INDEX OF SHEETS

SEE SHEET 2

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

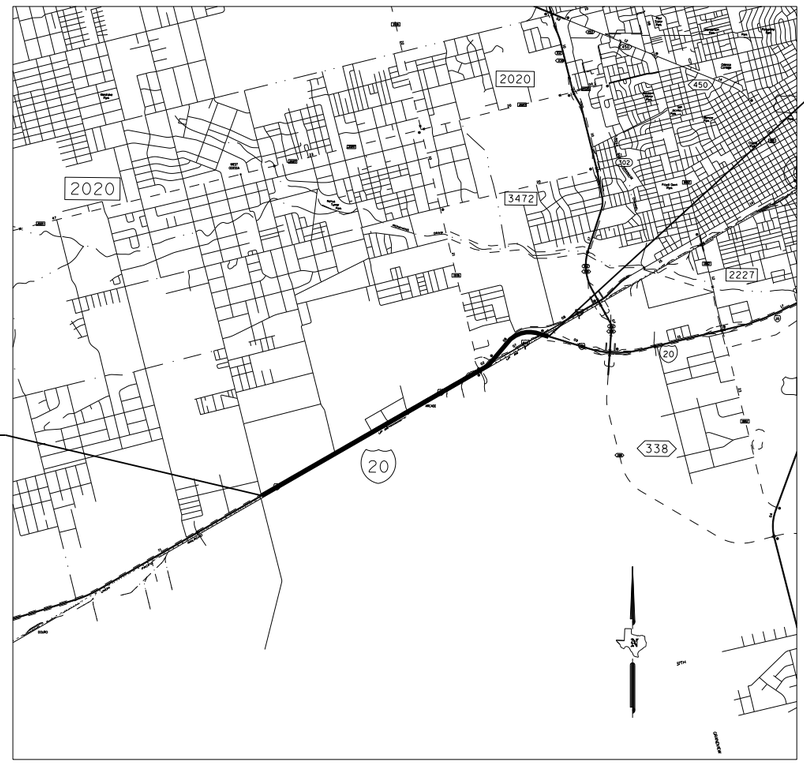
PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

STATE PROJECT NO. C 4-7-138

ECTOR
IH-20

NET LENGTH OF PROJECT: 4.977 MI.
LIMITS: FROM MOSS AVENUE TO EAST OF FM 1936

FOR THE CONSTRUCTION AND REHABILITATION OF EXISTING ROADWAY
CONSITING OF MILLING OF ACP AND PLACEMENT SP-B & SMAR-F
AND BRIDGE/INTERSECTION UPGRADES



PROJECT ENDS
CSJ: 0004-07-138
STA. 262+60.00
MILE POINT:30.572

PROJECT BEGINS
CSJ: 0004-07-138
STA. 00+00.00
MILE POINT:25.595

EQUATIONS: NONE

RAILROADS:UNION PACIFIC RAILROAD
STA. 41+50.00
STA. 259+00

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STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH 20

DESIGN SPEED = 75 MPH
URBAN INTERSTATE
ADT (CURRENT, 2022): 39,477
ADT (FUTURE, 20YR, 2042): 55,268

FINAL PLANS

CONTRACTOR:

LETTING DATE: 02/01/2024

DATE CONTRACTOR BEGAN WORK: XX/XX/XXXX

DATE WORK WAS COMPLETED: XX/XX/XXXX

DATE WORK WAS ACCEPTED: XX/XX/XXXX

FINAL CONTRACT COST: $X,XXX,XXX

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING: 11/30/2023 20__

DocuSigned by:
_____, P.E.
AREA ENGINEER
Adriana Geiger
5D27AB2475A943F...

RECOMMENDED FOR LETTING: 11/30/2023 20__

DocuSigned by:
_____, P.E.
DIRECTOR OF TRANSPORTATION
PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 11/30/2023 20__

DocuSigned by:
_____, P.E.
DISTRICT ENGINEER

COUNTY_____ PROJ. NO._____
HWY. NO._____ LETTING DATE_____
DATE ACCEPTED_____

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: SPECIAL LABOR PROVISIONS FOR STATE PROJECTS (000--008).

STAT08

ver. 2013.04.06

INDEX OF SHEETS

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

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

_____ , PE _____
DATE

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Texas Department of Transportation

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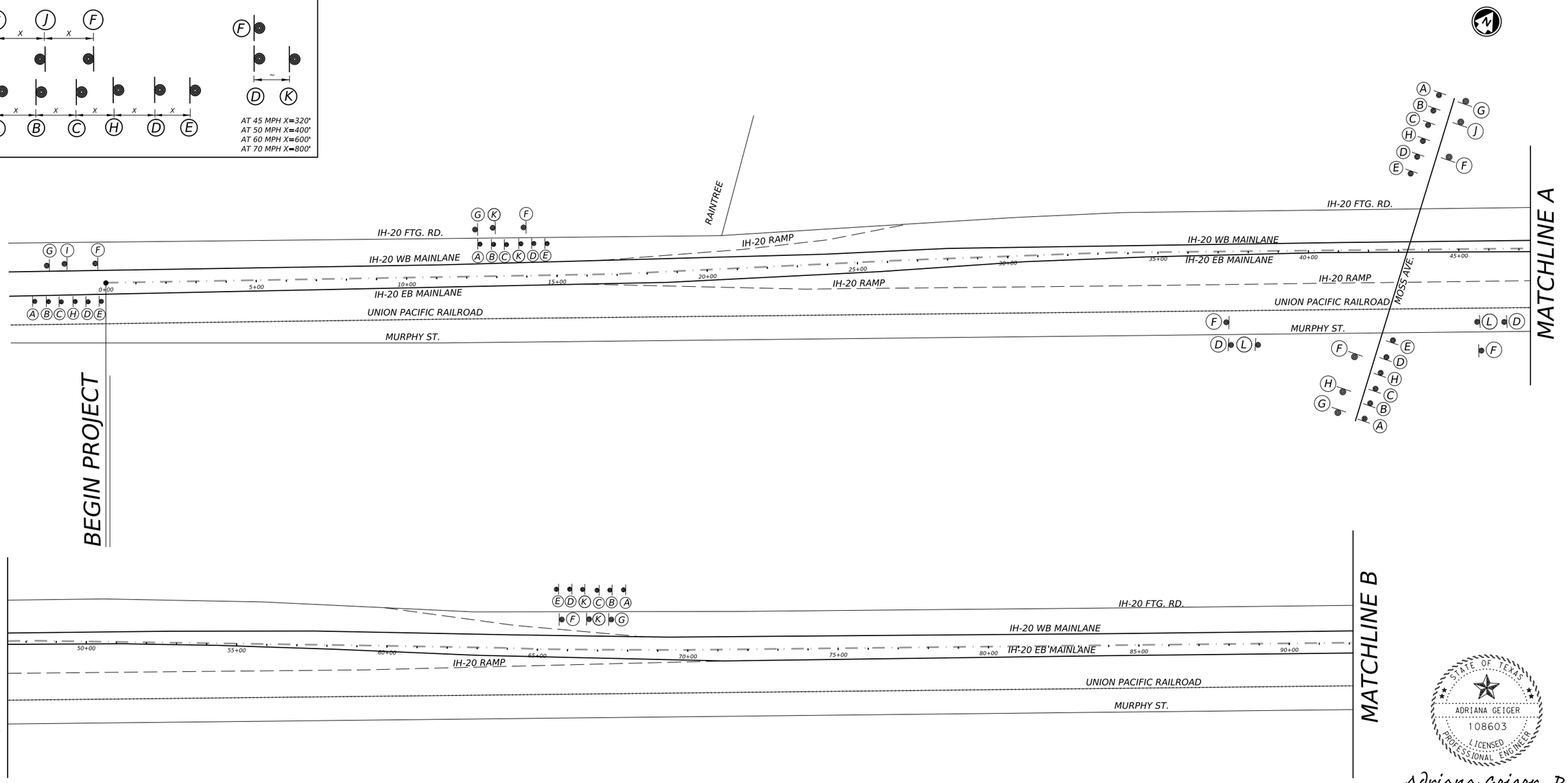
TYPICAL SIGN SPACING

ADJUST BASED ON BC(12)-21

AT 45 MPH X=320'
AT 50 MPH X=400'
AT 60 MPH X=600'
AT 70 MPH X=800'



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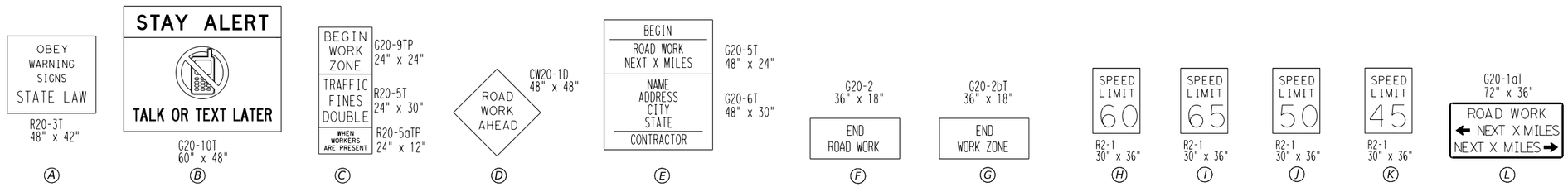
SCALE IN FEET



STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

PROJECT LAYOUT & ADVANCED WARNING

SHEET 1 OF 4

Texas Department of Transportation

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STATE	STATE DIST.	COUNTY	
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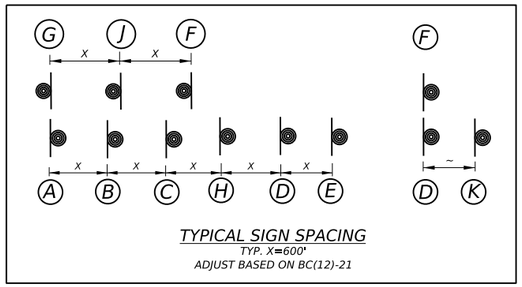
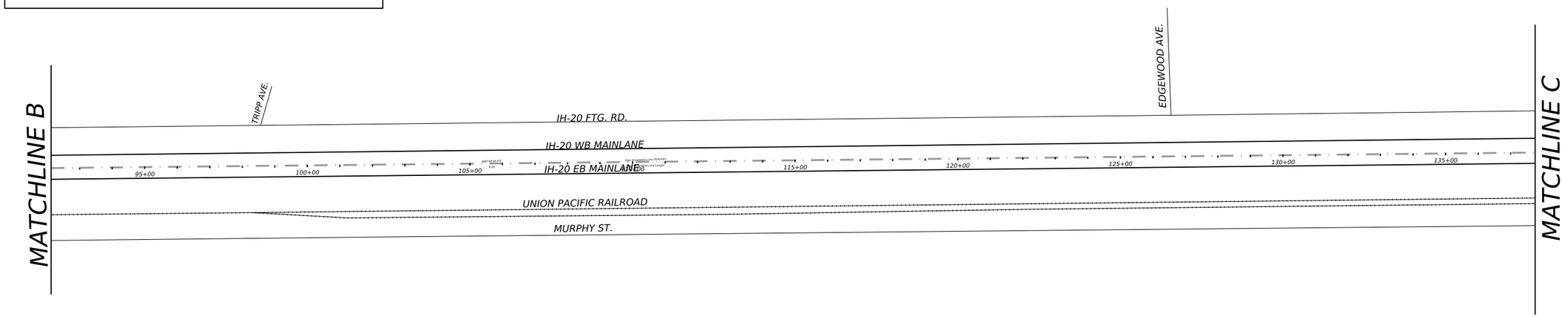
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

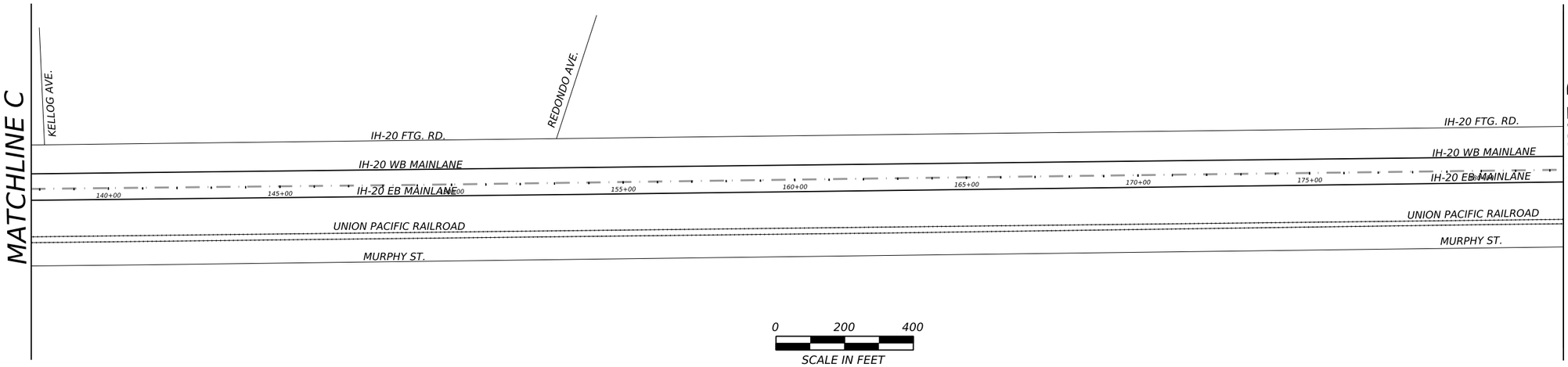


TYPICAL SIGN SPACING

TYP. X=600'

ADJUST BASED ON BC(12)-21





OBEY WARNING SIGNS STATE LAW
R20-3T
48" x 42"
Ⓐ

STAY ALERT
TALK OR TEXT LATER
G20-10T
60" x 48"
Ⓑ

BEGIN WORK ZONE — G20-9TP 24" x 24"
TRAFFIC FINES DOUBLE — R20-5T 24" x 30"
WHEN WORKERS ARE PRESENT — R20-5aTP 24" x 12"
Ⓒ

ROAD WORK AHEAD
CW20-1D
48" x 48"
Ⓓ

BEGIN ROAD WORK NEXT X MILES — G20-5T 48" x 24"
NAME ADDRESS CITY STATE CONTRACTOR — G20-6T 48" x 30"
Ⓔ

G20-2
36" x 18"
END ROAD WORK
Ⓕ

G20-2bT
36" x 18"
END WORK ZONE
Ⓖ

SPEED LIMIT 60
R2-1
30" x 36"
Ⓗ

SPEED LIMIT 65
R2-1
30" x 36"
Ⓘ

SPEED LIMIT 50
R2-1
30" x 36"
Ⓙ

SPEED LIMIT 45
R2-1
30" x 36"
Ⓚ

G20-1aT
72" x 36"
ROAD WORK
← NEXT X MILES
NEXT X MILES →
Ⓛ

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.

11/27/2023

PROJECT LAYOUT & ADVANCED WARNING

SHEET 2 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
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CONT.	SECT.	JOB	HIGHWAY NO.
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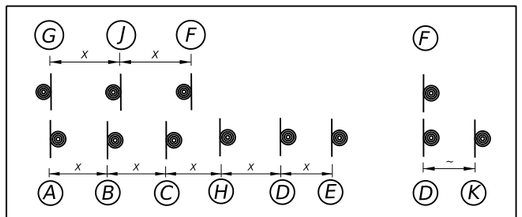
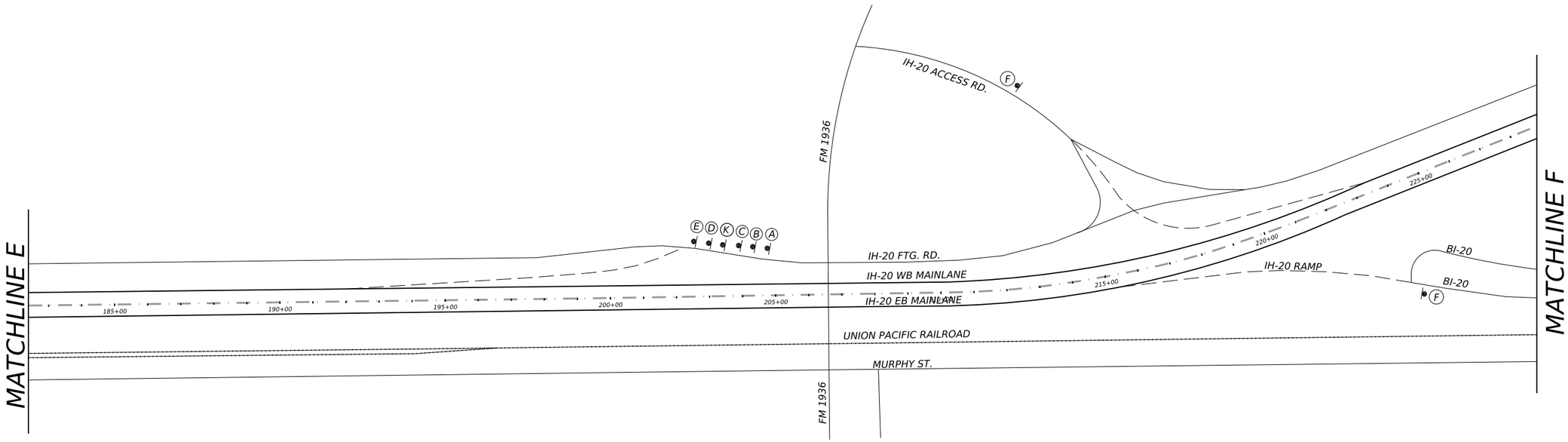


TYPICAL SIGN SPACING
TYP. X=600'
ADJUST BASED ON BC(12)-21



0 200 400
SCALE IN FEET

OBEY WARNING SIGNS STATE LAW
R20-3T
48" x 42"
Ⓐ

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Ⓒ

ROAD WORK AHEAD
CW20-1D
48" x 48"
Ⓓ

BEGIN ROAD WORK NEXT X MILES — G20-5T 48" x 24"
NAME ADDRESS CITY STATE CONTRACTOR — G20-6T 48" x 30"
Ⓔ

G20-2
36" x 18"
END ROAD WORK
Ⓕ

G20-2bT
36" x 18"
END WORK ZONE
Ⓖ

SPEED LIMIT 60
R2-1
30" x 36"
Ⓗ

SPEED LIMIT 65
R2-1
30" x 36"
Ⓘ

SPEED LIMIT 50
R2-1
30" x 36"
Ⓙ

SPEED LIMIT 45
R2-1
30" x 36"
Ⓚ

G20-1aT
72" x 36"
ROAD WORK
← NEXT X MILES
NEXT X MILES →
Ⓛ

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

PROJECT LAYOUT & ADVANCED WARNING

SHEET 3 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
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STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
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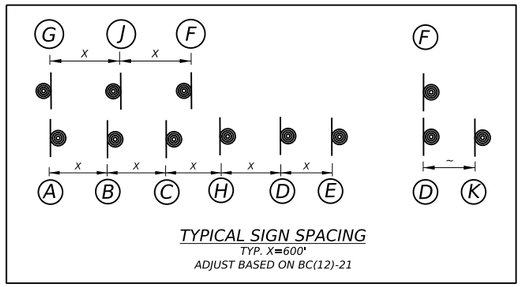
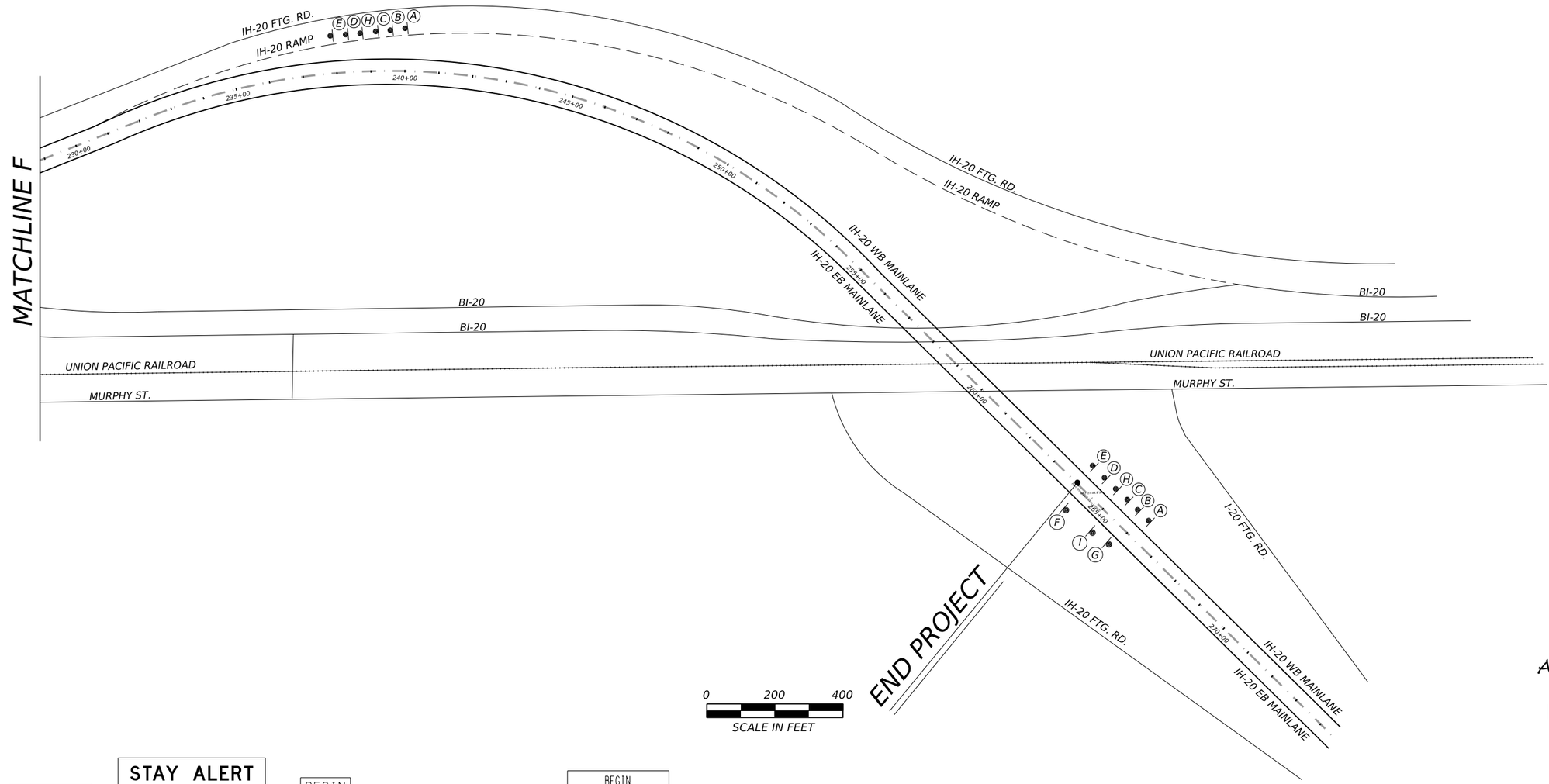


TYPICAL SIGN SPACING
TYP. X=600'
ADJUST BASED ON BC(12)-21



R20-3T
48" x 42"

Ⓐ

G20-10T
60" x 48"

Ⓑ

G20-9TP
24" x 24"

R20-5T
24" x 30"

R20-5aTP
24" x 12"

Ⓒ

CW20-1D
48" x 48"

Ⓓ

G20-5T
48" x 24"

G20-6T
48" x 30"

Ⓔ

G20-2
36" x 18"

Ⓕ

G20-2bT
36" x 18"

Ⓖ

R2-1
30" x 36"

Ⓗ

R2-1
30" x 36"

Ⓘ

R2-1
30" x 36"

Ⓙ

R2-1
30" x 36"

Ⓚ

G20-1aT
72" x 36"

Ⓛ

Adriana Geiger, P.E.
11/27/2023

PROJECT LAYOUT & ADVANCED WARNING

SHEET 4 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
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STATE	STATE DIST.	COUNTY	
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CONT.	SECT.	JOB	HIGHWAY NO.
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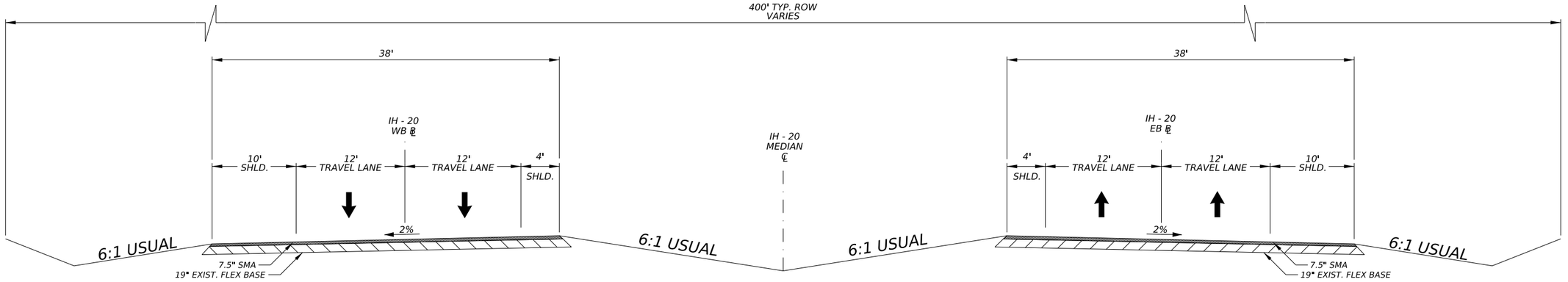


WESTBOUND LANE

STA. 00+00 TO 26+73
STA. 55+85 TO 256+54

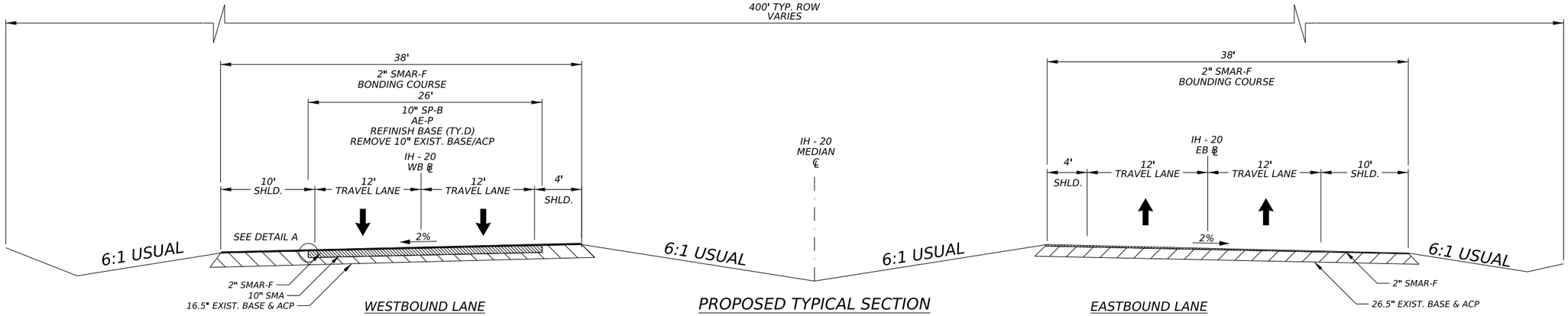
STA. 256+54 TO 262+10
LOCATED ON BRIDGE DETAILS

EXISTING TYPICAL SECTION

EASTBOUND LANE

STA. 00+00 TO 26+73
STA. 55+85 TO 255+50

STA. 255+50 TO 261+03
LOCATED ON BRIDGE DETAILS



WESTBOUND LANE

STA. 00+00 TO 26+73
STA. 55+85 TO 256+54

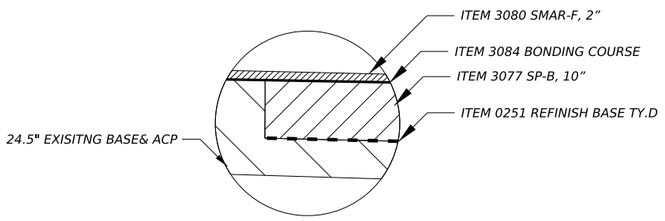
STA. 256+54 TO 262+10
LOCATED ON BRIDGE DETAILS

PROPOSED TYPICAL SECTION

EASTBOUND LANE

STA. 00+00 TO 26+73
STA. 55+85 TO 255+50

STA. 255+50 TO 261+03
LOCATED ON BRIDGE DETAILS



DETAIL A

NOT TO SCALE
SEE BRIDGE TIE IN DETAILS FOR MORE INFORMATION

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

TYPICAL SECTIONS

SHEET 1 OF 3

Texas Department of Transportation

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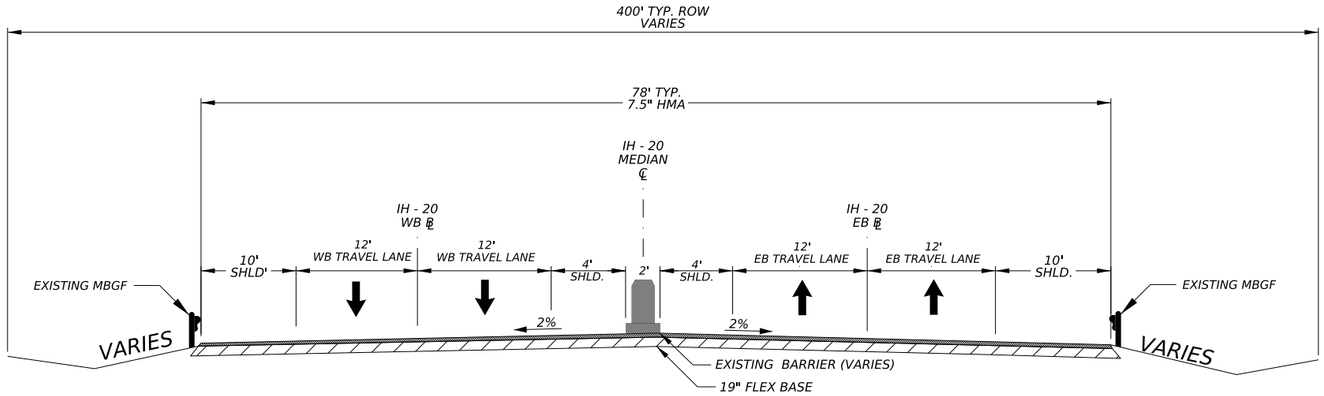
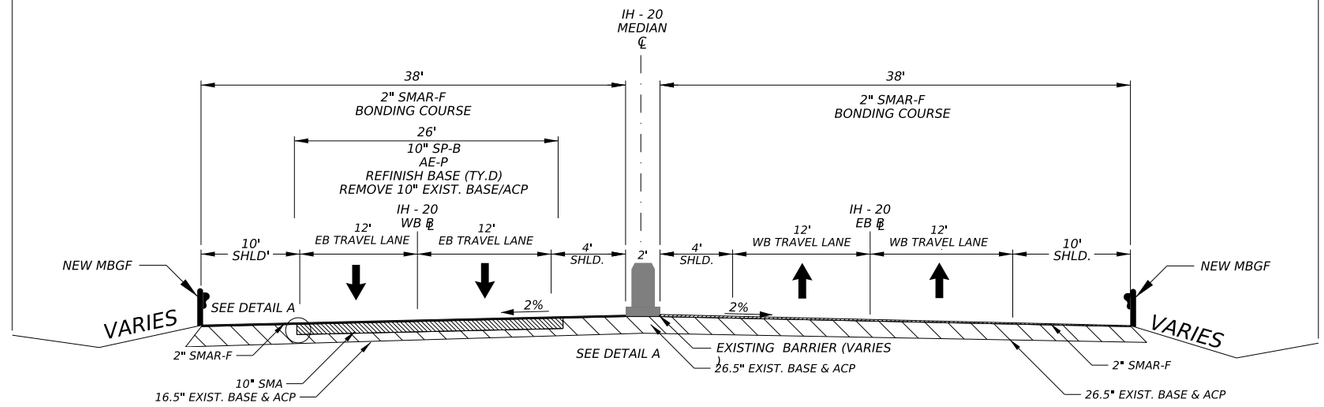


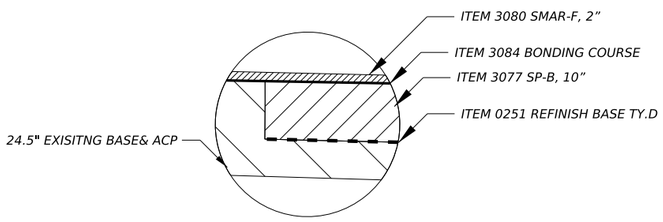
EXISTING TYPICAL SECTION

EB & WB IH-20
STA. 26+73 TO 55+85



PROPOSED TYPICAL SECTION

EB & WB IH-20
STA. 26+73 TO 55+85



DETAIL A

NOT TO SCALE
SEE BRIDGE TIE IN DETAILS FOR MORE INFORMATION

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

TYPICAL SECTIONS

SHEET 2 OF 3

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
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STATE	STATE DIST.	COUNTY	
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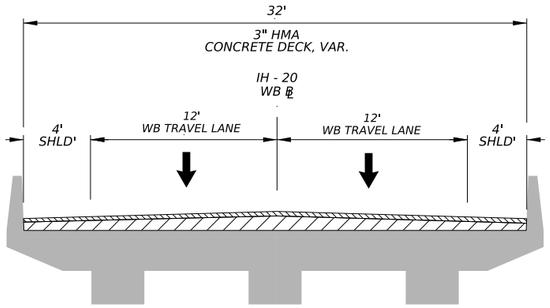
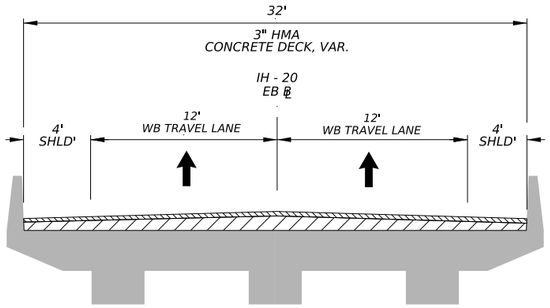


IH - 20
MEDIAN
℄

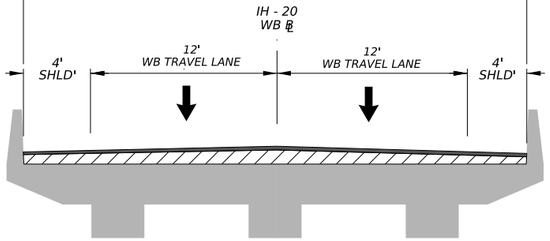


EXISTING TYPICAL SECTION

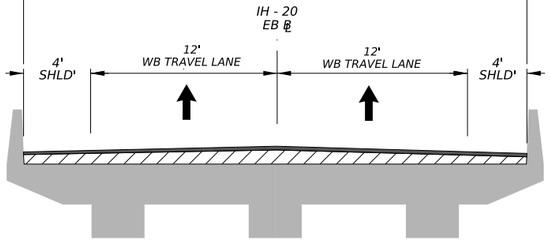
EB IH-20 OVER BI-20 BRIDGE DECK
STA. 255+50 TO 261+02

EXISTING TYPICAL SECTION

EB IH-20 OVER BI-20 BRIDGE DECK
STA. 255+50 TO 261+02



IH - 20
MEDIAN
℄



PROPOSED TYPICAL SECTION

WB IH-20 OVER BI-20 BRIDGE DECK
STA. 256+54 TO 262+10

PROPOSED TYPICAL SECTION

WB IH-20 OVER BI-20 BRIDGE DECK
STA. 256+54 TO 262+10

NOT TO SCALE
SEE BRIDGE TIE IN DETAILS FOR MORE INFORMATION

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

TYPICAL SECTIONS

SHEET 3 OF 3

Texas Department of Transportation

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CONT.	SECT.	JOB	HIGHWAY NO.
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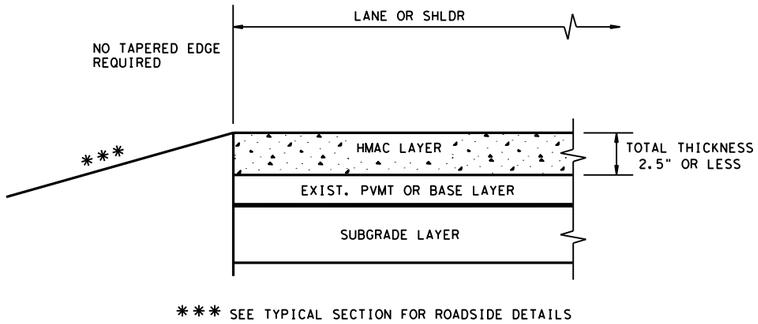
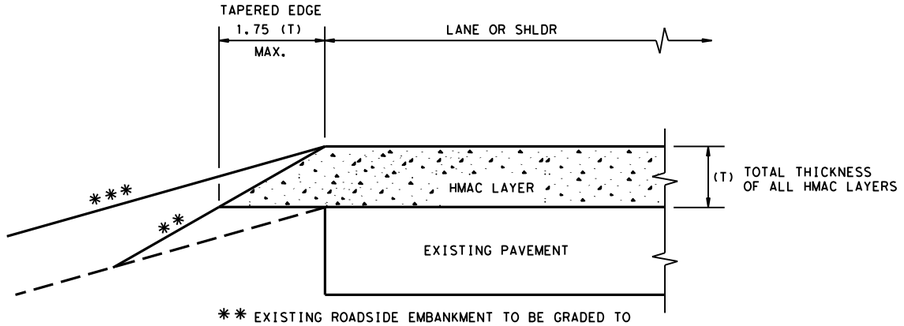


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

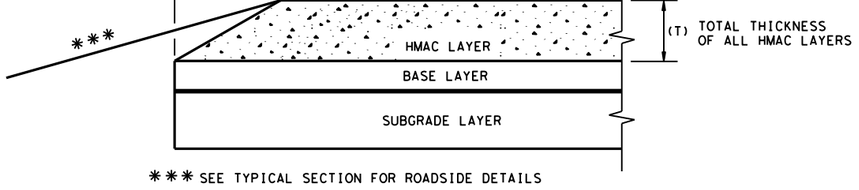
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

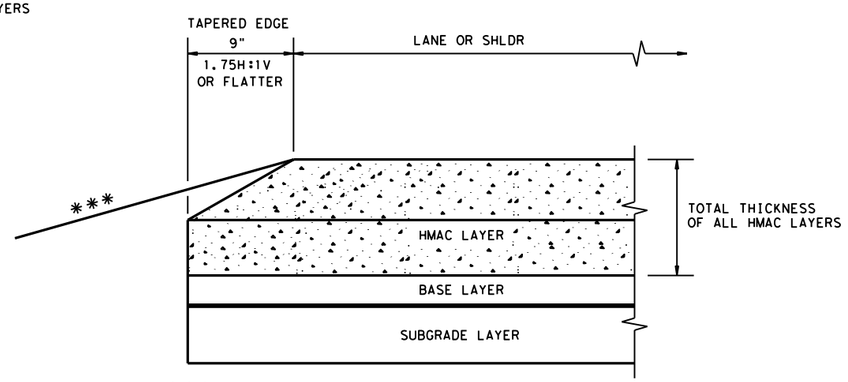
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2
OVERLAY OF EXISTING PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 5" OR GREATER

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H:1V OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

(NOT TO SCALE)

Texas Department of Transportation | Design Division Standard

TAPERED EDGE DETAILS HMAC PAVEMENT

TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
© TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0004	07	138	IH-20
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		10

DATE: 11/27/2023
FILE: $FILE$

Material Specification Information

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.

Schedule: Night Work

The following time schedule is to reduce the number of main lanes open to traffic:

Day	No Lane Closure Allowed	Lane Closure Allowed
Monday	5:00 AM - 9:00 PM	9:00 PM - 5:00 AM
Tuesday	5:00 AM - 9:00 PM	9:00 PM - 5:00 AM
Wednesday	5:00 AM - 9:00 PM	9:00 PM - 5:00 AM
Thursday	5:00 AM - 9:00 PM	9:00 PM - 5:00 AM
Friday	5:00 AM - 9:00 PM	9:00 PM - 5:00 AM
Saturday	5:00 AM - 9:00 PM	9:00 PM - 5:00 AM

Item 5: Control of the Work

For any structures containing bird nests, schedule all work to complete the cleaning of the existing structures identified in the plans between September 15, 2024 and March 15, 2025. Failure to complete this work during the specified timeframe may cause construction delays due to environmental regulations.

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 7: Legal Relations and Responsibilities

If access to the project is required through a new or unapproved driveway (i.e. Material source, stockpile location, field office, etc.), obtain an approved “Permit to Construct Access Driveway Facilities on Highway Right Of Way” (TxDOT Form 1058) before beginning any construction operations.

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.

The following significant traffic generator events have been identified – list of events and/or dates that road closures are prohibited.

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)

-Railroad Exhibits and/or Notes

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

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

Initiate the installation of Item 628 “Electrical Services” as part of the initial work sequence to allow TxDOT the lead-time necessary for coordination with utility companies to establish and provide for electrical service(s) proposed for this project.

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

The road-user cost liquidated damages are $24,684 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 105: Removing Treated and Untreated Base and Asphalt Pavement

Saw cut and remove existing asphaltic pavement by an approved method.

Item 132: Embankment

Use embankment Type B.

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 216: Proof Rolling

Proof rolling will be required on rock embankments where density tests are not practical and at other locations as directed.

Item 354: Planing and Texturing Pavement

Unused planed material will become the Contractor's property. Dispose of this material in accordance with applicable Federal, State, and local regulations.

Item 421: Hydraulic Cement Concrete

Furnish a job site curing tank equipped with a recording thermometer with the capability to chart temperatures for 24 hours, 7 days and 30 days. Furnish the Engineer with copies of the temperature records.

Furnish disposable 4" or 6" cylinder molds and caps that meet testing tolerances.

The Engineer will provide strength testing equipment for acceptance testing.

Within seven (7) days after concrete has been placed for foundations for traffic signals, roadway illumination assemblies, or high mast illumination assemblies, provide a rub finish for exposed surfaces in accordance with Item 427, Surface Finishes for Concrete, Article 4.3.3.

Furnish Type II or IP cement.

Furnish Type II or IP cement for cast-in-place concrete.

All plants and trucks may be inspected and approved by the Engineer in lieu of the NRMCA or Non-Department Engineer Sealed Certifications. The criteria and frequency of the Engineer approval of plants and trucks is the same used for NRMCA Certification.

Item 432: Riprap

Use approved expansion joint material and place between the proposed riprap and curb and gutter.

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.

Demolition plans will require each span to be removed in sections.

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.

Maintain "No Center Line", "Do Not Pass" and "Pass With Care" signs until the permanent lane markings have been placed in accordance with plans.

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.

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 permitted 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".

-Temporary Sediment Control Fence

-Rock Filter Dams

-Biodegradable Erosion Control Logs

-Construction Exits

-Earthwork For Erosion Control

The total disturbed area for this project is 4.8 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 540: Metal Beam Guard Fence

Provide steel post for this project.

Item 542: Removing Metal Beam Guard Fence

Do not salvage any existing metal beam guard fence as State property; retain ownership of all material requiring removal including steel posts, metal rail, and hardware, and remove from the project.

For removal of posts embedded in concrete, remove the posts and the concrete footings; payment for removal of concrete footings is subsidiary to Item 542.

Item 585: Ride Quality for Pavement Surfaces

Use surface test Type A to evaluate ride quality of travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces.", this note only applies to the intersection work done on Moss Ave.

Use surface test Type B pay adjustment schedule 3 to evaluate ride quality of the eastbound travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces.

Use surface test Type B pay adjustment schedule 2 to evaluate ride quality of the westbound travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces.

Item 644: Small Roadside Sign Assemblies

All new sign supports for stop and yield signs will have a 12" red strip of Type C High Specific Intensity Reflective tape. Place the top of the tape 4' above the edge of the roadway. This work will not be paid for directly and will be subsidiary to the pertinent bid item.

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 658: Delineator and Object Marker Assemblies

Delineator and object marker assembly posts shall be composed of post-consumer recycled materials. Embedded stub shall be perforated square tubing.

Install Shur-Tite® Concrete Traffic Barrier “8” Cup Mount” Delineator on top of concrete barrier.

Install per table below:

Spacing Used	Deliniator Spacing	Type	Note
Tangent	100'	Single Directional Yellow	
Taper	100'	Bi-Directional Yellow	
Curve	100'	Single Directional Yellow	
Bridge	100'	Single Directional Yellow	100 within Min. 3

Item 662: Work Zone Pavement Markings

After permanent pavement markings are placed, pull tabs from hot mix surface and/or cut off tabs flush with the pavement on seal coat surface. Remove tabs from the project and dispose of properly.

Materials used for non-removable work zone pavement markings will be paint and beads or other approved materials.

Item 666 Retroreflectorized Pavement Markings

Type I markings shall meet the minimum retroreflectivity values defined by Article 4.4 Retroreflectivity Requirements.

This Contract totals more than 200,000 feet of pavement markings; use a mobile retroreflectometer for retroreflectivity measurements. Portable retroreflectometers may not be used for this Contract.

Place Type I pavement markings with a ribbon-gun application.

Measure thickness for markings in accordance with Tex-854-B using usage rates (Part II).

Item 668: Prefabricated Pavement Markings

Do not tab or use existing RR pavement markings for placement of proposed RR pavement marking; place proposed RR pavement markings in accordance with standard RCD(1)-16 and RCD(2)-16.

Item 672: Raised Pavement Markers

Do not place raised pavement markers until the micro-surfacing has cured a minimum of 48 hours.

Item 3077: Superpave Mixtures

Binder:

Provide a binder that has a Performance Grade of 70 -20 (PG 70 -22) for the B mix.

Aggregate quality:

Furnish Class B aggregate for the Type B mix.

Furnish aggregates for the shoulders and/or ramps that meet project SAC requirements.

Mixture design:

Design a mixture with a gradation that has stone on stone contact and passes below the reference zone.

Test method Tex-530-C (Boil Test) will not be required.

Placement:

Semi-trailer type vehicles are prohibited from dumping directly into the finishing machine for the finished surface unless the trailer is equipped with an auger slatted chain or another approved conveyor.

No more than 10% RAP will be allowed in non-surface courses.

No RAS will be allowed.

Mineral filler will not be allowed.

Lime will not be allowed as an anti-stripping agent.

Field sand will not be allowed.

Item 3080: Stone-Matrix Asphalt

Binder:

Furnish Type I asphalt-rubber binder containing Grade C rubber.

Aggregate quality:

Provide Class A aggregate. Blending of SAC A and SAC B material will not be allowed for the coarse or intermediate aggregate.

Magnesium sulfate soundness loss will not be greater than 20 percent when Class A aggregate is required.

Mixture design:

Test method Tex-530-C (Boil Test) will not be required.

Placement:

Semi-trailer type vehicles are prohibited from dumping directly into the finishing machine for the finished surface unless the trailer is equipped with an auger slatted chain or another approved conveyor.

No RAP will be allowed in the surface course.

No RAS will be allowed.

Mineral filler will not be allowed.

Lime will not be allowed as an anti-stripping agent.

Field sand will not be allowed.

Item 6001: Portable Changeable Message Sign

PCMS shall be placed in operation a minimum of one (1) week prior to construction. Location(s) and duration for PCMS shall be as directed by the Engineer;

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

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-2)-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.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-3)-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.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-4)-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.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-5)-12; the shadow vehicle(s) with TMA specified on the traffic control plan as "required"

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (3-2)-13; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

TMA SUMMARY						TOTALS	
STATIONARY							
TCP	Req. No./Dy.	Opt. No./Dy.	Est. Days	Req. Days	Opt. Days	Stat. Req.	Stat. Opt.
2-6	1	1	77	77	77	83	89
6-2,3,4,5	1	2	6	6	12		
MOBILE OPERATIONS						Mob. Req.	Mob. Opt.
3-2	2	3	10	20	30	29	42
3-3	3	4	3	9	12		

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.

Estimate & Quantity Sheet

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HIGHWAY IH 20

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0004-07-138**			
		PROJECT ID		**A00178416**			
		COUNTY		**Ector**			
		HIGHWAY		**IH 20**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	105-6005	REMOVING STAB BASE AND ASPH PAV (3")	SY	4,018.000		4,018.000	
	105-6022	REMOVING STAB BASE AND ASPH PAV (13")	SY	4,184.000		4,184.000	
	105-6033	REMOVING STB BASE AND ASPH PAV(10-14")	SY	621.000		621.000	
	105-6058	REMOVING STAB BASE & ASPH PAV (10"-12")	SY	386.000		386.000	
	110-6001	EXCAVATION (ROADWAY)	CY	1,000.000		1,000.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	1,000.000		1,000.000	
	134-6002	BACKFILL (TY B)	STA	483.000		483.000	
	150-6002	BLADING	HR	20.000		20.000	
	216-6001	PROOF ROLLING	HR	20.000		20.000	
	251-6079	REWORK BS MTL (TY D)(SURF)(ORD COMP)	SY	85,448.000		85,448.000	
	310-6005	PRIME COAT (AE-P)	GAL	16,362.000		16,362.000	
	315-6004	FOG SEAL (CSS-1H)	GAL	2,330.000		2,330.000	
	351-6003	FLEXIBLE PAVEMENT STRUCTURE REPAIR(7")	SY	300.000		300.000	
	354-6020	PLANE ASPH CONC PAV(0" TO 1")	SY	390.000		390.000	
	354-6021	PLANE ASPH CONC PAV(0" TO 2")	SY	192.000		192.000	
	354-6064	PLANE ASPH CONC PAV (2 1/2")	SY	81,810.000		81,810.000	
	354-6201	PLANE ASPH CONC PAV (7.5")	SY	81,810.000		81,810.000	
	354-6224	PLANE ASPH CONC PAV (3" TO 13")	SY	182.000		182.000	
	360-6072	CONCPVMT(CONT REIN)(FST TRK)(CL P)(13")	SY	3,639.000		3,639.000	
	360-6080	CONC PVMT(CRCP)(TRANSITION SLAB)	SY	414.000		414.000	
	432-6006	RIPRAP (CONC)(CL B)	CY	2,019.000		2,019.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	411.000		411.000	
	454-6007	HEADER TYPE EXPANSION JOINT	LF	1,040.000		1,040.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	7.000		7.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	2,840.000		2,840.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	2,840.000		2,840.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	61,157.000		61,157.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	12,386.000		12,386.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	8.000		8.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	4.000		4.000	
	540-6018	MTL BM GD FEN TRANS (NON - SYM)	EA	4.000		4.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	11,260.000		11,260.000	
	542-6003	REMOVE DOWNSTREAM ANCHOR TERMINAL	EA	4.000		4.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	8.000		8.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	8.000		8.000	
	636-6007	REPLACE EXISTING ALUMINUM SIGNS(TY A)	SF	142.000		142.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0004-07-138 **DISTRICT** Odessa **COUNTY** Ector
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			CONTROL SECTION JOB	**0004-07-138**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00178416**			
			COUNTY	**Ector**			
			HIGHWAY	**IH 20**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	47.000		47.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	17.000		17.000	
	644-6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	3.000		3.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	52.000		52.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	6.000		6.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	135.000		135.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	110.000		110.000	
	658-6064	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	EA	80.000		80.000	
	658-6069	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BR)	EA	18.000		18.000	
	658-6070	INSTL DEL ASSM (D-SY)SZ (BRF)CTB (BR)	EA	75.000		75.000	
	662-6005	WK ZN PAV MRK NON-REMOV (W)6"(BRK)	LF	14,000.000		14,000.000	
	662-6008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF	75,000.000		75,000.000	
	662-6035	WK ZN PAV MRK NON-REMOV (Y)6"(BRK)	LF	7,018.000		7,018.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF	137,000.000		137,000.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	6,099.000		6,099.000	
	666-6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	688.000		688.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	14,000.000		14,000.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	75,000.000		75,000.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	7,018.000		7,018.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	137,000.000		137,000.000	
	666-6350	REFL PAV MRK TY I (W)12"(DOT)(100MIL)	LF	920.000		920.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	150.000		150.000	
	668-6087	PREFAB PAV MRK TY C (W) (EXIT GORE)	EA	4.000		4.000	
	668-6089	PREFAB PAV MRK TY C (W) (RR XING)	EA	1.000		1.000	
	668-6092	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	EA	24.000		24.000	
	672-6007	REFL PAV MRKR TY I-C	EA	339.000		339.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	387.000		387.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	763.000		763.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	3,000.000		3,000.000	
	752-6002	BRUSH REMOVAL	MI	0.500		0.500	
	3077-6007	SP MIXES SP-B SAC-B PG70-22	TON	45,217.000		45,217.000	
	3080-6021	STONE-MTRX-ASPH SMAR-F SAC-A	TON	30,689.000		30,689.000	
	3084-6001	BONDING COURSE	GAL	27,362.000		27,362.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	4.000		4.000	
	6072-6001	MODULAR GLARE SCREENS (FURN & INSTALL)	LF	2,100.000		2,100.000	
	6072-6002	MODULAR GLARE SCREENS (REMOVE)	LF	2,100.000		2,100.000	
	6158-6001	TMSP RADAR SPEED CONTROL MONITOR	EA	2.000		2.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0004-07-138 **DISTRICT** Odessa **COUNTY** Ector
HIGHWAY IH 20

		CONTROL SECTION JOB		**0004-07-138**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00178416**			
		COUNTY		**Ector**			
		HIGHWAY		**IH 20**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	6185-6002	TMA (STATIONARY)	DAY	89.000		89.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	42.000		42.000	
	08	CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000		1.000	

ROADWAY & REMOVAL SUMMARY

LOCATIONS SUMMARY					EXISTING WIDTHS			PROPOSED WIDTHS			WIDTH OF		AREAS						0354 6201	0354 6064	0310 6005	0251 6079	3080 6021	3084 6001	0216 6001	0315 6004	0150 6002	0110 6001	0134 6002	0132 6003	0351 6003	3077 6007
No.	DESCRIPTION	STATIONS		N/S/E/W	W1	W2	AVG	W1	W2	AVG	MAIN LN.	LENGTH	EXISTING	PROPOSED	WIDENING	MAIN LANE	SHOULDER		PLANE ASPH CONC PAV (7.5")	PLANE ASPH CONC PAV (2 1/2")	PRIME COAT (AE-P)	REWORK BS MTL (TY D)(SURF)(ORD COMP)	STONE-MTRX -ASPH SMAR-F SAC-A	BONDING COURSE	PROOF ROLLING	FOG SEAL (CSS-1H)	BLADING	EXCAVATION (ROADWAY)	BACKFILL (TY B)	EMBANKMENT (FINAL)(ORD COMP)(TY B)	FLEXIBLE PAVEMENT STRUCTURE REPAIR(7")	SP MIXES SP-B SAC-B PG70-22
																			MAIN LANE	MAIN LANE	MAIN LANE	MAIN LANE	PROPOSED	PROPOSED		LENGTH			LENGTH		PROPOSED	MAIN LANE
																			SY	SY	GAL	SY	TON	GAL	HR	GAL	HR	CY	STA	CY	SY	TON
																					0.2 GAL/SY	1 SY/SY	110 LB/SY	0.1 GAL/SY		0.2 GAL/SY			0.01 / FT.		*	110 LB/SY
																							2.0 IN			RMBL. STR.						10.0 IN
1	MAIN LANES	0+00	26+73	EB	38	38	38	38	38	38	26	2,673	11,286	11,286	0	7,722	3,564		0	0	0	0	1,241	1,129					27			0
2	MAIN LANES	0+00	26+73	WB	38	38	38	38	38	38	26	2,673	11,286	11,286	0	7,722	3,564		7,722	7,722	1,544	7,722	1,241	1,129					27			4,247
3	W OF MOSS BDG.	26+73	40+94	EB/WB	78	78	78	78	78	78	26	1,421	12,316	12,316	0	4,105	8,211		4,105	4,105	821	4,105	1,355	1,232					14			2,258
4	MOSS BDG. DECK	40+94	42+16	EB/WB	78	78	78	78	78	78	26	122	1,060	1,060	0	353	707		0	0	0	0	117	0					1			0
5	E OF MOSS BDG.	42+16	55+85	EB/WB	78	78	78	78	78	78	26	1,369	11,861	11,861	0	3,954	7,907		3,954	3,954	791	3,954	1,305	1,186					14			2,174
6	MAIN LANES	55+85	255+50	EB	38	38	38	38	38	38	26	19,965	84,299	84,299	0	57,678	26,621		0	0	0	0	9,273	8,430	20	2,330	20	1,000	200	1,000	300	0
7	MAIN LANES	55+85	256+54	WB	38	38	38	38	38	38	26	20,069	84,738	84,738	0	57,978	26,759		57,978	57,978	11,596	57,978	9,321	8,474					201			31,888
8	EB BI-2 BDG.	255+50	261+03	EB	32	32	32	32	32	32	26	552	1,964	1,964	0	1,596	368		0	0	0	0	216	0					0			0
9	WB BI-2 BDG.	256+54	262+10	WB	32	32	32	32	32	32	26	556	1,976	1,976	0	1,605	370		0	0	0	0	217	0					0			0
10	RAMPS MAIN LN.	VAR	VAR	EB/WB	VAR	VAR	VAR	VAR	VAR	VAR	26	VAR	8,050	8,050	0	8,050	0		8,050	8,050	1,610	8,050	886	805					0			4,428
11	RAMPS FULL WIDTH	VAR	VAR	EB/WB	VAR	VAR	VAR	VAR	VAR	VAR	26	VAR	49,775	49,775	0	0	0		0	0	0	0	5,475	4,978					0			0
				TOTALS:								49,401	278,610	278,610	0	150,764	78,071		81,810	81,810	16,362	81,810	30,648	27,362	20	2,330	20	1,000	483	1,000	300	44,996

STRIPING AND SIGNAGE SUMMARY

LOCATIONS SUMMARY					0666 6321	0666 6318	0666 6306	0666 6309	0666 6036	0666 6042	0666 6350	0668 6076	0533 6001	0668 6092	0668 6089	0668 6087	0672 6010	0672 6009	0672 6007	0644 6033	0644 6030	0644 6027	0644 6004	0644 6001	0636 6007	0644 6076
No.	DESCRIPTION	STATIONS		N/S/E/W	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	REFL PAV MRK TY I (W)12"(DOT)(100MIL)	PREFAB PAV MRK TY C (W) (24") (SLD)	RUMBLE STRIPS (SHOULDER)	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	PREFAB PAV MRK TY C (W) (RR XING)	PREFAB PAV MRK TY C (W) (EXIT GORE)	REFL PAV MRKR TY II-C-R	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY I-C	IN SM RD SN SUP&AM TYS80(1)SA(U)	IN SM RD SN SUP&AM TYS80(1)SA(T)	IN SM RD SN SUP&AM TYS80(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	REPLACE EXISTING ALUMINUM SIGNS(TY A)	REMOVE SM RD SN SUP&AM
					LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	SF	EA
					1.00 /LF	0.25 /LF	0.25 /LF	1.00 /LF	1.00 /LF	1.00 /LF	0.25 /LF	1.00 /LF														
1	MAIN LANES	0+00	26+73	EB																						
2	MAIN LANES	0+00	26+73	WB																						
3	W OF MOSS BDG.	26+73	40+94	EB/WB																						
4	MOSS BDG. DECK	40+94	42+16	EB/WB																						
5	E OF MOSS BDG.	42+16	55+85	EB/WB																						
6	MAIN LANES	55+85	255+50	EB	137,000	28,069	56,000	75,000	6,099	688	3,679	150	105,040	24	1	4	1,713	387	339	6	52	3	17	47	142	135
7	MAIN LANES	55+85	256+54	WB																						
8	EB BI-2 BDG.	255+50	261+03	EB																						
9	WB BI-2 BDG.	256+54	262+10	WB																						
10	RAMPS MAIN LN.	VAR	VAR	EB/WB																						
11	RAMPS FULL WIDTH	VAR	VAR	EB/WB																						
				TOTALS:	137,000	7,018	14,000	75,000	6,099	688	920	150	105,040	24	1	4	1,713	387	339	6	52	3	17	47	142	135

GUARDRAIL TREATMENT LENGTH SUMMARY

ITEM	DESCRIPTION	QTY.	UOM	LEGEND	MOSS BRIDGE WB	MOSS BRIDGE EB	BI-20 BRIDGE WB	BI-20 BRIDGE EB	INSTALL LENGTH TOTALS
0540 6018	MTL BM GD FEN TRANS (NON - SYM)	4	EA	L_{ASY}	6.25 FT	6.25 FT	6.25 FT	6.25 FT	25 FT
0540 6016	DOWNSTRM ANCHOR TERMINAL SECTION	4	EA	L_{DAT}	9.33 FT	9.33 FT	9.33 FT	9.33 FT	37 FT
0544 6001	GUARDRAIL END TRTMENT (INSTALL)	8	EA	$L_{GET,I}$	40.00 FT	40.00 FT	40.00 FT	40.00 FT	384 FT
				$L_{GET,O}$	56.00 FT	56.00 FT	56.00 FT	56.00 FT	
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	10,499	LF	$L_{MBGF,DW}$	1,464.43 FT	1,454.43 FT	1,384.43 FT	1,214.43 FT	10,499 FT
				$L_{MBGF,UP,I}$	0.00 FT	0.00 FT	260.00 FT	0.00 FT	
				$L_{MBGF,UP,O}$	1,395.25 FT	1,485.25 FT	990.25 FT	850.25 FT	
0540 6006	MTL BM GD FEN TRANS (THRIE-BM)	8	EA	$L_{THR,I}$	18.75 FT	18.75 FT	18.75 FT	18.75 FT	75 FT
				$L_{THR,O}$	18.75 FT	18.75 FT	18.75 FT	18.75 FT	75 FT
* 0542 6001	REMOVE METAL BEAM GUARD FENCE	10,450 FT	LF	L_{RMV}	2,950.00 FT	3,030.00 FT	2,465.00 FT	2,005.00 FT	0 FT
* 0544 6003	GUARDRAIL END TRTMENT (REMOVE)	8	EA	-	-	-	-	-	0 FT
* 0542 6003	REMOVE DOWNSTRM ANCHOR TERMINAL	4	EA	-	-	-	-	-	0 FT
								TOTAL LEGNTH	11,095.00 FT

*** ALSO INCLUDED IN REMOVAL SUMMARY**

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

CONSOLIDATED SUMMARY

SHEET 1 OF 2

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		19
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

BRIDGE SUMMARY

LOCATIONS SUMMARY					0105 6005	0105 6058	0105 6033	0454 6007	0454 6007	0540 6002	0540 6006	0542 6001	0544 6001	0544 6003	0354 6020	0354 6021	6072 6001	6072 6002	0658 6064	0658 6061	0658 6069	0658 6070	0432 6006	0432 6045
					REMOVING STAB BASE AND ASPH PAV (3")	REMOVING STAB BASE & ASPH PAV (10"-12")	REMOVING STB BASE AND ASPH PAV(10-14")	HEADER TYPE EXPANSION JOINT	HEADER TYPE EXPANSION JOINT	MTL W-BEAM GD FEN (STEEL POST)	MTL BM GD FEN TRANS (THRIE-BM)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TRTMENT (INSTALL)	GUARDRAIL END TRTMENT (REMOVE)	PLANE ASPH CONC PAV(0" TO 1")	PLANE ASPH CONC PAV(0" TO 2")	MODULAR GLARE SCREENS (FURN & INSTALL)	MODULAR GLARE SCREENS (REMOVE)	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BR)	INSTL DEL ASSM (D-SY)SZ (BRF)CTB (BR)	RIPRAP (CONC)(CL B)	RIPRAP (MOW STRIP)(4 IN)
					SY	SY	SY	LF	LF	LF	EA	LF	EA	EA	SY	SY	LF	LF	EA	EA	EA	EA	CY	CY
								MOSS BRIDGE	BI-20 BRIDGE								STA. 235+00 TO 256+00 AT EXISTING SPACING		PLACE ON INNER MBGF AT 100' SPACING	PLACE ON OUTER MBGF AT 100' SPACING	PLACE ALONG OUTER BRIDGE RAILING/ CONCRETE BARRIER	PLACE ALONG INNER BRIDGE RAILING/ CONCRETE BARRIER	#########	3 FT METAL BEAM GUARD FENCE
No.	DESCRIPTION	STATIONS		N/S/E/W																			24,232 SY	
1	MAIN LANES	0+00	26+73	EB		192																		
2	MAIN LANES	0+00	26+73	WB												192								
3	W OF MOSS BDG.	26+73	40+94	EB/WB															CANDLESTICK	CANDLESTICK	CUP-MOUNTED	CUP-MOUNTED		
4	MOSS BDG. DECK	40+94	42+16	EB/WB	68																320			
5	E OF MOSS BDG.	42+16	55+85	EB/WB																	500	2,900		
6	MAIN LANES	55+85	255+50	EB			621	80	960	12,386	4	11,260	8	8	390		2,100	2,100	80	110	525	2,700		
7	MAIN LANES	55+85	256+54	WB																	18	75	2,019	411
8	EB BI-2 BDG.	255+50	261+03	EB	3,950																			
9	WB BI-2 BDG.	256+54	262+10	WB																				
10	RAMPS MAIN LN.	VAR	VAR	EB/WB																				
11	RAMPS FULL WIDTH	VAR	VAR	EB/WB																				
				TOTALS:	4,018	193	621	1,040		12,386	4	11,260	8	8	390	192	2,100	2,100	80	110	18	75	2,019	411

WORK ZONE SUMMARY

LOCATIONS SUMMARY				0662 6037	0662 6035	0662 6008	0662 6005	0677 6001	0506 6042	0506 6043	6185 6005	6185 6002	6158 6001	6001 6002
				WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	WK ZN PAV MRK NON-REMOV (Y)6"(BRK)	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	WK ZN PAV MRK NON-REMOV (W)6"(BRK)	ELIM EXT PAV MRK & MRKS (4")	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)	TMA (MOBILE OPERATION)	TMA (STATIONARY)	TMSP RADAR SPEED CONTROL MONITOR	PORTABLE CHANGBLE MESSAGE SIGN
				LF	LF	LF	LF	LF	LF	LF	DAY	DAY	EA	EA
					0.25 /LF		0.25 /LF	PROJECT LIMITS TRANISITION LENGTHS						
No.	STATIONS		N/S/E/W											
1	0+00	26+73	EB											
2	0+00	26+73	WB											
3	26+73	40+94	EB/WB											
4	40+94	42+16	EB/WB											
5	42+16	55+85	EB/WB											
6	55+85	255+50	EB	137,000	7,017	75,000	56,000	3,000	2,840	2,840	42	89	2	4
7	55+85	256+54	WB											
8	255+50	261+03	EB											
9	256+54	262+10	WB											
10	VAR	VAR	EB/WB											
11	VAR	VAR	EB/WB											
			TOTALS:	137,000	7,018	75,000	14,000	3,000	2,840	2,840	42	89	2	4

MOSS INTERSECTION SUMMARY

INTERSECTION AREA [SY]	0360 6072 CONCPVMT(CONT REIN)(FST TRK)(CL P)(13") *	0251 6079 REWORK BS MTL (TY D)(SURF)(ORD COMP)	0105 6022 REMOVING STAB BASE AND ASPH PAV (13")	0354 6224 PLANE ASPH CONC PAV (3" TO 13")	3077 6007 SP MIXES SP-B SAC-B PG70-22	3080 6021 STONE-MTRX-ASPH SMAR-F SAC-A	0360 6080 CONC PVMT(CRCP)(TRANSITION SLAB)
UOM	SY	SY	SY	SY	TON	TON	SY
APPLICATION	1/ SY	1/ SY	1/ SY	1/ SY	11" TYP. (110 LB/SY)	2" TYP. (110 LB/SY)	1/ SY
3,638	3,639	3,638	4,002	182	221	41	414
					SEE TRANS-20		

*USE CLASS-P WITH HES OF 3,200 PSI WITHIN 24 HOURS

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

CONSOLIDATED SUMMARY

SHEET 2 OF 2

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		20
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

PHASE NARRATIVE TYPICAL WORK

1. ADVANCE PROJECT WARNING SIGNS SHALL REMAIN IN PLACE THROUGHOUT THE DURATION OF THE PROJECT OR AS DIRECTED BY THE ENGINEER. LOCATIONS OF SIGNS SHALL BE IN ACCORDANCE WITH THE APPLICABLE BC STANDARDS AND THE LATEST TEXAS MANUAL UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).
2. INSTALL ALL TRAFFIC CONTROL DEVICES IN ACCORDANCE TO THE TMUTCD.
3. EXISTING SIGNS THAT CONFLICT WITH THE PROPOSED CONSTRUCTION SEQUENCING OR TRAFFIC CONTROL DEVICES SHALL BE COVERED OR REMOVED AS DIRECTED BY THE ENGINEER. THIS WORK SHALL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.
4. THE MAXIMUM WORK AREA LENGTH SHALL BE BASED ON DAILY PRODUCTION FOR THE APPLICABLE WORK ITEM AS PER TCP. ANY ADJUSTMENTS MUST BE APPROVED BY ENGINEER.
5. CONTRACTOR TO COMPLETE CONSTRUCTION(MILLING AND FILLING) OF THE PRIOR PHASE/STAGE BEFORE BEGINNING WORK ON THE NEXT PHASE, UNLESS OTHERWISE DIRECTED BY ENGINEER.

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

PHASE NARRATIVE

SHEET 1 OF 6

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		21
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

PHASE 1A

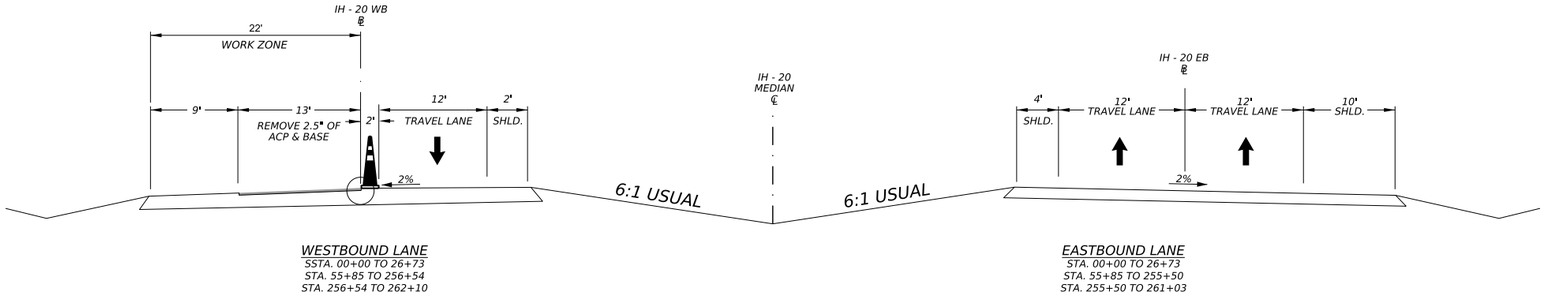
WORKED PERFORMED AT NIGHT 9PM TO 5AM

1. PLACE ADVANCED WARNING SIGNING AND CLOSE OUTSIDE WESTBOUND TRAVEL LANE IN ACCORDANCE WITH CORRESPONDING TCP(2-6)-18. THE MAXIMUM WORK AREA LENGTH SHALL BE LIMITED TO HALF A MILE. ADJUSTMENTS MUST BE APPROVED BY THE ENGINEER.

2. REMOVE 2.5" EXISTING ACP & BASE ON THE OUTSIDE MAIN LANE IN ACCORDANCE WITH TYPICAL SECTIONS, TE(HMAC)-11, "TREATMENT FOR VARIOUS EDGE CONDITIONS" STANDARD AND NOTE 1.

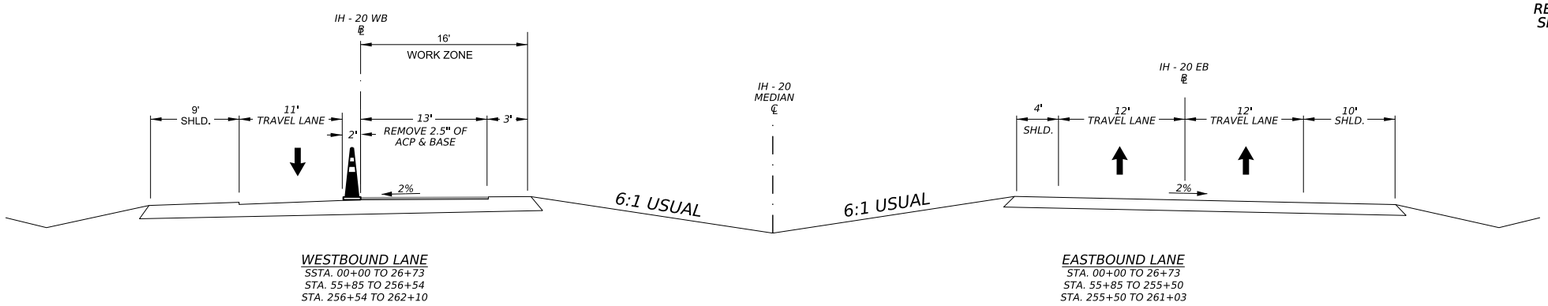
NOTE: ALL WORK MUST BE COMPLETED WITHIN THE SAME NIGHT. EDGE CONDITION 3 ACCORDING TO "TREATMENT FOR VARIOUS EDGE CONDITIONS" WILL BE MET FOR 24 HOURS MAX. ANY PERIOD EXCEEDING A 24-HOUR PERIOD WILL REQUIRE MEETING EDGE CONDITION 1 AND A 3:1 SAFETY SLOPE AS SHOWN IN NOTE 1.

3.REPEAT FOR INSIDE WESTBOUND LANE.



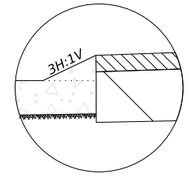
WESTBOUND LANE
SSTA. 00+00 TO 26+73
STA. 55+85 TO 256+54
STA. 256+54 TO 262+10

EASTBOUND LANE
STA. 00+00 TO 26+73
STA. 55+85 TO 255+50
STA. 255+50 TO 261+03



WESTBOUND LANE
SSTA. 00+00 TO 26+73
STA. 55+85 TO 256+54
STA. 256+54 TO 262+10

EASTBOUND LANE
STA. 00+00 TO 26+73
STA. 55+85 TO 255+50
STA. 255+50 TO 261+03



NOTE 1:

ALL DROP-OFFS GREATER THAN 2" REQUIRE THE CONSTRUCTION OF A 3:1 SAFETY SLOPE BEFORE THE WORK DAY IS COMPLETED

PHASE 1B

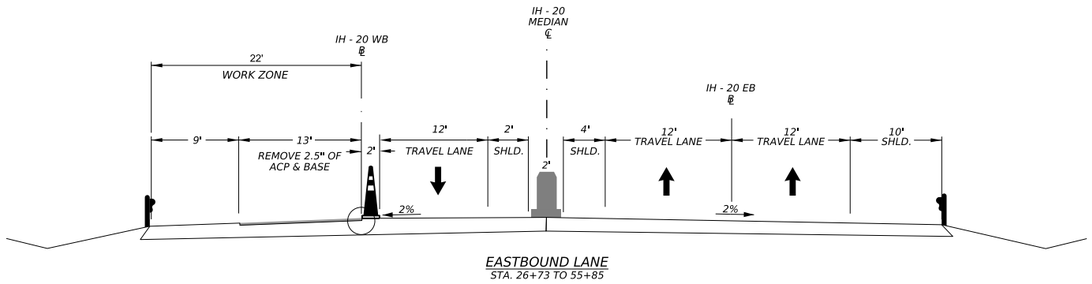
WORKED PERFORMED AT NIGHT 9PM TO 5AM

1. PLACE ADVANCED WARNING SIGNING AND CLOSE OUTSIDE WESTBOUND TRAVEL LANE IN ACCORDANCE WITH CORRESPONDING TCP(2-6)-18. THE MAXIMUM WORK AREA LENGTH SHALL BE LIMITED TO HALF A MILE. ADJUSTMENTS MUST BE APPROVED BY THE ENGINEER.

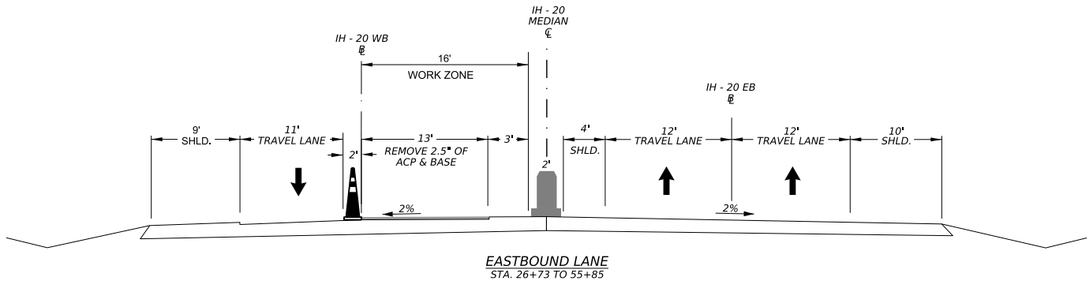
2. REMOVE 2.5" EXISTING ACP & BASE ON THE OUTSIDE MAIN LANE IN ACCORDANCE WITH TYPICAL SECTIONS, TE(HMAC)-11, "TREATMENT FOR VARIOUS EDGE CONDITIONS" STANDARD AND NOTE 1.

NOTE: ALL WORK MUST BE COMPLETED WITHIN THE SAME NIGHT. EDGE CONDITION 3 ACCORDING TO "TREATMENT FOR VARIOUS EDGE CONDITIONS" WILL BE MET FOR 24 HOURS MAX. ANY PERIOD EXCEEDING A 24-HOUR PERIOD WILL REQUIRE MEETING EDGE CONDITION 1 AND A 3:1 SAFETY SLOPE AS SHOWN IN NOTE 1.

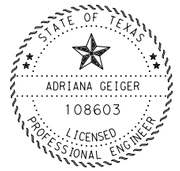
3.REPEAT FOR INSIDE WESTBOUND LANE.



EASTBOUND LANE
STA. 26+73 TO 55+85



EASTBOUND LANE
STA. 26+73 TO 55+85



Adriana Geiger, P.E.
11/27/2023

PHASE NARRATIVE

SHEET 2 OF 6

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		22
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

PHASE 2A

WORKED PERFORMED AT NIGHT 9PM TO 5AM

1. PLACE ADVANCED WARNING SIGNING AND CLOSE OUTSIDE WESTBOUND TRAVEL LANE IN ACCORDANCE WITH CORRESPONDING TCP(2-6)-18. THE MAXIMUM WORK AREA LENGTH SHALL BE LIMITED TO HALF A MILE. ADJUSTMENTS MUST BE APPROVED BY THE ENGINEER.

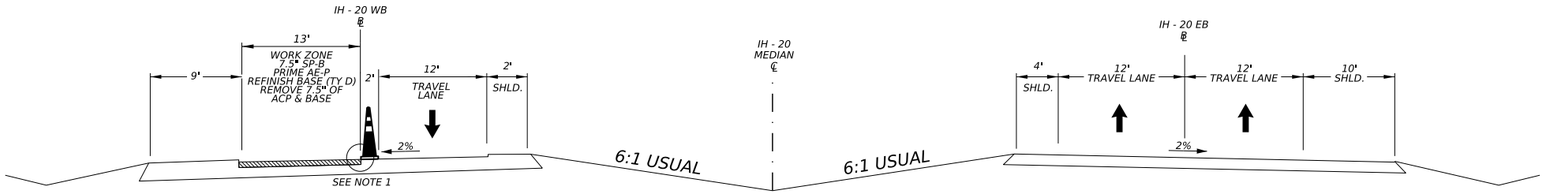
2.REMOVE 7.5" OF EXISTING ACP & BASE ON THE MAIN LANE IN ACCORDANCE WITH TYPICAL SECTIONS, TE(HMAC)-11, "TREATMENT FOR VARIOUS EDGE CONDITIONS" STANDARD AND NOTE 1.

3. REFINISH EXISTING BASE AND PLACE PRIME AE-P.

4. PLACE 7.5" SP-B IN TWO LIFTS (3.75") IN ACCORDANCE WITH TYPICAL SECTIONS, TE(HMAC)-11, "TREATMENT FOR VARIOUS EDGE CONDITIONS" STANDARD AND NOTE 1. ALLOW TO CURE AND PLACE WORK ZONE TABS/STRIPING BEFORE OPENING TO TRAFFIC.

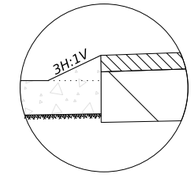
NOTE: ALL WORK MUST BE COMPLETED WITHIN THE SAME NIGHT. EDGE CONDITION 3 ACCORDING TO "TREATMENT FOR VARIOUS EDGE CONDITIONS" WILL BE MET FOR 24 HOURS MAX. ANY PERIOD EXCEEDING A 24-HOUR PERIOD WILL REQUIRE MEETING EDGE CONDITION 1 AND A 3:1 SAFETY SLOPE AS SHOWN IN NOTE 1.

5.REPEAT FOR INSIDE WESTBOUND TRAVEL LANE.



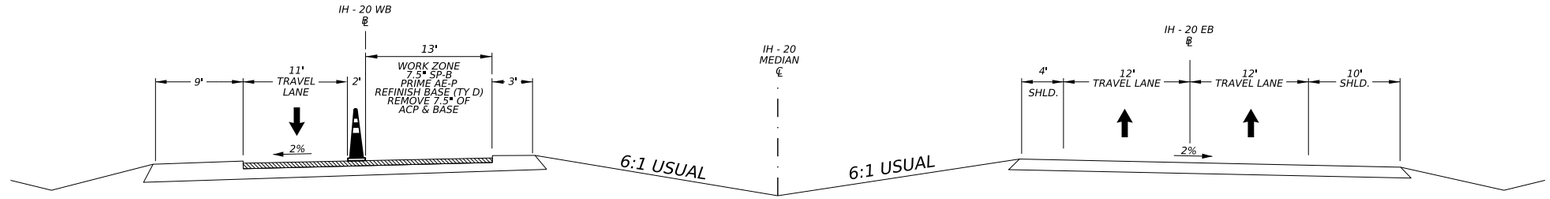
WESTBOUND LANE
SSTA. 00+00 TO 26+73
STA. 55+85 TO 256+54
STA. 256+54 TO 262+10

EASTBOUND LANE
STA. 00+00 TO 26+73
STA. 55+85 TO 255+50
STA. 255+50 TO 261+03



NOTE 1:

ALL DROP-OFFS GREATER THAN 2" REQUIRE THE CONSTRUCTION OF A 3:1 SAFETY SLOPE BEFORE THE WORK DAY IS COMPLETED



WESTBOUND LANE
SSTA. 00+00 TO 26+73
STA. 55+85 TO 256+54
STA. 256+54 TO 262+10

EASTBOUND LANE
STA. 00+00 TO 26+73
STA. 55+85 TO 255+50
STA. 255+50 TO 261+03

PHASE 2B

WORKED PERFORMED AT NIGHT 9PM TO 5AM

1. PLACE ADVANCED WARNING SIGNING AND CLOSE OUTSIDE WESTBOUND TRAVEL LANE IN ACCORDANCE WITH CORRESPONDING TCP(2-6)-18. THE MAXIMUM WORK AREA LENGTH SHALL BE LIMITED TO HALF A MILE. ADJUSTMENTS MUST BE APPROVED BY THE ENGINEER.

2.REMOVE 7.5" OF EXISTING ACP & BASE ON THE MAIN LANE IN ACCORDANCE WITH TYPICAL SECTIONS, TE(HMAC)-11, "TREATMENT FOR VARIOUS EDGE CONDITIONS" STANDARD AND NOTE 1.

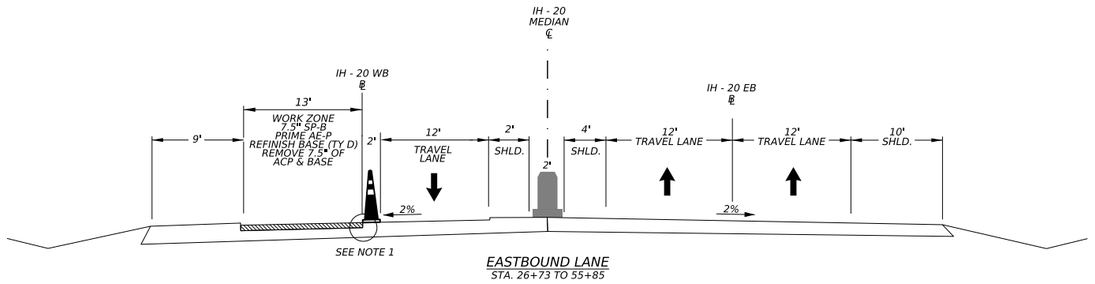
3. REFINISH EXISTING BASE AND PLACE PRIME AE-P.

4. PLACE 7.5" SP-B IN TWO LIFTS (3.75") IN ACCORDANCE WITH TYPICAL SECTIONS, TE(HMAC)-11, "TREATMENT FOR VARIOUS EDGE CONDITIONS" STANDARD AND NOTE 1. ALLOW TO CURE AND PLACE WORK ZONE TABS/STRIPING BEFORE OPENING TO TRAFFIC.

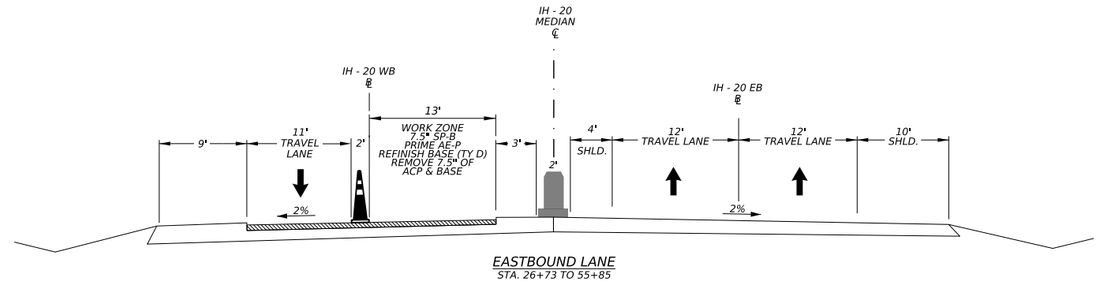
NOTE: ALL WORK MUST BE COMPLETED WITHIN THE SAME NIGHT. EDGE CONDITION 3 ACCORDING TO "TREATMENT FOR VARIOUS EDGE CONDITIONS" WILL BE MET FOR 24 HOURS MAX. ANY PERIOD EXCEEDING A 24-HOUR PERIOD WILL REQUIRE MEETING EDGE CONDITION 1 AND A 3:1 SAFETY SLOPE AS SHOWN IN NOTE 1.

5.REPEAT FOR INSIDE WESTBOUND TRAVEL LANE.

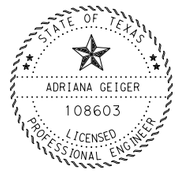
NOTE:SEE TIE IN DEAILS FOR BRIDGE APPROACH



EASTBOUND LANE
STA. 26+73 TO 55+85



EASTBOUND LANE
STA. 26+73 TO 55+85



Adriana Geiger, P.E.
11/27/2023

PHASE NARRATIVE

SHEET 3 OF 6

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		23
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

PHASE 3A

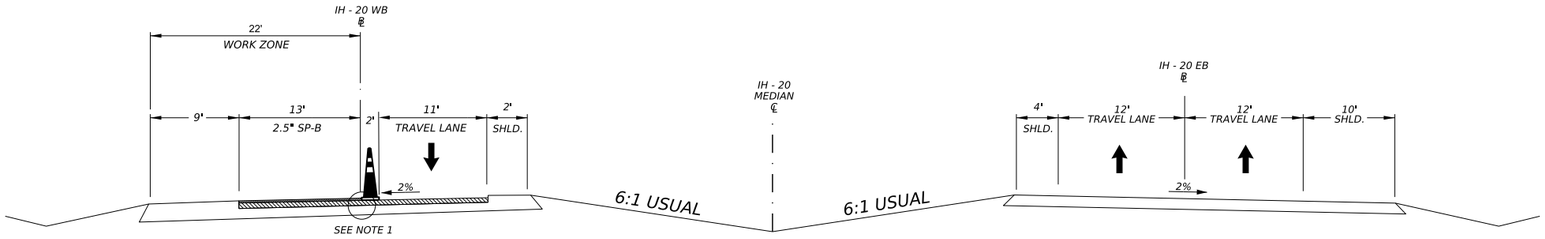
WORKED PERFORMED AT NIGHT 9PM TO 5AM

1. PLACE ADVANCED WARNING SIGNING AND CLOSE OUTSIDE WESTBOUND TRAVEL LANE AND SHOULDER IN ACCORDANCE WITH CORRESPONDING TCP(2-6)-18. THE MAXIMUM WORK AREA LENGTH SHALL BE LIMITED TO HALF A MILE. ADJUSTMENTS MUST BE APPROVED BY THE ENGINEER.

2. PLACE 2.5" OF SP-B IN ACCORDANCE WITH TYPICAL SECTIONS, TE(HMAC)-11, "TREATMENT FOR VARIOUS EDGE CONDITIONS" STANDARD AND NOTE 1. ALLOW TO CURE AND PLACE WORK ZONE TABS/STRIPING BEFORE OPENING TO TRAFFIC.

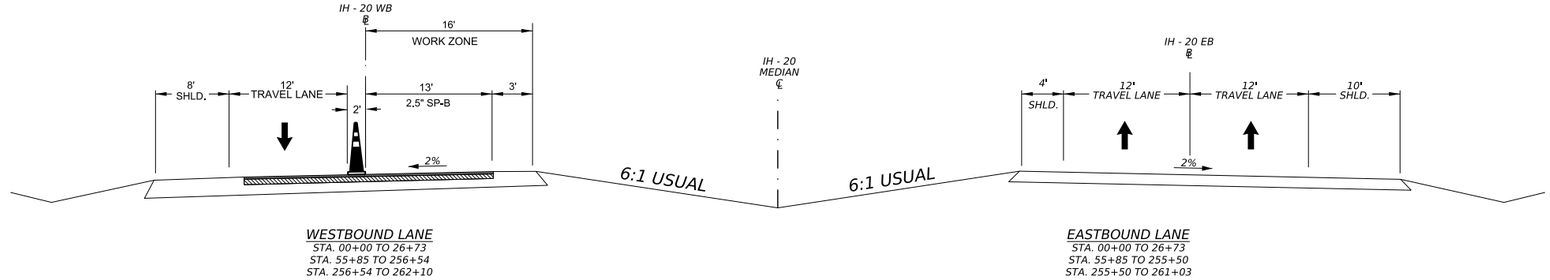
NOTE: ALL WORK MUST BE COMPLETED WITHIN THE SAME NIGHT. EDGE CONDITION 3 ACCORDING TO "TREATMENT FOR VARIOUS EDGE CONDITIONS" WILL BE MET FOR 24 HOURS MAX. ANY PERIOD EXCEEDING A 24-HOUR PERIOD WILL REQUIRE MEETING EDGE CONDITION 1 AND A 3:1 SAFETY SLOPE AS SHOWN IN NOTE 1.

3.REPEAT FOR INSIDE WESTBOUND TRAVEL LANE.



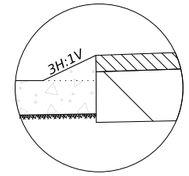
WESTBOUND LANE
STA. 00+00 TO 26+73
STA. 55+85 TO 256+54
STA. 256+54 TO 262+10

EASTBOUND LANE
STA. 00+00 TO 26+73
STA. 55+85 TO 255+50
STA. 255+50 TO 261+03



WESTBOUND LANE
STA. 00+00 TO 26+73
STA. 55+85 TO 256+54
STA. 256+54 TO 262+10

EASTBOUND LANE
STA. 00+00 TO 26+73
STA. 55+85 TO 255+50
STA. 255+50 TO 261+03



NOTE 1:

ALL DROP-OFFS GREATER THAN 2" REQUIRE THE CONSTRUCTION OF A 3:1 SAFETY SLOPE BEFORE THE WORK DAY IS COMPLETED

PHASE 3B

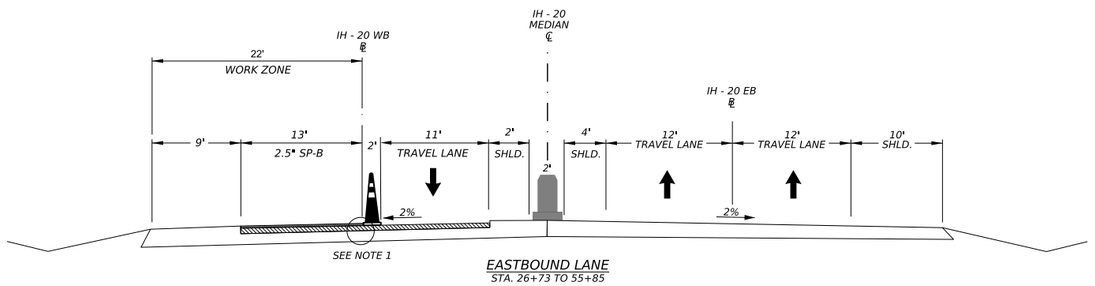
WORKED PERFORMED AT NIGHT 9PM TO 5AM

1. PLACE ADVANCED WARNING SIGNING AND CLOSE OUTSIDE WESTBOUND TRAVEL LANE AND SHOULDER IN ACCORDANCE WITH CORRESPONDING TCP(2-6)-18. THE MAXIMUM WORK AREA LENGTH SHALL BE LIMITED TO HALF A MILE. ADJUSTMENTS MUST BE APPROVED BY THE ENGINEER.

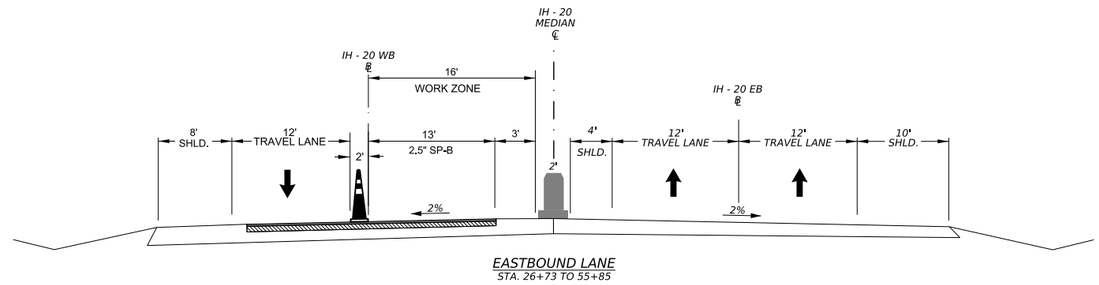
2. PLACE 2.5" OF SP-B IN ACCORDANCE WITH TYPICAL SECTIONS, TE(HMAC)-11, "TREATMENT FOR VARIOUS EDGE CONDITIONS" STANDARD AND NOTE 1. ALLOW TO CURE AND PLACE WORK ZONE TABS/STRIPING BEFORE OPENING TO TRAFFIC.

NOTE: ALL WORK MUST BE COMPLETED WITHIN THE SAME NIGHT. EDGE CONDITION 3 ACCORDING TO "TREATMENT FOR VARIOUS EDGE CONDITIONS" WILL BE MET FOR 24 HOURS MAX. ANY PERIOD EXCEEDING A 24-HOUR PERIOD WILL REQUIRE MEETING EDGE CONDITION 1 AND A 3:1 SAFETY SLOPE AS SHOWN IN NOTE 1.

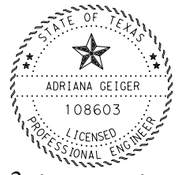
3.REPEAT FOR INSIDE WESTBOUND TRAVEL LANE.



EASTBOUND LANE
STA. 26+73 TO 55+85



EASTBOUND LANE
STA. 26+73 TO 55+85



Adriana Geiger, P.E.
11/27/2023

PHASE NARRATIVE

SHEET 4 OF 6

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		24
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

PHASE 4A

WORKED PERFORMED AT NIGHT 9PM TO 5AM

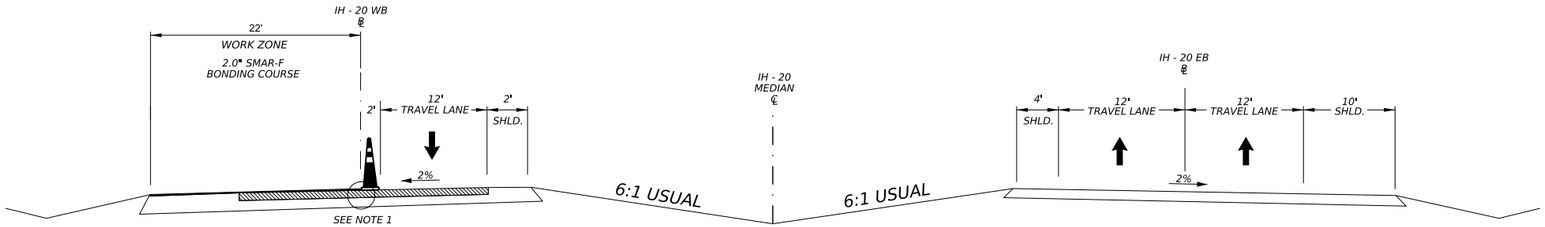
1. PLACE ADVANCED WARNING SIGNING AND CLOSE OUTSIDE WESTBOUND TRAVEL LANE AND SHOULDER IN ACCORDANCE WITH CORRESPONDING TCP(2-6)-18. THE MAXIMUM WORK AREA LENGTH SHALL BE LIMITED TO HALF A MILE. ADJUSTMENTS MUST BE APPROVED BY THE ENGINEER.

2.PLACE BONDING COURSE AND ALLOW TO CURE.

3. PLACE 2.0" SMAR-F IN ACCORDANCE WITH TYPICAL SECTIONS, TE(HMAC)-11, "TREATMENT FOR VARIOUS EDGE CONDITIONS" STANDARD AND NOTE 1. ALLOW TO CURE AND PLACE ANY NECESSARY WORK ZONE TABS/STRIPING BEFORE OPENING TO TRAFFIC.

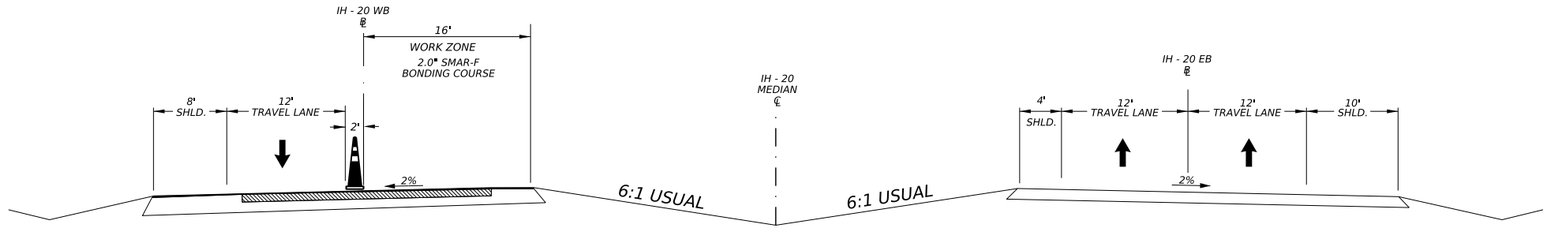
NOTE: ALL WORK MUST BE COMPLETED WITHIN THE SAME NIGHT. EDGE CONDITION 3 ACCORDING TO "TREATMENT FOR VARIOUS EDGE CONDITIONS" WILL BE MET FOR 24 HOURS MAX. ANY PERIOD EXCEEDING A 24-HOUR PERIOD WILL REQUIRE MEETING EDGE CONDITION 1 AND A 3:1 SAFETY SLOPE AS SHOWN IN NOTE 1.

4.REPEAT FOR INSIDE WESTBOUND TRAVEL LANE.



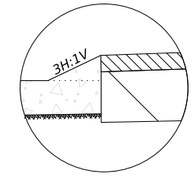
WESTBOUND LANE
SSTA. 00+00 TO 26+73
STA. 55+85 TO 256+54
STA. 256+54 TO 262+10

EASTBOUND LANE
STA. 00+00 TO 26+73
STA. 55+85 TO 255+50
STA. 255+50 TO 261+03



WESTBOUND LANE
SSTA. 00+00 TO 26+73
STA. 55+85 TO 256+54
STA. 256+54 TO 262+10

EASTBOUND LANE
STA. 00+00 TO 26+73
STA. 55+85 TO 255+50
STA. 255+50 TO 261+03



NOTE 1:

ALL DROP-OFFS GREATER THAN 2" REQUIRE THE CONSTRUCTION OF A 3:1 SAFETY SLOPE BEFORE THE WORK DAY IS COMPLETED

PHASE 4B

WORKED PERFORMED AT NIGHT 9PM TO 5AM

1. PLACE ADVANCED WARNING SIGNING AND CLOSE OUTSIDE WESTBOUND TRAVEL LANE AND SHOULDER IN ACCORDANCE WITH CORRESPONDING TCP(2-6)-18. THE MAXIMUM WORK AREA LENGTH SHALL BE LIMITED TO HALF A MILE. ADJUSTMENTS MUST BE APPROVED BY THE ENGINEER.

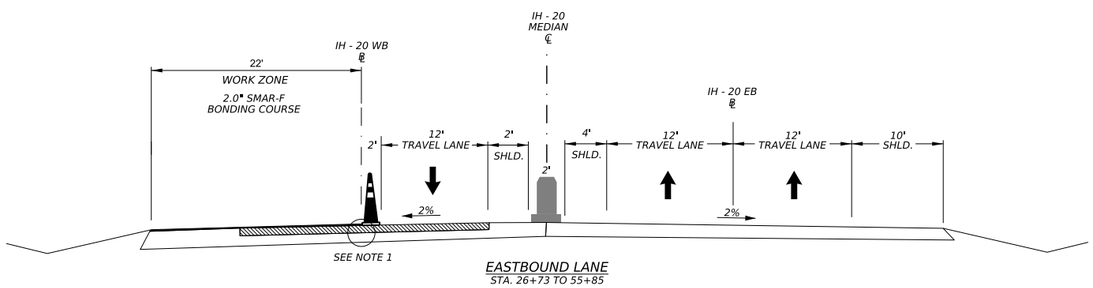
2.PLACE BONDING COURSE AND ALLOW TO CURE.

3. PLACE 2.0" SMAR-F IN ACCORDANCE WITH TYPICAL SECTIONS, TE(HMAC)-11, "TREATMENT FOR VARIOUS EDGE CONDITIONS" STANDARD AND NOTE 1. ALLOW TO CURE AND PLACE ANY NECESSARY WORK ZONE TABS/STRIPING BEFORE OPENING TO TRAFFIC.

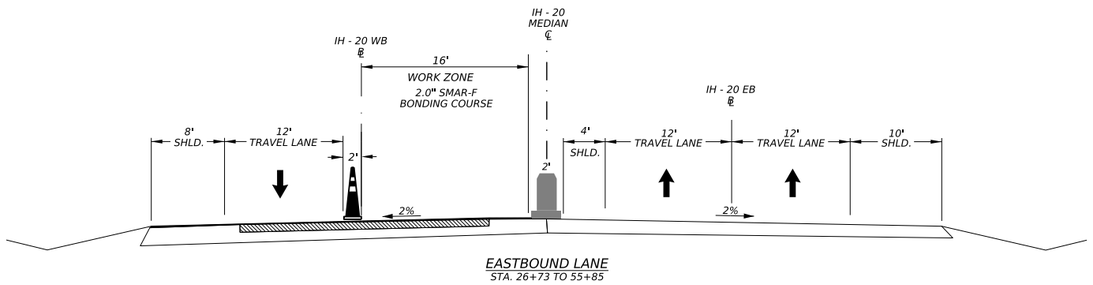
NOTE: ALL WORK MUST BE COMPLETED WITHIN THE SAME NIGHT. EDGE CONDITION 3 ACCORDING TO "TREATMENT FOR VARIOUS EDGE CONDITIONS" WILL BE MET FOR 24 HOURS MAX. ANY PERIOD EXCEEDING A 24-HOUR PERIOD WILL REQUIRE MEETING EDGE CONDITION 1 AND A 3:1 SAFETY SLOPE AS SHOWN IN NOTE 1.

4.REPEAT FOR INSIDE WESTBOUND TRAVEL LANE.

NOTE:SEE TIE IN DEAILS FOR BRIDGE APPROACH



EASTBOUND LANE
STA. 26+73 TO 55+85



EASTBOUND LANE
STA. 26+73 TO 55+85

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

PHASE NARRATIVE

SHEET 5 OF 6

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		25
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

PHASE 5A

WORKED PERFORMED AT NIGHT 9PM TO 5AM

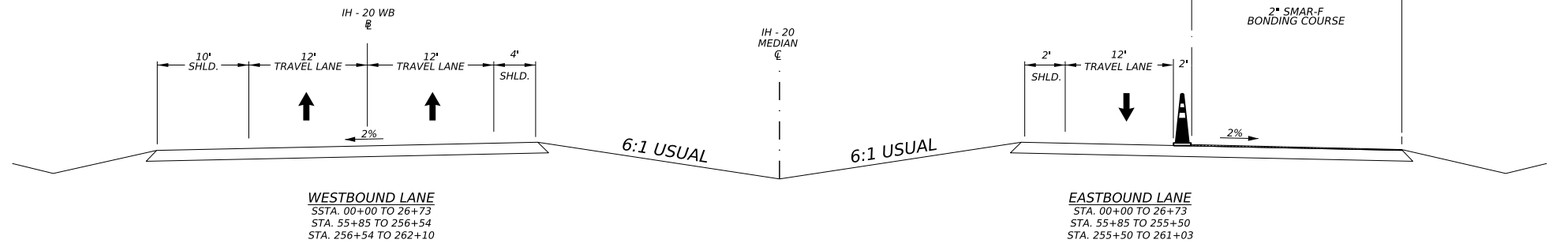
1. PLACE ADVANCED WARNING SIGNING AND CLOSE OUTSIDE WESTBOUND TRAVEL LANE AND SHOULDER IN ACCORDANCE WITH CORRESPONDING TCP(2-6)-18. THE MAXIMUM WORK AREA LENGTH SHALL BE LIMITED TO HALF A MILE. ADJUSTMENTS MUST BE APPROVED BY THE ENGINEER.

2.PLACE BONDING COURSE AND ALLOW TO CURE.

3. PLACE 2.0" SMAR-F IN ACCORDANCE WITH TYPICAL SECTIONS, TE(HMAC)-11, "TREATMENT FOR VARIOUS EDGE CONDITIONS" STANDARD AND NOTE 1. ALLOW TO CURE AND PLACE ANY NECESSARY WORK ZONE TABS/STRIPING BEFORE OPENING TO TRAFFIC.

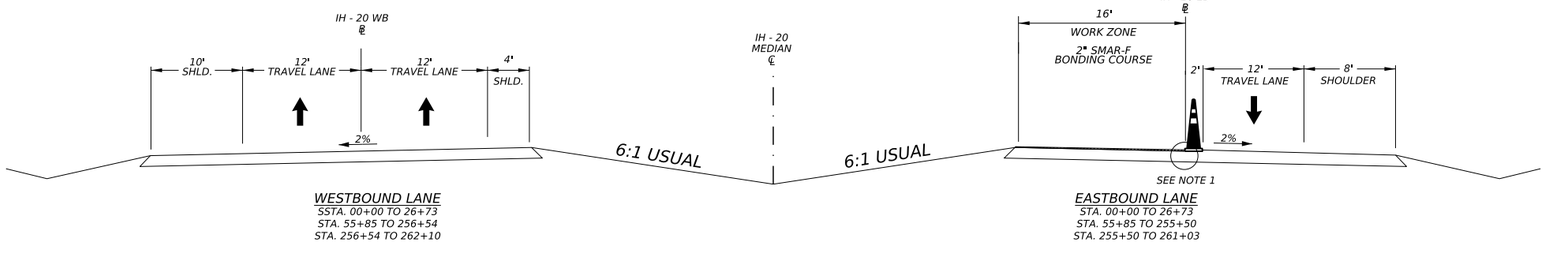
NOTE: ALL WORK MUST BE COMPLETED WITHIN THE SAME NIGHT.

4.REPEAT FOR INSIDE EASTBOUND TRAVEL LANE.



WESTBOUND LANE
SSTA. 00+00 TO 26+73
STA. 55+85 TO 256+54
STA. 256+54 TO 262+10

EASTBOUND LANE
STA. 00+00 TO 26+73
STA. 55+85 TO 255+50
STA. 255+50 TO 261+03



WESTBOUND LANE
SSTA. 00+00 TO 26+73
STA. 55+85 TO 256+54
STA. 256+54 TO 262+10

EASTBOUND LANE
STA. 00+00 TO 26+73
STA. 55+85 TO 255+50
STA. 255+50 TO 261+03

PHASE 6A

WORKED PERFORMED AT NIGHT 9PM TO 5AM

1. APPLY FINAL STRIPING CONFIGURATION AND RAISED PAVEMENT MARKERS, ETC.

2. PERFORMED MILLED-IN EDGE LINE RUMBLE STRIPS AND FOG SEAL.

3. GRADE DITCHES IN ACCORDANCE TO TYPICAL SECTIONS.

4. BACKFILL PAVEMENT EDGES.

5. INSTALL SIGNS AND DELINIATORS.

6. PERFORM FINAL CLEANUP.

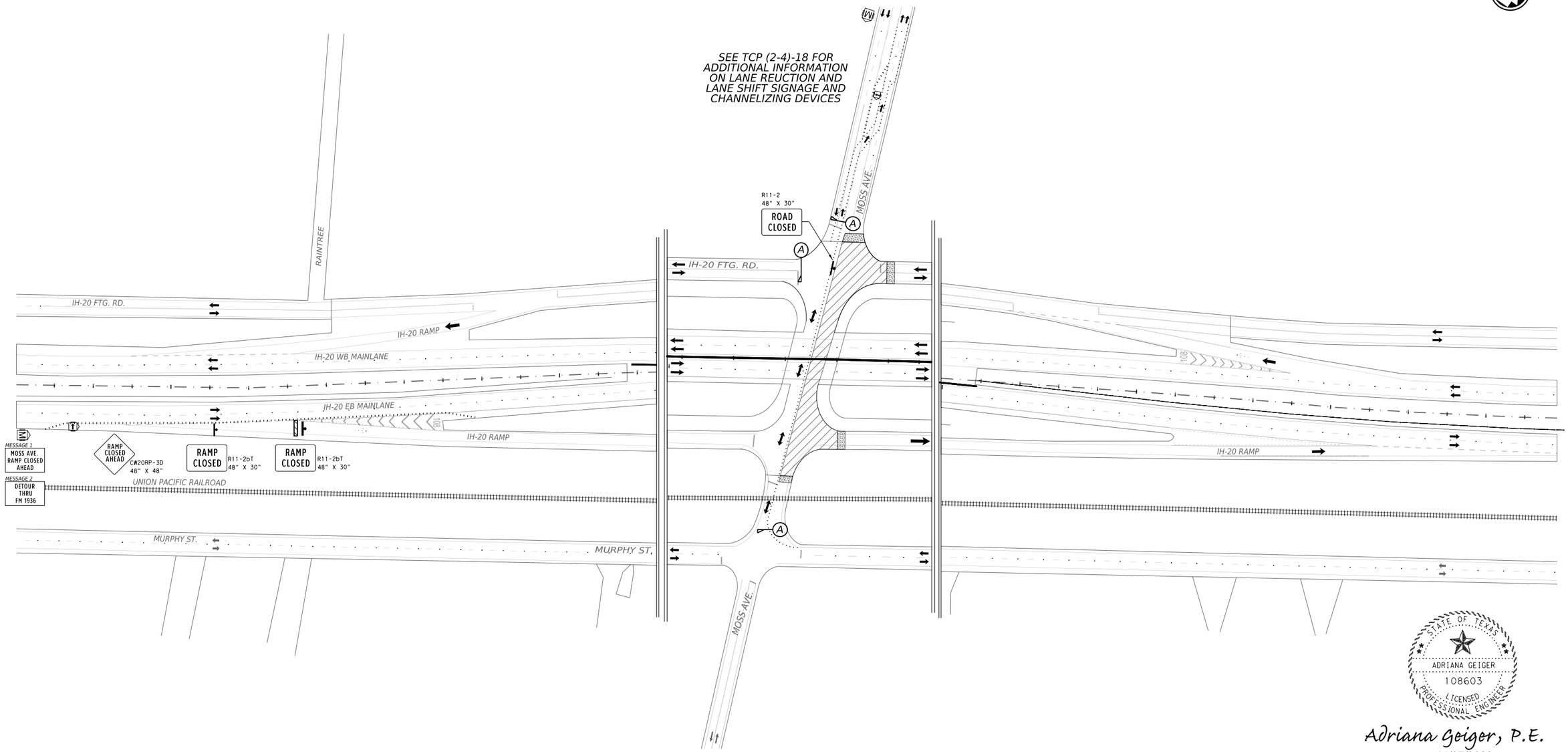
Adriana Geiger, P.E.
11/27/2023

PHASE NARRATIVE

SHEET 6 OF 6

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		26
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20



LEGEND	
	CHANNELIZING DEVICES*
Ⓜ	PCMS
	TRAILER MOUNTED FLASHING ARROW BOARD
	TMA
	SIGN
Ⓐ	AUTOMATED FLAGGER
	TRAFFIC FLOW
	TYP. III BARRIER
	TRANSITION AREA
	AREA OF WORK
	DETOUR PATH

*REFERENCE TCP STANDARDS FOR CHANNELIZING DEVICE SPACING AND TAPERS

PHASE A: NORTHBOUND MOSS LANES

NOTE: NOT TO SCALE, ALL SIGNING, SPACING, TRAFFIC BARRIER AND TAPER LENGTHS MUST COMPLY WITH ALL APPLICABLE TRAFFIC CONTROL PLAN ROADWAY AND WORK ZONE STANDARDS

REFER TO STANDARDS FOR ADDITIONAL SIGNAGE NOT SHOWN ON PLANS

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

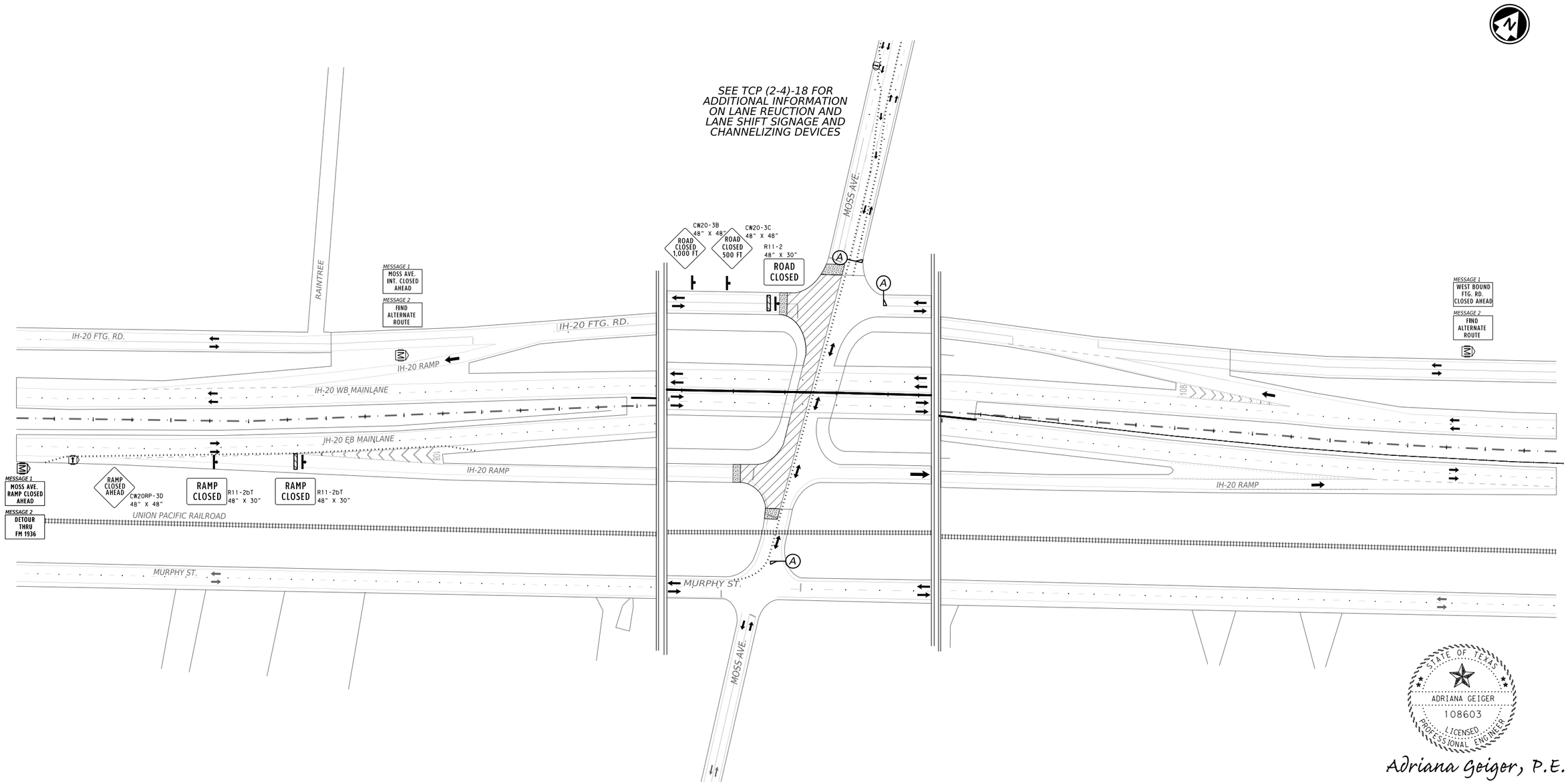
Adriana Geiger, P.E.
11/27/2023

TRAFFIC CONTROL PLAN - MOSS AVE.

SHEET 1 OF 3

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		27
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20



LEGEND	
·····	CHANNELIZING DEVICES*
Ⓜ	PCMS
	TRAILER MOUNTED FLASHING ARROW BOARD
	TMA
	SIGN
Ⓐ	AUTOMATED FLAGGER
	TRAFFIC FLOW
	TYP. III BARRIER
	TRANSITION AREA
	AREA OF WORK
— ' '	DETOUR PATH

*REFERENCE TCP STANDARDS FOR CHANNELIZING DEVICE SPACING AND TAPERS

PHASE B: SOUTHBOUND MOSS LANES

NOTE: NOT TO SCALE, ALL SIGNING, TRAFFIC BARRIER AND TAPER LENGTHS MUST COMPLY WITH ALL APPLICABLE TRAFFIC CONTROL PLAN ROADWAY AND WORK ZONE STANDARDS

REFER TO STANDARDS FOR ADDITIONAL SIGNAGE NOT SHOWN ON PLANS

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

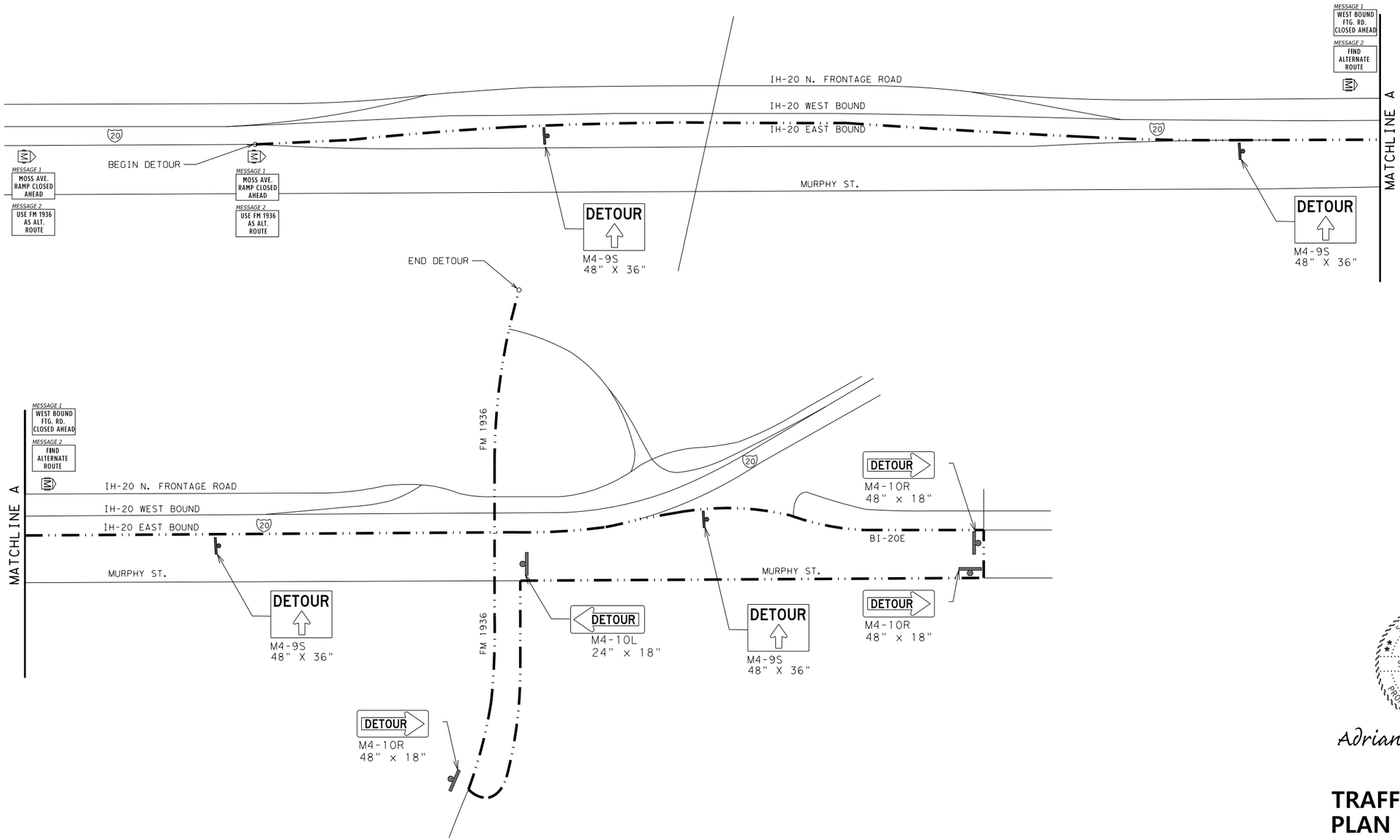
Adriana Geiger, P.E.
11/27/2023

TRAFFIC CONTROL PLAN - MOSS AVE.

SHEET 2 OF 3

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		28
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20



LEGEND	
.....	CHANNELIZING DEVICES*
M	PCMS
	TRAILER MOUNTED FLASHING ARROW BOARD
	TMA
	SIGN
A	AUTOMATED FLAGGER
	TRAFFIC FLOW
	TYP. III BARRIER
	TRANSITION AREA
	AREA OF WORK
	DETOUR PATH

*REFERENCE TCP STANDARDS FOR CHANNELIZING DEVICE SPACING AND TAPERS

ADDITIONAL SIGNAGE FOR DETOUR FOR MOSS AVE. THROUGH FM 1936

NOTE: NOT TO SCALE, ALL SIGNING, TRAFFIC BARRIER AND TAPER LENGTHS MUST COMPLY WITH ALL APPLICABLE TRAFFIC CONTROL PLAN ROADWAY AND WORK ZONE STANDARDS

REFER TO STANDARDS FOR ADDITIONAL SIGNAGE NOT SHOWN ON PLANS

STATE OF TEXAS
SAUL ROMERO, JR.
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

TRAFFIC CONTROL PLAN - MOSS AVE.

SHEET 3 OF 3

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
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STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13	0004	07	138	IH-20
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	ODA	ECTOR		30

DATE: 11/27/2023 8:57:04 AM
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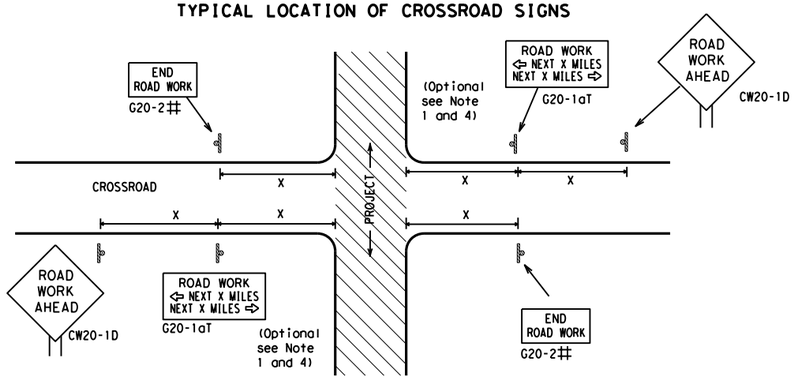
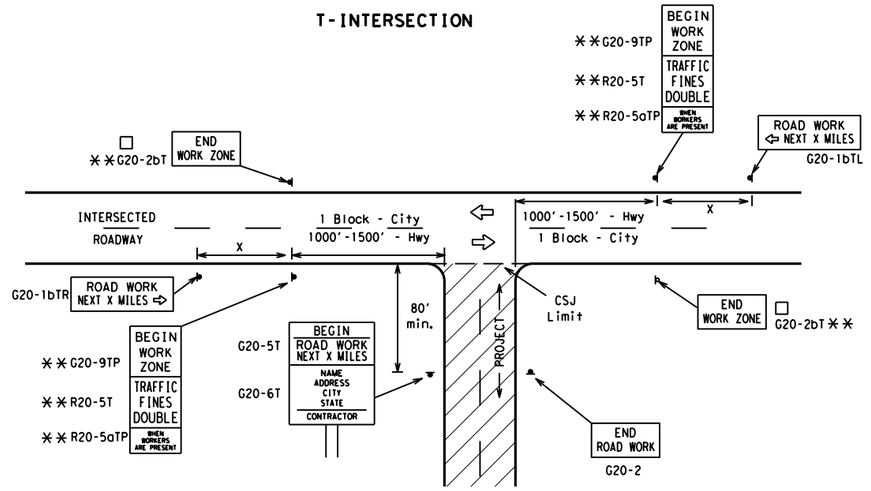
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

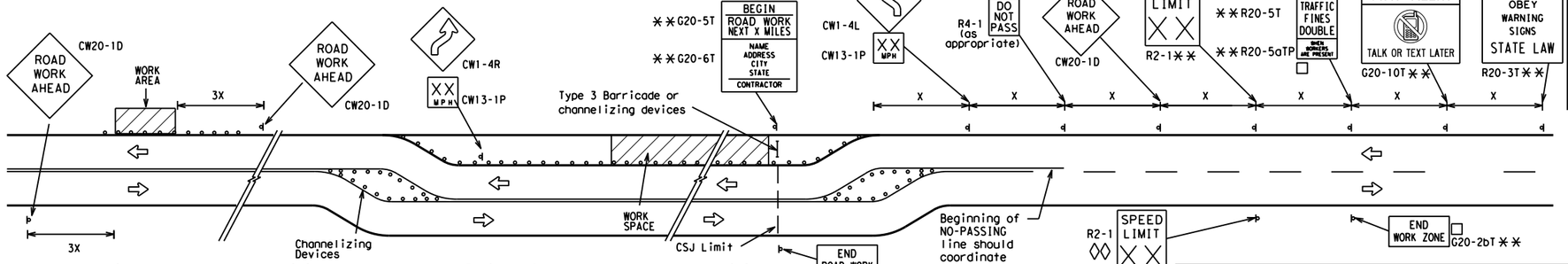
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

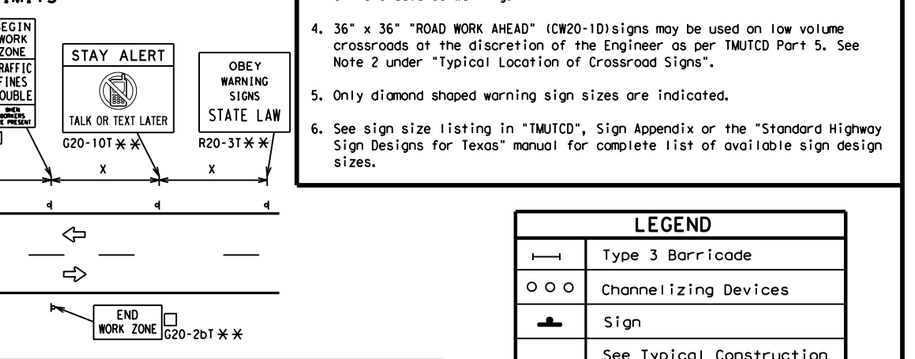
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

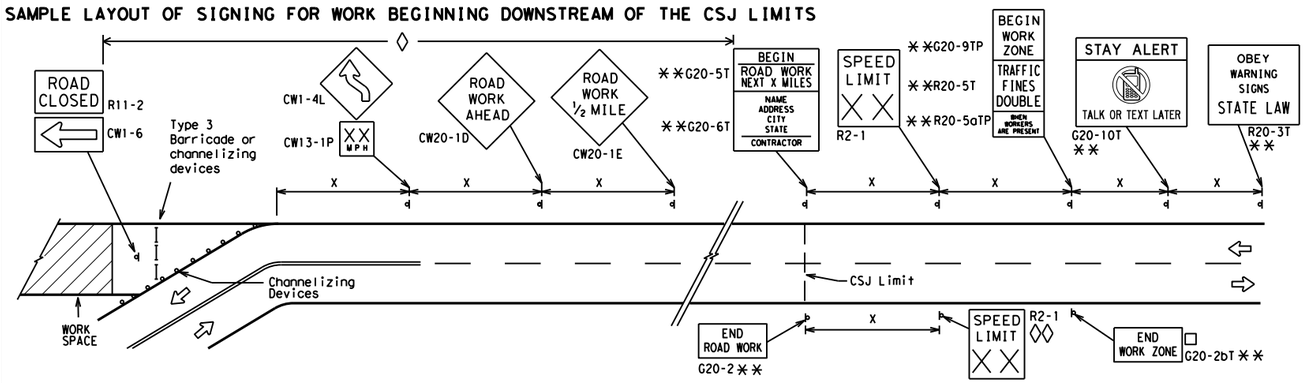


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING 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	0004	07	138	IH-20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	ECTOR		31

DATE: 11/27/2023 8:57:04 AM
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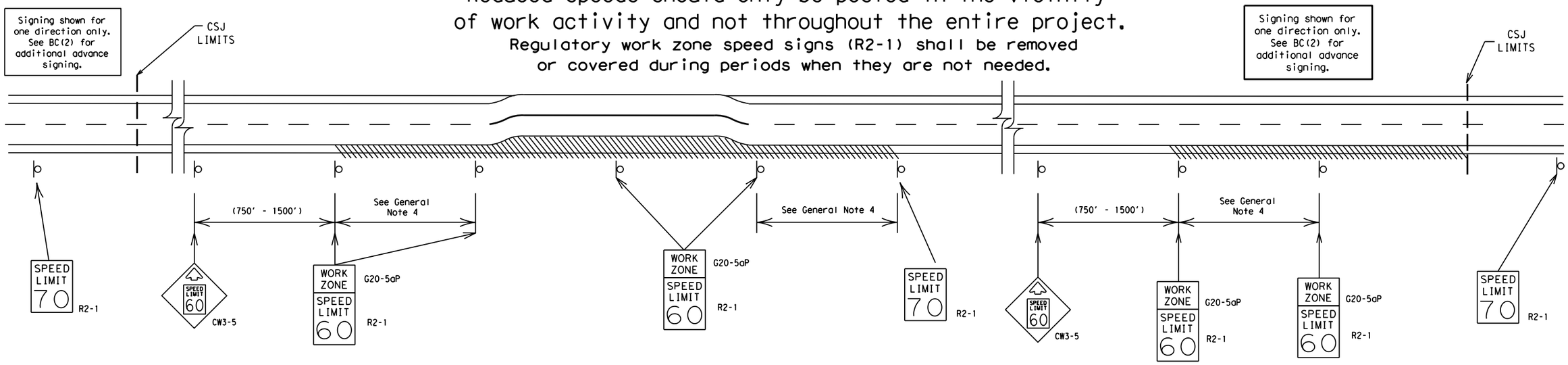
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0004	07	138	IH-20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	ECTOR		32

DATE: 11/27/2023 8:57:05 AM
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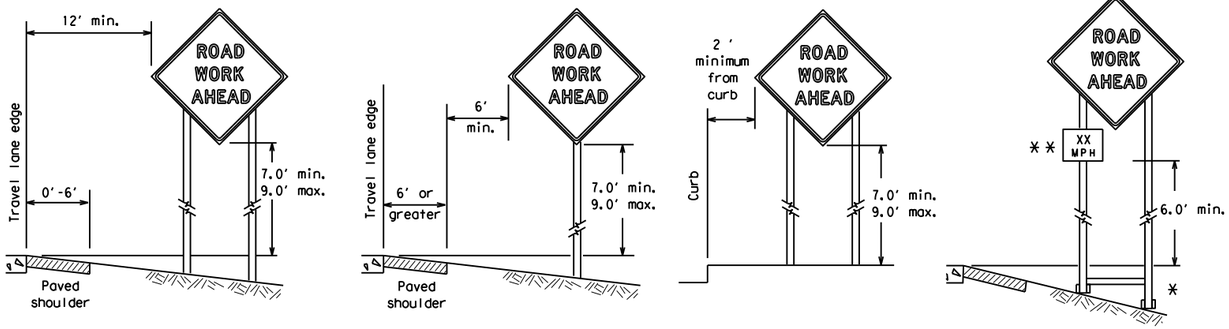
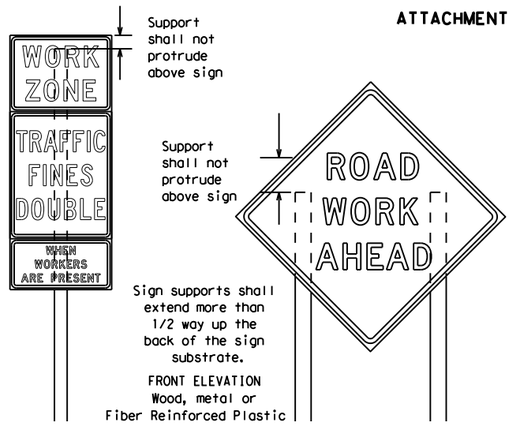
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

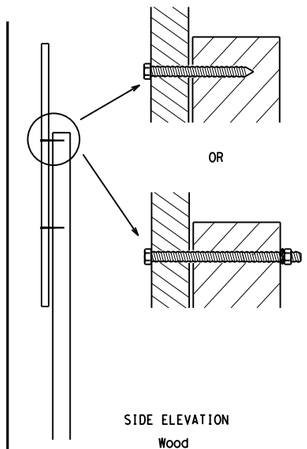


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





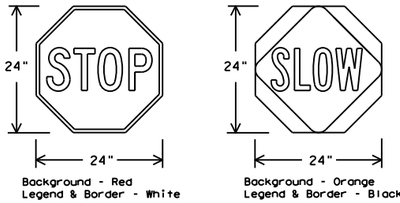
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0004	07	138	IH-20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	ECTOR		33

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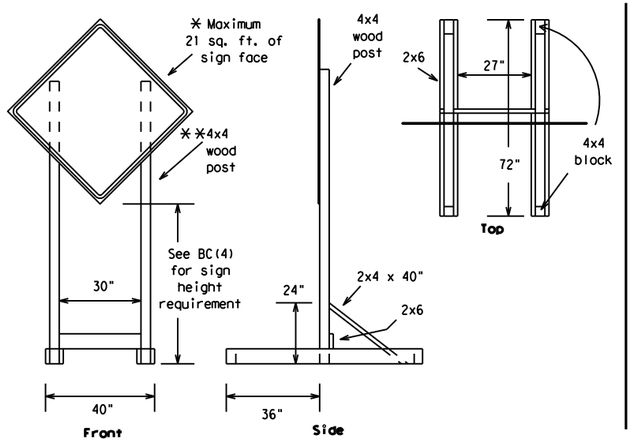
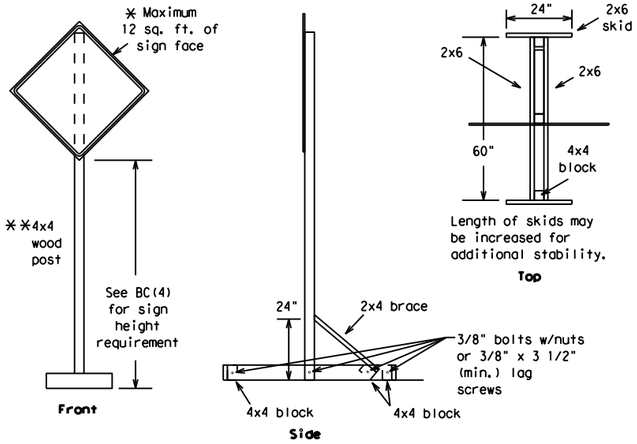
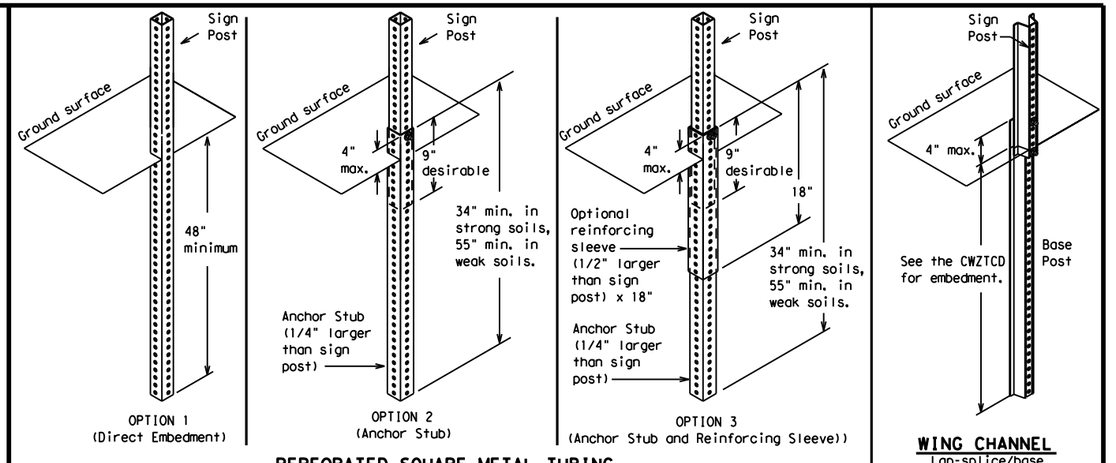




SKID MOUNTED WOOD SIGN SUPPORTS

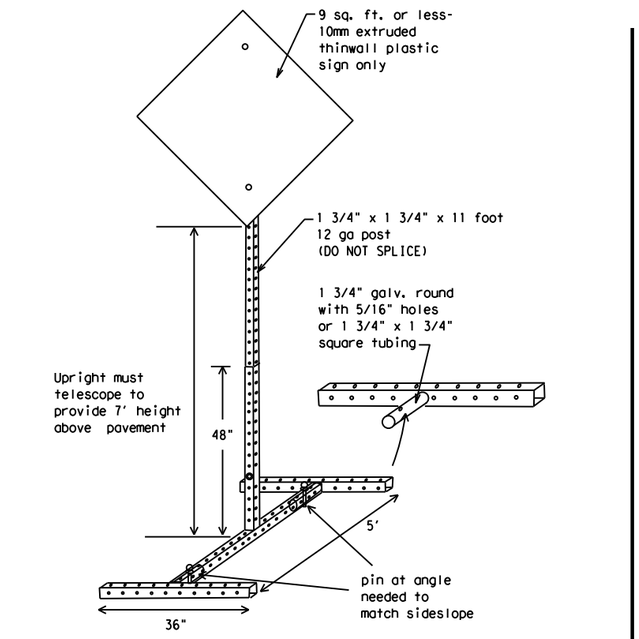
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

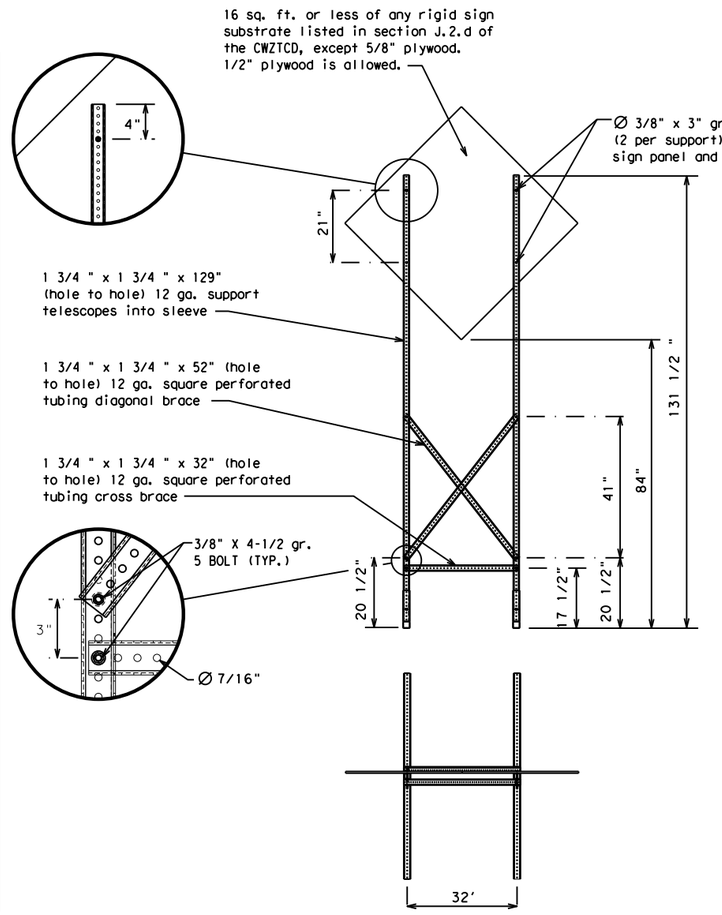


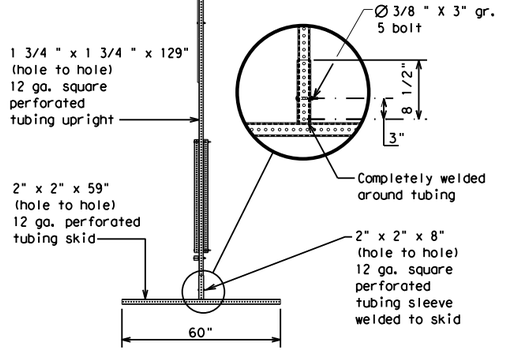
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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







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.

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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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

** 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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REVISIONS		0004	07	138	IH-20
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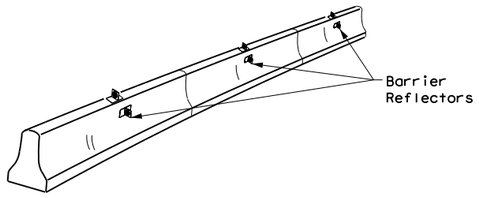
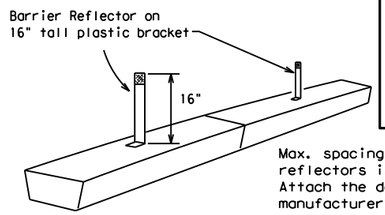
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



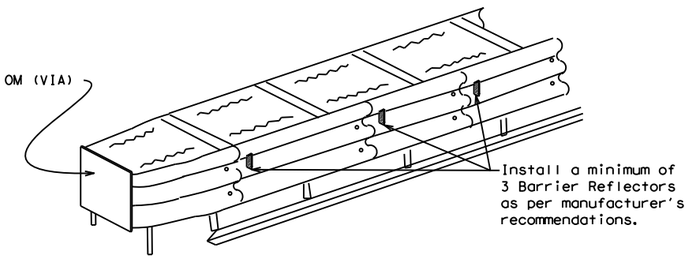
CONCRETE TRAFFIC BARRIER (CTB)

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

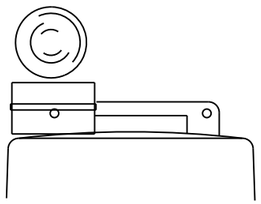
LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

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

WARNING LIGHTS

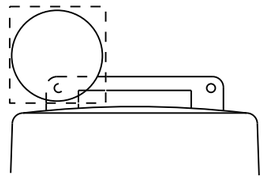


Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.

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.



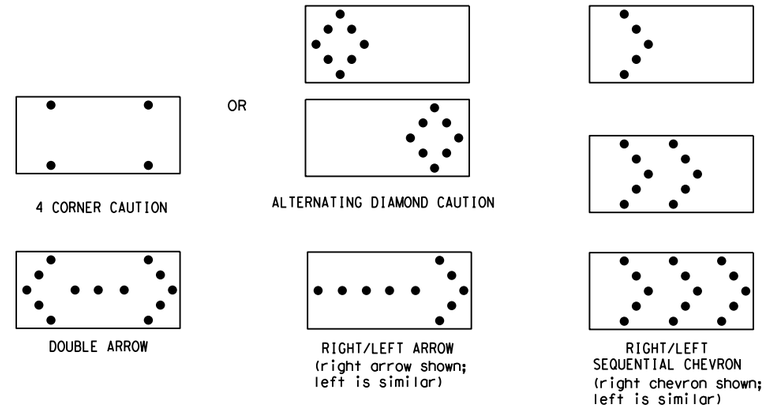
Warning reflector may be round or square.Must have a yellow reflective surface area of at least 30 square inches

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

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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	0004	07	138	IH-20
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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

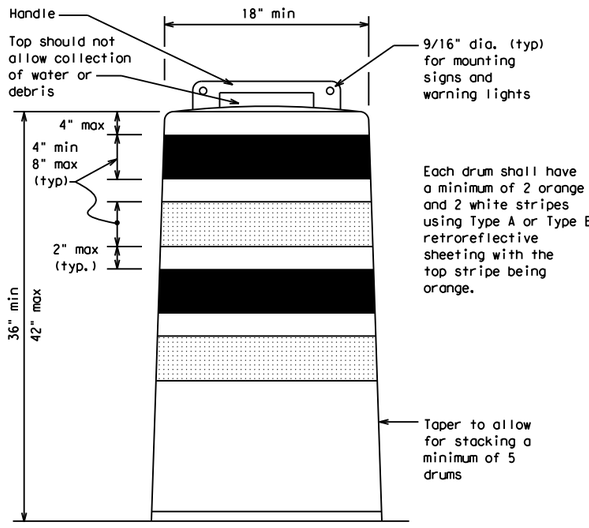
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

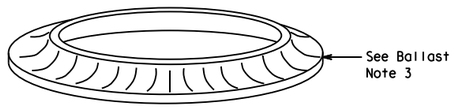
RETROREFLECTIVE SHEETING

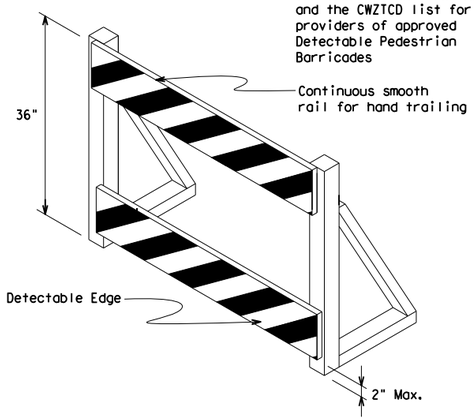
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

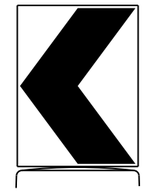




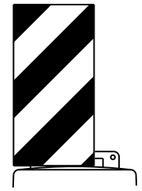


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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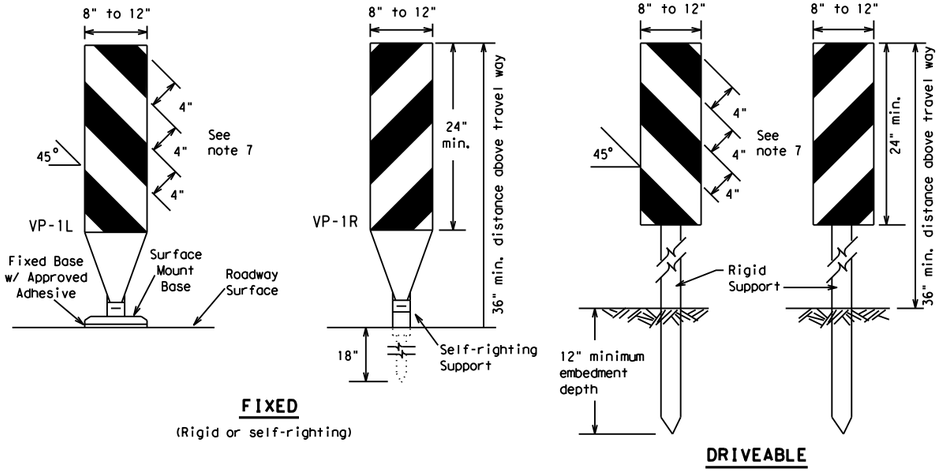
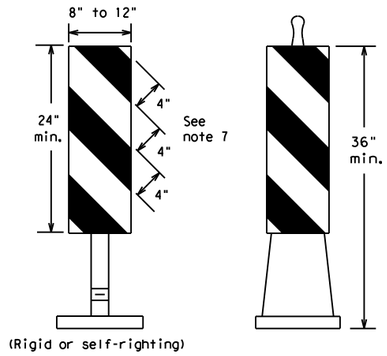


FIXED
(Rigid or self-righting)

DRIVEABLE

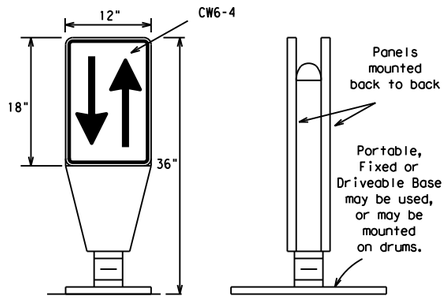


(Rigid or self-righting)

PORTABLE

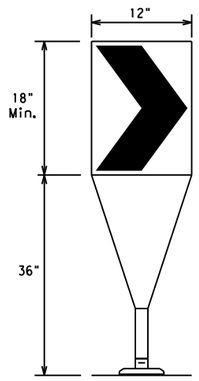
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



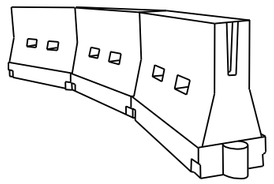
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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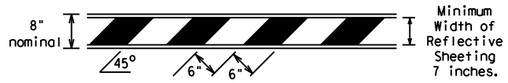
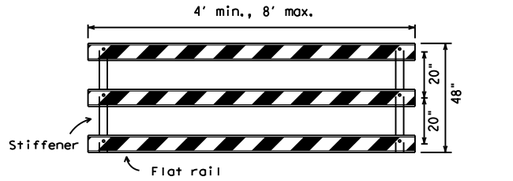
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



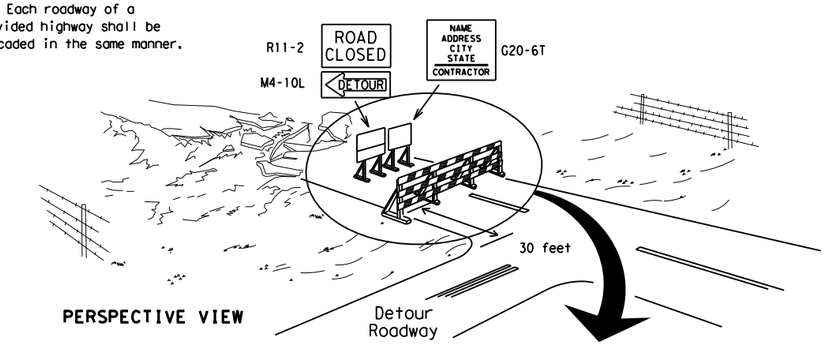
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

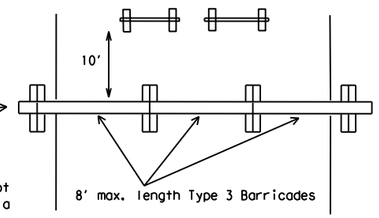
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

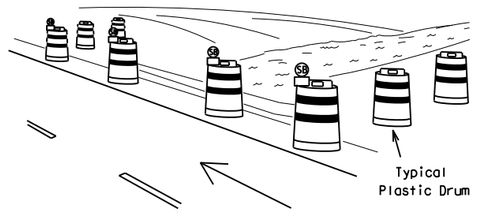
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

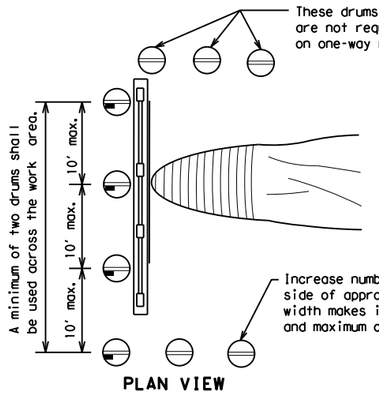
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

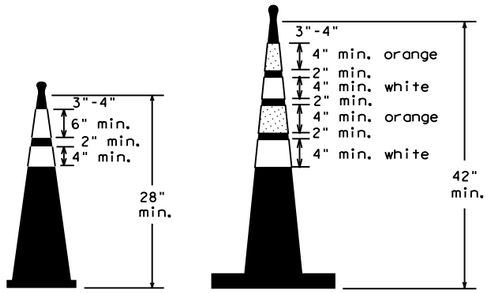
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

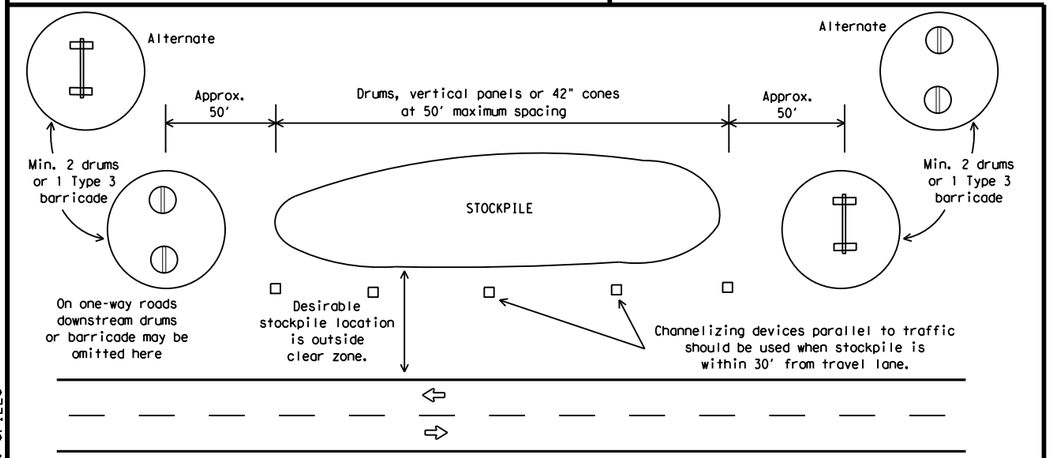
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

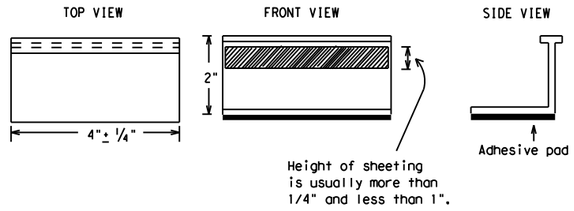
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0004	07	138	IH-20
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	ODA	ECTOR		40
11-02 8-14				

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DATE: 11/27/2023 8:57:07 AM
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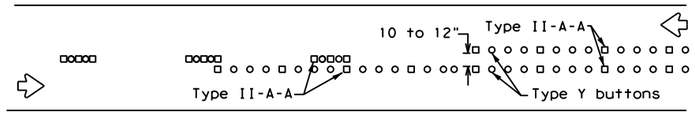
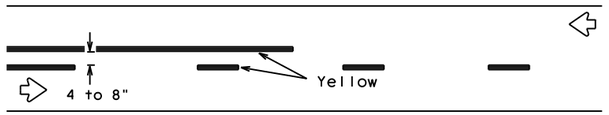
PAVEMENT MARKING PATTERNS

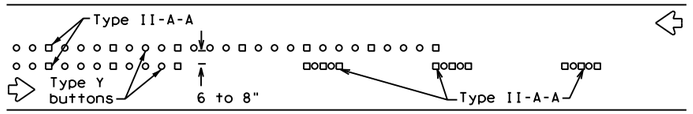
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



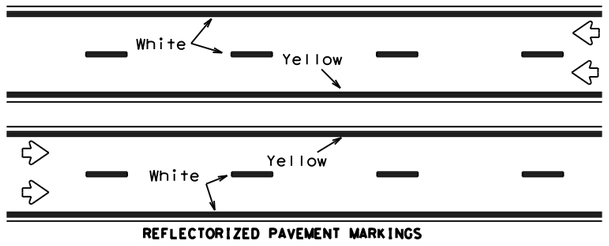
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



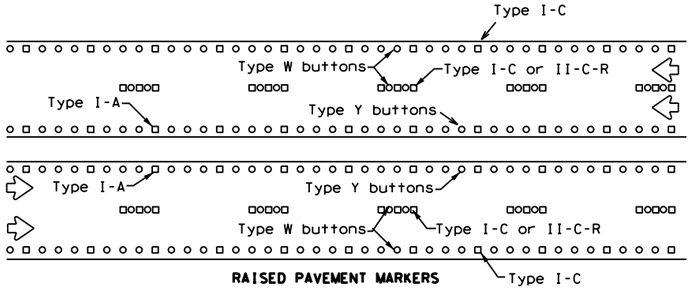
RAISED PAVEMENT MARKERS - PATTERN B

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

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



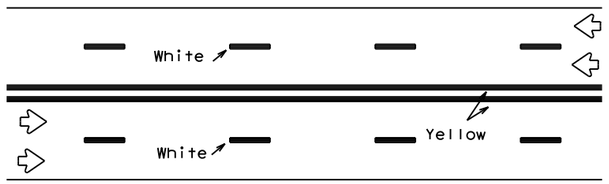
REFLECTORIZED PAVEMENT MARKINGS



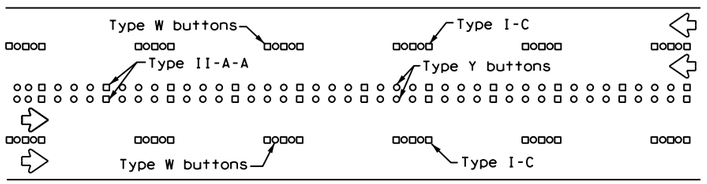
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



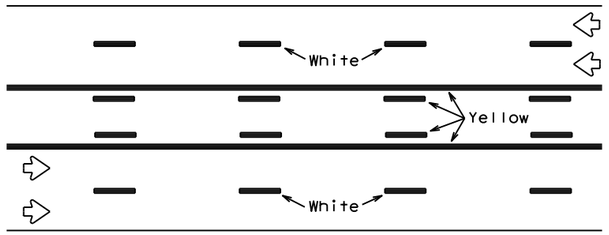
REFLECTORIZED PAVEMENT MARKINGS



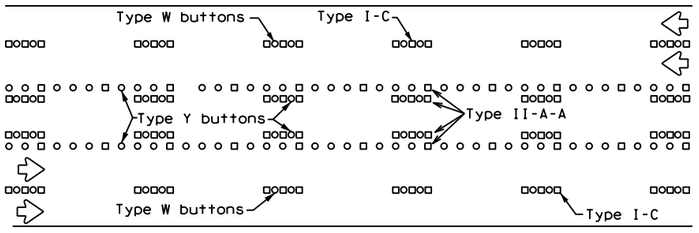
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

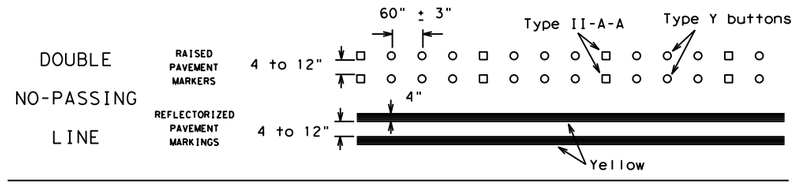
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

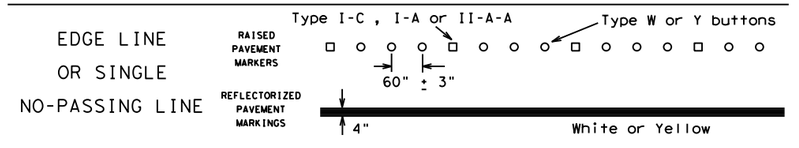
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

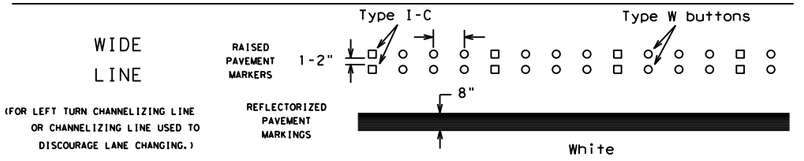


EDGE LINE OR SINGLE NO-PASSING LINE



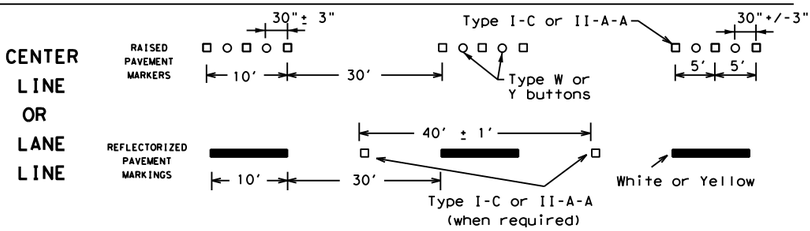
WIDE LINE

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

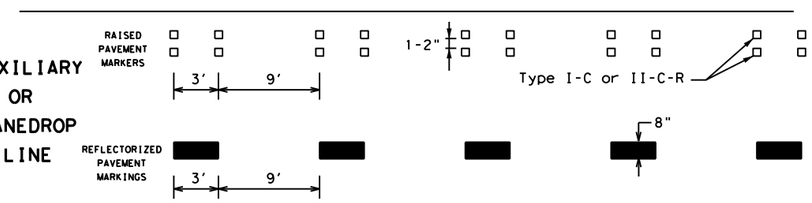


BROKEN LINES

CENTER LINE OR LANE LINE

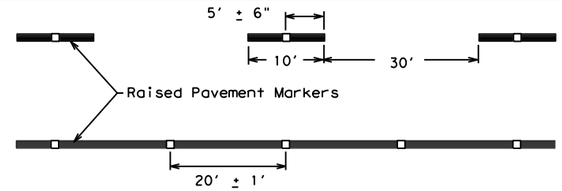


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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1-97 9-07 5-21	DIST	COUNTY		SHEET NO.
2-98 7-13	ODA	ECTOR		41
11-02 8-14				

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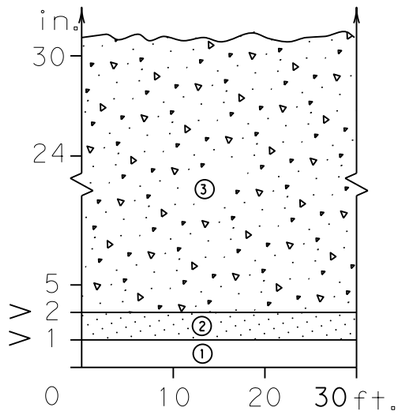
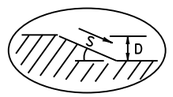
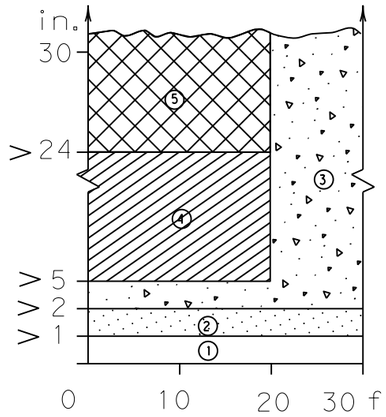
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet

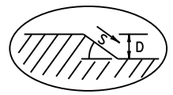


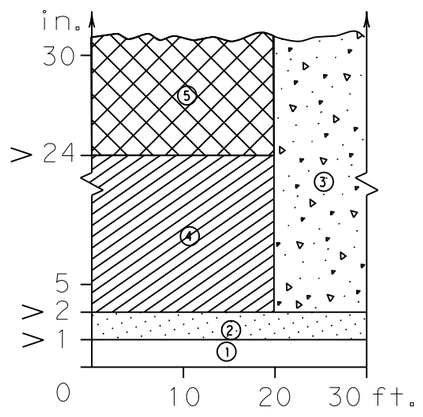
Edge Condition I
S = (3:1) (or flatter)



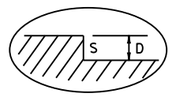


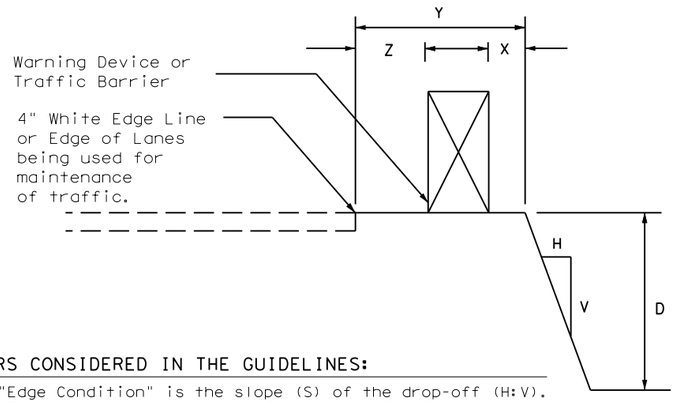
Edge Condition II
S = ((2.99):1) to (1:1)





Edge Condition III
S is steeper than (1:1)





FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".

2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.

3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.

4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.

5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

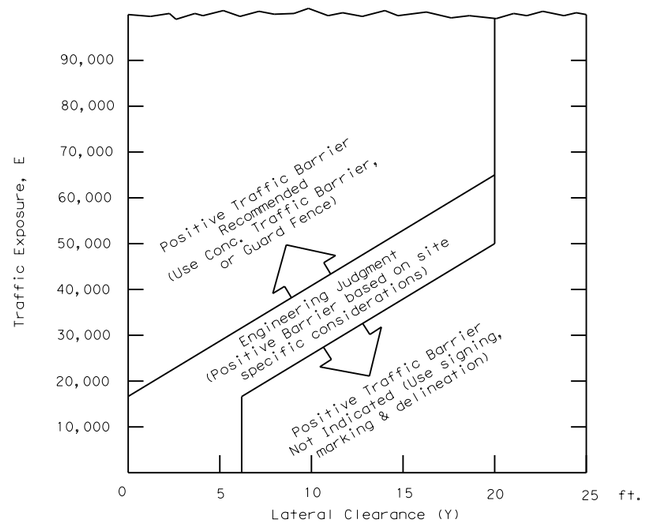
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.

3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.

4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▨)



1. E = ADT x T
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

2. Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.

3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

Engineer's Seal

Date _____

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
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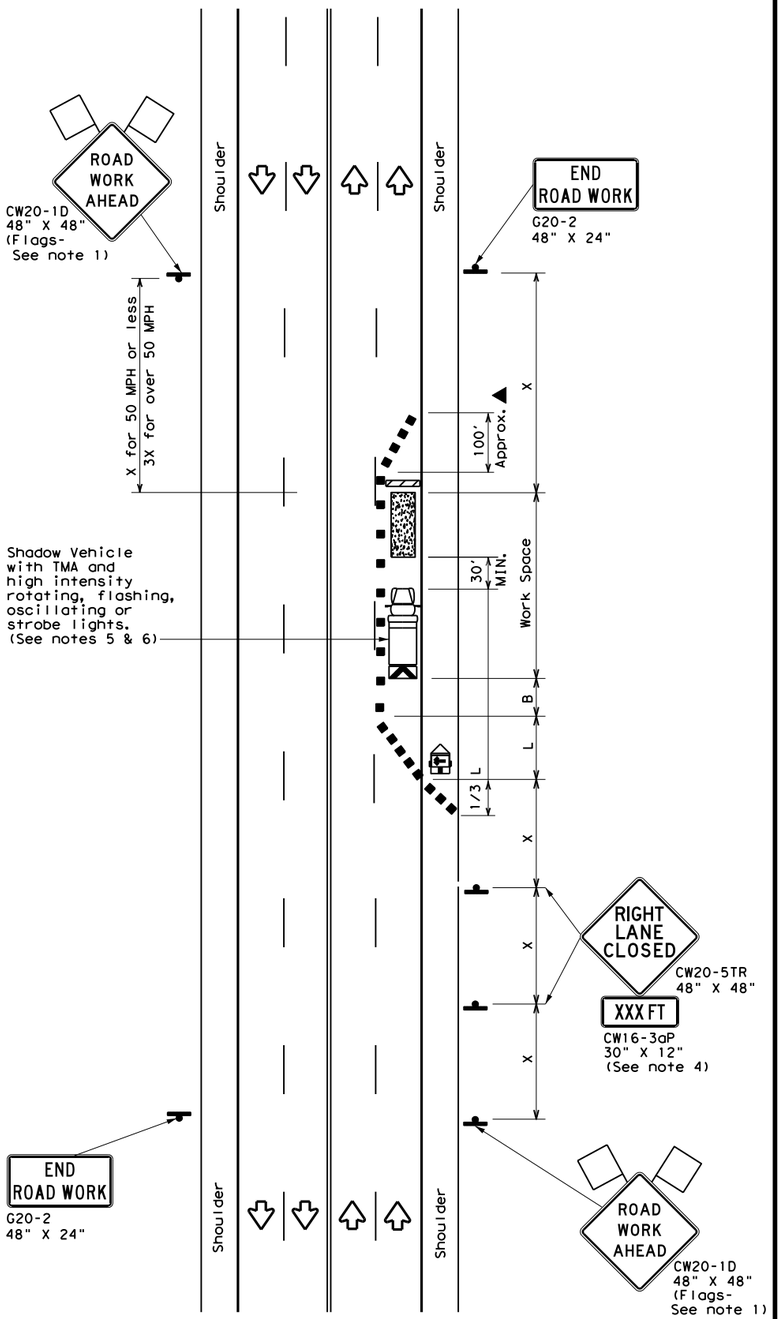
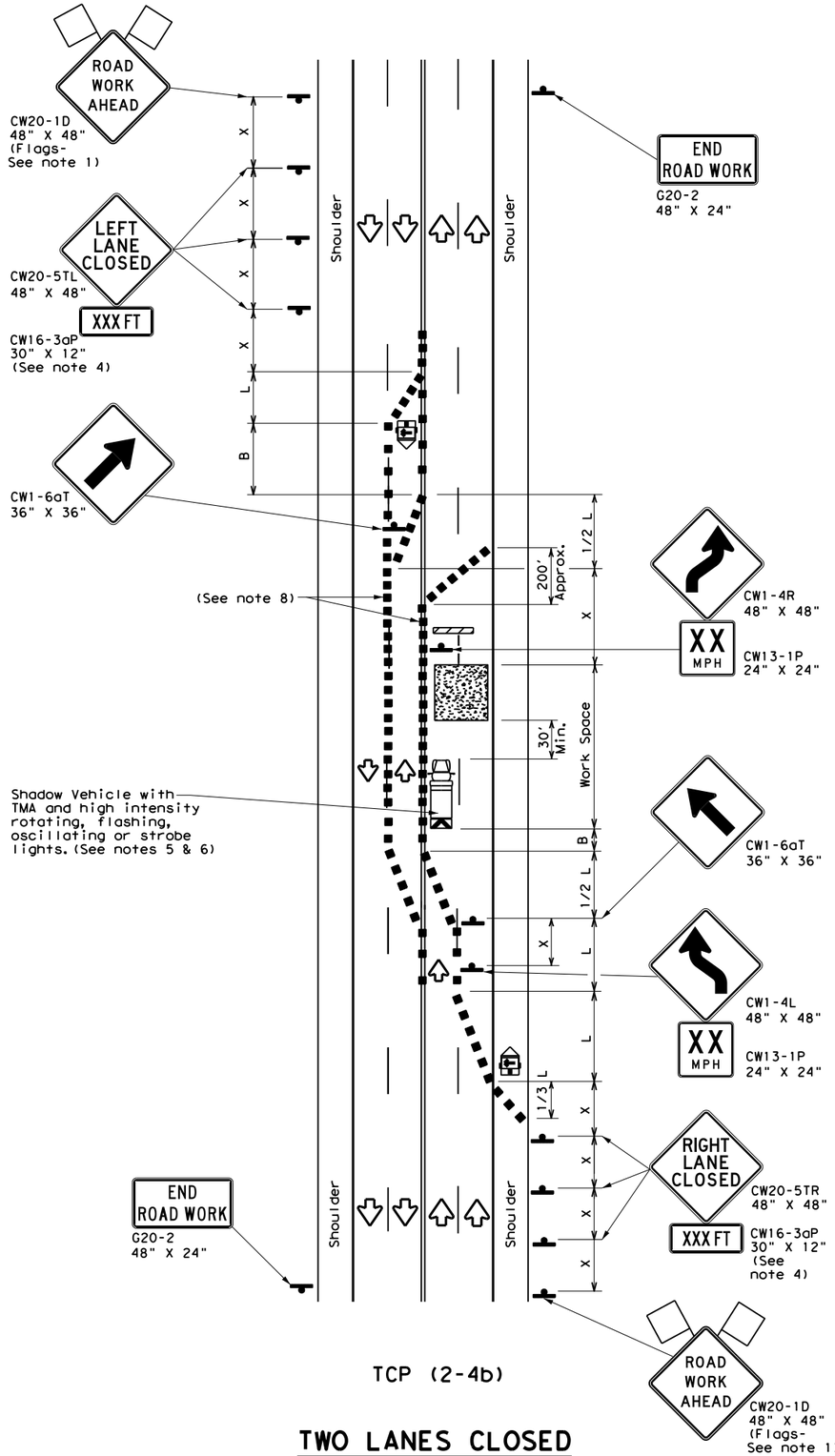


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

TCP (2-4a)

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

TCP (2-4b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
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4-98 2-18	ODA	ECTOR		43

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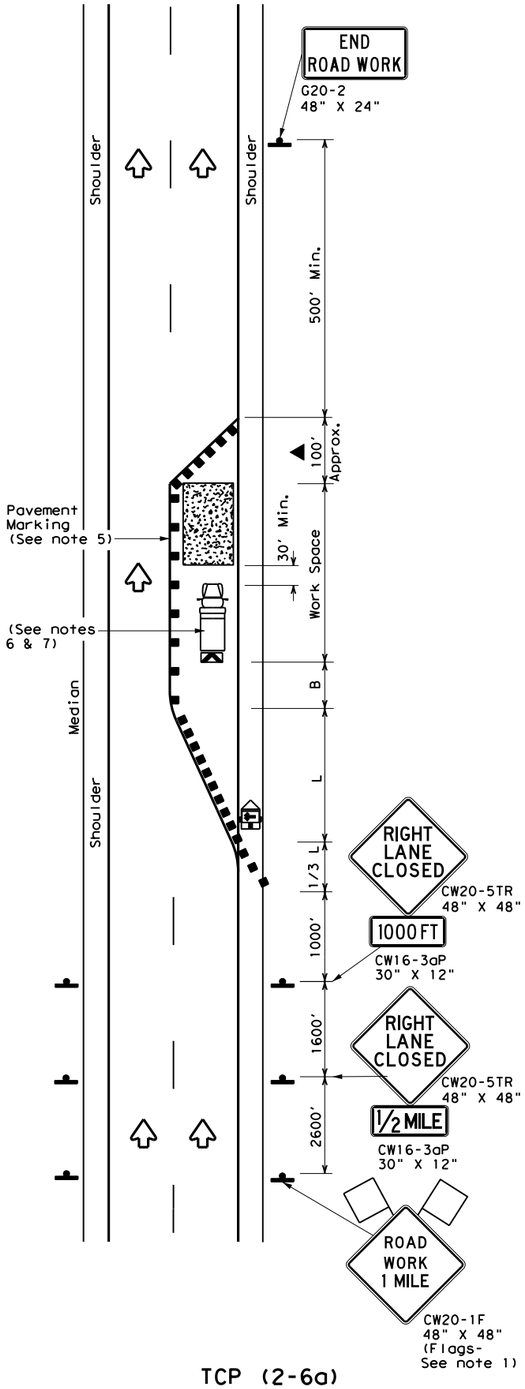
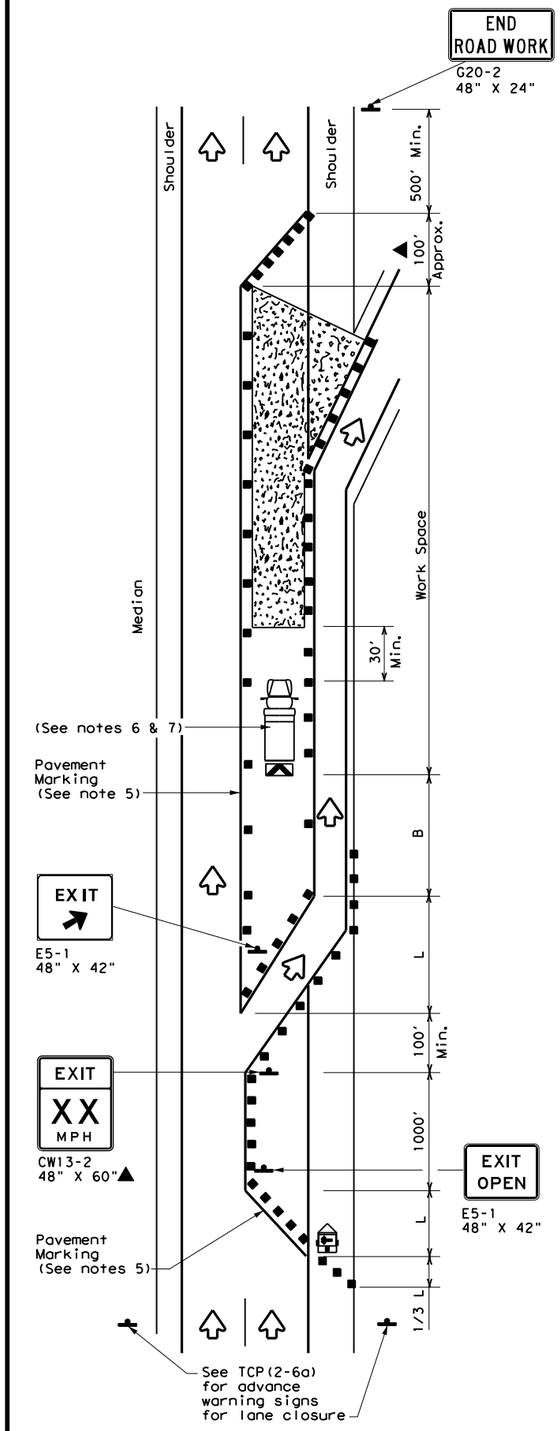


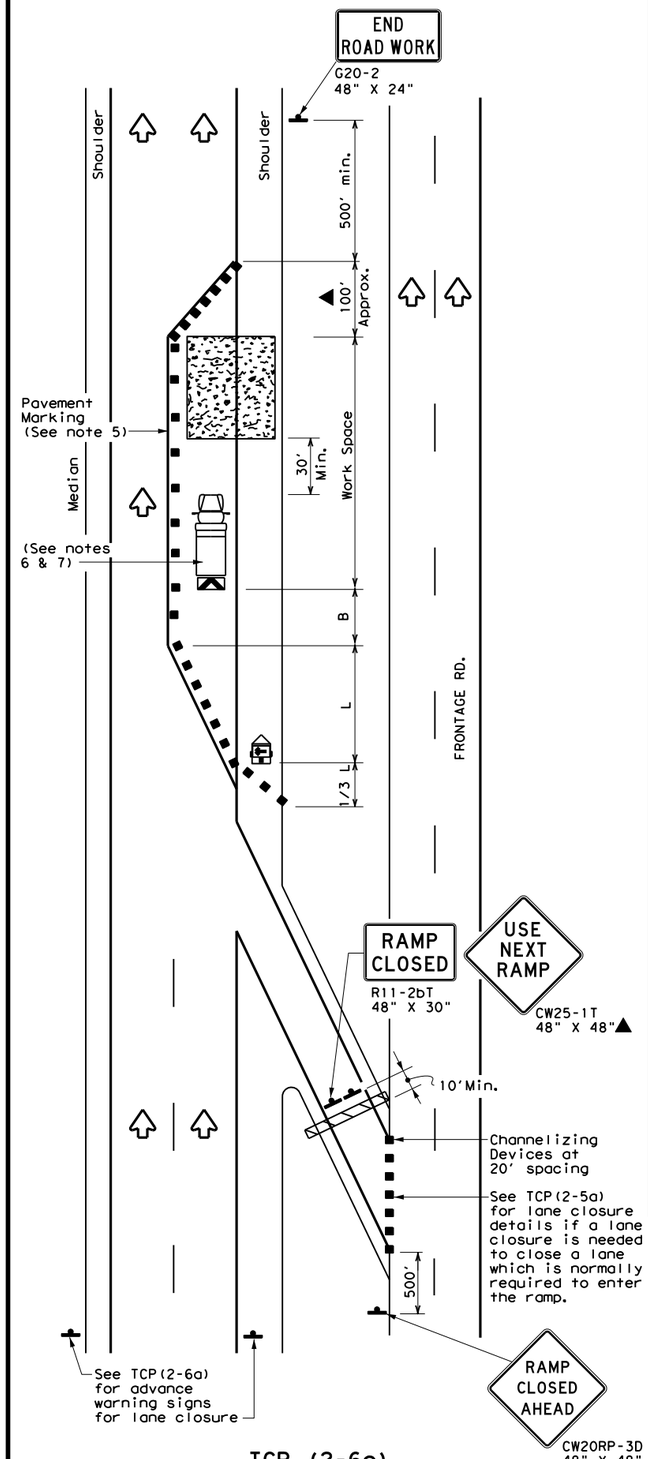
TCP (2-6a)

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

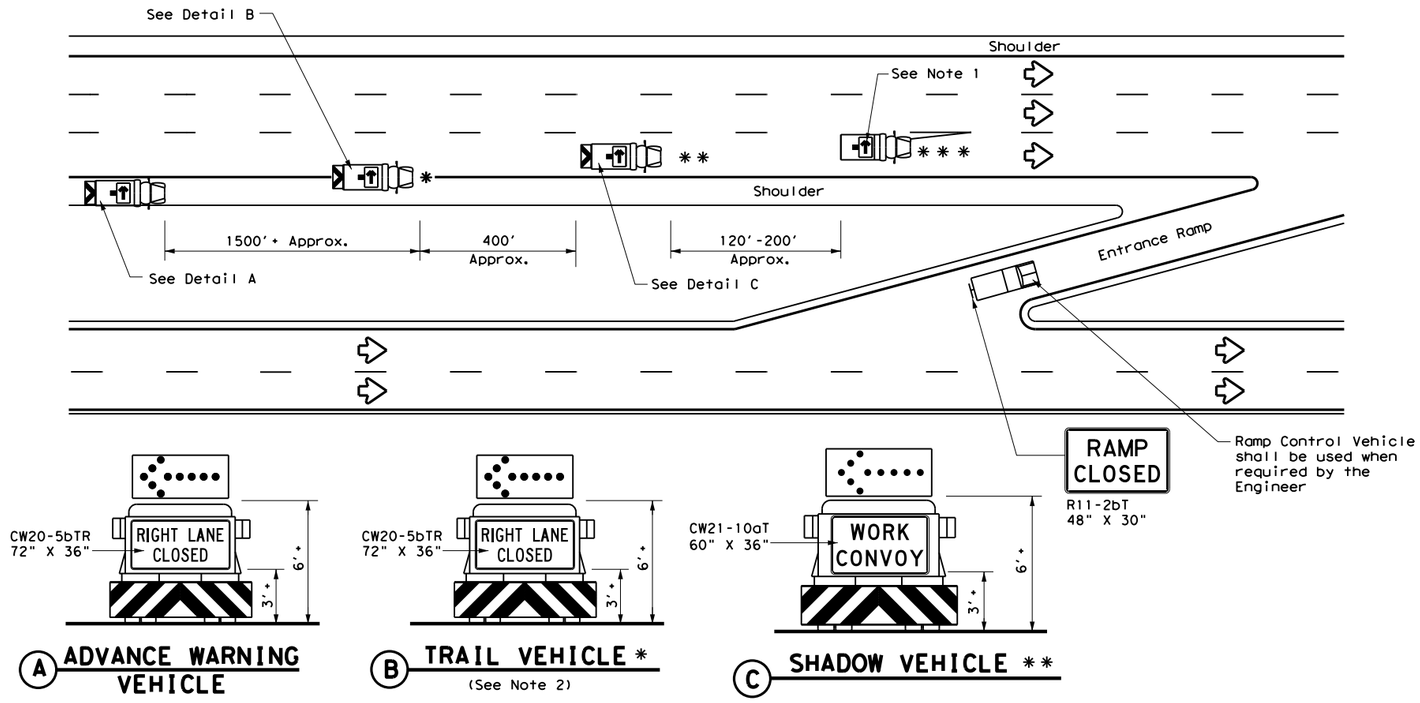
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

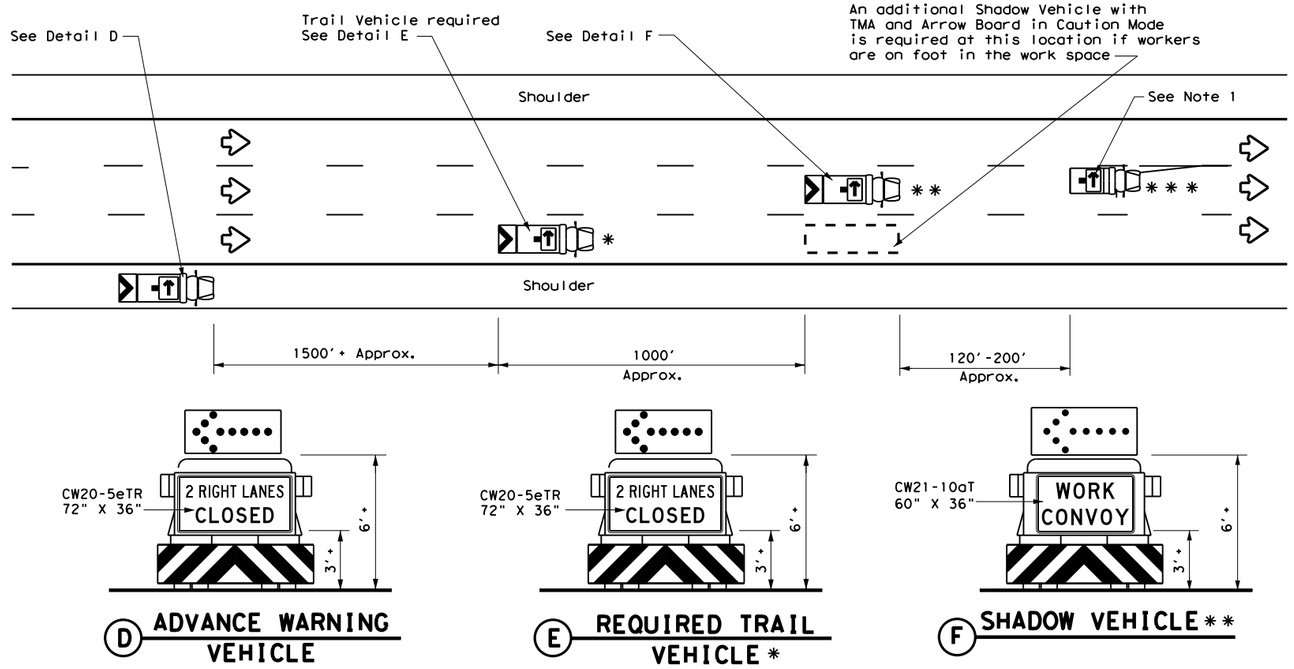
TCP(2-6)-18

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	0004	07	138	IH - 20
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		44

DATE:
FILE:



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



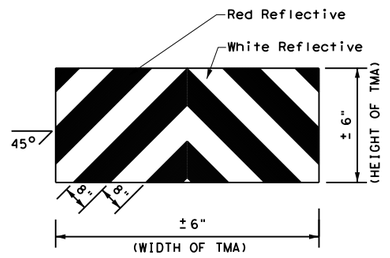
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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

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

GENERAL NOTES

1. ADVANCE WARNING, TRAIL and SHADOW vehicles shall be equipped with Type B or Type C flashing arrow boards as per the Barricade and Construction (BC) standards. Arrow boards on WORK vehicles will be optional based on the type of work being performed. The arrow boards shall be operated from inside the vehicle.
2. For TCP(3-2a) the Engineer will determine if the TRAIL VEHICLE is required based on prevailing roadway conditions, traffic volume, and sight distance restrictions. All other vehicles shown for both TCP(3-2a) and TCP(3-2b) are required.
3. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
4. The use of truck mounted attenuators (TMA) on the ADVANCE WARNING, SHADOW, and TRAIL vehicles are required.
5. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DMS 8300, Type A.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE may vary according to terrain, work activity and other factors.
9. Standard 48" X 48" diamond shaped warning signs with the same message as those shown may be used where adequate mounting space exists.
10. The signs shown should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or a truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board, must be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
12. The principles on this sheet may be used to close lanes from the left side of the roadway considering the number of lanes, shoulder width, sight distance, and ramp frequency.
13. Signs and flashing arrow board modes shall be appropriately altered when implementing left lane closures or interior closures which close the left lanes.
14. The Advance Warning Vehicle may straddle the edgeline when shoulder width makes it necessary.



STRIPING FOR TMA

Texas Department of Transportation

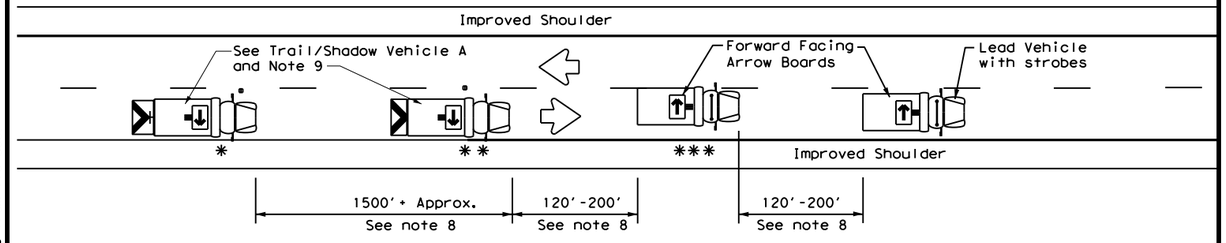
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

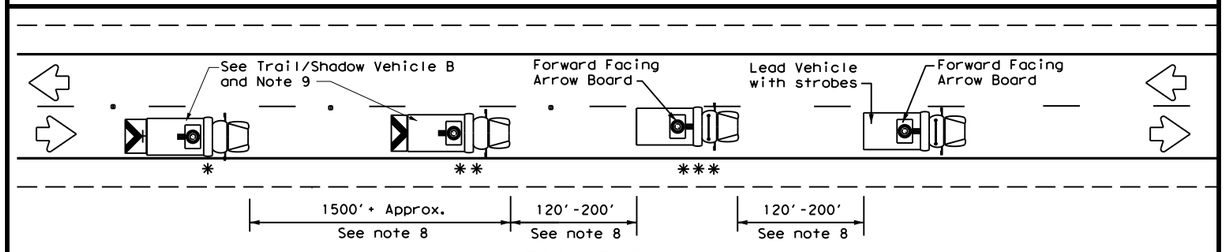
FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0004	07	138	IH - 20
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		45

176



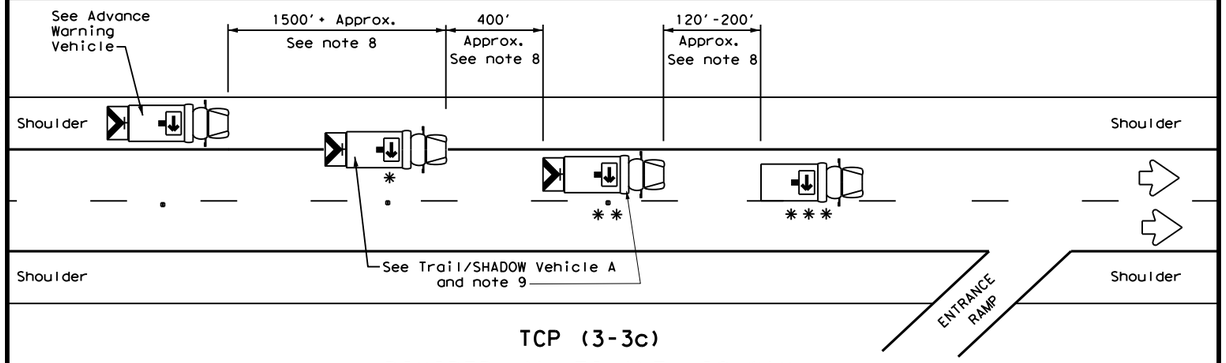
TCP (3-3a)

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



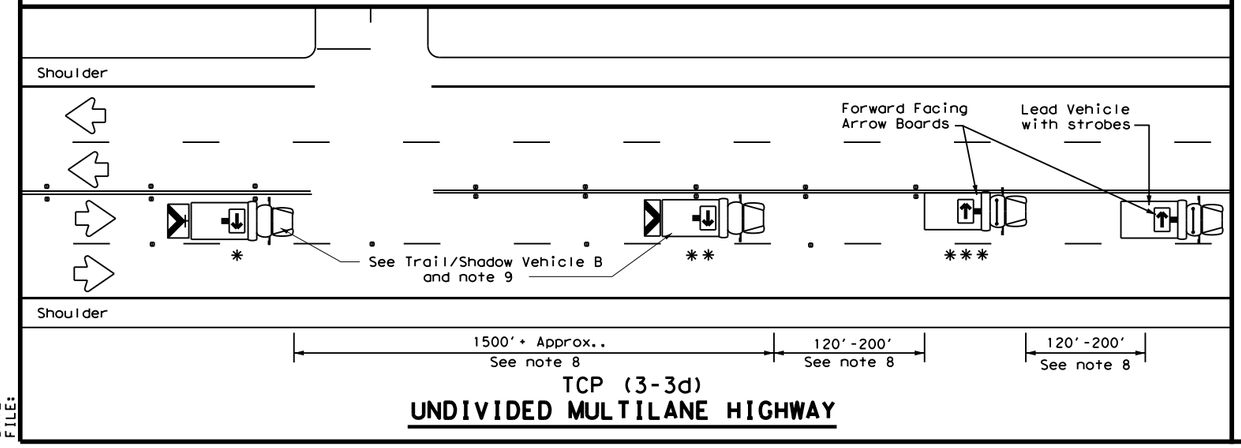
TCP (3-3b)

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



TCP (3-3c)

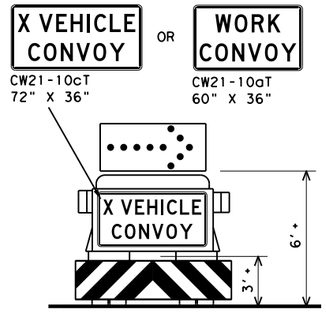
DIVIDED MULTILANE HIGHWAY



TCP (3-3d)

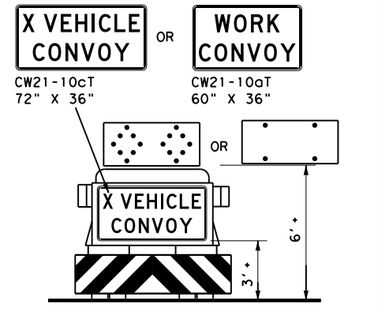
UNDIVIDED MULTILANE HIGHWAY

DATE:
FILE:



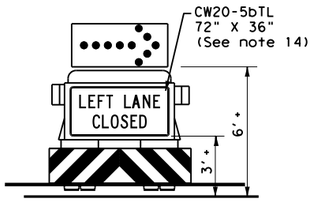
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

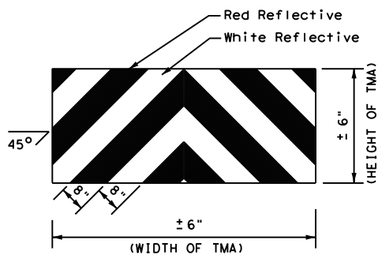


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

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

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0004	07	138	IH-20
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	ODA	ECTOR		46
1-97 7-14				

DATE:
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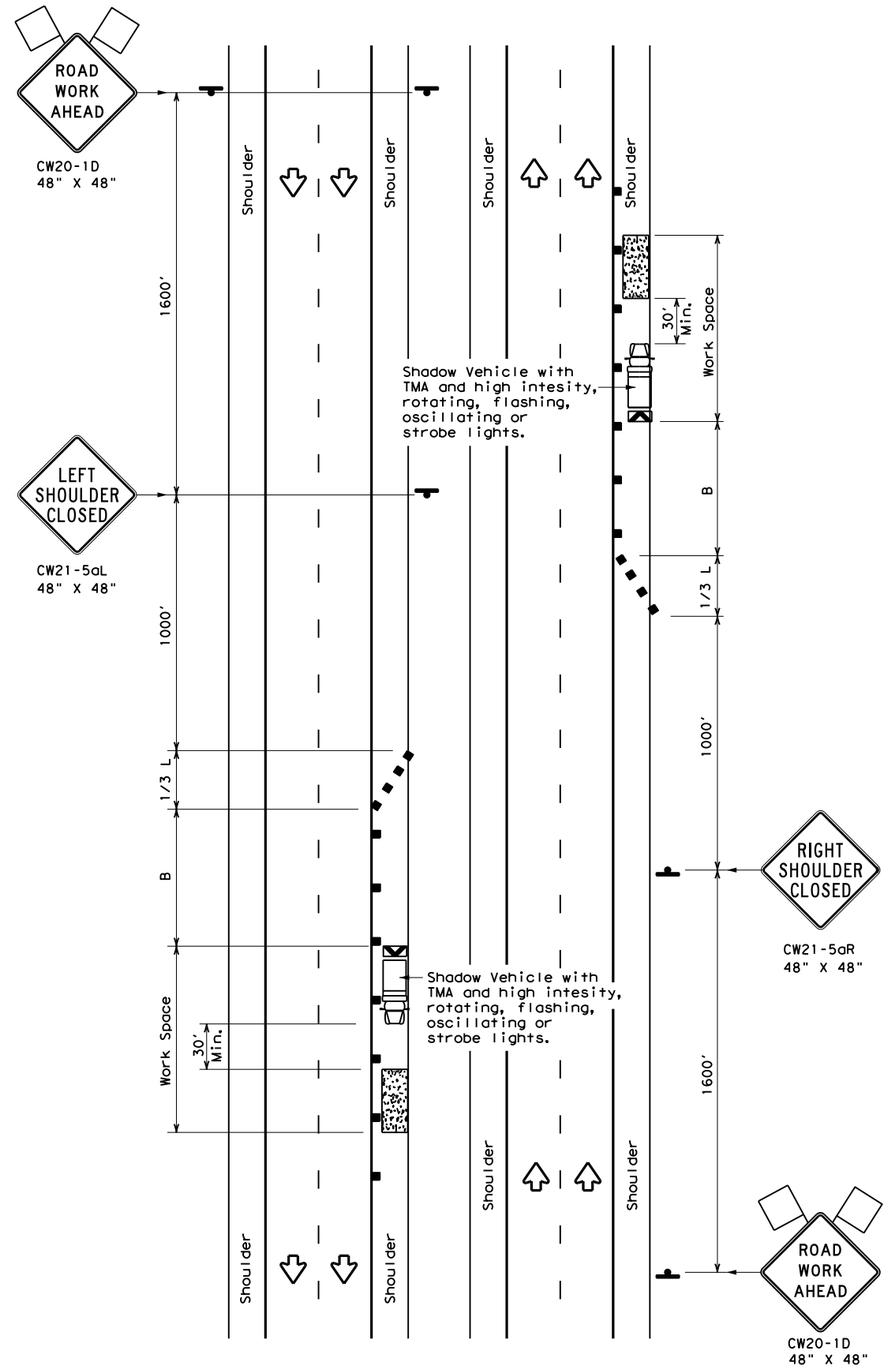
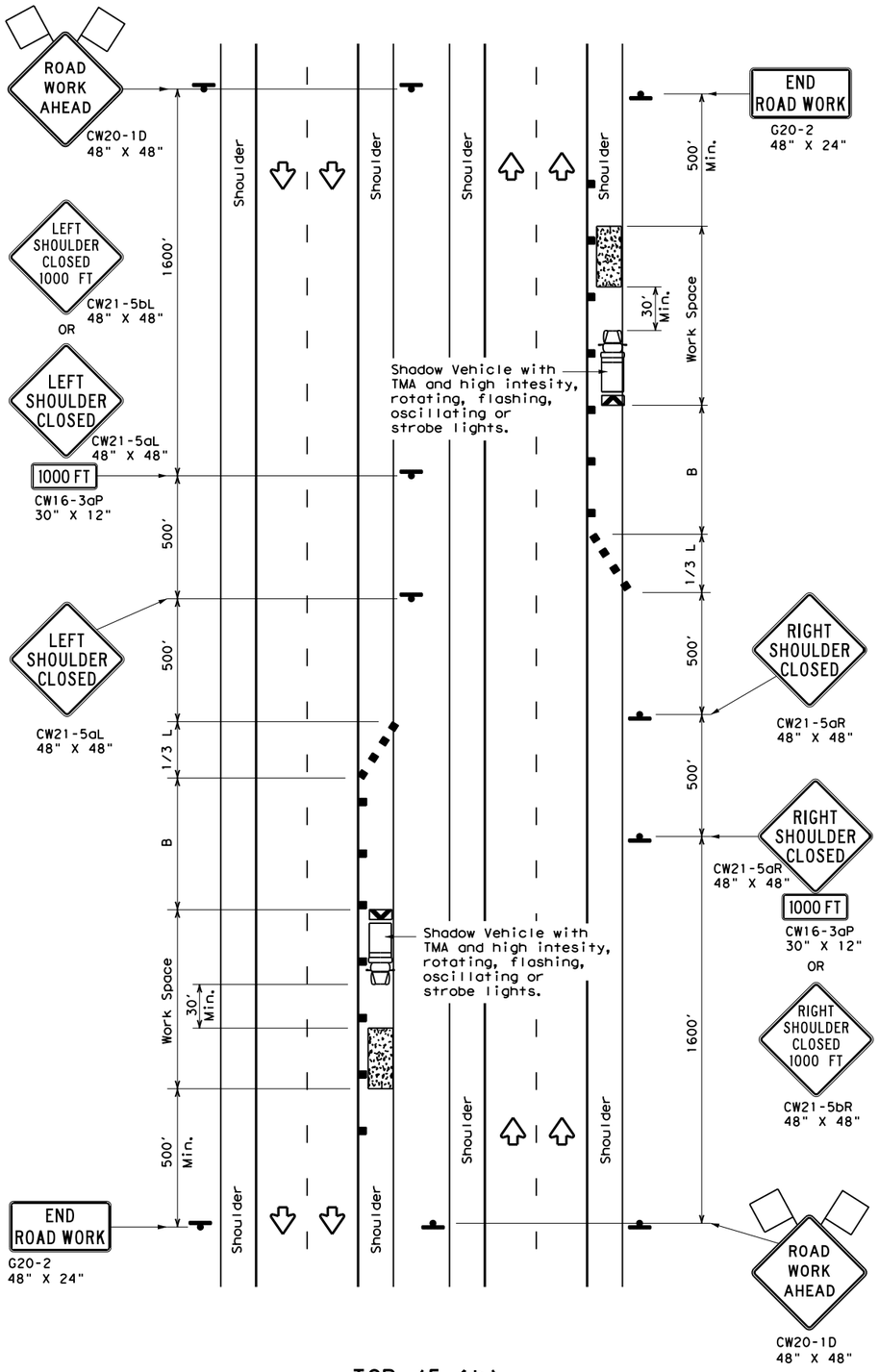


TCP (5-1a)

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

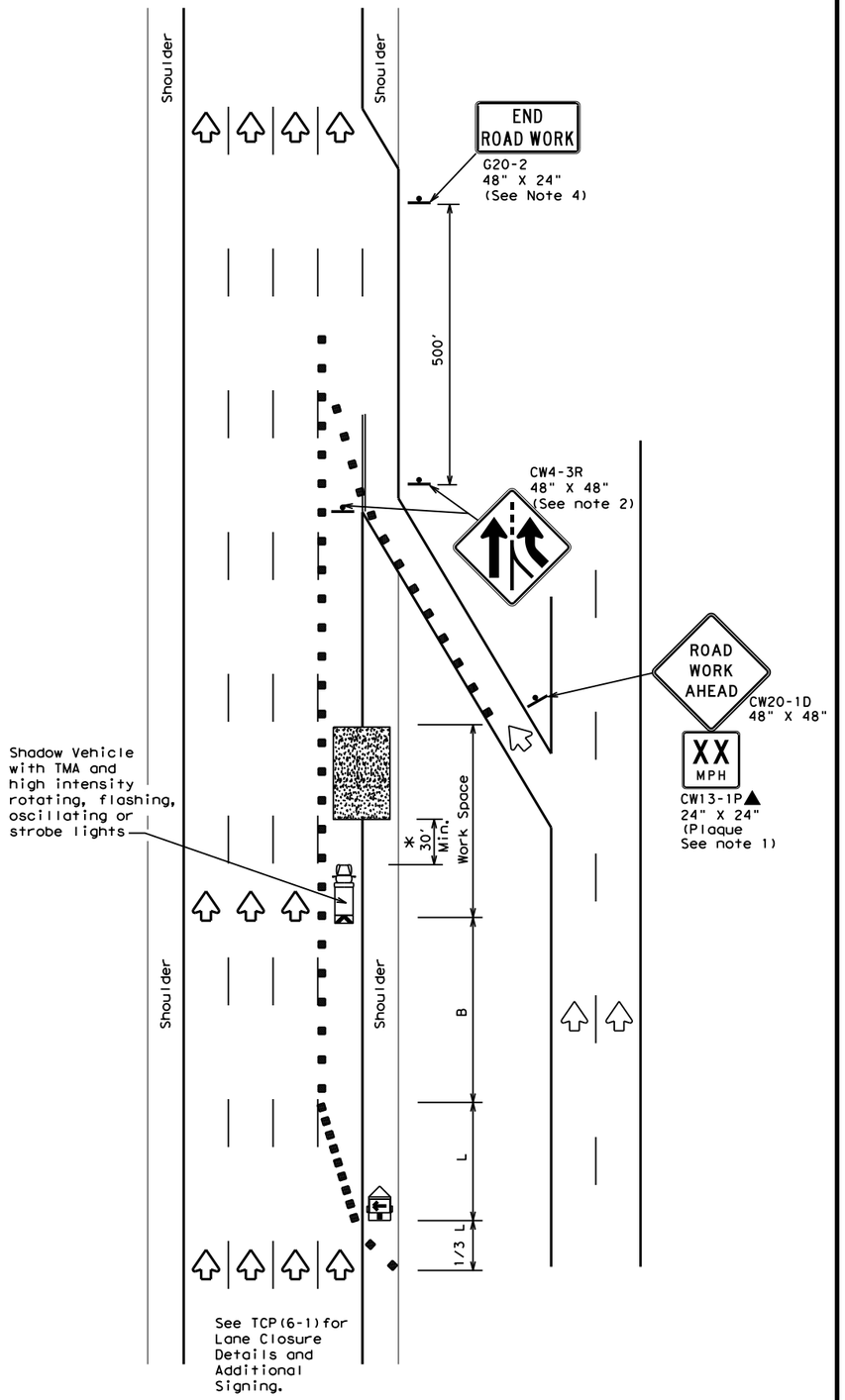
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

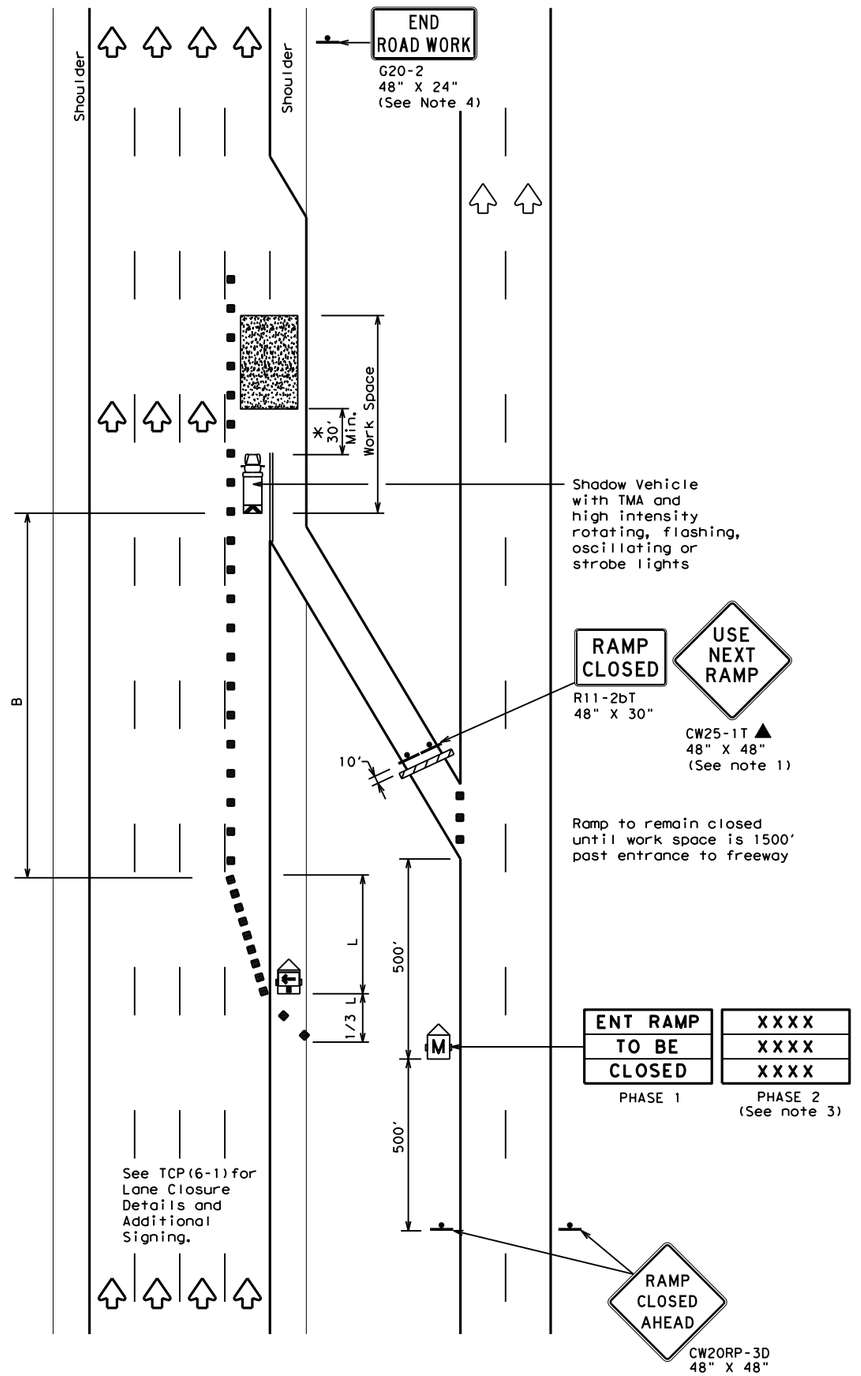
FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	0004	07	138	IH-20
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		47

DATE:
FILE:



TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP CLOSED

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

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" **			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
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. ADDED LANE Symbol (CW4-3) sign may be omitted when sign between ramp and mainlane can be seen from both roadways.
3. See "Advance Notice List" on BC(6) for recommended date and time formatting options for PCMS Phase 2 message.
4. 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.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

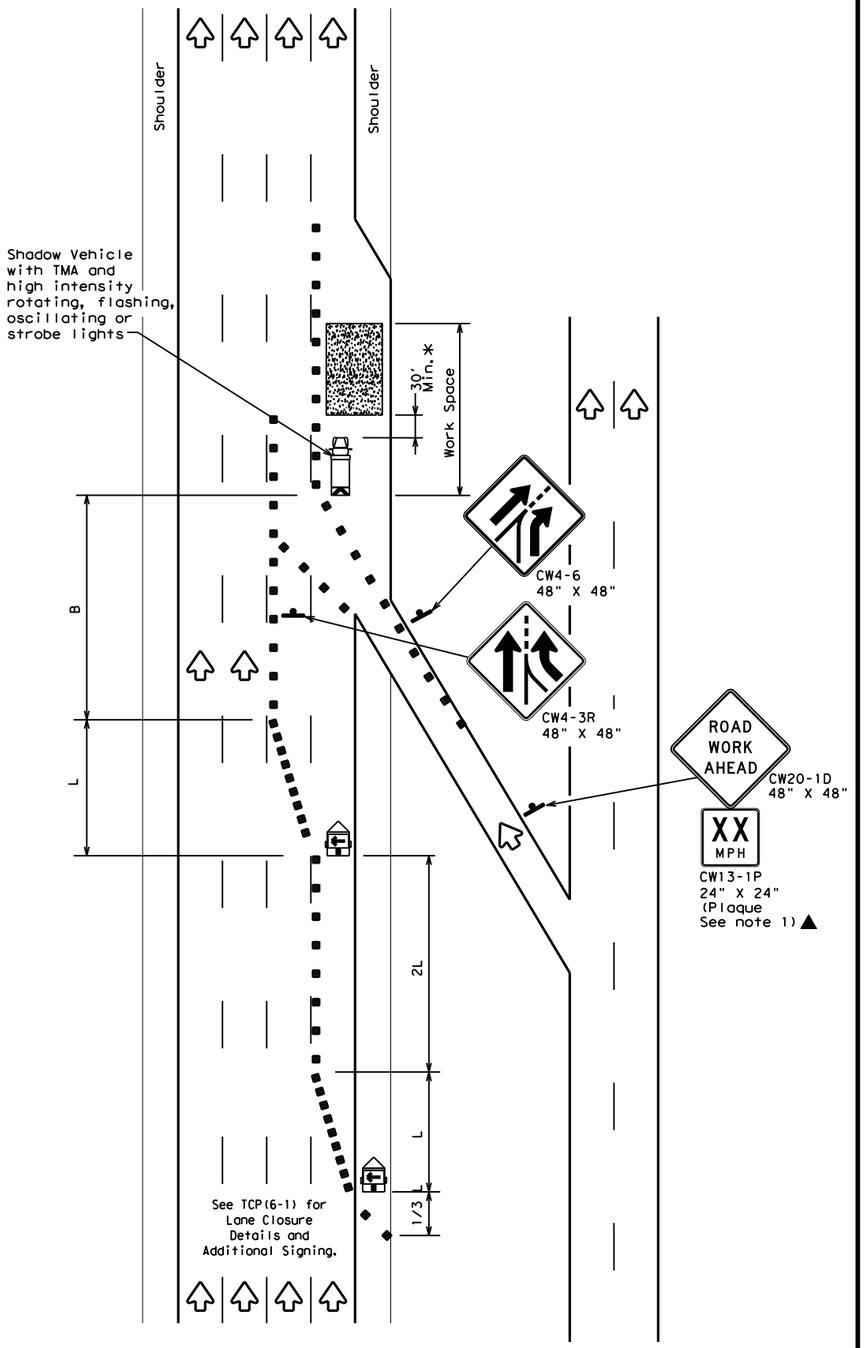
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

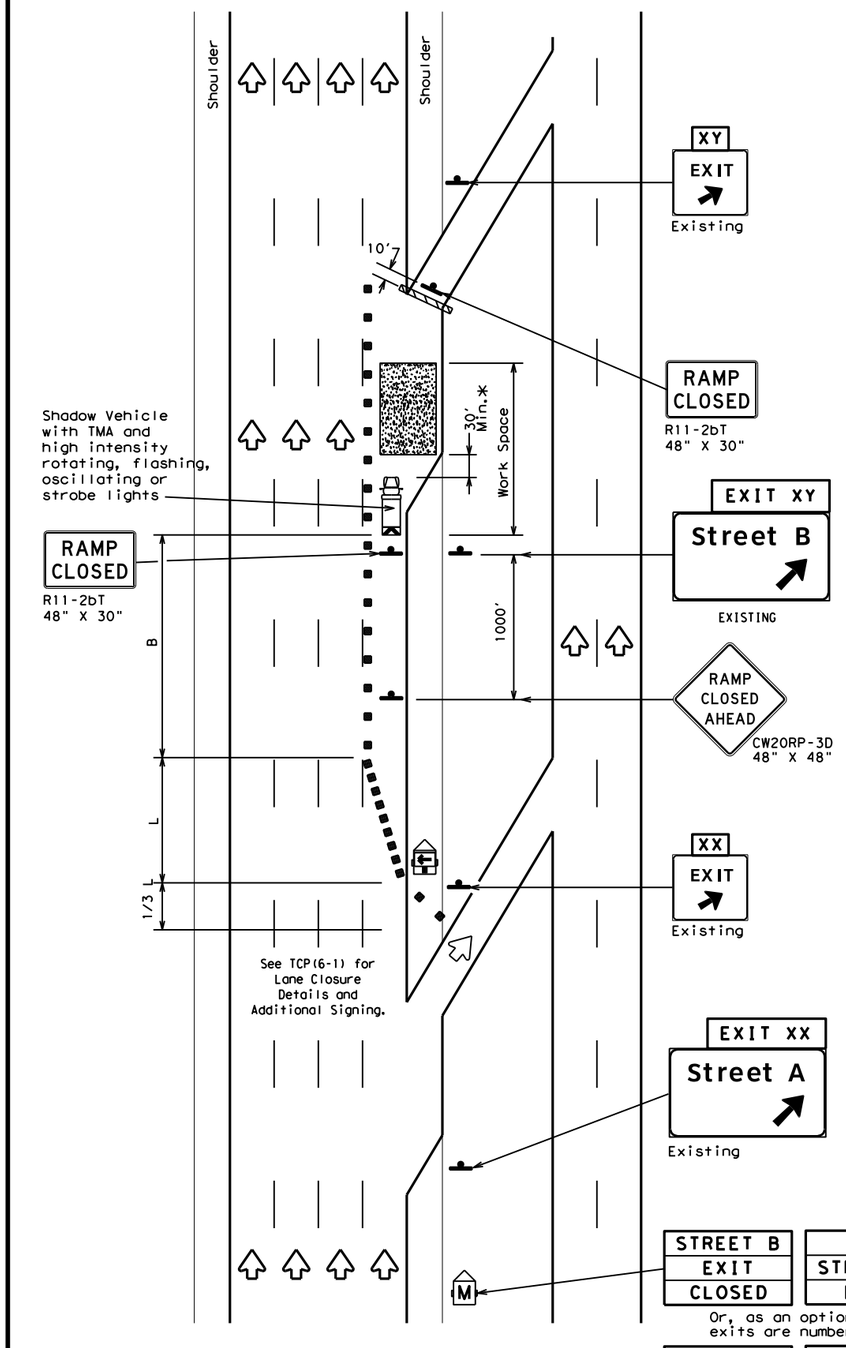
FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0004	07	138	IH-20
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	ODA	ECTOR		48

DATE:
FILE:



TCP (6-3a)

ENTRANCE RAMP OPEN



TCP (6-3b)

EXIT RAMP CLOSED

TRAFFIC EXITS PRIOR TO CLOSED RAMP

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" **			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
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.

*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.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0004	07	138	IH-20
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	ODA	ECTOR		49

DATE:
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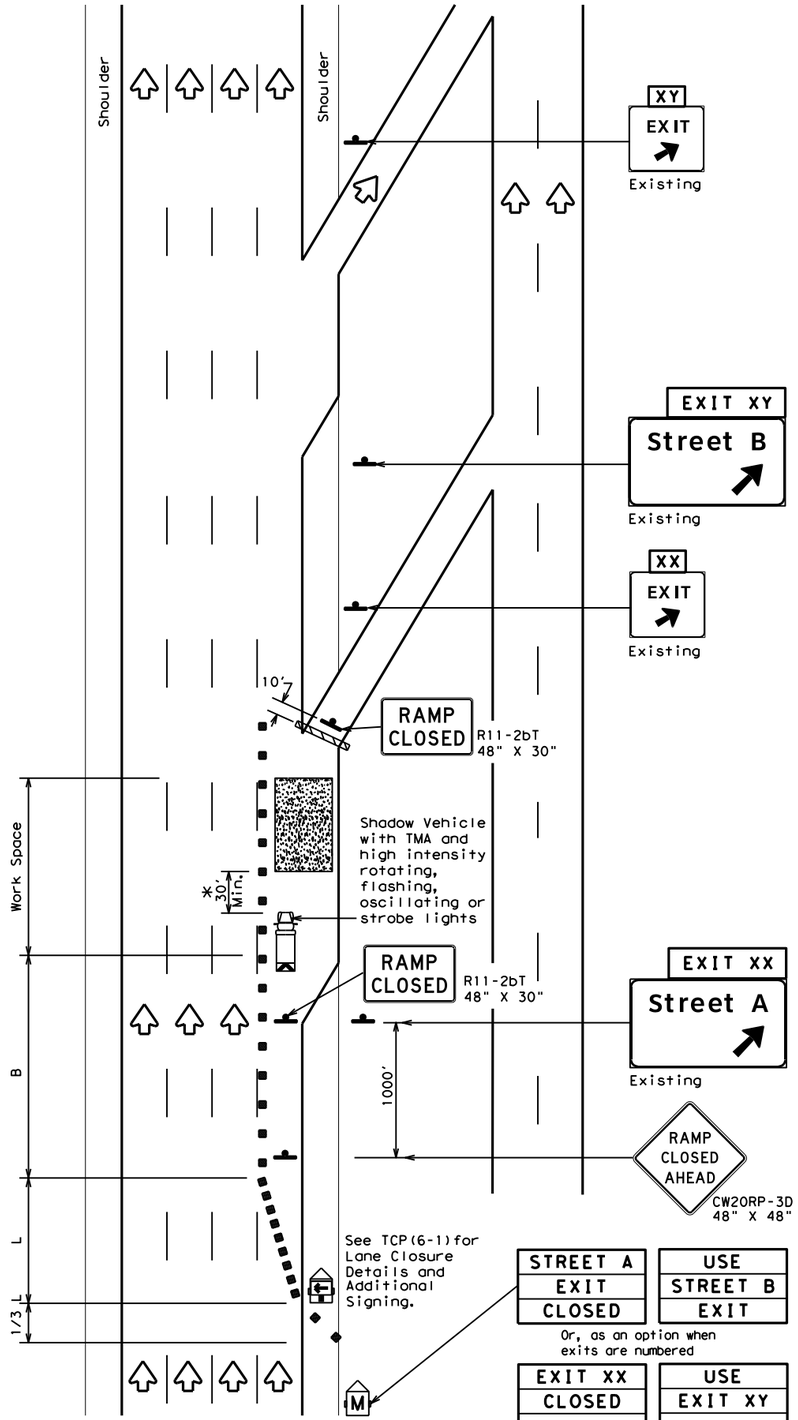
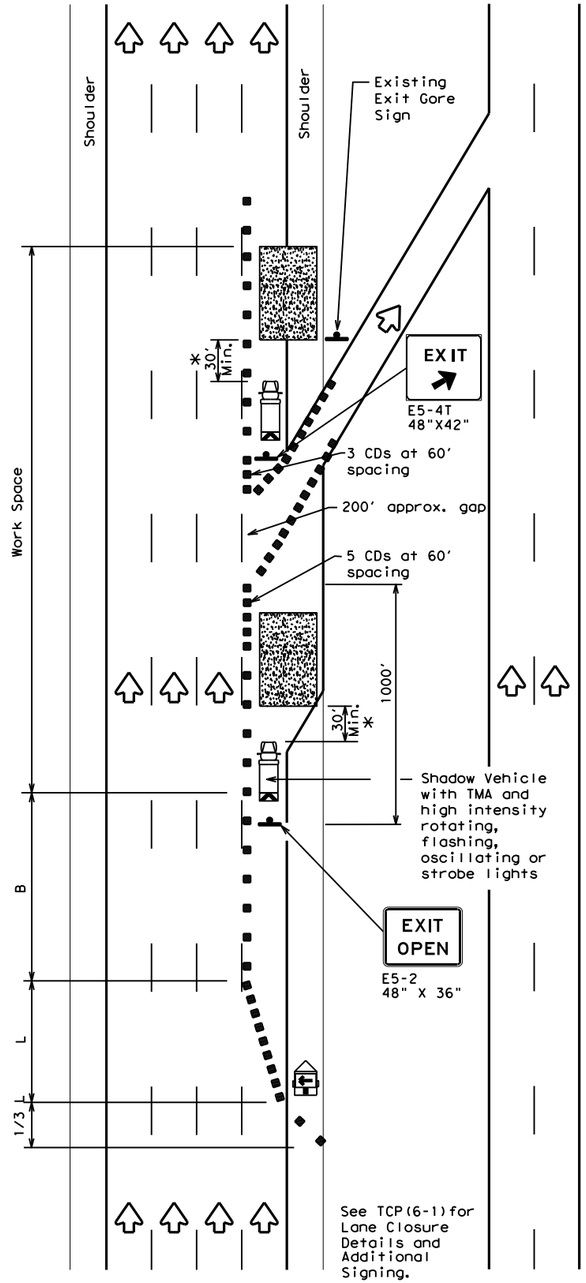


TCP (6-4a)

EXIT RAMP CLOSED
TRAFFIC EXITS PAST CLOSED RAMP



TCP (6-4b)

EXIT RAMP OPEN

LEGEND			
	Type 3 Barricade		Channelizing Devices (CDs)
	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. See BC Standards for sign details.

*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.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP(6-4)-12

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4-98 8-12	ODA	ECTOR		50

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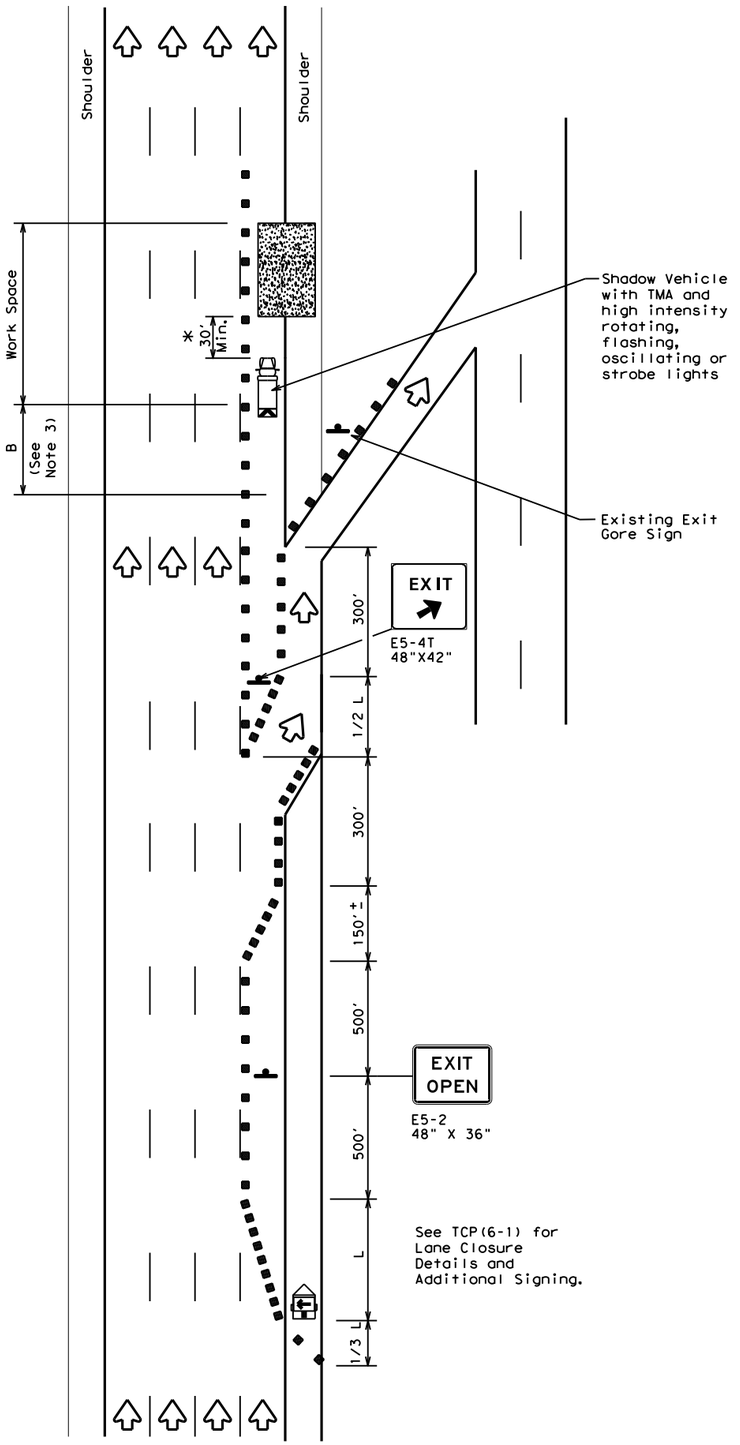
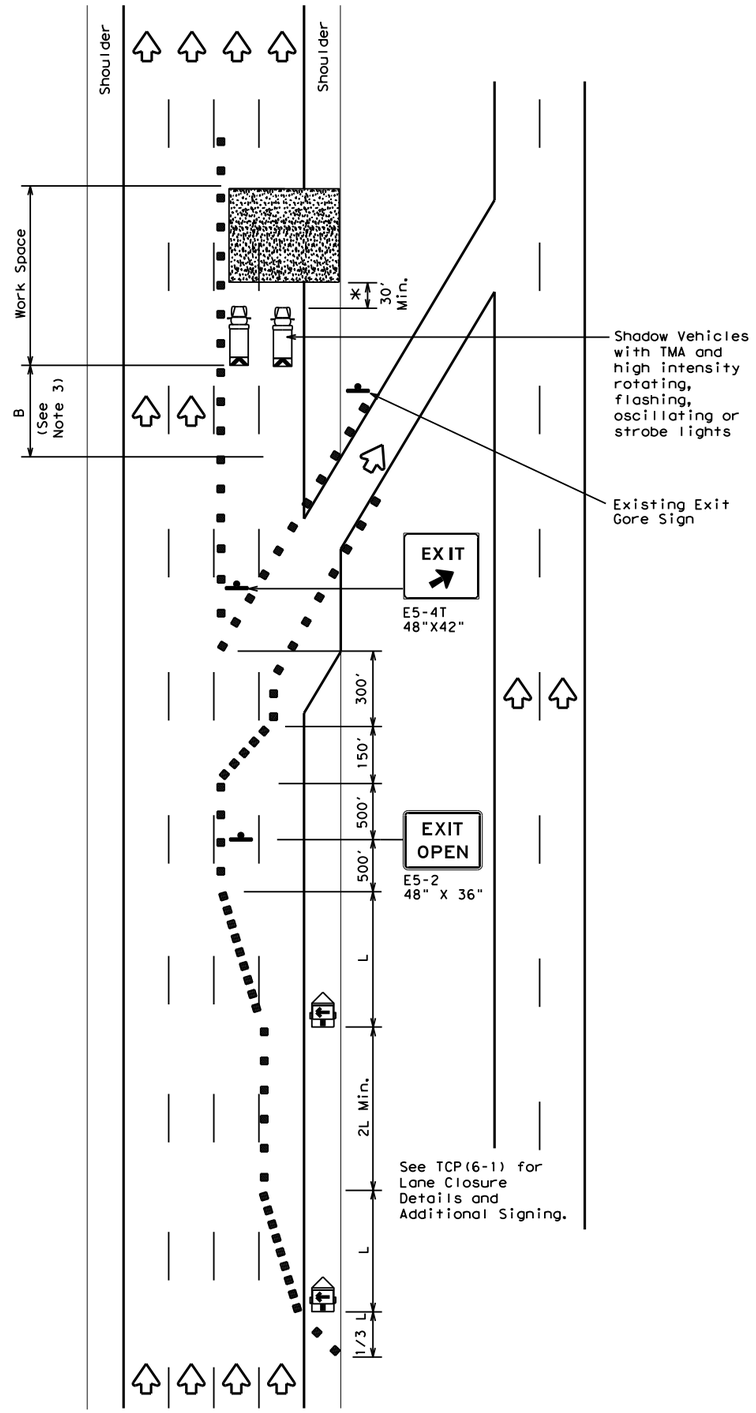


TCP (6-5a)

EXIT RAMP OPEN



TCP (6-5b)

EXIT RAMP OPEN
TWO LANE CLOSURE WITHIN 1500' PAST EXIT RAMP

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. See BC standards for sign details.
3. If adequate longitudinal buffer length "B" does not exist between the work space and the exit ramp, consideration should be given to closing the ramp.

*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.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND EXIT RAMP

TCP(6-5)-12

FILE: tcp6-5.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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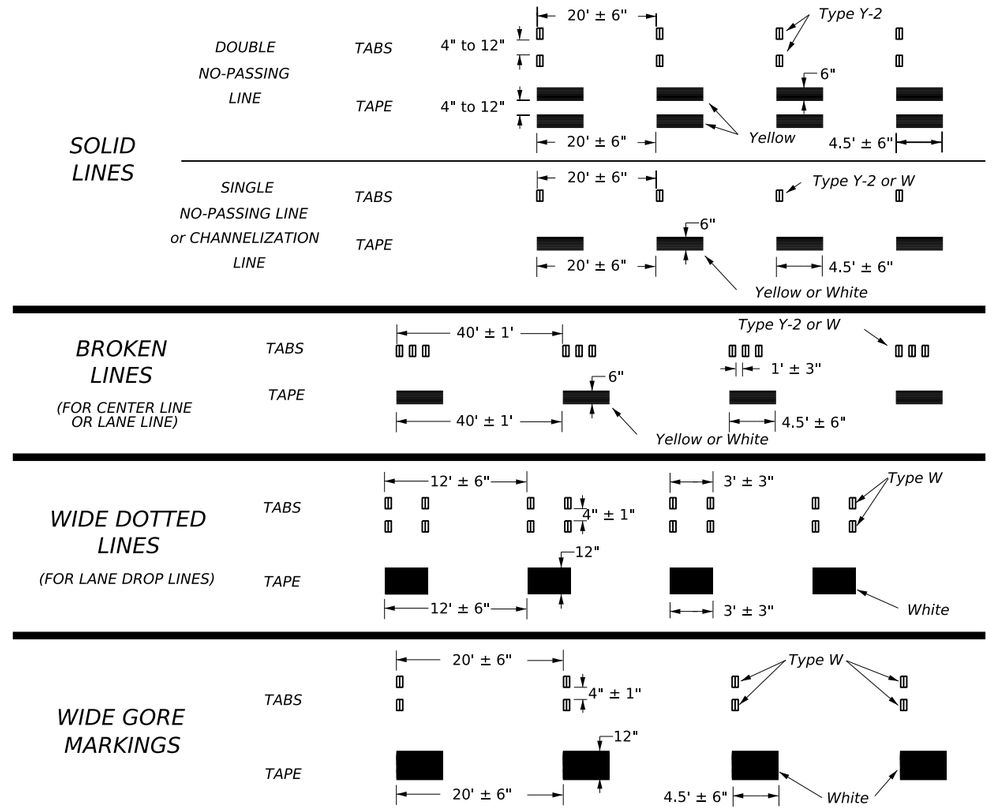
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



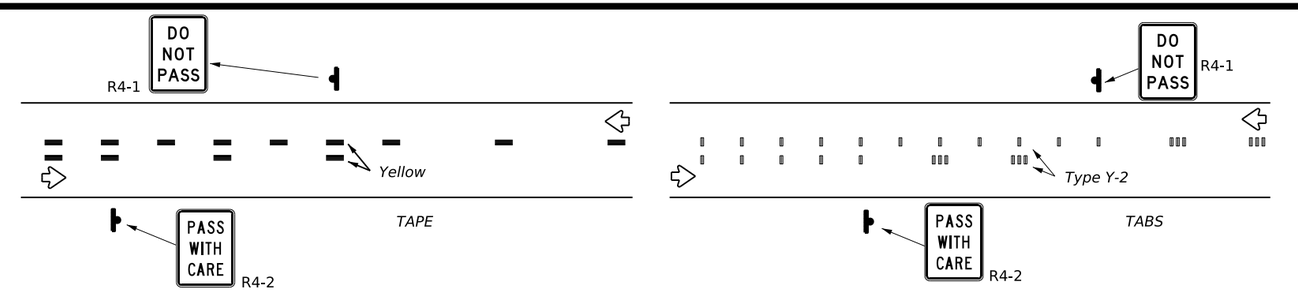
NOTES:

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

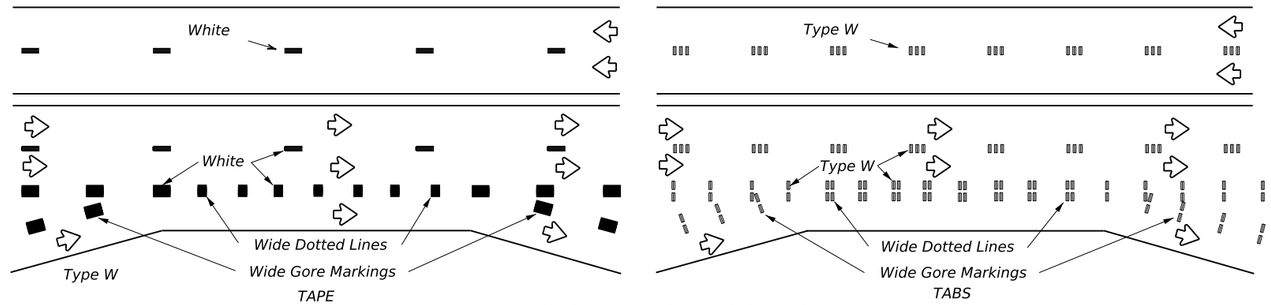
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

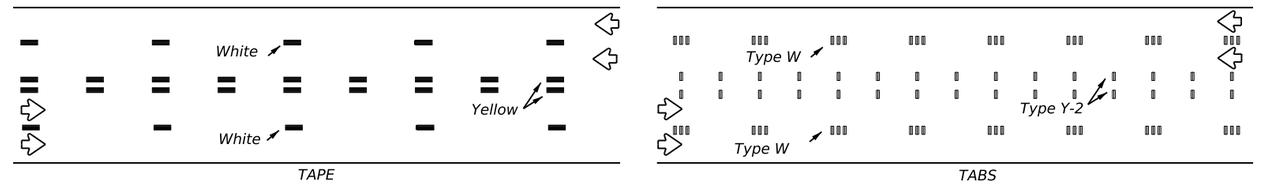
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



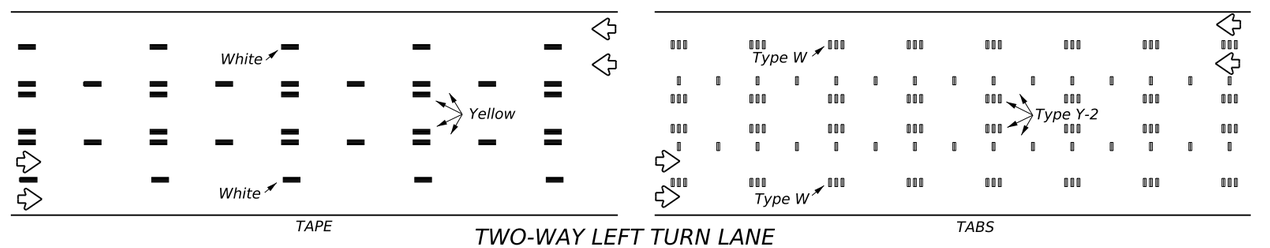
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



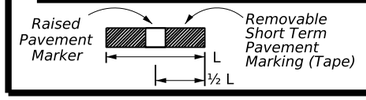
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

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1-97 2-23	ODA	ECTOR		52
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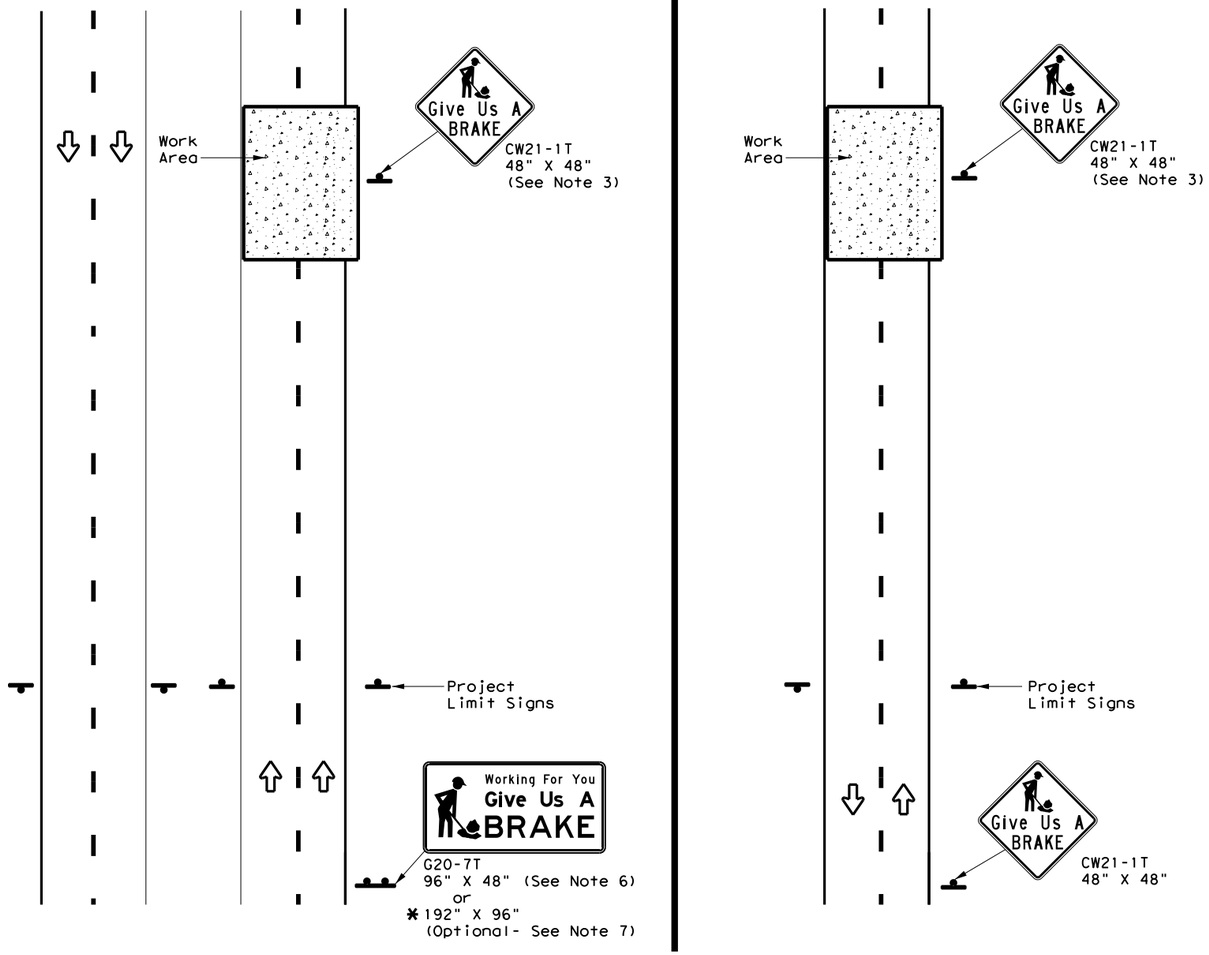

DIVIDED HIGHWAY

UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

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

SUMMARY OF LARGE SIGNS

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

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	ODA	ECTOR		53

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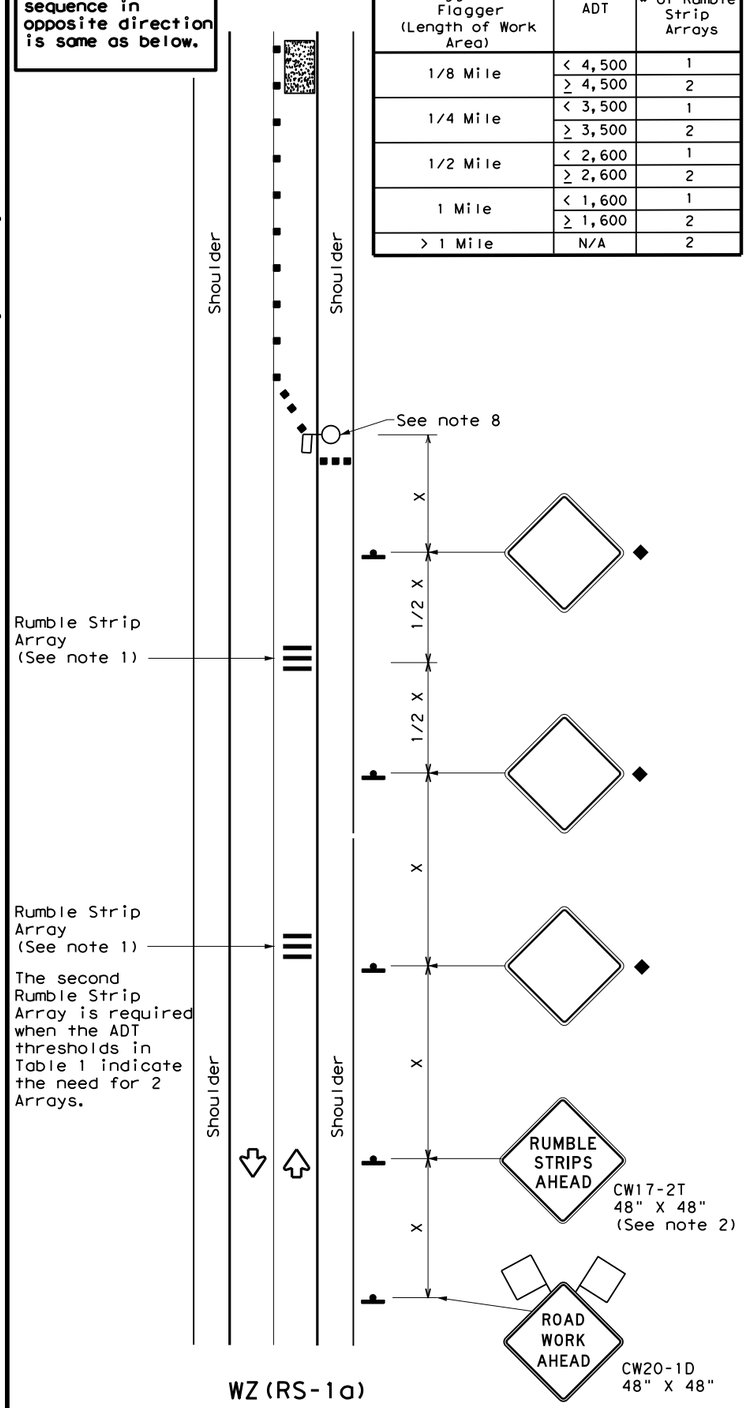
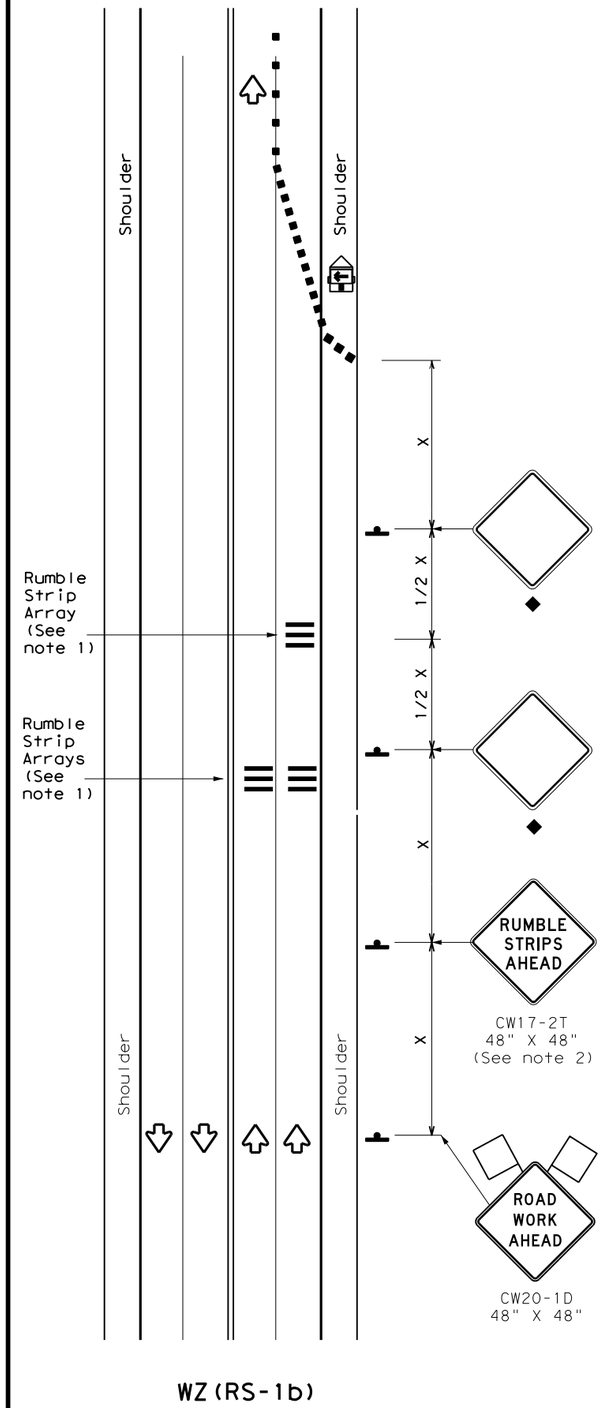
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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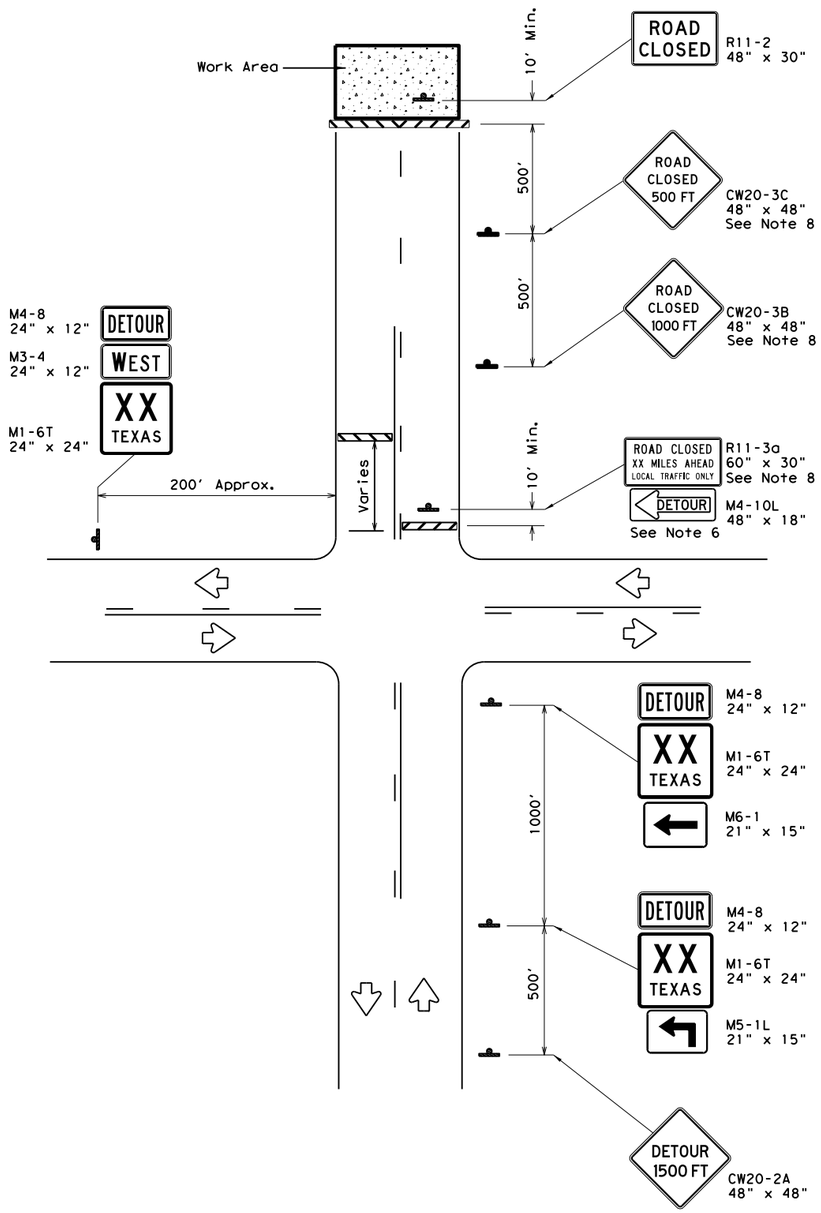
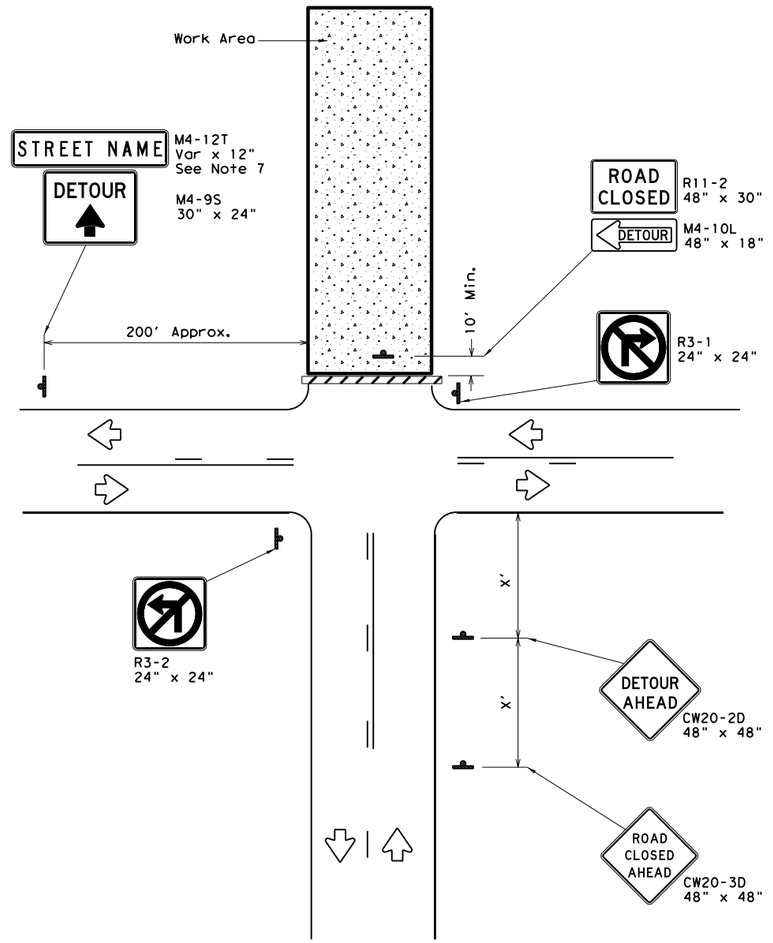


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

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

LEGEND	
	Type 3 Barricade
	Sign

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

* Conventional Roads Only

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

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2-98 3-03	ODA	ECTOR		55

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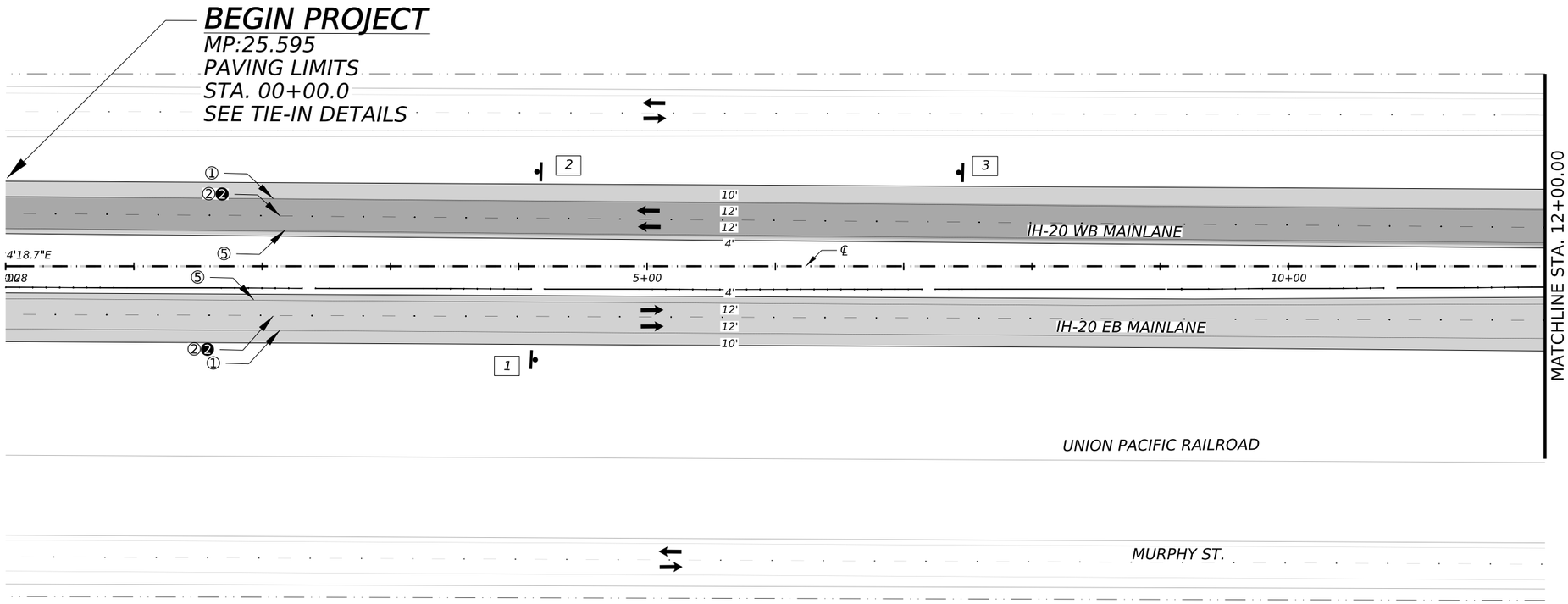

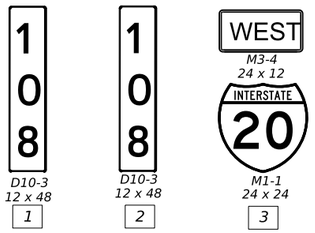

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

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SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

SHEET 1 OF 23

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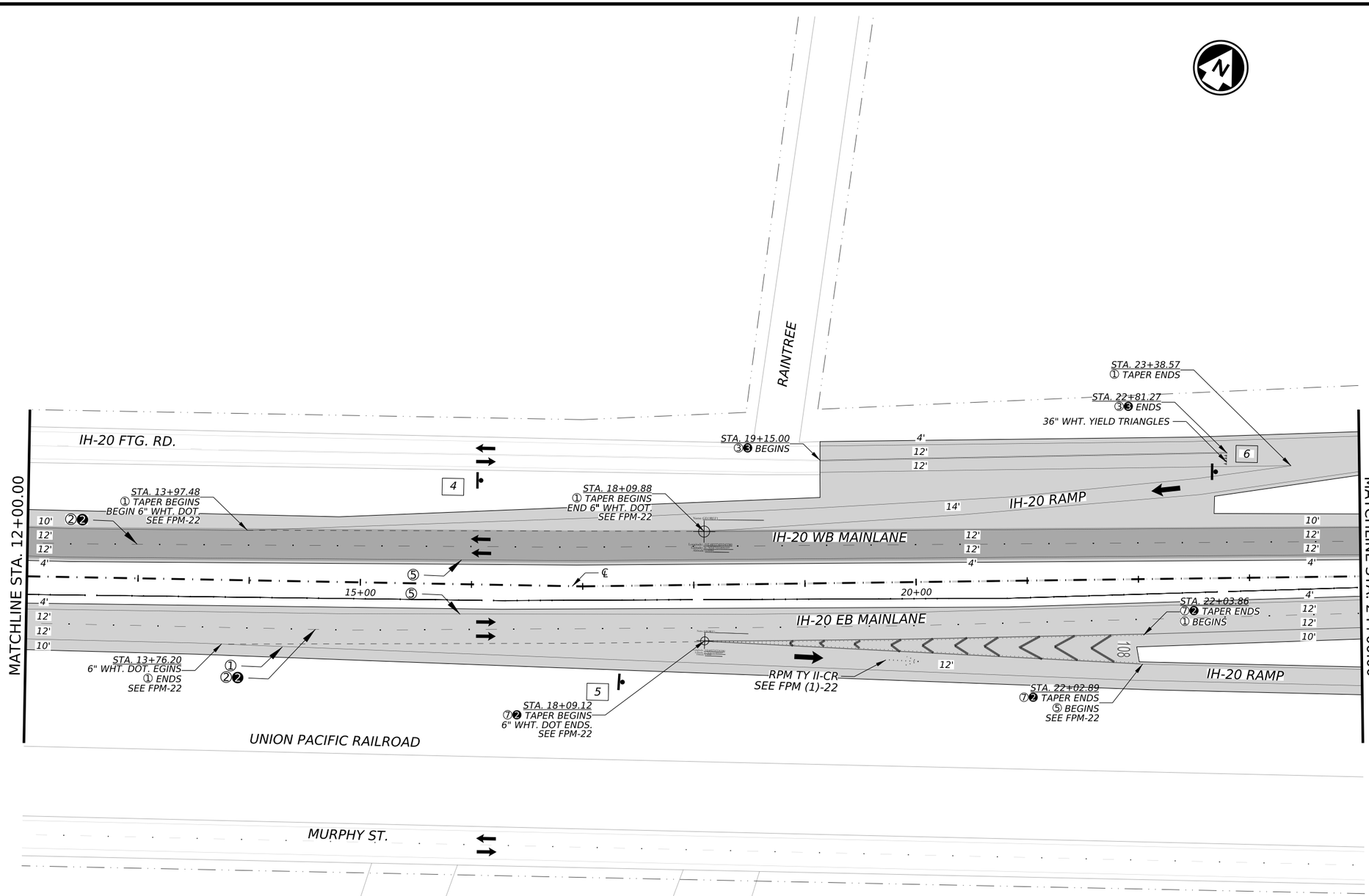

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.

11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

SHEET 2 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		57

DATE: 11/27/2023 10:00:08 AM
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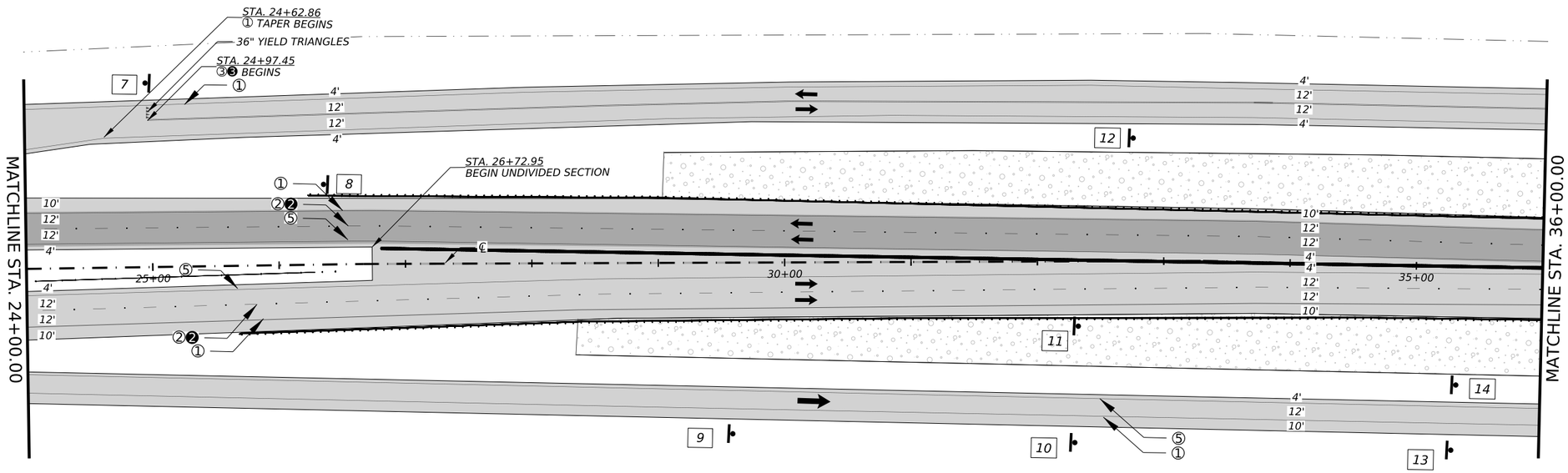
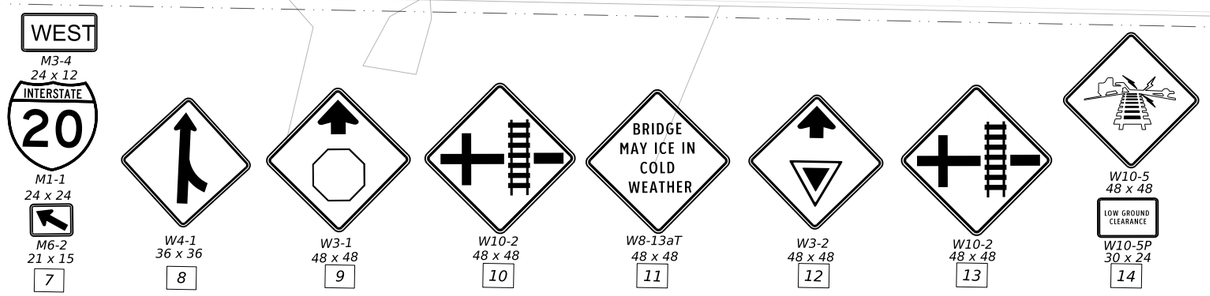




LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

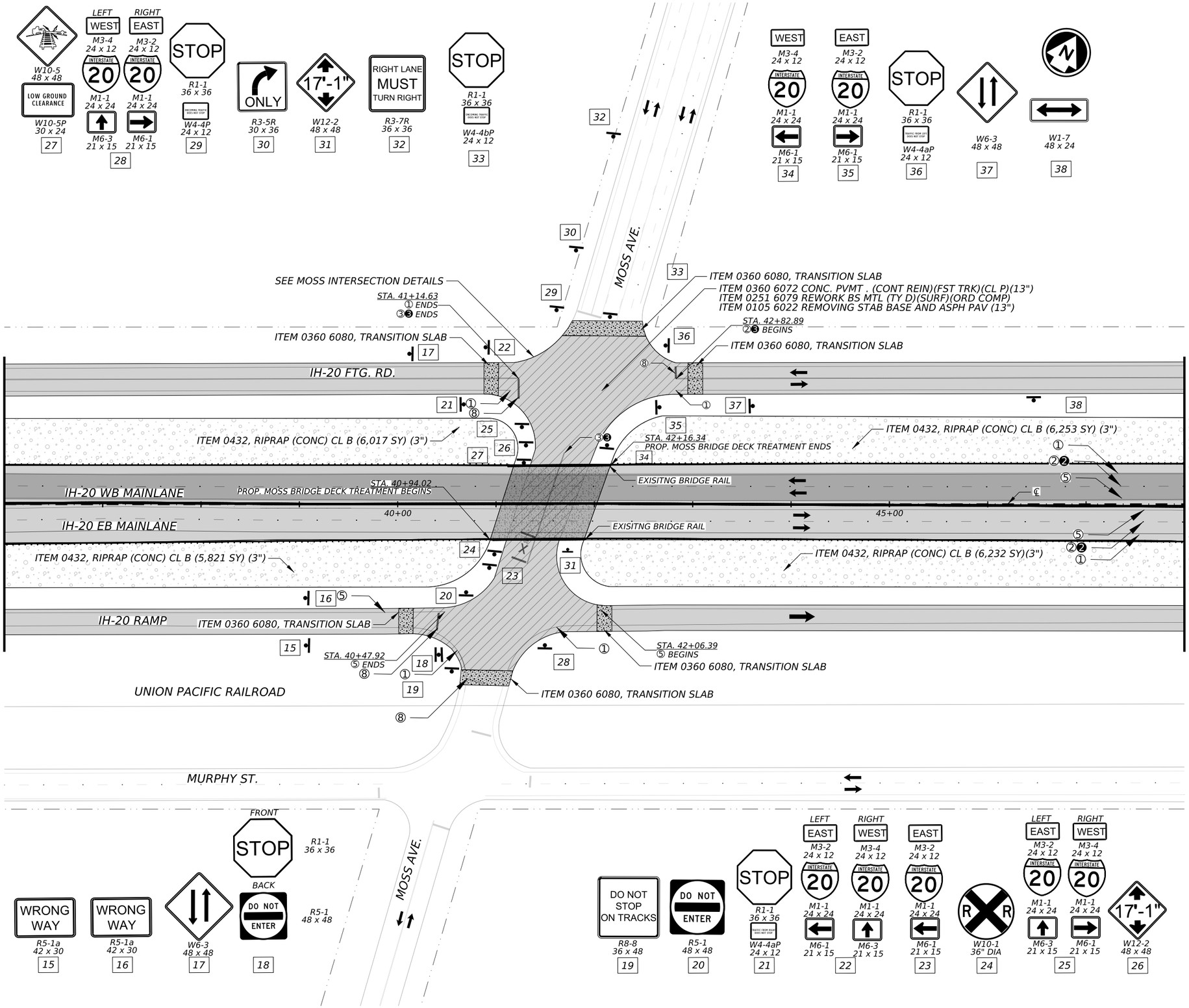
Texas Department of Transportation

ROADWAY LAYOUT

SHEET 3 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		58

DATE: 11/27/2023 10:00:09 AM
FILE: $FILE$



LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.

11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

SHEET 4 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		59

DATE: 11/27/2023 10:00:11 AM
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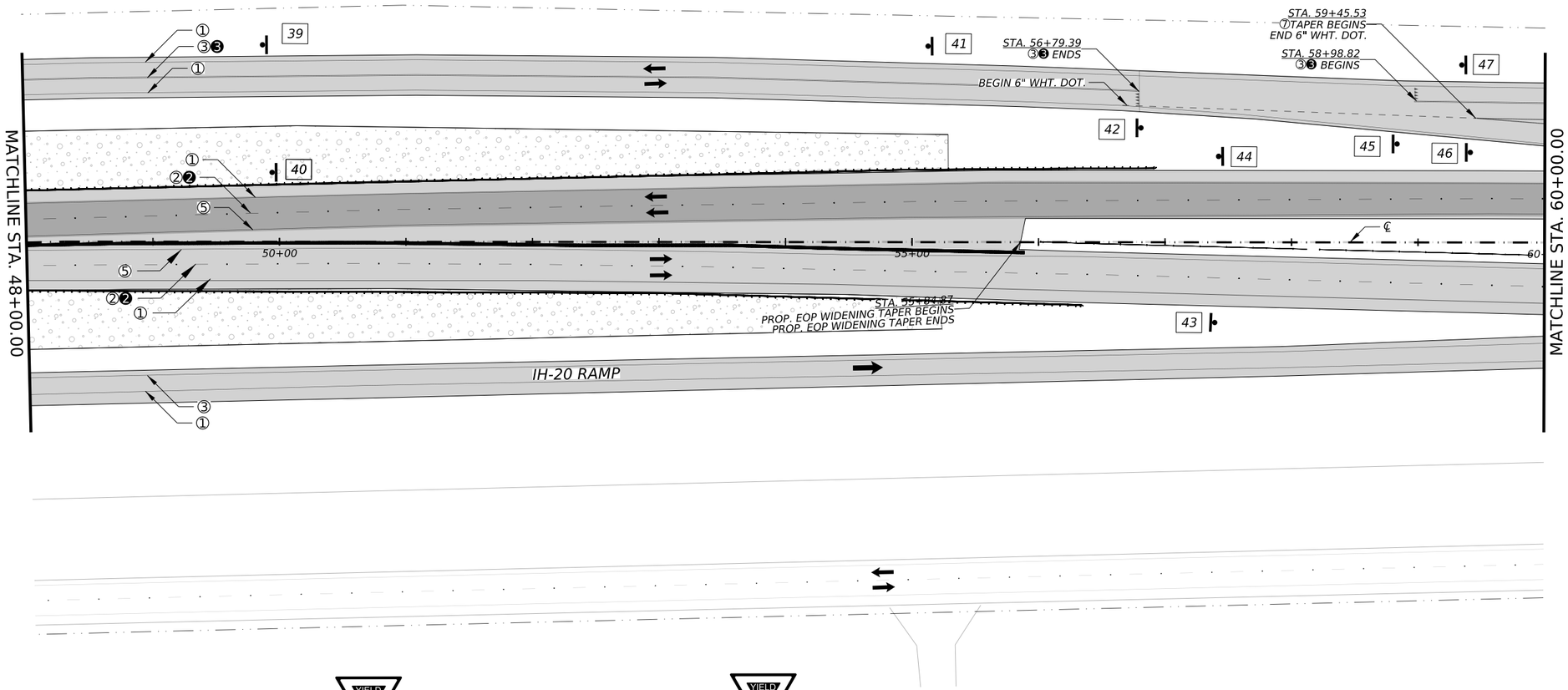
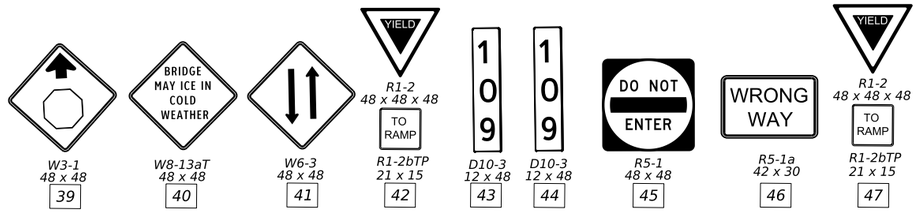




W3-1 48 x 48 — 39
W8-13aT 48 x 48 — 40
W6-3 48 x 48 — 41
R1-2 48 x 48 x 48 / R1-2bTP 21 x 15 — 42
D10-3 12 x 48 — 43
D10-3 12 x 48 — 44
R5-1 48 x 48 — 45
R5-1a 42 x 30 — 46
R1-2 48 x 48 x 48 / R1-2bTP 21 x 15 — 47

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

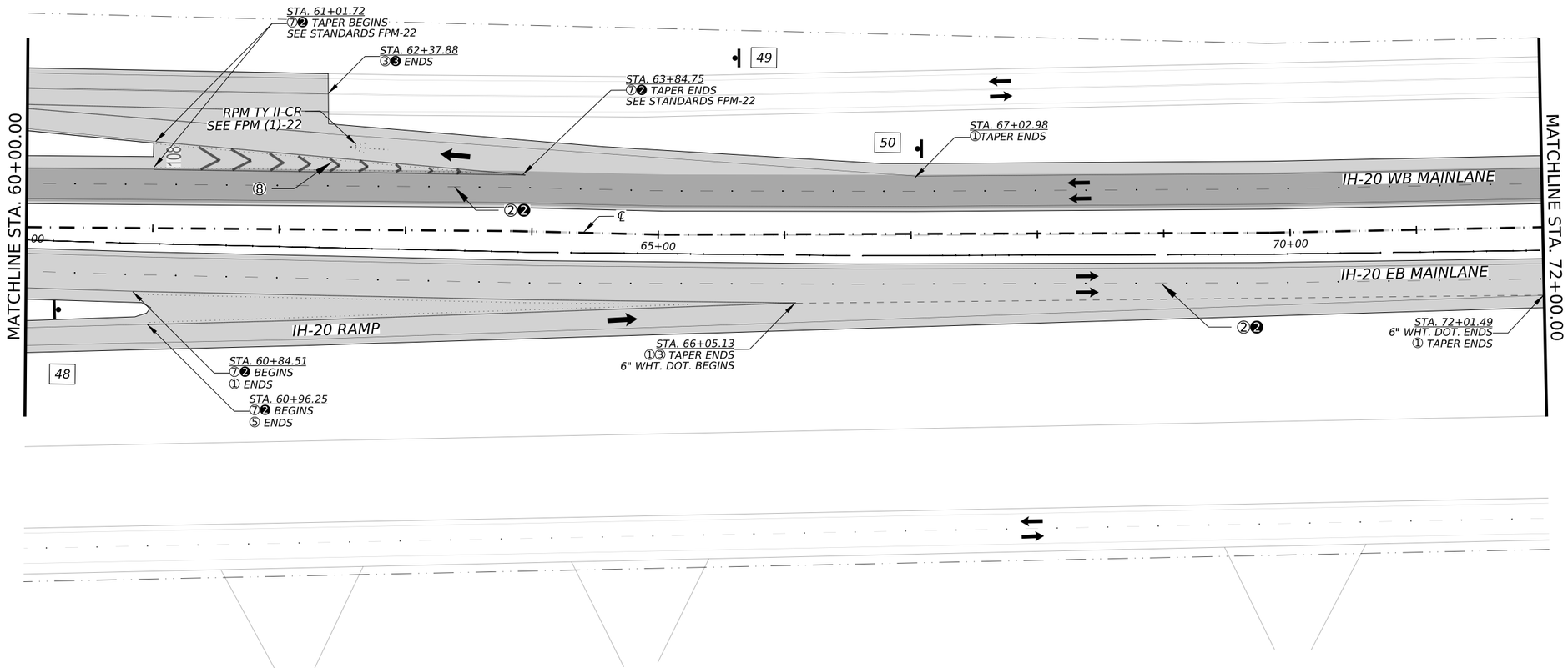
Adriana Geiger, P.E.
11/27/2023

DATE: 11/27/2023 10:00:13 AM
FILE: $FILE$

Texas Department of Transportation

ROADWAY LAYOUT

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		60



W4-1
36 x 36
48

W3-2
48 x 48
49

RAMP
55
MPH
W13-2
48 x 60
50

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
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PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		61

DATE: 11/27/2023 10:00:14 AM
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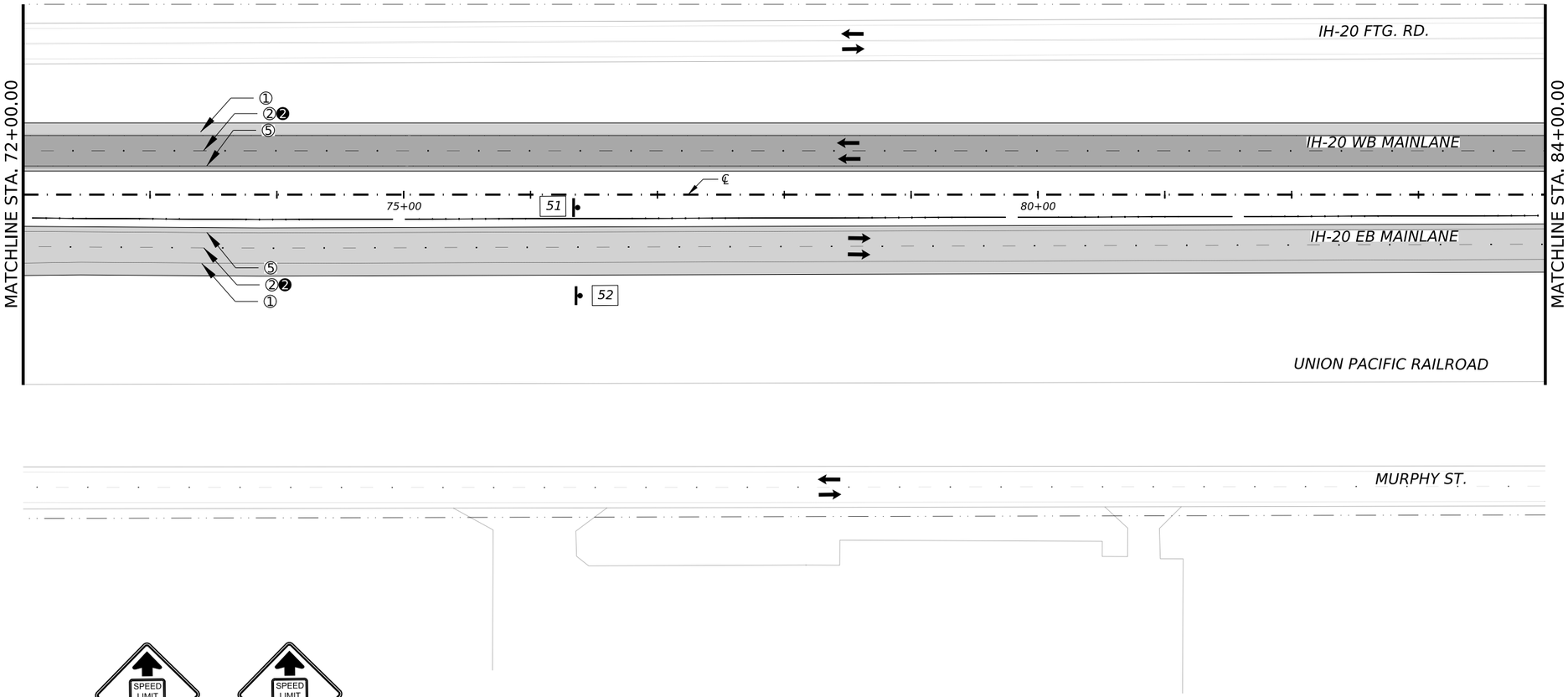

W3-5
48 x 48
51

W3-5
48 x 48
52

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
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PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		62

DATE: 11/27/2023 10:00:15 AM
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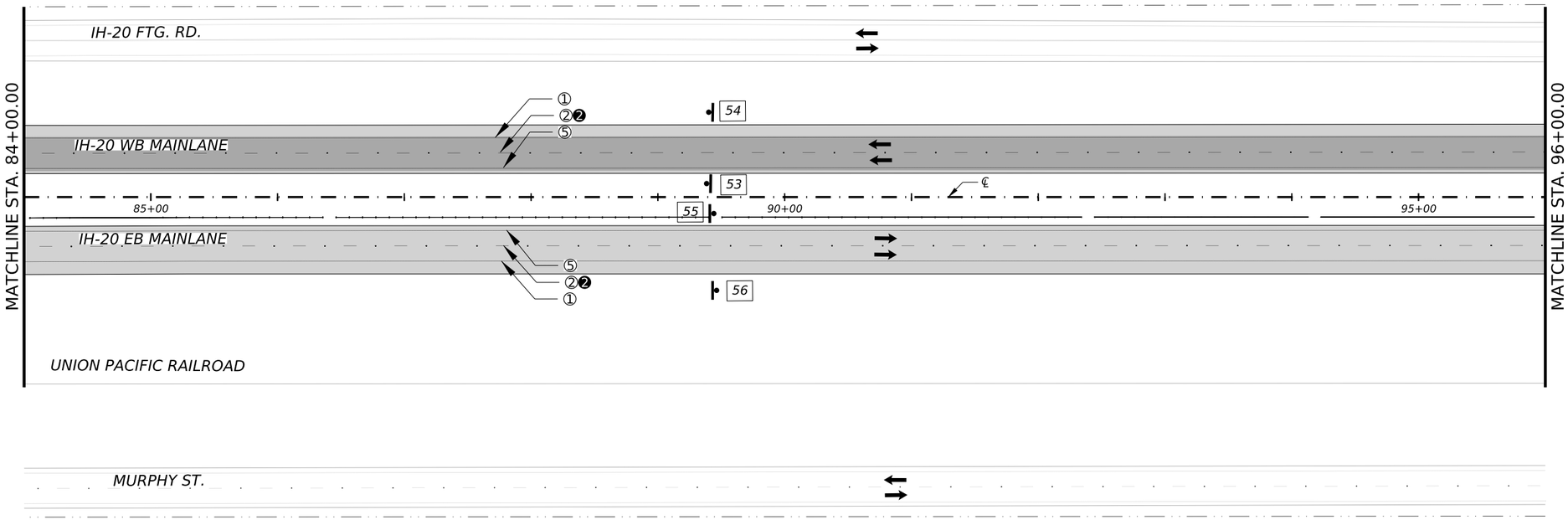

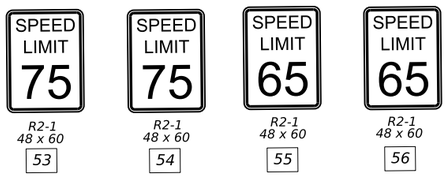

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

SHEET 8 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		63

DATE: 11/27/2023 10:00:16 AM
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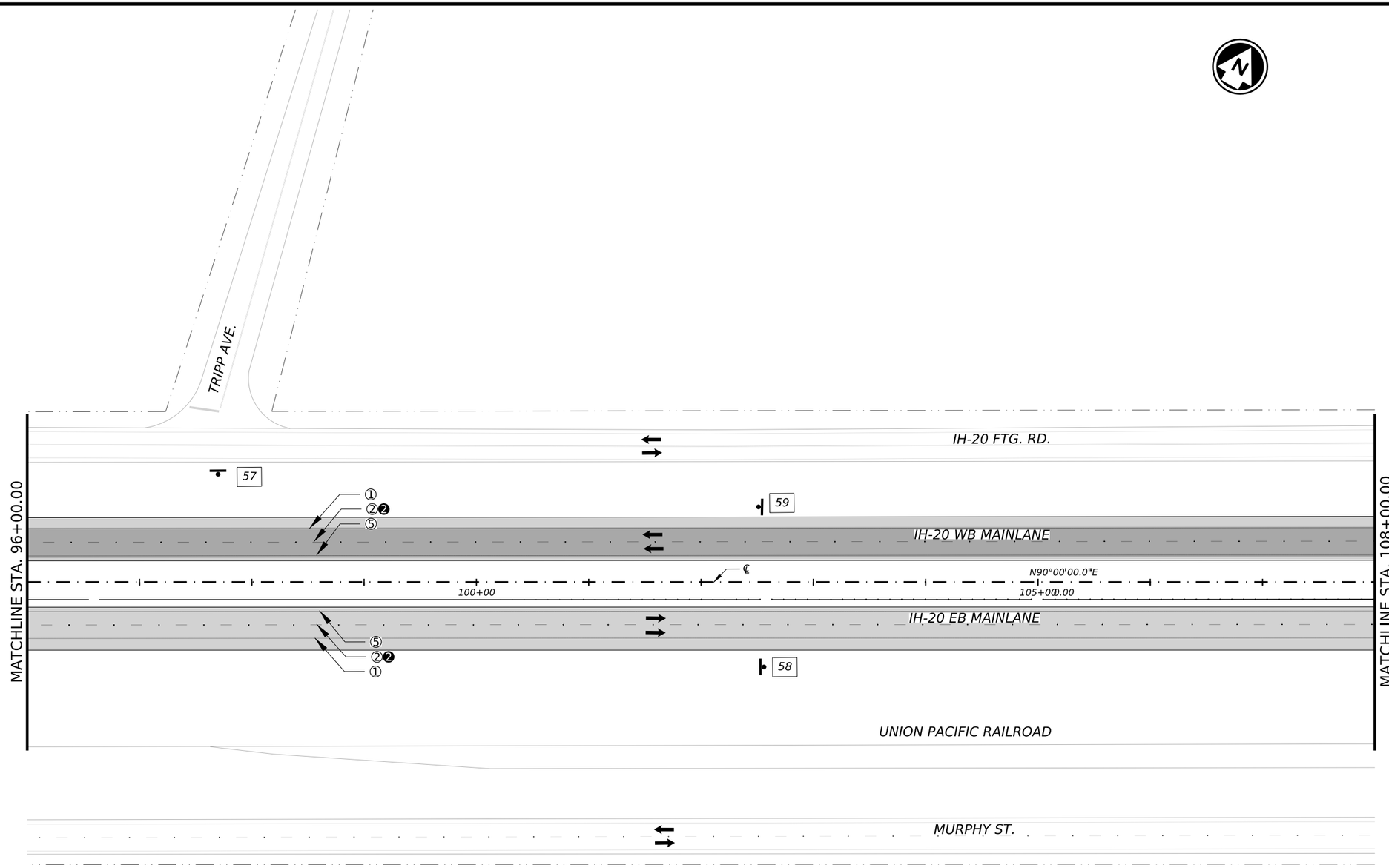
CK
DW
CK
DW



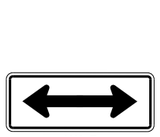
LEGEND

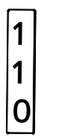
	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

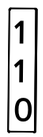
① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET


W1-7
48 x 60
57



D10-3
12 x 48
58



D10-3
12 x 48
59

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

SHEET 9 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		64

DATE: 11/27/2023 10:00:17 AM
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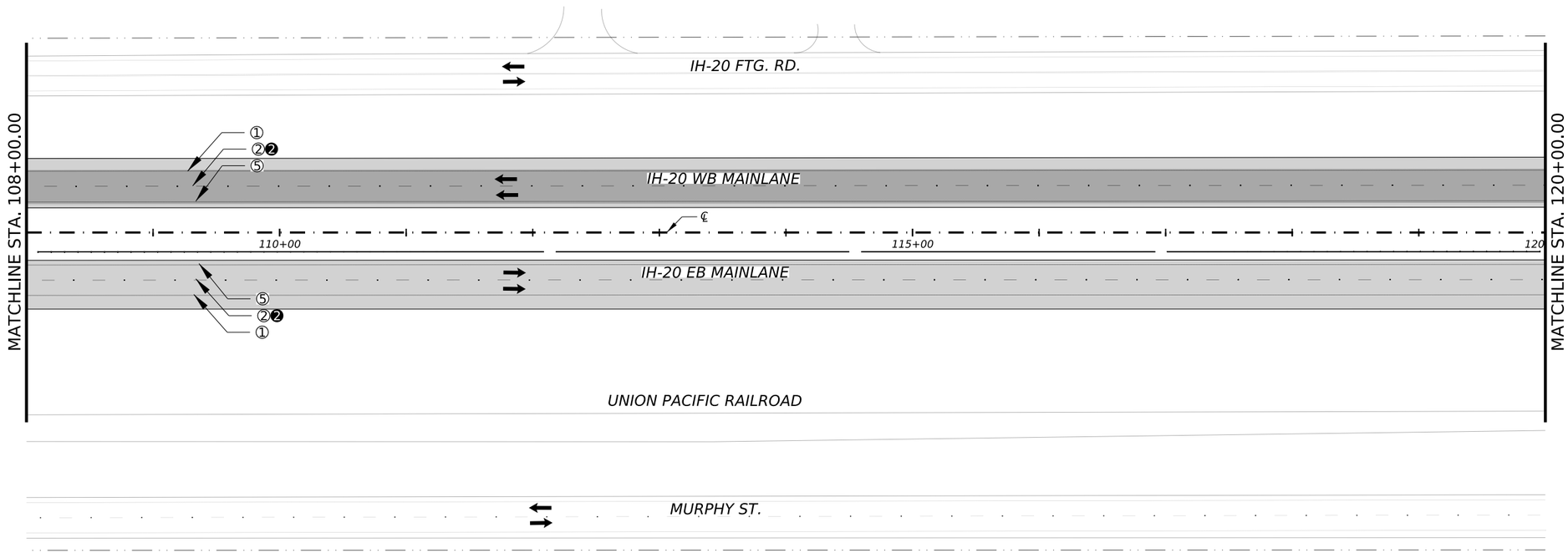

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

SHEET 10 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		65

DATE: 11/27/2023 10:00:18 AM
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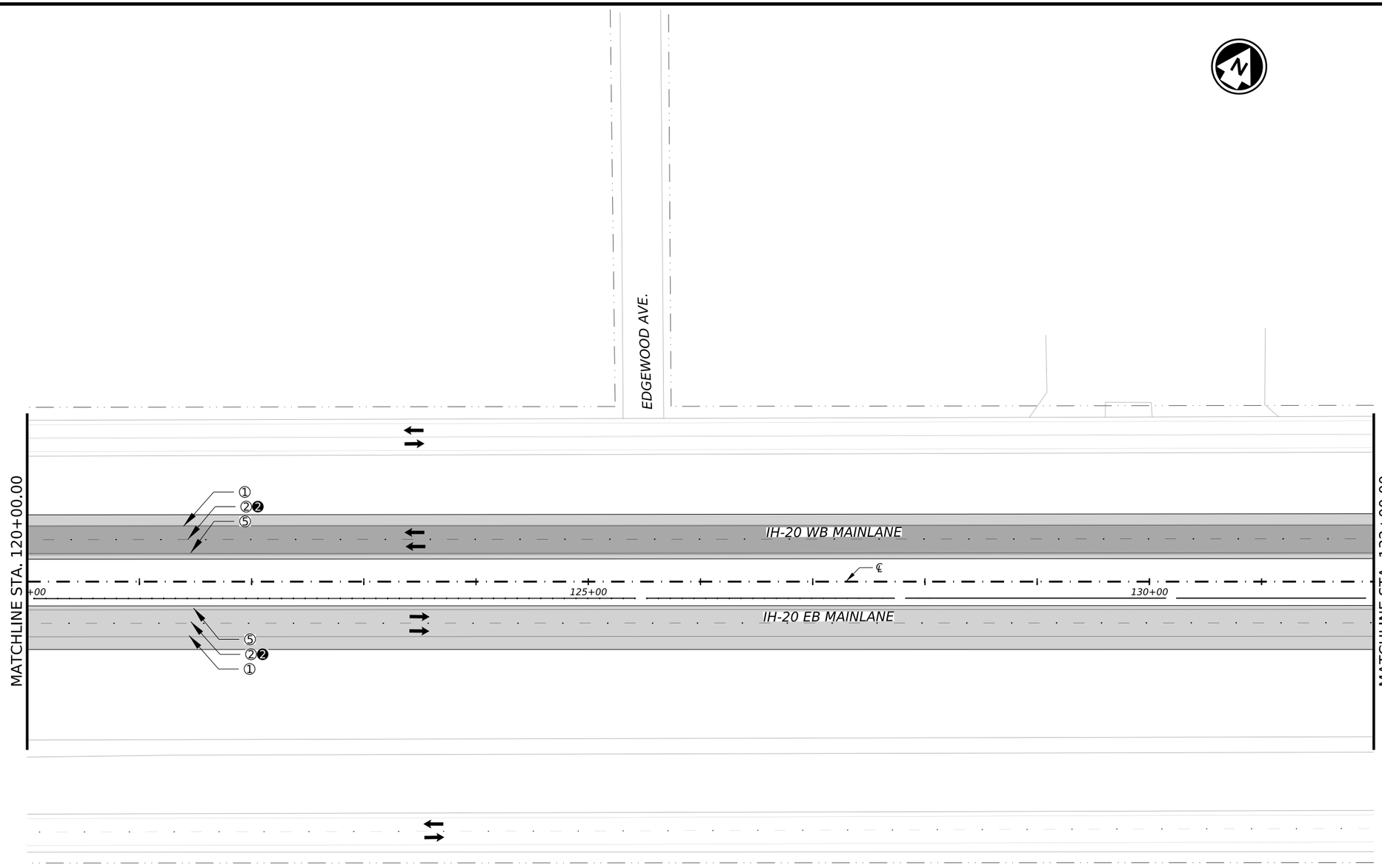

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.

11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

SHEET 11 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		66

DATE: 11/27/2023 10:00:19 AM
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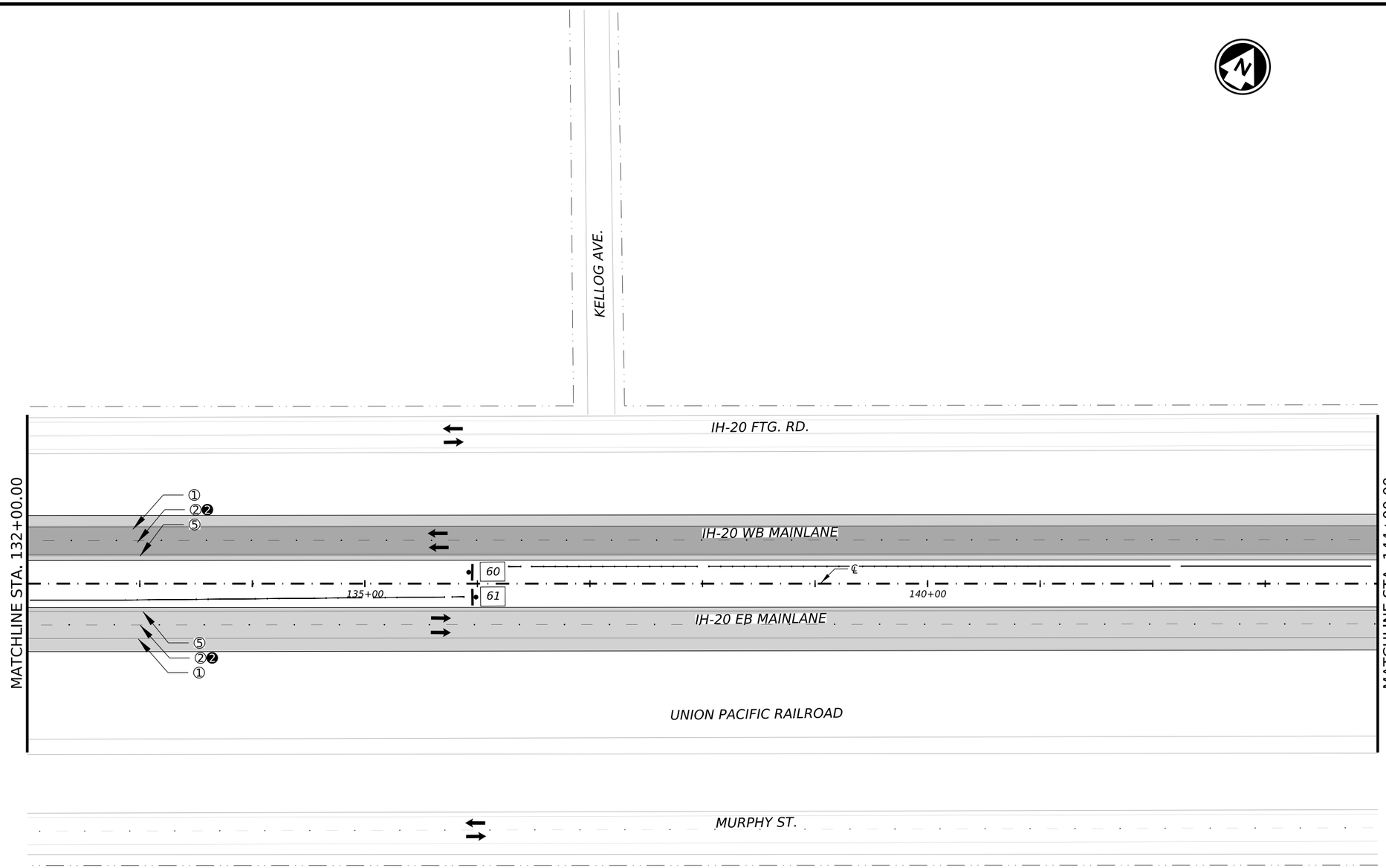


R5-11T
48 x 48
60

R5-11T
48 x 48
61

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

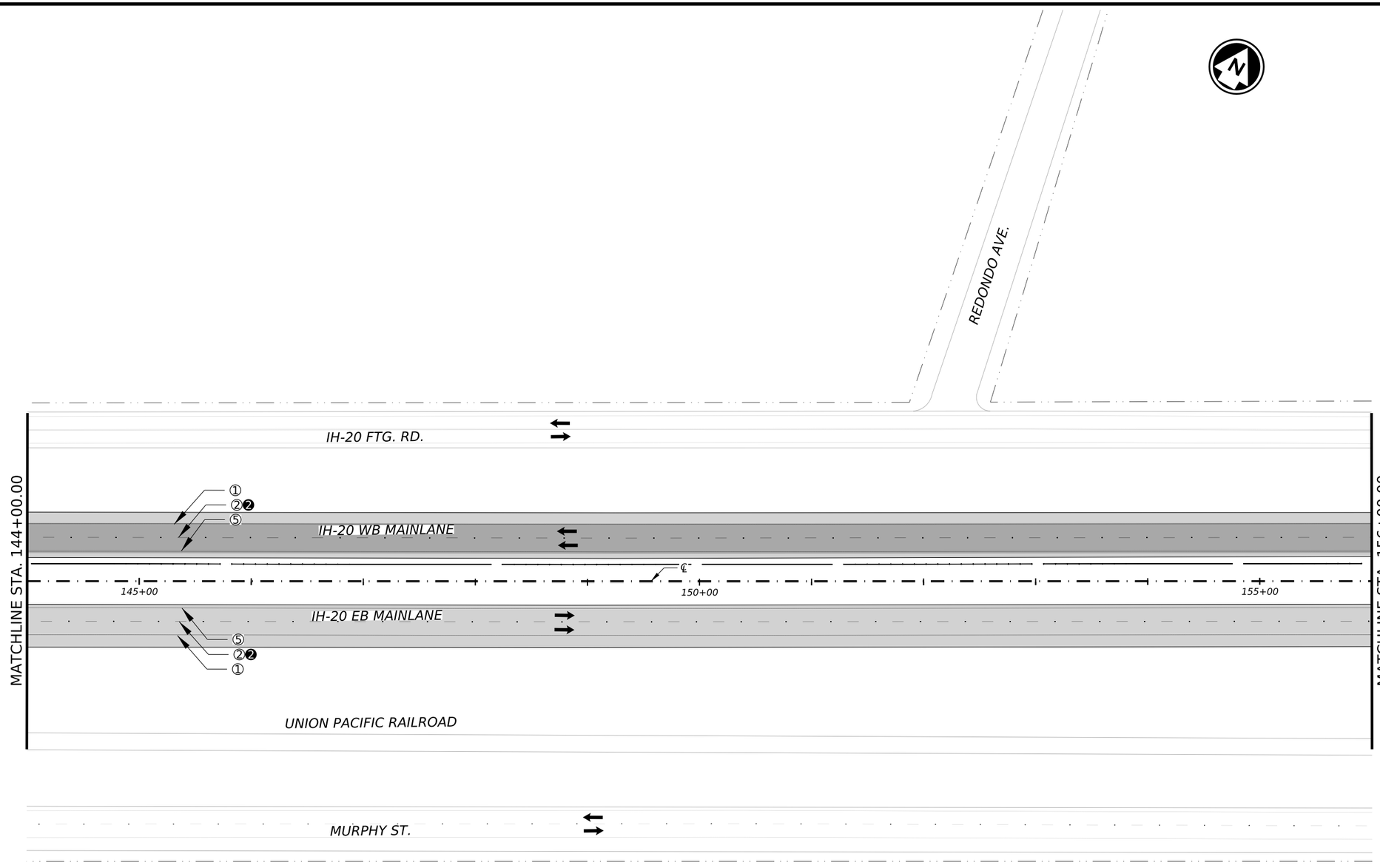
Texas Department of Transportation

ROADWAY LAYOUT

SHEET 12 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		67

DATE: 11/27/2023 10:00:20 AM
FILE: $FILE$



LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

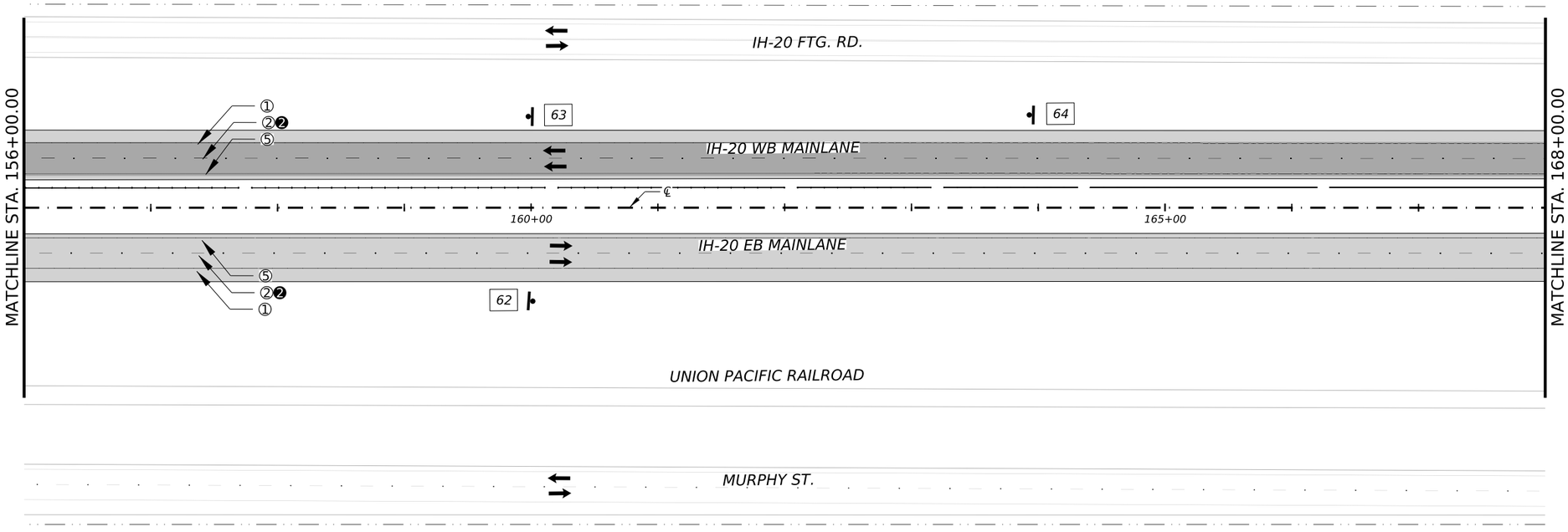
DATE: 11/27/2023 10:00:21 AM
FILE: $FILE$

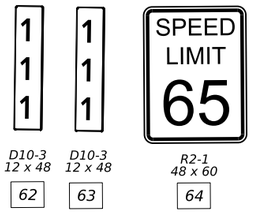
Texas Department of Transportation

ROADWAY LAYOUT

SHEET 13 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		68





LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.

11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

SHEET 14 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		69

DATE: 11/27/2023 10:00:21 AM
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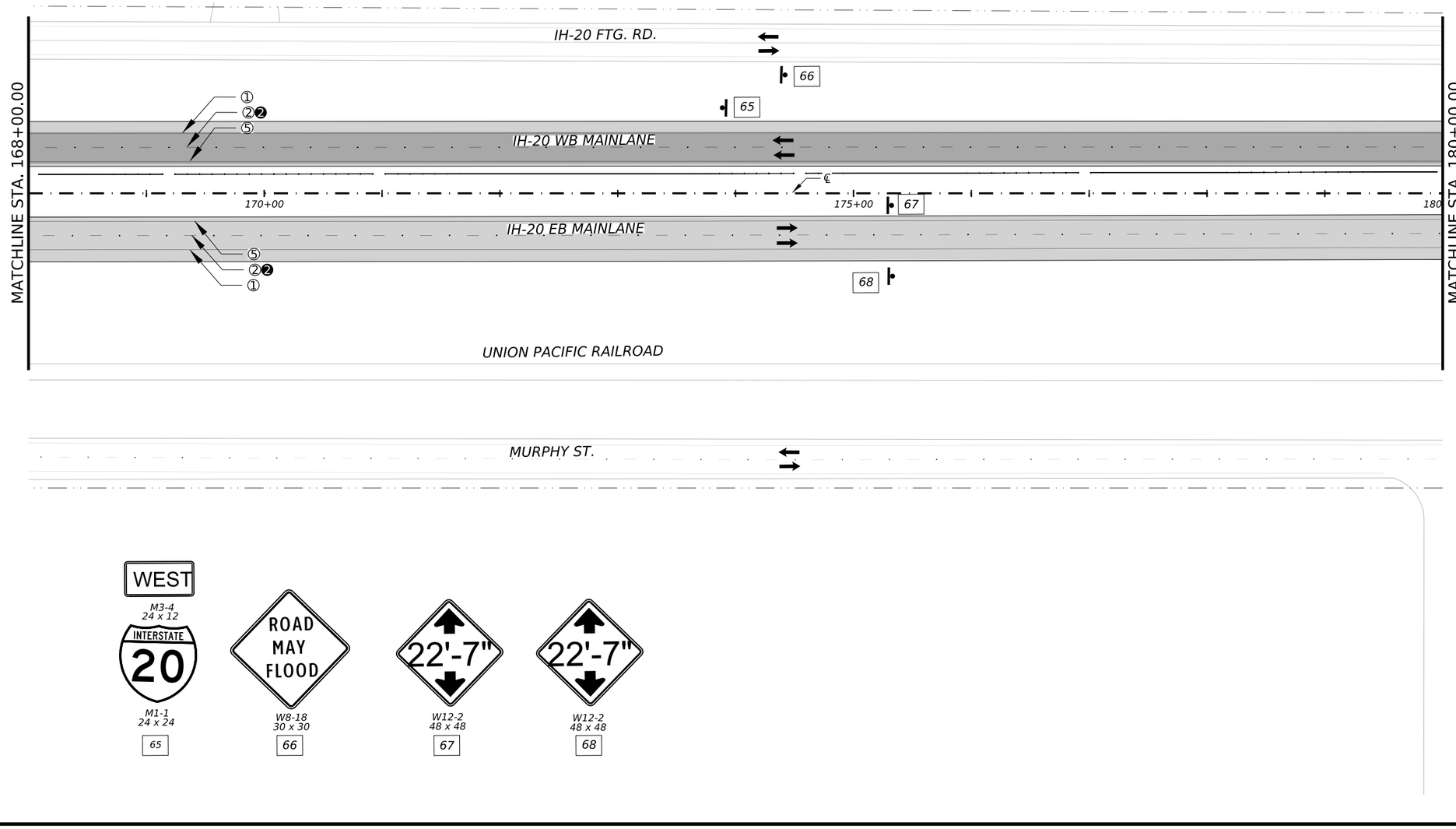

M3-4
24 x 12

M1-1
24 x 24

65

W8-18
30 x 30

66

W12-2
48 x 48

67

W12-2
48 x 48

68

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

Adriana Geiger, P.E.

11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

SHEET 15 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		70

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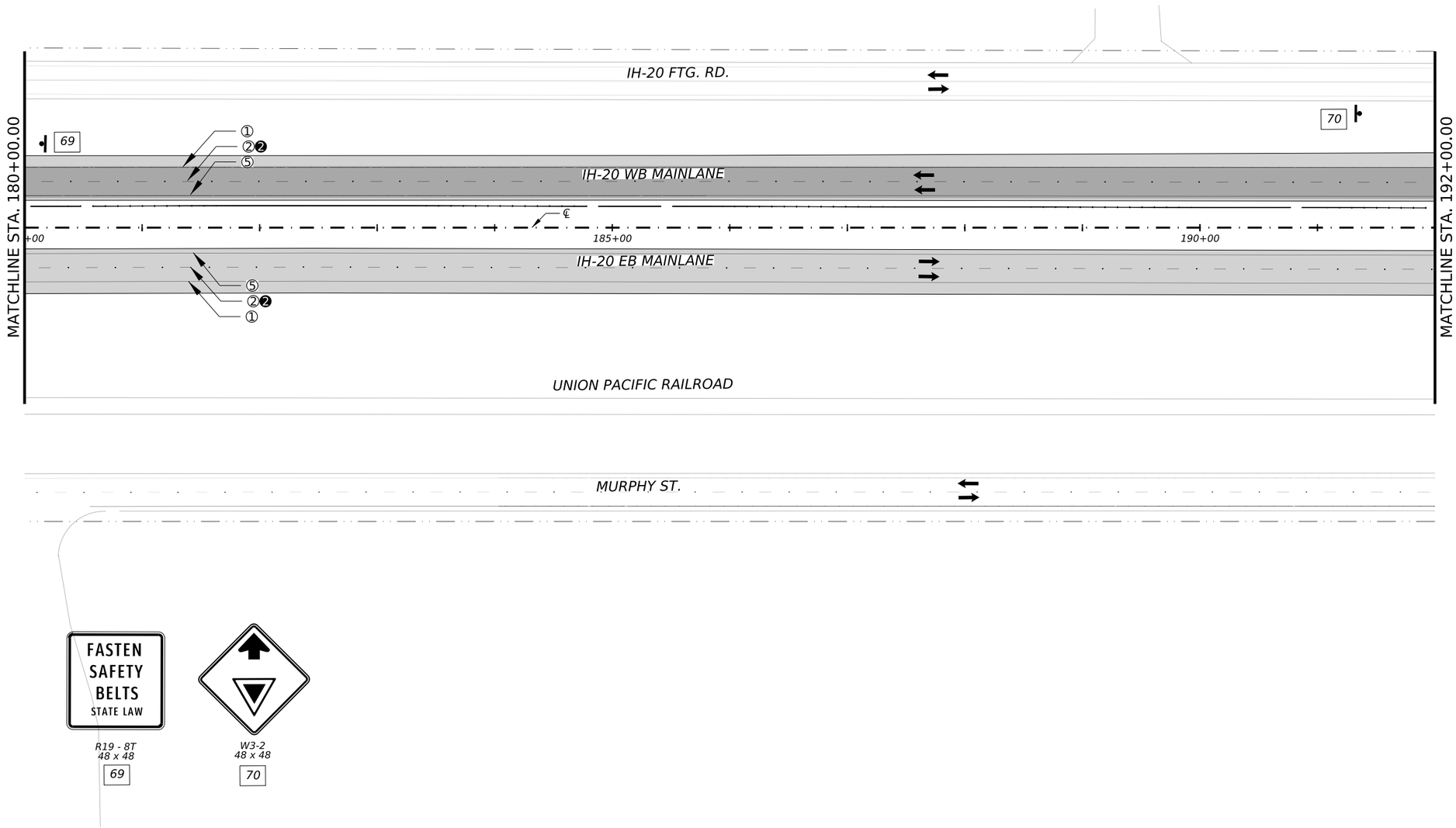

R19 - 8T
48 x 48
69

W3-2
48 x 48
70

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

Adriana Geiger, P.E.
11/27/2023

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ROADWAY LAYOUT

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		71

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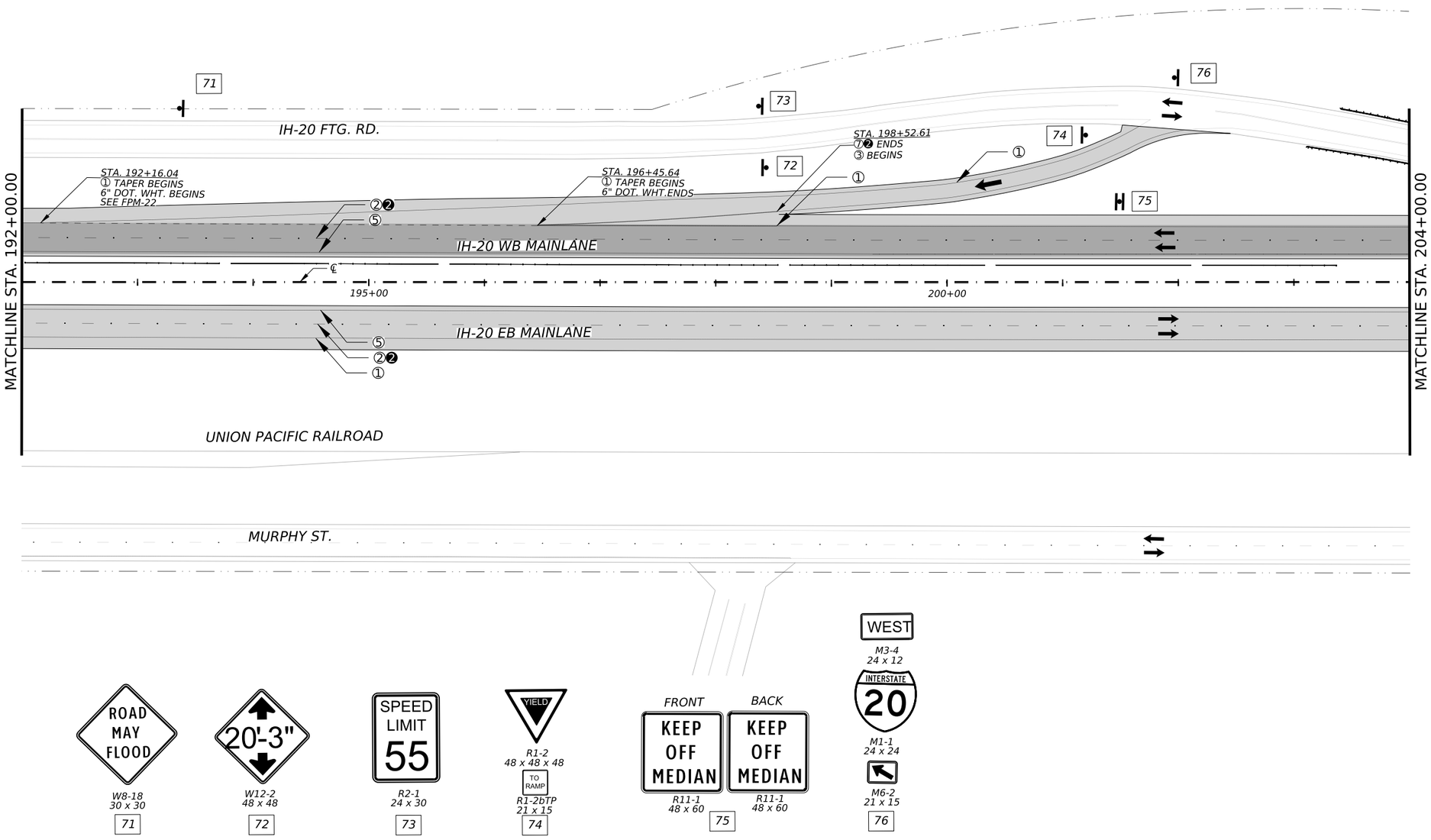

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
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Adriana Geiger, P.E.

11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

SHEET 17 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		72

DATE: 11/27/2023 10:00:25 AM
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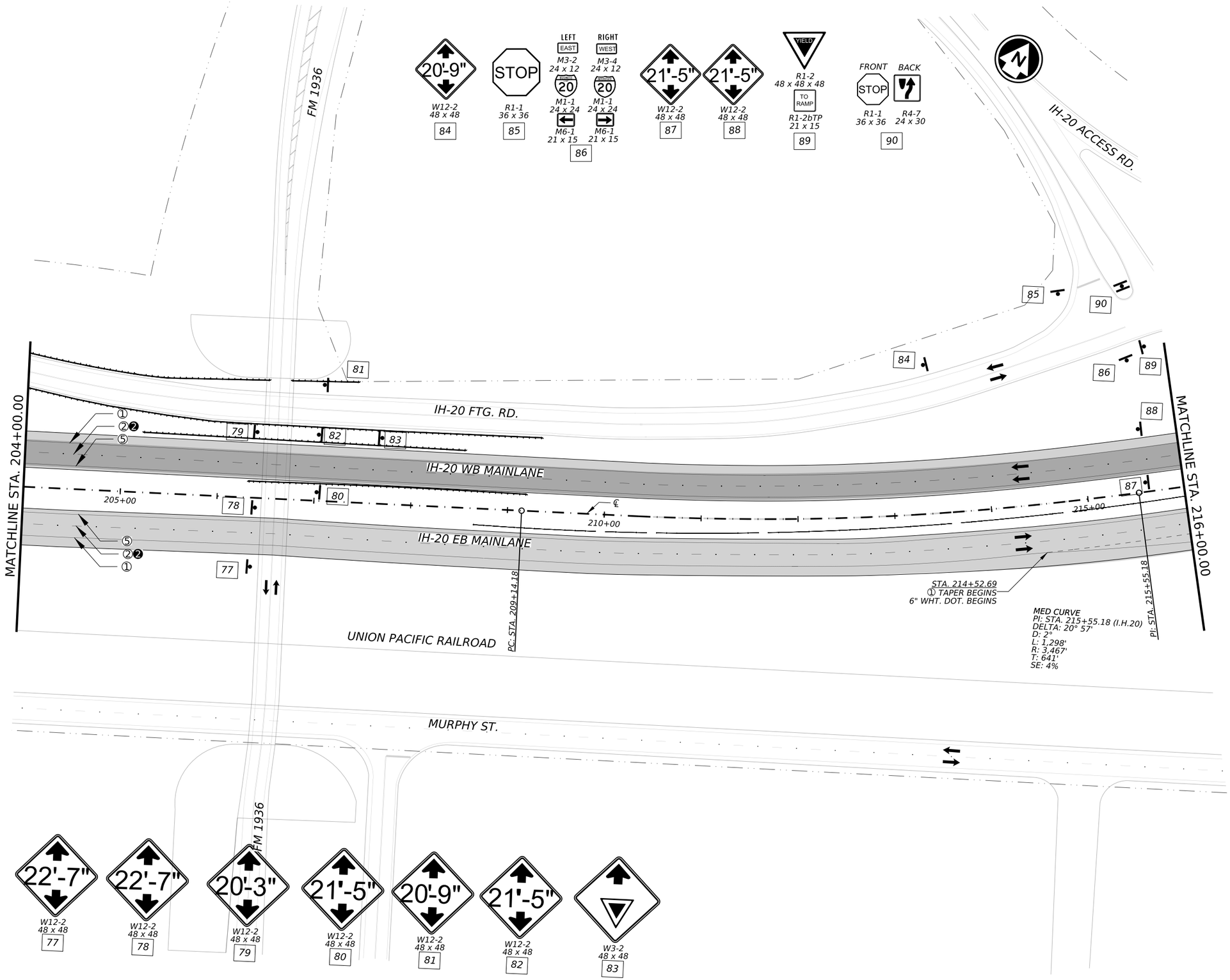

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

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Texas Department of Transportation

ROADWAY LAYOUT

SHEET 18 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		73

DATE: 11/27/2023 10:00:26 AM
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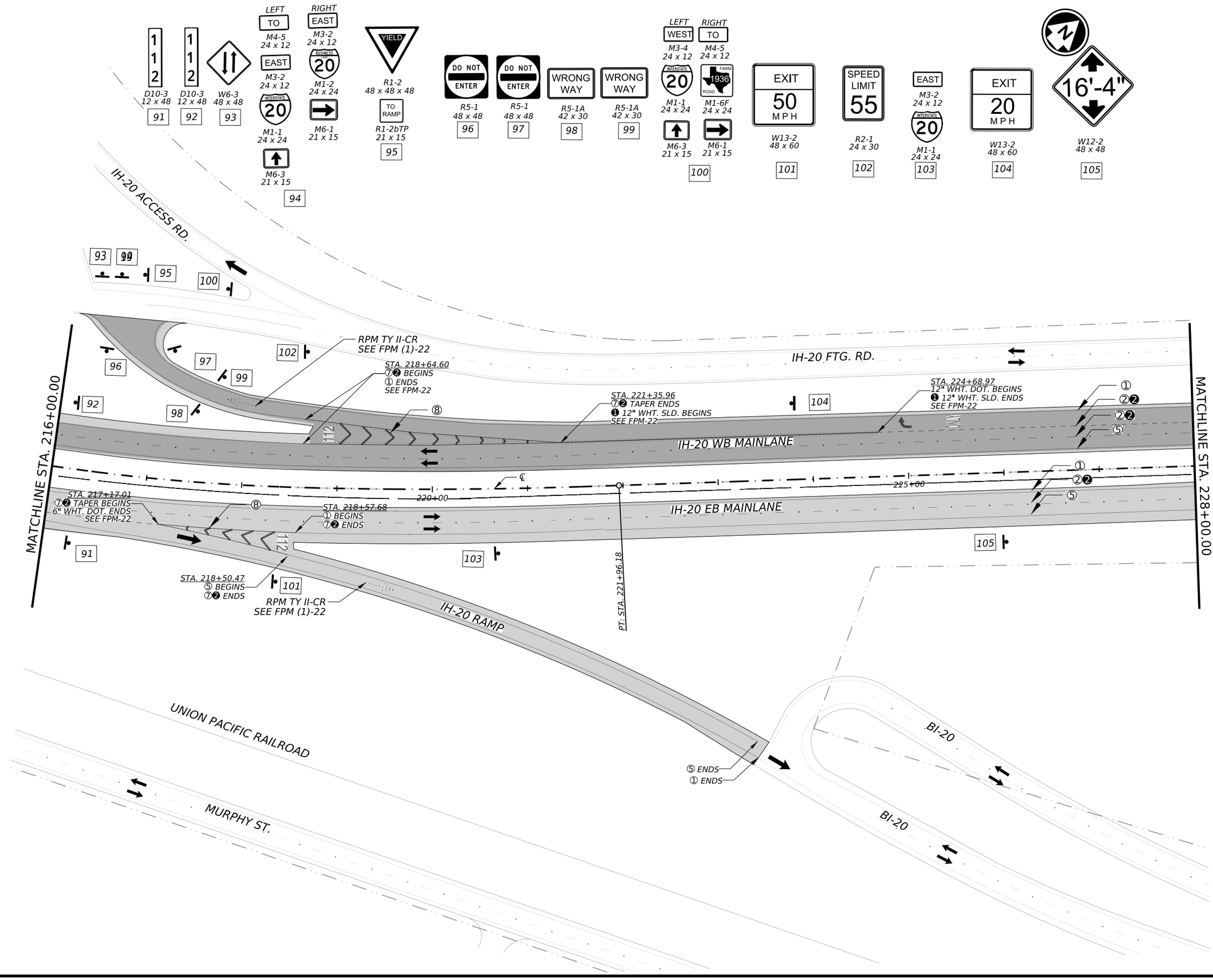

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

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11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

SHEET 19 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		74

DATE: 11/27/2023 10:00:27 AM
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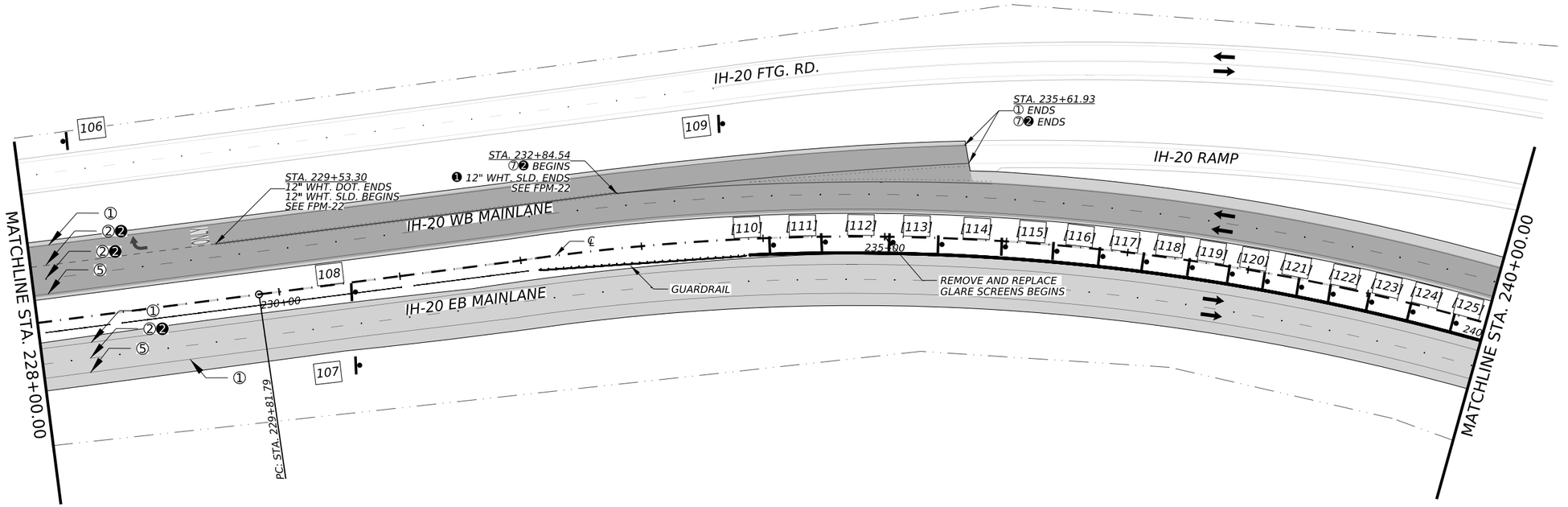

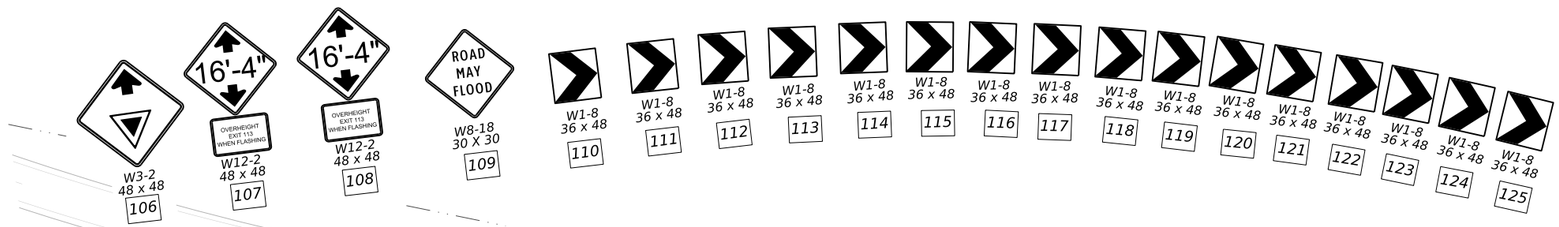

LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
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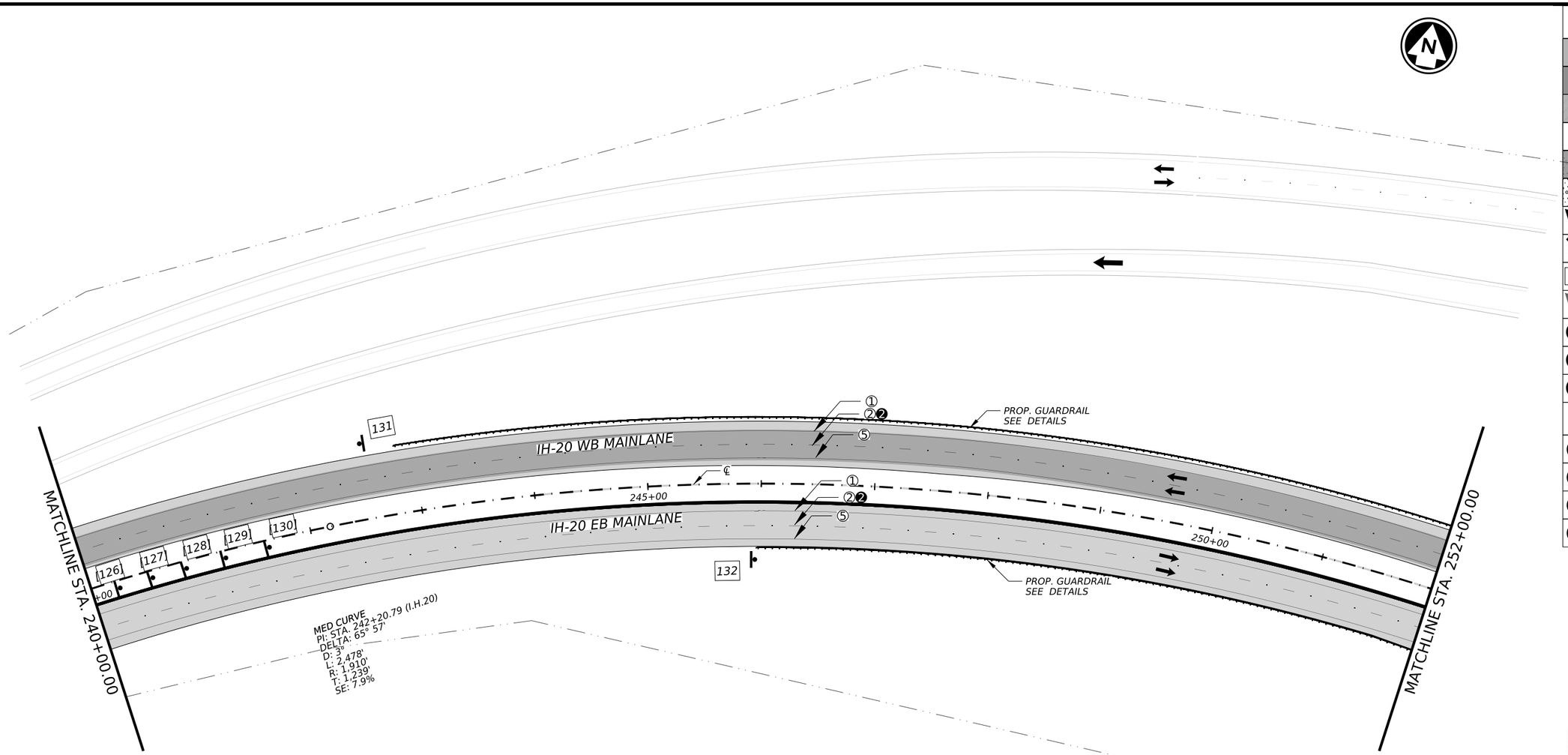
Adriana Geiger, P.E.
11/27/2023

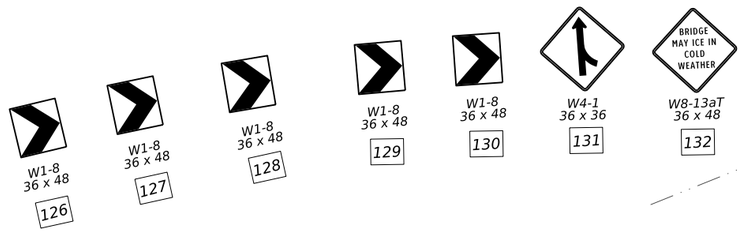
DATE: 11/27/2023 10:00:28 AM
FILE: $FILE$

Texas Department of Transportation

ROADWAY LAYOUT

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		75





LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
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11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

SHEET 21 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		76

DATE: 11/27/2023 10:00:29 AM
FILE: $FILE$

MATCHLINE A

IH-20 FTG. RD.

133

IH-20 RAMP

UNION PACIFIC RAILROAD

MURPHY ST.

BI-20

BI-20

MATCHLINE STA. 252+00.00

PROP. GUARDRAIL
SEE DETAILS

PT: STA. 254+59.79

STA. 255+44.44
PROP DECK TIE-IN DETAIL BEGINS

STA. 256+54.36
PROP. WB BI-20 BRIDGE DECK TREATMENT BEGINS

IH-20 WB MAINLANE

255+00

260+00

STA. 262+60
PROP. DECK TIE-IN DETAIL ENDS
SEE TIE-IN DETAILS

STA. 262+10.03
PROP. WB BRIDGE TREATMENT ENDS
PROP. DECK TIE-IN DETAIL BEGINS

PROP. GUARDRAIL
SEE DETAILS

MATCHLINE STA. 264+00.00

IH-20 EB MAINLANE

PROP. GUARDRAIL
SEE DETAILS

STA. 254+52.71
PROP. DECK TIE-IN DETAIL BEGINS

STA. 255+50.38
PROP. EB BI-20 BRIDGE DECK TREATMENT BEGINS

REMOVE AND REPLACE
GLARE SCREENS ENDS

ITEM 0454, HEADER TYPE
EXPANSION JOINT [TYP.]

STA. 261+02.80
PROP. EOP WIDENING TAPER BEGINS
PROP. EOP WIDENING TAPER ENDS

STA. 261+61.61
PROP. DECK TIE-IN DETAIL ENDS
SEE TIE-IN DETAILS

PROP. GUARDRAIL
SEE DETAILS

END PROJECT
PAVING LIMITS
MP:30.572
STA. 226+60

FRONT	BACK
KEEP OFF MEDIAN	KEEP OFF MEDIAN
R11-1 24 x 30	R11-1 24 x 30

133

LEGEND

- 2" SMAR-F OVERLAY (ITEM 3080)
- MILL & FILL (10" SP-B) (ITEM 0354, 3077)
- CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
- RIPRAP (CONC) CL B (3") (ITEM 0432)
- BRIDGE DECK TREATMENT (SEE DETAILS)
- TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
- FLOW OF TRAFFIC
- SIGN
- # SIGN NUMBER
- PAVEMENT MARKINGS
- 1 RPM TY. I-C
- 2 RPM TY. II-CR
- 3 RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

STATE OF TEXAS
ADRIANA GEIGER
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Adriana Geiger, P.E.

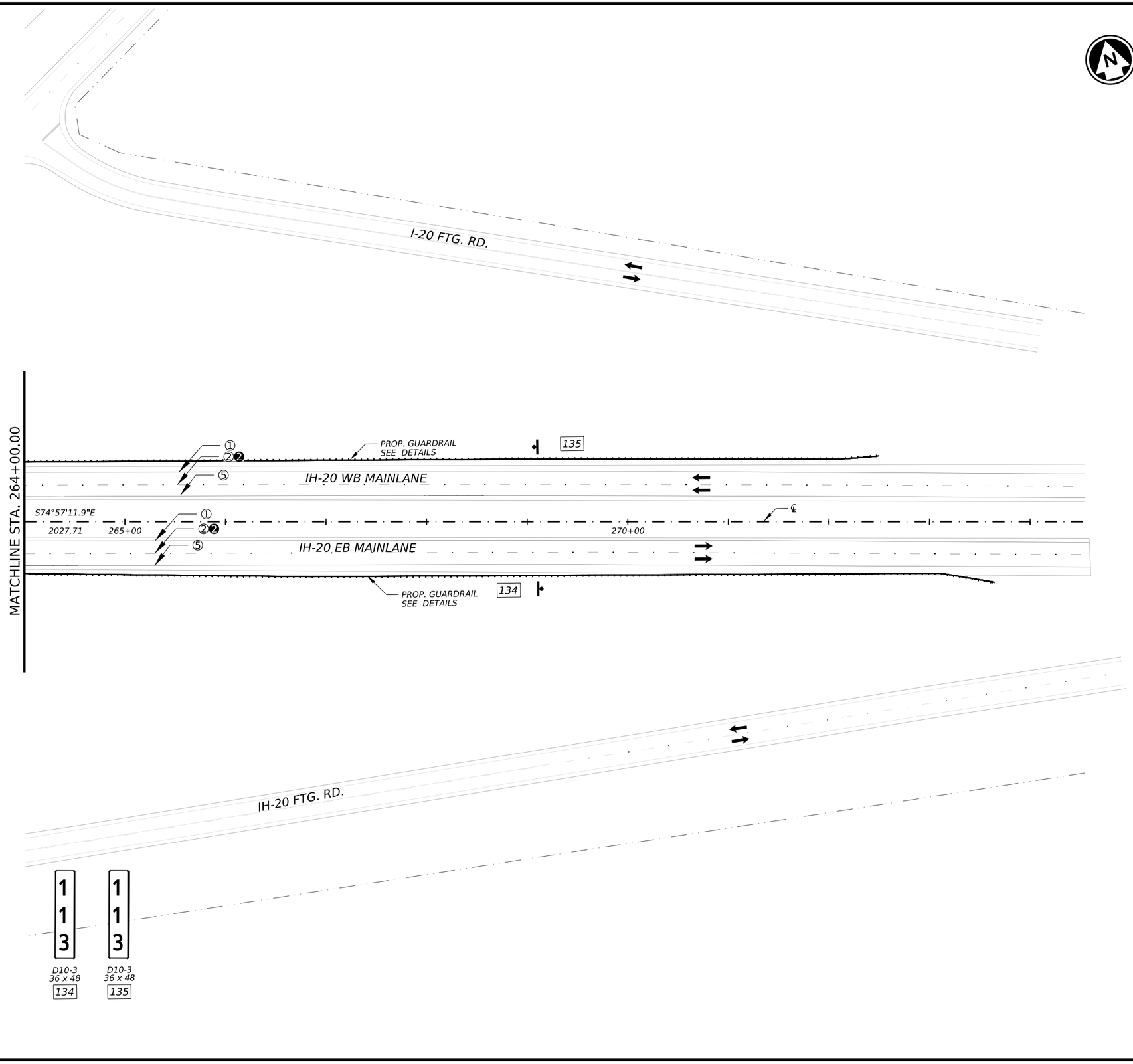
11/27/2023

DATE: 11/27/2023 10:00:31 AM
FILE: $FILE$

Texas Department of Transportation

ROADWAY LAYOUT

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		77



LEGEND

	2" SMAR-F OVERLAY (ITEM 3080)
	MILL & FILL (10" SP-B) (ITEM 0354, 3077)
	CRCP INTERSECTION LIMITS (ITEM 0360, 0251, 0105)
	RIPRAP (CONC) CL B (3") (ITEM 0432)
	BRIDGE DECK TREATMENT (SEE DETAILS)
	TRANISITION SLAB LIMITS (15' WIDE TYP.) (ITEM 0360)
	FLOW OF TRAFFIC
	SIGN
#	SIGN NUMBER
	PAVEMENT MARKINGS
❶	RPM TY. I-C
❷	RPM TY. II-CR
❸	RPM TY. II-AA

STRIPING LEGEND

① 6" WHT. SLD.	⑤ 6" YLW. SLD.
② 6" WHT. BRK.	⑥ 6" YLW. PASS.
③ 6" YLW. DBL.	⑦ 8" WHT. SLD.
④ 6" YLW. BRK.	⑧ 24" WHT. SLD.

0 50 100
SCALE IN FEET

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11/27/2023

Texas Department of Transportation

ROADWAY LAYOUT

SHEET 23 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		78

DATE: 11/27/2023 10:00:34 AM
FILE: $FILE$

Existing Bridge

Moss Ave. Bridge BMI: 06-069-0-0004-07-088
WB BI-20 & UP RR BMI: 06-069-0-0004-07-225
EB BI-20 & UP RR BMI: 06-069-0-0004-07-226

Safety Appurtenances

This project meets the basic safety requirements of the 4R design criteria of the Roadway Design Manual (May 2022 version). signing, and pavement markings will be upgraded to current standards. Cross drainage box and pipe culverts, parallel and driveway culverts, mailbox supports, luminaire supports and sign supports within the required obstruction clearance of 20 feet have been treated or upgraded to standard.

Existing and Proposed Horizontal Alignment and Superelevation

CSJ 0004-07-138								
ECTOR COUNTY								
EXISTING AND PROPOSED HORIZONTAL ALIGNMENT AND SUPERELEVATION								
HORIZONTAL CURVES								SUPERELEVATION RATE %
R	PC	PI	PT	DELTA	D	L	T	
3,467 '	209+14.18	215+55.18	221+96.18	20°57'	2°	1,298 '	641 '	4
1,910 '	229+81.79	242+20.79	254+59.79	65°57'	3°	2,478 '	1,239 '	7.9

Existing and Proposed Vertical Alignment

CSJ 0004-07-138						
ECTOR COUNTY						
EXISTING AND PROPOSED VERTICAL ALIGNMENT						
VERTICAL CURVES						ROADWAY CLASSIFICATION
PI	Length (ft)	G1%	G2%	K	CREST OR SAG	
74+00	400 '	0.88	0.43	889	CREST	URBAN (DESIGN SPEED 70)
119+00	400 '	0.29	1.15	465	SAG	
208+00	400 '	0.78	0.33	889	CREST	
251+44	200 '	-0.83	0.66	134	SAG	
259+21	1,500 '	2.95	-3	252	CREST	

NOTE: Vertical Curve information is provided to verify 4R project requirements and is not intended for use in construction. Any field superelevations not meeting 4R criteria for the designated design speed above are to be corrected with milling and hot mix.

Project element information was taken from as-built plans fromm CSJ:0004-07-030.

11/27/2023

Adriana Geiger, P.E.

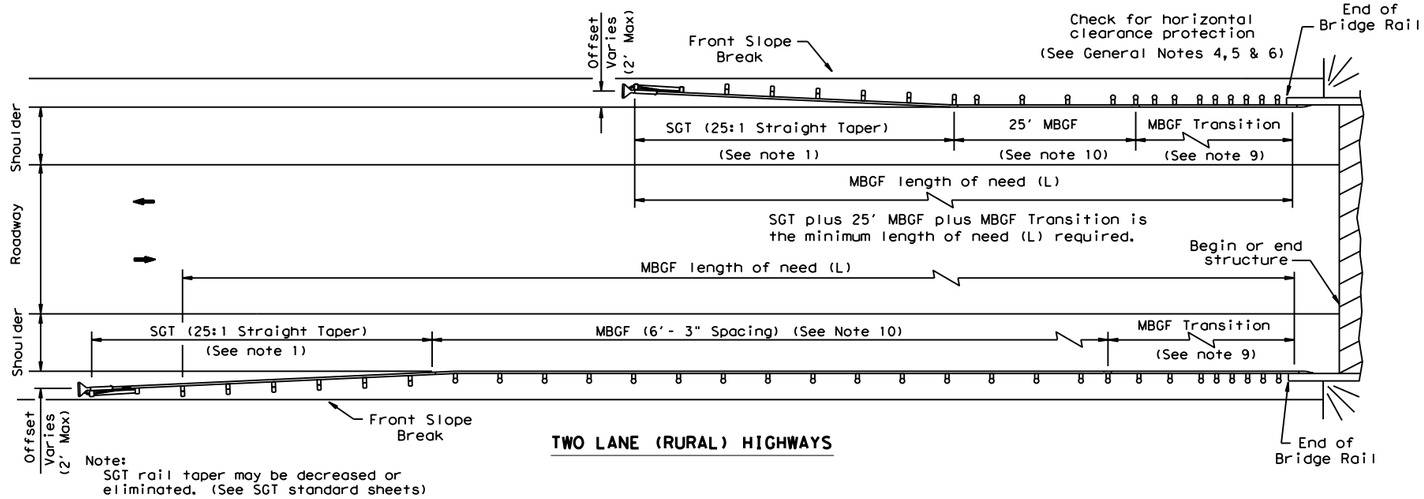
ALIGNMENT DATA SHEET

SHEET 1 OF 1

Texas Department of Transportation

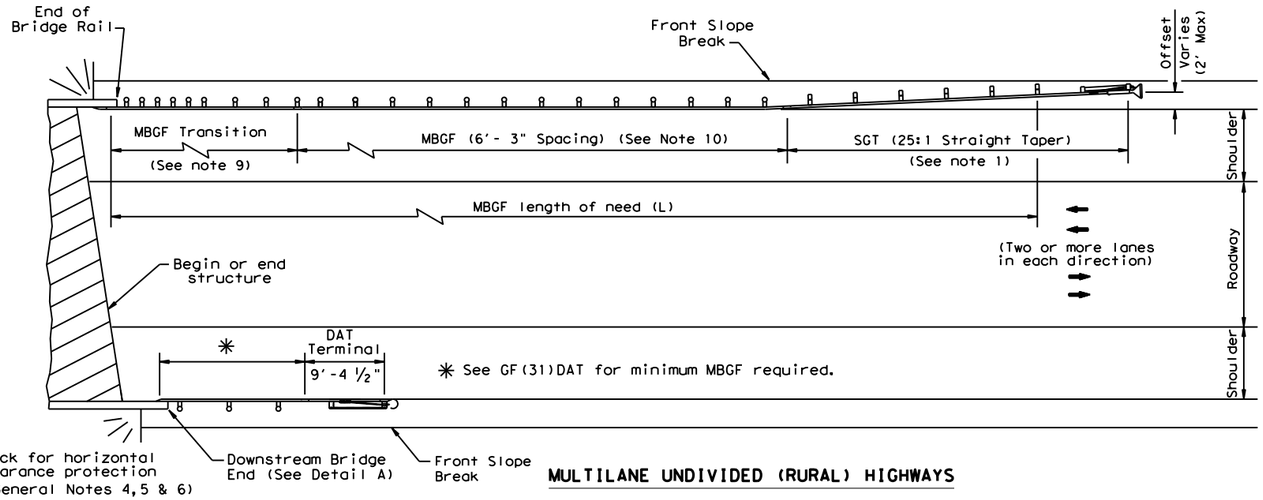
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		79
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

DATE:
FILE:

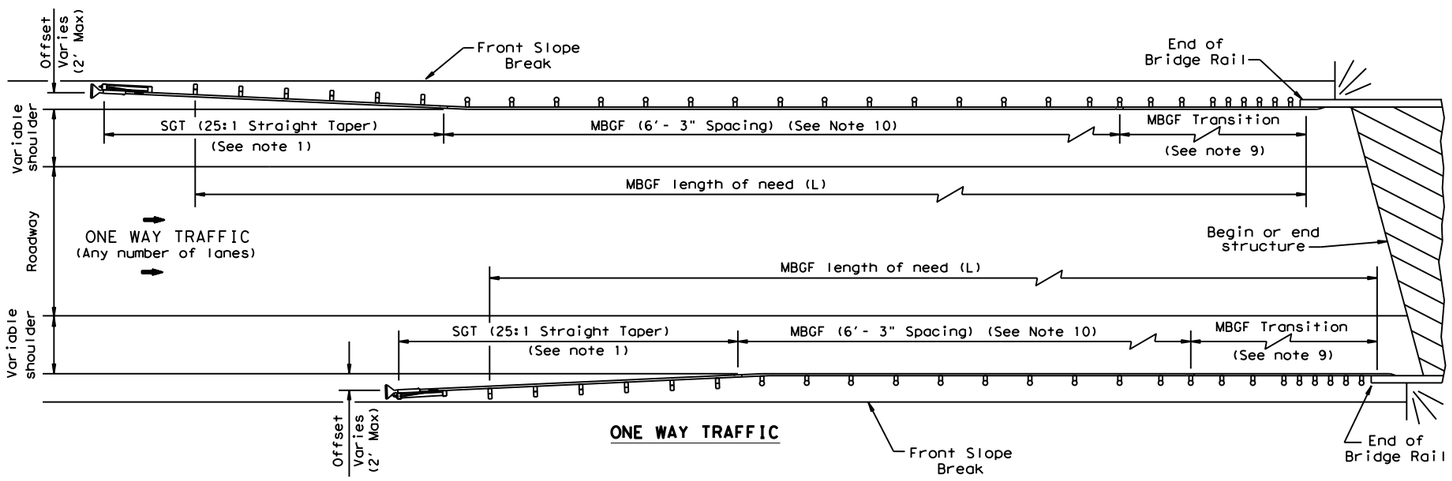


TWO LANE (RURAL) HIGHWAYS

Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)



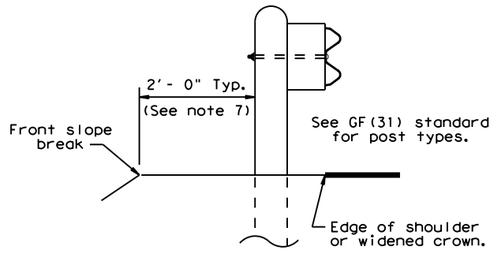
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

1. For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
2. Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
3. Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
4. MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
5. Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
6. Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
7. The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'- 0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
8. <u>For restrictive bridge widths:</u> The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft. "maximum" offset from the shoulder edge in the approach direction.
9. Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
10. A minimum 25' length of MBGF will be required.



TYPICAL CROSS SECTION AT MBGF

Note:
All rail elements shall be lapped in the direction of adjacent traffic.

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

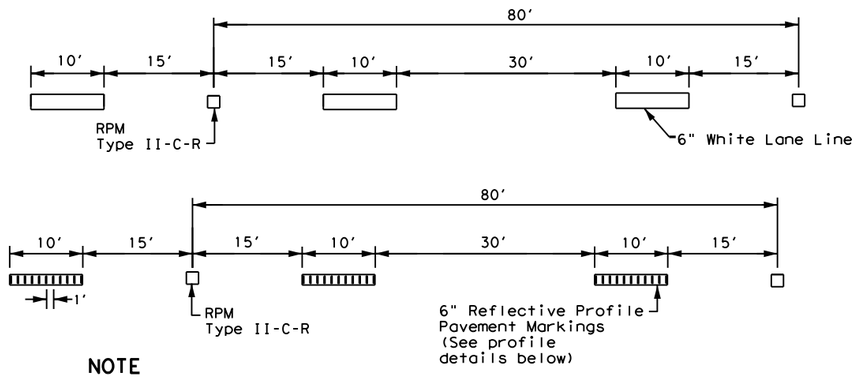
Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

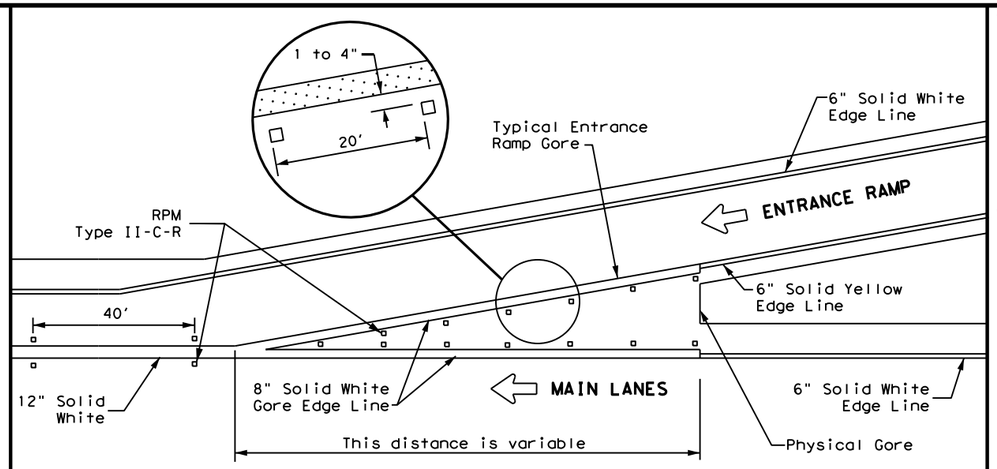
FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	0004	07	138	IH-20
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		80



NOTE

Reflectorized raised pavement markers Type II-C-R shall be spaced on 80' centers with the clear face toward normal traffic and the red face toward wrong way traffic. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.

TRAFFIC LANE LINES PAVEMENT MARKING



TYPICAL ENTRANCE RAMP GORE MARKING

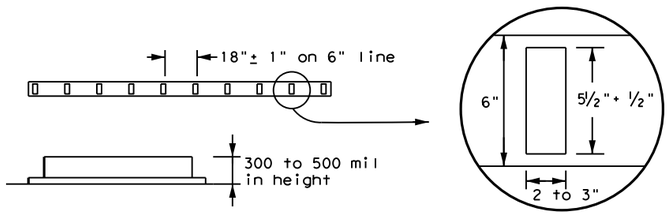
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R

GENERAL NOTE

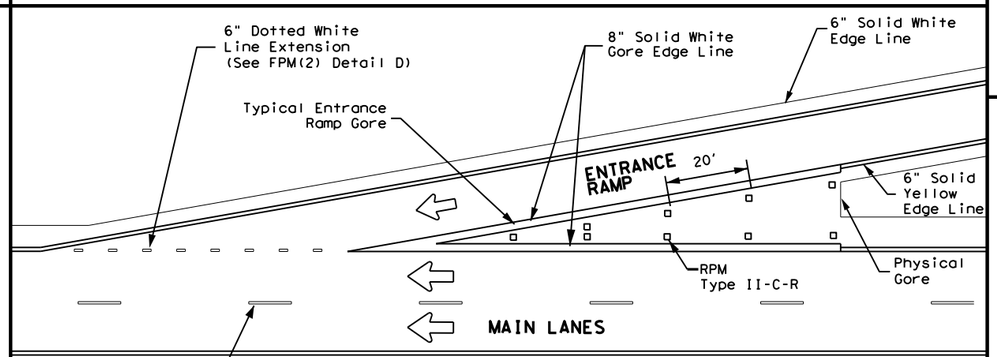
On concrete pavements the raised pavement markers shall be placed to one side of the longitudinal joints.



NOTE

Edge lines should typically be 6" wide and the materials shall be as specified in the plans. See details above if reflective profile pavement markings are to be used.

EDGE LINE PAVEMENT MARKINGS



NOTE

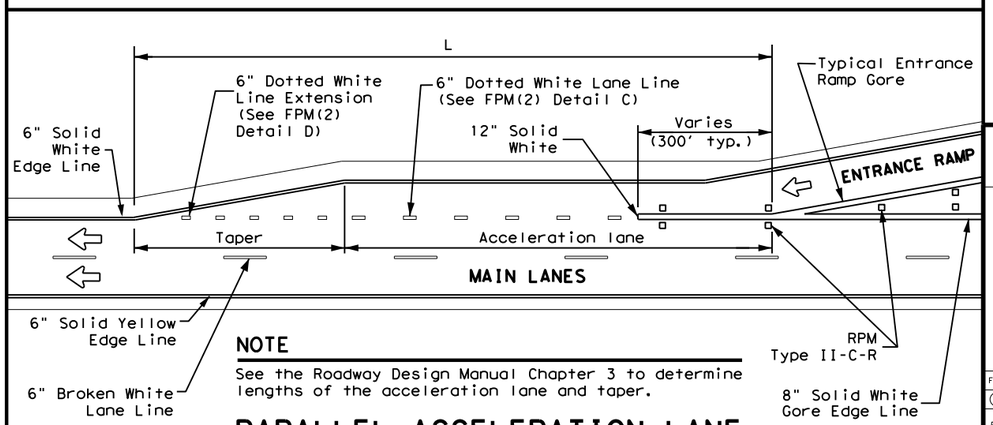
See the Roadway Design Manual Chapter 3 to determine if a tapered acceleration lane may be used.

TAPERED ACCELERATION LANE

NOTES

1. Reflectorized raised pavement markers Type-II-C-R in the wrong way arrow shall have the clear face toward normal traffic and the red face toward the wrong way traffic.
2. Red reflectorized wrong way arrows, not to exceed two, may be placed on exit ramps. Locations of the arrows shall be as shown in the plans or as directed by the engineer.

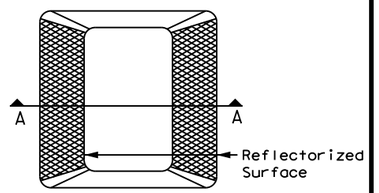
WRONG WAY ARROW



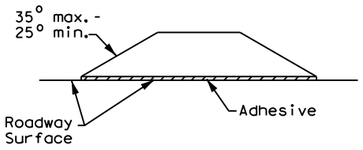
NOTE

See the Roadway Design Manual Chapter 3 to determine lengths of the acceleration lane and taper.

PARALLEL ACCELERATION LANE



Type II (Top View)



SECTION A

REFLECTORIZED RAISED PAVEMENT MARKER (RPM)

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

FPM(1)-22

FILE: fpm(1)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
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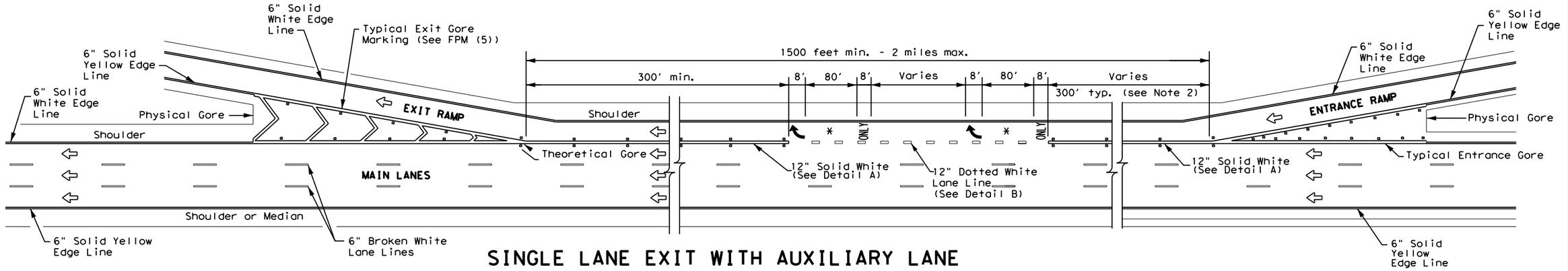
5-74 8-00 2-12	DIST	COUNTY		SHEET NO.
4-92 2-08 10-22	ODA	ECTOR		81
5-00 2-10				

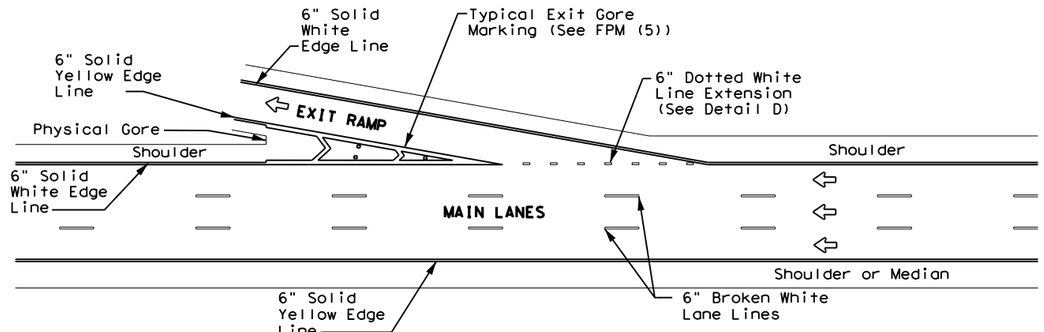
23A

DATE: 11/27/2023 8:57:18 AM
FILE: $FILE$



SINGLE LANE EXIT WITH AUXILIARY LANE

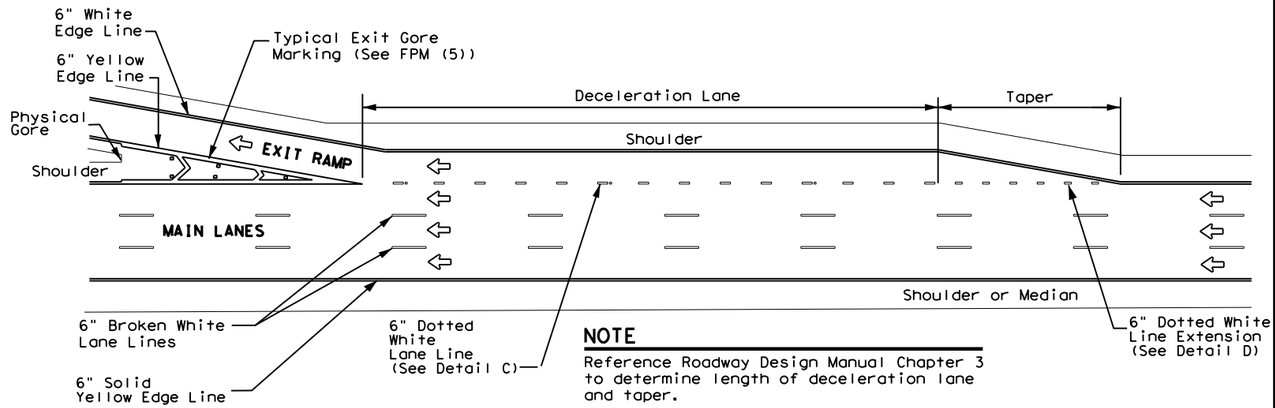
(See Note 2)



NOTE

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

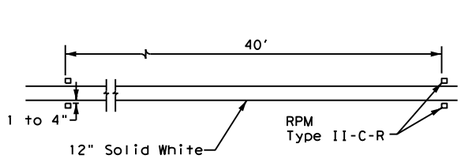
TAPERED DECELERATION LANE



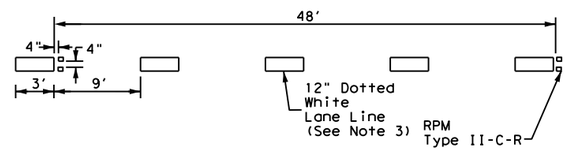
NOTE

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

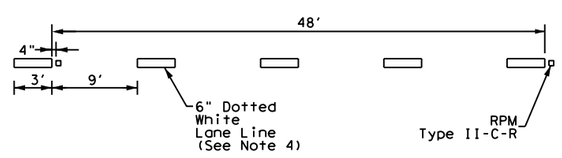
PARALLEL DECELERATION LANE



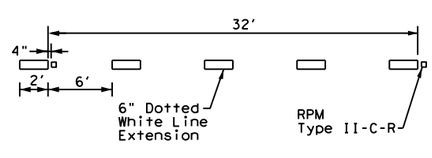
DETAIL A



DETAIL B



DETAIL C



DETAIL D

GENERAL NOTES

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

LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R
✳	Arrow markings are optional, however "ONLY" is required if arrow is used

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

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

Texas Department of Transportation

Traffic Safety Division Standard

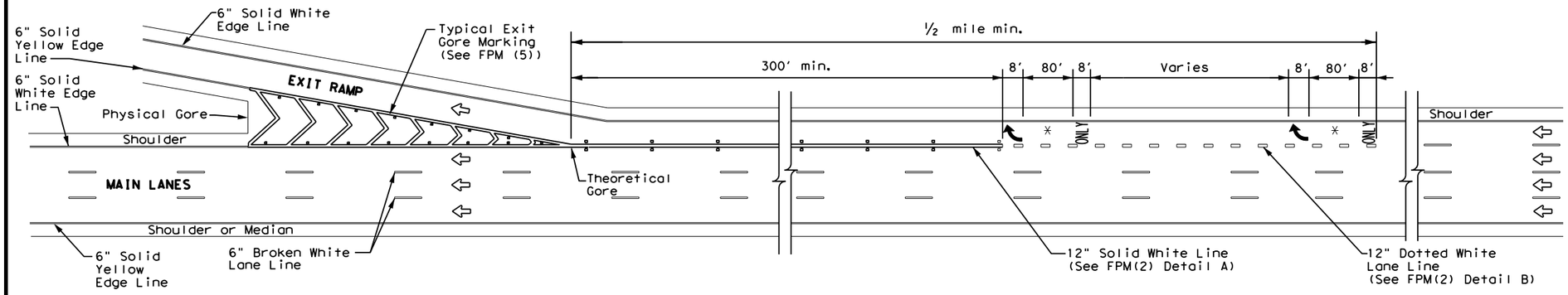
TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPS

FPM(2)-22

FILE: fpm(2)-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-77 5-00 2-12 4-92 8-00 10-22 8-95 2-10	0004	07	138	IH-20
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		82

23B

DATE:
FILE:

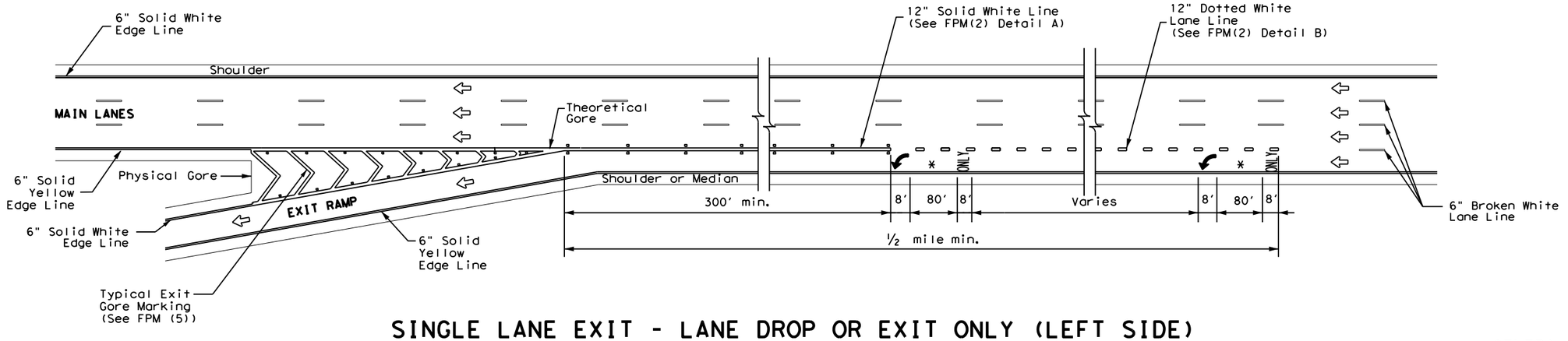


SINGLE LANE EXIT - LANE DROP OR EXIT ONLY

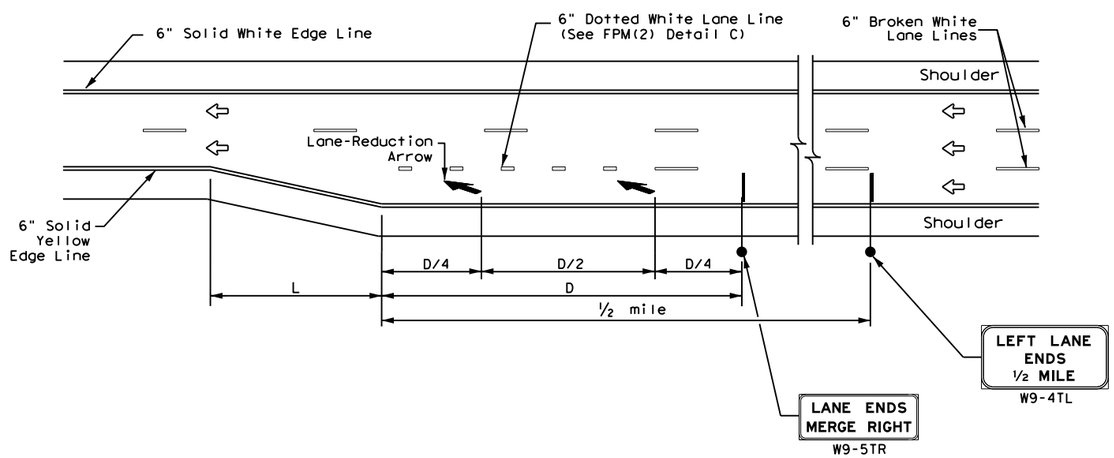
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R
*	Arrow markings are optional, however "ONLY" is required if arrow is used



SINGLE LANE EXIT - LANE DROP OR EXIT ONLY (LEFT SIDE)



FREEWAY LANE REDUCTION

NOTES

1. Large Guide signs shall conform to the TxDOT Freeway Signing Handbook.
2. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
3. Arrows and sign details can be found in the Standard Highway Sign Designs for Texas (SHSD) at http://www.txdot.gov.
4. These guidelines may also be applied to the design of a right side lane reduction. Use LANE ENDS MERGE LEFT (W9-5TL) and RIGHT LANE ENDS 1/2 MILE (W9-4TR) signs in lieu of what is shown on drawing.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	
80 MPH	1,500	
85 MPH	1,625	

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Edge lines are not required in curb and gutter sections of frontage roads.
5. See FPM(1) for traffic lane line pavement marking details.

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS SINGLE LANE DROP (EXIT ONLY) AND LANE REDUCTION DETAILS

FPM(3)-22

FILE: fpm(3)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
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5-00 2-12	ODA	ECTOR		83
8-00 10-22				

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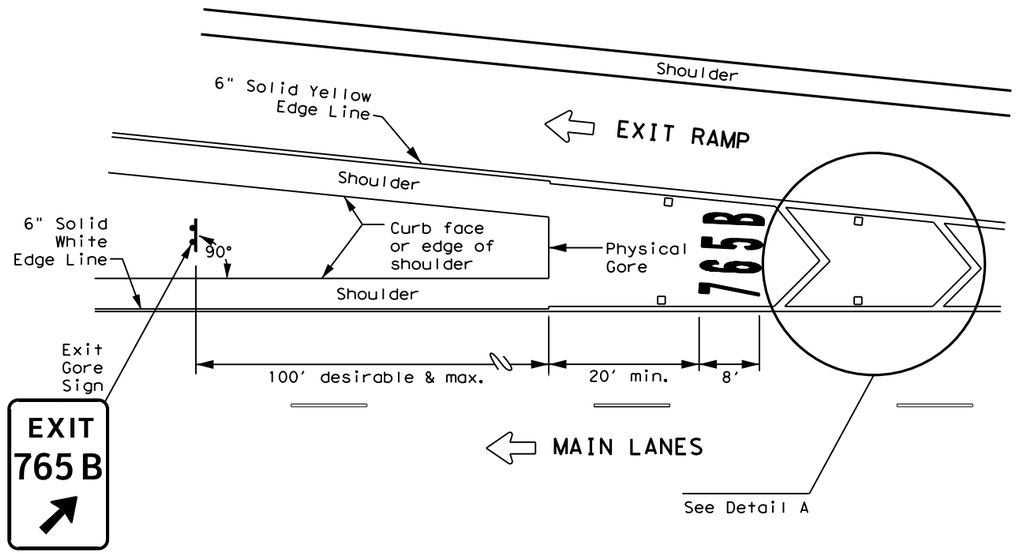
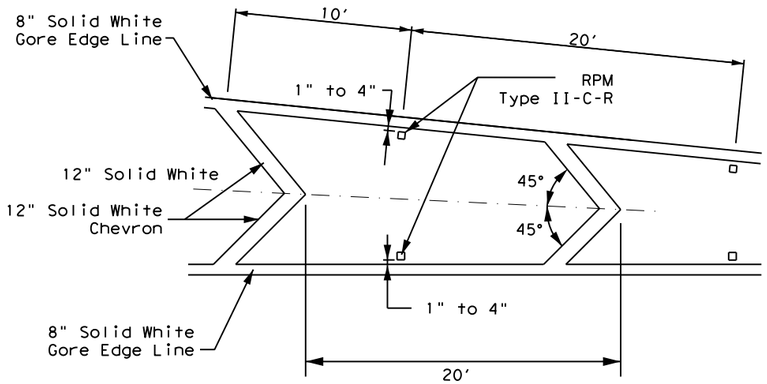
EXIT NUMBER PAVEMENT MARKING NOTES

1. Minimum 8 foot white exit number pavement markings should be used, unless otherwise noted.
2. Spacing between letters and numbers should be approximately 4 inches.
3. Pavement markings are to be located as specified elsewhere in the plans.
4. Numbers and Letters details can be found in the Standard Highway Design for Texas (SHSD) Section 12 at http://www.txdot.gov



MARKINGS WITH EXIT NUMBER



NOTES

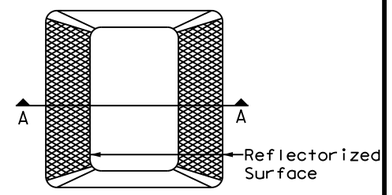
1. Raised pavement markers shall be centered between each chevron or neutral area line.
2. For more information, see Reflectorized Raised Pavement Marker Detail.

DETAIL A

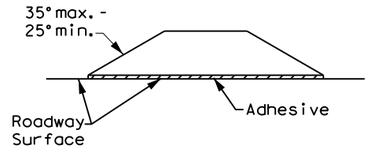
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

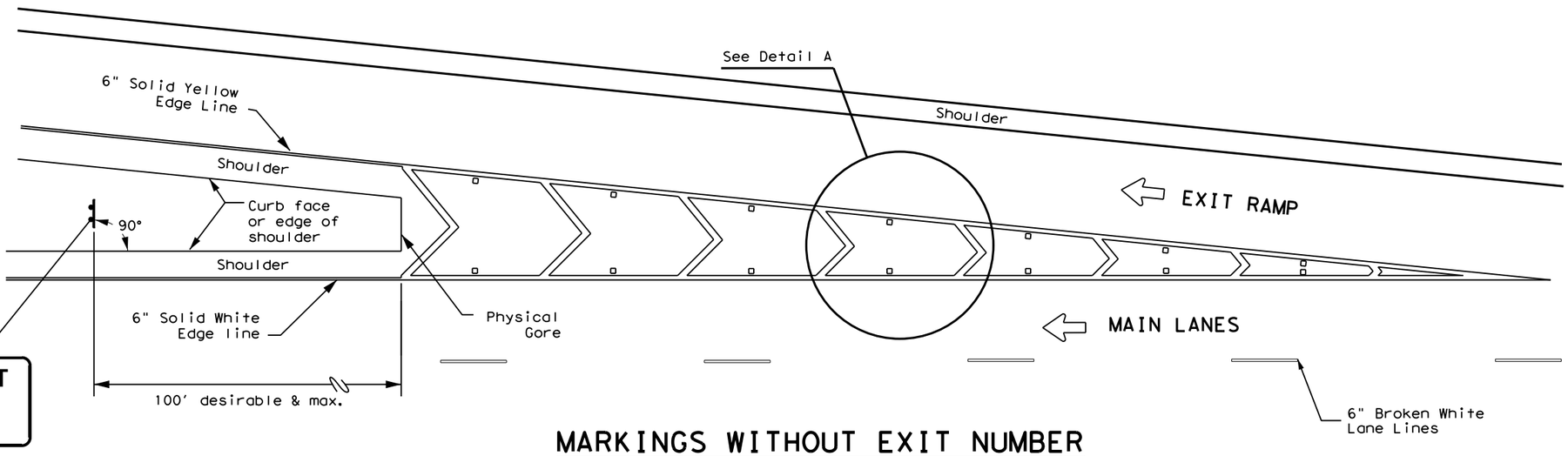
LEGEND	
⇦	Traffic flow
▫	Reflectorized Raised Markers (RPM) Type II-C-R



Type II (Top View)



SECTION A



MARKINGS WITHOUT EXIT NUMBER

REFLECTORIZED RAISED PAVEMENT MARKER (RPM)

Texas Department of Transportation

Traffic Safety Division Standard

EXIT GORE PAVEMENT MARKINGS

FPM(5)-22

FILE: fpm(5)-22.dgn	DN:	CK:	DW:	CK:
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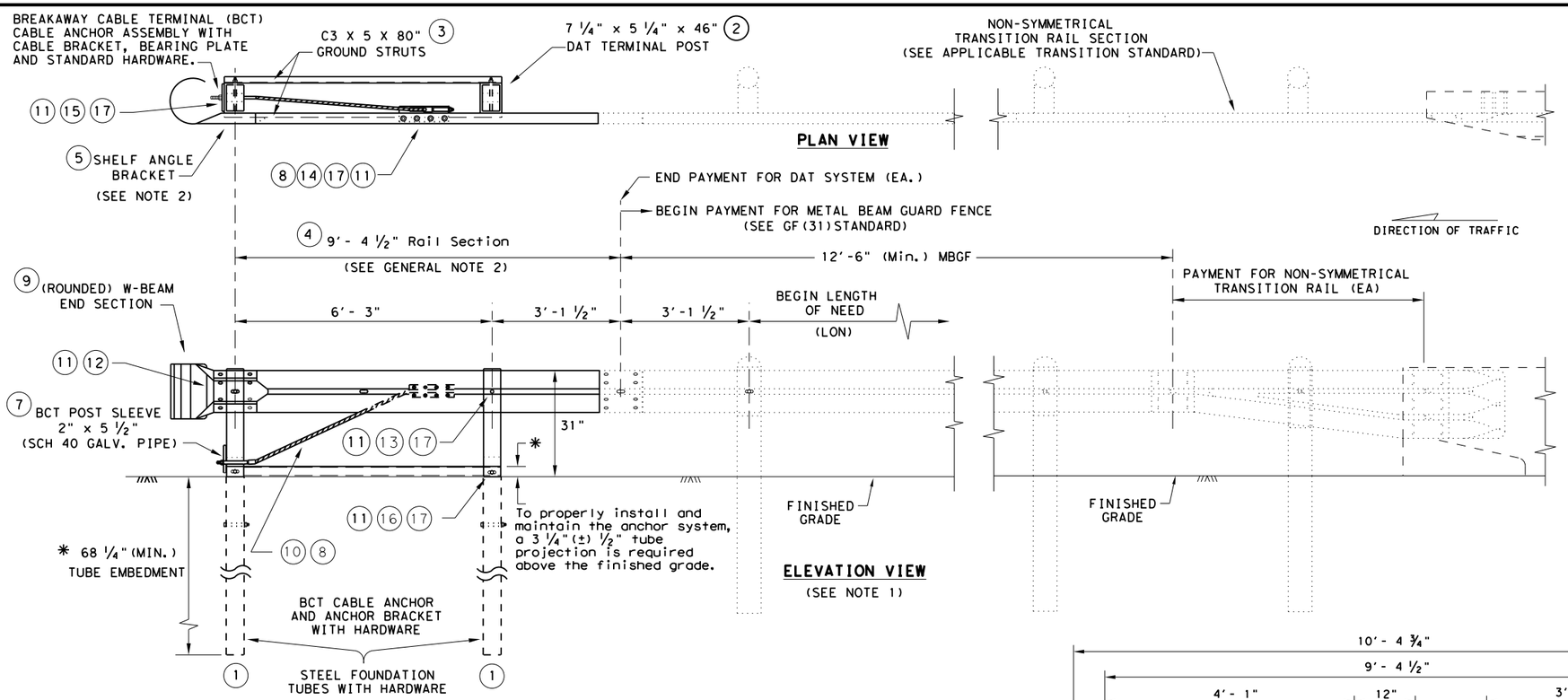
	ODA	ECTOR		84

23E

DATE:
FILE:



DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

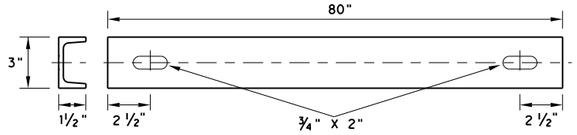
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

MOW STRIP INSTALLATION

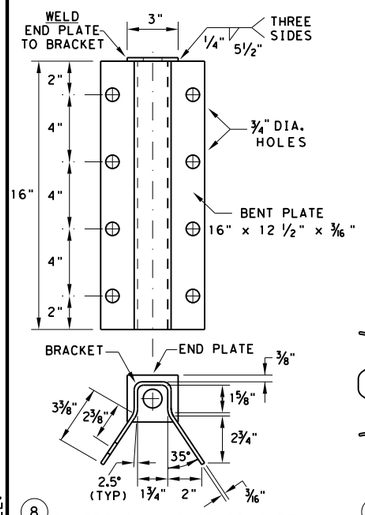
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(DAT) PARTS LIST	QTY
(1)	STEEL FOUNDATION TUBE	2
(2)	DAT TERMINAL POST	2
(3)	CHANNEL STRUT	2
(4)	TERMINAL RAIL ELEMENT	1
(5)	SHELF ANGLE BRACKET	1
(6)	BCT BEARING PLATE	1
(7)	BCT POST SLEEVE	1
(8)	GUARDRAIL ANCHOR BRACKET	1
(9)	(ROUNDED) W-BEAM END SECTION	1
(10)	BCT CABLE ANCHOR	1
(11)	RECESSED NUT, GUARDRAIL	20
(12)	1 1/4" BUTTON HEAD BOLT	4
(13)	10" BUTTON HEAD BOLT	2
(14)	5/8" X 2" HEX HEAD BOLT	8
(15)	5/8" X 8" HEX HEAD BOLT	4
(16)	5/8" X 10" HEX HEAD BOLT	2
(17)	5/8" FLAT WASHER	18

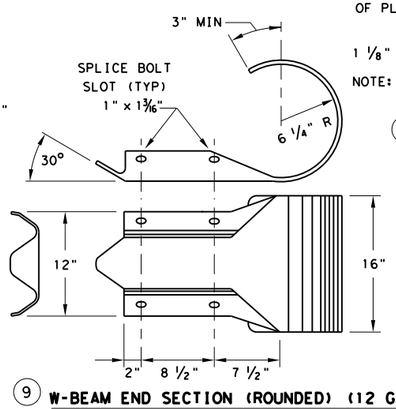
(4) TERMINAL RAIL ELEMENT FOR DAT



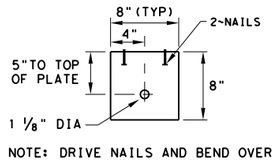
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

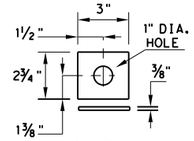


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

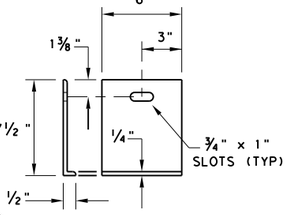


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

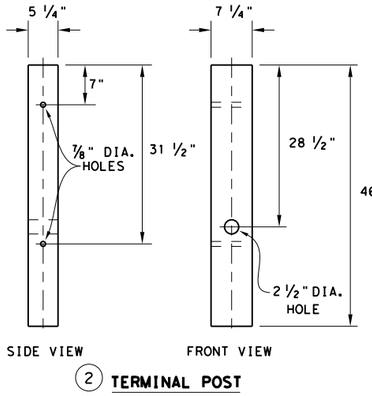
(6) BEARING PLATE
8"x 8"x 5/8" R



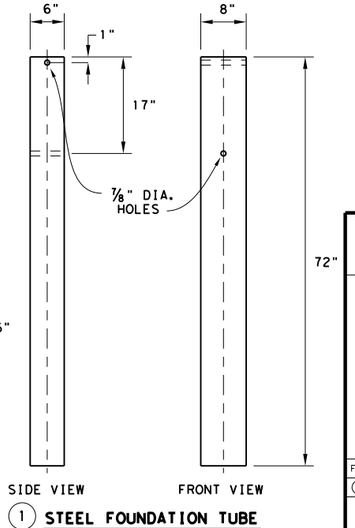
END PLATE



(5) SHELF ANGLE BRACKET



(2) TERMINAL POST
7 1/4"x 5 1/4"x 46" WOOD POST



(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

Texas Department of Transportation — Design Division Standard

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

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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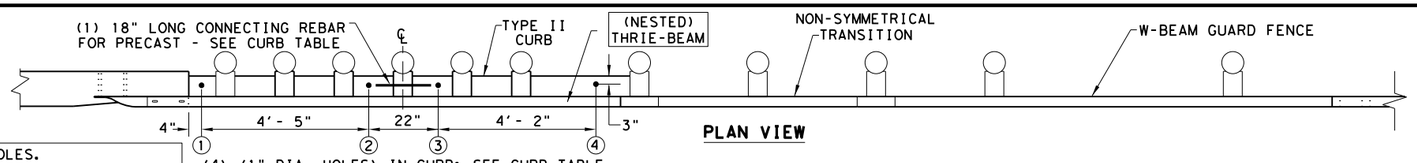


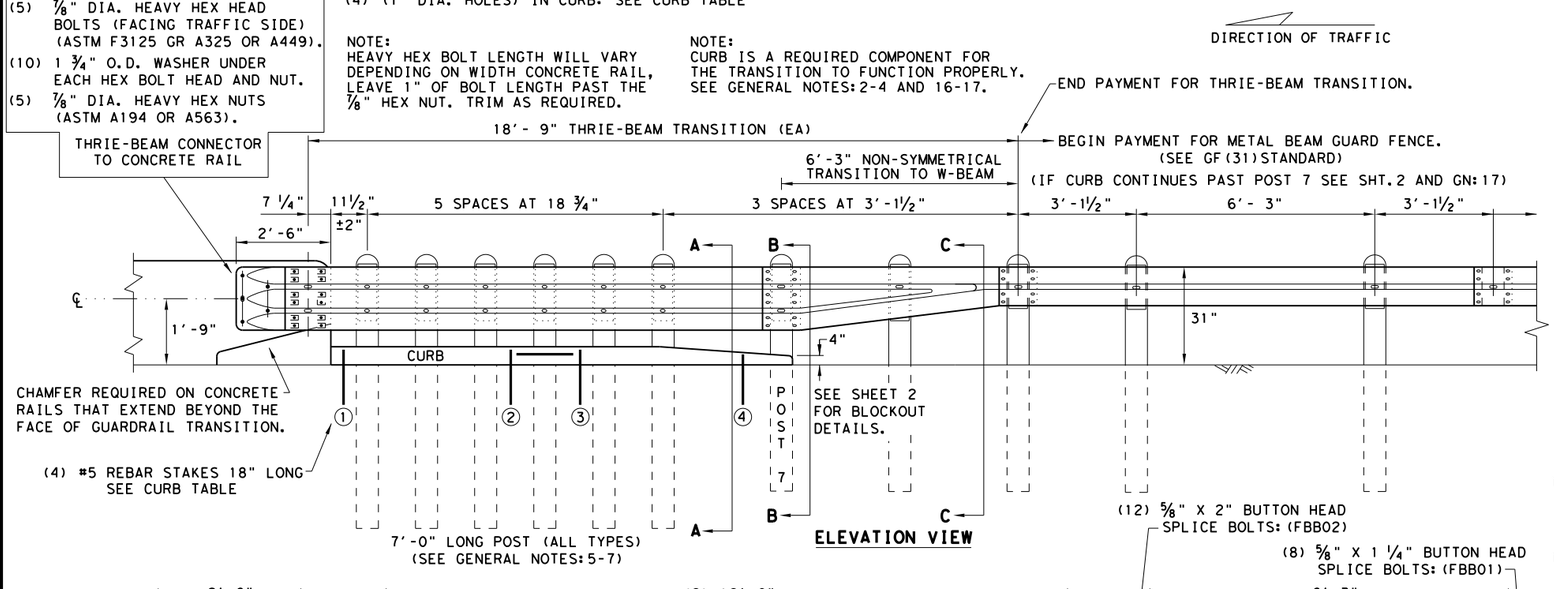
PLAN VIEW

(5) 1" DIA. HOLES.
(5) ⅞" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
(10) 1 ¾" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
(5) ⅞" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

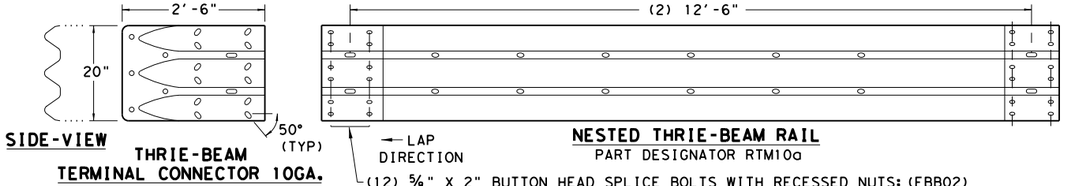
NOTE:
HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE ⅞" HEX NUT. TRIM AS REQUIRED.

NOTE:
CURB IS A REQUIRED COMPONENT FOR THE TRANSITION TO FUNCTION PROPERLY. SEE GENERAL NOTES: 2-4 AND 16-17.

DIRECTION OF TRAFFIC



ELEVATION VIEW



SIDE-VIEW

THRIE-BEAM TERMINAL CONNECTOR 10GA.
PART DESIGNATOR RTE01b
NOTE: SEE GENERAL NOTE: 9

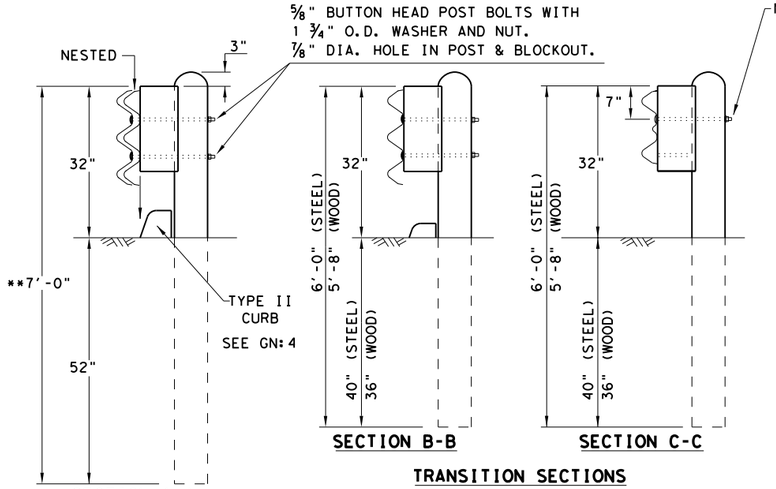
NESTED THRIE-BEAM RAIL
PART DESIGNATOR RTM10a

NON-SYMMETRICAL W-BEAM TO THRIE-BEAM TRANSITION 10GA.
PART DESIGNATOR
RWT02a OR RWT02b

(12) ⅝" X 2" BUTTON HEAD SPLICE BOLTS WITH RECESSED NUTS: (FBB02)
(12) RECTANGULAR GUARDRAIL PLATE WASHERS: (FWR03)

PLATE WASHER INSTRUCTIONS

BRIDGE APPROACH - UPSTREAM: THE NESTED RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



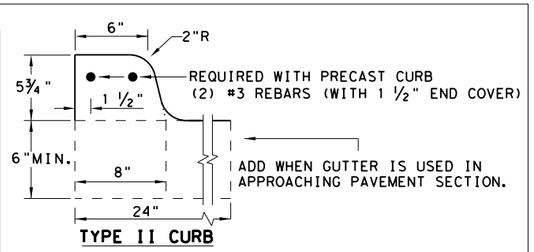
SECTION A-A
SECTION B-B
SECTION C-C

TRANSITION SECTIONS
NOTE: ALL POST TYPES, SEE GENERAL NOTE: 5 & 6

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

THRIE-BEAM TERMINAL - CURB TABLE

PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

NOTE: OPTIONS FOR TYPE II CURB:
1. PRECAST
2. CAST-IN-PLACE

* NOTES: NOT NEEDED FOR CAST-IN-PLACE.
SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS.
PERCUSSION DRILLING IS NOT PERMITTED WITH:
TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.

TYPE II CURB DETAILS

GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- ¾" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST ⅝" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16g) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

Texas Department of Transportation
Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

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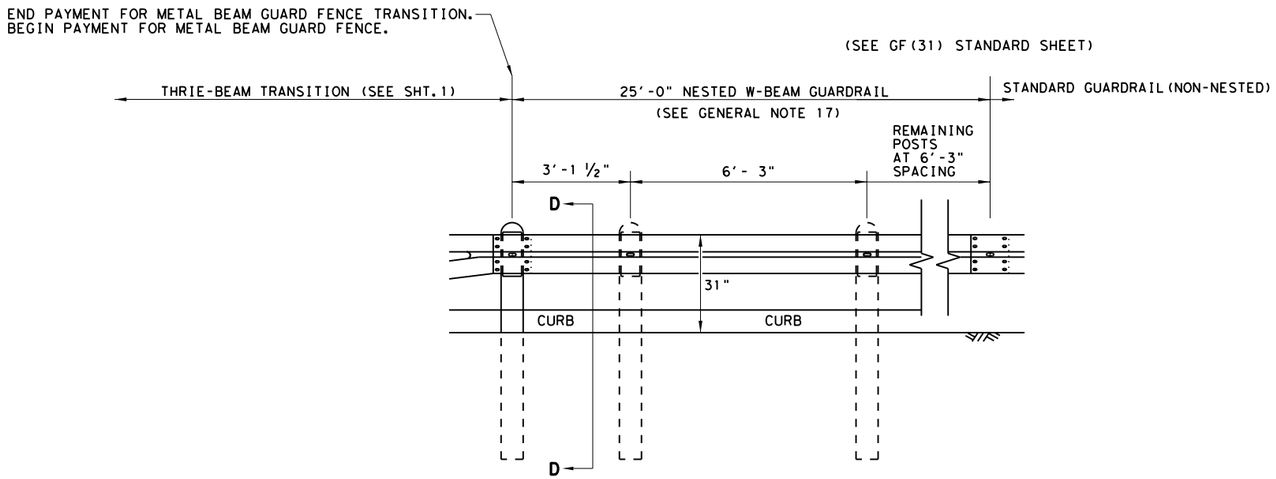
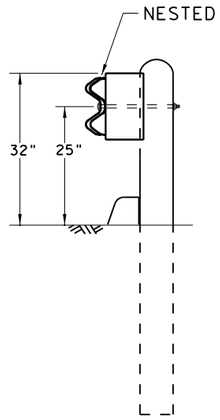
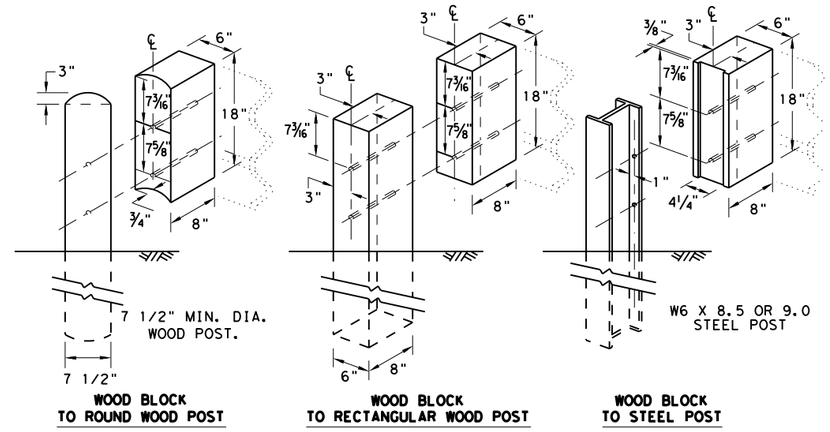
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

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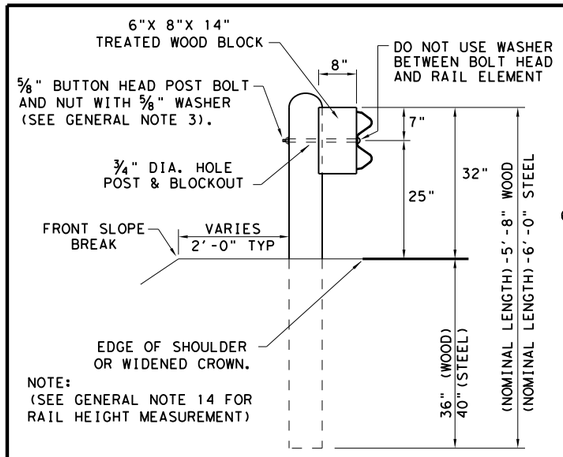
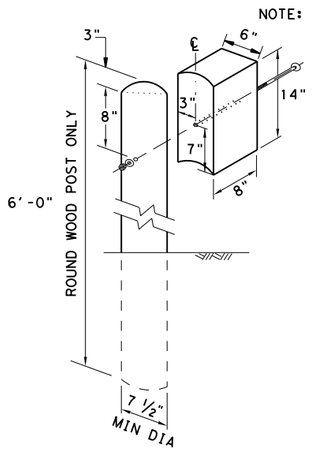
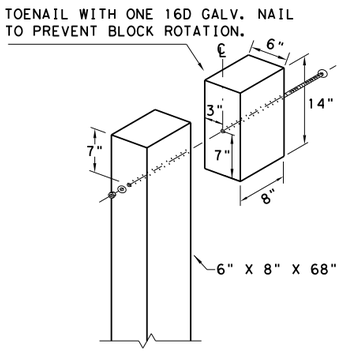


TYPICAL POST PLACEMENT

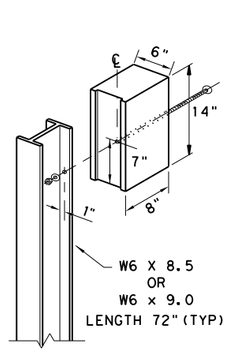


WOOD BLOCK TO ROUND WOOD POST

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

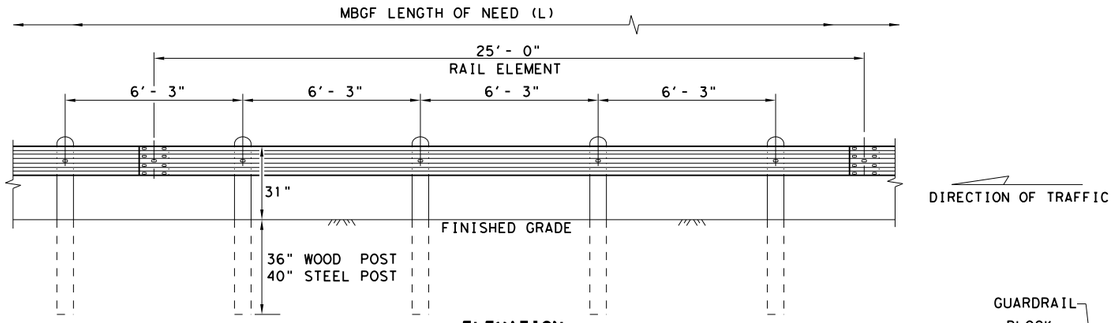


WOOD BLOCK TO RECTANGULAR WOOD POST



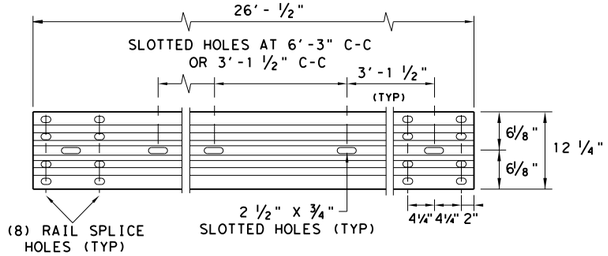
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION MID-SPAN RAIL SPLICE

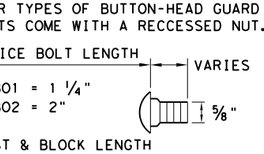
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

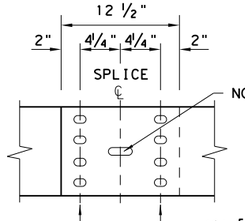
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.



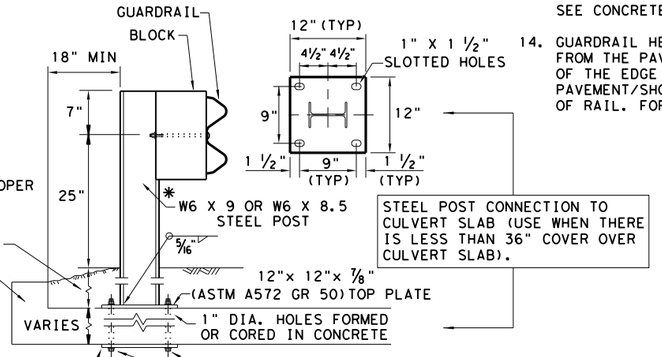
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



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

STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.

NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

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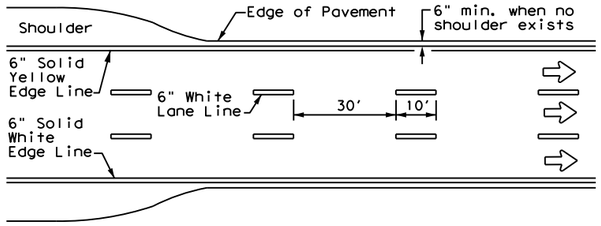
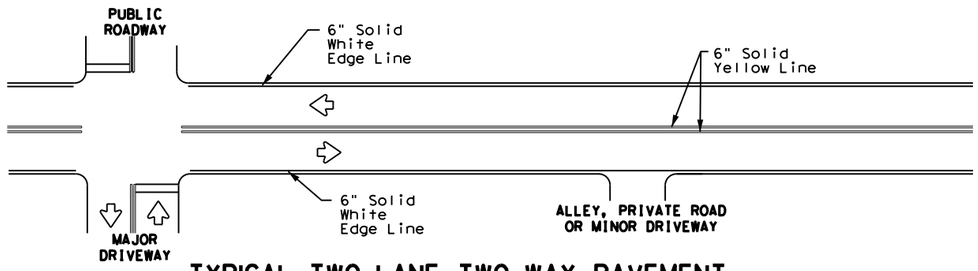
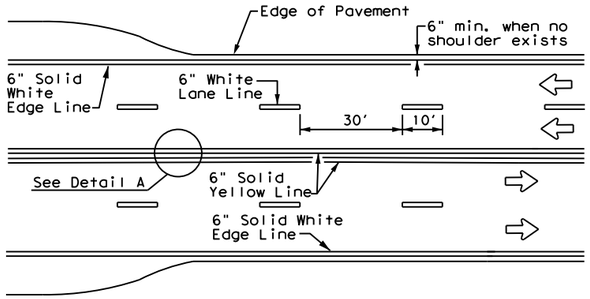
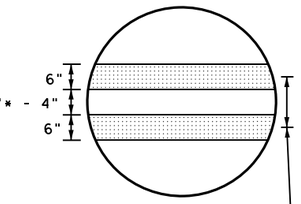


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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

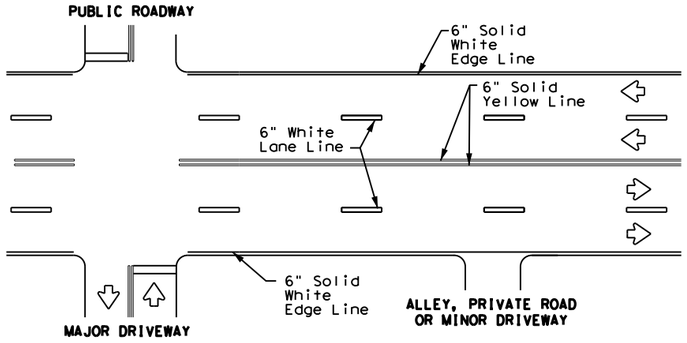




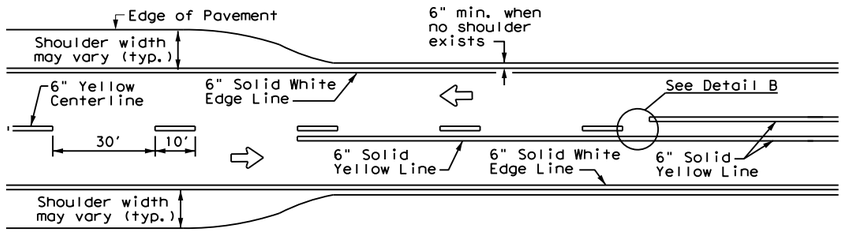
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

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

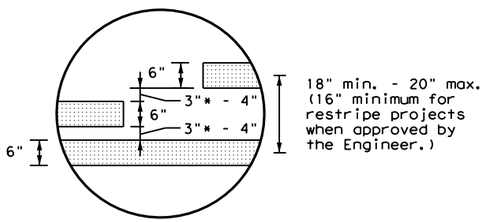
** 8" minimum for restripe projects when approved by the Engineer.



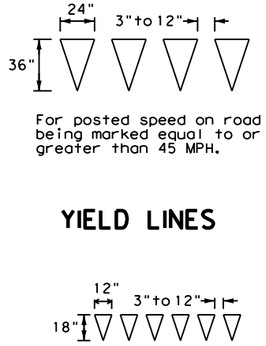
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

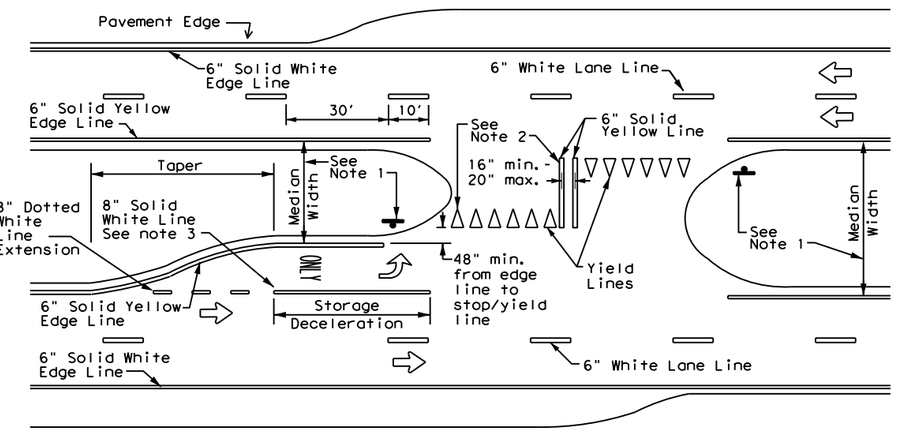


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

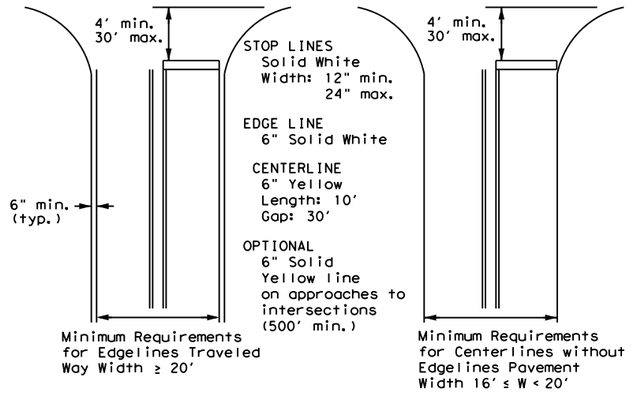
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections.
   Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

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

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



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
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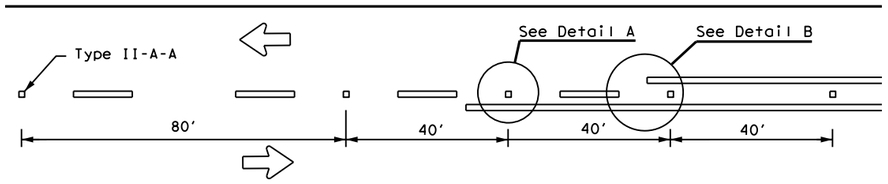
REVISIONS	0004	07	138	IH-20
11-78 8-00 6-20	DIST	COUNTY		SHEET NO.
8-95 3-03 12-22	ODA	ECTOR		89
5-00 2-12				

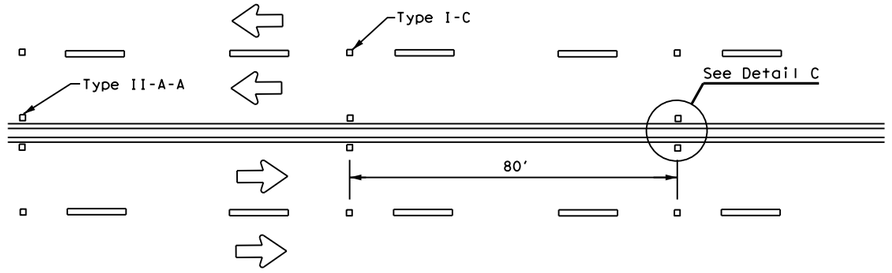
22A

DATE:
FILE:

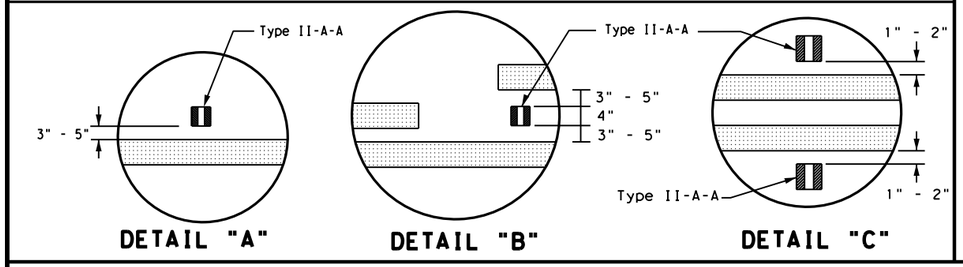
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

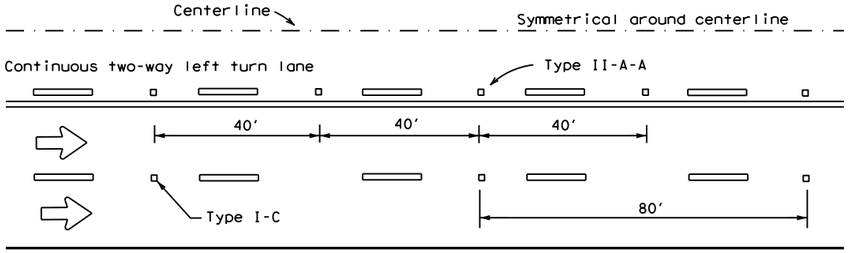


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

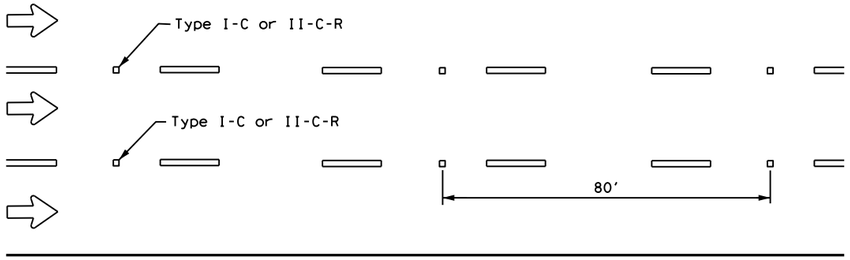


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





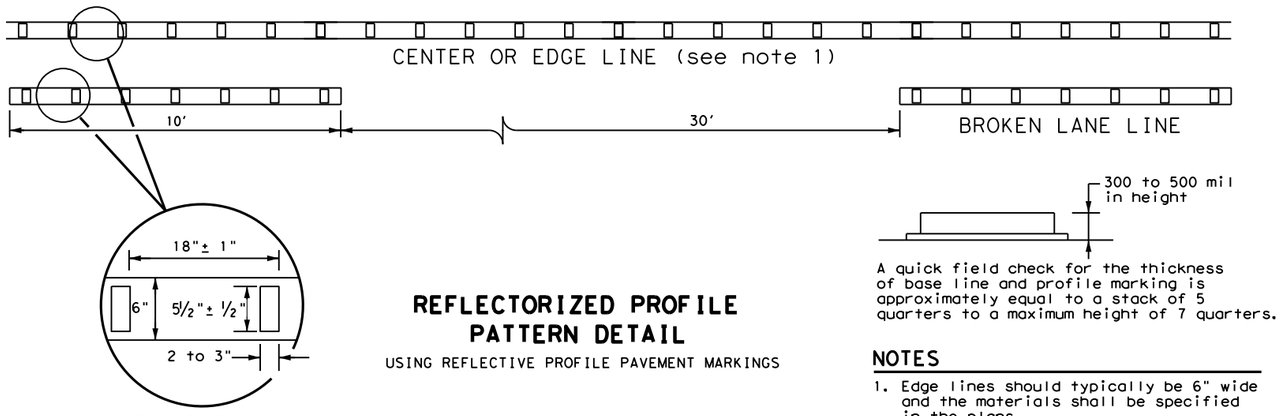
CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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

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

See Note 3.



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

NOTES

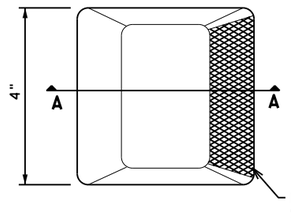
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

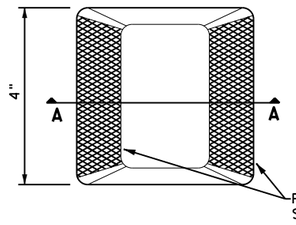
1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

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

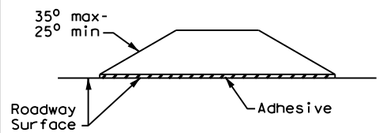
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

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

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	0004	07	138	IH-20
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		90

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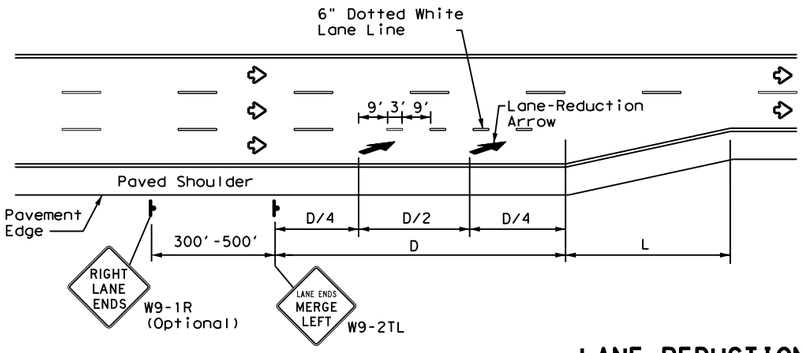


LANE REDUCTION

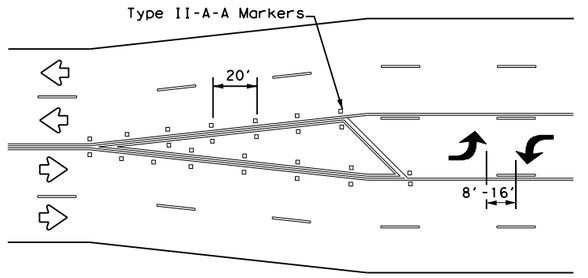
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

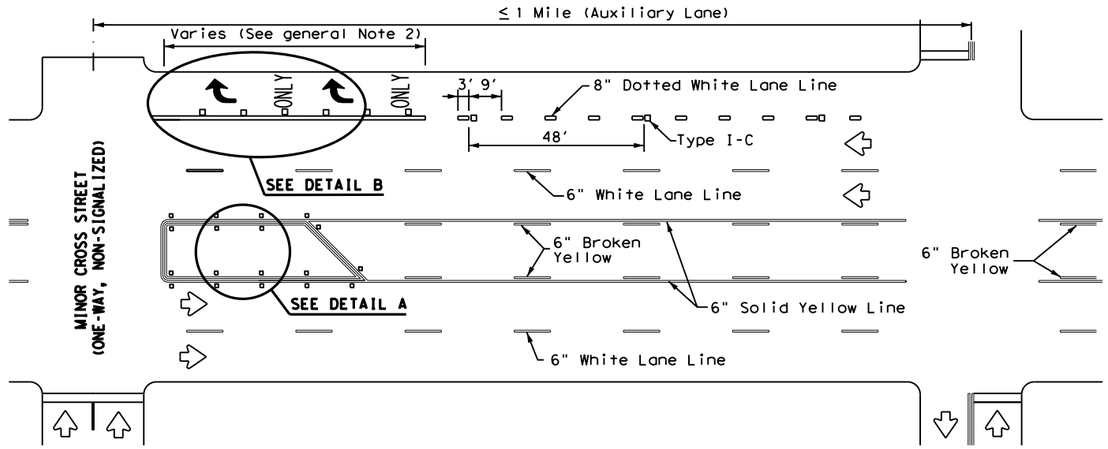


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

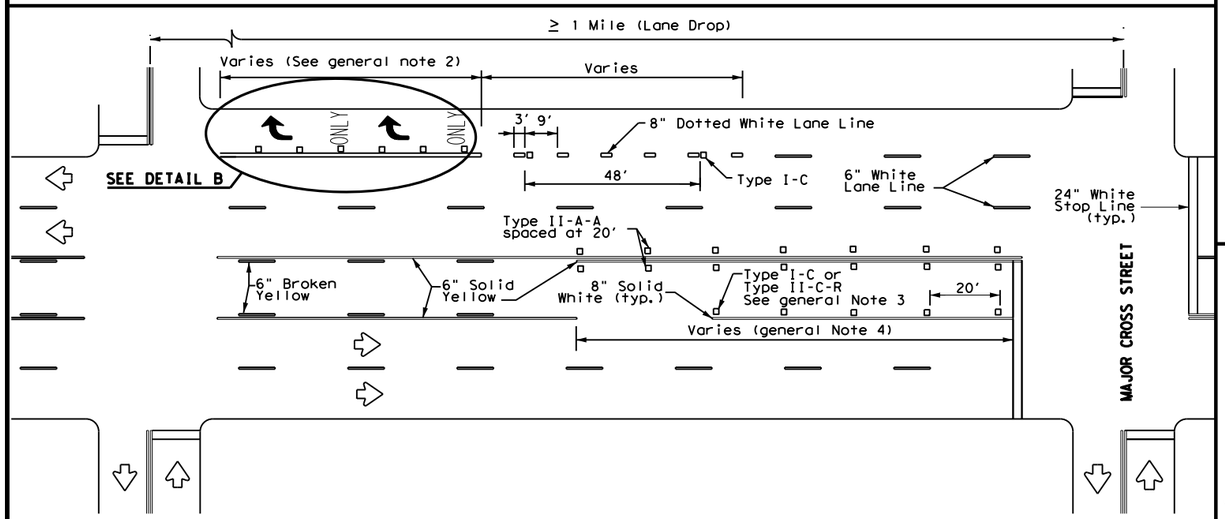
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

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

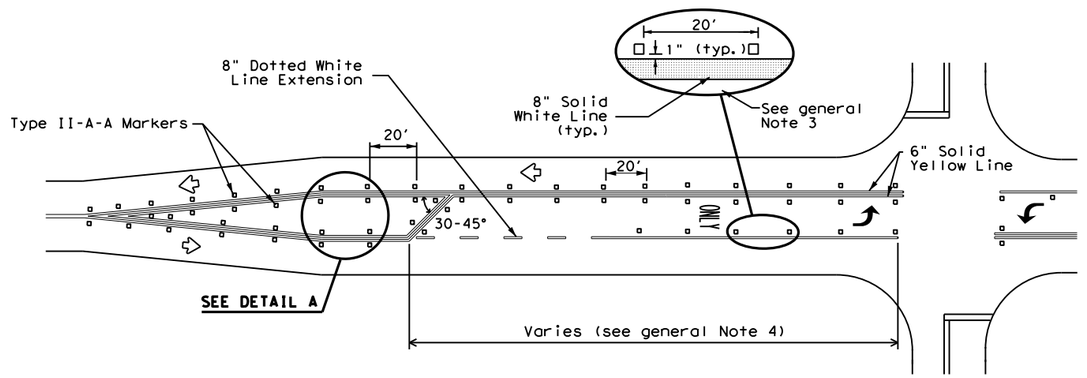
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



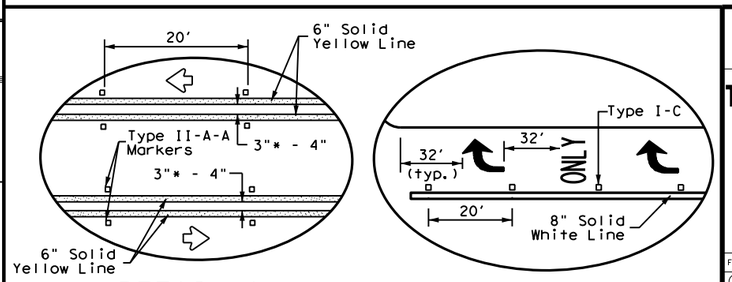
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



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

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
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REVISIONS 4-98 3-03 6-20	0004	07	138	IH-20
5-00 2-10 12-22	DIST	COUNTY		SHEET NO.
8-00 2-12	ODA	ECTOR		91

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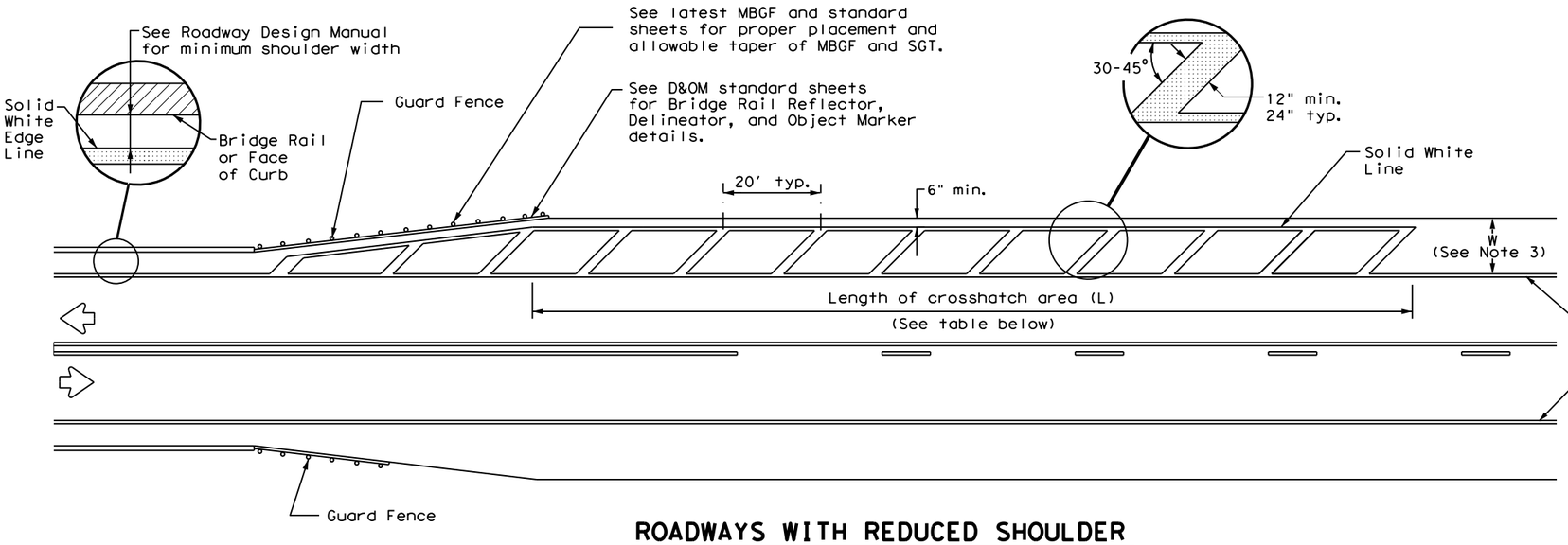

ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT

CROSSHATCH LENGTH (L)	
Posted Speed (MPH)	L (ft)
30	300 ft
35	
40	
45	
50	500 ft
55	
60	
65	
70	
75	

NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 4 inches from the bridge rail or face of curb or 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions.
2. No-passing zone on bridge approach is optional. If used, the no-passing zone shall be a minimum 500 feet long from the beginning of the bridge.
3. The crosshatching should be required if the shoulder width in advance of the bridge is 4 feet or wider and a reduction of at least 3 feet in shoulder width across the bridge occurs.
4. On divided highways, review both the right and left shoulder widths for the need for narrow bridge pavement markings.

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

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

Texas Department of Transportation

Traffic Safety Division Standard

PAVEMENT MARKINGS FOR ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT

PM(5)-22

FILE: pm5-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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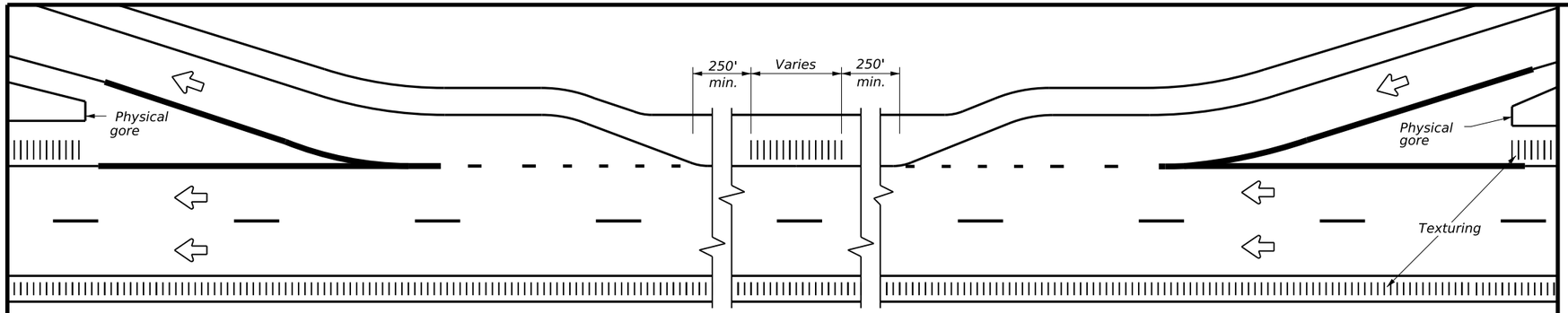
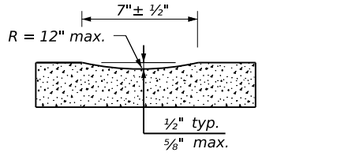
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		92

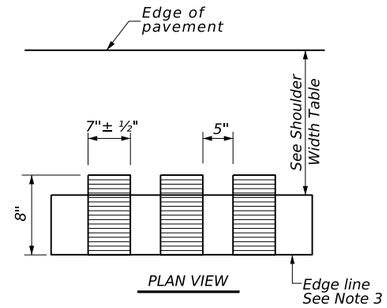
22E



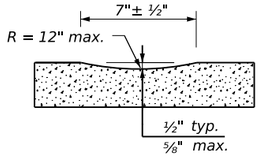
TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS



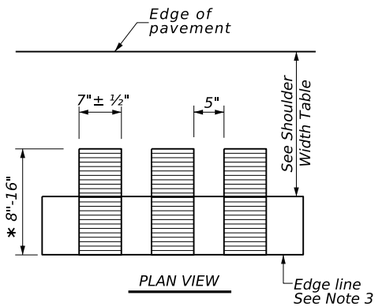
PROFILE VIEW
OPTION 1



CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

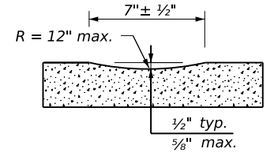


PROFILE VIEW
OPTION 2

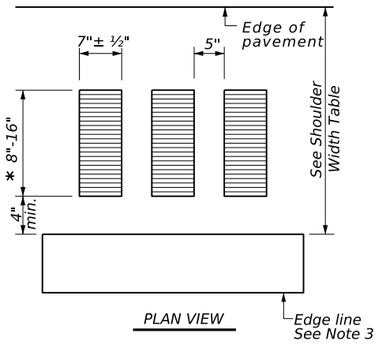


* This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

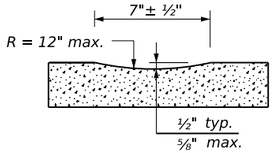


PROFILE VIEW
OPTION 3

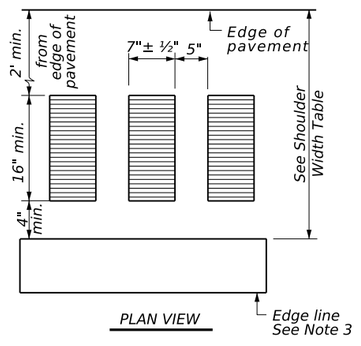


* This distance may vary based on width of shoulder

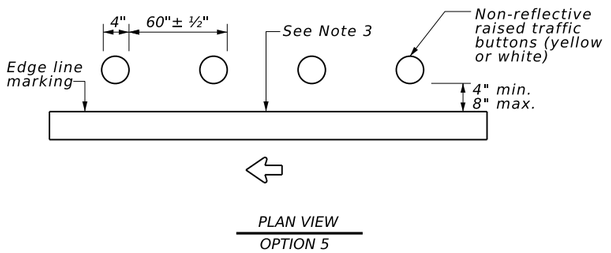
CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PROFILE VIEW
OPTION 4

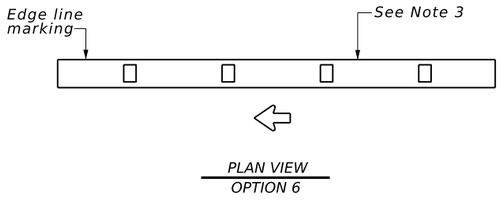


CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGE LINE
(Rumble Strips)



PLAN VIEW
OPTION 6

PROFILE EDGE LINE MARKINGS
(Rumble Strips)

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use standard sheets PM(2) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edge line rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble stripe.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines may substitute for buttons.

SHOULDER WIDTH TABLE

EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5, or 6	Option 1, 2, 3, 5, or 6	Option 2, 4, 5, or 6

Texas Department of Transportation

Traffic Safety Division Standard

EDGE LINE RUMBLE STRIPS ON FREEWAYS AND DIVIDED HIGHWAYS RS(1)-23

FILE: rs(1)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0004	07	138	IH-20
4-06 1-23	DIST	COUNTY		SHEET NO.
2-10	ODA	ECTOR		93
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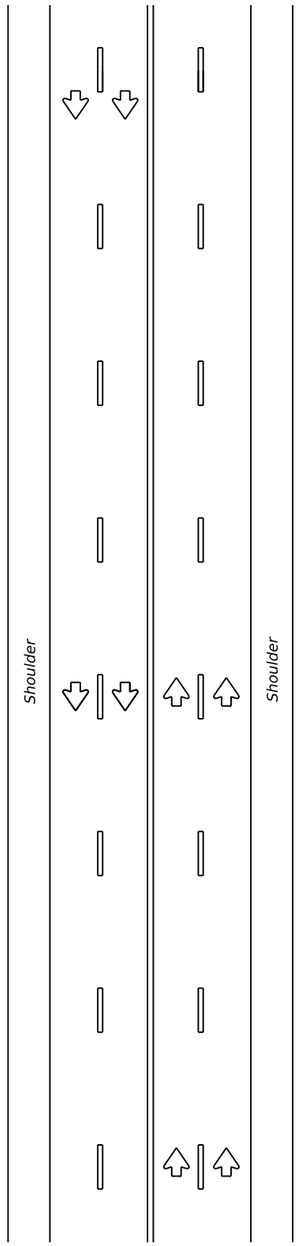
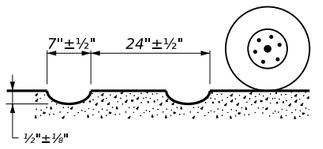
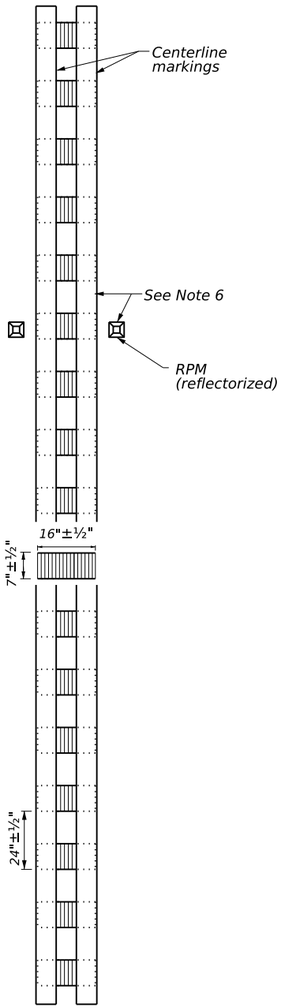
CENTERLINE RUMBLE STRIPS



MULTILANE UNDIVIDED HIGHWAY WITH SHOULDER

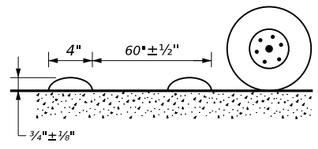


PROFILE VIEW

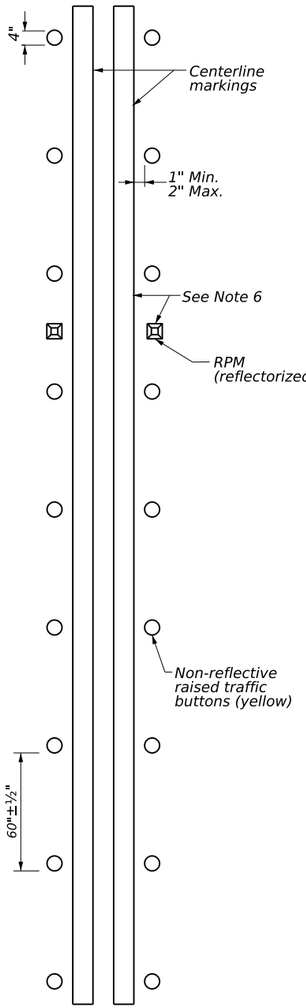


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

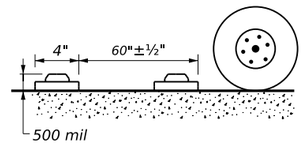


PROFILE VIEW

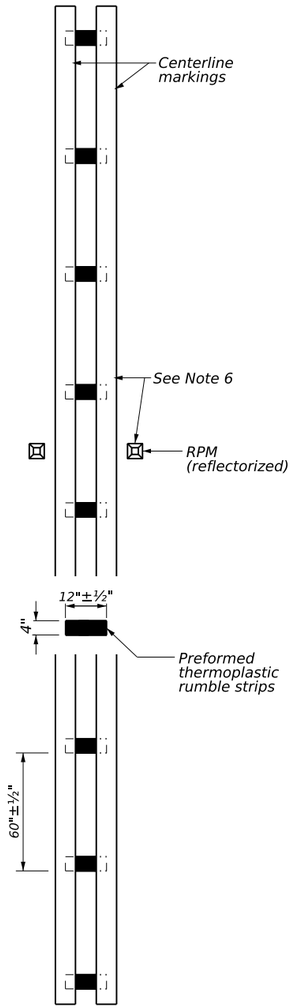


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

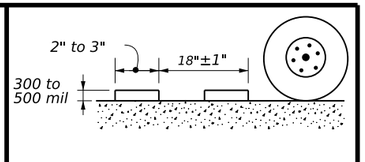


PROFILE VIEW

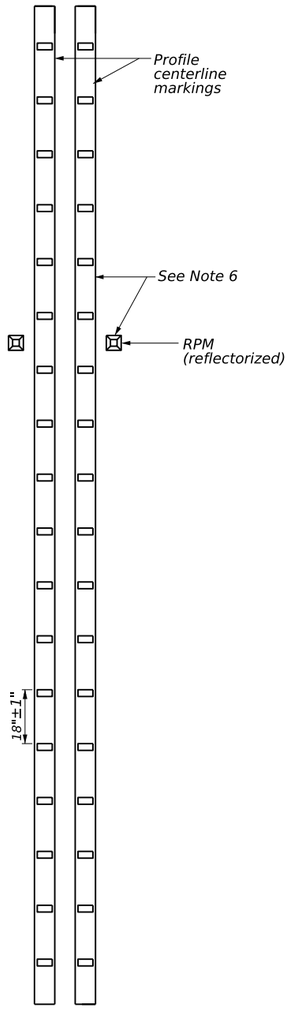


PLAN VIEW
OPTION 3

PREFORMED THERMOPLASTIC RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on multilane undivided highways.
2. Centerline and edge line rumble strips or profile markings shall not be placedon roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may beused if approved by the Traffic Safety Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and nomore than 150 feet in advance of bridges, railroad crossing, intersections ordriveways with high usage of large trucks.
6. Use standard sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips for normal centerline spacing. For wider medians, specify in the plans the exact placement of the rumble strips. Place the rumble strips under each centerline marking or centered in the middle of the median.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The color of the button should be yellow for a continuous no passing roadway. The button will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING EDGE LINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

12. See standard sheet RS(2).

Texas Department of Transportation

Traffic Safety Division Standard

CENTERLINE RUMBLE STRIPS ON MULTILANE UNDIVIDED HIGHWAYS RS(3)-23

FILE: rs(3)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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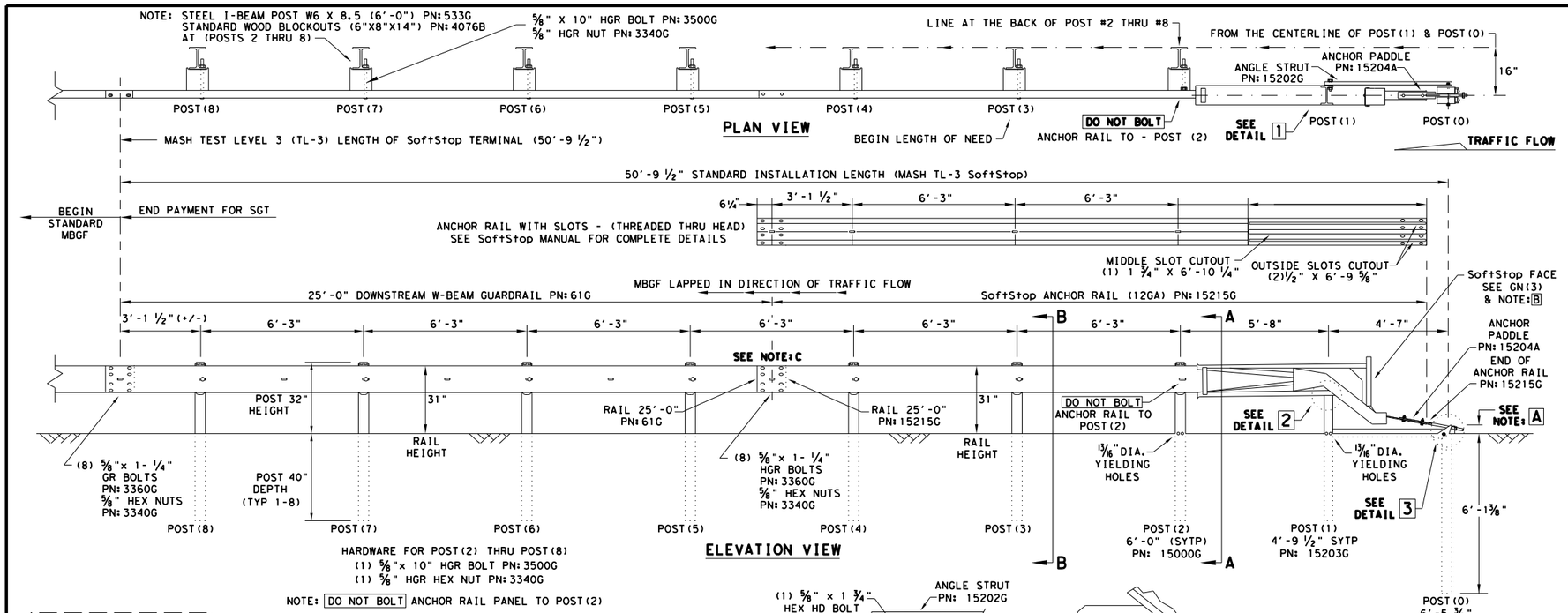
REVISIONS	0004	07	138	IH-20
10-13 1-23	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		94



GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY AT 1(888)323-6374. 2525 N. STEMMONS FREEWAY, DALLAS, TX 75207
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN: 620237B
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
7. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
8. POSTS SHALL NOT BE SET IN CONCRETE.
9. IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
10. DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.

NOTE: A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-3/4" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE: C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 7/8")
15203G	1	POST #1 - (SYTP) (4'- 9 1/2")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 1/2" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (1/2" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR. DH
3717G	2	3/4" x 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR. DH
3360G	16	5/8" x 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	5/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	5/8" x 10" HGR POST BOLT A307
3391G	1	5/8" x 1 3/4" HEX HD BOLT A325
4489G	1	5/8" x 9" HEX HD BOLT A325
4372G	4	5/8" WASHER F436
105285G	2	5/8" x 2 1/2" HEX HD BOLT GR-5
105286G	1	5/8" x 1 1/2" HEX HD BOLT GR-5
3240G	6	5/8" ROUND WASHER (WIDE)
3245G	3	5/8" HEX NUT A563 GR. DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SoftStop END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT(10S)31-16

FILE: sgt10s3116		DN: TxDOT		CK: KM	DW: VP		CK: MB/VP
© TxDOT: JULY 2016		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0004	07	138		IH-20	
		DIST		COUNTY			SHEET NO.
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(SEE GN NOTE 15)
STANDARD 31" MBGF

ITEM (6)
INNER SIDE SLIDER
(ISS) PANEL FOR RAIL 3

FIELD-SIDE
(RAIL 3)

NOTE:
RECESSED HEX NUTS FACING
TRAFFIC-SIDE **SEE DETAIL (C)**

REFERENCE LINE USED TO INSTALL
LINE POST(9) THRU POST(2)

POST 1 OFFSET DISTANCE MEASURED
7-⅝" FROM REFERENCE LINE

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2

RAIL 4 | RAIL 3 | RAIL 2 | RAIL 1

CABLES

ITEM (5)
TRAFFIC SIDE SLIDER
(TSS) PANEL FOR RAIL 2

NOTE: SECURE THE (TSS) PANEL TO OUTSIDE
OF RAIL 2 WITH THE PANEL ARROWS
POINTING TOWARDS THE HEAD.

NOTES:
1. ITEM (12) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

PLAN VIEW

MBGF RAIL 2 | INSTALL GUARD FENCE RECESSED HEX NUTS ON TRAFFIC-SIDE | MBGF RAIL 1

DETAIL (C)

TRAFFIC FLOW

ITEM (25)
MAX-TENSION HEAD
SEE DETAIL (A)

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- ½"

49'-8 9/16"

6'-3" | 6'-3" | 6'-3" | 6'- ¾" | 6'-3" | 6'-3" | 6'-3" | 37 ½" | 5'-3 11/16"

RAIL HEIGHT 31"

ARROWS

HEAD HEIGHT 32-¼"

ITEM (13) RAIL 4 | ITEM (13) RAIL 3 | ITEM (13) RAIL 2 | ITEM (13) RAIL 1

DETAIL (D)

DETAIL (B)

CABLES

FINISHED GRADE

ITEM (10)
CABLE
ASSEMBLY

ITEM (2)
GROUNDSTRUT

68-⅛"

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2 | POST 1
ITEM (4)
I-BEAM
W6 X 9
NO BLOCKOUT
AT (POST 1)

(8) X-LITE LINE POST - ITEM (11)

ELEVATION VIEW

**SOIL
ANCHOR POST**
ITEM (1)

A

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

INSTALL THE TSS AND RSS
WITH THE ARROWS POINTING
TOWARDS THE MAX-HEAD

TSS PANEL AND RSS PLATE
DETAIL (D)

HEAD HEIGHT 32-¼"

TOP OF POST

31-⅞"

FINISHED GRADE

40-⅛"

68-⅛"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

ITEM (11)
LINE POSTS
2 THRU 9
(NOTE: ITEM (4) POST 1 (NOT SHOWN),
TO BE INSTALLED AT SAME DEPTH
AS LINE POSTS.)

**SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9**

SECTION VIEW A-A

NOTE:
USE THE MASH APPROVED
X-TENSION CABLE ASSEMBLY.

7 5/16"

2 ⅛"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

NOTE:
INSTALL ⅝" RECESSED HEX
NUTS ON TRAFFIC SIDE.

ITEM (24)

ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

(RAIL 1)

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN
ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

* TO BE PROVIDED BY DISTRIBUTOR
OR CONTRACTOR.

** ALTERNATIVE ITEMS NOT SHOWN.
ITEM(26) 8" WOOD-BLOCKOUTS
ITEM(27) 25'GUARD FENCE PANELS

APPROX 5'-10" | 5'-0" | 50' APPROACH GRADING

STANDARD
MBGF

2'-0"

EDGE OF PAVEMENT

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX.
RAIL OFFSET

APPROACH GRADING
(1V:10H OR FLATTER)
SEE PRODUCT ASSEMBLY MANUAL
FOR ADDITIONAL GUIDANCE.

NOTE: TXDOT GENERIC APPROACH GRADING LAYOUT
USED FOR ALL TANGENT TYPE END TREATMENTS.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE MAX-TENSION END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
2. FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE; MAX-TENSION INSTALLATION INSTRUCTION MANUAL. P/N MANMAX REV D (ECN 3516).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURE'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
7. COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST(MPL)FOR CERTIFIED PRODUCERS.
8. REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
9. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
10. POSTS SHALL NOT BE SET IN CONCRETE.
11. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POST TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST.
12. MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
13. IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
14. THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
15. A MINIMUM OF 12'-6" OF 12GA. MBGF IS REQUIRED IMMEDIATELY DOWNSTREAM OF THE MAX-TENSION SYSTEM.

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	⅝" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	¾" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	⅝" X 1 ¼" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	⅝" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	⅝" WASHER F436 STRUCTURAL MGAL	2
20	4001116	⅝" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	⅝" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	¼" X ¾" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
* 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
** 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
** 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

Texas Department of Transportation

Design Division Standard

MAX-TENSION END TERMINAL
MASH - TL-3

SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
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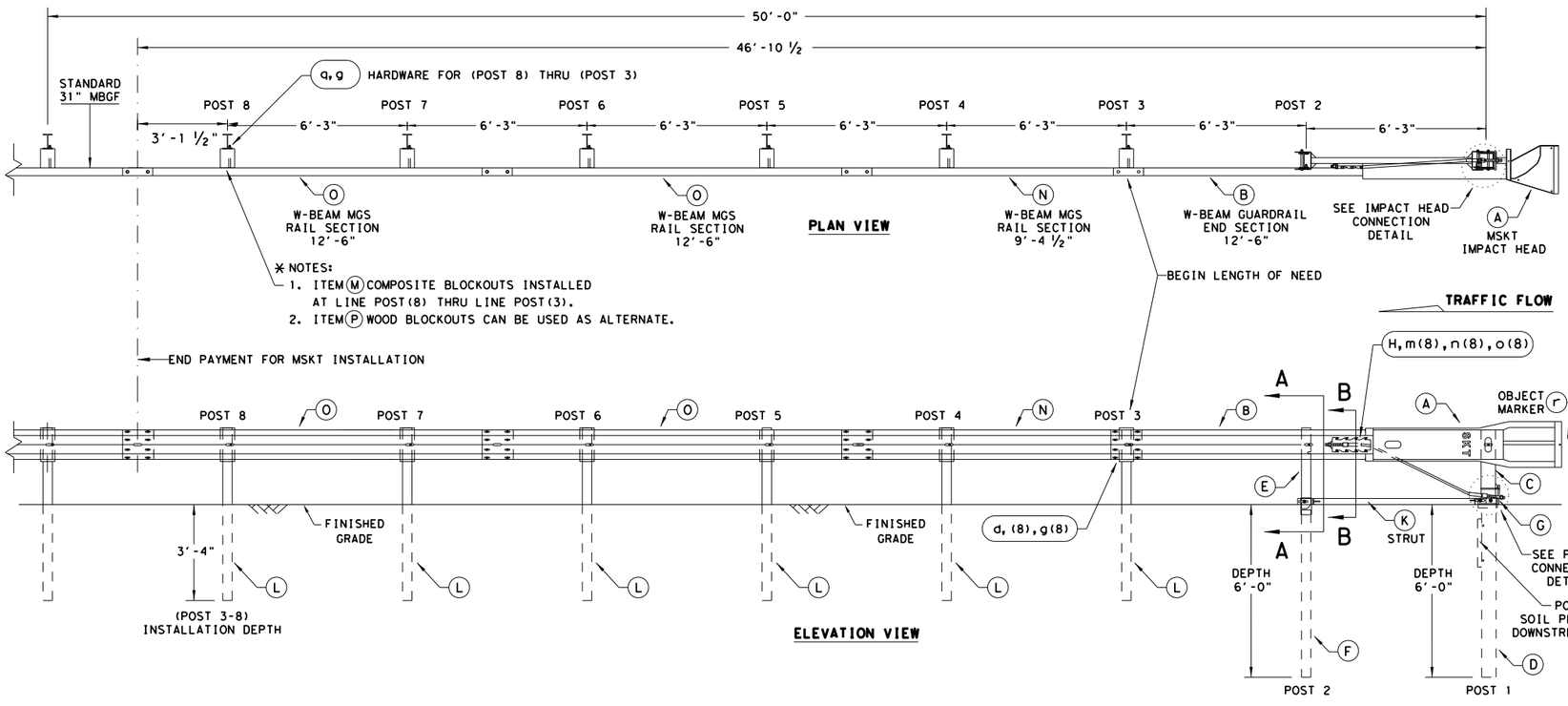
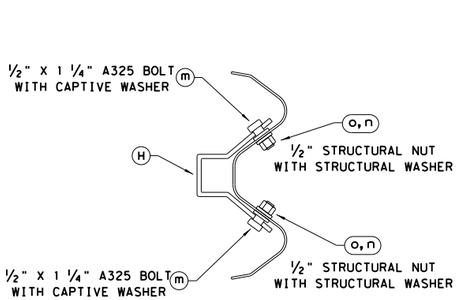
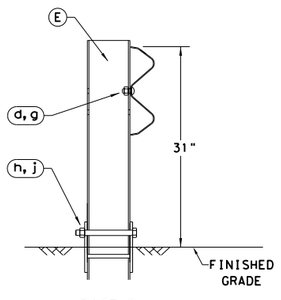
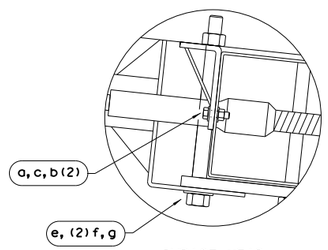
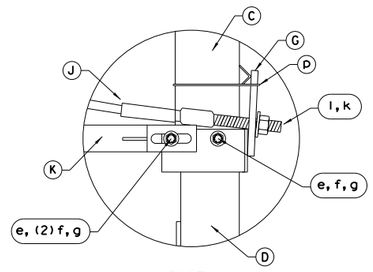


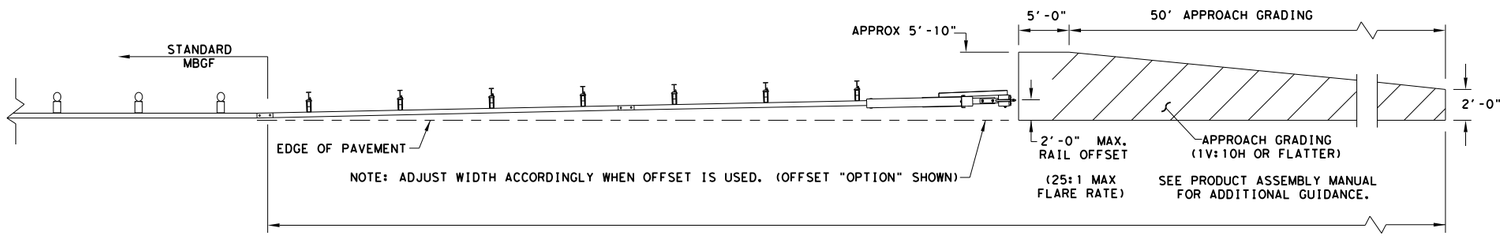
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.











APPROACH GRADING AT GUARDRAIL END TREATMENTS

NOTE: TXDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MSKT END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

GENERAL NOTES

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

SEE NOTES: *

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

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

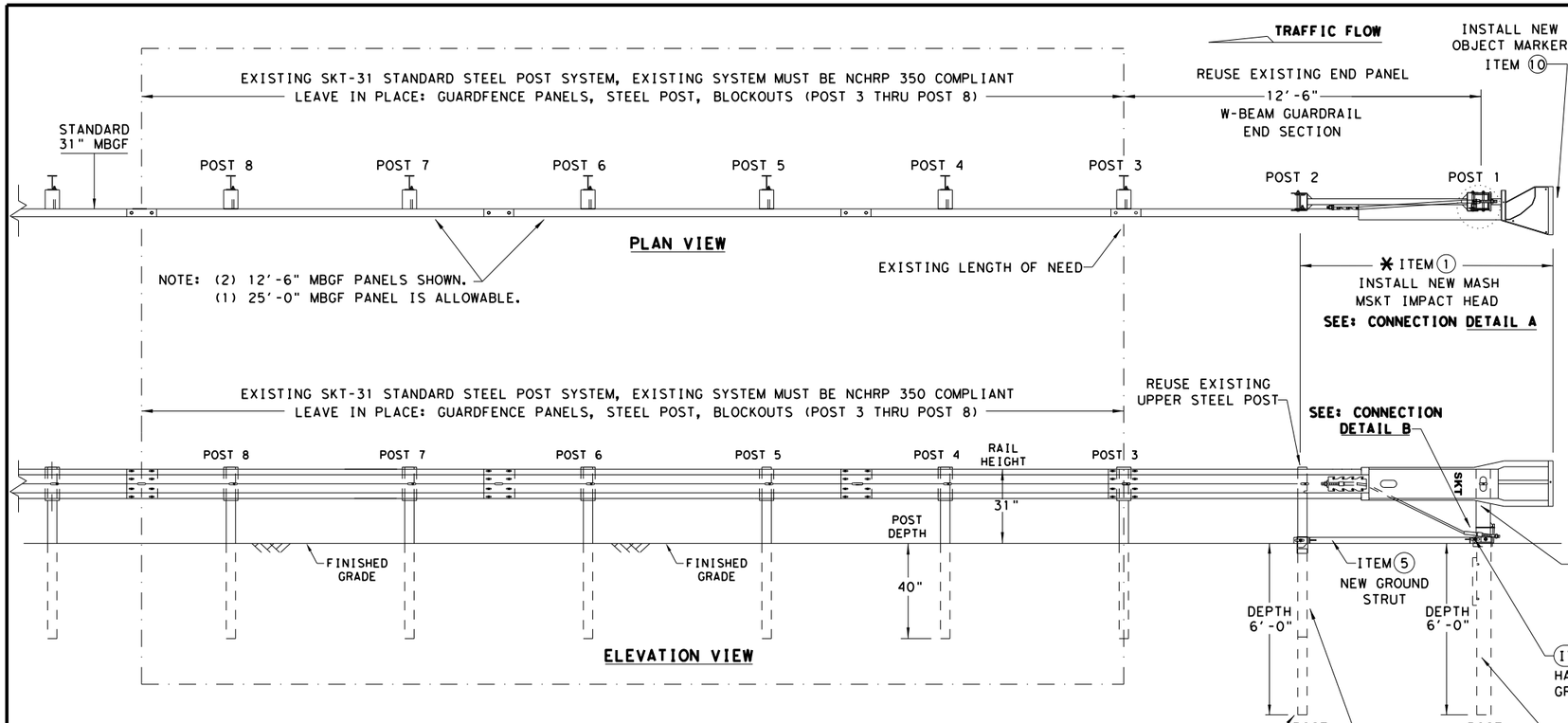
Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0004	07	138	IH-20	
	DIST	COUNTY		SHEET NO.	
	ODA	ECTOR		97	

DATE:
FILE:



GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
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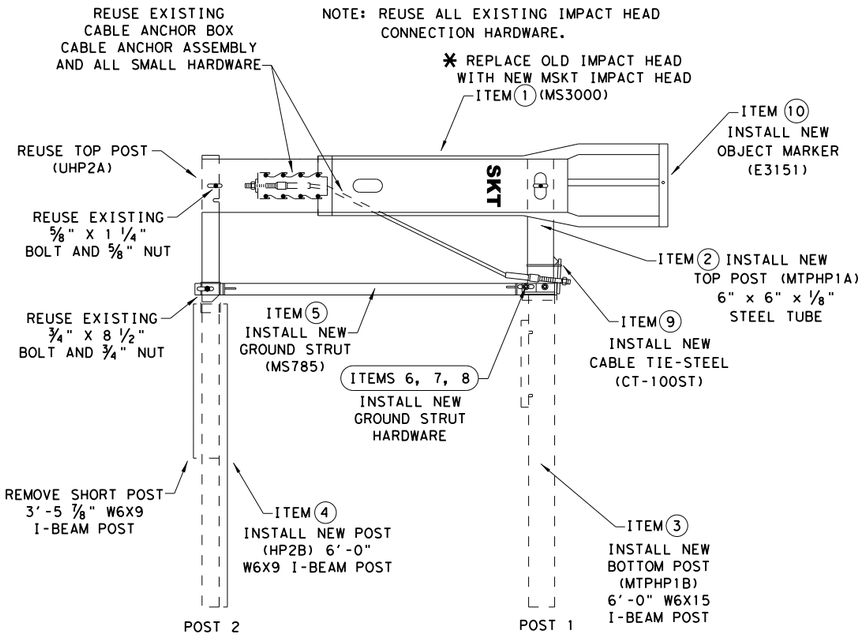
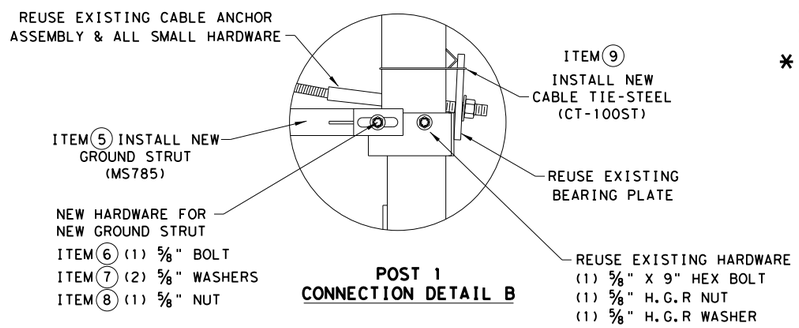
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. THE EXISTING SKT 31" STANDARD STEEL POST SYSTEM MUST BE THOROUGHLY INSPECTED, AND DETERMINED TO BE INTACT, AND FREE OF ANY DAMAGE OR DEFECTS BEFORE RETROFITTING. THIS INSPECTION INCLUDES COMPLETING THE MSKT RETROFIT INSPECTION CHECKLIST FOR THE EXISTING SKT 31" STEEL POST NCHRP 350 SYSTEM. ALL EXISTING, AND REUSABLE PARTS MUST BE FREE OF ANY DAMAGE FOR A MASH COMPLIANT RETROFIT.
9. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
10. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
11. SPECIAL DRIVING CAP TO BE USED WHEN DRIVING (LOWER POSTS 1 & 2) TO PREVENT DAMAGE TO THE WELDED PLATES.



CONNECTION DETAIL A
IMPACT HEAD (POST 1 & POST 2)



POST 1
CONNECTION DETAIL B

ITEMS	QTY	MAIN SYSTEM COMPONENTS	PART NUMBERS
* 1	1	MSKT IMPACT HEAD	MS3000
2	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
3	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
4	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
5	1	GROUND STRUT	MS785
6	1	5/8" X 9" HEX BOLT (GRD A449)	B580904A
7	2	5/8" WASHERS	W050
8	1	5/8" H.G.R NUT	N050
9	1	CABLE TIE-STEEL	CT-100ST
* 10	1	OBJECT MARKER 18" X 18"	E3151

COMPONENTS REQUIRED TO RETROFIT: EXISTING 31" STEEL POST (NCHRP 350 SKT) GUARDRAIL TERMINAL WITH THE NEW 31" (MASH COMPLIANT MSKT IMPACT HEAD).

*** IF THE EXISTING NCHRP 350 (31" STEEL POST SKT) ALREADY HAS THE MSKT IMPACT HEAD THERE IS NO NEED TO REPLACE THE IMPACT HEAD OR OBJECT MARKER AS LONG AS IT IS NOT DAMAGED.**

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE EXISTING; SKT END TERMINAL RETROFITED TO THE MSKT MASH COMPLIANT TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

RETROFIT STANDARD SKT 31" STEEL POST SYSTEM TO MASH MSKT

SGT(13S)31-18

FILE: sgt13s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL
©TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0004	07	138	IH-20
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		98

EXISTING TYPICAL SECTION

DETAIL A-A

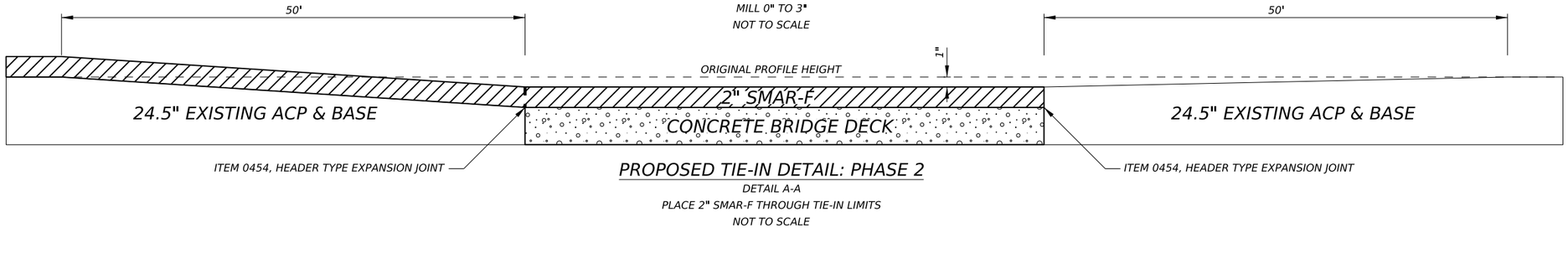
NOT TO SCALE

PROPOSED TIE-IN DETAIL: PHASE 1

DETAIL A-A

MILL 0" TO 3"

NOT TO SCALE

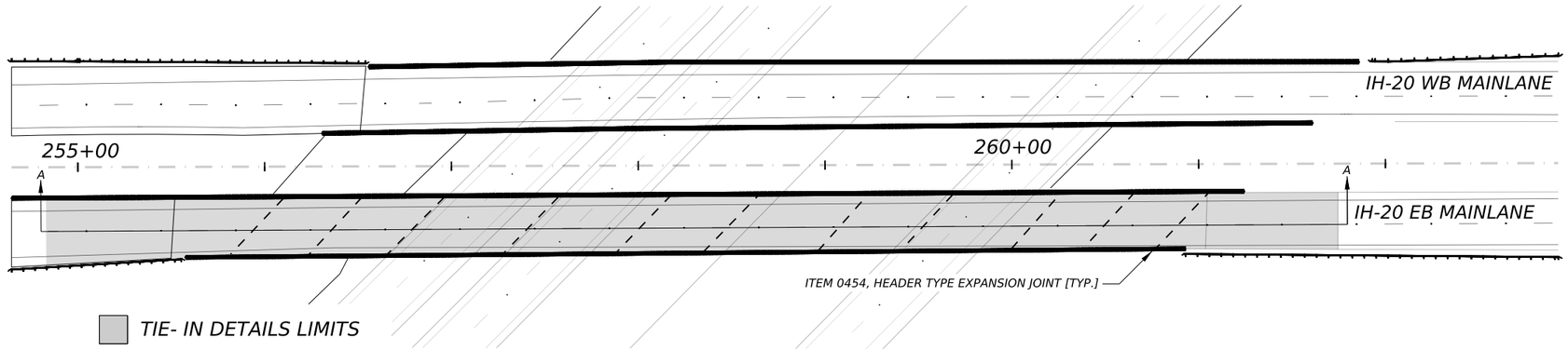


PROPOSED TIE-IN DETAIL: PHASE 2

DETAIL A-A

PLACE 2" SMAR-F THROUGH TIE-IN LIMITS

NOT TO SCALE



STATE OF TEXAS
ADRIANA GEIGER
108603
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PROFESSIONAL ENGINEER

Adriana Geiger, P.E.

11/27/2023

BI-20 BRIDGE EAST BOUND TIE-IN

SHEET 1 OF 4

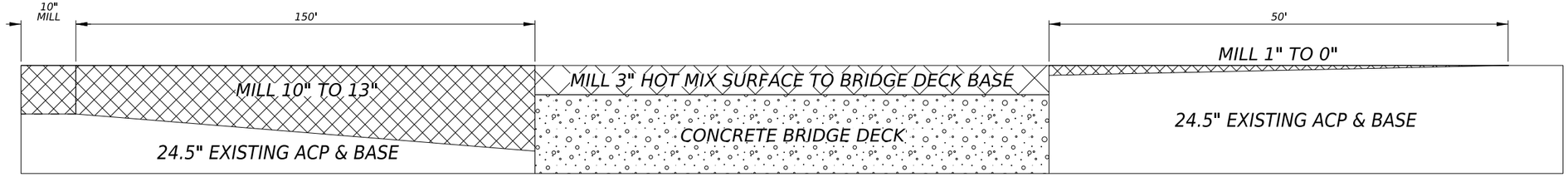
Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		99
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

EXISTING TYPICAL SECTION

DETAIL A-A

NOT TO SCALE



PROPOSED TIE-IN DETAIL: PHASE 1

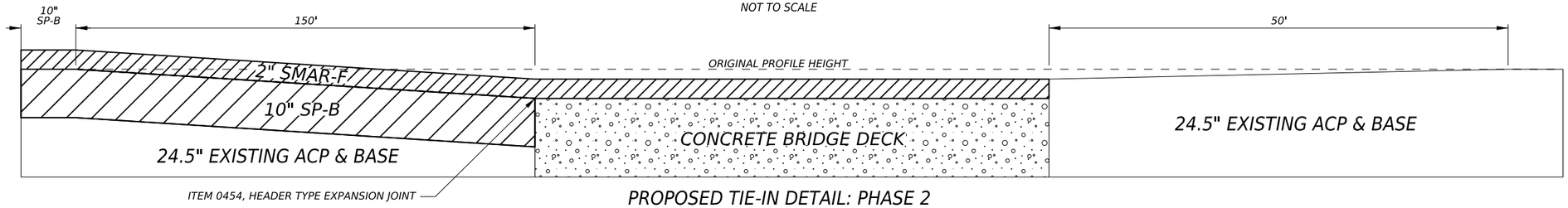
DETAIL A-A

MILL 10" TO 13" LEADING TO BRIDGE DECK

MILL 3" HOT MIX ON BRIDGE DECK

MILL 3" TO 0" PASSING BRIDGE DECK

NOT TO SCALE



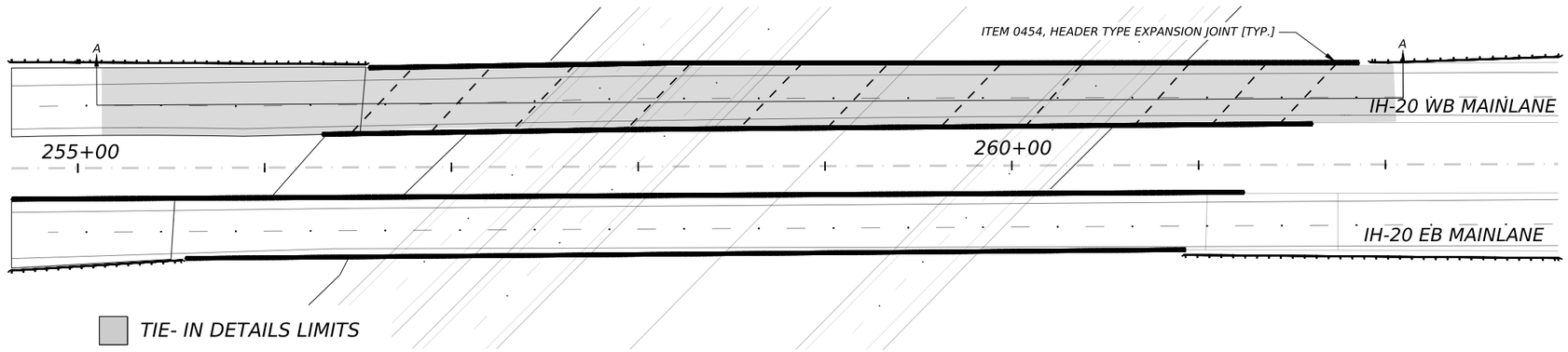
PROPOSED TIE-IN DETAIL: PHASE 2

DETAIL A-A

PLACE 10" SP-B

PLACE 2" SMAR-F

NOT TO SCALE



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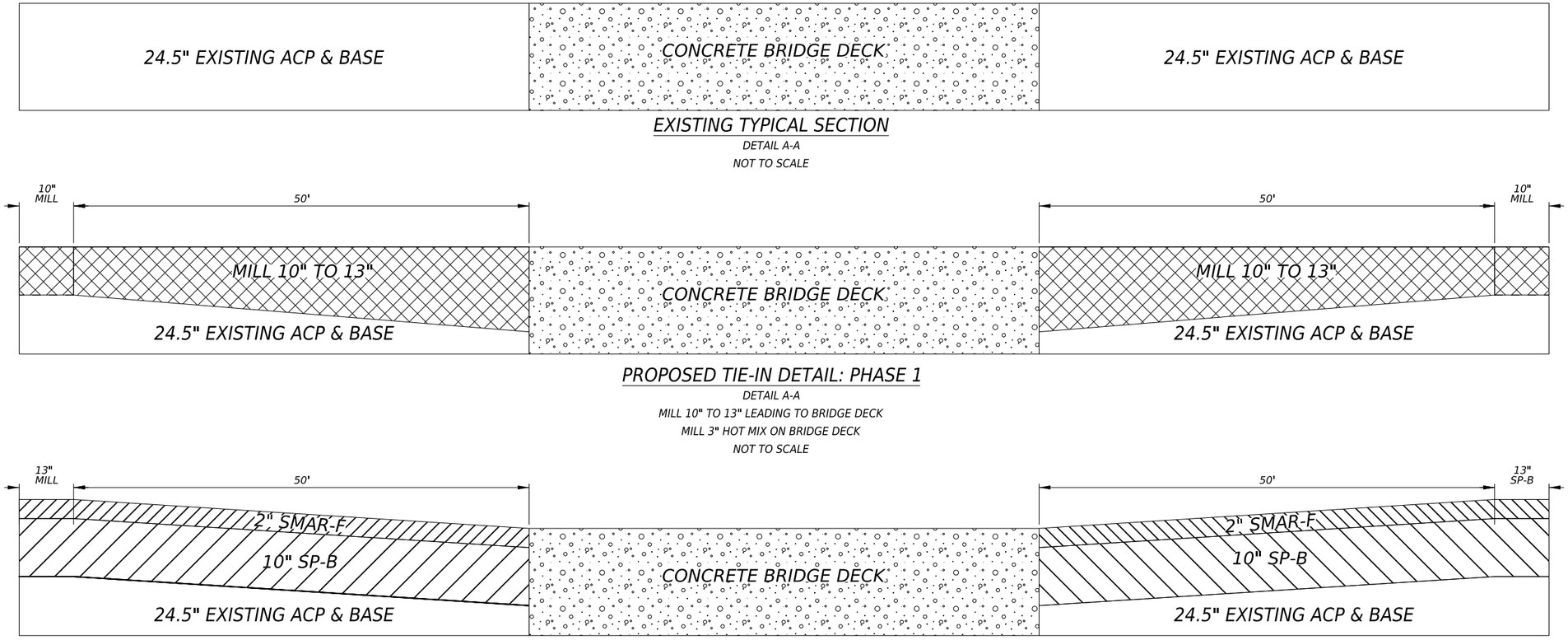
11/27/2023

BI-20 BRIDGE WEST BOUND TIE-IN

SHEET 2 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		100
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20



EXISTING TYPICAL SECTION

DETAIL A-A

NOT TO SCALE

PROPOSED TIE-IN DETAIL: PHASE 1

DETAIL A-A

MILL 10" TO 13" LEADING TO BRIDGE DECK

MILL 3" HOT MIX ON BRIDGE DECK

NOT TO SCALE

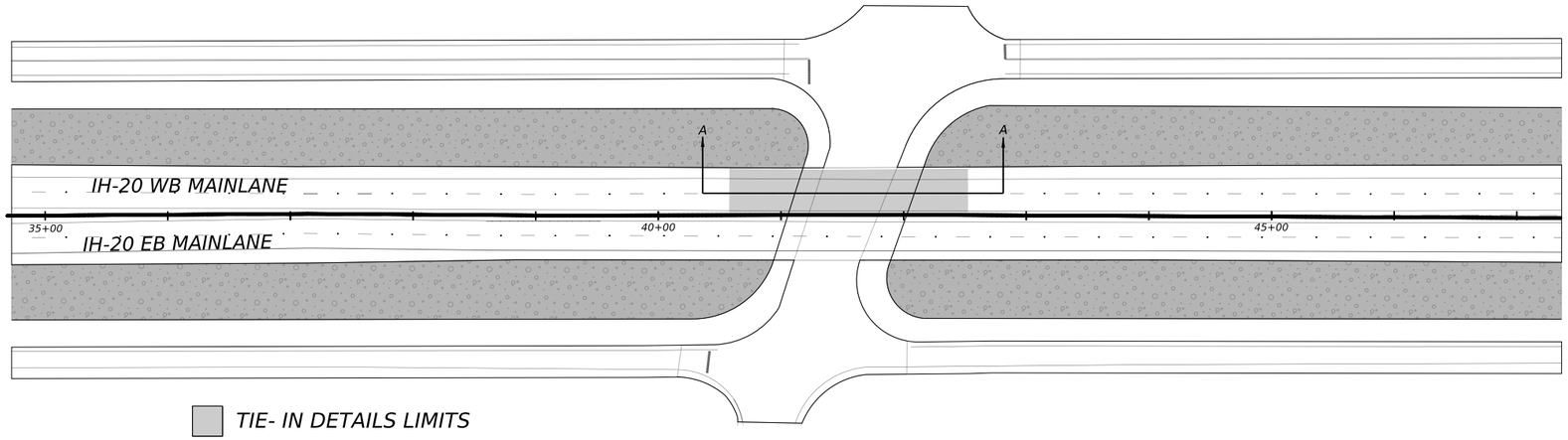
PROPOSED TIE-IN DETAIL: PHASE 2

DETAIL A-A

PLACE 10" SP-B

PLACE 2" SMAR-F

NOT TO SCALE



TIE- IN DETAILS LIMITS

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11/27/2023

MOSS BRIDGE WEST BOUND TIE-IN

SHEET 3 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		101
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

EXISTING TYPICAL SECTION

DETAIL A-A

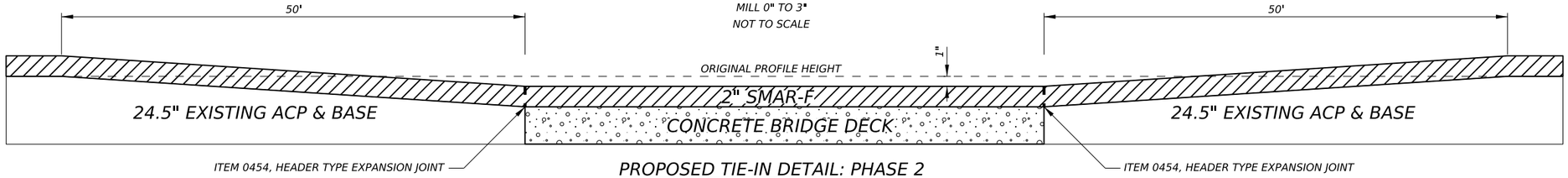
NOT TO SCALE

PROPOSED TIE-IN DETAIL: PHASE 1

DETAIL A-A

MILL 0" TO 3"

NOT TO SCALE

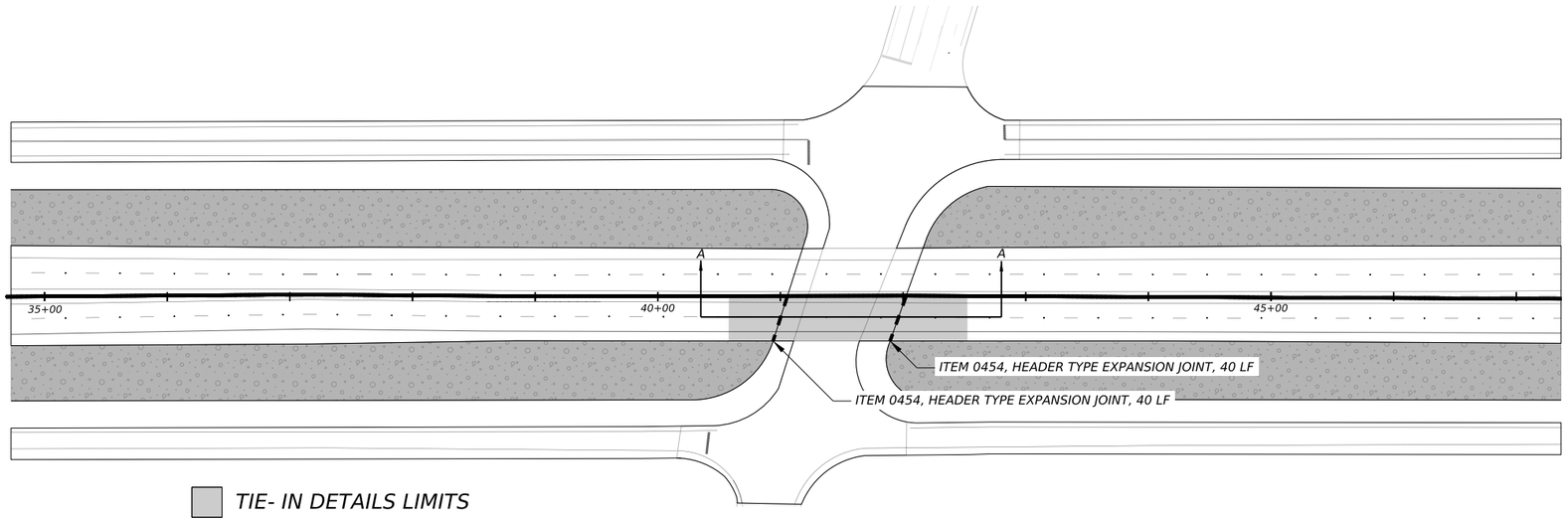


PROPOSED TIE-IN DETAIL: PHASE 2

DETAIL A-A

PLACE 2" SMAR-F THROUGH TIE-IN LIMITS

NOT TO SCALE



Adriana Geiger, P.E.

11/27/2023

MOSS BRIDGE EAST BOUND TIE-IN

SHEET 4 OF 4

Texas Department of Transportation

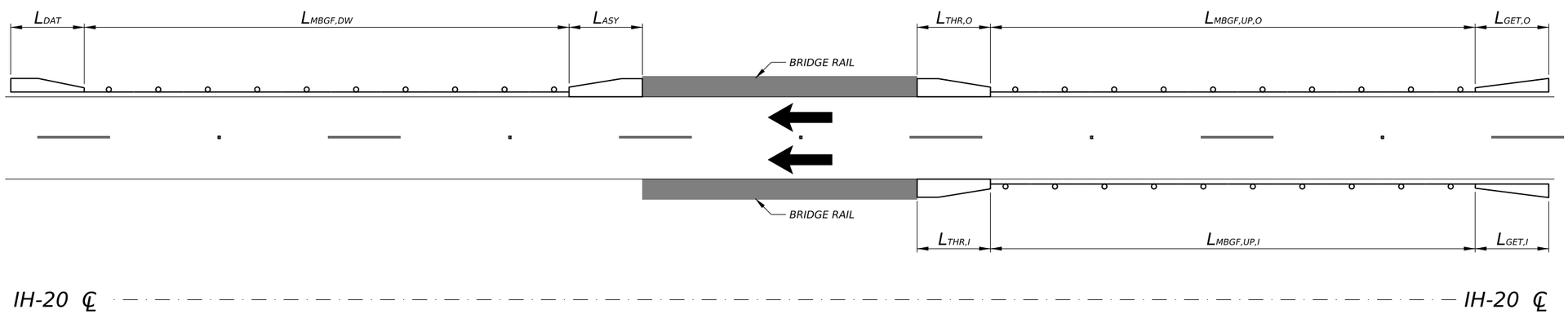
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		102
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

GUARDRAIL TREATMENT LENGTH SUMMARY

ITEM	DESCRIPTION	QTY.	UOM	LEGEND	MOSS BRIDGE WB	MOSS BRIDGE EB	BI-20 BRIDGE WB	BI-20 BRIDGE EB	INSTALL LENGTH TOTALS
0540 6018	MTL BM GD FEN TRANS (NON - SYM)	4	EA	L_{ASY}	6.25 FT	6.25 FT	6.25 FT	6.25 FT	25 FT
0540 6016	DOWNSTRM ANCHOR TERMINAL SECTION	4	EA	L_{DAT}	9.33 FT	9.33 FT	9.33 FT	9.33 FT	37 FT
0544 6001	GUARDRAIL END TRTMENT (INSTALL)	8	EA	$L_{GET,I}$	40.00 FT	40.00 FT	40.00 FT	40.00 FT	384 FT
				$L_{GET,O}$	56.00 FT	56.00 FT	56.00 FT	56.00 FT	
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	10,499	LF	$L_{MBGF,DW}$	1,464.43 FT	1,454.43 FT	1,384.43 FT	1,214.43 FT	10,499 FT
				$L_{MBGF,UP,I}$	0.00 FT	0.00 FT	260.00 FT	0.00 FT	
				$L_{MBGF,UP,O}$	1,395.25 FT	1,485.25 FT	990.25 FT	850.25 FT	
0540 6006	MTL BM GD FEN TRANS (THRIE-BM)	8	EA	$L_{THR,I}$	18.75 FT	18.75 FT	18.75 FT	18.75 FT	75 FT
				$L_{THR,O}$	18.75 FT	18.75 FT	18.75 FT	18.75 FT	75 FT
* 0542 6001	REMOVE METAL BEAM GUARD FENCE	10,450 FT	LF	L_{RMV}	2,950.00 FT	3,030.00 FT	2,465.00 FT	2,005.00 FT	0 FT
* 0544 6003	GUARDRAIL END TRTMENT (REMOVE)	8	EA	-	-	-	-	-	0 FT
* 0542 6003	REMOVE DOWNSTRM ANCHOR TERMINAL	4	EA	-	-	-	-	-	0 FT
								TOTAL LEGNTH	11,095.00 FT

*** ALSO INCLUDED IN REMOVAL SUMMARY**

DOWNSTREAM OF BRIDGE *UPSTREAM OF BRIDGE*



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11/27/2023

BRIDGE GUARDRAIL ITEM SUMMARY

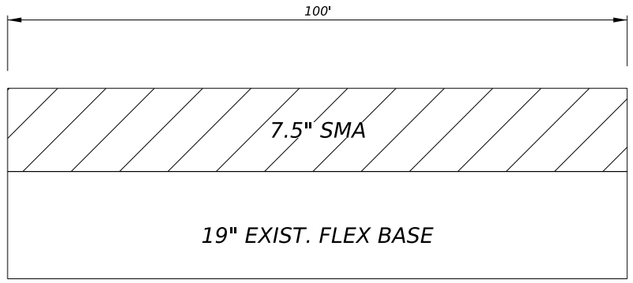
SHEET 1 OF 1

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		103
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

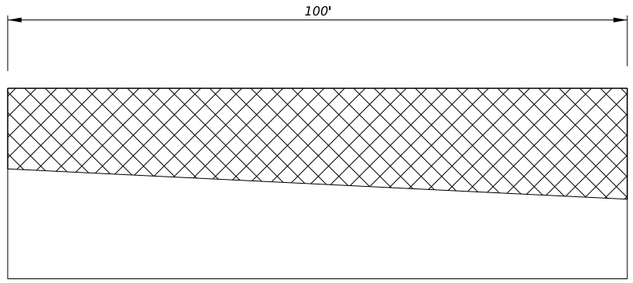
WESTBOUND IH-20 BEGINNING TIE-IN DETAILS

NOT TO SCALE



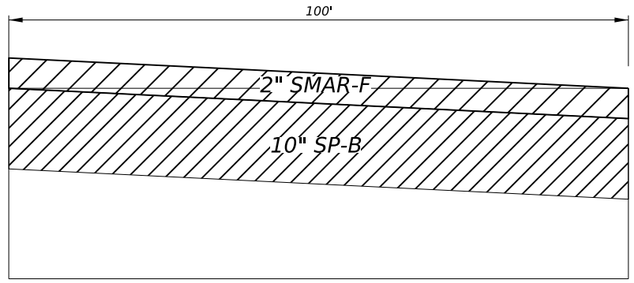
PROPOSED TIE-IN DETAIL: PHASE 1

DETAIL A-A
MILL 0" TO 3"
NOT TO SCALE



PROPOSED TIE-IN DETAIL: PHASE 2

MILL 10" TO 12"

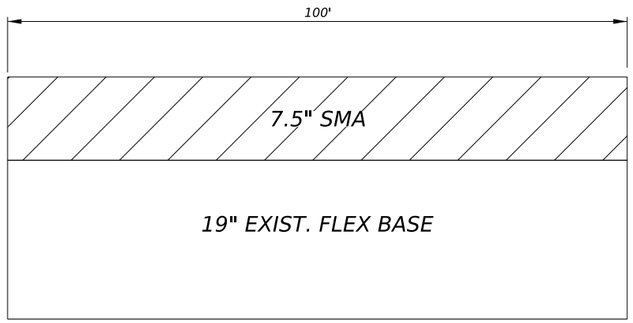


PROPOSED TIE-IN DETAIL: PHASE 3

PLACE 2" SMAR-F
PLACE 10" SP-B

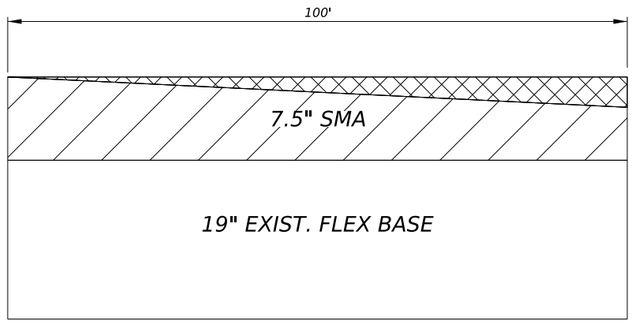
EASTBOUND IH-20 BEGINNING TIE-IN DETAILS

NOT TO SCALE



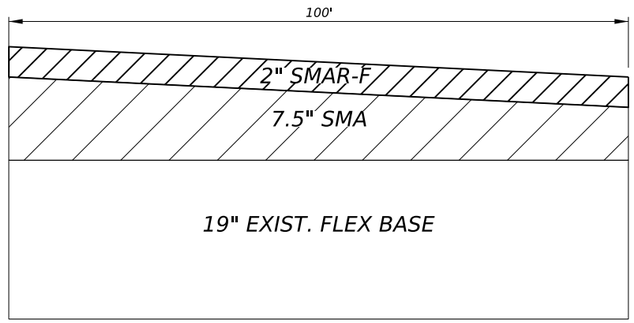
PROPOSED TIE-IN DETAIL: PHASE 1

EXISTING 7.5" SMA
EXISTING 19" FLEX BASE



PROPOSED TIE-IN DETAIL: PHASE 2

MILL 0" TO 2"



PROPOSED TIE-IN DETAIL: PHASE 3

PLACE 2" SMAR-F

STATE OF TEXAS
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11/27/2023

WEST PROJECT LIMITS TIE-IN

SHEET 1 OF 1

Texas Department of Transportation

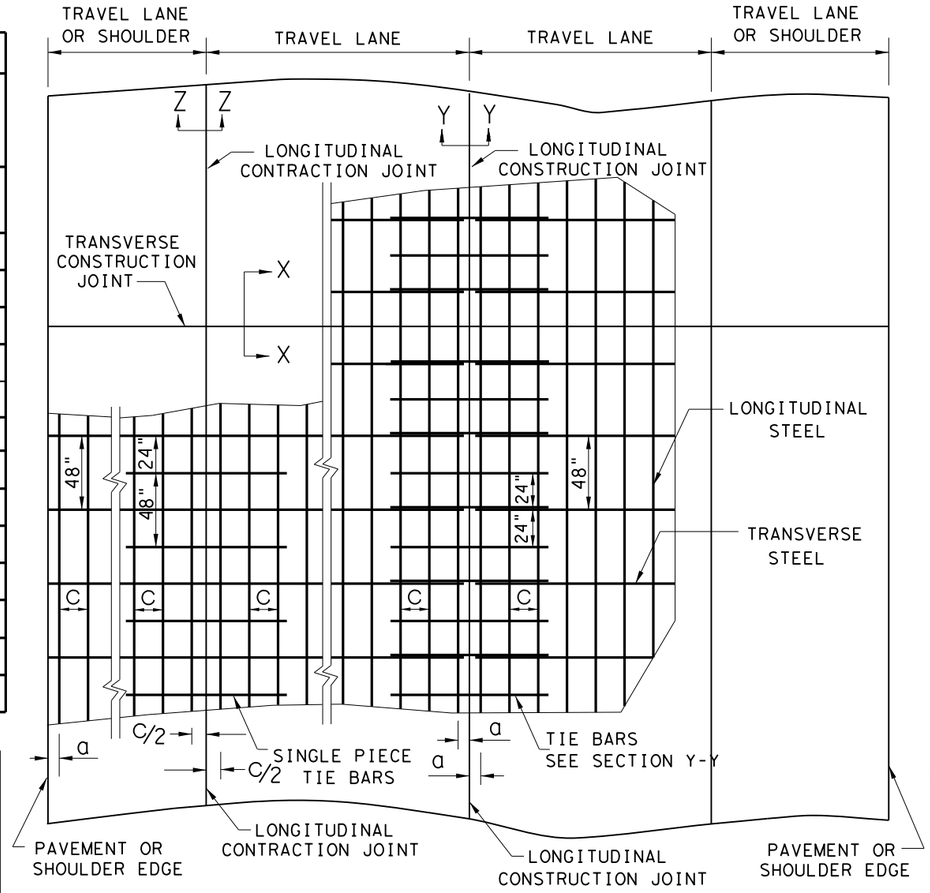
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		104
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	07	138	IH-20

DATE:
FILE:

TABLE NO. 1 LONGITUDINAL STEEL				
SLAB THICKNESS AND BAR SIZE		LONGITUDINAL STEEL BARS	FIRST SPACING AT EDGE OR JOINT	LONG. STEEL VERTICAL POSITION FROM BOTTOM OF PAVEMENT
T (IN.)	BAR SIZE	SPACING C (IN.)	SPACING a (IN.)	T1 (IN.)
7.0	#5	6.5	3 TO 4	3.5
7.5	#5	6.0	3 TO 4	3.75
8.0	#6	9.0	3 TO 4	4.0
8.5	#6	8.5	3 TO 4	4.25
9.0	#6	8.0	3 TO 4	4.5
9.5	#6	7.5	3 TO 4	4.75
10.0	#6	7.0	3 TO 4	5.0
10.5	#6	6.75	3 TO 4	5.5
11.0	#6	6.5	3 TO 4	6.0
11.5	#6	6.25	3 TO 4	6.5
12.0	#6	6.0	3 TO 4	7.0
12.5	#6	5.75	3 TO 4	7.5
13.0	#6	5.5	3 TO 4	8.0

TABLE NO. 2 TRANSVERSE STEEL AND TIE BARS						
SLAB THICKNESS (IN.)	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z)		TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT (SECTION Y-Y)	
	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0 - 7.5	#5*	48	#5*	48	#5*	24
8.0 - 13.0	#5*	48	#6	48	#6	24

*CONTRACTOR MAY USE #6 REINFORCING STEEL INSTEAD OF #5 REINFORCING STEEL OR COMBINATION OF EACH SIZE

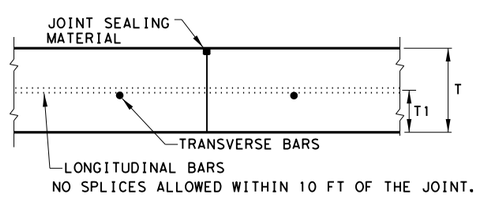


TYPICAL PAVEMENT LAYOUT

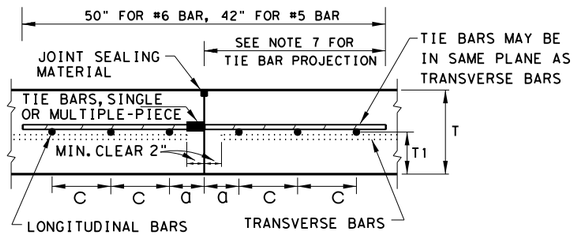
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

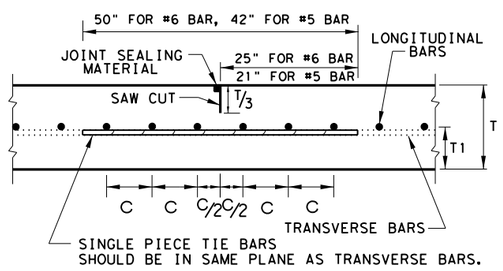
1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. FOR PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT, ADDITIONAL DETAIL MAY BE SHOWN ELSEWHERE IN THE PLANS.
2. USE COARSE AGGREGATES WITH A RATED COEFFICIENT OF THERMAL EXPANSION (CoTE) OF NOT MORE THAN 5.5 X 10^{-6} IN/IN/ °F AS LISTED IN THE CONCRETE RATED SOURCE QUALITY CATALOG (CRSQC).
3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60) OR ABOVE. STEEL BAR SIZES AND SPACINGS SHALL CONFORM TO TABLE NO.1 AND TABLE NO.2.
4. STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS) SHALL CONFORM TO TABLE NO.1.
5. ADJUST REINFORCING STEEL VERTICALLY USING SHIMS OR OTHER METHODS, AS APPROVED, TO MEET VERTICAL TOLERANCES PRIOR TO CONCRETE PLACEMENT.
6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
7. THE MINIMUM PROJECTION OF TIE BARS INTO THE ADJACENT PLACEMENT IS 22.5 IN. for #6 BARS AND 18.5 IN. FOR #5 BARS.
8. SEE STANDARD SHEET "CONCRETE CURB AND CURB AND GUTTER," FOR DETAILS WHEN TYING CONCRETE CURB OR CURB GUTTER AT A LONGITUDINAL JOINT.
9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN.10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
10. OMIT TIE BARS LOCATED WITHIN 18-IN. OF THE TRANSVERSE CONSTRUCTION JOINTS (SECTION X-X). USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
11. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



TRANSVERSE CONSTRUCTION JOINT
SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT
SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT
SECTION Z - Z

SHEET 1 OF 2

Texas Department of Transportation

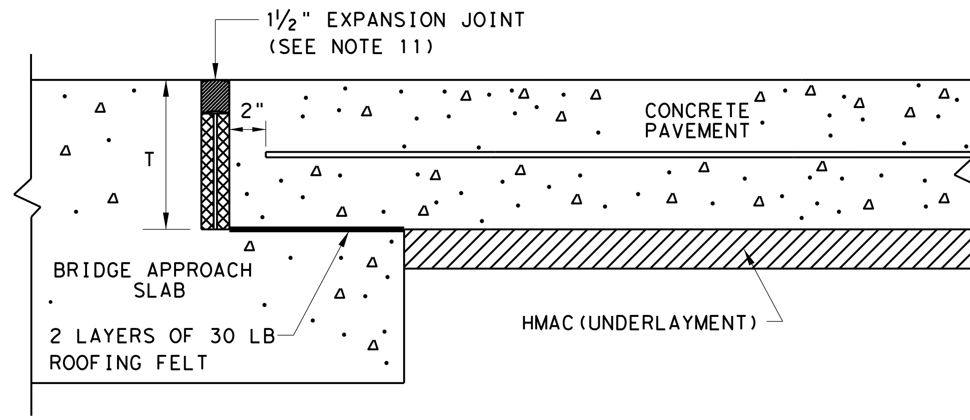
Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

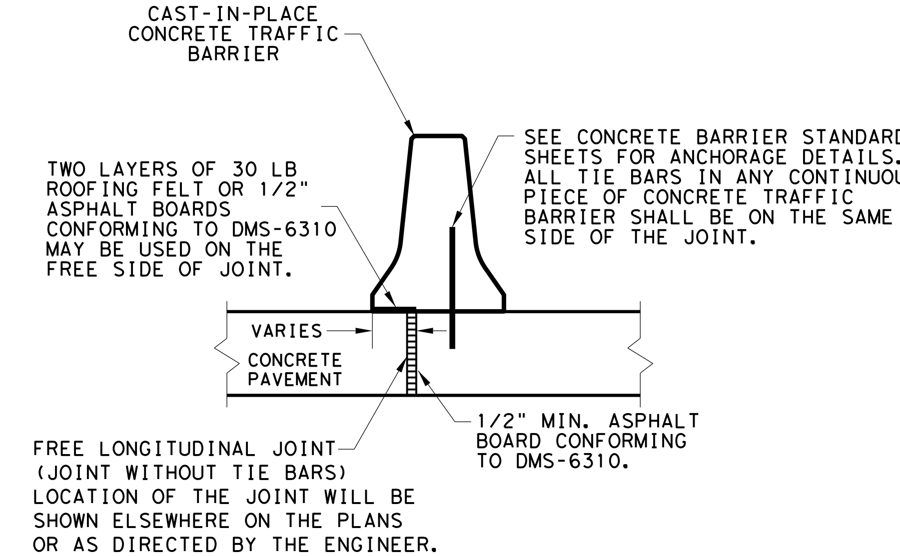
ONE LAYER STEEL BAR PLACEMENT T - 7 to 13 INCHES

CRCP(1)-23

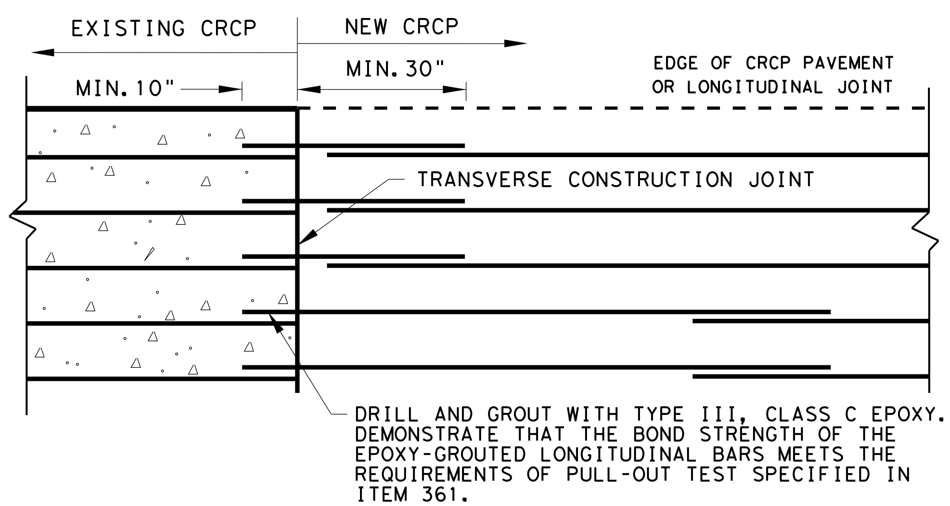
FILE: crcp123.dgn	DN: TxDOT	CK: KM	DW: CES	CK:
©TxDOT: APRIL 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0004	07	138	IH-20
APRIL 2023: REVISED LONG. STEEL VERTICAL LOCATION. REMOVED ADDITIONAL TIEBAR AT TRANSVERSE CONSTRUCTION JOINTS	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		105



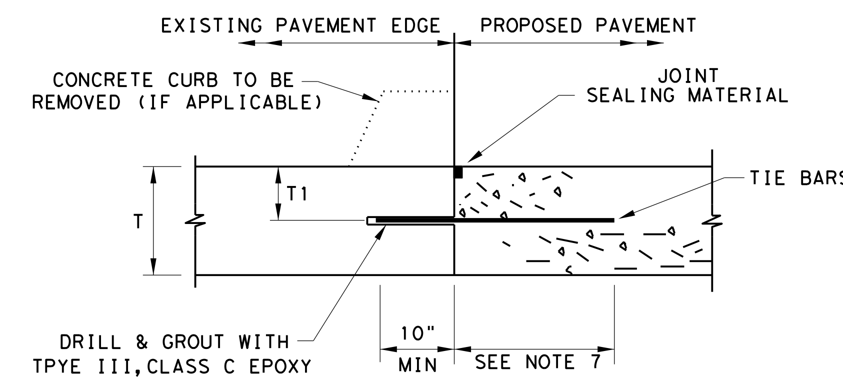
TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH



CENTERLINE FREE LONGITUDINAL JOINT DETAIL

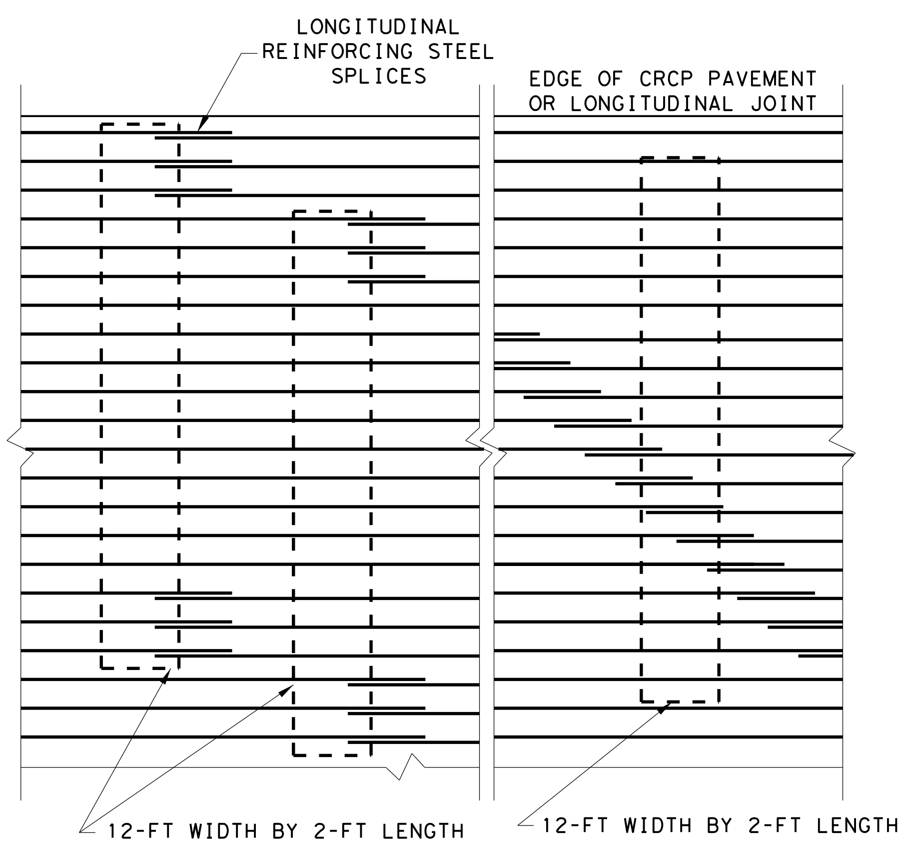


OPTION A: DRILL AND EPOXY
PLAN VIEW (NOT TO SCALE)



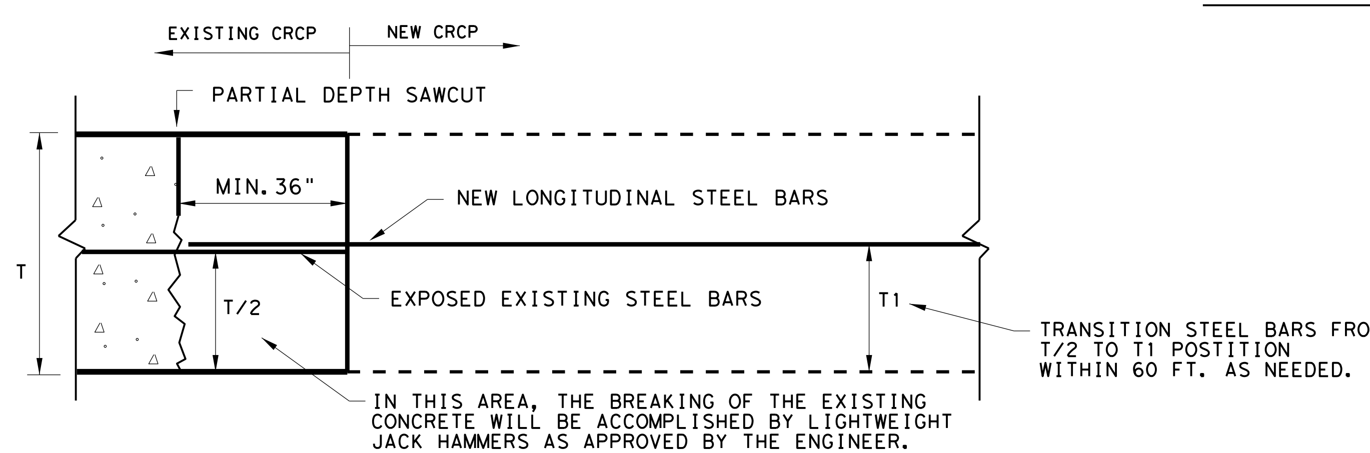
1. BEFORE CONCRETE PLACEMENT, PERFORM PULL-OUT TESTS ON EPOXY-GROUTED TIE BARS IN ACCORDANCE WITH ITEM 360.
2. SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER PAVEMENTS, USE #5 TIE BARS FOR LESS THAN 8" THICK PAVEMENTS.

LONGITUDINAL WIDENING JOINT DETAIL



STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT. ANY OTHER LAP CONFIGURATION MEETING THIS REQUIREMENT WILL BE ALLOWED.

EXAMPLES OF LAP CONFIGURATION
PLAN VIEW (NOT TO SCALE)



OPTION B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL
NEW CRCP TO EXISTING CRCP

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

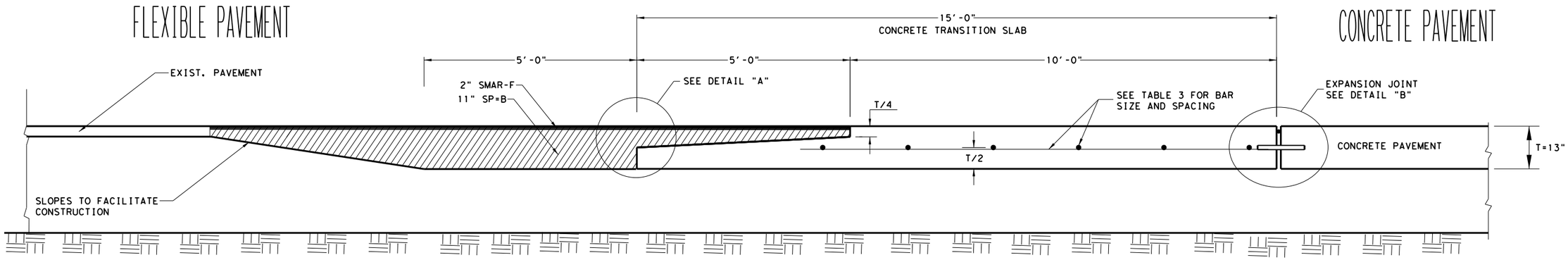
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

ONE LAYER STEEL BAR PLACEMENT T - 7 to 13 INCHES

CRCP(1)-23

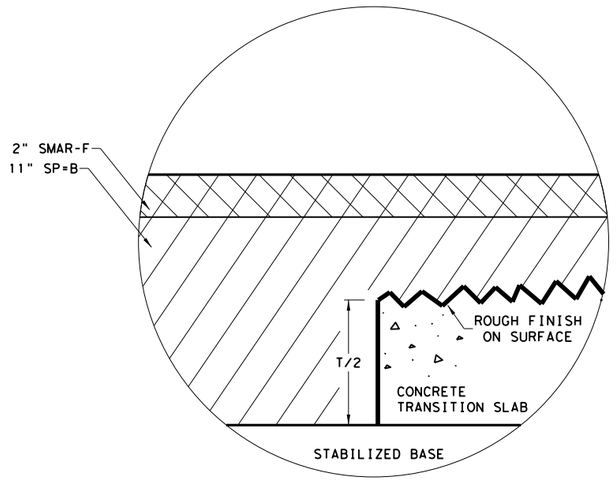
FILE: crcp123.dgn	DN: TxDOT	CK: KM	DW: CES	CK:
© TxDOT: APRIL 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS APRIL 2023: MODIFIED EXPANSION JOINT DETAIL AT BRIDGE APPROACH SLAB	0004	07	138	IH-20
	DIST		COUNTY	SHEET NO.
	ODA		ECTOR	106

DATE:
FILE:

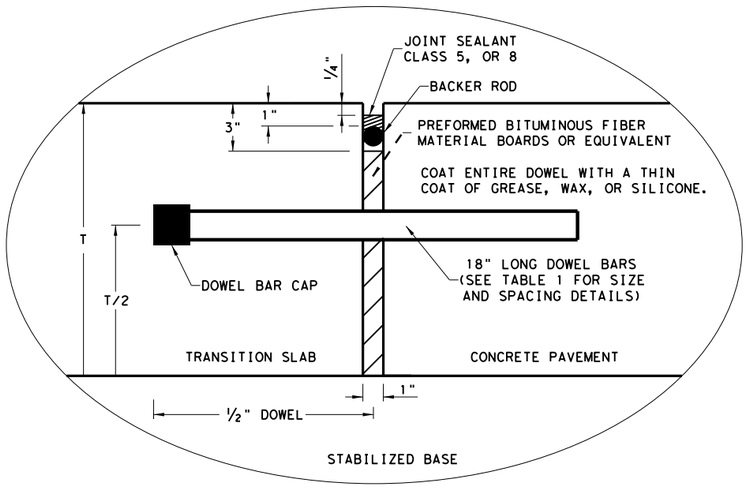


TYPICAL JUNCTION OF CONCRETE PAVEMENT WITH FLEXIBLE PAVEMENT

(NOT TO SCALE)



DETAIL "A"



DETAIL "B"

GENERAL NOTES

1. FOR FURTHER INFORMATION REGARDING THE PLACEMENT OF CONCRETE AND LOAD TRANSFER DEVICES REFER TO THE GOVERNING SPECIFICATIONS FOR "CONCRETE PAVEMENT" AND "REINFORCING STEEL."
2. DETAILS FOR PAVEMENT WIDTH AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS.
3. MATCH THE LONGITUDINAL JOINTS OF THE CONCRETE TRANSITION SLAB WITH ADJOINING CONCRETE PAVEMENT. PROVIDE EQUIVALENT TIEBARS OR TRANSVERSE BARS AT THESE LONGITUDINAL JOINTS, SEE TABLE NO. 2.
4. REFER TO DMS-6310, "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
5. TRANSITION SLABS WILL BE PAID UNDER ITEM 360, "CONCRETE PAVEMENTS."

TABLE NO.1 DOWELS (SMOOTH BARS)

SLAB THICKNESS T (IN.)	BAR DIA. AND LENGTH	SPACING (IN.)
7 TO 7.5	1" X 18"	12
8 TO 10	1 1/4" X 18"	12
10 TO 13	1 1/2" X 18"	12

TABLE NO.2 TIE BARS (DEFORMED BARS)

SLAB THICKNESS T (IN.)	BAR SIZE	SPACING (IN.)
7 TO 7.5	#5	24
8 TO 13	#6	24

TABLE NO.3 TRANSITION SLAB STEEL (DEFORMED BARS)

SLAB THICKNESS T (IN.)	BAR SIZE	SPACING (IN.) TRANSVERSE DIRECTION	SPACING (IN.) LONGITUDINAL DIRECTION
7 TO 7.5	#5	24	12
8 TO 13	#6	24	12

ADJUST SPACING OF LONGITUDINAL BARS AS NEEDED TO ACCOMDATE DOWEL BAR SPACING.

Texas Department of Transportation

Design Division Standard

CONCRETE PAVEMENT DETAILS TRANSITION SLAB

T-7 to 13 INCHES

TRANS-20

FILE: transitslab20.dgn	DN: TxDOT	DN: TxDOT	DW: AN	CK: KM
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		107

DATE: 11/27/2023
FILE: $FILE$

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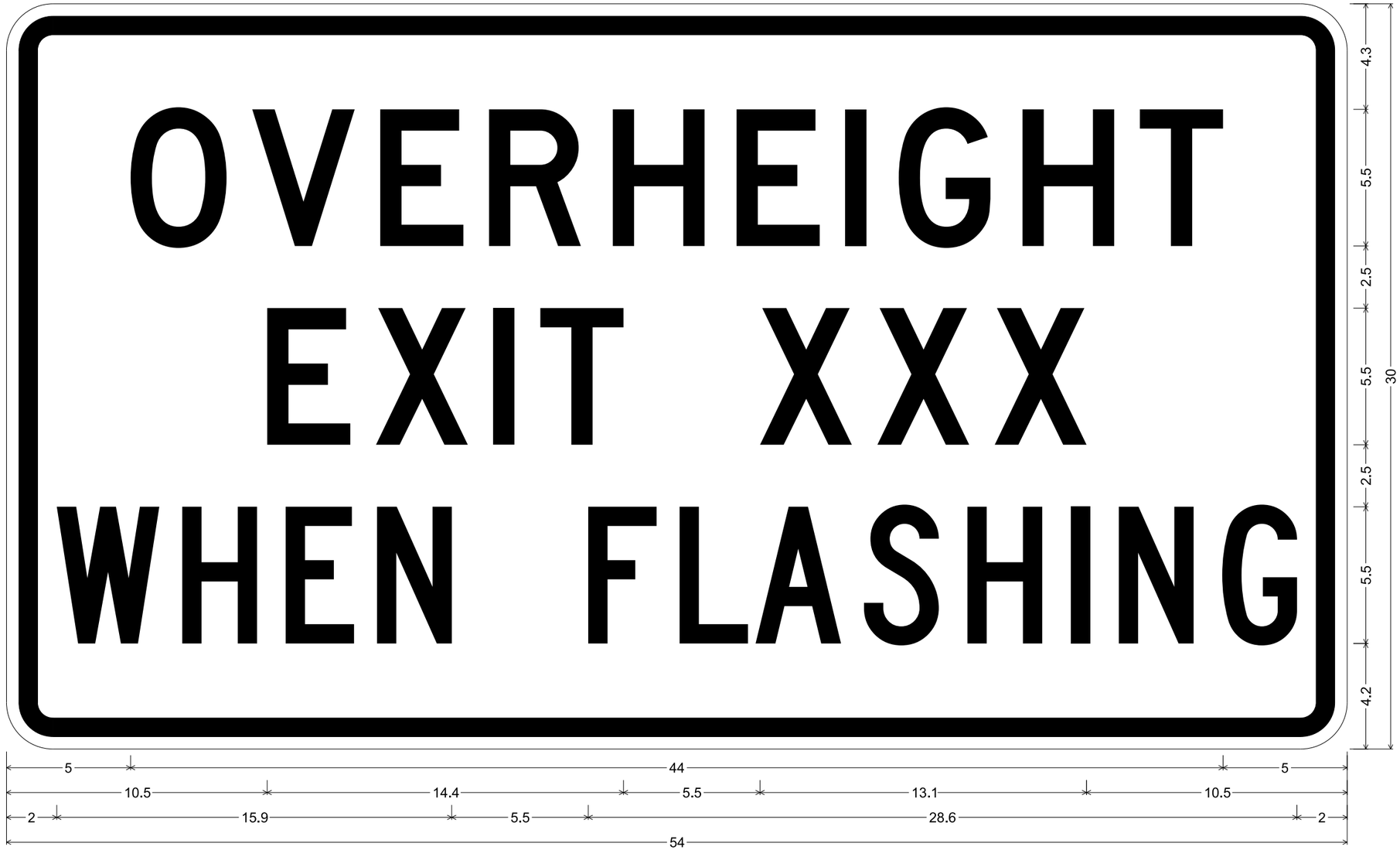

Warning_54x30;
1.9" Radius, 0.8" Border, 0.5" Indent, Black on Yellow;
"OVERHEIGHT", D; "EXIT XXX", D; "WHEN FLASHING", C;

DATE:
FILE:

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

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).
4. All replaced signal mast/illumination pole mounted or "Replace Signs Only" signs will be paid under Item 636-6007 unless denoted as a new (*) sign. New signs that are only repacing the sign itself (and not the post) will be paid as item 636-6001.

* DENOTES NEW SIGN

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS Details

SHEET 1 of 1

SOSS Details

FILE: sums16ex.dgn	DN:	CK:	DW:	CK:
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4-16	DIST	COUNTY		SHEET NO.
8-16	ODA	ECTOR		108

TB

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE (FRP = Fiberglass, TWT = Thin-wall, 10BWG = 10 BWG, S80 = Sched 80)	POSTS (1 or 2)	ANCHOR TYPE (UA = Univer-Conc, UB = Univer-Bolt, SA = Slip-Conc, SA = Slip-Bolt, WS = Wedge Steel, WP = Wedge Plstic)	MOUNTING DESIGNATION: PREFABRICATED (P = Prefb."Plain", T = Prefab. "T", U = Prefab. "U")	MOUNTING DESIGNATION (1EXT or 2EXT = # of Ext. BM = Extruded Beam, WC = 1.12 #/ft Wing Chan., EXAL = Extruded Alum. Signs)	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) (TY N = Type N, TY S = Type S)
1	1	D10-3	108	12 x 48	X		10BWG	1	SA	P		
1	2	D10-3	108	12 x 48	X		10BWG	1	SA	P		
1	3	M3-4 (BLUE)	WEST	24 x 12	X		10BWG	1	SA	P		
		M1-1	INTERSTATE 20	24 x 24	X							
2	4	W3-2		48 x 48	X		S80	1	SA	T		
2	5	W13-2	RAMP 55 MPH	48 x 60	X		S80	1	SA	T		
2	6	R1-2	YIELD	48 x 48 x 48	X		10BWG	1	SA	T		
3	7	M3-4 (BLUE)	WEST	24 x 12	X							
		M1-1	INTERSTATE 20	24 x 24	X		10BWG	1	SA	P		
		M6-2		21 x 15	X							
3	8	W4-1		36 x 36	X		10BWG	1	SA	P		

DATE:
FILE:

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

ALUMINUM SIGN BLANKS THICKNESS	
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4. All replaced signal mast/illumination pole mounted or "Replace Signs Only" signs will be paid under Item 636-6007 unless denoted as a new (*) sign. New signs that are only repacing the sign itself (and not the post) will be paid as item 636-6001.

* DENOTES NEW SIGN

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SHEET 1 of 17

SOSS

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8-16		ODA	ECTOR		109

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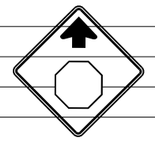
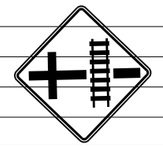
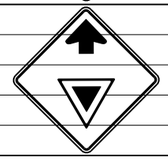
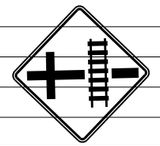
SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
										PREFABRICATED		
							FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	Posts (1 or 2)	UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SA = Slip-Bolt WS = Wedge Steel WP = Wedge Plstic	P = Prefb."Plain" T = Prefab. "T" U = Prefab. "U"	1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	TY N = Type N TY S = Type S
3	9	W3-1		48 x 48	X		S80	1	SA	T		
3	10	W10-2		48 x 48	X		S80	1	SA	T		
3	11	W8-13aT		48 x 48	X		S80	1	SA	T		
3	12	W3-2		48 x 48	X		S80	1	SA	T		
3	13	W10-2		48 x 48	X		S80	1	SA	T		
3	14	W10-5		48 x 48	X		S80	1	SA	T		
		W10-5P		30 x 24	X							
4	15	R5-1a		42 x 30			10BWG	1	SA	T		
4	16	R5-1a		42 x 30	X		10BWG	1	SA	P		

DATE:
FILE:

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

ALUMINUM SIGN BLANKS THICKNESS	
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* DENOTES NEW SIGN

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SUMMARY OF SMALL SIGNS

SHEET 2 of 17

SOSS

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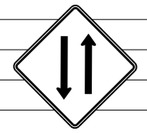
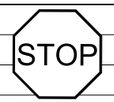
8-16	ODA	ECTOR		110

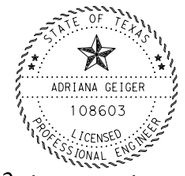
TB

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE: FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	POSTS: Posts (1 or 2)	ANCHOR TYPE: UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SA = Slip-Bolt WS = Wedge Steel WP = Wedge Plstic	MOUNTING DESIGNATION: PREFABRICATED P = Prefb."Plain" T = Prefab. "T" U = Prefab. "U"	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2): TY N = Type N TY S = Type S
4	17	W6-3		48 x 48	X		S80	1	SA	T		
4	18	R1-1		36 x 36	X		S80	1	SA	T		
		R5-1		48 x 48	X							
4	19	R8-8		36 x 48	X		10BWG	1	SA	P		
4	20	R5-1		48 x 48	X		S80	1	SA	T		
4	21	W4-4aP		24 x 12	X		10BWG	1	SA	P		
		R1-1		36 x 36	X							
4	22	M3-2	LEFT (BLUE) 	24 x 12	X							
		M1-1		24 x 24	X							
		M6-1		21x 15	X		S80	1	SA	U		
			RIGHT (BLUE)									
		M3-4		24 x 12	X							
		M1-1		24 x 24	X							
		M6-3		21x 15	X							

DATE:
FILE:



Adriana Geiger, P.E.
11/27/2023

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

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* DENOTES NEW SIGN

Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 3 of 17

FILE: sums16ex.dgn	DN:	CK:	DW:	CK:
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REVISIONS	0004	07	138	IH-20
4-16	DIST	COUNTY		SHEET NO.
8-16	ODA	ECTOR		111

TB

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE (FRP = Fiberglass, TWT = Thin-wall, 10BWG = 10 BWG, S80 = Sched 80)	POSTS (1 or 2)	ANCHOR TYPE (UA = Univer-Conc, UB = Univer-Bolt, SA = Slip-Conc, SA = Slip-Bolt, WS = Wedge Steel, WP = Wedge Plstic)	MOUNTING DESIGNATION: PREFABRICATED (P = Prefb."Plain", T = Prefab. "T", U = Prefab. "U")	MOUNTING DESIGNATION (1EXT or 2EXT = # of Ext. BM = Extruded Beam, WC = 1.12 #/ft Wing Chan., EXAL = Extruded Alum. Signs)	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) (TY N = Type N, TY S = Type S)
4	23	M3-2	BLUE WEST INTERSTATE 20	24 x 12	X							
		M1-1		24 x 24	X		10BWG	1	SA	T		
		M6-1		21 x 15	X							
4	24	W10-1	R R	36" DIA	X		S80	1	SA	P		
4	25	M3-2	LEFT (BLUE) EAST INTERSTATE 20	24 x 12	X							
		M1-1		24 x 24	X							
		M6-3		21 x 15	X							
			RIGHT (BLUE)									
		M3-4	WEST INTERSTATE 20	24 x 12	X		S80	1	SA	U		
		M1-1		24 x 24	X							
		M6-1		21 x 15	X							
4	26	W12-2	17'-1"	48 x 48	X		10BWG	1	SA	T		
4	27	W10-5	LOW GROUND CLEARANCE	48 x 48	X		S80	1	SA	T		
		W10-5P		30 x 24	X							

DATE:
FILE:

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

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* DENOTES NEW SIGN

Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SHEET 4 of 17

SOSS

FILE:	sums16ex.dgn	DN:	CK:	DW:	CK:
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4-16		DIST	COUNTY		SHEET NO.
8-16		ODA	ECTOR		112

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	Posts (1 or 2)	UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SA = Slip-Bolt WS = Wedge Steel WP = Wedge PIstic	PREFABRICATED P = Prefb."Plain" T = Prefab. "T" U = Prefab. "U"	1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	TY N = Type N TY S = Type S
4	28	M3-4	LEFT (BLUE) WEST INTERSTATE 20	24 x 12	X							
		M1-1		24 x 24	X							
		M6-3		21x 15	X							
			RIGHT (BLUE)									
		M3-2	EAST INTERSTATE 20	24 x 12	X		S80	1	SA	U		
		M1-1		24 x 24	X							
		M6-1		21x 15	X							
4	29	R1-1	STOP ONCOMING TRAFFIC DOES NOT STOP	36 x 36	X		10BWG	1	SA	P		
		W4-4bP		24 x 12	X							
4	30	R3-5R	ONLY	30 x 36	X		10BWG	1	SA	T		
4	31	W12-2	17'-1"	48 x 48	X		S80	1	SA	T		
4	32	R3-7R	RIGHT LANE MUST TURN RIGHT	36 x 36	X		10BWG	1	SA	P		
4	33	R1-1	STOP ONCOMING TRAFFIC DOES NOT STOP	36 x 36	X		10BWG	1	SA	P		
		W4-4bP		24 x 12	X							

DATE:
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STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
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Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 5 of 17

FILE: sums16ex.dgn	DN:	CK:	DW:	CK:
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REVISIONS	0004	07	138	IH-20
4-16	DIST	COUNTY		SHEET NO.
8-16	ODA	ECTOR		113

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
										PREFABRICATED		
							FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	Posts (1 or 2)	UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SA = Slip-Bolt WS = Wedge Steel WP = Wedge Plstic	P = Prefb."Plain" T = Prefab. "T" U = Prefab. "U"	1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	TY N = Type N TY S = Type S
4	34	M3-4	(BLUE) WEST INTERSTATE 20	24 x 12	X							
		M1-1		24 x 24	X		10BWG	1	SA	P		
		M6-1		21x 15	X							
4	35	M3-2	(BLUE) EAST INTERSTATE 20	24 x 12	X							
		M1-1		24 x 24	X		10BWG	1	SA	P		
		M6-1		21x 15	X							
4	36	R1-1	STOP	36 x 36	X							
							10BWG	1	SA	P		
		W4-4aP	TRAFFIC FROM LEFT DOES NOT STOP	24 x 12	X							
4	37	W6-3		48 x 48	X		S80	1	SA	T		
4	38	W1-7		48 x 24	X		10BWG	1	SA	T		
5	39	W3-1		48 x 48	X		10BWG	1	SA	P		
5	40	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	48 x 48	X		S80	1	SA	T		
5	41	W6-3		48 x 48	X		S80	1	SA	T		

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ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

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Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

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SHEET 6 of 17

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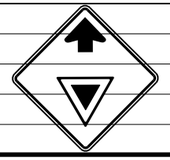
DATE:
FILE:

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	Posts (1 or 2)	UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SA = Slip-Bolt WS = Wedge Steel WP = Wedge Plstic	PREFABRICATED P = Prefb."Plain" T = Prefab. "T" U = Prefab. "U"	1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	TY N = Type N TY S = Type S
5	42	R1-2		48 x 48 x 48	X							
							10BWG	1	SA	P		
		R1-2bTP		21x 15	X							
5	43	D10-3		12 x 48	X		10BWG	1	SA	P		
5	44	D10-3		12 x 48	X		10BWG	1	SA	P		
5	45	R5-1		48 x 48	X		S80	1	SA	T		
5	46	R5-1a		42 x 30	X		10BWG	1	SA	P		
5	47	R1-2		48 x 48 x 48	X							
							10BWG	1	SA	P		
		R1-2bTP		21x 15	X							
6	48	W4-1		36 x 36	X		10BWG	1	SA	P		
6	49	W3-2		48 x 48	X		S80	1	SA	T		

Adriana Geiger, P.E.
11/27/2023

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Square Feet	Minimum Thickness
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Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 7 of 17

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	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		115

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
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6	50	W13-2	RAMP 55 MPH	48 x 60	X		S80	1	SA	P		
7	51	W3-5	SPEED LIMIT 65	48 x 48	X		S80	1	SA	T		
7	52	W3-5	SPEED LIMIT 65	48 x 48	X		S80	1	SA	T		
8	53	R2-1	SPEED LIMIT 75	48 x 60	X		S80	1	SA	T		
8	54	R2-1	SPEED LIMIT 75	48 x 60	X		S80	1	SA	T		
8	55	R2-1	SPEED LIMIT 65	48 x 60	X		S80	1	SA	T		
8	56	R2-1	SPEED LIMIT 65	48 x 60	X		S80	1	SA	T		
9	57	W1-7		48 x 60	X		S80	1	SA	P		

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DATE:
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STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

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FILE: sums16ex.dgn	DN:	CK:	DW:	CK:
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	0004	07	138	IH-20
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		116

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE (FRP = Fiberglass, TWT = Thin-wall, 10BWG = 10 BWG, S80 = Sched 80)	POSTS (1 or 2)	ANCHOR TYPE (UA = Univer-Conc, UB = Univer-Bolt, SA = Slip-Conc, SA = Slip-Bolt, WS = Wedge Steel, WP = Wedge Plstic)	MOUNTING DESIGNATION: PREFABRICATED (P = Prefb."Plain", T = Prefab. "T", U = Prefab. "U")	MOUNTING DESIGNATION (1EXT or 2EXT = # of Ext. BM = Extruded Beam, WC = 1.12 #/ft Wing Chan., EXAL = Extruded Alum. Signs)	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) (TY N = Type N, TY S = Type S)
9	58	D10-3	110	12 x 48	X		10BWG	1	SA	P		
9	59	D10-3	110	12 x 48	X		10BWG	1	SA	P		
12	60	R5-11T	FOR OFFICIAL OR EMERGENCY VEHICLE USE ONLY	48 x 48	X		S80	1	SA	T		
12	61	R5-11T	FOR OFFICIAL OR EMERGENCY VEHICLE USE ONLY	48 x 48	X		S80	1	SA	T		
14	62	D10-3	111	12 x 48	X		10BWG	1	SA	P		
14	63	D10-3	111	12 x 48	X		10BWG	1	SA	P		
14	64	R2-1	SPEED LIMIT 65	48 x 60	X		S80	1	SA	T		
15	65	M3-4	(BLUE) WEST	24 x 12	X		10BWG	1	SA	P		
		M1-1	INTERSTATE 20	24 x 24	X							

DATE:
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Adriana Geiger, P.E.
11/27/2023

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Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SHEET 9 of 17

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FILE:	sums16ex.dgn	DN:	CK:	DW:	CK:
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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
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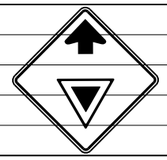
15	67	W12-2		48 x 48	X		S80	1	SA	T		
15	68	W12-2		48 x 48	X		S80	1	SA	T		
16	69	R19 - 8T		48 x 48	X		S80	1	SA	T		
16	70	W3-2		48 x 48	X		S80	1	SA	T		
17	71	W8-18		30 x 30	X		10BWG	1	SA	P		
17	72	W12-2		48 x 48	X		S80	1	SA	T		
17	73	R2-1		24 x 30	X		10BWG	1	SA	P		

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* DENOTES NEW SIGN

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 10 of 17

FILE: sums16ex.dgn	DN:	CK:	DW:	CK:
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0004	07	138	IH-20
4-16	DIST	COUNTY		SHEET NO.
8-16	ODA	ECTOR		118

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE: FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	POSTS: Posts (1 or 2)	ANCHOR TYPE: UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SA = Slip-Bolt WS = Wedge Steel WP = Wedge Plstic	MOUNTING DESIGNATION: PREFABRICATED P = Prefb."Plain" T = Prefab. "T" U = Prefab. "U"	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY N = Type N TY S = Type S
17	74	R1-2		48 x 48 x 48	X							
		R1-2bTP		21x 15	X		10BWG	1	SA	P		
17	75		FRONT									
		R11-1		48 x 60	X							
			BACK				S80	1	SA	T		
		R11-1		48 x 60	X							
17	76	M3-4	(BLUE) 	24 x 12	X							
		M1-1		24 x 24	X		10BWG	1	SA	P		
		M6-2		21x 15	X							
18	77	W12-2		48 x 48	X		S80	1	SA	T		
18	78	W12-2		48 x 48	X		S80	1	SA	T		
18	79	W12-2		48 x 48	X		S80	1	SA	T		
18	80	W12-2		48 x 48	X		S80	1	SA	T		
18	81	W12-2		48 x 48	X		S80	1	SA	T		

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DATE:
FILE:

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

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

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

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 11 of 17

FILE: sums16ex.dgn	DN:	CK:	DW:	CK:
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
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4-16	DIST	COUNTY		SHEET NO.
8-16	ODA	ECTOR		119

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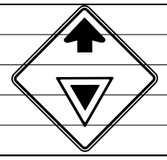
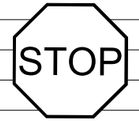
SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
										PREFABRICATED		
							FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	Posts (1 or 2)	UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SA = Slip-Bolt WS = Wedge Steel WP = Wedge Plstic	P = Prefb."Plain" T = Prefab. "T" U = Prefab. "U"	1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	TY N = Type N TY S = Type S
18	82	W12-2		48 x 48	X		S80	1	SA	T		
18	83	W3-2		48 x 48	X		S80	1	SA	T		
18	84	W12-2		48 x 48	X		S80	1	SA	T		
18	85	R1-1		36 x 36	X		10BWG	1	SA	P		
18	86	M3-2	LEFT (GREEN) 	24 x 12	X							
		M1-1		24 x 24	X							
		M6-1		21x 15	X							
							S80	1	SA	U		
		M3-4	RIGHT (BLUE) 	24 x 12	X							
		M1-1		24 x 24	X							
		M6-1		21x 15	X							
18	87	W12-2		48 x 48	X		S80	1	SA	T		

Adriana Geiger, P.E.
11/27/2023

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 12 of 17

FILE: sums16ex.dgn	DN:	CK:	DW:	CK:
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4-16	DIST	COUNTY		SHEET NO.
8-16	ODA	ECTOR		120

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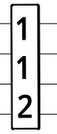
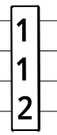
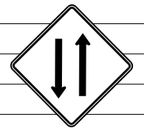
SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	Posts (1 or 2)	UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SA = Slip-Bolt WS = Wedge Steel WP = Wedge Plstic	PREFABRICATED P = Prefb."Plain" T = Prefab. "T" U = Prefab. "U"	1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	TY N = Type N TY S = Type S
18	88	W12-2		48 x 48	X		S80	1	SA	T		
18	89	R1-2		48 x 48 x 48	X		10BWG	1	SA	P		
		R1-2bTP		21x 15	X							
18	90	R1-1	FRONT 	36 x 36	X		10BWG	1	SA	P		
		R4-7	BACK 	24 x 30	X							
19	91	D10-3		12 x 48	X		10BWG	1	SA	P		
19	92	D10-3		12 x 48	X		10BWG	1	SA	P		
19	93	W6-3		48 x 48	X		S80	1	SA	T		

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STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
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* DENOTES NEW SIGN

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 13 of 17

FILE: sums16ex.dgn	DN:	CK:	DW:	CK:
© TxDOT May 1987 REVISIONS 4-16 8-16	CONT	SECT	JOB	HIGHWAY
	0004	07	138	IH-20
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		121

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	Posts (1 or 2)	UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SA = Slip-Bolt WS = Wedge Steel WP = Wedge PIstic	PREFABRICATED P = Prefb."Plain" T = Prefab. "T" U = Prefab. "U"	1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	TY N = Type N TY S = Type S
19	94	M4-5	LEFT (BLUE) TO EAST	24 x 12	X							
		M3-2	INTERSTATE 20	24 x 12	X							
		M1-1		24 x 24	X							
		M6-3	RIGHT (GREEN)	21x 15	X							
			EAST				S80	1	SA	U		
		M3-2	BUSINESS 20	24 x 12	X							
		M1-2		24 x 24	X							
		M6-1		21x 15	X							
19	95	R1-2	YIELD TO RAMP	48 x 48 x 48	X		10BWG	1	SA	P		
		R1-2bTP		21x 15	X							
19	96	R5-1	DO NOT ENTER	48 x 48	X		S80	1	SA	T		
19	97	R5-1	DO NOT ENTER	48 x 48	X		S80	1	SA	T		
19	98	R5-1A	WRONG WAY	42 x 30	X		10BWG	1	SA	P		
19	99	R5-1A	WRONG WAY	42 x 30	X		10BWG	1	SA	P		

DATE:
FILE:

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SHEET 14 of 17

SOSS

FILE:	sums16ex.dgn	DN:	CK:	DW:	CK:
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4-16		DIST	COUNTY		SHEET NO.
8-16		ODA	ECTOR		122

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	Posts (1 or 2)	UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SA = Slip-Bolt WS = Wedge Steel WP = Wedge Plstic	PREFABRICATED P = Prefb."Plain" T = Prefab. "T" U = Prefab. "U"	1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	TY N = Type N TY S = Type S
19	100	M3-4	LEFT (BLUE) WEST INTERSTATE 20	24 x 12	X							
		M1-1		24 x 24	X							
		M6-3		21x 15	X							
							S80	1	SA	U		
		M4-5	RIGHT (WHITE) TO FARM 1936 ROAD	24 x 12	X							
		M1-6F		24 x 24	X							
		M6-1		21x 15	X							
19	101	W13-2	EXIT 50 MPH	48 x 60	X		S80	1	SA	T		
19	102	R2-1	SPEED LIMIT 55	24 x 30	X		10BWG	1	SA	P		
19	103	M3-2	EAST BUSINESS LOOP 20	24 x 12	X							
		M1-1		24 x 24	X		10BWG	1	SA	P		
19	104	W13-2	EXIT 20 MPH	48 x 60	X		S80	1	SA	T		
19	105	W12-2	16'-4"	48 x 48	X		S80	1	SA	T		

DATE:
FILE:

ADRIANA GEIGER 108603 LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

Adriana Geiger, P.E.
11/27/2023

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

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Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

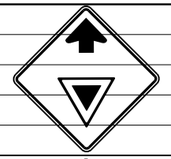
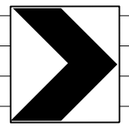
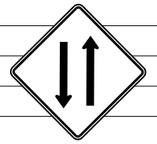
SOSS

SHEET 15 of 17

FILE:	sums16ex.dgn	DN:	CK:	DW:	CK:
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0004	07	138	IH-20
4-16		DIST	COUNTY		SHEET NO.
8-16		ODA	ECTOR		123

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS (IN)	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE: FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	POSTS: Posts (1 or 2)	ANCHOR TYPE: UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SA = Slip-Bolt WS = Wedge Steel WP = Wedge Plstic	MOUNTING DESIGNATION: PREFABRICATED P = Prefb."Plain" T = Prefab. "T" U = Prefab. "U"	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY N = Type N TY S = Type S
20	106	W3-2		48 x 48	X		S80	1	SA	T		
20	107	W12-2		48 x 48	X		S80	1	SA	T		
20	108	W12-2		48 x 48	X		S80	1	SA	T		
20	109	W8-18		30 x 30	X		10BWG	1	SA	P		
20 - 21	110-130	W1-8		36 x 48	X		10BWG	1	SA	T		
21	131	W4-1		36 x 36	X		10BWG	1	SA	P		
21	132	W8-13aT		36 x 48	X		10BWG	1	SA	P		
22	133	FRONT R11-1		24 x 30	X							
		BACK R11-1		24 x 30	X		10BWG	1	SA	P		

DATE:
FILE:

Adriana Geiger, P.E.
11/27/2023

ALUMINUM SIGN BLANKS THICKNESS	
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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SHEET 16 of 17

SOSS

FILE:	sums16ex.dgn	DN:	CK:	DW:	CK:
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0004	07	138	IH-20
4-16		DIST	COUNTY		SHEET NO.
8-16		ODA	ECTOR		124

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	ALUMINUM TYPE A	ALUMINUM TYPE G	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
										PREFABRICATED		
							FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	Posts (1 or 2)	UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SA = Slip-Bolt WS = Wedge Steel WP = Wedge PIstic	P = Prefb."Plain" T = Prefab. "T" U = Prefab. "U"	1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	TY N = Type N TY S = Type S
23	134	D10-3	113	36 x 48	X		10BWG	1	SA	P		
23	135	D10-3	113	36 x 48	X		10BWG	1	SA	P		

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STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

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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).

4. All replaced signal mast/illumination pole mounted or "Replace Signs Only" signs will be paid under Item 636-6007 unless denoted as a new (*) sign. New signs that are only repacing the sign itself (and not the post) will be paid as item 636-6001.

* DENOTES NEW SIGN

Texas Department of Transportation

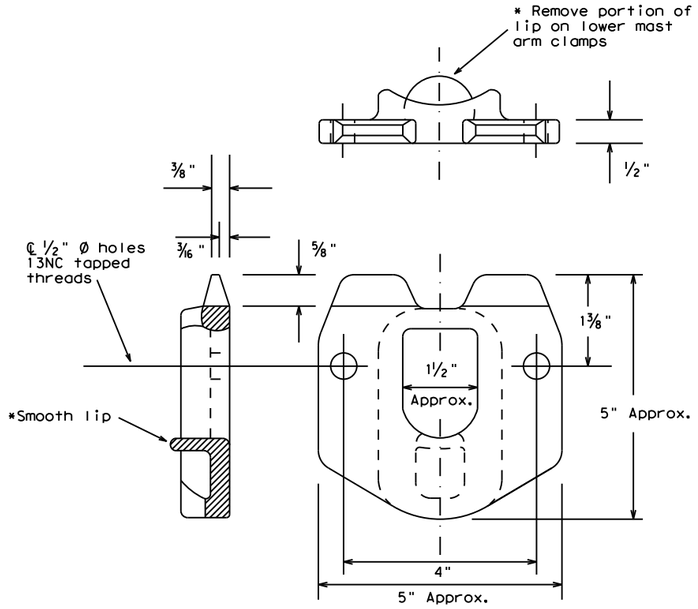
Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

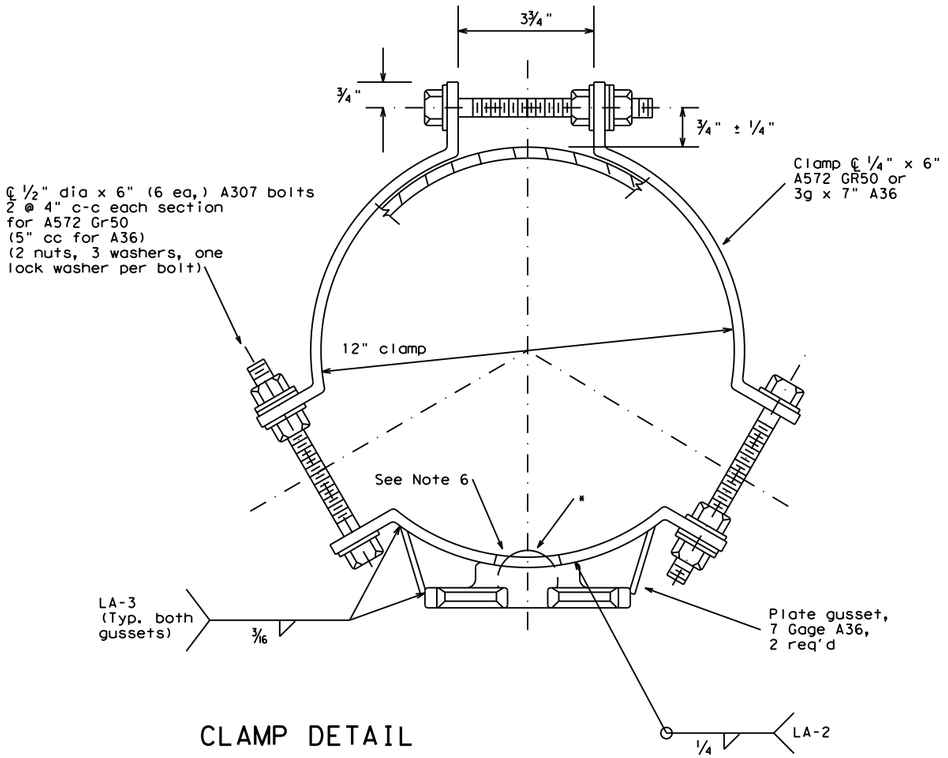
SHEET 17 of 17

SOSS

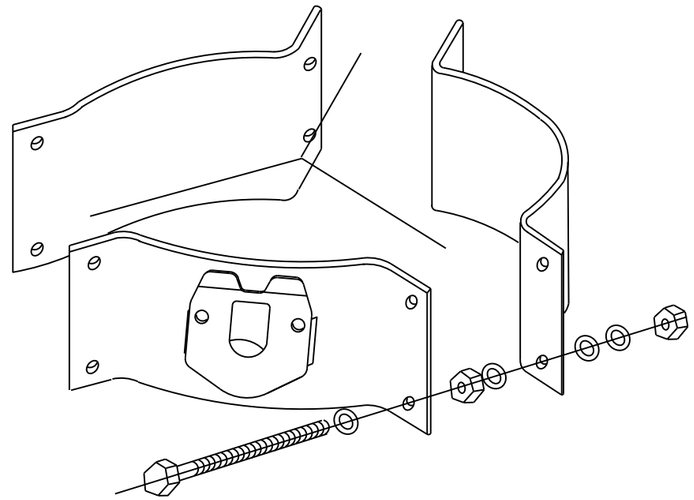
FILE:	sums16ex.dgn	DN:	CK:	DW:	CK:
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0004	07	138	IH-20
4-16		DIST	COUNTY		SHEET NO.
8-16		ODA	ECTOR		125



POLE SIMPLEX DETAILS



CLAMP DETAIL



PROJECTION

OTHER MATERIALS:

1. Pole simplex shall be ASTM A27 GR65-35 or A148 GR80-50 or A576 GR1021. ASTM A576 must be suitable for forging and also meet minimum tensile of 65ksi, minimum yield of 35ksi, and a minimum elongation of 22 percent in 2 inches.
2. Welded tabs and backplates shall be ASTM A-36 steel or better.
3. Nylon insert locknuts shall conform to ASTM A563.

GENERAL NOTES:

1. Materials and fabrication shall be in accordance with Standard Sheet "MA-C" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
2. All parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing". The throat of the Simplex shall be made free of all rough or sharp edges resulting from the galvanizing process.
3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts, 1/2in. X 1 1/2in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.
4. Design conforms to 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq.ft.,12 ft. maximum arm length.
5. Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.
6. Approximately 2 in. diameter hole in upper mast arm clamp.

For 8.9 - 12 inch diameter Signal Poles
(Two req'd for each mast arm)

Texas Department of Transportation
Traffic Operations Division

CLAMP ON FITTING ASSEMBLY FOR LUMINAIRE MAST ARM

CFA-12

© TxDOT	DN: KAB	CK: RES	DW: FDN	CK: CAL
REVISIONS	CONT	SECT	JOB	HIGHWAY
11-99	0004	07	138	IH-20
1-12	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		126

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

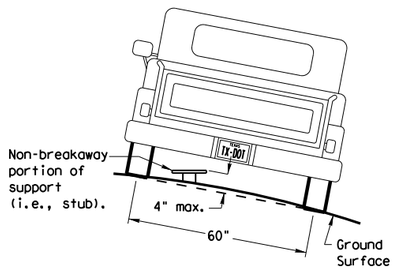
Anchor Type

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

Sign Mounting Designation

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

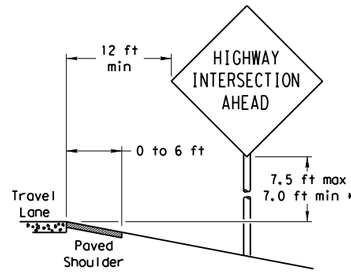
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

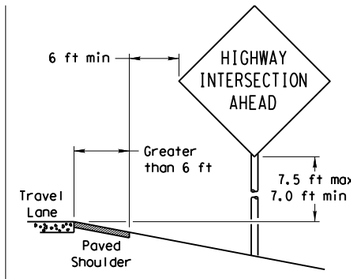
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

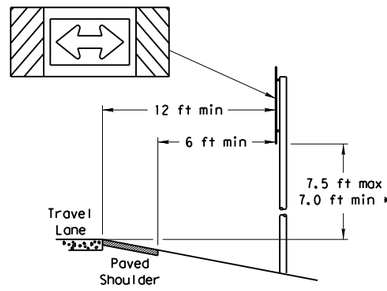
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



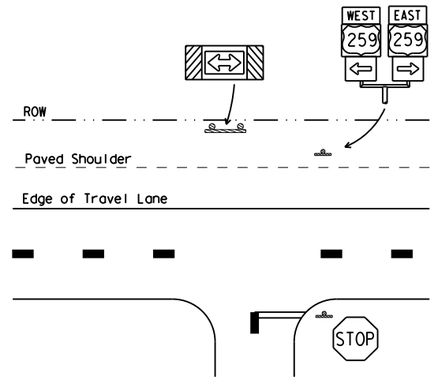
GREATER THAN 6 FT. WIDE

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

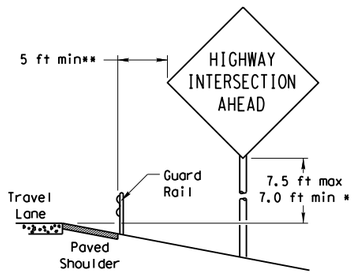
T-INTERSECTION



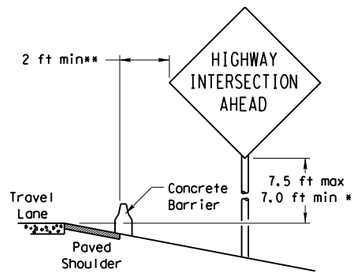
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

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

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

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

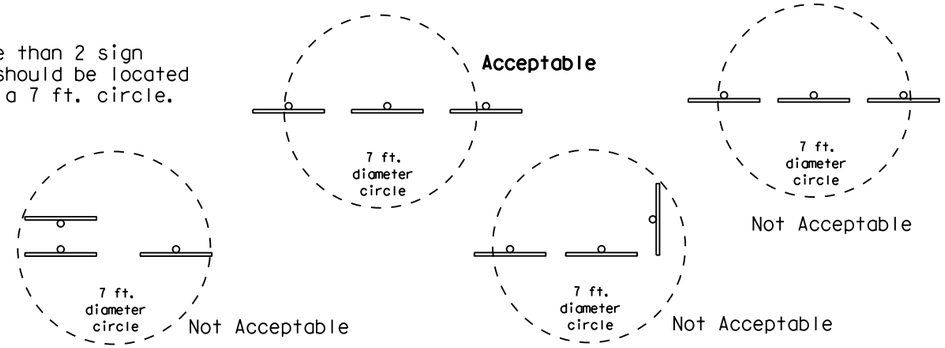
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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

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

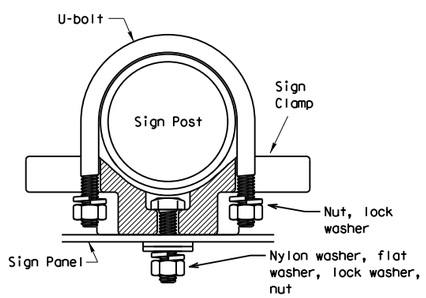
The website address is:
http://www.txdot.gov/publications/traffic.htm

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

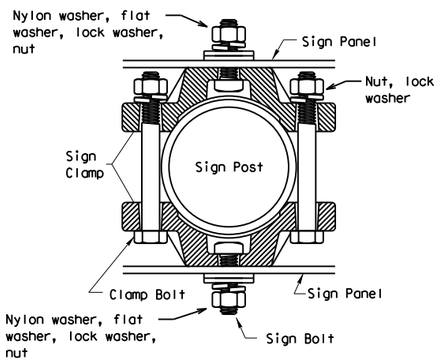


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

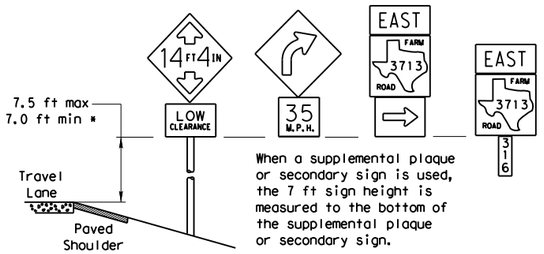
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



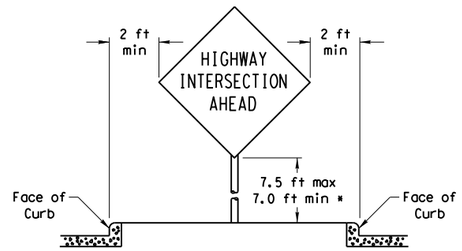
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



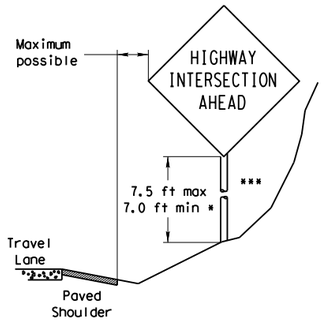
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS
9-08

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

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20

DIST	COUNTY	SHEET NO.
ODA	ECTOR	127

DATE: 11/27/2023 8:57:54 AM
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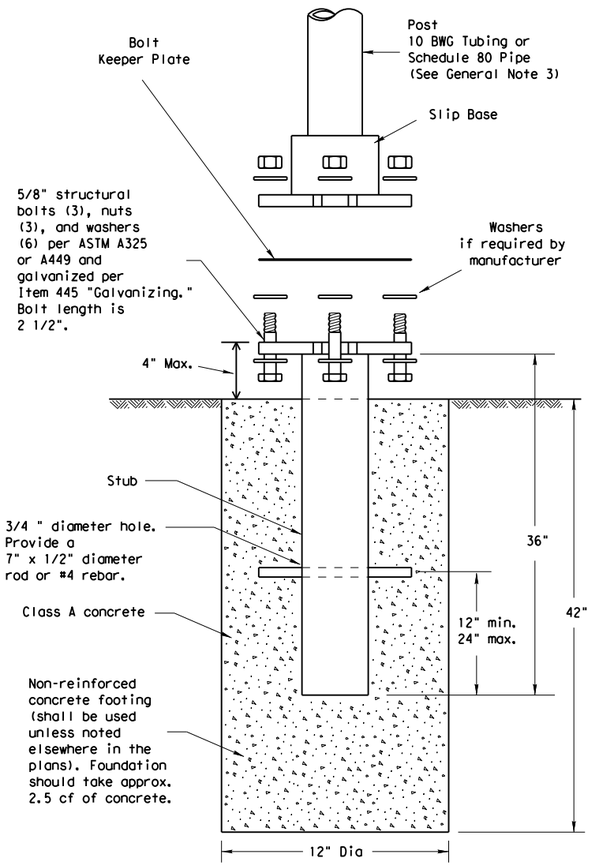
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

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

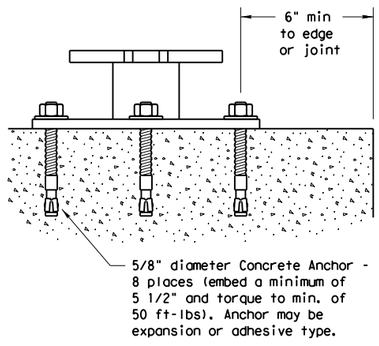
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum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

ASSEMBLY PROCEDURE

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

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

CONCRETE ANCHOR



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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

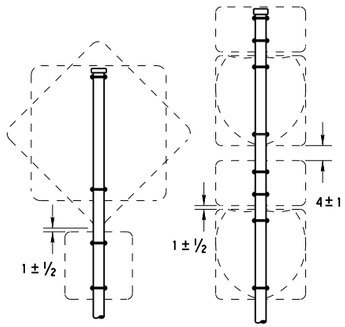
SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS 9-08			

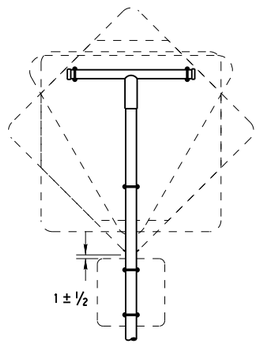
CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		128

DATE:
FILE:

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.



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



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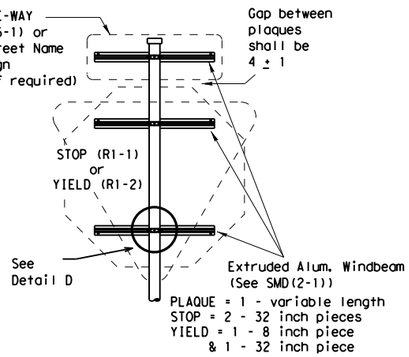
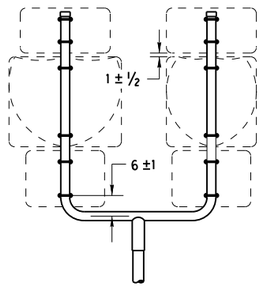
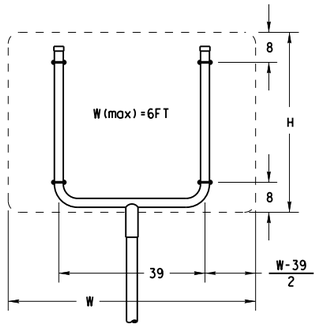


SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



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



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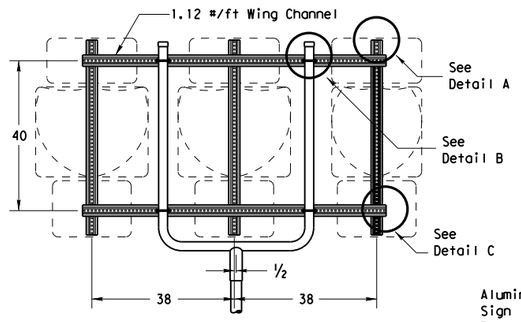
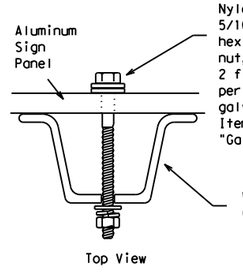
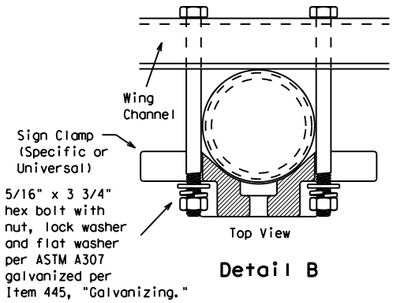


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



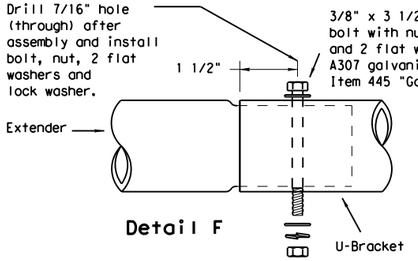
Top View

Detail A



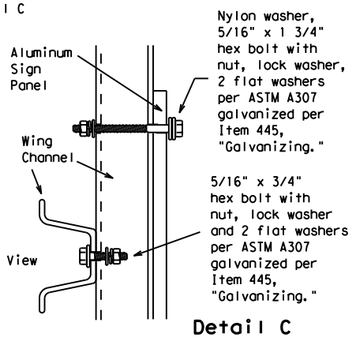
Top View

Detail B

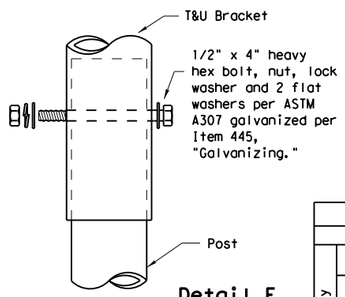


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



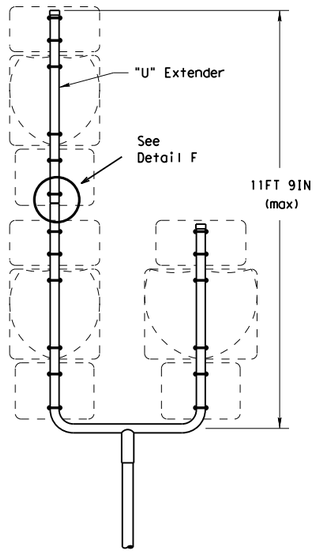
Detail E

GENERAL NOTES:

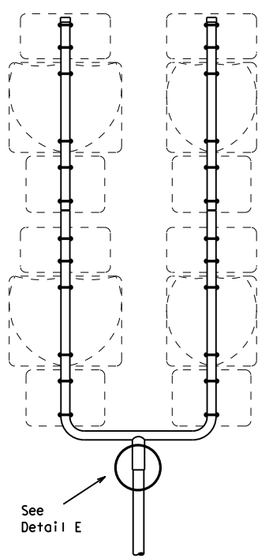
1.

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

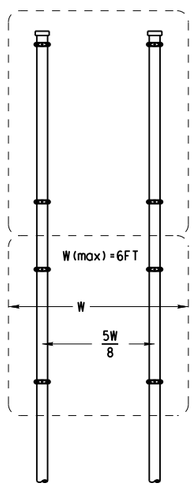
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material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



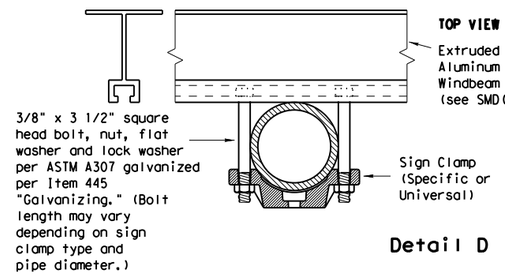
SM RD SGN ASSM TY S80(1)XX(U-1EXT)



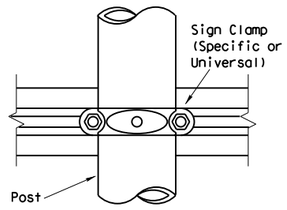
SM RD SGN ASSM TY S80(1)XX(U-2EXT)



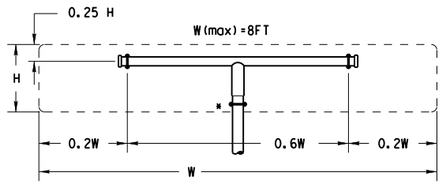
SM RD SGN ASSYM TY XXXXX(2)XX(P)



Detail D



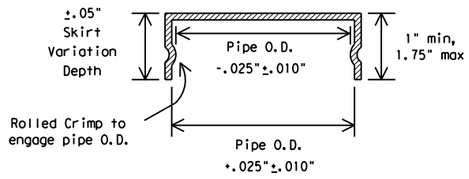
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)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



All dimensions are in english unless detailed otherwise.

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

FRICTION CAP DETAIL



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

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

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

Texas Department of Transportation
Traffic Operations Division

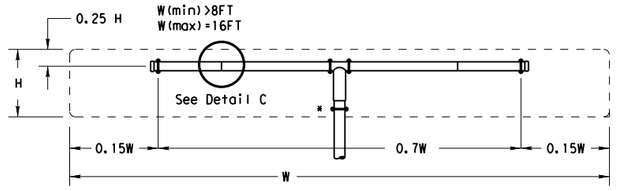
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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

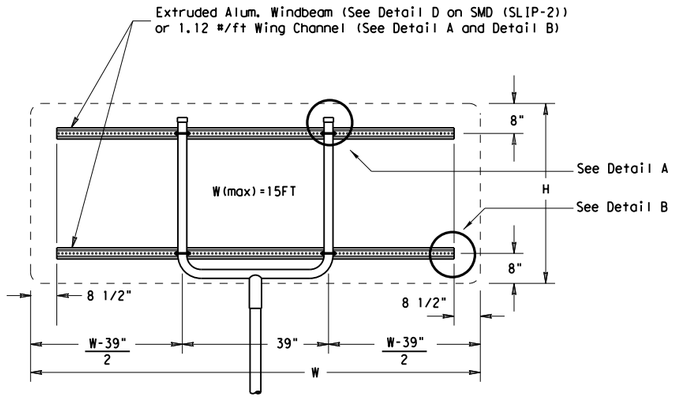
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0004	07	138	IH-20
	DIST	COUNTY		SHEET NO.
	IH-20	ECTOR		129

DATE:
FILE:

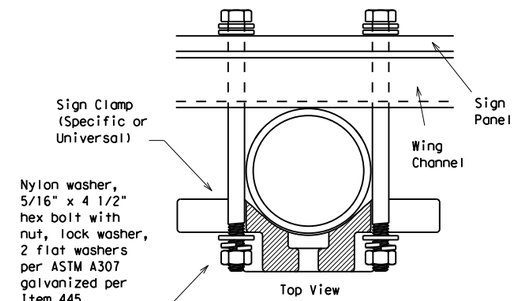


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

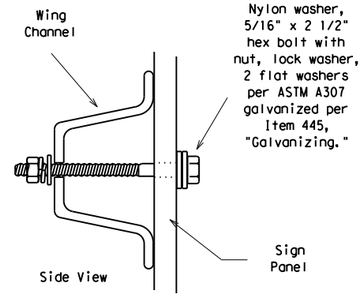
(* - See Note 12)



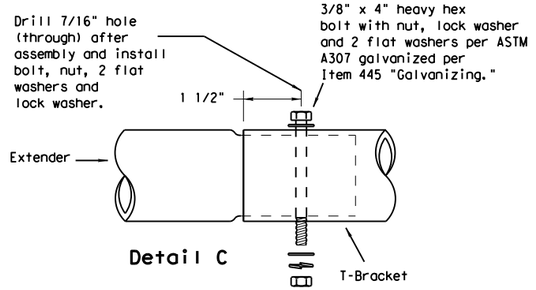
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



Detail A

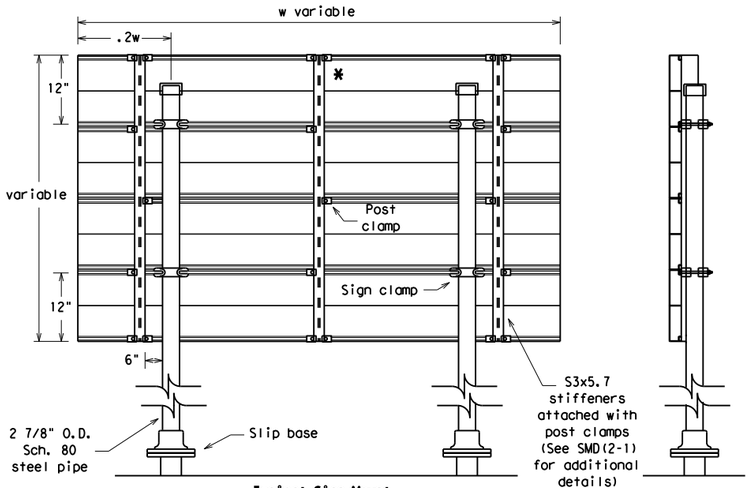


Detail B



Detail C

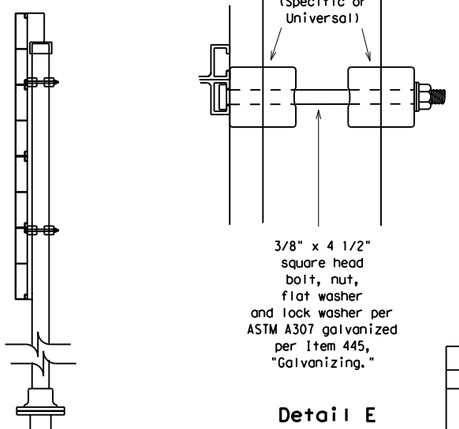
Splices shall only be allowed behind the sign substrate.

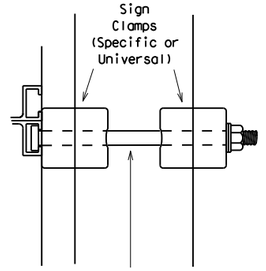


Typical Sign Mount

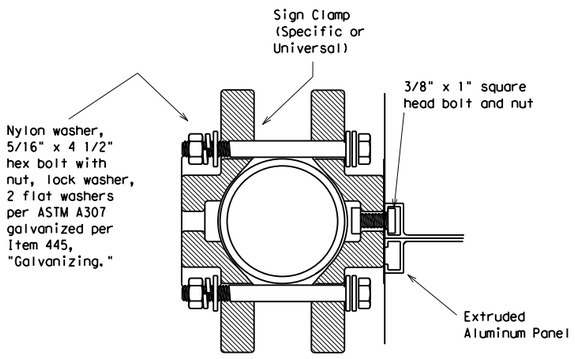
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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



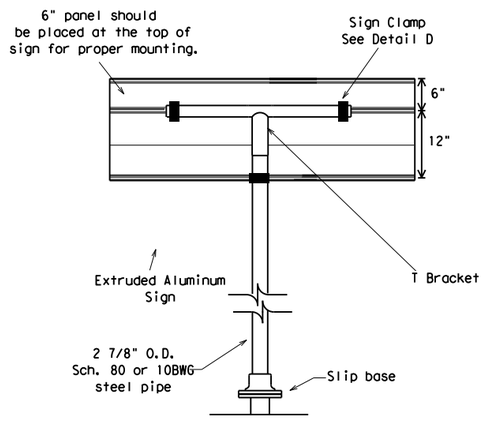


Detail E

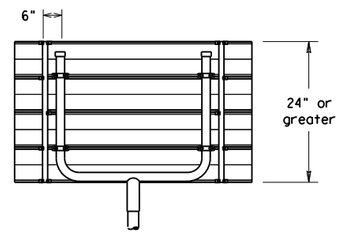


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

GENERAL NOTES:

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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS
9-08

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

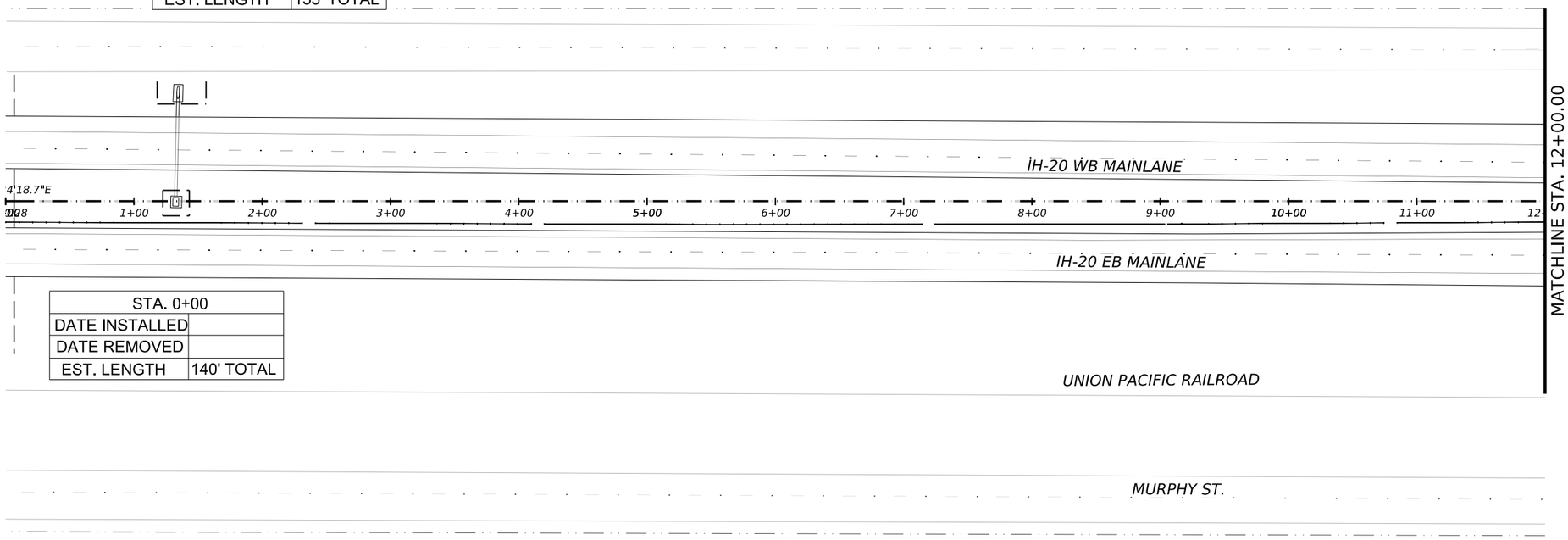
CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20

DIST	COUNTY	SHEET NO.
ODA	ECTOR	130

DATE:
FILE:

— — — EROSION CONTROL LOG

STA. 1+33	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	155' TOTAL



STA. 0+00	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	140' TOTAL

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.

11/27/2023

Texas Department of Transportation

SW3P LAYOUT

SHEET 1 OF 23

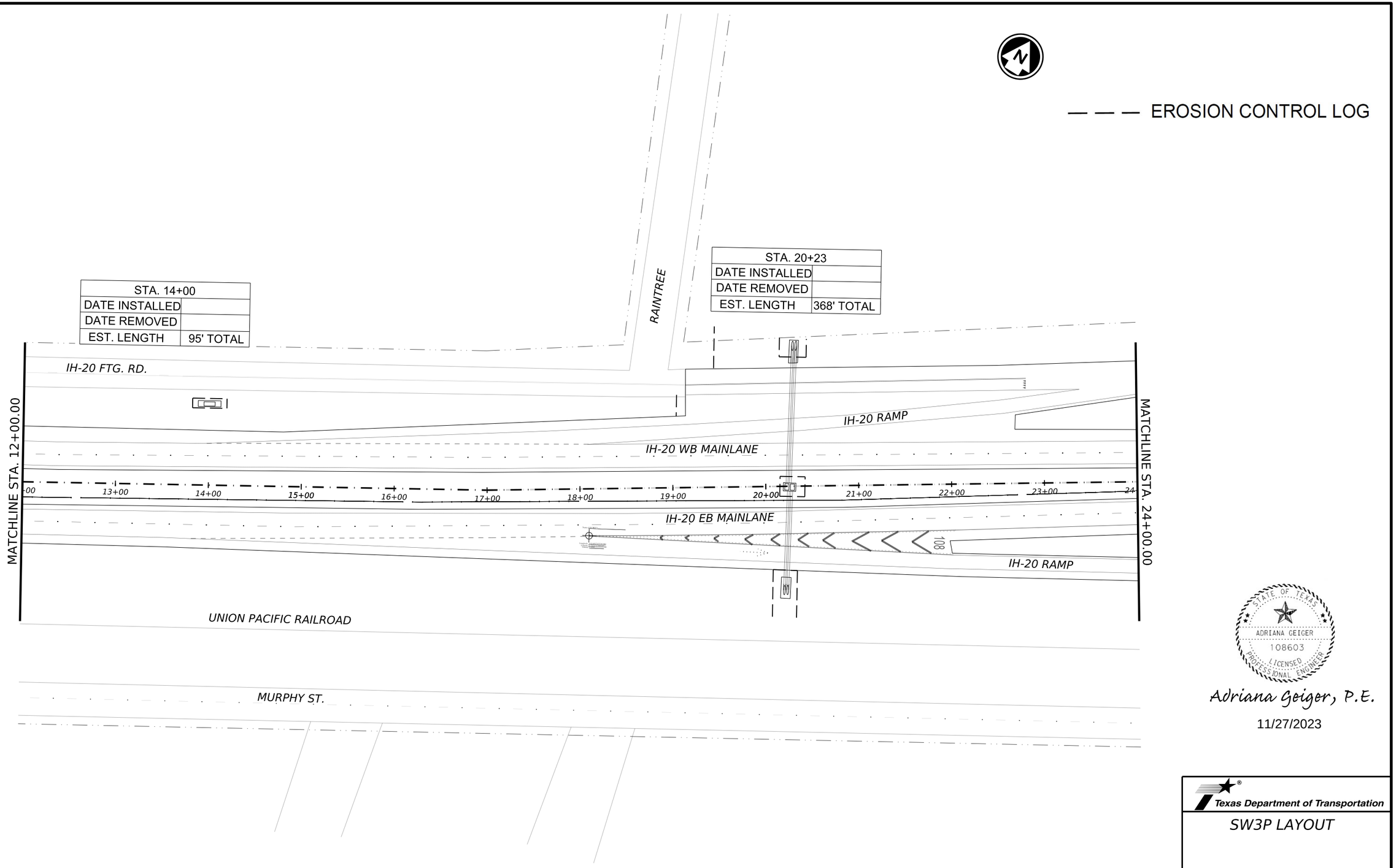
CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		131

DATE: 11/27/2023 10:28:08 AM
FILE: $FILE$

— — — EROSION CONTROL LOG

STA. 14+00	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	95' TOTAL

STA. 20+23	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	368' TOTAL



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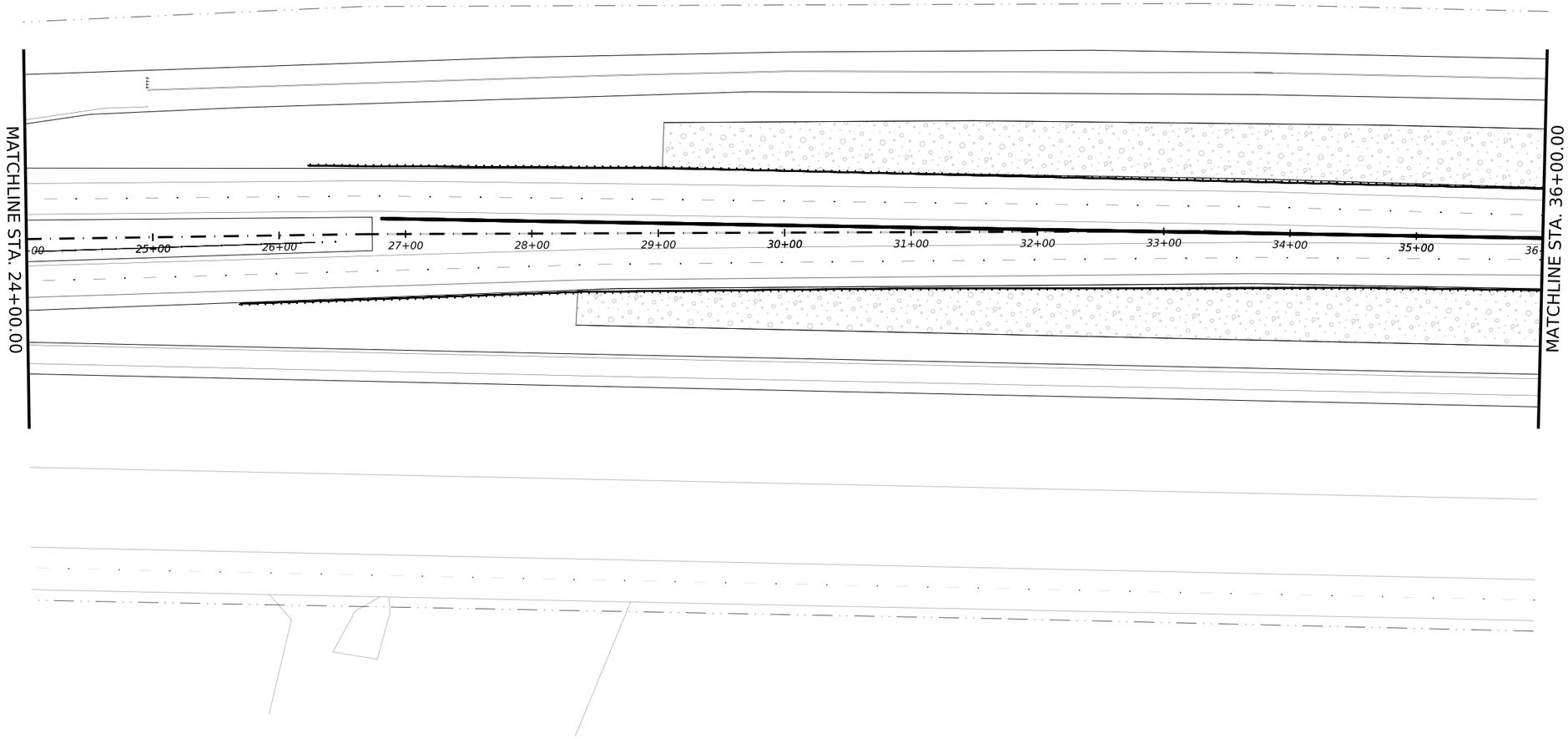
SW3P LAYOUT

SHEET 2 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		132

DATE: 11/27/2023 10:28:11 AM
FILE: $FILE$

— — — EROSION CONTROL LOG



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SW3P LAYOUT

SHEET 3 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		133

DATE: 11/27/2023 10:28:14 AM
FILE: $FILE$

— — — EROSION CONTROL LOG

STA. 38+24	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	100' TOTAL

STA. 42+00	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	65' TOTAL

MOSS AVE.

IH-20 FTG. RD.

⑧

①

MATCHLINE STA. 36+00.00

IH-20 WB MAINLANE

IH-20 EB MAINLANE

37+00 38+00 39+00 40+00 41+00 42+00 43+00 44+00 45+00 46+00 47+00

MATCHLINE STA. 48+00.00

IH-20 RAMP

UNION PACIFIC RAILROAD

MURPHY ST.

MOSS AVE.

STA. 37+00	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	100' TOTAL

STA. 44+00	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	310' TOTAL

STA. 45+38	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	356' TOTAL

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SW3P LAYOUT

SHEET 4 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		134

DATE: 11/27/2023 10:28:18 AM
FILE: $FILE$

— — — EROSION CONTROL LOG

STA. 58+00	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	76' TOTAL

STATE OF TEXAS
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SW3P LAYOUT

SHEET 5 OF 23

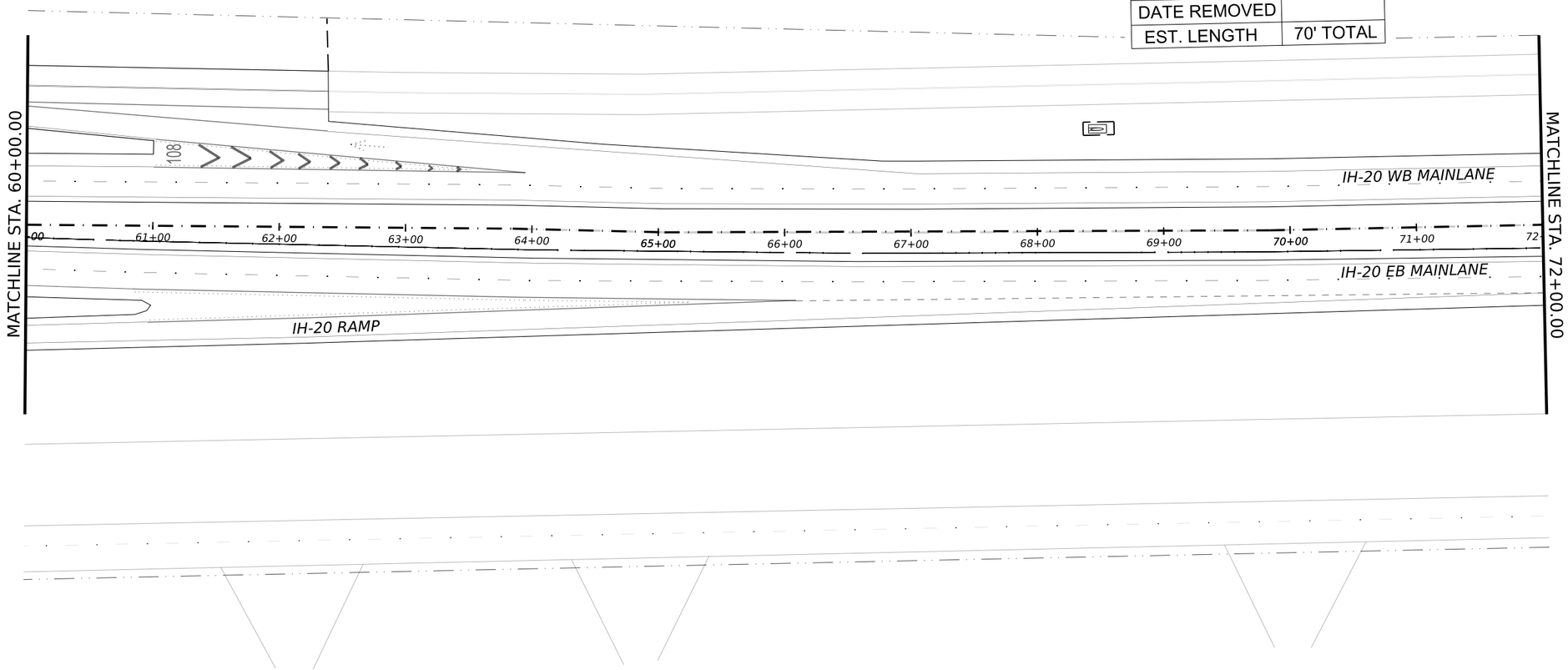
CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		135

DATE: 11/27/2023 10:28:21 AM
FILE: $FILE$

— — — EROSION CONTROL LOG

STA. 63+30	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	40' TOTAL

STA. 68+50	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	70' TOTAL



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11/27/2023

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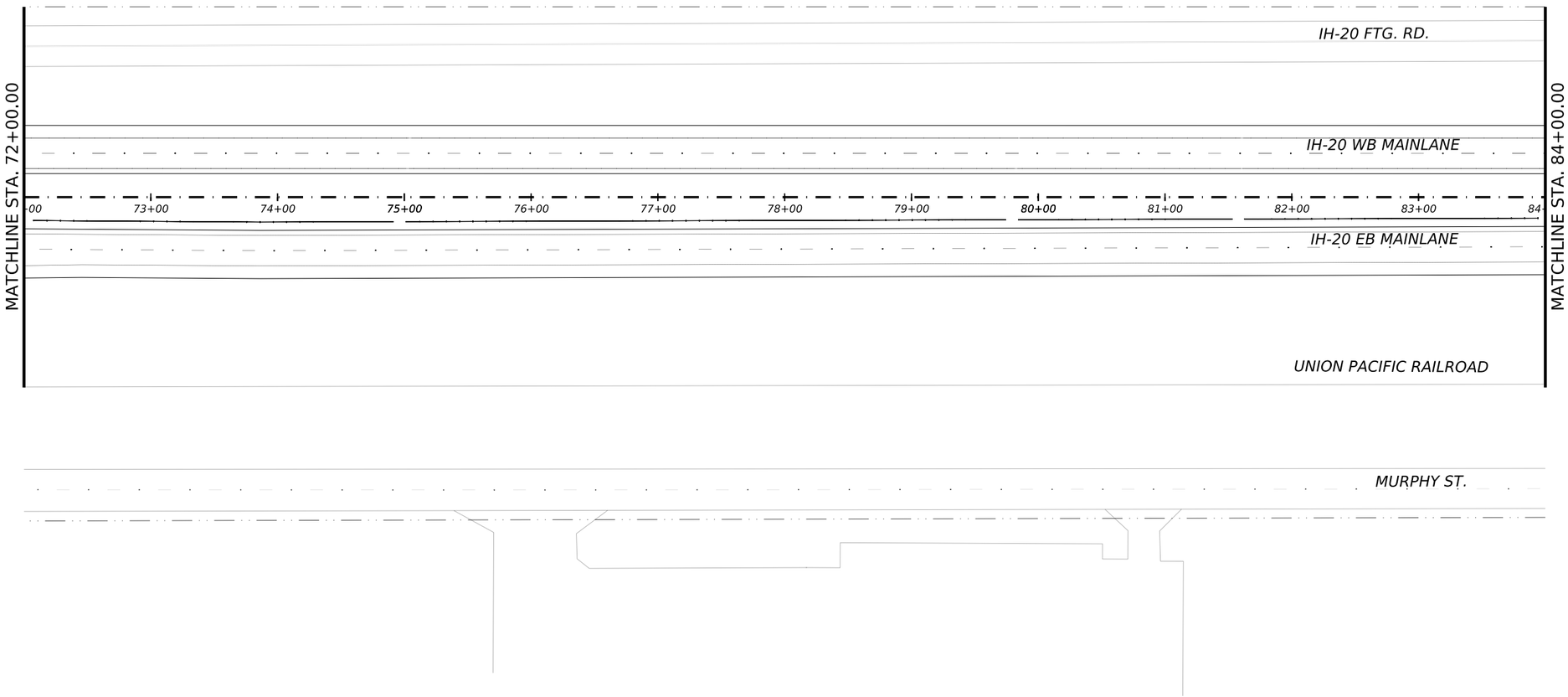
SW3P LAYOUT

SHEET 6 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		136

DATE: 11/27/2023 10:28:25 AM
FILE: $FILE$

— — — EROSION CONTROL LOG



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11/27/2023

Texas Department of Transportation

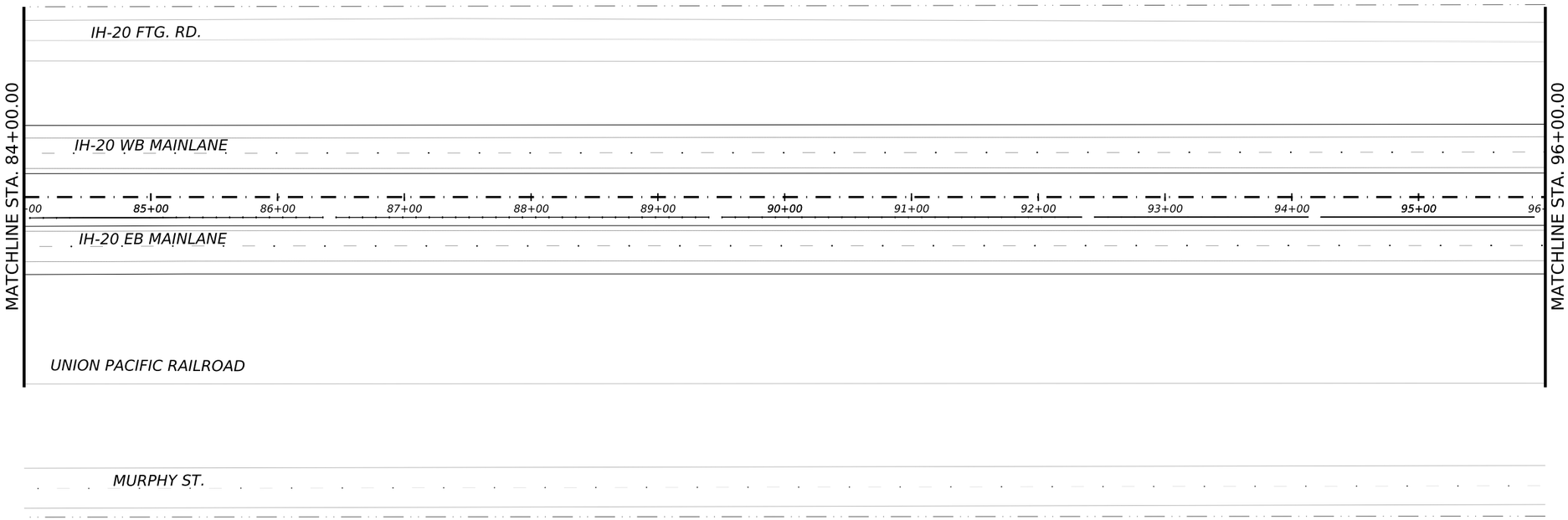
SW3P LAYOUT

SHEET 7 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		137

DATE: 11/27/2023 10:28:28 AM
FILE: $FILE$

— — — EROSION CONTROL LOG



STATE OF TEXAS
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Adriana Geiger, P.E.

11/27/2023

Texas Department of Transportation

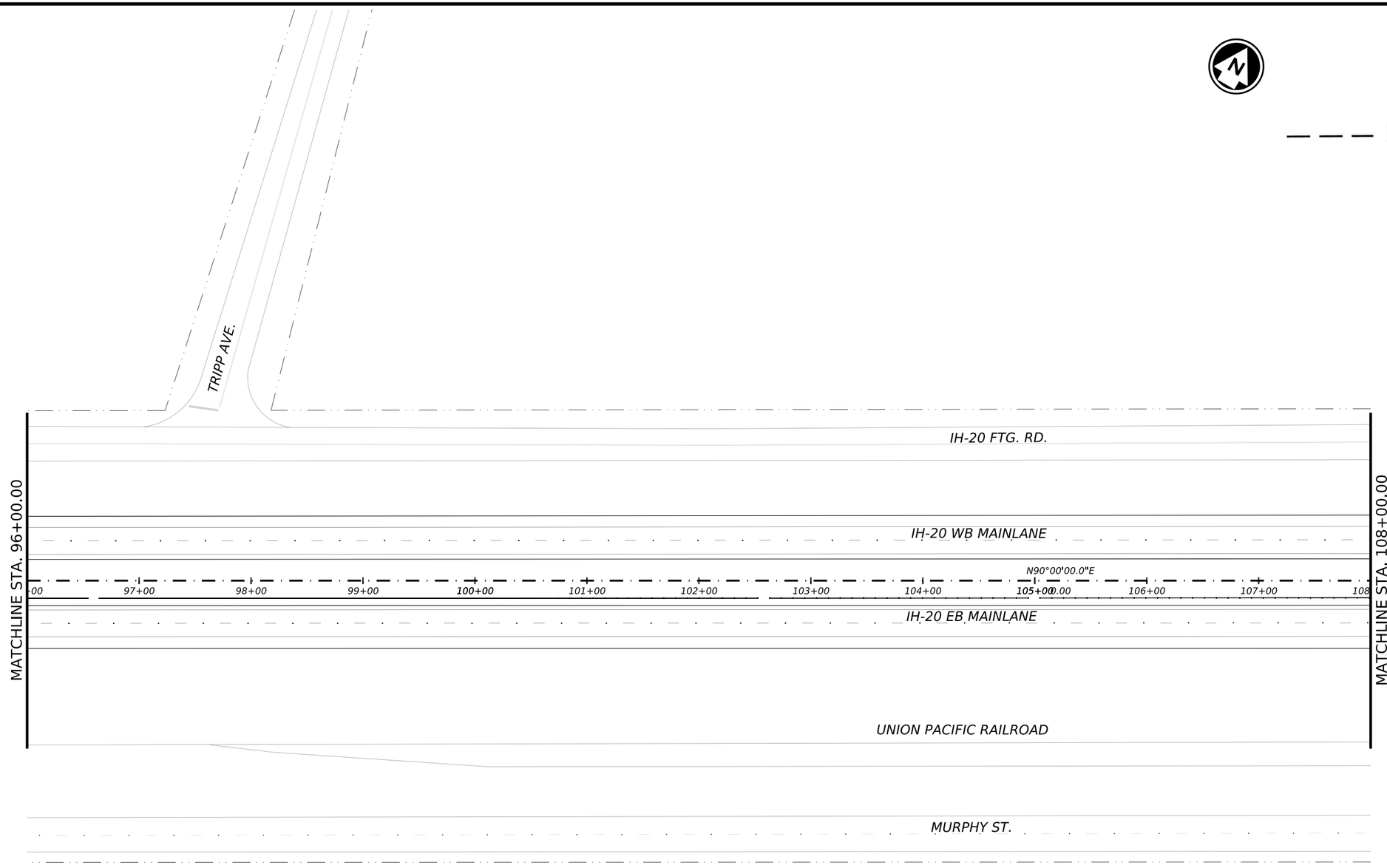
SW3P LAYOUT

SHEET 8 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		138

DATE: 11/27/2023 10:28:30 AM
FILE: $FILE$

— — — EROSION CONTROL LOG



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Adriana Geiger, P.E.

11/27/2023

Texas Department of Transportation

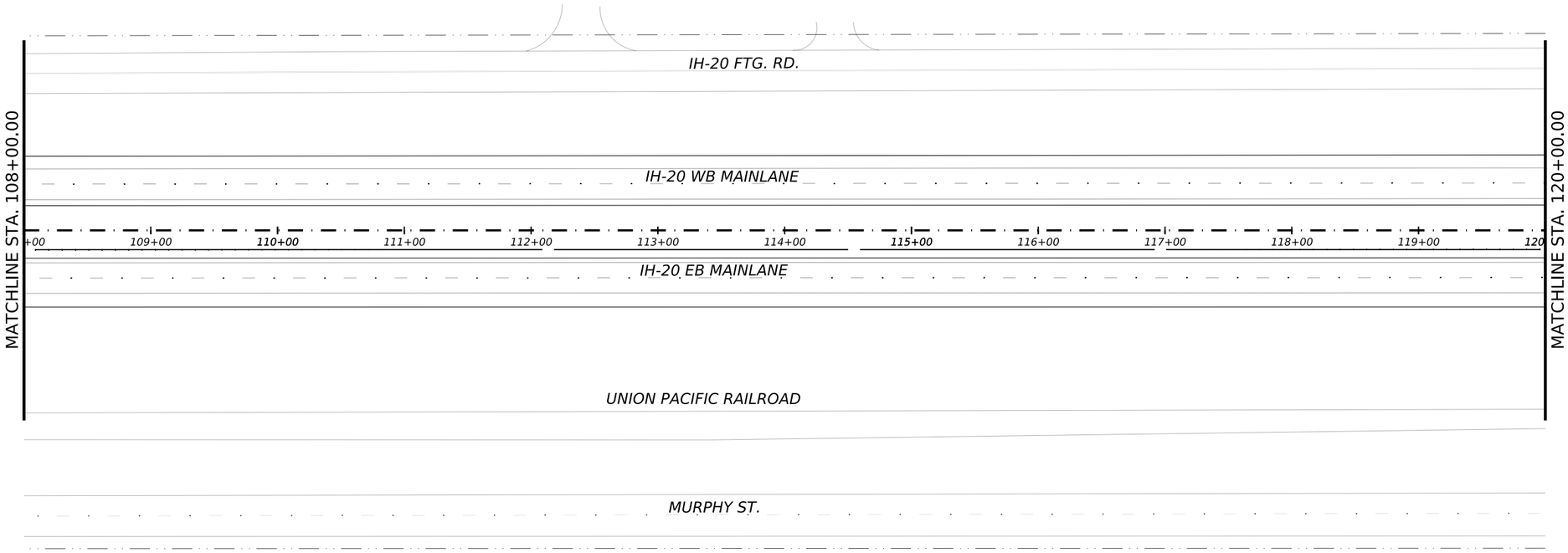
SW3P LAYOUT

SHEET 9 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		139

DATE: 11/27/2023 10:28:33 AM
FILE: $FILE$

— — — EROSION CONTROL LOG



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Adriana Geiger, P.E.
11/27/2023

Texas Department of Transportation

SW3P LAYOUT

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		140

DATE: 11/27/2023 10:28:36 AM
FILE: $FILE$

— — — EROSION CONTROL LOG

EDGEWOOD AVE.

IH-20 WB MAINLANE

IH-20 EB MAINLANE

MATCHLINE STA. 120+00.00

MATCHLINE STA. 132+00.00

121+00 122+00 123+00 124+00 125+00 126+00 127+00 128+00 129+00 130+00 131+00

STATE OF TEXAS
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11/27/2023

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SW3P LAYOUT

SHEET 11 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		141

DATE: 11/27/2023 10:28:39 AM
FILE: $FILE$

— — — EROSION CONTROL LOG

KELLOG AVE.

IH-20 FTG. RD.

IH-20 WB MAINLANE

IH-20 EB MAINLANE

MATCHLINE STA. 132+00.00

MATCHLINE STA. 144+00.00

133+00 134+00 135+00 136+00 137+00 138+00 139+00 140+00 141+00 142+00 143+00

UNION PACIFIC RAILROAD

MURPHY ST.

STATE OF TEXAS
ADRIANA GEIGER
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LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.

11/27/2023

Texas Department of Transportation

SW3P LAYOUT

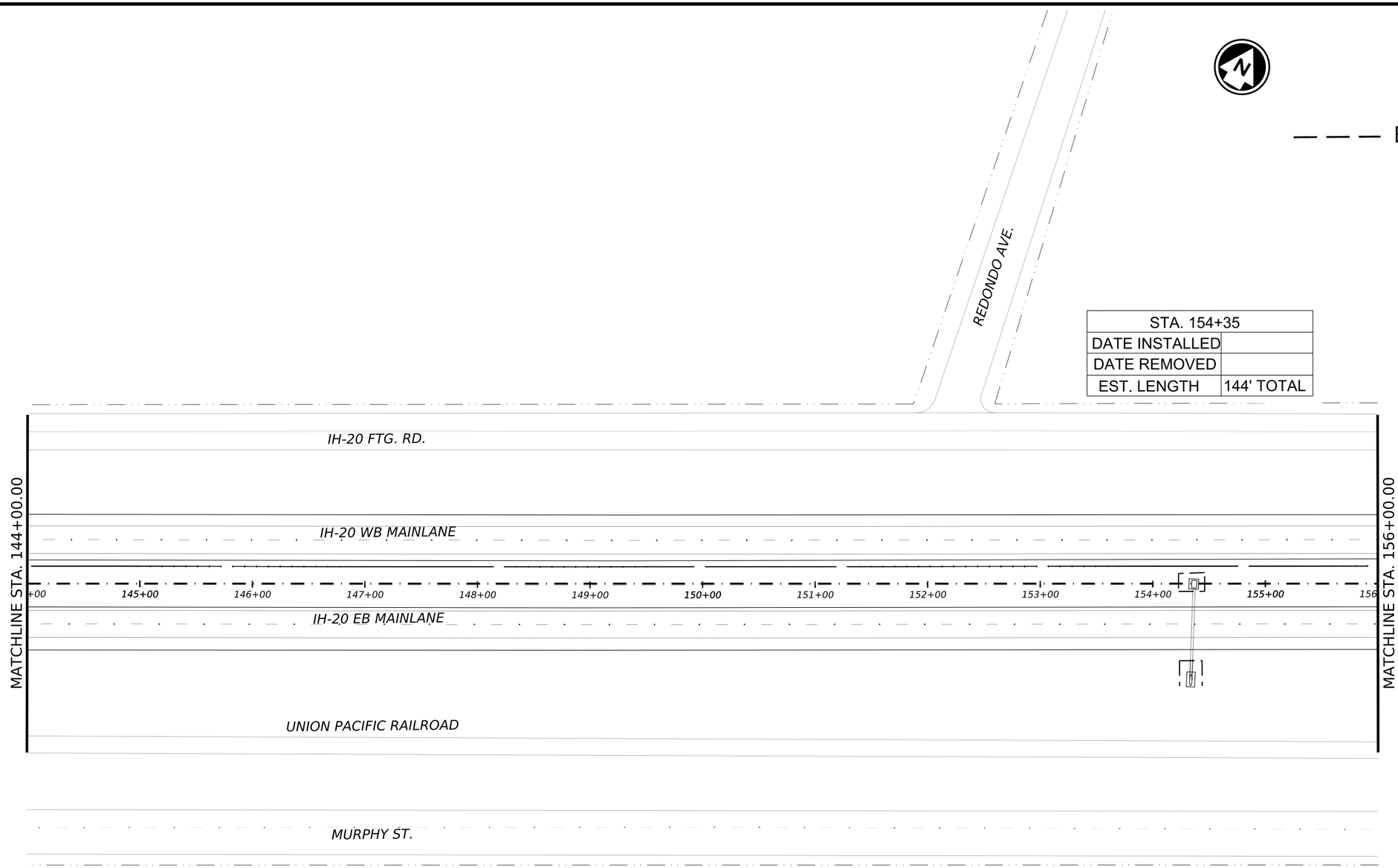
SHEET 12 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		142

DATE: 11/27/2023 10:28:42 AM
FILE: $FILE$

— — — EROSION CONTROL LOG

STA. 154+35	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	144' TOTAL



STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.

11/27/2023

Texas Department of Transportation

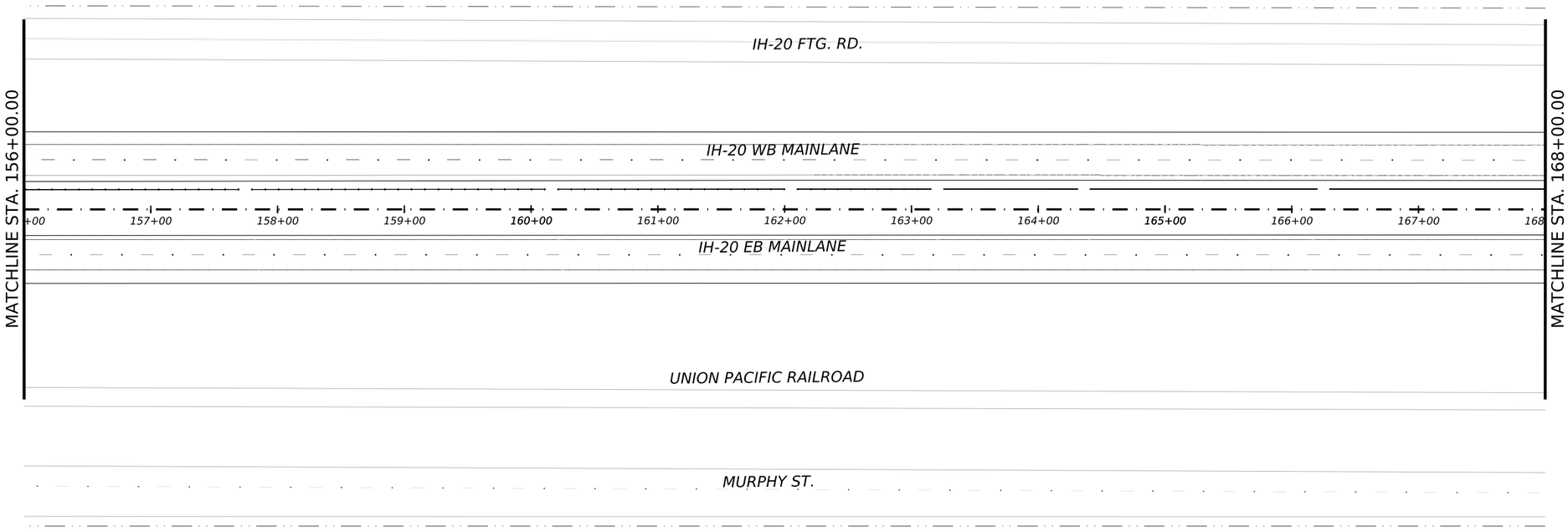
SW3P LAYOUT

SHEET 13 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		143

DATE: 11/27/2023 10:28:44 AM
FILE: $FILE$

— — — EROSION CONTROL LOG



STATE OF TEXAS
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108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

Texas Department of Transportation

SW3P LAYOUT

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		144

DATE: 11/27/2023 10:28:47 AM
FILE: $FILE$

— — — EROSION CONTROL LOG

STATE OF TEXAS
ADRIANA GEIGER
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11/27/2023

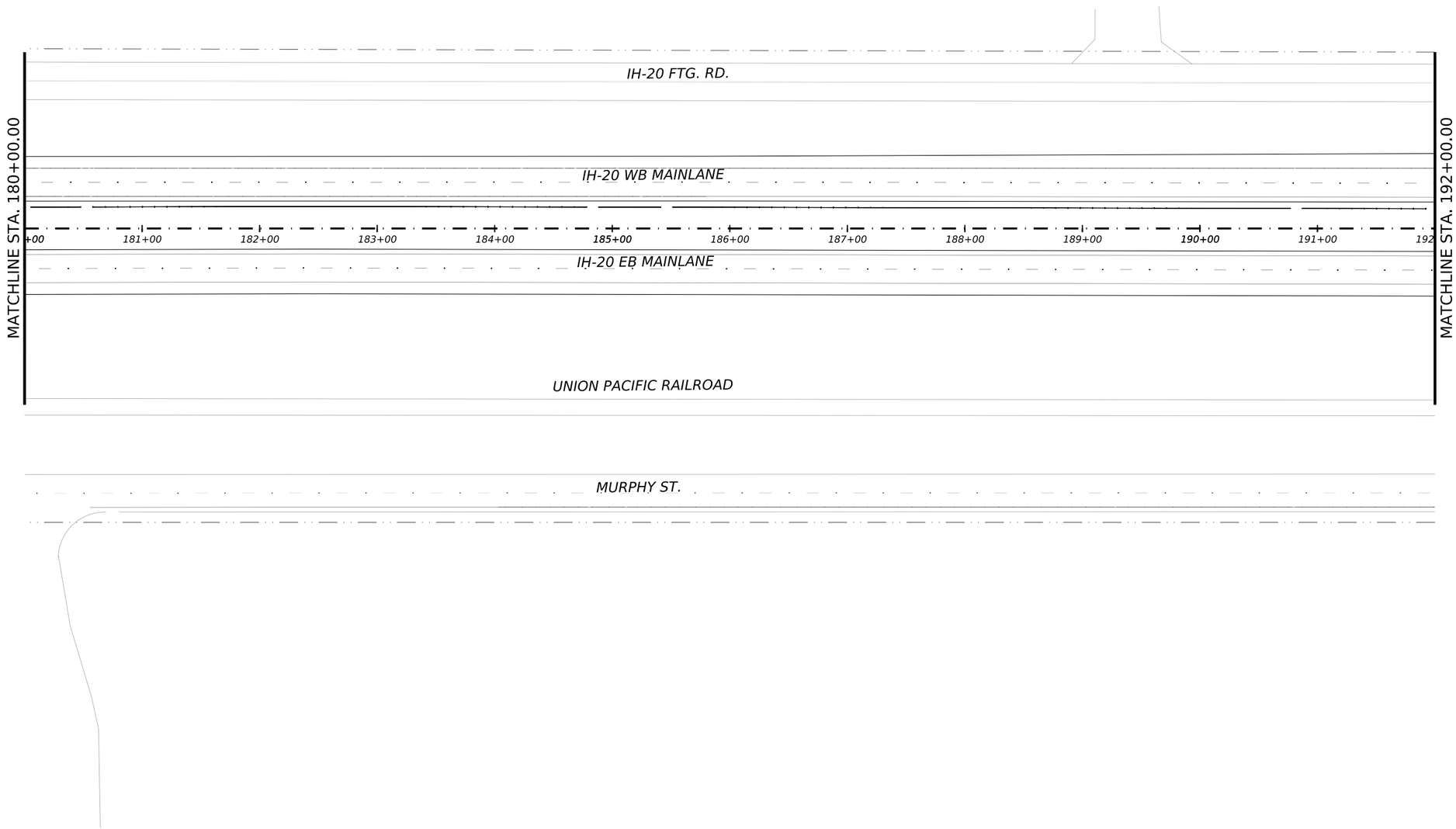
Texas Department of Transportation

SW3P LAYOUT

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		145

DATE: 11/27/2023 10:28:50 AM
FILE: $FILE$

— — — EROSION CONTROL LOG



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11/27/2023

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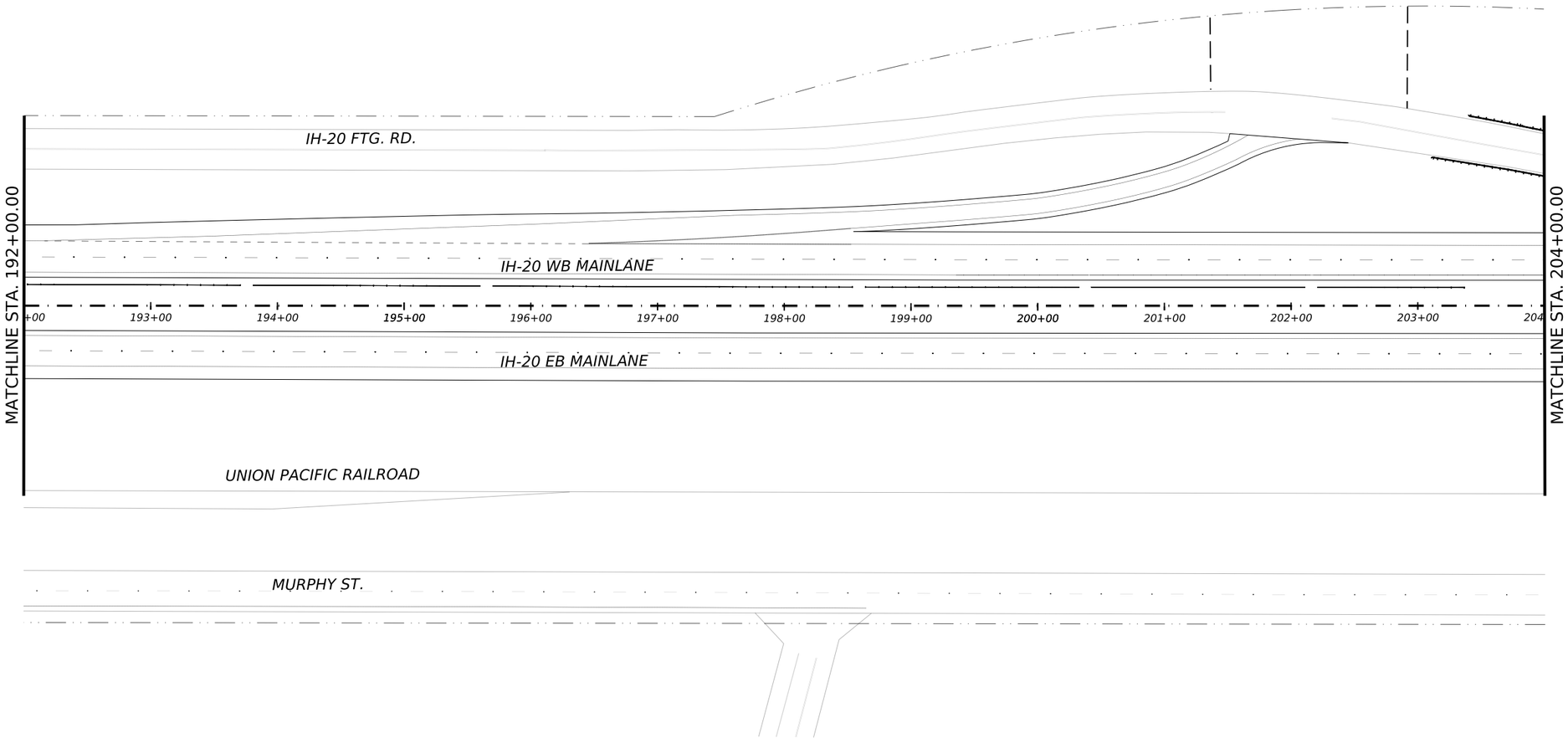
SW3P LAYOUT

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		146

DATE: 11/27/2023 10:28:53 AM
FILE: $FILE$

— — — EROSION CONTROL LOG

STA. 202+00	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	135' TOTAL



STATE OF TEXAS
ADRIANA GEIGER
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11/27/2023

Texas Department of Transportation

SW3P LAYOUT

SHEET 17 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		147

DATE: 11/27/2023 10:28:56 AM
FILE: $FILE$

— — — EROSION CONTROL LOG

STA. 204+70	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	60' TOTAL

STA. 205+43	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	145' TOTAL

FM 1936

IH-20 ACCESS RD.

IH-20 FTG. RD.

IH-20 WB MAINLANE

IH-20 EB MAINLANE

MATCHLINE STA. 204+00.00

MATCHLINE STA. 216+00.00

204+00 205+00 206+00 207+00 208+00 209+00 210+00 211+00 212+00 213+00 214+00 215+00 216

UNION PACIFIC RAILROAD

MURPHY ST.

FM 1936

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11/27/2023

Texas Department of Transportation

SW3P LAYOUT

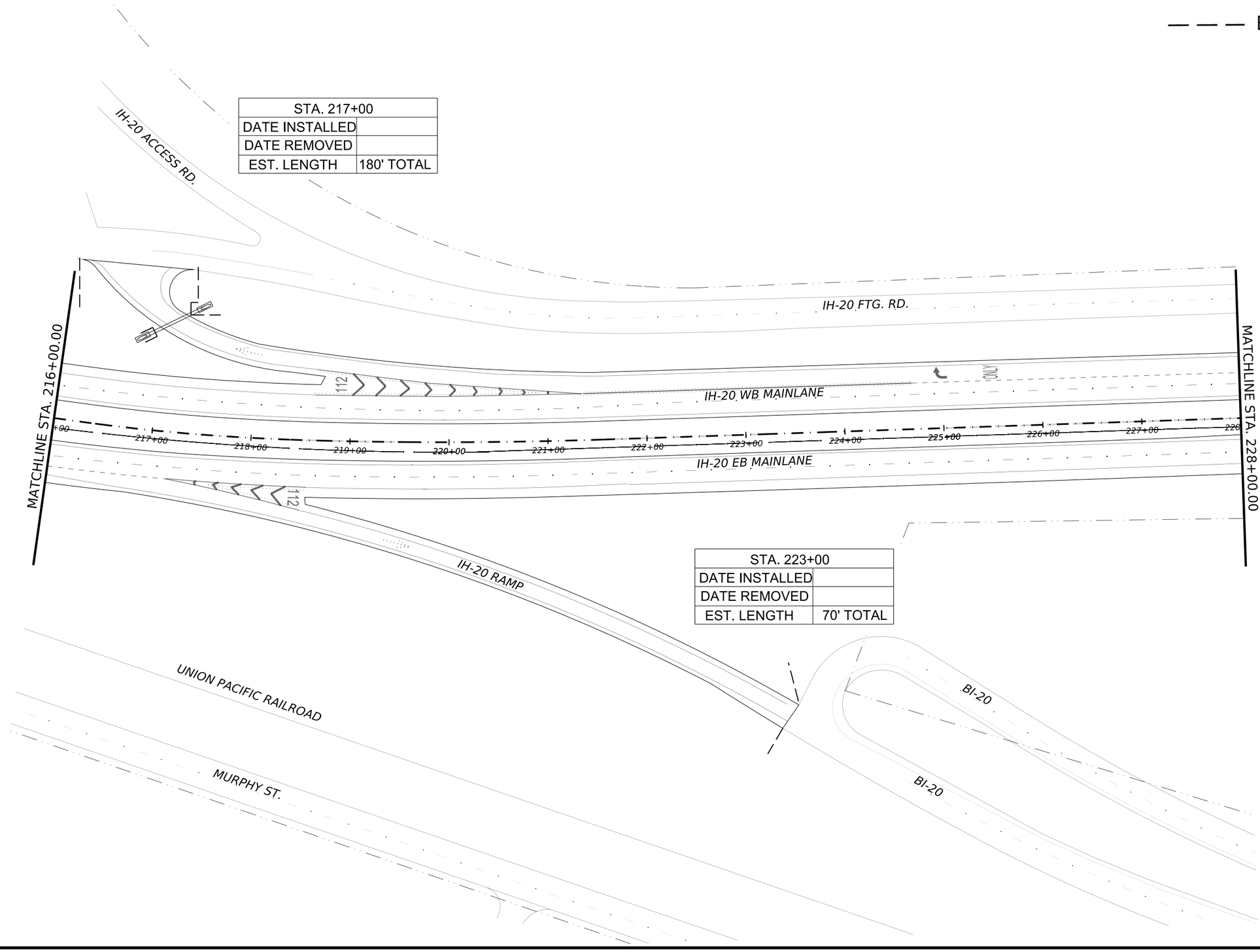
CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		148

DATE: 11/27/2023 10:28:59 AM
FILE: $FILE$

— — — EROSION CONTROL LOG

STA. 217+00	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	180' TOTAL

STA. 223+00	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	70' TOTAL



STATE OF TEXAS
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Adriana Geiger, P.E.

11/27/2023

Texas Department of Transportation

SW3P LAYOUT

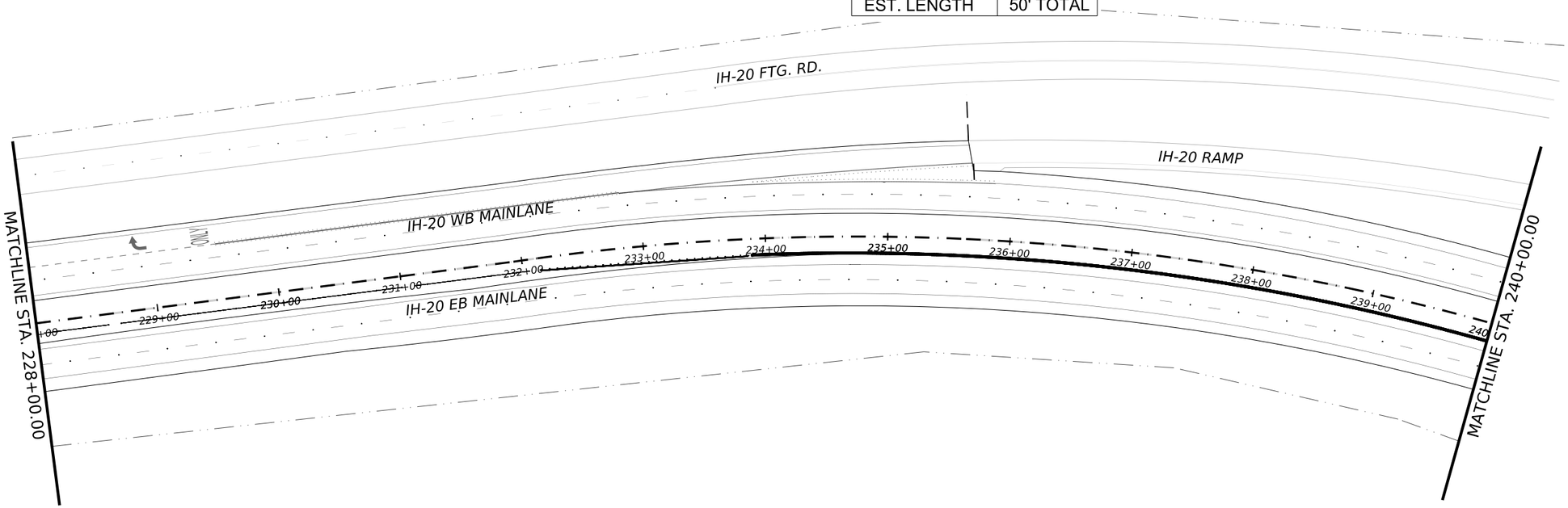
SHEET 19 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		149

DATE: 11/27/2023 10:29:01 AM
FILE: $FILE$

— — — EROSION CONTROL LOG

STA. 235+70	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	50' TOTAL



STATE OF TEXAS
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11/27/2023

Texas Department of Transportation

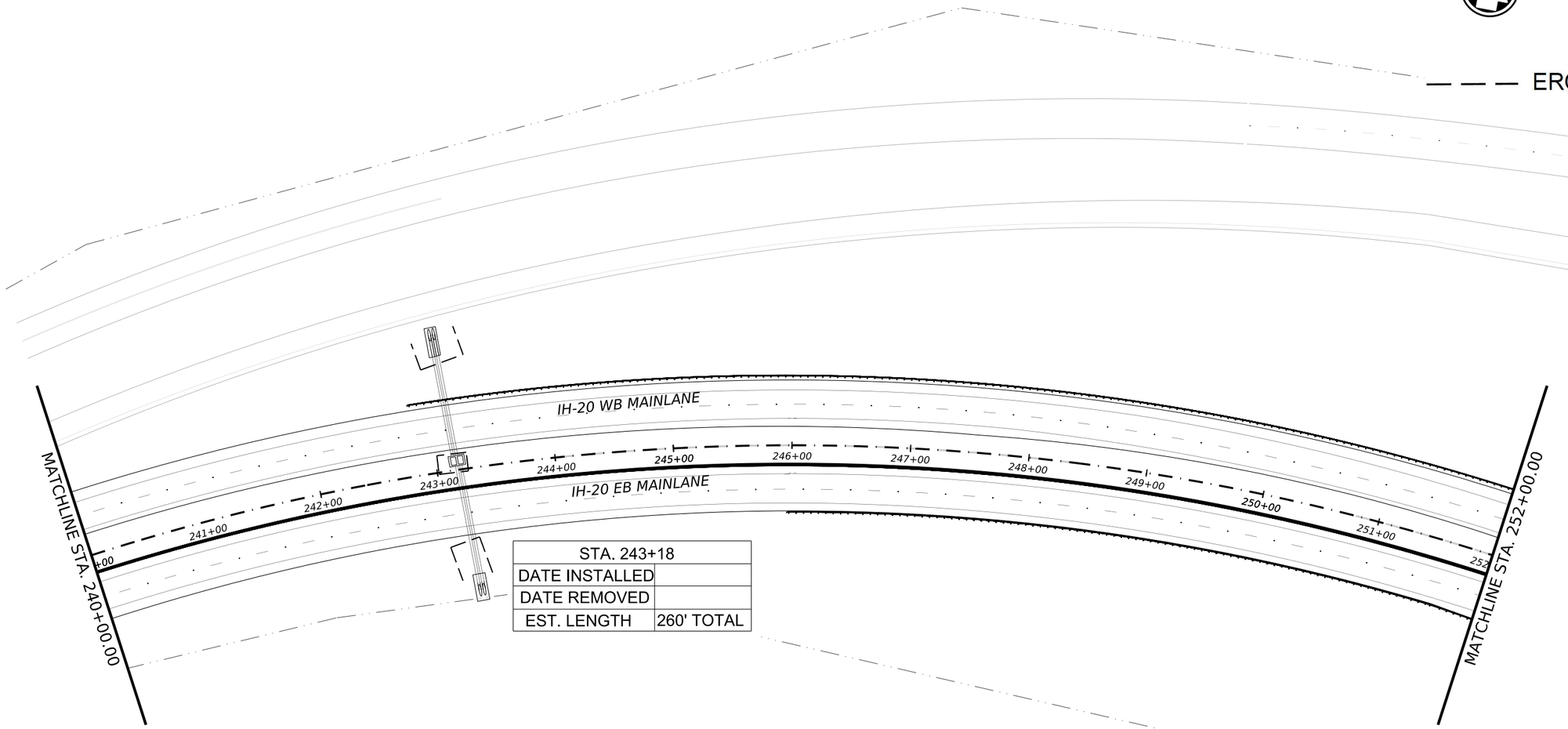
SW3P LAYOUT

SHEET 20 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		150

DATE: 11/27/2023 10:29:04 AM
FILE: $FILE$

— — — EROSION CONTROL LOG



STA. 243+18	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	260' TOTAL

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

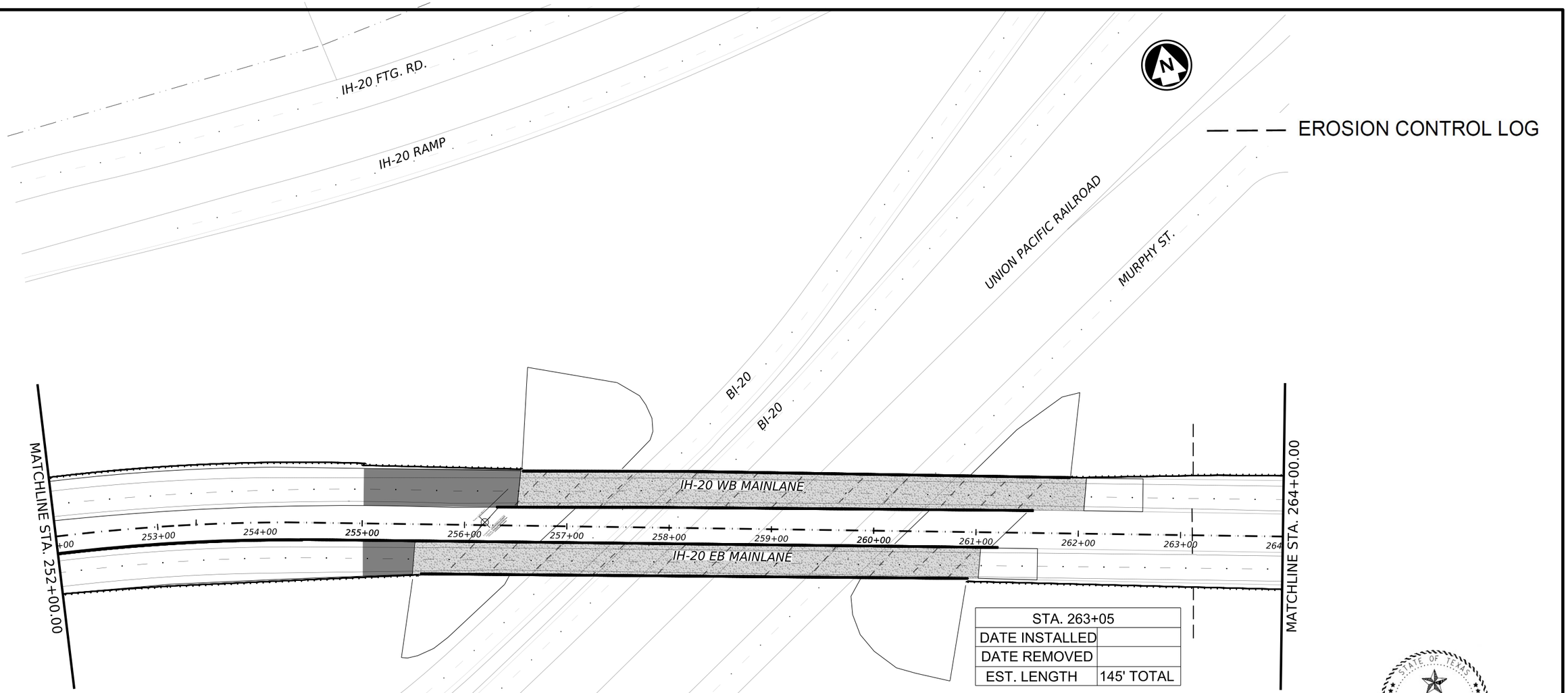
Texas Department of Transportation

SW3P LAYOUT

SHEET 21 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		151

DATE: 11/27/2023 10:29:07 AM
FILE: $FILE$



STA. 263+05	
DATE INSTALLED	
DATE REMOVED	
EST. LENGTH	145' TOTAL

STATE OF TEXAS
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PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
11/27/2023

Texas Department of Transportation

SW3P LAYOUT

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		152

DATE: 11/27/2023 10:29:11 AM
FILE: $FILE$

— — — EROSION CONTROL LOG

I-20 FTG. RD.

MATCHLINE STA. 264+00.00

IH-20 WB MAINLANE

S74°57'11.9"E

+00 2027.71 265+00 266+00 267+00 268+00 269+00 270+00 271+00 272+00 273+00 274+00

IH-20 EB MAINLANE

IH-20 FTG. RD.

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.

11/27/2023

Texas Department of Transportation

SW3P LAYOUT

SHEET 23 OF 23

CONT	SECT	JOB	HIGHWAY
0004	07	138	IH-20
DIST	COUNTY		SHEET NO.
ODA	ECTOR		153

DATE: 11/27/2023 10:29:16 AM
FILE: $FILE$

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

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

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

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

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):

_____

1.2 PROJECT LIMITS:

From: MOSS AVE.

To: EAST OF FM 1936

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 31.7809630 ,(Long) -102.4904230

END: (Lat) 31.8166834 ,(Long) -102.4187907

1.4 TOTAL PROJECT AREA (Acres): 45 AC

1.5 TOTAL AREA TO BE DISTURBED (Acres): 4.8 AC

1.6 NATURE OF CONSTRUCTION ACTIVITY:

ROADWAY REHABILITATION

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Fa (73.4%)	Faskin-Urban land complex
CnA (23.6%)	Conger loam, 0 to 2 percent slopes
SSA (2.1%)	Stegall-Slaughter association, nearly level

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

* 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

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		154
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	04	007	IH-20

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

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

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

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

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

2.2 SEDIMENT CONTROL BMPs:

T / P

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

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

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

T / P

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

2.3 PERMANENT CONTROLS:

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

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

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

2.5 POLLUTION PREVENTION MEASURES:

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

2.6 VEGETATED BUFFER ZONES:

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

Type	Stationing	
	From	To

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

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

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

2.8 INSPECTIONS:

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

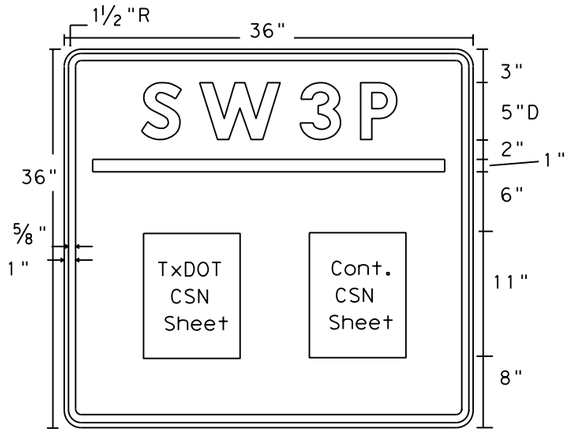
2.9 MAINTENANCE:

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

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
06	SEE TITLE SHEET		155
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	ECTOR	
CONT.	SECT.	JOB	HIGHWAY NO.
0004	04	007	IH-20



SW3P SIGN

TxDOT & Contractor Construction Site Note (CSN)

Sign Dimensions

36" X 36"

Letters - White
Numbers - White
Border - White
Background - Blue

GENERAL NOTES:

1. The alphabets and lateral spacing between letters and numerals shall conform with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways", (TMUTCD) latest edition, and the "Compliant Work Zone Traffic Control Devices List". Lateral spacing of text shall provide a balanced appearance. All materials shall conform to Department Specifications.
2. Legend and border may be applied by reverse screening process with transparent colored ink, cut-out white reflective sheeting applied to colored background or combination thereof. Background shall be reflective sheeting Type C.
3. CSN Sheets will be laminated and attached to the sign with an adhesive. Ensure sheets remain dry. (See Figure 1).
4. SW3P Signs should be placed just inside the ROW line at the project limits at a readable height. It may be placed perpendicular or parallel to ROW line. If the sign cannot be placed outside the clear zone, it will be mounted per TMUTCD requirements.
5. Final location of the signs will be as approved by the Engineer.

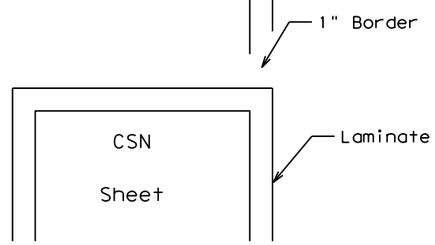
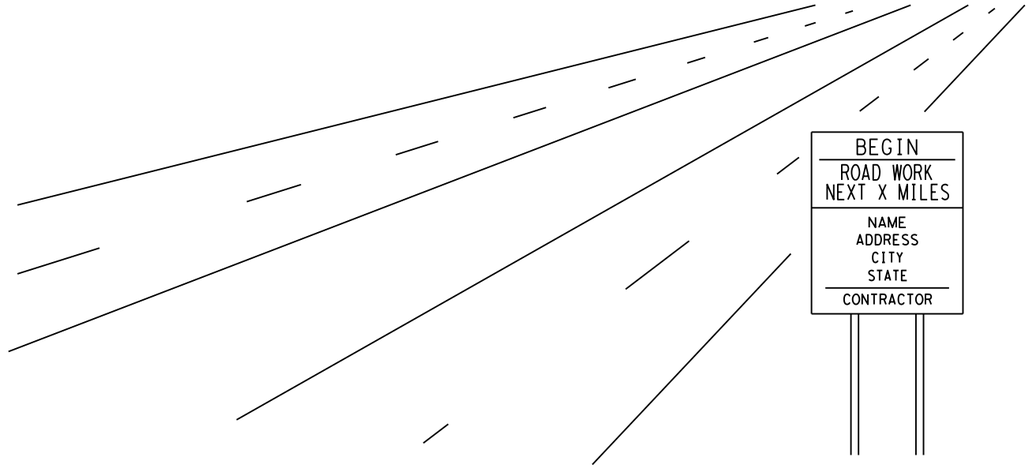
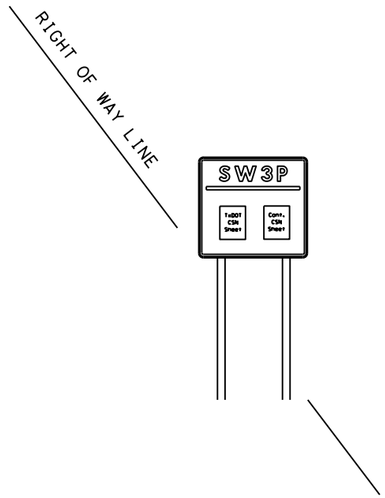


Figure 1





DEPARTMENT MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
FLAT SURFACE REFLECTIVE SHEETING	DMS-8300
VINYL NON-REFLECTIVE DECAL SHEETING	DMS-8320

COLOR	USAGE	REFLECTIVE SHEETING OR OTHER MATERIAL
BLUE	BACKGROUND	TYPE C (FLUORESCENT PRISMATIC)
WHITE	LEGEND & BORDERS	VINYL NON-REFLECTIVE DECAL SHEETING

Texas Department of Transportation
DALLAS DISTRICT STANDARD

SW3P SIGN SHEET

FILE:	DN: TxDOT	CK:	DW:	CK:
	DISTRICT	FEDERAL AID PROJECT		SHEET
REVISION DATE: 10-16-15	ODA	SEE TITLE SHEET		156
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	ECTOR	0004	04	007	IH-20

LEVELS DISPLAYED
PATH:

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 412458P
Crossing Type: At Grade
RR Company Operating Track at Crossing: UNION PACIFIC RAILROAD
RR Company Owning Track at Crossing: UNION PACIFIC RAILROAD
RR MP: 5 81.130
RR Subdivision: Toyah
City: Odessa
County: Ector
CSJ at this Crossing: 0004-07-138
Latitude: 31.786420°
Longitude: -102.478932°

Scope of Work, including any TCP, to be performed by State Contractor:

Mill & Fill of WB Lanes of IH-20 and overlay of EB lanes and Moss Ramps. BI-20 Overpass Bridge deck Mill & Filling and joint repairs. At Moss/IH-20 underpass intersection will be replaced with a rigid pavement CRCP structure.

Scope of Work to be performed by Railroad Company:

None

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: _____

On this project, night or weekend flagging is:

☑ Expected
☐ Not Expected

Flagging services will be provided by:

☐ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☑ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☑ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-6777

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **CPKCR** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☑ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required

Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☑ Not Required	
☐ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☑ Not Required
☐ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
  ☐ BNSF: _____
  https://bnsf.railpermitting.com
  ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
  ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: Union Pacific Railroad Company
Railroad Emergency Line at: 1-888-877-7267
Location: DOT 412458P
RR Milepost: 581.130
Subdivision: Toyah

RRD Review Only
Initials: JLL
Date: 9/6/2023

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:	
© TxDOT June 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0004	07	138		IH-20	
6/2023		DIST	COUNTY			SHEET NO.	
		ODA	ECTOR			157	

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 796234C
Crossing Type: RR Under
RR Company Operating Track at Crossing: UNION PACIFIC RAILROAD
RR Company Owning Track at Crossing: UNION PACIFIC RAILROAD
RR MP: 577.100
RR Subdivision: Toyah
City: Odessa
County: Ector
CSJ at this Crossing: 0004-07-138
Latitude: 31.816963°
Longitude: -102.420115°

Scope of Work, including any TCP, to be performed by State Contractor:

Mill & Fill of WB Lanes of IH-20 and overlay of EB lanes and Moss Ramps. BI-20 Overpass Bridge deck Mill & Filling and joint repairs. At Moss/IH-20 underpass intersection will be replaced with a rigid pavement CRCP structure.

Scope of Work to be performed by Railroad Company:

None

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 4

On this project, night or weekend flagging is:

☑ Expected
☐ Not Expected

Flagging services will be provided by:

☐ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☑ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

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Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☑ OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☐ Not Required
☑ Required. Contact Information for Construction Inspection:

Jason Taylor

(254)652-0774
jtaylor@benesch.com

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required

Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

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☐ Required: Contractor to obtain
- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

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Call: Union Pacific Railroad Company
Railroad Emergency Line at: 1-888-877-7267
Location: DOT 796234C
RR Milepost: 577.100
Subdivision: Toyah

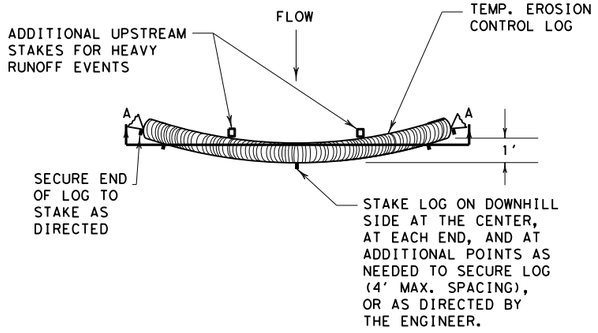
RRD Review Only
Initials: KD
Date: 12/21/23

Texas Department of Transportation — Rail Division

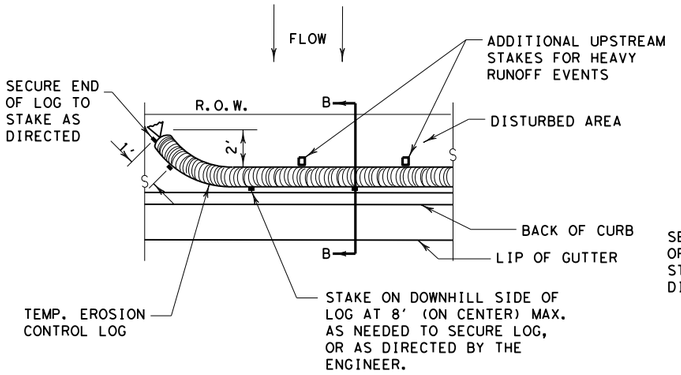
RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf	DN: TxDOT	CK:	DW:		CK:
© TxDOT June 2014	CONT	SECT	JOB		HIGHWAY
REVISIONS 6/2023	0004	07	138		IH-20
	DIST	COUNTY			SHEET NO.
					160

DATE:
FILE:



PLAN VIEW



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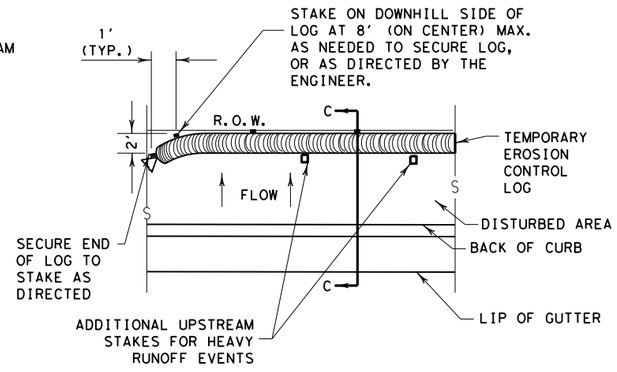

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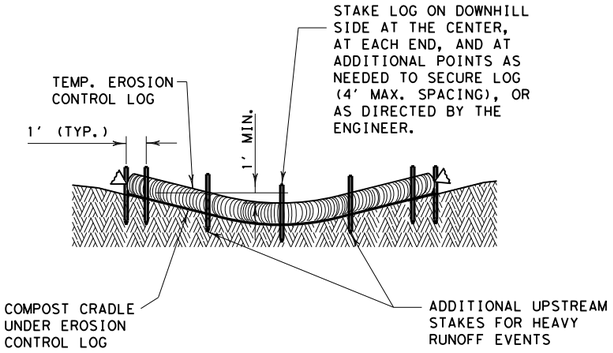
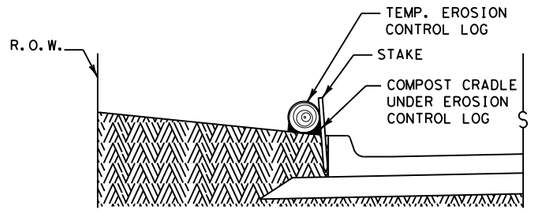


SECTION A-A

EROSION CONTROL LOG DAM

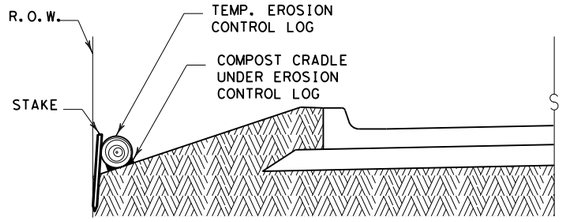
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

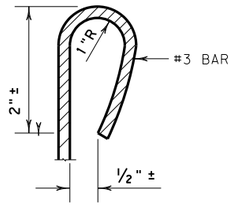
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

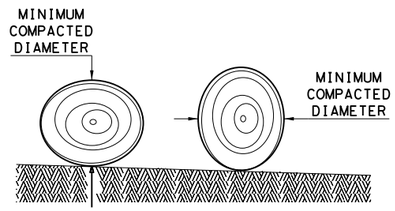
CL-ROW



REBAR STAKE DETAIL

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.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

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

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.

Texas Department of Transportation

Design Division Standard

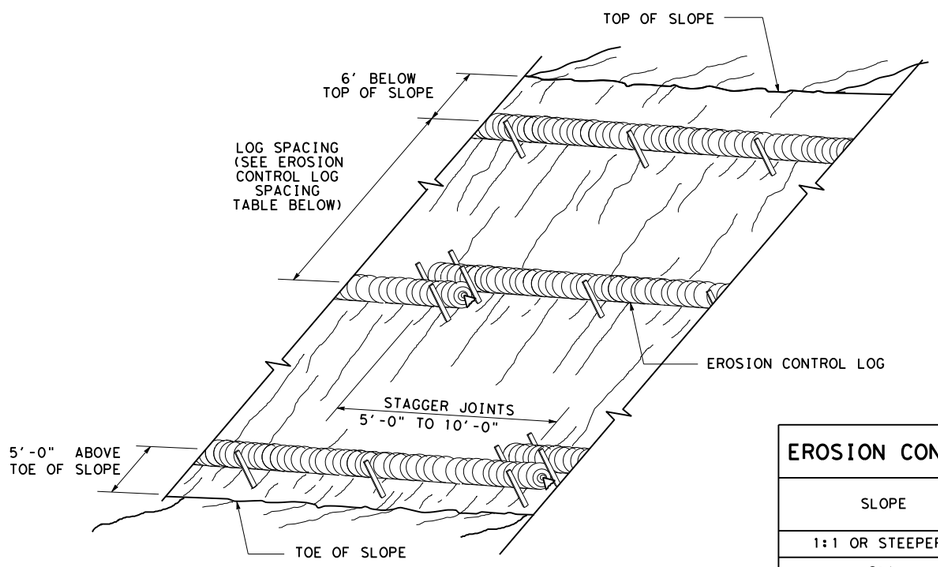
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

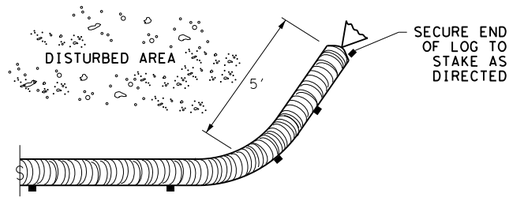
FILE: ec916		DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0004	07	138		IH-20		
	DIST	COUNTY				SHEET NO.	
	ODA	ECTOR				159	

DATE:
FILE:



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

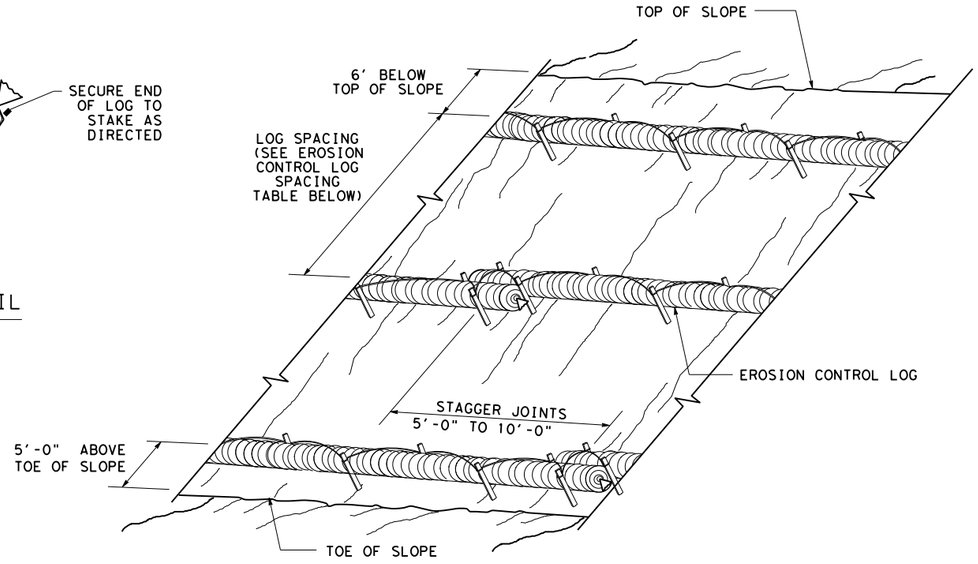
CL-SST



END SECTION RAP DETAIL

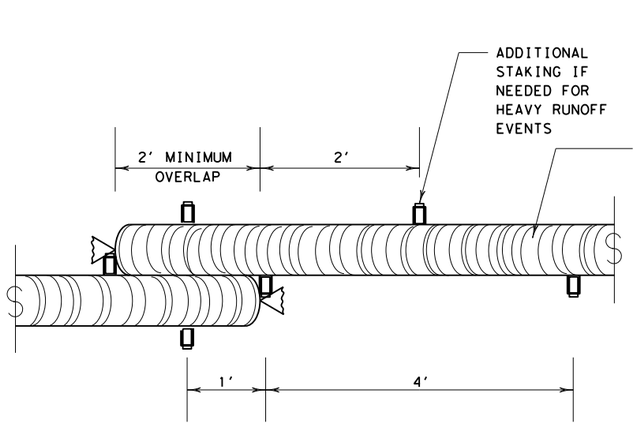
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

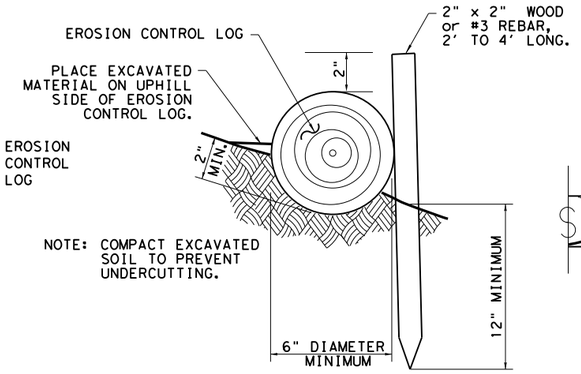
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

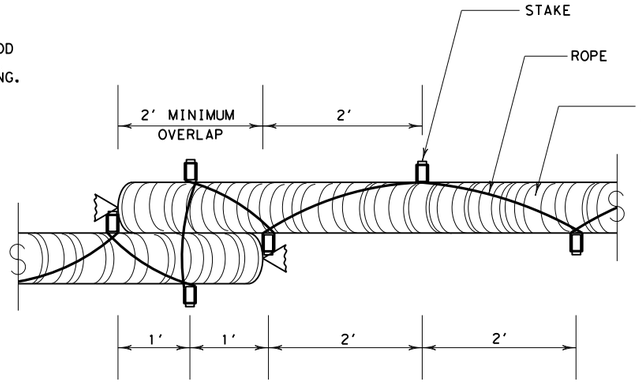


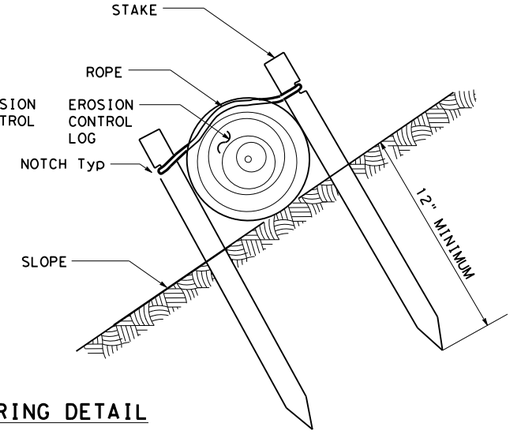


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

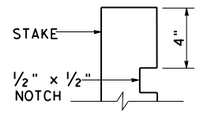
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

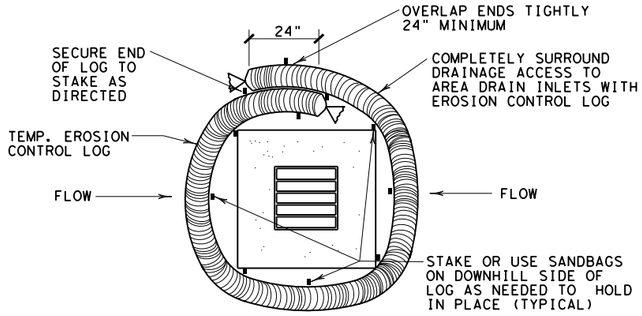
Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

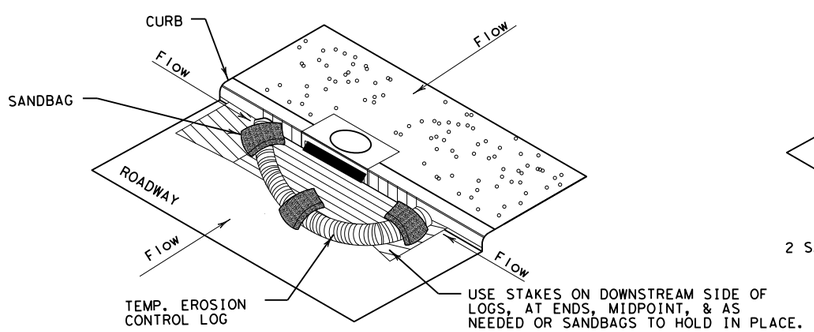
FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0004	07	138		IH-20	
	DIST	COUNTY			SHEET NO.	
	ODA	ECTOR			160	

DATE:
FILE:



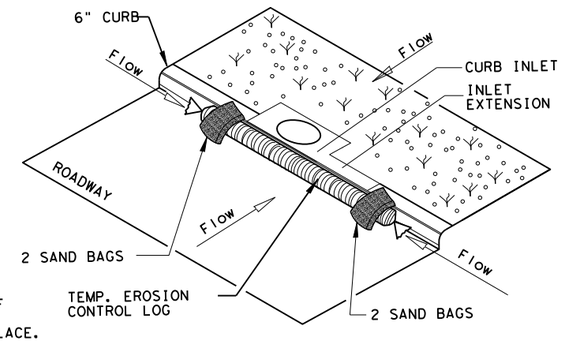
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

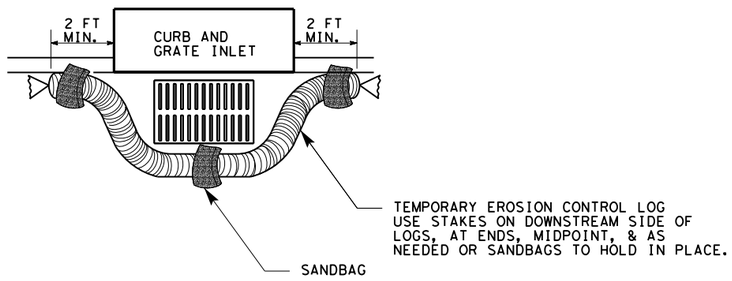
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

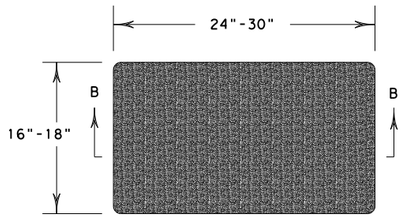
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



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	0004	07	138	IH-20
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		161

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.

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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
☐ Erosion Control Logs	☐ 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.

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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.

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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) Contrgctors will be advised of potential occurrence of Texas horned lizards in the project area, and to avoid harm, if encountered. This should include avoiding harvester ant mounds, where feasible.

2) Contractors will avoid harm to migratory birds, eggs, and active nests. Inactive nests and/or vegetation suspected to contain nests should be removed outside of nesting season. Nesting season is typically March 15 to September 15.

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.

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VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

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Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
© TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0004	07	138	IH-20	
	DIST	COUNTY		SHEET NO.	
	ODA	ECTOR		162	