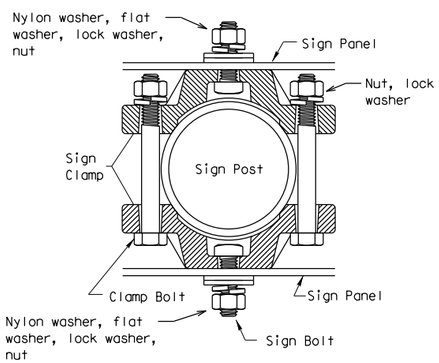


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

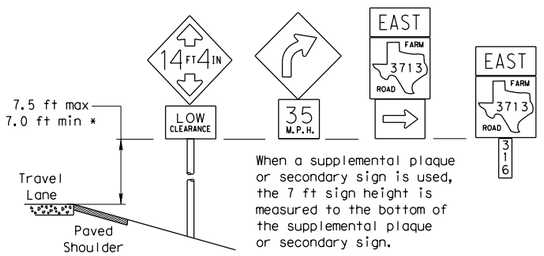
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



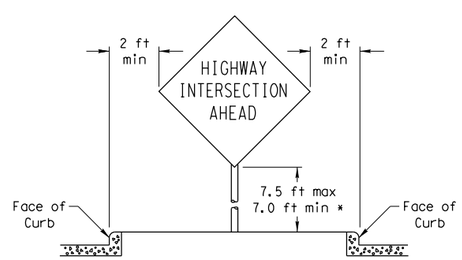
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



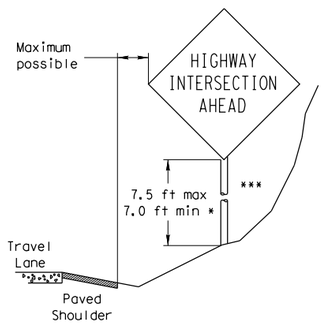
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

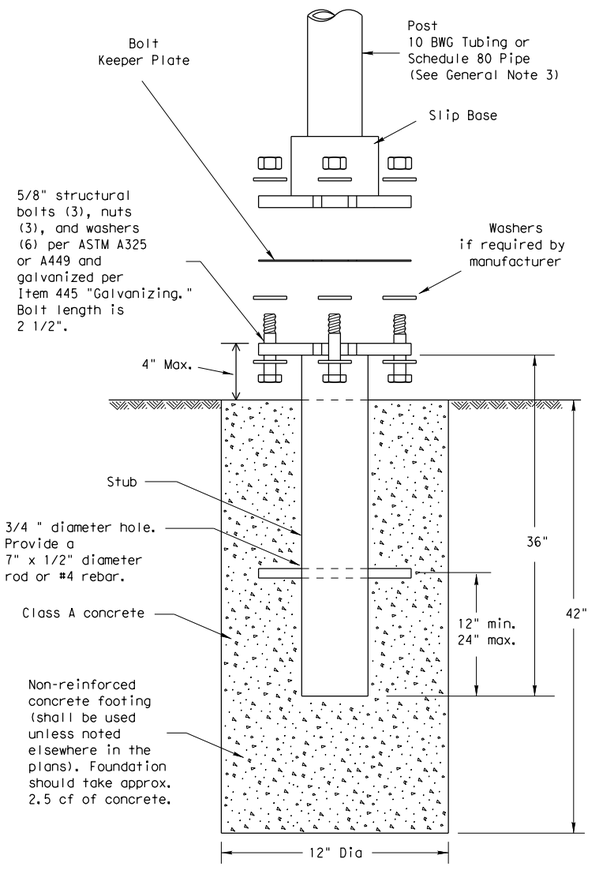
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	005	04	082	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	MARTIN, ETC		65

DATE: 3/27/2023 2:32:40 PM
FILE: c:\bms\pwe101-01\mark,richardson\dms29777\smdgen.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

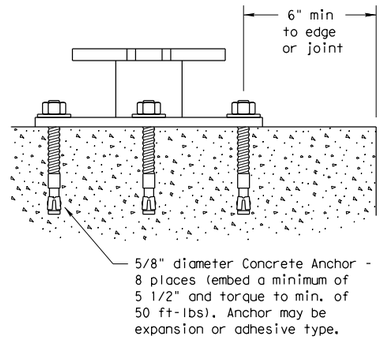
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
005	04	082	IH 20, ETC

DIST	COUNTY	SHEET NO.
ODA	MARTIN, ETC	66

DATE: 3/27/2023 2:32:41 PM
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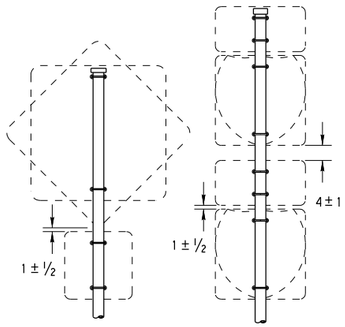
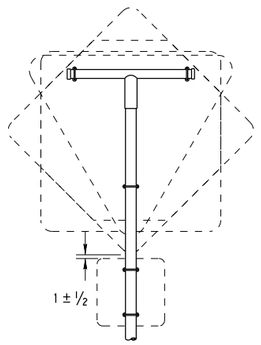
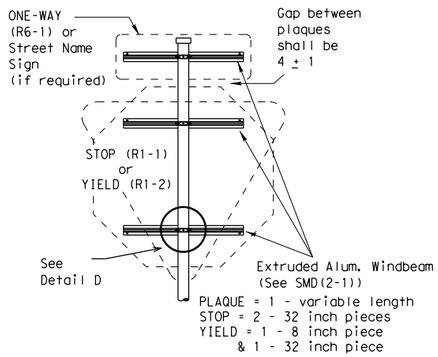


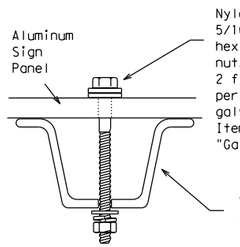
SM RD SGN ASSM TY XXXXX(1)XX(P)



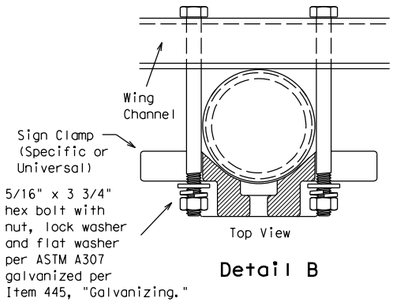
SM RD SGN ASSM TY XXXXX(1)XX(T)



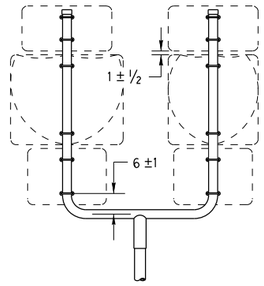
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



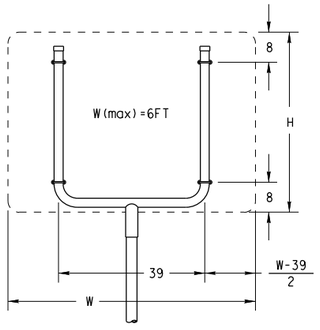
Detail A



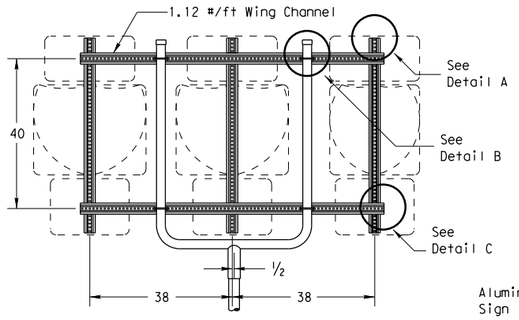
Detail B



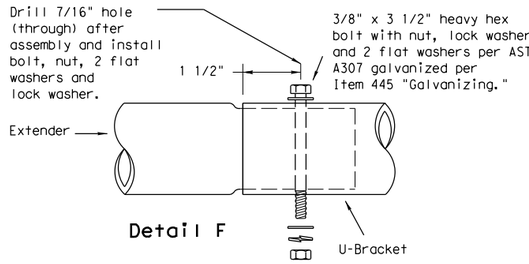
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

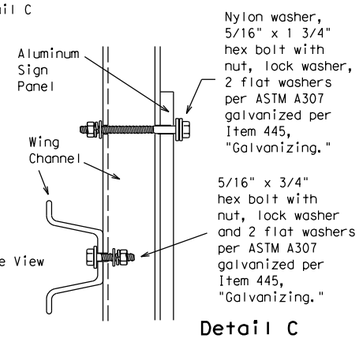


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

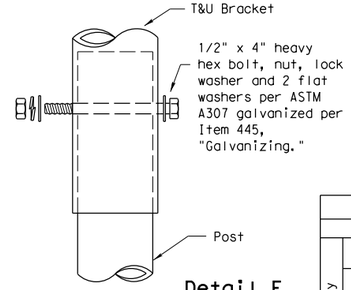


Detail F

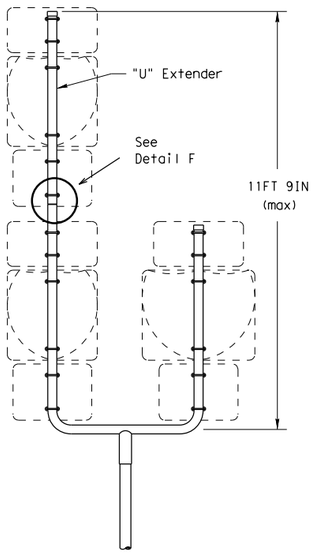
Splices shall only be allowed behind the sign substrate.



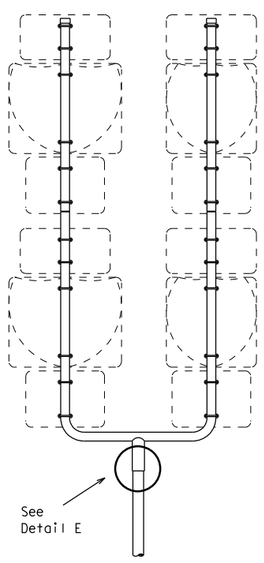
Detail C



Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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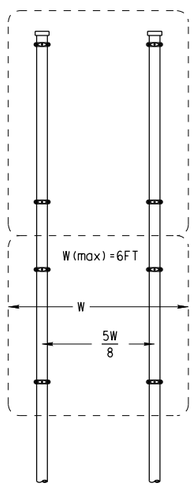
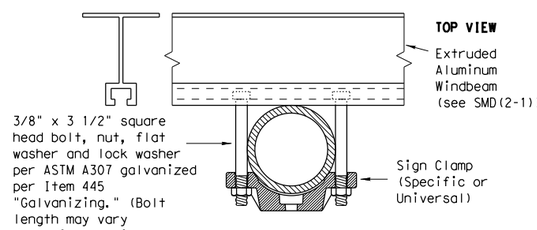
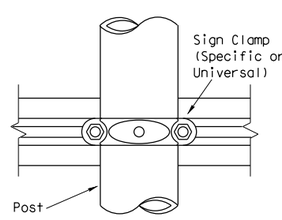


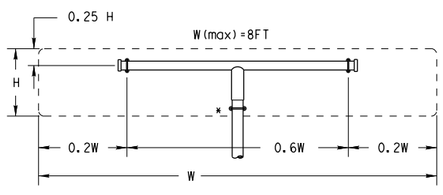
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW





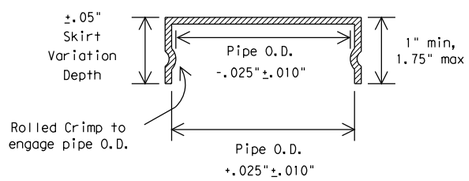
Detail D



SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

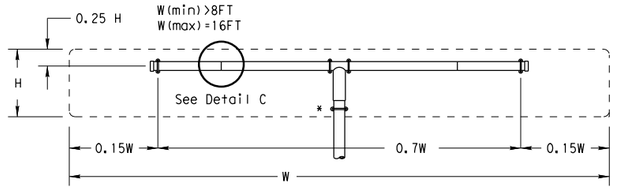
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	005	04	082	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	MARTIN, ETC		67

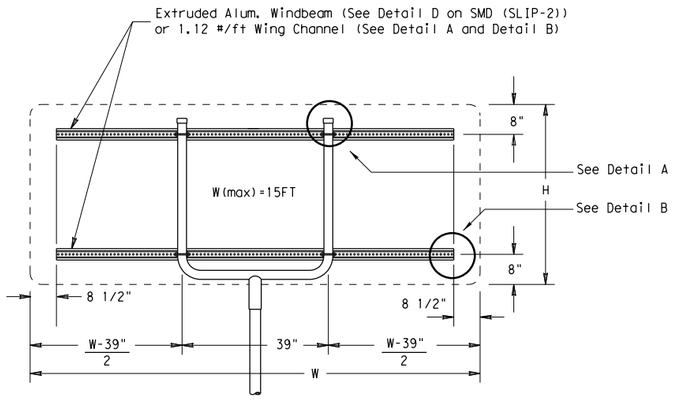
26C

DATE: 3/27/2023 2:32:43 PM
FILE: c:\dms\pwe101-01\mark,richardson\dms29777\smds2.dgn

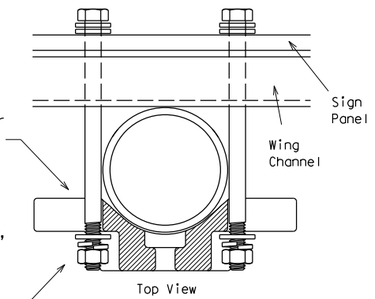


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

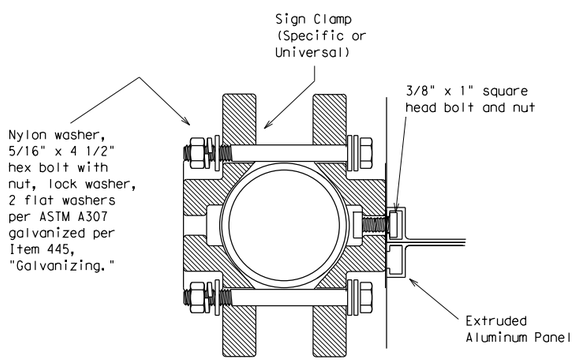
(* - See Note 12)



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

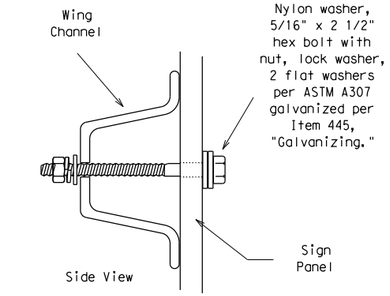


Detail A

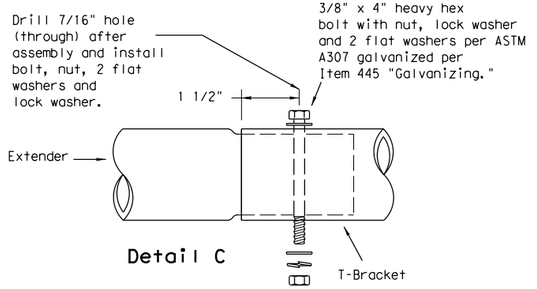


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

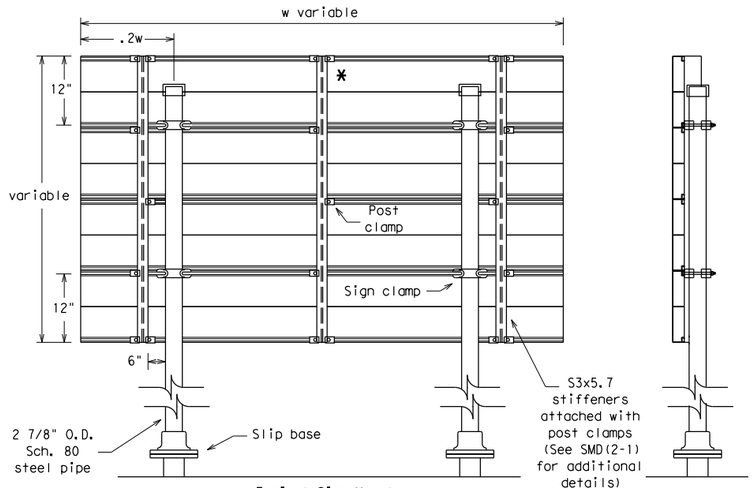


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

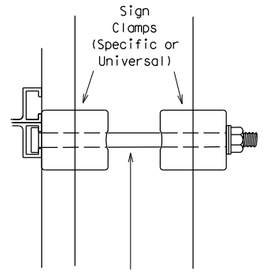


Typical Sign Mount

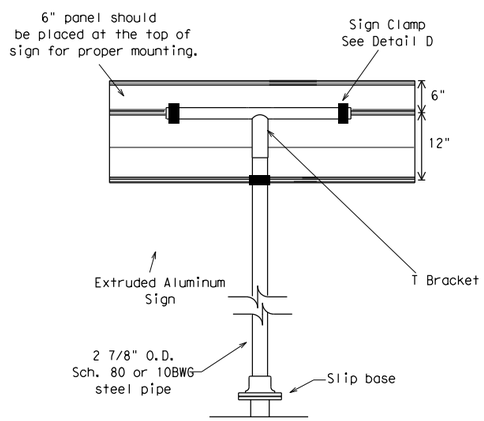
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

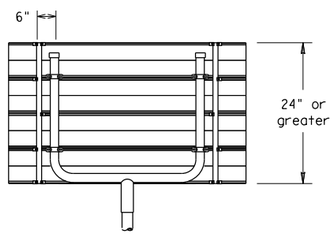
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
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3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
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6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
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	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
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	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
005	04	082	IH 20, ETC
DIST	COUNTY		SHEET NO.
ODA	MARTIN, ETC		68

DATE: 3/27/2023 2:32:45 PM
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DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☒ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☐ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR		
	CONT	SECT	JOB		HIGHWAY	
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	005	04	082		IH 20, ETC	
	DIST	COUNTY			SHEET NO.	
	ODA	MARTIN, ETC			69	

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0005-04-082 and 0292-04-071

1.2 PROJECT LIMITS:
From: SH 137 (IH20) AND 45TH STREET (SH 18)

To: BI 20 (IH20) AND FM 1776 (SH 18)

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 32.138 ,(Long) -101.806

END: (Lat) 32.141 ,(Long) -101.758

1.4 TOTAL PROJECT AREA (Acres): 36.48

1.5 TOTAL AREA TO BE DISTURBED (Acres): 2.74

1.6 NATURE OF CONSTRUCTION ACTIVITY:
CONSTRUCTION OF MEDIAN BARRIER

1.7 MAJOR SOIL TYPES:

Soil Type	Description
SAND	SILTY, CLAYEY
CLAY	LEAN, SANDY

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- ☐ PSLs determined during preconstruction meeting
- ☐ PSLs determined during construction
- ☒ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

- ☒ Mobilization
- ☒ Install sediment and erosion controls
- ☒ Blade existing topsoil into windrows, prep ROW, clear and grub
- ☐ Remove existing pavement
- ☒ Grading operations, excavation, and embankment
- ☐ Excavate and prepare subgrade for proposed pavement widening
- ☐ Remove existing culverts, safety end treatments (SETs)
- ☐ Remove existing metal beam guard fence (MBGF), bridge rail
- ☐ Install proposed pavement per plans
- ☐ Install culverts, culvert extensions, SETs
- ☒ Install mow strip, MBGF, bridge rail
- ☐ Place flex base
- ☒ Rework slopes, grade ditches
- ☒ Blade windrowed material back across slopes
- ☒ Revegetation of unpaved areas
- ☒ Achieve site stabilization and remove sediment and erosion control measures
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- ☒ Sediment laden stormwater from stormwater conveyance over disturbed area
- ☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- ☐ Solvents, paints, adhesives, etc. from various construction activities
- ☒ Transported soils from offsite vehicle tracking
- ☒ Construction debris and waste from various construction activities
- ☐ Contaminated water from excavation or dewatering pump-out water
- ☐ Sanitary waste from onsite restroom facilities
- ☒ Trash from various construction activities/receptacles
- ☐ Long-term stockpiles of material and waste
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
NONE	NONE

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- ☒ Development of plans and specifications
- ☐ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- ☒ Post Construction Site Notice
- ☐ Submit NOI/CSN to local MS4
- ☒ Perform SWP3 inspections
- ☒ Maintain SWP3 records and update to reflect daily operations
- ☐ Complete and submit Notice of Termination to TCEQ
- ☒ Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- ☒ Day To Day Operational Control
- ☐ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- ☒ Post Construction Site Notice
- ☐ Submit NOI/CSN to local MS4
- ☒ Maintain schedule of major construction activities
- ☒ Install, maintain and modify BMPs
- ☐ Complete and submit Notice of Termination to TCEQ
- ☒ Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity
NONE

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			70
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	MARTIN, ETC	
CONT.	SECT.	JOB	HIGHWAY NO.
0005	04	082, ETC	IH 20, ETC

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- X ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- X ☐ Permanent Planting, Sodding or Seeding
- X ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- X ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- X ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☐ ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☐ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
NONE		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- X Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☐ Loaded haul trucks to be covered with tarpaulin
- ☐ Stabilized construction exit
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- X Concrete and Materials Waste Management
- X Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
NONE		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3 .

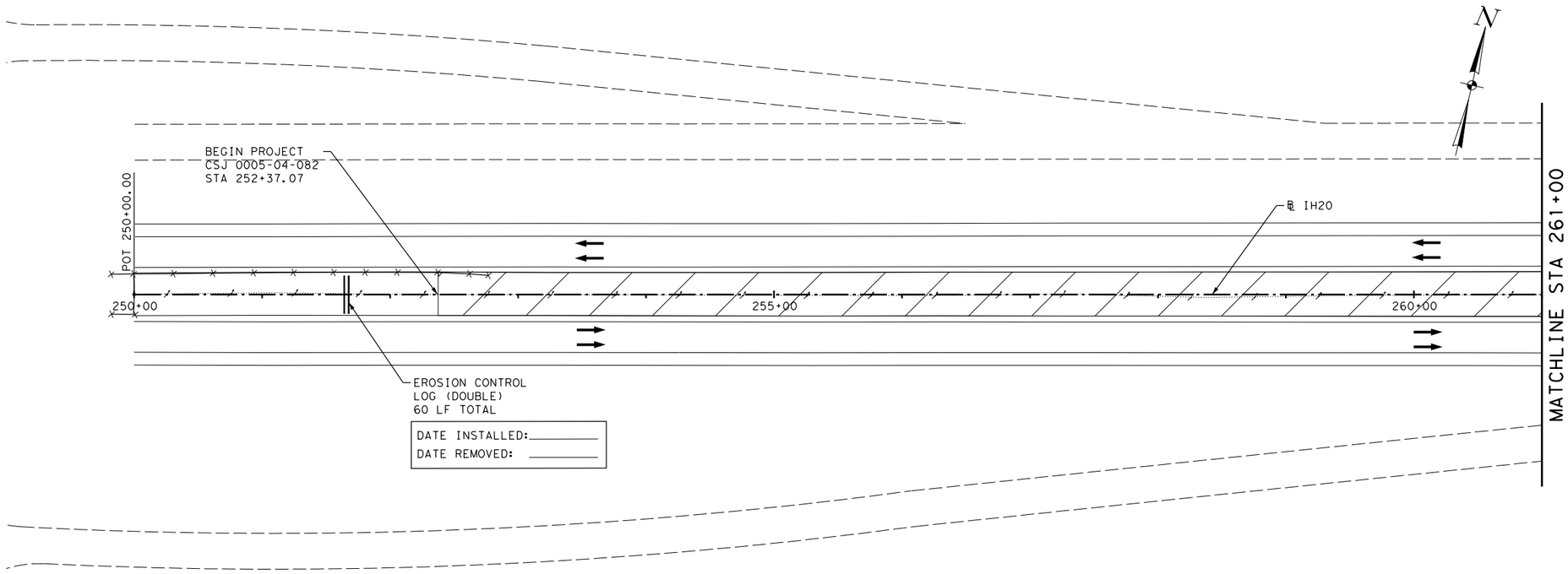
2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			71
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	MARTIN, ETC	
CONT.	SECT.	JOB	HIGHWAY NO.
0005	04	082, ETC	IH 20, ETC



LEGEND:

- DIRECTION OF TRAVEL
- EROSION CONTROL LOG
- AREA OF CONSTRUCTION

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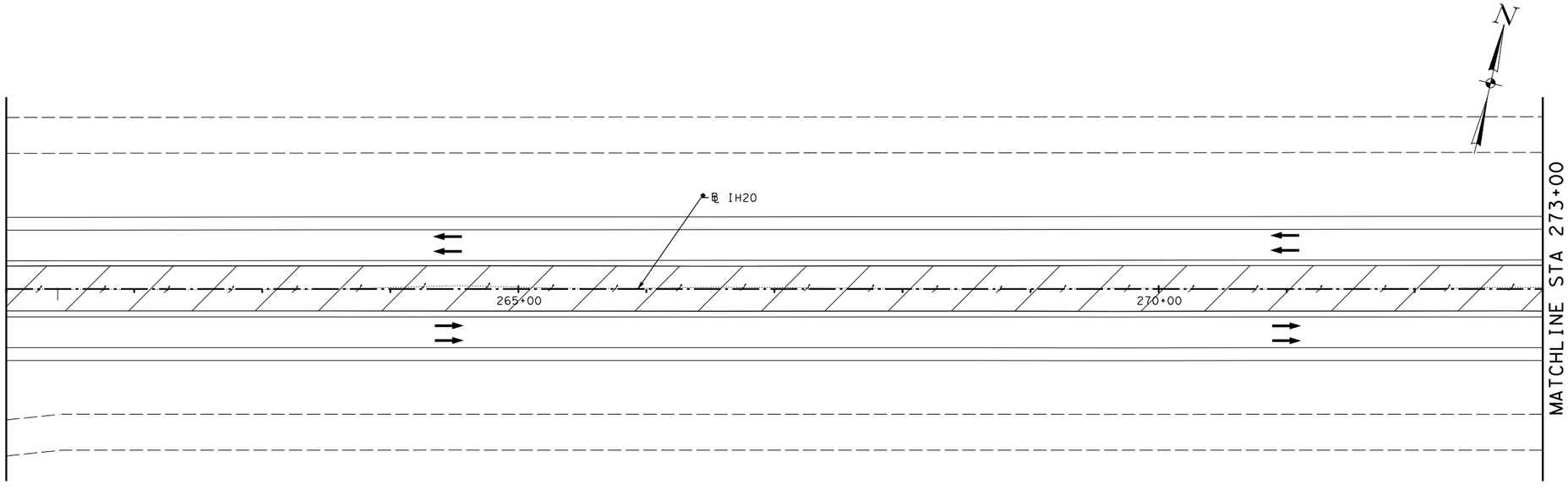
SCALE: 1"=100′



NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
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IH 20
PROPOSED SWPPP
STA 249+00 TO STA 273+00

SHEET 1 OF 6

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	72
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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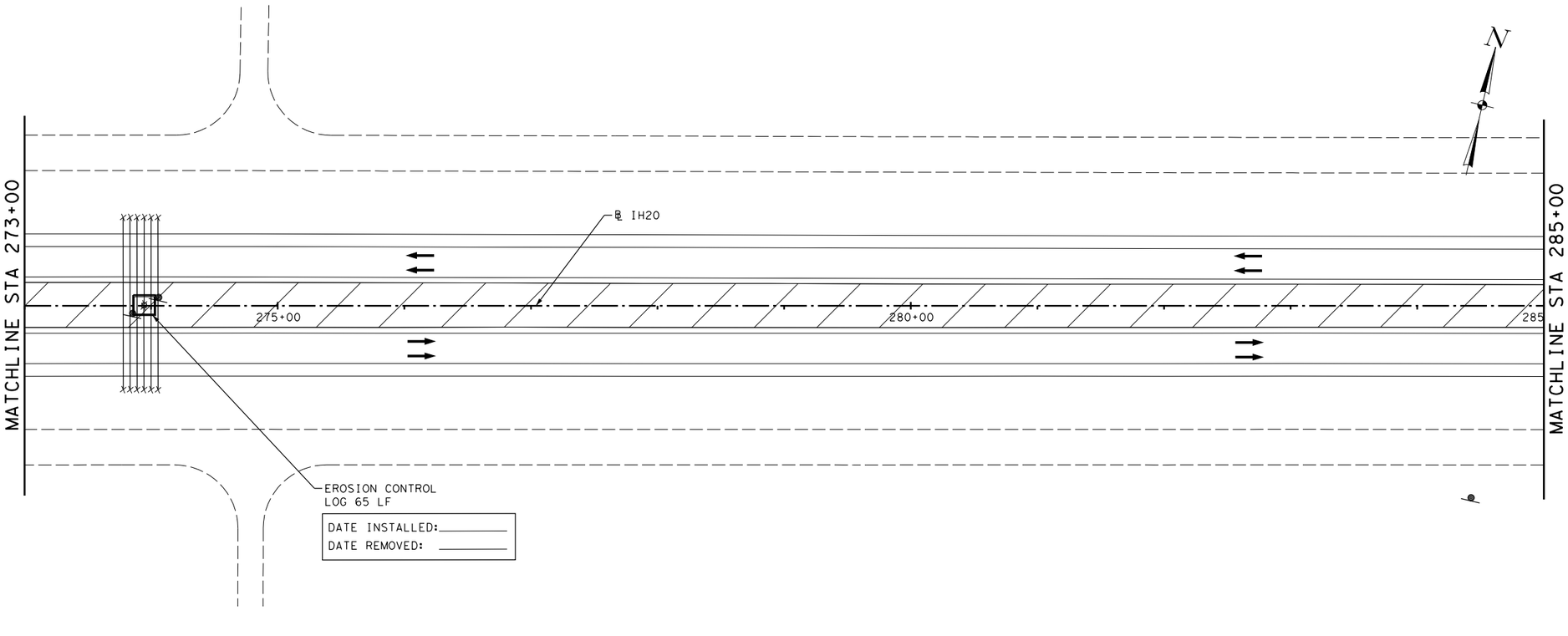

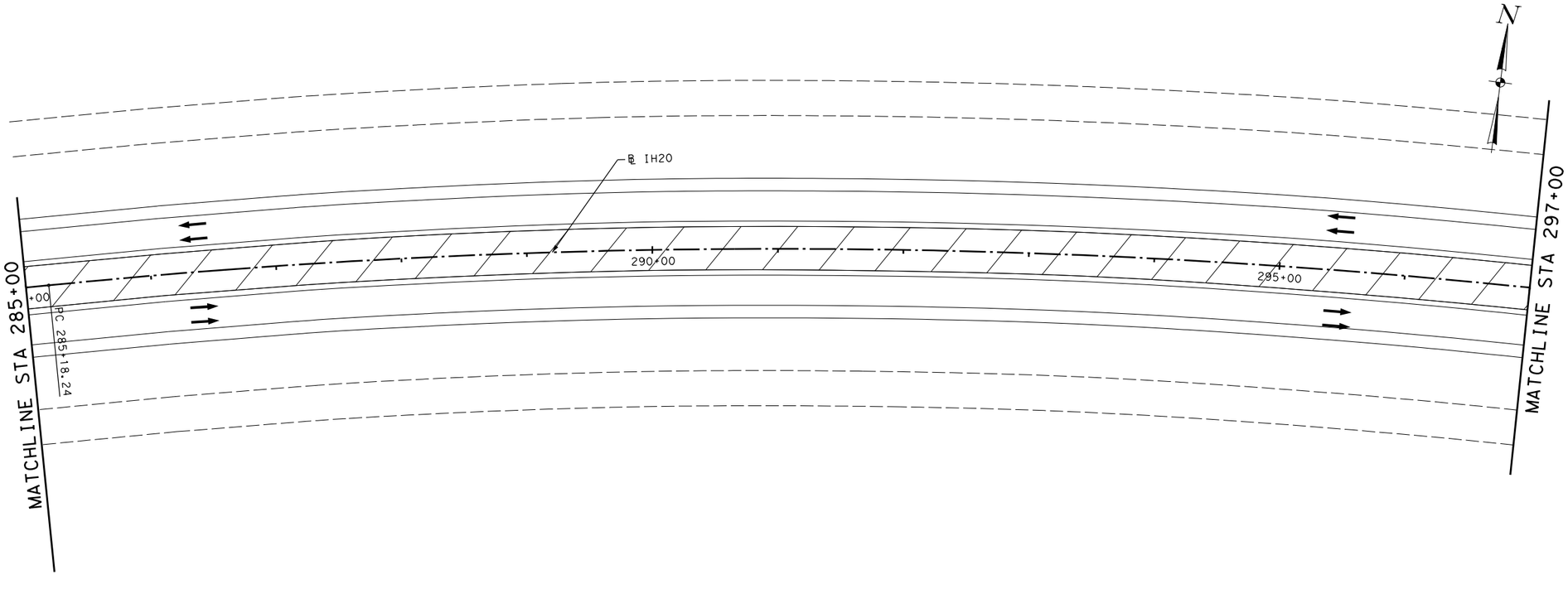

LEGEND:

- DIRECTION OF TRAVEL
- EROSION CONTROL LOG
- AREA OF CONSTRUCTION

0′ 25′ 50′ 100′

SCALE: 1"=100′

NO.	DATE	REVISION	APPROVED

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IH 20
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STA 273+00 TO STA 297+00

SHEET 2 OF 6

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	73
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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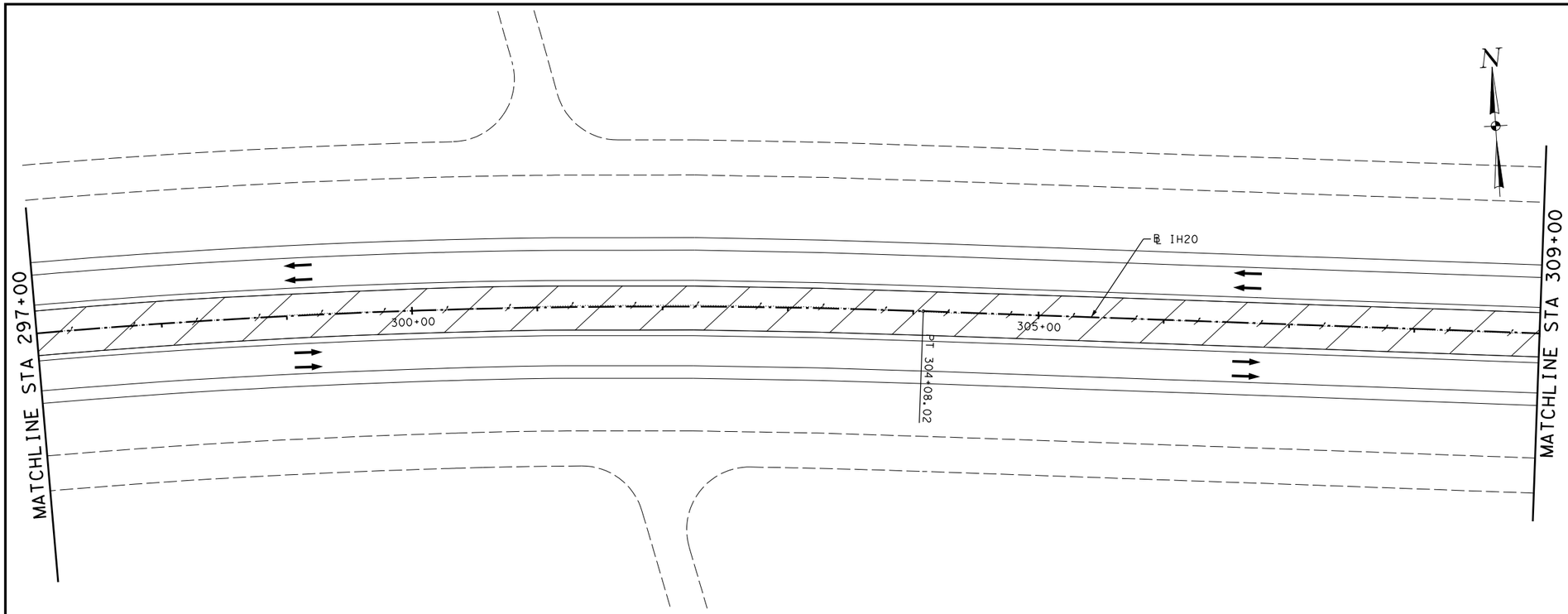

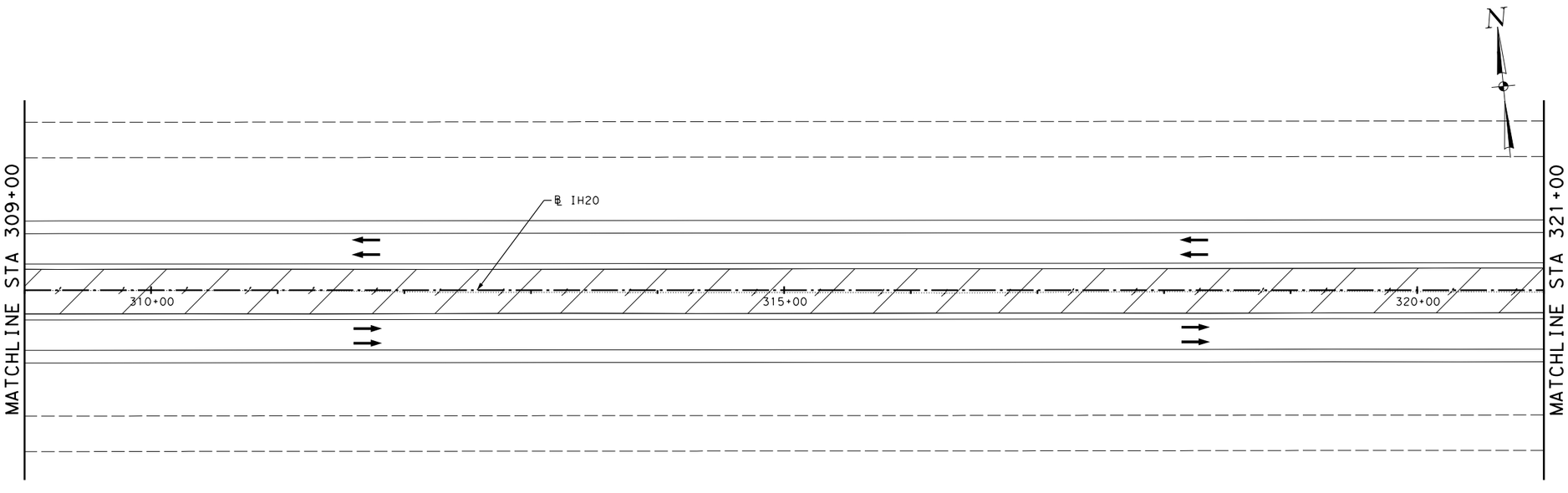

LEGEND:

- DIRECTION OF TRAVEL
- EROSION CONTROL LOG
- AREA OF CONSTRUCTION

0′ 25′ 50′ 100′

SCALE: 1"=100′

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IH 20
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STA 297+00 TO STA 321+00

SHEET 3 OF 6

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	74
	005	04	082	

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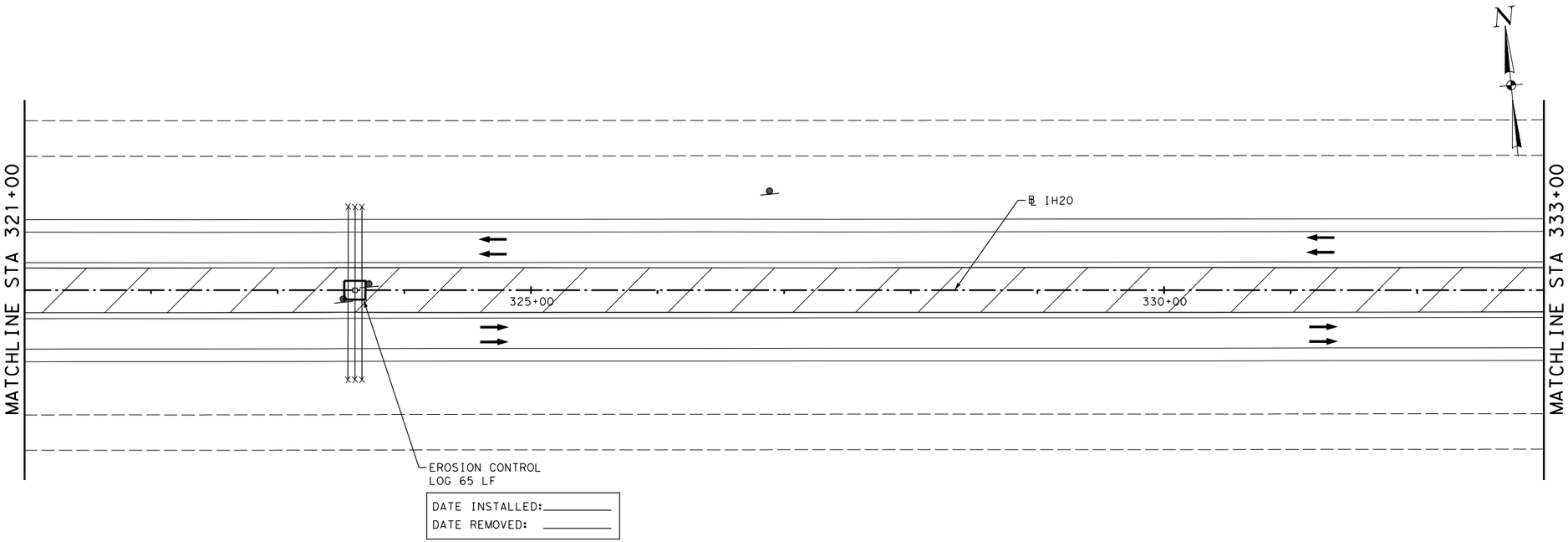

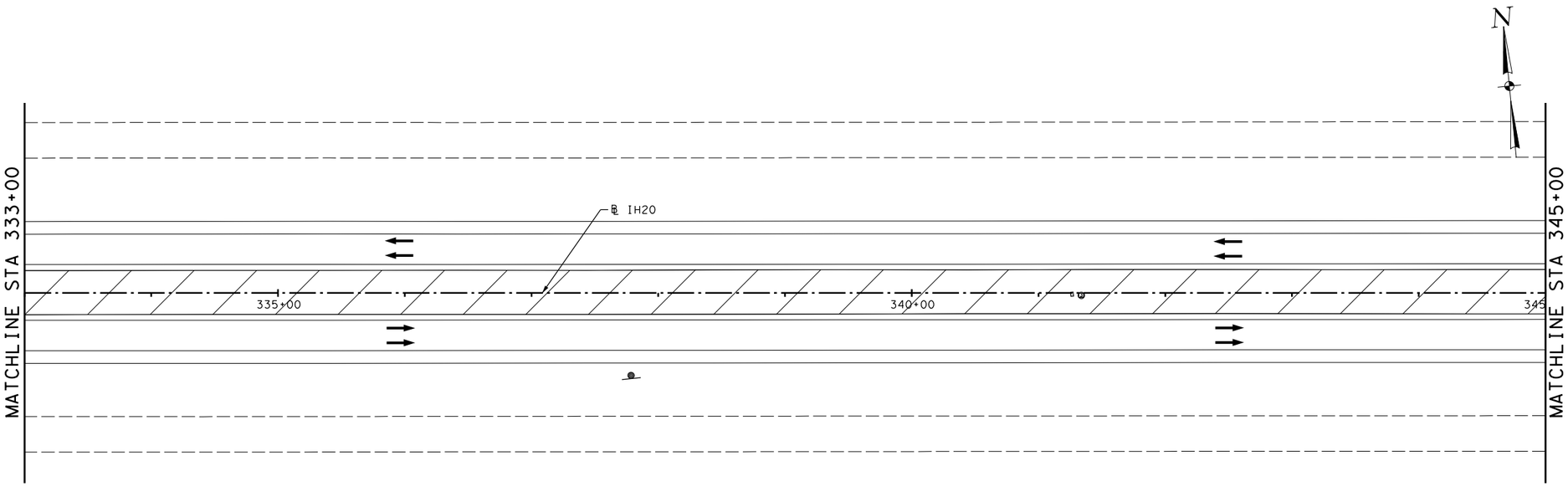

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- DIRECTION OF TRAVEL
- EROSION CONTROL LOG
- AREA OF CONSTRUCTION

0′ 25′ 50′ 100′
SCALE: 1"=100′

NO.	DATE	REVISION	APPROVED

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IH 20
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STA 321+00 TO STA 345+00

SHEET 4 OF 6

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	75
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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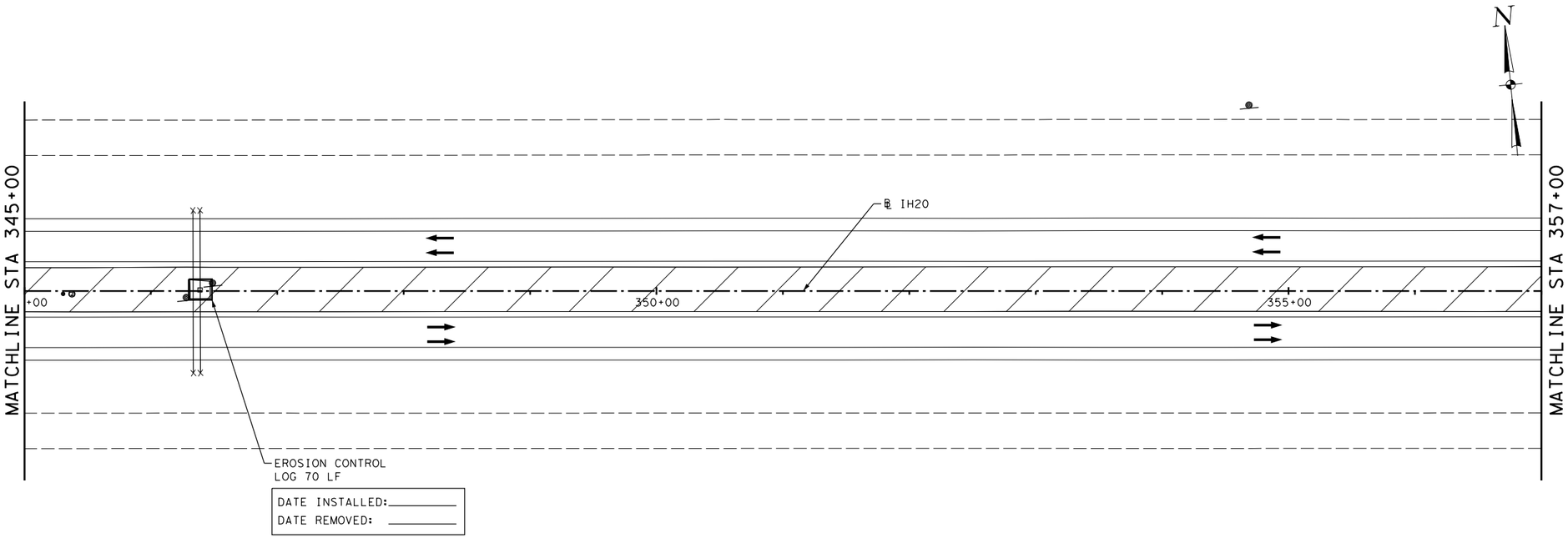

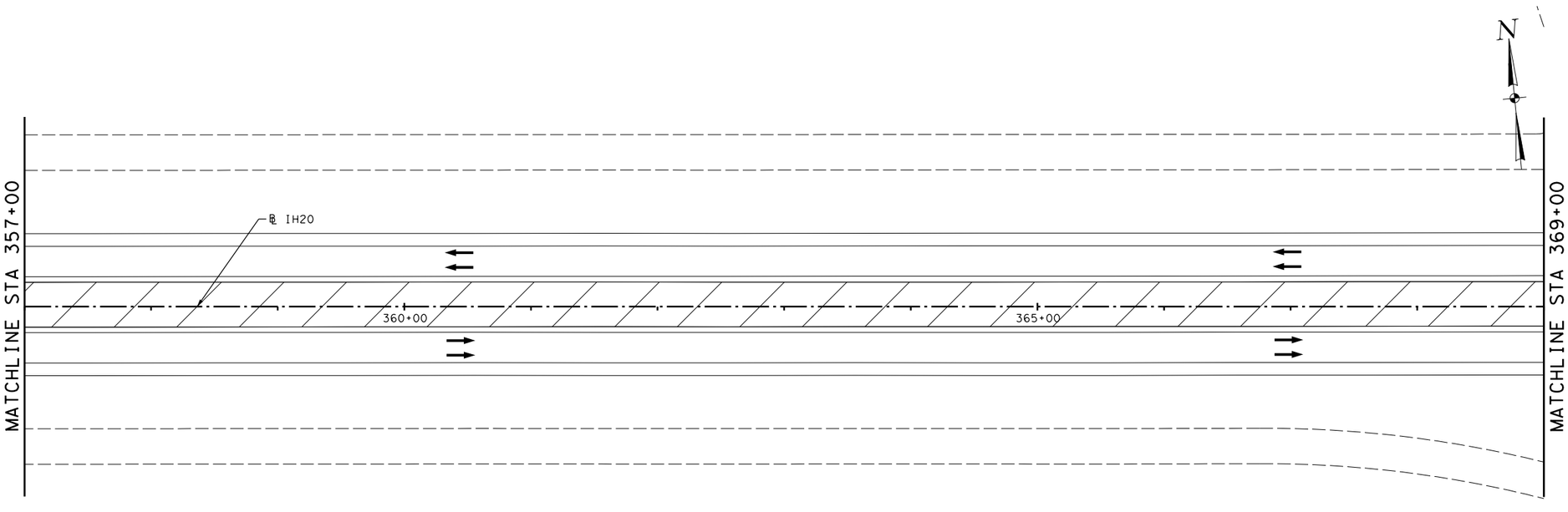

LEGEND:

- DIRECTION OF TRAVEL
- EROSION CONTROL LOG
- AREA OF CONSTRUCTION

0′ 25′ 50′ 100′
SCALE: 1"=100′

NO.	DATE	REVISION	APPROVED

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IH 20
PROPOSED SWPPP
STA 345+00 TO STA 369+00

SHEET 5 OF 6

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	76
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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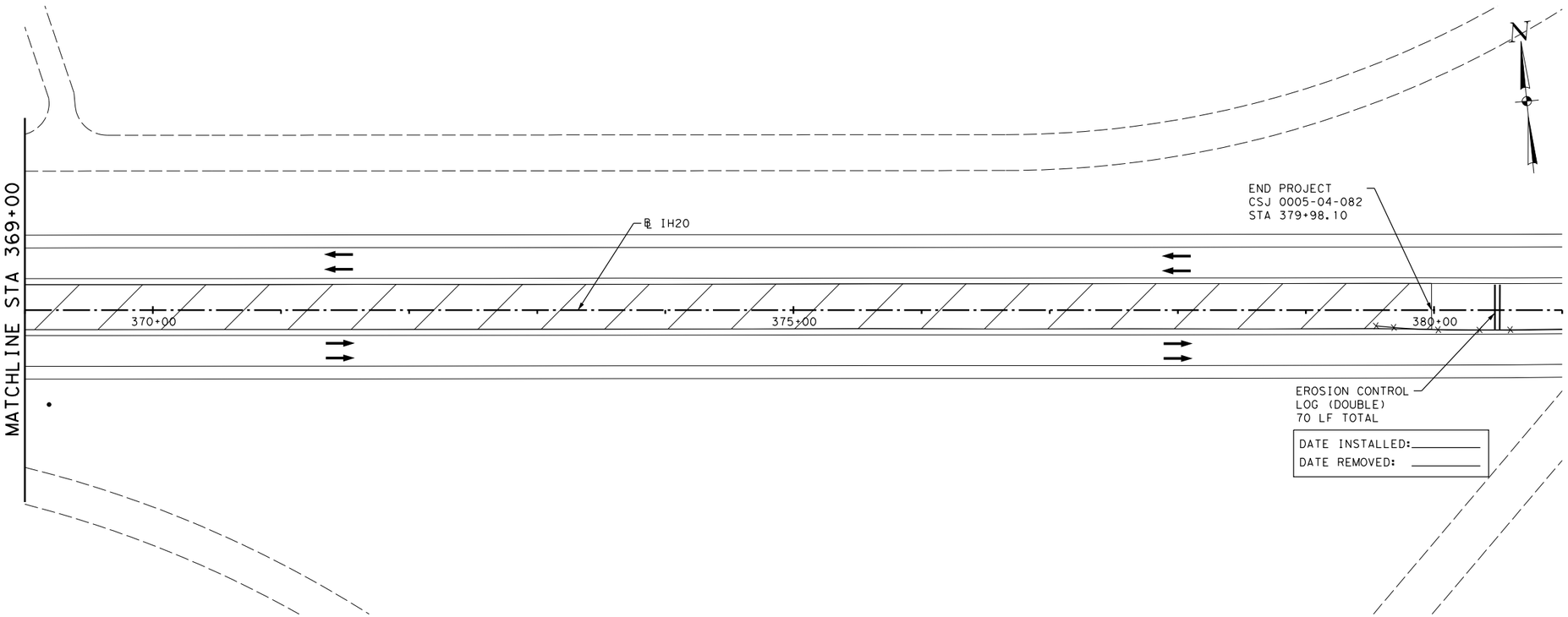

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- DIRECTION OF TRAVEL
- EROSION CONTROL LOG
- AREA OF CONSTRUCTION

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SCALE: 1"=100′

NO.	DATE	REVISION	APPROVED

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IH 20
PROPOSED SWPPP
STA 369+00 TO END

SHEET 6 OF 6

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	77
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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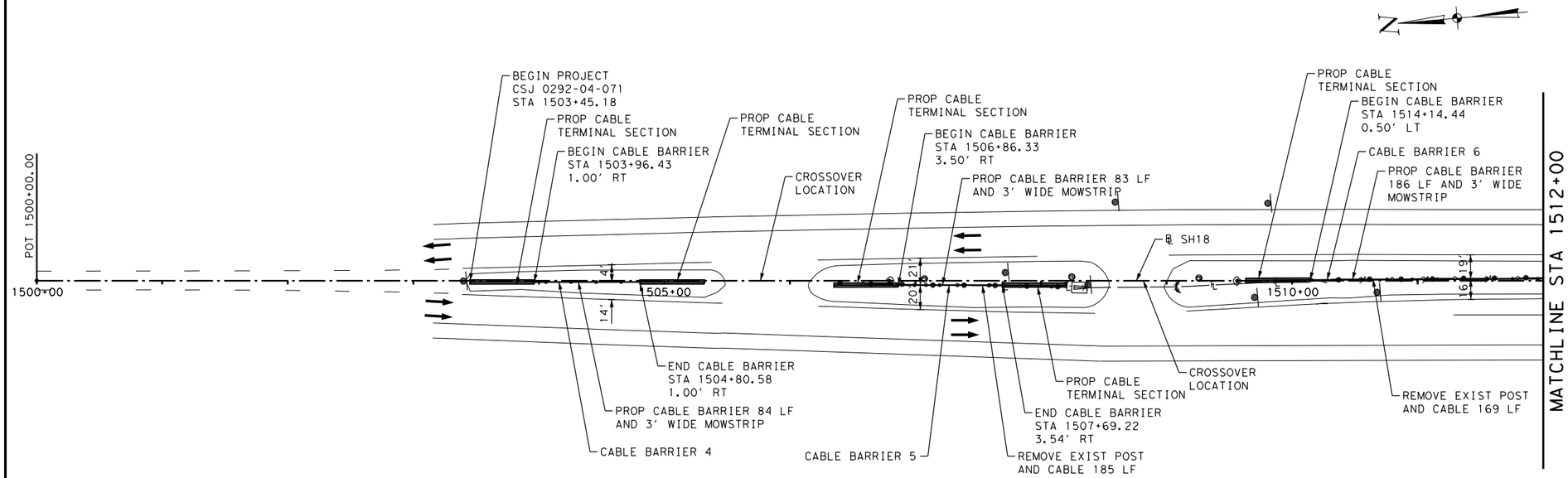

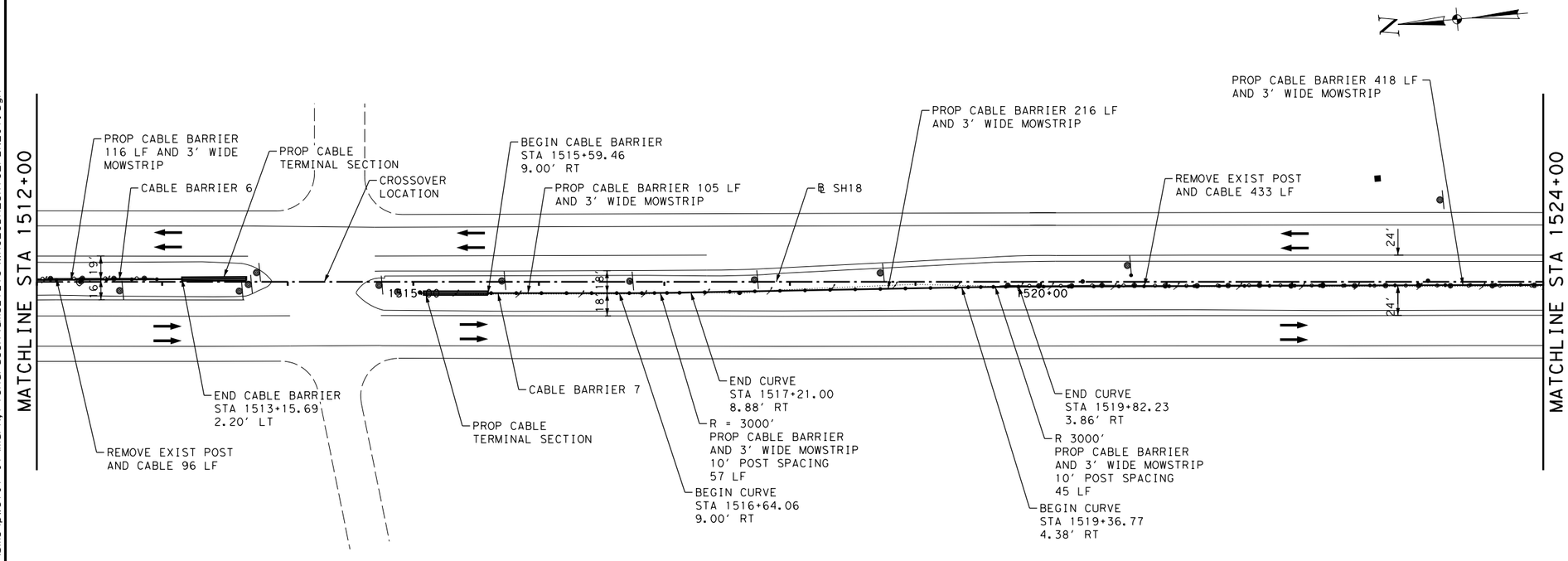

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
3. ADJUST POST SPACING AND RIPRAP LIMITS AS NECESSARY AVOIDING DRAINAGE FEATURES, SIGNS, AND OTHER FEATURES. REVIEW ADJUSTMENTS WITH THE ENGINEER.

0' 25' 50' 100'
SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

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SH 18
PROPOSED PLAN
BEGIN TO STA 1524+00

SHEET 1 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	50
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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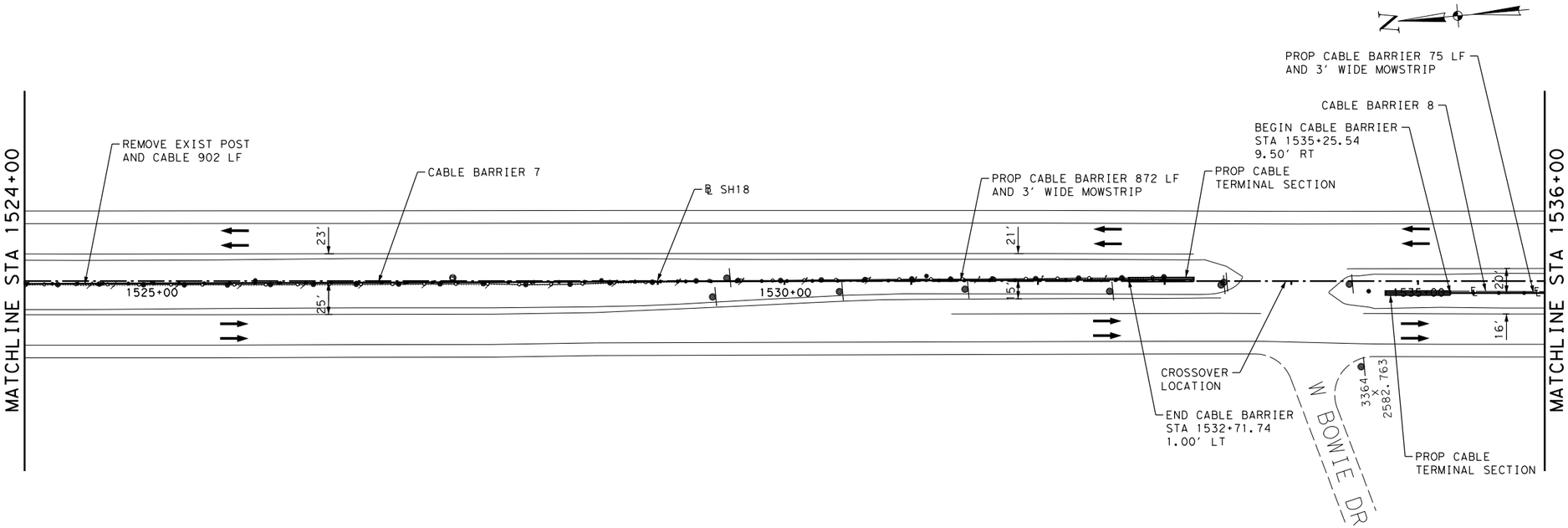

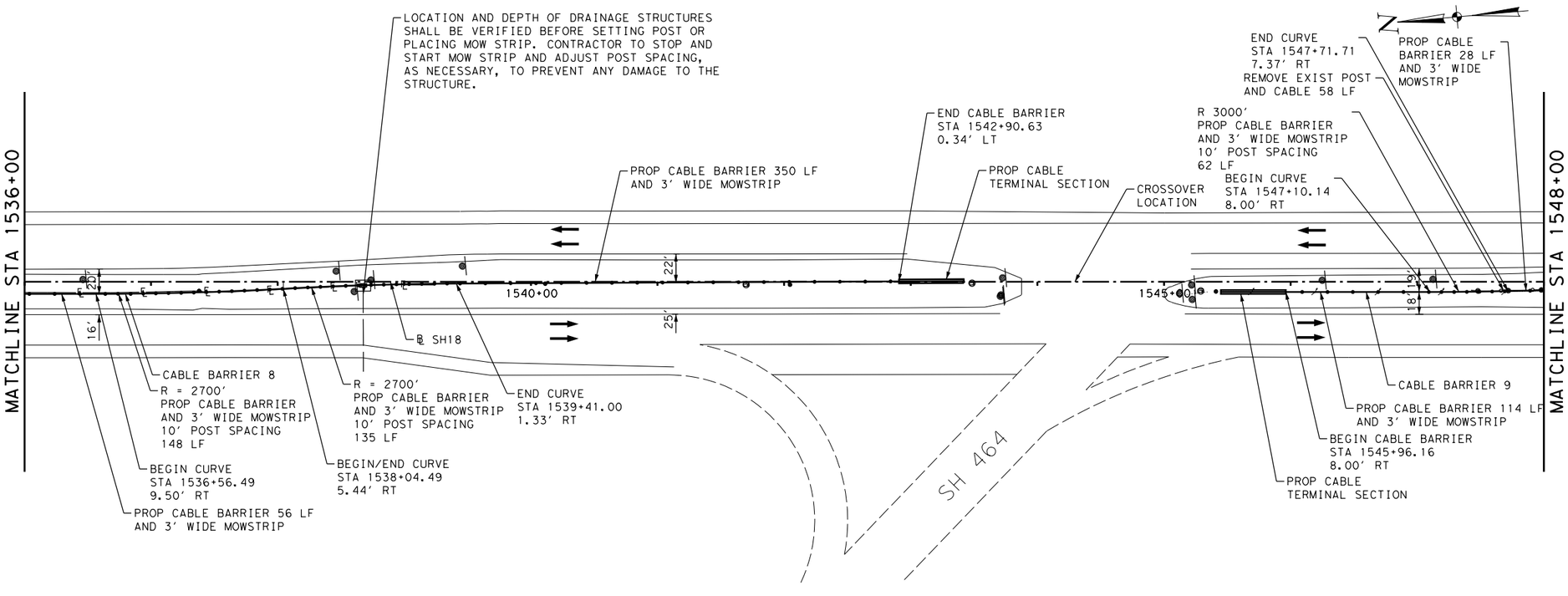

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

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3. ADJUST POST SPACING AND RIPRAP LIMITS AS NECESSARY AVOIDING DRAINAGE FEATURES, SIGNS, AND OTHER FEATURES. REVIEW ADJUSTMENTS WITH THE ENGINEER.

0' 25' 50' 100'
SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

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SH 18
PROPOSED PLAN
STA 1524+00 TO STA 1548+00

SHEET 2 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	51
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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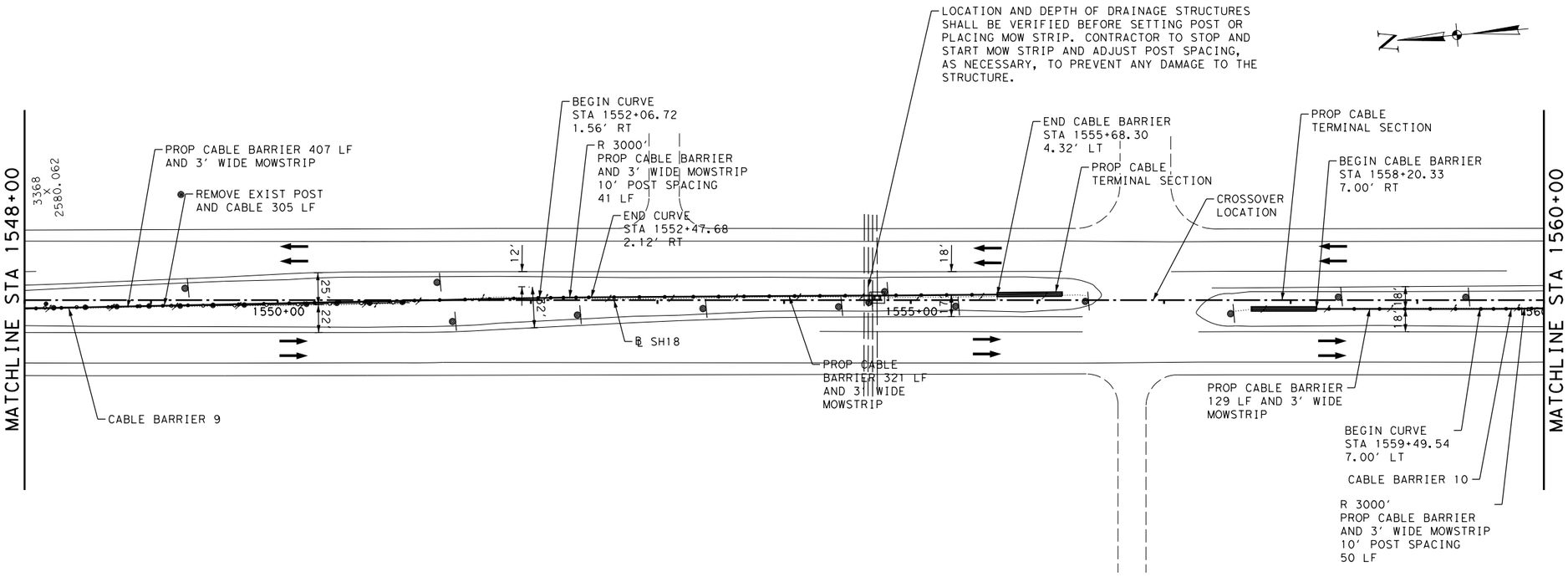

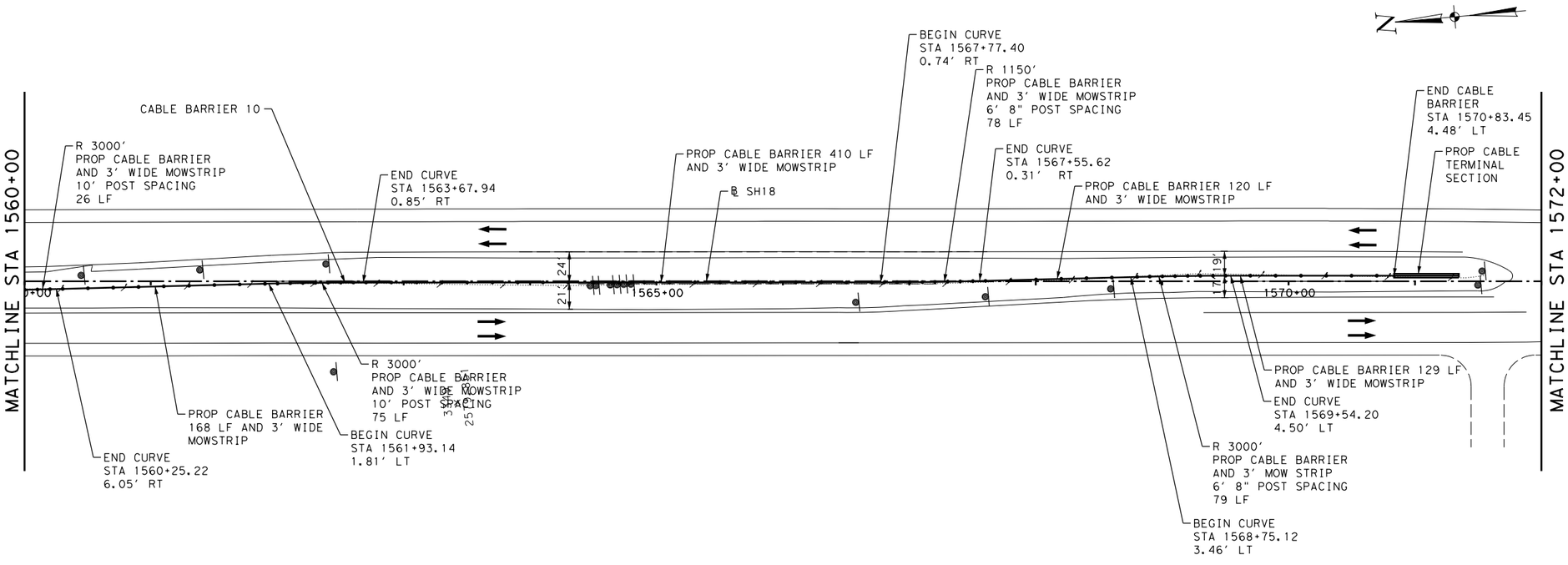

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
3. ADJUST POST SPACING AND RIPRAP LIMITS AS NECESSARY AVOIDING DRAINAGE FEATURES, SIGNS, AND OTHER FEATURES. REVIEW ADJUSTMENTS WITH THE ENGINEER.

0' 25' 50' 100'
SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARK R. RICHARDSON
143771
LICENSED
PROFESSIONAL ENGINEER

03/27/2023

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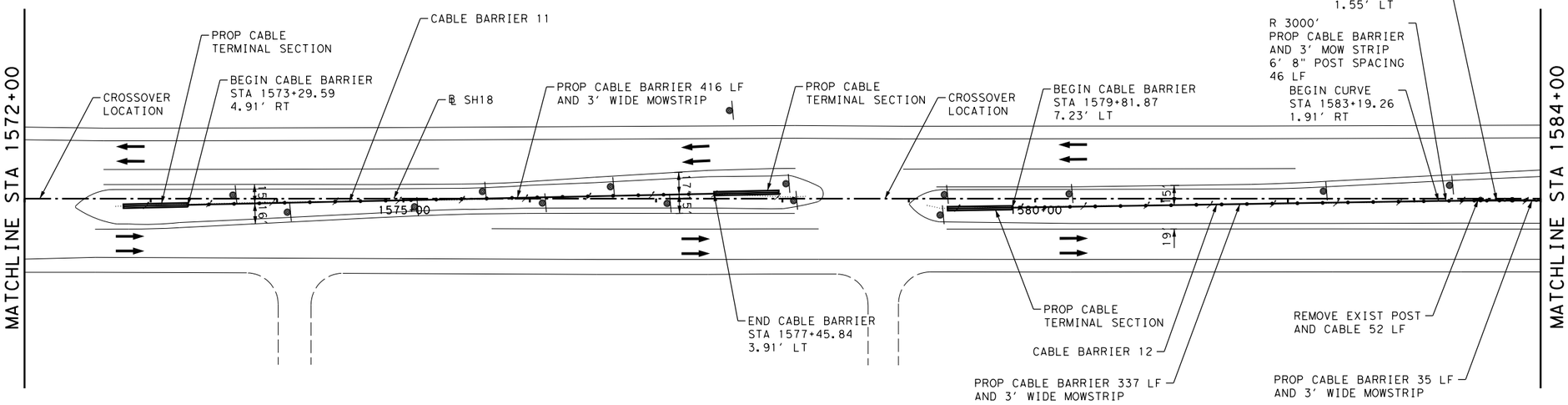
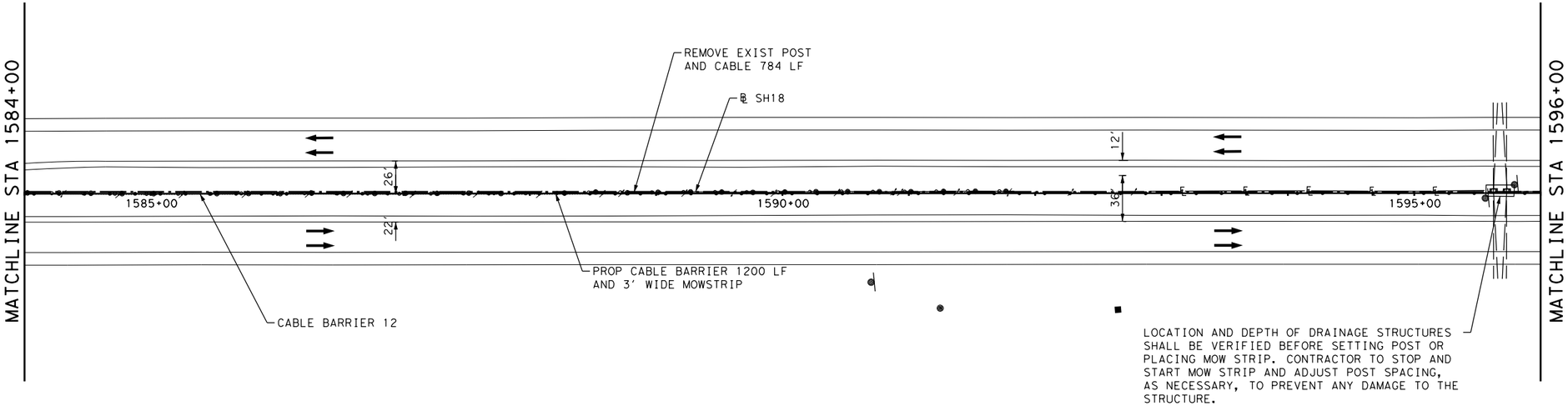
SH 18
PROPOSED PLAN
STA 1548+00 TO STA 1572+00

SHEET 3 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	52
	005	04	082	





LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
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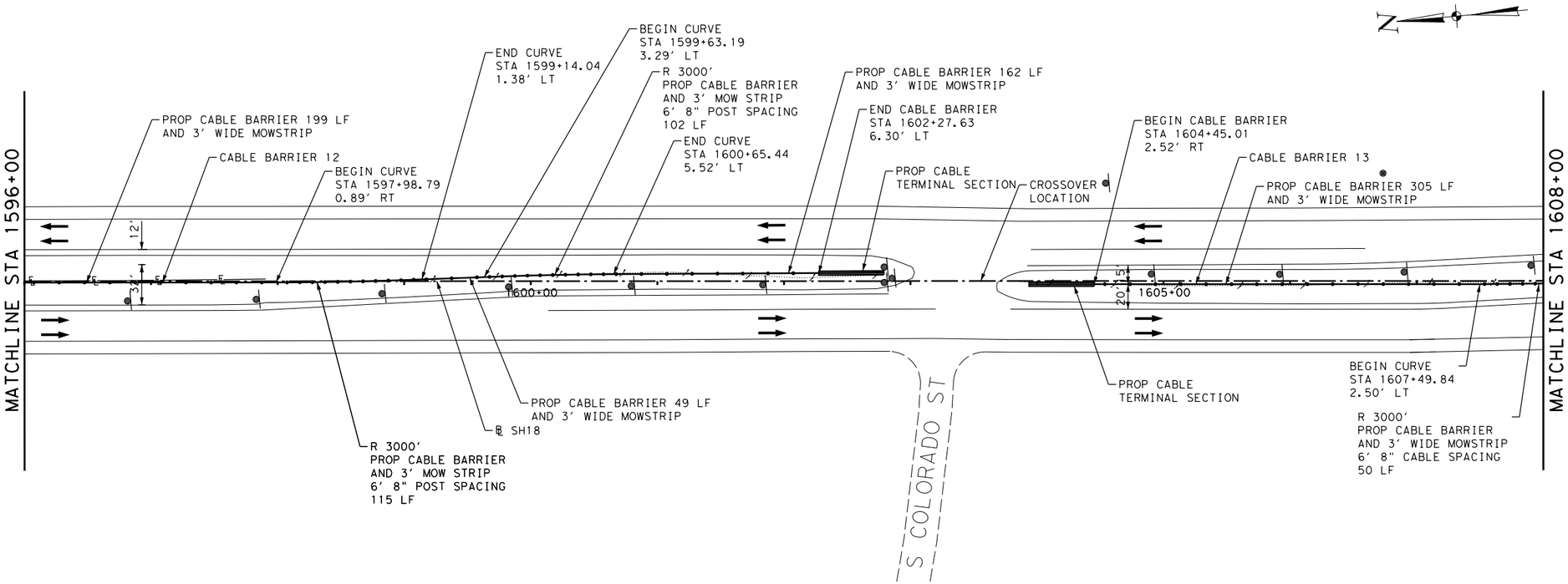
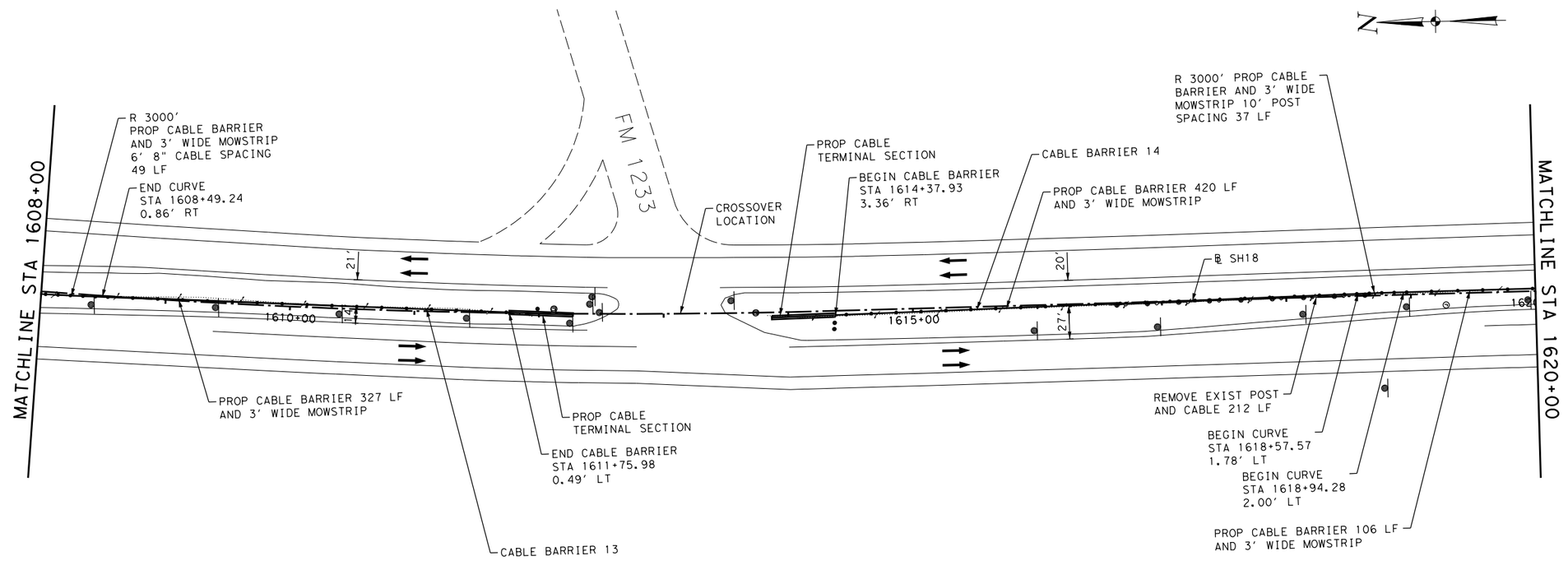
SH 18
PROPOSED PLAN
STA 1572+00 TO STA 1596+00

SHEET 4 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	53
APPROVED	CONT.	SECT.	JOB	
	005	04	082	





LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
3. ADJUST POST SPACING AND RIPRAP LIMITS AS NECESSARY AVOIDING DRAINAGE FEATURES, SIGNS, AND OTHER FEATURES. REVIEW ADJUSTMENTS WITH THE ENGINEER.

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SH 18
PROPOSED PLAN
STA 1596+00 TO STA 1620+00

SHEET 5 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	54
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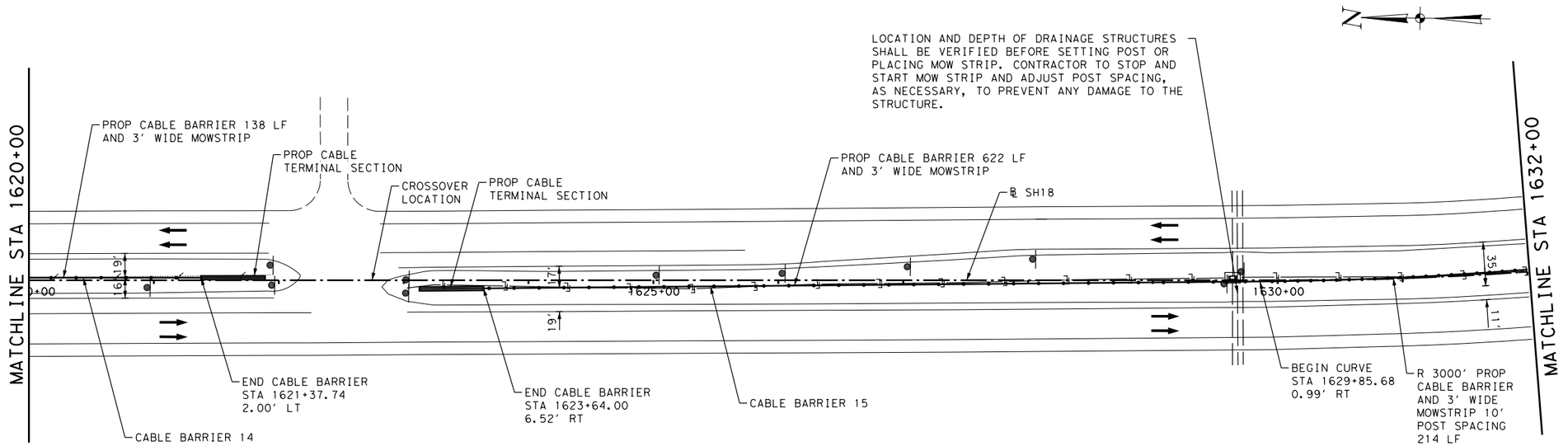

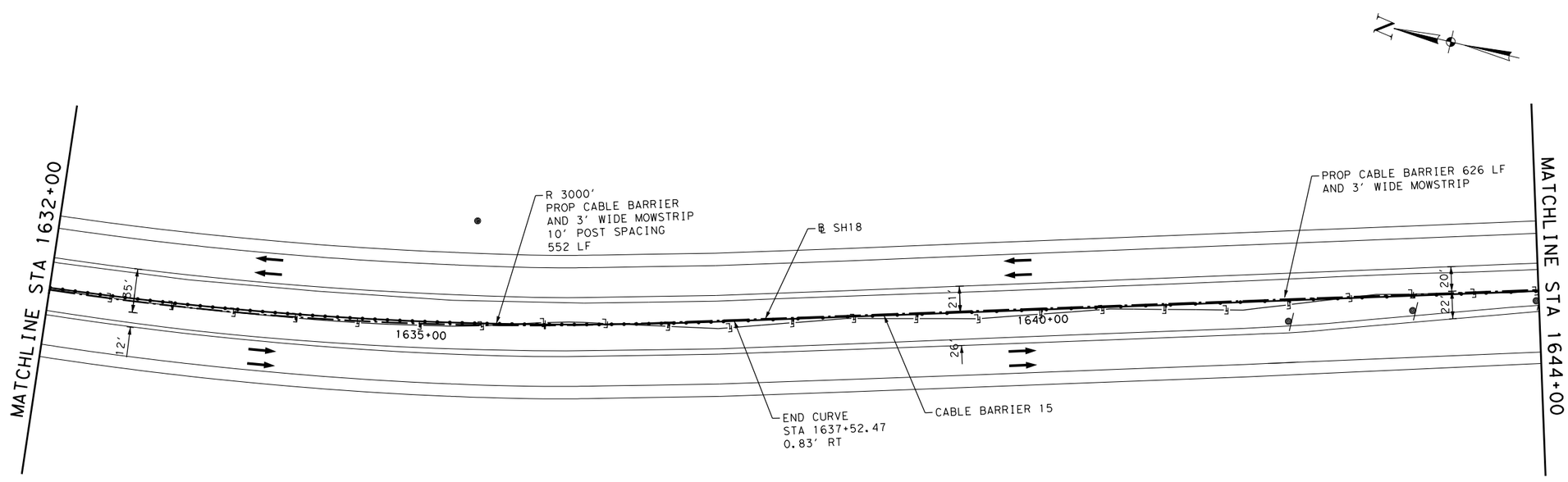

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
3. ADJUST POST SPACING AND RIPRAP LIMITS AS NECESSARY AVOIDING DRAINAGE FEATURES, SIGNS, AND OTHER FEATURES. REVIEW ADJUSTMENTS WITH THE ENGINEER.

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SH 18
PROPOSED PLAN
STA 1620+00 TO STA 1644+00

SHEET 6 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	55
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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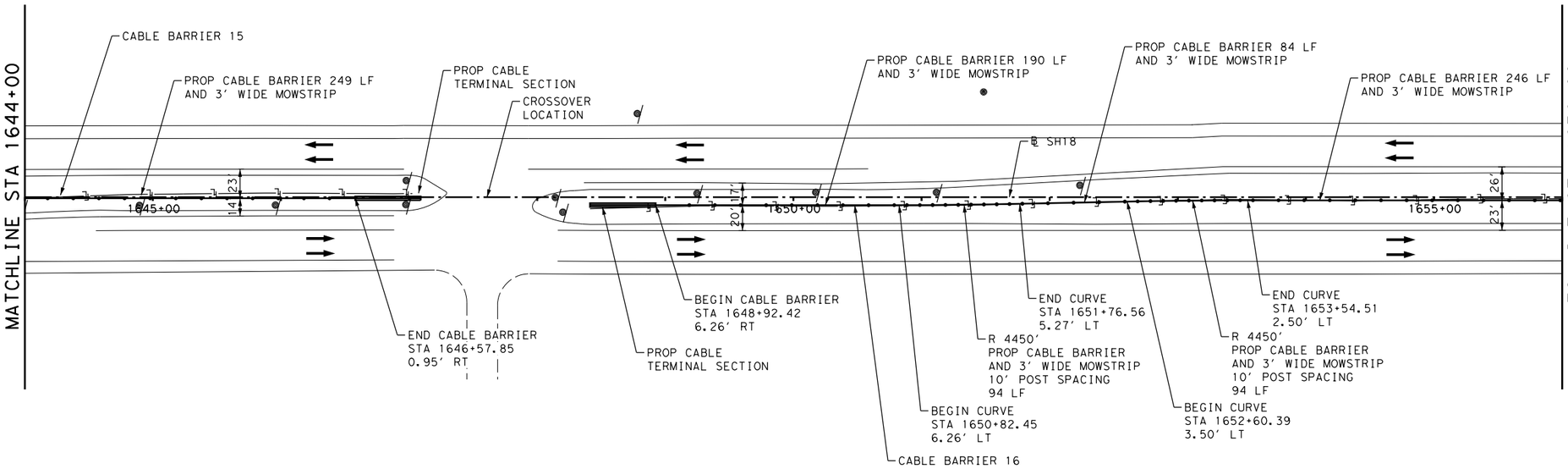

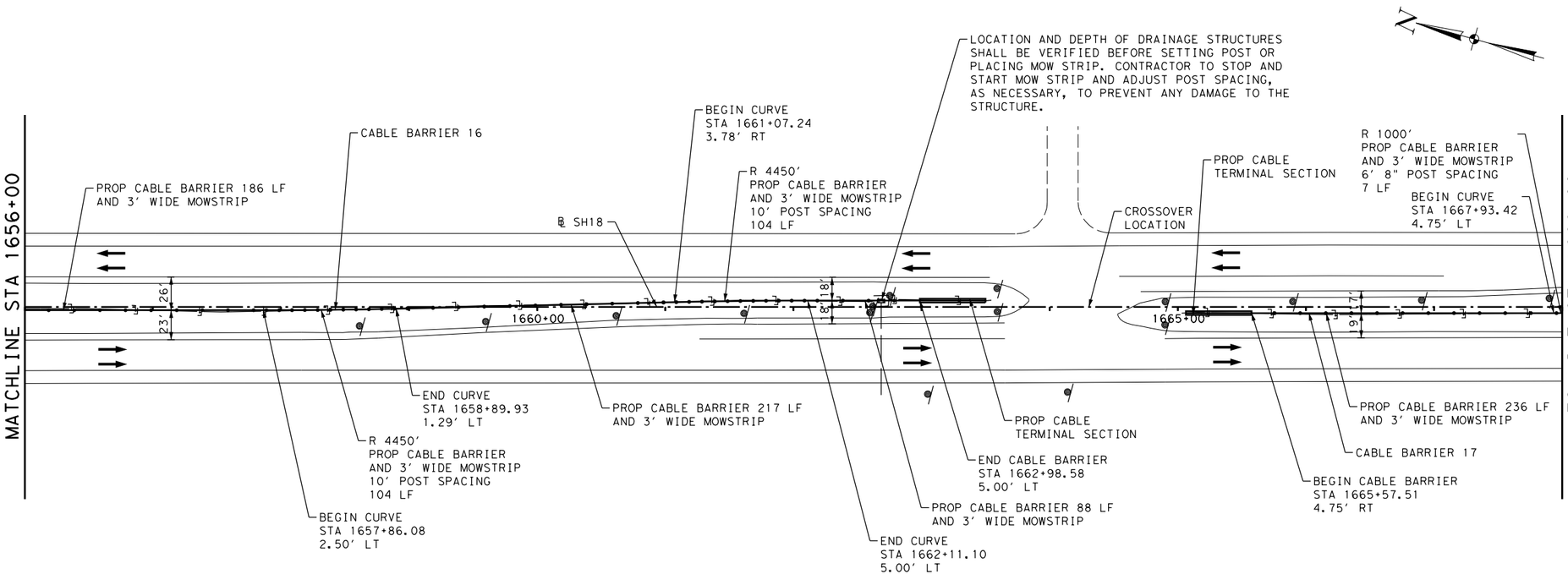

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
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SH 18
PROPOSED PLAN
STA 1644+00 TO STA 1668+00

SHEET 7 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	56
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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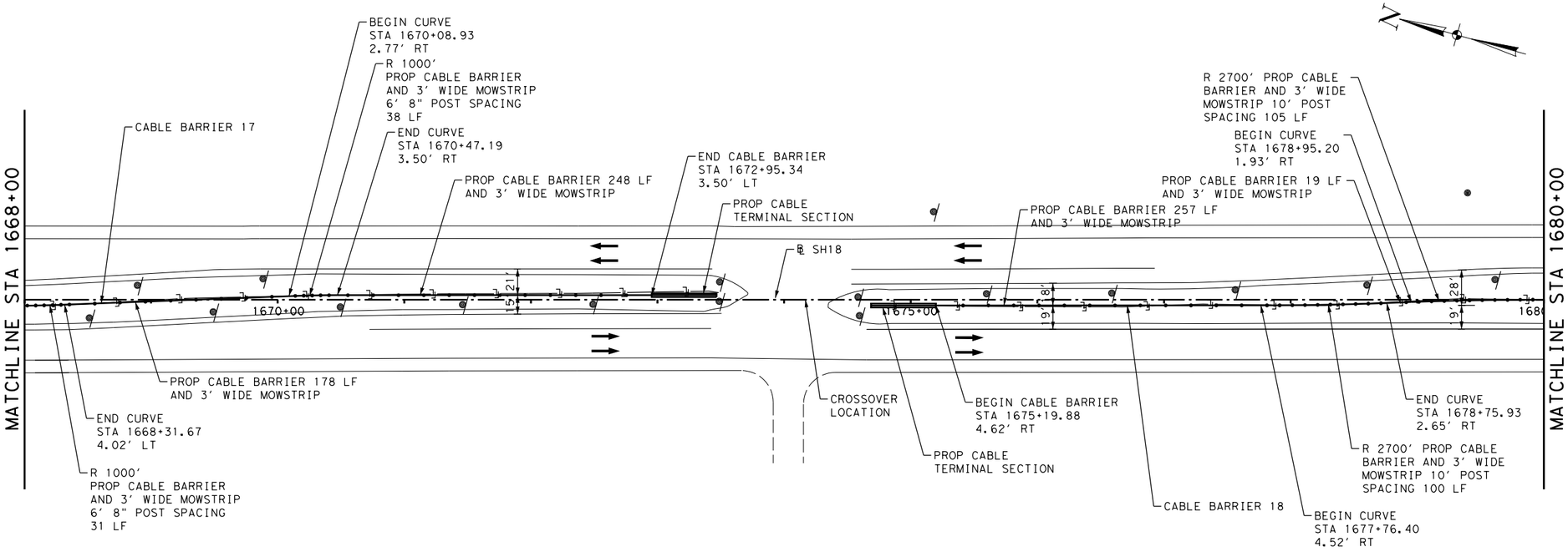

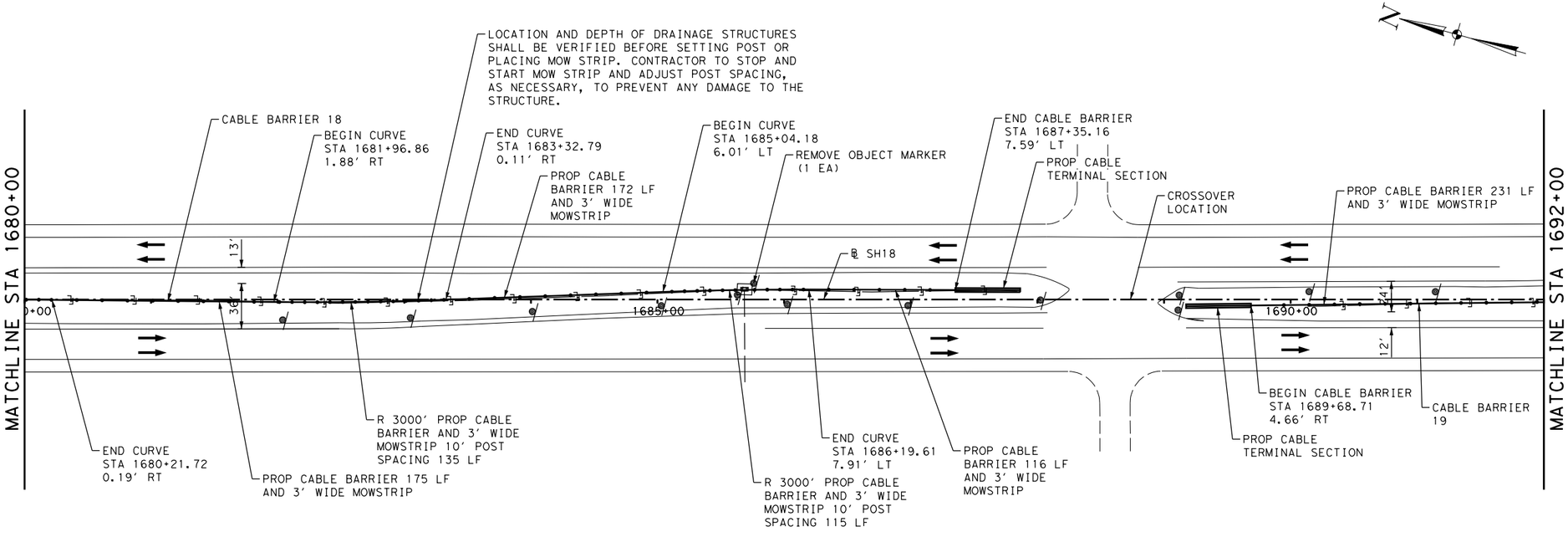

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
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SH 18
PROPOSED PLAN
STA 1668+00 TO STA 1692+00

SHEET 8 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
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APPROVED	CONT.	SECT.	JOB	
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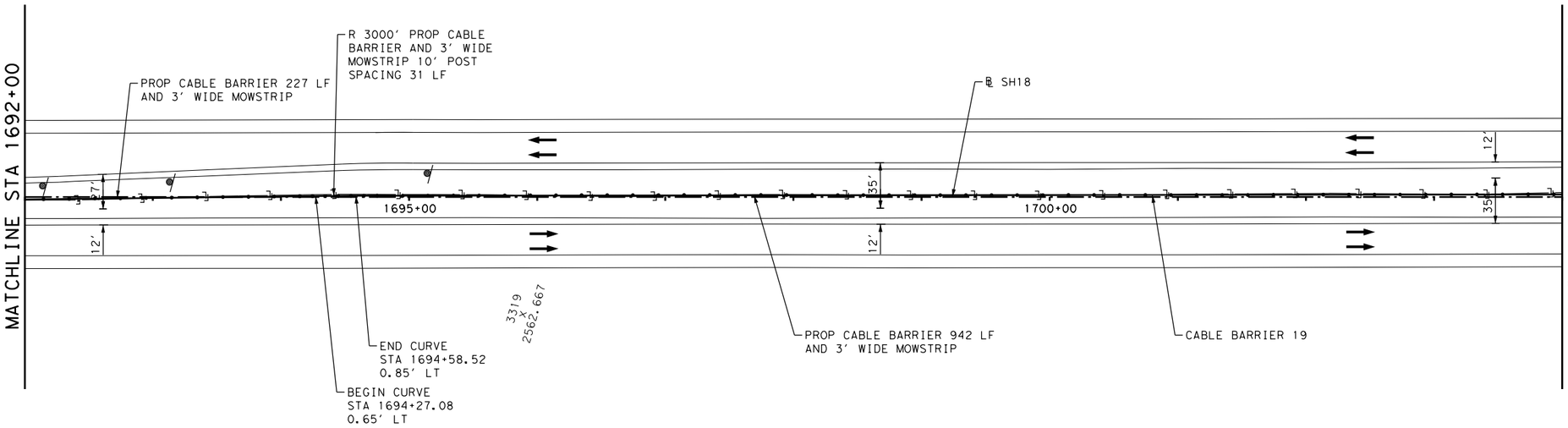

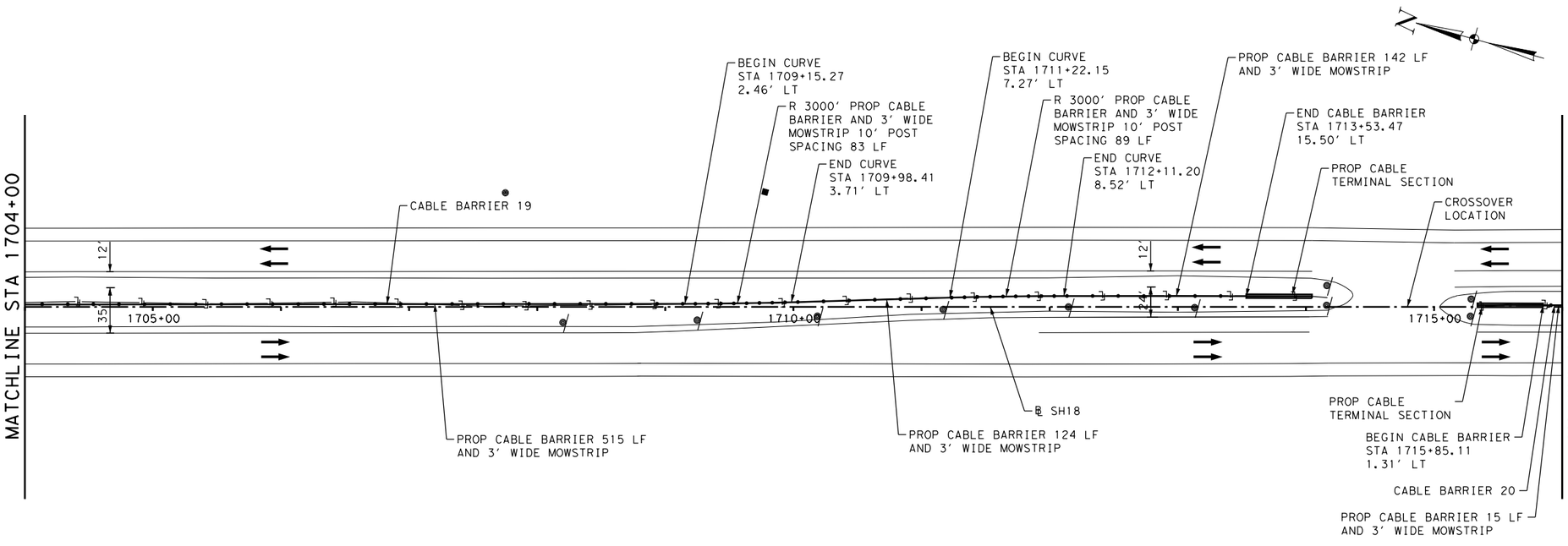

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
3. ADJUST POST SPACING AND RIPRAP LIMITS AS NECESSARY AVOIDING DRAINAGE FEATURES, SIGNS, AND OTHER FEATURES. REVIEW ADJUSTMENTS WITH THE ENGINEER.

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NO.	DATE	REVISION	APPROVED

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SH 18
PROPOSED PLAN
STA 1692+00 TO STA 1716+00

SHEET 9 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	58
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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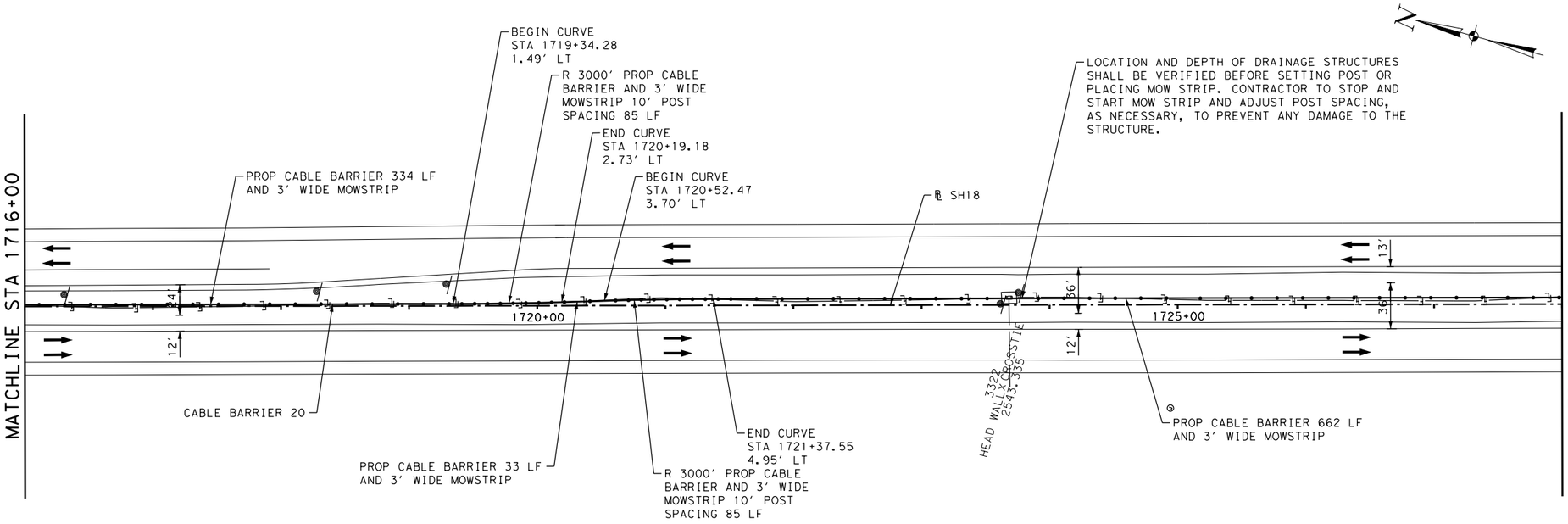

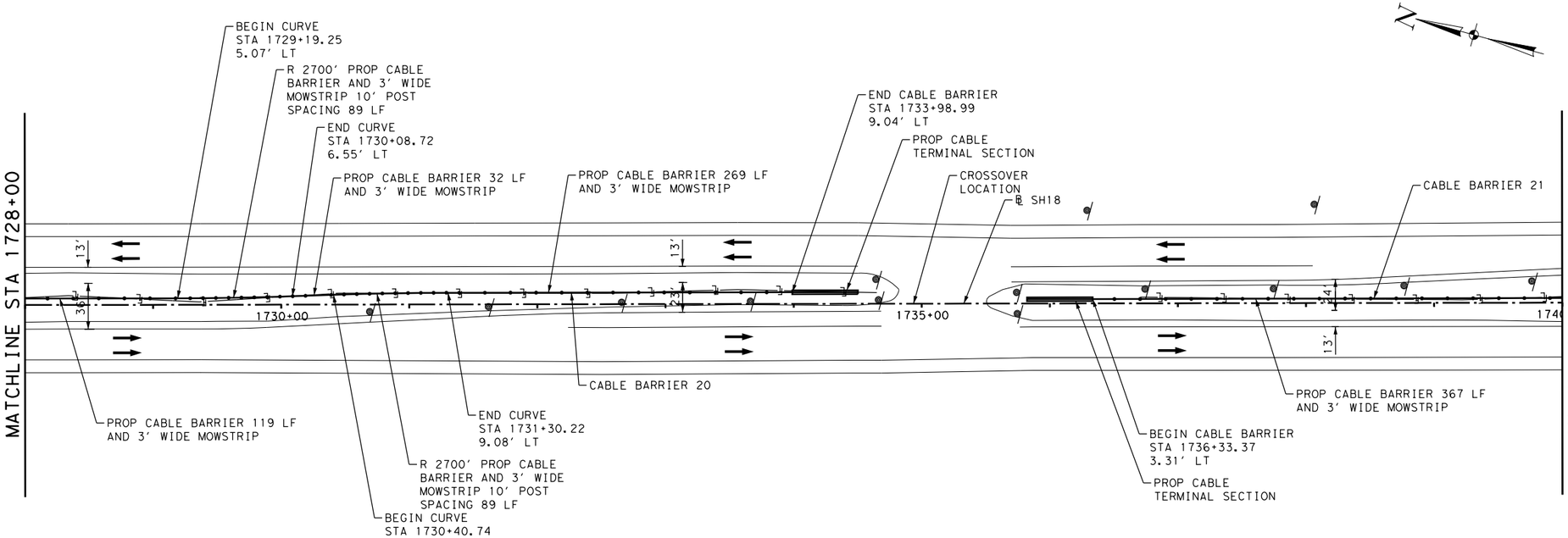

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
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SH 18
PROPOSED PLAN
STA 1716+00 TO STA 1740+00

SHEET 10 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	59
APPROVED	CONT.	SECT.	JOB	
	005	04	082	

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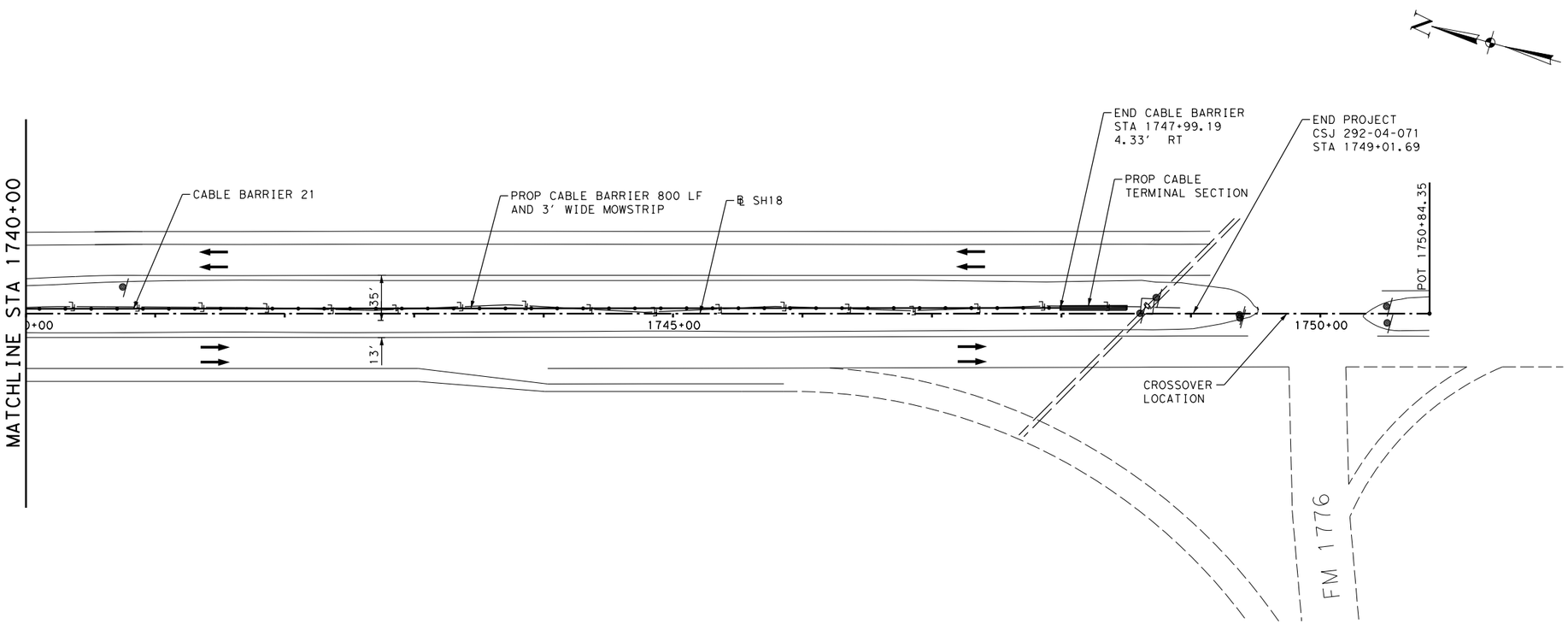

LEGEND:

- DIRECTION OF TRAVEL
- CABLE BARRIER END TREATMENT
- CABLE BARRIER (CASS TL-4)
- REGRADE SIDE SLOPES
- (#) PROPOSED SIGN

NOTES

1. CABLE BARRIER POST SPACING WILL BE 20' IN ACCORDANCE WITH CASS(TL4)-14 UNLESS OTHERWISE NOTED IN THE PLANS.
2. MEDAIN DITCH FLOWLINES ARE APPROXIMATE. INSTALL BARRIER AT LEAST BUT NO MORE THAN 1' FROM THE ACTUAL DITCH BOTTOM TO BE VERIFIED BY CONTRACTOR.
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SH 18
PROPOSED PLAN
STA 1740+00 TO END

SHEET 11 OF 11

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	60
APPROVED	CONT.	SECT.	JOB	
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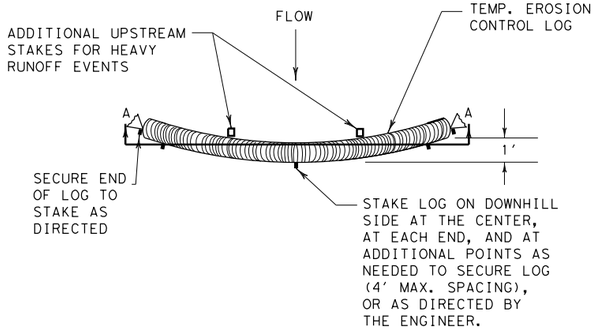
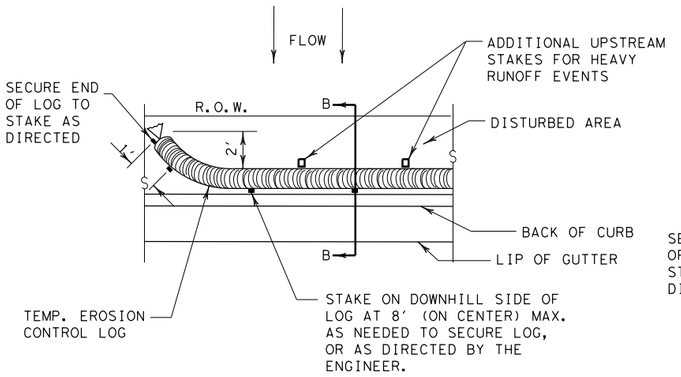
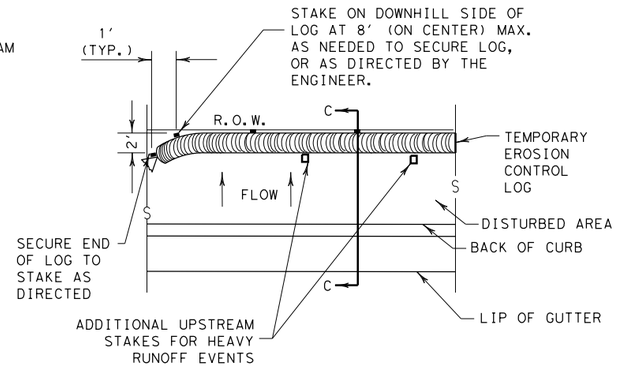


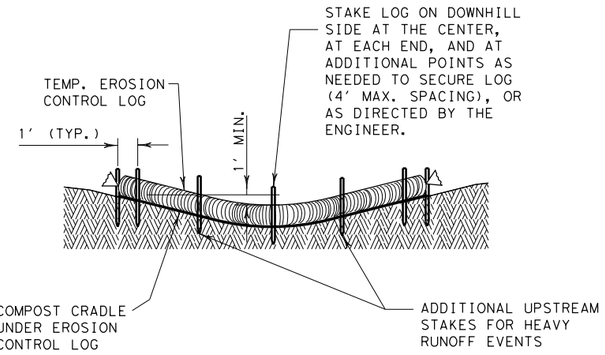
PLAN VIEW



PLAN VIEW



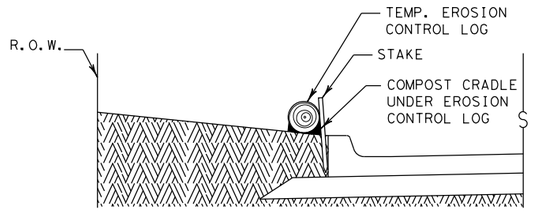
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

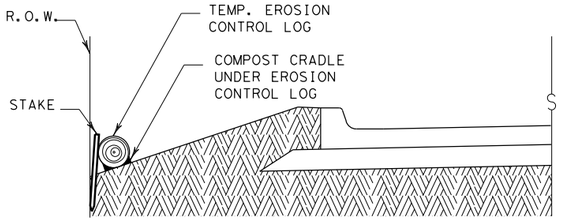
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

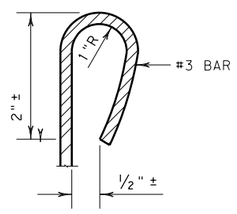
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

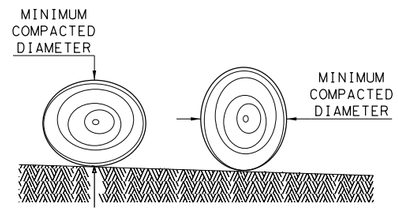
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation | Design Division Standard

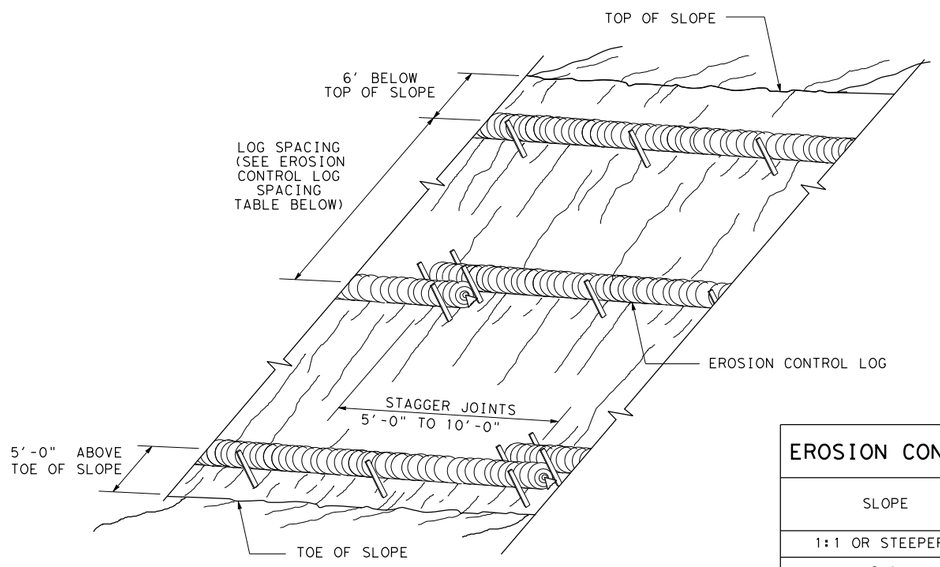
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

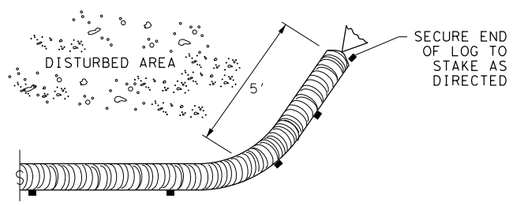
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	005	04	082	IH 20, ETC	
	DIST	COUNTY		SHEET NO.	
	ODA	MARTIN, ETC		89	

DATE:
FILE:



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

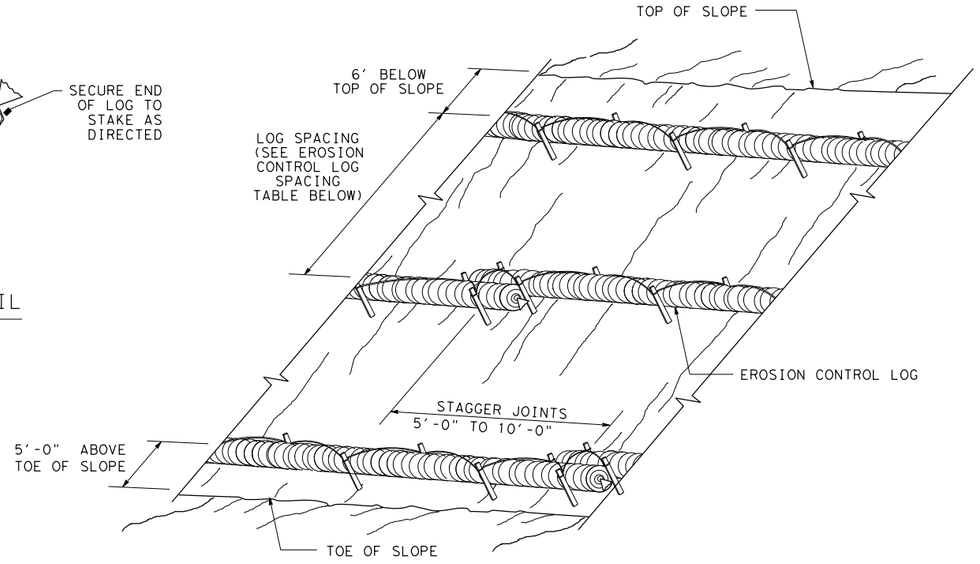
CL-SST



END SECTION RAP DETAIL

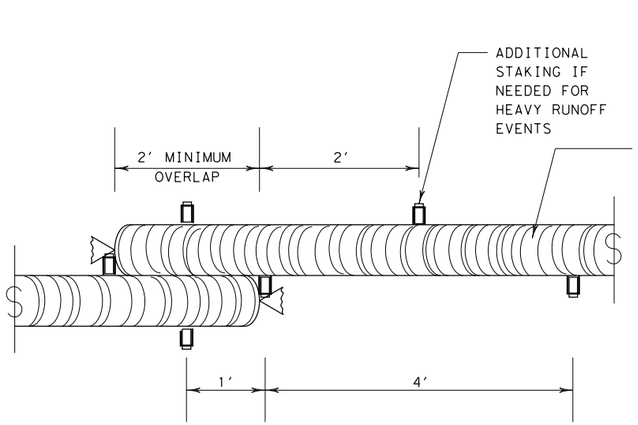
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

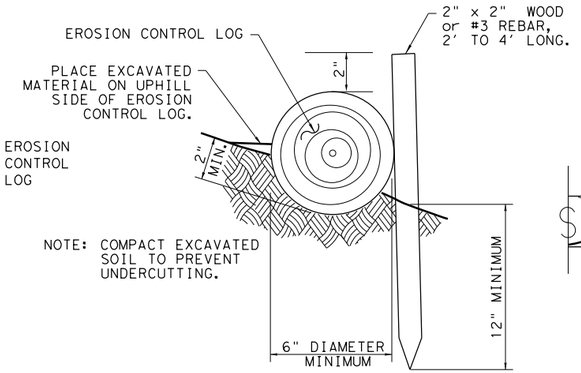
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

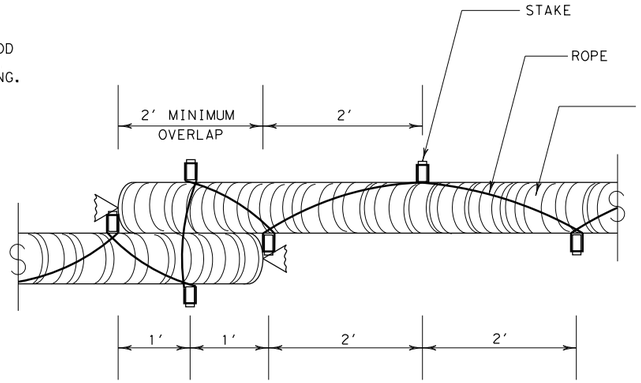




STAKE AND TRENCHING ANCHORING DETAIL

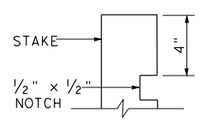
CL-SST

TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"

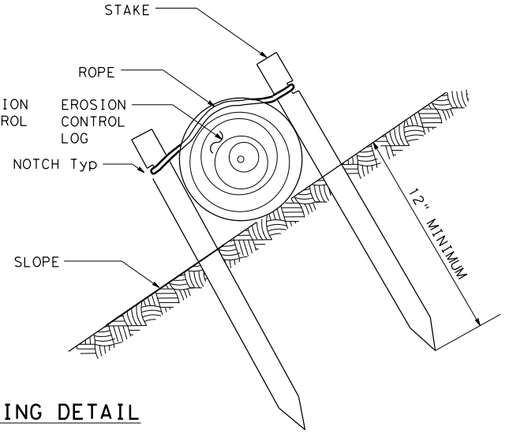


STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL



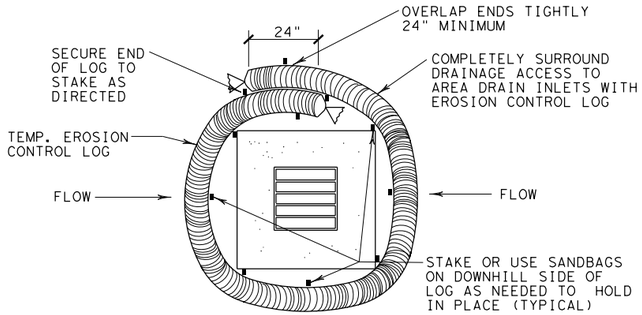
Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

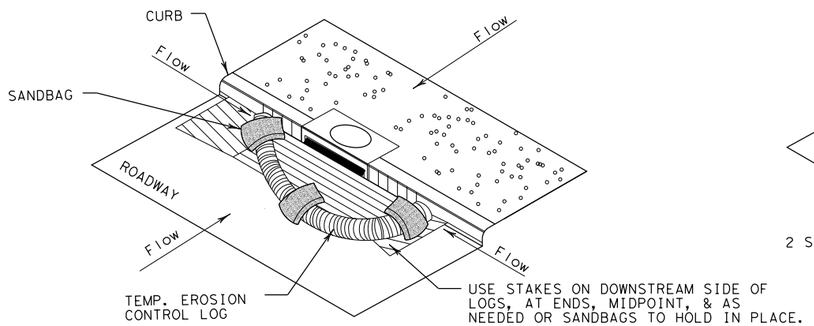
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	005	04	082	IH 20, ETC	
	DIST	COUNTY		SHEET NO.	
	ODA	MARTIN, ETC		90	

DATE:
FILE:



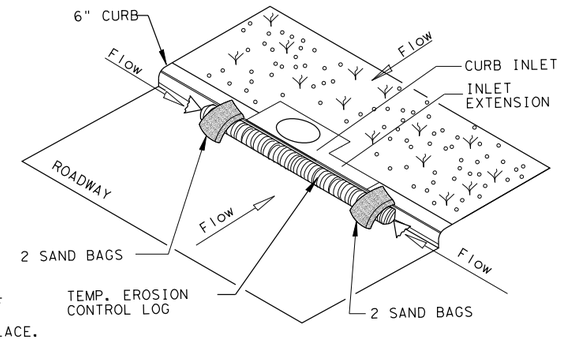
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

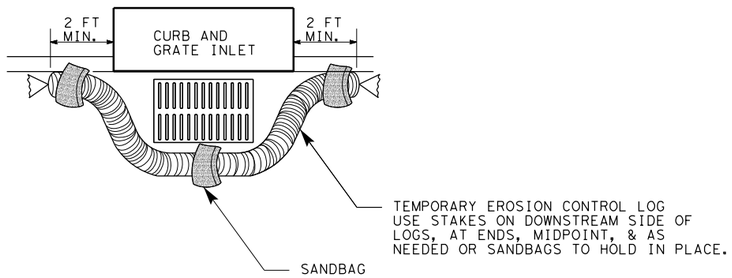
CL-CI



EROSION CONTROL LOG AT CURB INLET

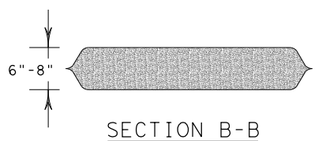
CL-CI

NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.

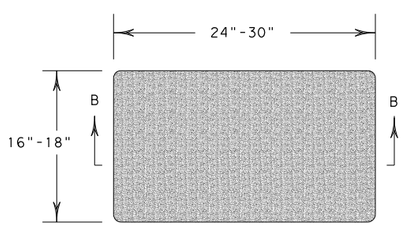


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS			
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY			
REVISIONS	005	04	082	IH 20, ETC			
	DIST	COUNTY		SHEET NO.			
	ODA	MARTIN, ETC		91			

DRILLING LOG

WinCore Version 3.3

County	Ward	Hole	B-1	District	Odessa
Highway	SH 18	Structure	Cable Barriers	Date	12/13/2022
CSJ	0292-04-071	Station		Grnd. Elev.	2529.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	Properties: LL	Properties: PI	Properties: Wet Den. (pcf)	Additional Remarks
			SAND, silty, loose to slightly compact, brown			5				#200(%)-13; SPT(mod):9-12-9
										SPT(mod):26-19-12
2525.			SAND, clayey, loose to very dense, light gray and tan (SC)							SPT(mod):3-3-3
5		12 (6) 8 (6)								
										SPT(mod):28-50/4in
										SPT(mod):42-31-25
10		50 (1) 50 (1)								
						9	32	11		#200(%)-39; SPT(mod):21-24-30
15		50 (6) 50 (2)								
										SPT(mod):50/5in
2509. 20		50 (1) 50 (1)								
25										

Remarks: Advancement Method: Dry auger to completion. GPS: (Lat: 31.48200, Lon: -102.88520). SPT testing was modified using a 170-lb hammer with a 24-inch drop height. Ground elevation based on Google Earth Imagery.

The ground water elevation was not determined during the course of this boring.

Driller: B. Perez Logger: E. Sanchez Organization: Terracon Consultants, Inc.

Prepared By: AJM Reviewed By: PGB

DRILLING LOG

WinCore Version 3.3

County	Ward	Hole	B-2	District	Odessa
Highway	SH 18	Structure	Cable Barriers	Date	12/13/2022
CSJ	0292-04-071	Station		Grnd. Elev.	2561.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	Properties: LL	Properties: PI	Properties: Wet Den. (pcf)	Additional Remarks
			SAND, silty, very dense, redish brown, tan, and light gray							SPT(mod):1-2-4
										SPT(mod):8-50/3in
										SPT(mod):40-37-50/5in
5		50 (2) 50 (2)								
						8				#200(%)-18; SPT(mod):10-50/2in
										SPT(mod):50/3in
10		50 (1) 50 (1)								
										SPT(mod):50/6in
15		50 (1) 50 (1)								
										SPT(mod):50/5in
2541. 20		50 (1) 50 (1)								
25										

Remarks: Advancement Method: Dry auger to completion. GPS: (Lat: 31.49480, Lon: -102.88970). SPT testing was modified using a 170-lb hammer with a 24-inch drop height. Ground elevation based on Google Earth Imagery.

The ground water elevation was not determined during the course of this boring.

Driller: B. Perez Logger: E. Sanchez Organization: Terracon Consultants, Inc.

Prepared By: AJM Reviewed By: PGB

NO.	DATE	REVISION	APPROVED

Texas Department of Transportation

Terracon
Consulting Engineers and Scientists

IH 20 & SH 18
BORE LOGS

SHEET 1 OF 5

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	92
	0005	04	082, etc.	

DRILLING LOG

WinCore Version 3.3

County	Ward	Hole	B-3	District	Odessa
Highway	SH 18	Structure	Cable Barriers	Date	12/13/2022
CSJ	0292-04-071	Station		Grnd. Elev.	2572.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			SAND, silty, very loose to very dense, brown, tan, and light gray, with scattered gravel							SPT(mod):3-18-40
						14				#200(%)-17; SPT(mod):9-7-5
5		5 (6) 5 (6)								SPT(mod):3-21-40
										SPT(mod):20-16-21
						12				#200(%)-26; SPT(mod):40-50/6in
10		50 (3) 50 (2)								
										SPT(mod):50/4in
15		50 (2) 50 (1)								
										SPT(mod):50/4in
2552. 20		50 (1) 50 (1)								
25										

Remarks: Advancement Method: Dry auger to completion. GPS: (Lat: 31.50870, Lon: -102.89460). SPT testing was modified using a 170-lb hammer with a 24-inch drop height. Ground elevation based on Google Earth Imagery.

The ground water elevation was not determined during the course of this boring.

Driller: B. Perez Logger: E. Sanchez Organization: Terracon Consultants, Inc.

Prepared By: AJM Reviewed By: PGB

DRILLING LOG

WinCore Version 3.3

County	Ward	Hole	B-4	District	Odessa
Highway	SH 18	Structure	Cable Barriers	Date	12/13/2022
CSJ	0292-04-071	Station		Grnd. Elev.	2575.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			SAND, silty, dense, brown, light gray, and tan							SPT(mod):4-8-11
						8				#200(%)-37; SPT(mod):4-5-9
5		42 (6) 50 (2)								SPT(mod):30-34-25
										SPT(mod):21-20-22
										SPT(mod):18-22-22
10		50 (3) 50 (2)								
										SPT(mod):28-33-30
15		48 (6) 50 (3)								
										SPT(mod):18-26-25
2555. 20		50 (6) 50 (4)								
25										

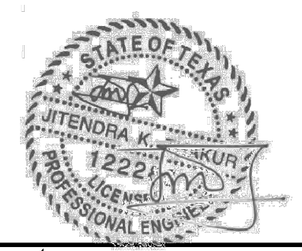
Remarks: Advancement Method: Dry auger to completion. GPS: (Lat: 31.52220, Lon: -102.89580). SPT testing was modified using a 170-lb hammer with a 24-inch drop height. Ground elevation based on Google Earth Imagery.

The ground water elevation was not determined during the course of this boring.

Driller: B. Perez Logger: E. Sanchez Organization: Terracon Consultants, Inc.

Prepared By: AJM Reviewed By: PGB

NO.	DATE	REVISION	APPROVED



Texas Department of Transportation

Terracon
Consulting Engineers and Scientists

IH 20 & SH 18
BORE LOGS

SHEET 2 OF 5

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
CHECKED	STATE	DIST.	COUNTY	SHEET NO.
APPROVED	TEXAS	ODA	MARTIN, ETC	93
	CONT.	SECT.	JOB	
	0005	04	082, etc.	

DRILLING LOG

WinCore Version 3.3

County	Ward	Hole	B-5	District	Odessa
Highway	SH 18	Structure	Cable Barriers	Date	12/13/2022
CSJ	0292-04-071	Station		Grnd. Elev.	2584.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			SAND, clayey, compact, tan and brown, with scattered gravel and asphaltic concrete debris (FILL) (SC)			11	29	8		#200(%)-43; SPT(mod):9-19-18
										SPT(mod):23-31-28
2580.			SAND, clayey, compact to dense, brown and tan (SC)							SPT(mod):8-6-5
5		47 (6) 27 (6)								
										SPT(mod):3-4-5
						13	34	13		#200(%)-25; SPT(mod):50/6in
10		50 (6) 50 (1)								
										SPT(mod):35-40-50/6in
15		50 (5) 50 (3)								
										SPT(mod):23-38-22
2564. 20		42 (6) 50 (3)								
25										

Remarks: Advancement Method: Dry auger to completion. GPS: (Lat: 31.53730, Lon: -102.89470). SPT testing was modified using a 170-lb hammer with a 24-inch drop height. Ground elevation based on Google Earth Imagery.

The ground water elevation was not determined during the course of this boring.

Driller: B. Perez Logger: E. Sanchez Organization: Terracon Consultants, Inc.

Prepared By: AJM Reviewed By: PGB

DRILLING LOG

WinCore Version 3.3

County	Ward	Hole	B-6	District	Odessa
Highway	SH 18	Structure	Cable Barriers	Date	12/13/2022
CSJ	0292-04-071	Station		Grnd. Elev.	2608.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			SAND, silty, dense to very dense, tan and light gray, with scattered gravel							SPT(mod):9-3-2
										SPT(mod):6-19-27
										SPT(mod):21-18-13
5		50 (2) 50 (2)								
						10				#200(%)-19; SPT(mod):10-4-32
										SPT(mod):50/6in
10		50 (5) 50 (2)								
										SPT(mod):23-19-15
15		45 (6) 50 (4)								
										SPT(mod):18-50/6in
2588. 20		22 (6) 50 (2)								
25										

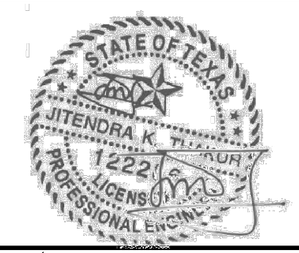
Remarks: Advancement Method: Dry auger to completion. GPS: (Lat: 31.54820, Lon: -102.89400). SPT testing was modified using a 170-lb hammer with a 24-inch drop height. Ground elevation based on Google Earth Imagery.

The ground water elevation was not determined during the course of this boring.

Driller: B. Perez Logger: E. Sanchez Organization: Terracon Consultants, Inc.

Prepared By: AJM Reviewed By: PGB

NO.	DATE	REVISION	APPROVED



Texas Department of Transportation

Terracon
Consulting Engineers and Scientists

IH 20 & SH 18
BORE LOGS

SHEET 3 OF 5

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	94
	0005	04	082, etc.	

DRILLING LOG

WinCore Version 3.3

County	Martin	Hole	B-7	District	Odessa
Highway	IH 20	Structure	Cable Barriers	Date	12/14/2022
CSJ	0005-04-082	Station		Grnd. Elev.	2688.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			CLAY, lean, sandy, very stiff, brown (SC)			8	34	13		#200(%)-52; SPT(mod):4-19-30
										SPT(mod):23-25-15
2684.			SAND, clayey, compact, tan and light gray, with scattered gravel (SC)							SPT(mod):10-8-10
5		36 (6) 29 (6)								
										SPT(mod):12-19-15
										SPT(mod):9-10-10
10		28 (6) 21 (6)								
						7				SPT(mod):19-23-17
15		27 (6) 32 (6)								
										SPT(mod):13-17-15
2668. 20		32 (6) 37 (6)								
25										

Remarks: Advancement Method: Dry auger to completion. GPS: (Lat: 32.13950, Lon: -101.80110). SPT testing was modified using a 170-lb hammer with a 24-inch drop height. Ground elevation based on Google Earth Imagery.

The ground water elevation was not determined during the course of this boring.

Driller: B. Perez Logger: E. Sanchez Organization: Terracon Consultants, Inc.

Prepared By: AJM Reviewed By: PGB

DRILLING LOG

WinCore Version 3.3

County	Martin	Hole	B-8	District	Odessa
Highway	IH 20	Structure	Cable Barriers	Date	12/17/2022
CSJ	0005-04-082	Station		Grnd. Elev.	2692.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			SAND, silty, clayey, slightly compact to dense, reddish brown and tan, with scattered gypsum and gravel							SPT(mod):4-5-7
										SPT(mod):9-14-14
						37	20	4		#200(%)-32; SPT(mod):30-27-33
5		50 (4) 50 (2)								
										SPT(mod):16-20-18
										SPT(mod):18-20-17
10		50 (5) 50 (5)								
										SPT(mod):17-20-23
15		37 (6) 43 (6)								
										SPT(mod):8-7-14
2672. 20		21 (6) 18 (6)								
25										

Remarks: Advancement Method: Dry auger to completion. GPS: (Lat: 32.14140, Lon: -101.78650). SPT testing was modified using a 170-lb hammer with a 24-inch drop height. Ground elevation based on Google Earth Imagery.

The ground water elevation was not determined during the course of this boring.

Driller: B. Perez Logger: E. Sanchez Organization: Terracon Consultants, Inc.

Prepared By: AJM Reviewed By: PGB

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS JITENDRA K THAKUR 122 LICENSED PROFESSIONAL ENGINEER

Texas Department of Transportation

Terracon
Consulting Engineers and Scientists

IH 20 & SH 18
BORE LOGS

SHEET 4 OF 5

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
				IH 20, ETC
DESIGNED	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	95
	0005	04	082, etc.	

DRILLING LOG

WinCore Version 3.3

County	Martin	Hole	B-9	District	Odessa
Highway	IH 20	Structure	Cable Barriers	Date	12/17/2022
CSJ	0005-04-082	Station		Grnd. Elev.	2698.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			SAND, silty, dense, reddish brown, with scattered gravel							SPT(mod):3-4-11
						3				#200(%)-15; SPT(mod):13-18-15
										SPT(mod):16-15-15
5		48 (6) 50 (6)								
2692.			SAND, silty, clayey, dense, reddish brown, light gray, and tan, with scattered gravel							
										SPT(mod):4-29-19
						5	24	4		#200(%)-30; SPT(mod):20-16-12
10		40 (6) 50 (6)								
										SPT(mod):21-17-15
15		43 (6) 50 (6)								
										SPT(mod):23-33-40
2678. 20		36 (6) 50 (5)								
25										

Remarks: Advancement Method: Dry auger to completion. GPS: (Lat: 32.14050, Lon: -101.77160). SPT testing was modified using a 170-lb hammer with a 24-inch drop height. Ground elevation based on Google Earth Imagery.

The ground water elevation was not determined during the course of this boring.

Driller: B. Perez Logger: E. Sanchez Organization: Terracon Consultants, Inc.

Prepared By: AJM Reviewed By: PGB

DRILLING LOG

WinCore Version 3.3

County	Martin	Hole	B-10	District	Odessa
Highway	IH 20	Structure	Cable Barriers	Date	12/17/2022
CSJ	0005-04-082	Station		Grnd. Elev.	2649.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			SAND, silty, dense, brown			4				#200(%)-25; SPT(mod):6-11-40
2647.			SAND, silty, clayey, very dense, light gray							SPT(mod):31-50/5in
										SPT(mod):50/4in
5		50 (1) 50 (1)								
						6	23	7		#200(%)-23; SPT(mod):50/6in
										SPT(mod):50/4in
10		50 (0) 50 (0)								
										SPT(mod):50/4in
15		50 (1) 50 (1)								
2633.										
20										
25										

Remarks: Advancement Method: Dry auger to completion. GPS: (Lat: 32.14180, Lon: -101.75610). SPT testing was modified using a 170-lb hammer with a 24-inch drop height. Ground elevation based on Google Earth Imagery. Boring terminated at 16 feet due to auger refusal.

The ground water elevation was not determined during the course of this boring.

Driller: B. Perez Logger: E. Sanchez Organization: Terracon Consultants, Inc.

Prepared By: AJM Reviewed By: PGB

NO.	DATE	REVISION	APPROVED

Texas Department of Transportation

Terracon
Consulting Engineers and Scientists

IH 20 & SH 18
BORE LOGS

SHEET 5 OF 5

DRAWN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DESIGNED				IH 20, ETC
	STATE	DIST.	COUNTY	SHEET NO.
CHECKED	TEXAS	ODA	MARTIN, ETC	
APPROVED	CONT.	SECT.	JOB	96
	0005	04	082, etc.	