FEDERAL AID PROJECT NO.			
STP 2022(468)HES			
CONT	SECT	JOB	HIGHWAY
0028	03	109	US 90
DIST		COUNTY	SHEET NO.
BMT		LIBERTY	1

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INDEX OF SHEETS

SHEET NO. DESCRIPTION

SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT
FEDERAL AID PROJECT

PROJECT NO: STP 2022(468)HES

CSJ: 0028-03-109

US 90
LIBERTY COUNTY

NET LENGTH OF PROJECT = 4,950.00 FT. = 0.9375 MI

LIMITS: FROM SH 146 (W), EAST
TO 0.44 MI E OF FM 1409

CONSISTING OF MILLING AND OVERLAYING EXISTING PAVEMENT SURFACE, ADJUST INLETS, AND PAVEMENT MARKINGS

US 90

DESIGN CRITERIA: 3R

FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL

DESIGN SPEED: 35 MPH

CURRENT ADT (2020) = 26,098 VPD
PROJECT ADT (2040) = 36,537 VPD

FINAL PLANS

LETTING DATE: ____

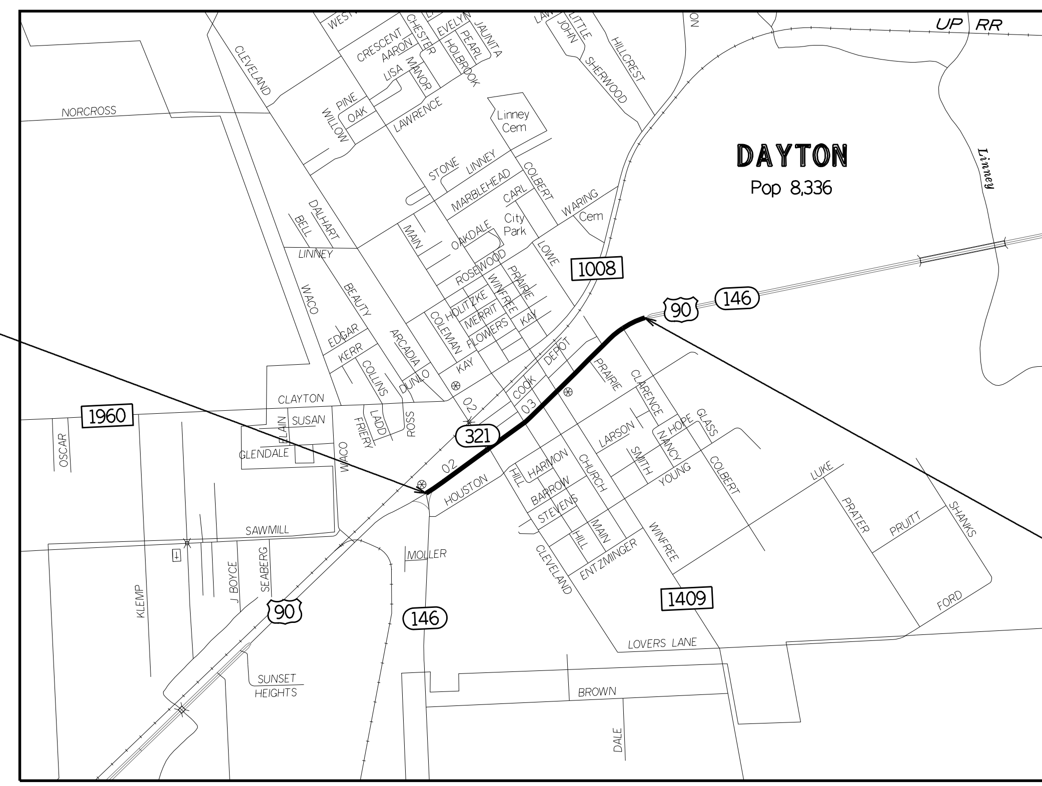
DATE CONTRACTOR BEGAN WORK: ____

DATE WORK WAS COMPLETED & ACCEPTED: ____

FINAL CONTRACT COST: $ ____

CONTRACTOR : ____

BEGIN PROJECT
CSJ: 0028-03-109
STA 100+50.00
REF MKR 870+1.505



VICINITY MAP
1" = 32,000'

END PROJECT
CSJ: 0028-03-109
STA 150+00.00
REF MKR 872+0.443

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

100% SUBMITTAL

STATE OF TEXAS
CHARLES M. SHINE
62999
LICENSED
PROFESSIONAL ENGINEER

5/25/2022

IDCUS
Planners | Engineers | Construction Managers
IDCUS, Inc.
15915 Katy Freeway, Suite 300
Houston, Texas 77094
(713) 541-5591 Fax: (713) 541-3501
T.B.P.E.FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

SUBMITTED FOR LETTING:

PROJECT ENGINEER

RECOMMENDED FOR LETTING: 6/8/2022

DocuSigned by: Adam Jack

DISTRICT DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 6/8/2022

DocuSigned by: Martin N. Gently, P.E.

578CD74950CD4F6...

DISTRICT ENGINEER

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AIDE CONSTRUCTION CONTRACTS. (FROM FHWA 1273, MAY 2012)

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

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I. GENERAL

II. TRAFFIC CONTROL PLAN

III. ROADWAY DETAILS

IV. TRAFFIC ITEMS

V. ENVIRONMENTAL ISSUES

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

Charles M Shine P.E. 5/25/2022
DATE

REV NO.	DATE	BY	REVISION

2

IDCUS
Planners-Engineers-Program Managers
IDCUS, Inc.
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Texas Department of Transportation

US 90

INDEX OF SHEETS

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	2

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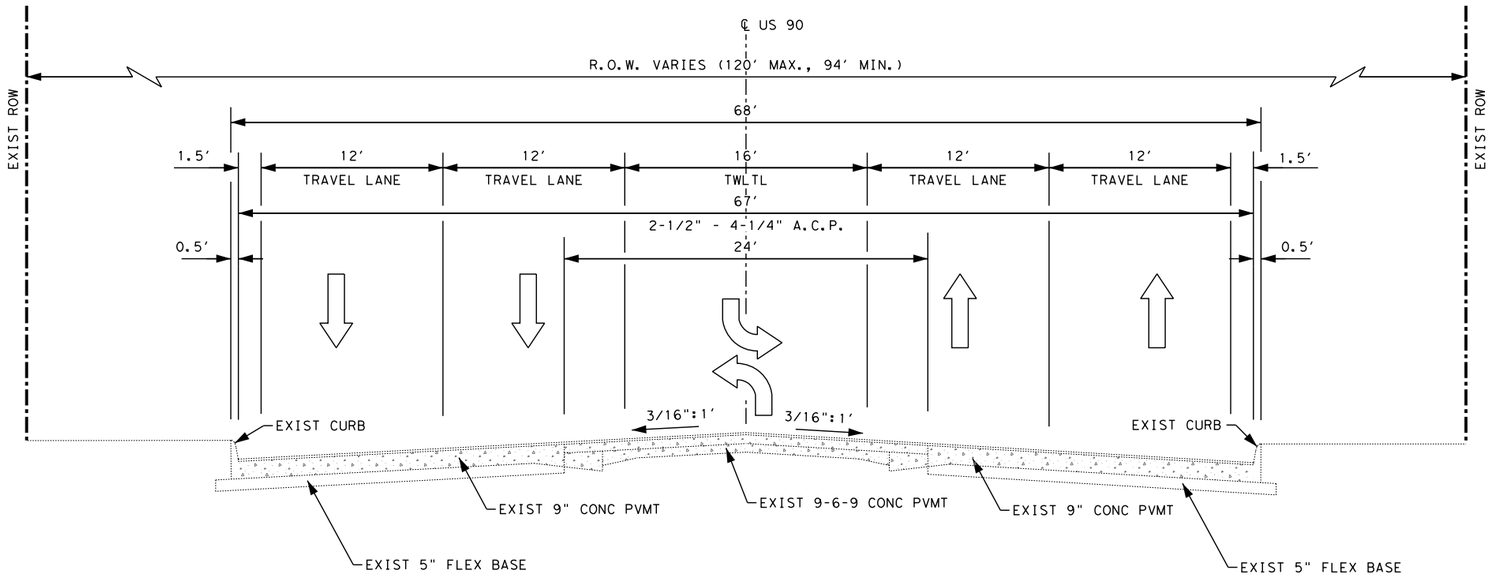
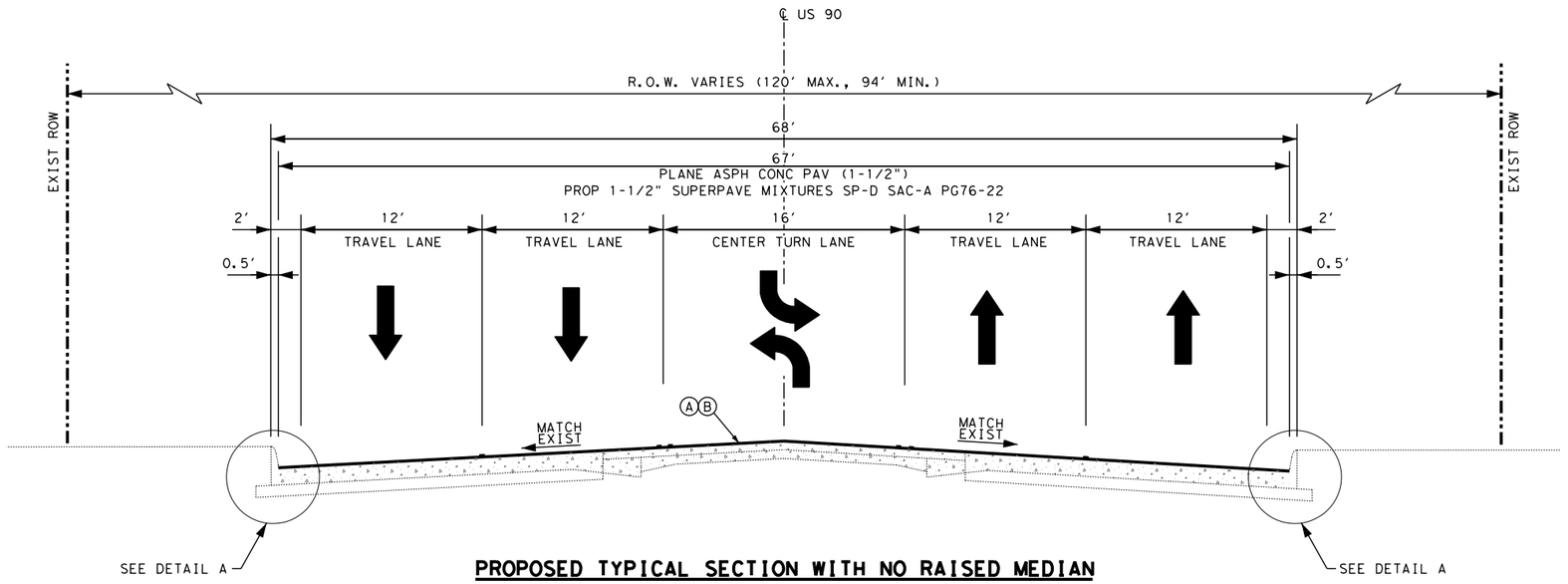


EXISTING TYPICAL SECTION

NOT TO SCALE

FROM STA 100+50.00 TO STA 138+75.93



PROPOSED TYPICAL SECTION WITH NO RAISED MEDIAN

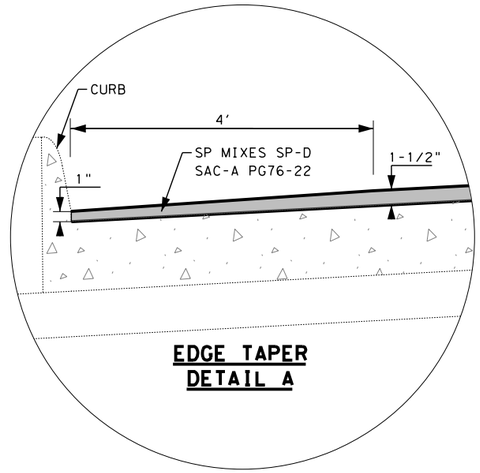
NOT TO SCALE

STA 102+60.00 TO STA 110+42.13
STA 115+54.94 TO STA 118+05.02
STA 123+08.76 TO STA 125+41.51
STA 130+57.06 TO STA 136+08.49

LEGEND

Ⓐ PLANE ASPH CONC PAV(1.5")

Ⓑ 1.5" - SUPERPAVE MIXTURES SP-D SAC-A PG76-22



EDGE TAPER DETAIL A

NOTE:

1. CONTRACTOR TO MATCH ALL EXISTING CROSS SLOPES, SUPERELEVATIONS, AND SUPERELEVATION TRANSITION POINTS.

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
LICENSED
PROFESSIONAL ENGINEER
P.E.
5/25/2022

IDCUS
Planners-Engineers-Program Managers
IDCUS, Inc.
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(713) 541-5591 Fax: (713) 541-3501
T.B.P.E.FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

US 90

TYPICAL SECTIONS

SHEET 01 OF 08

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	3

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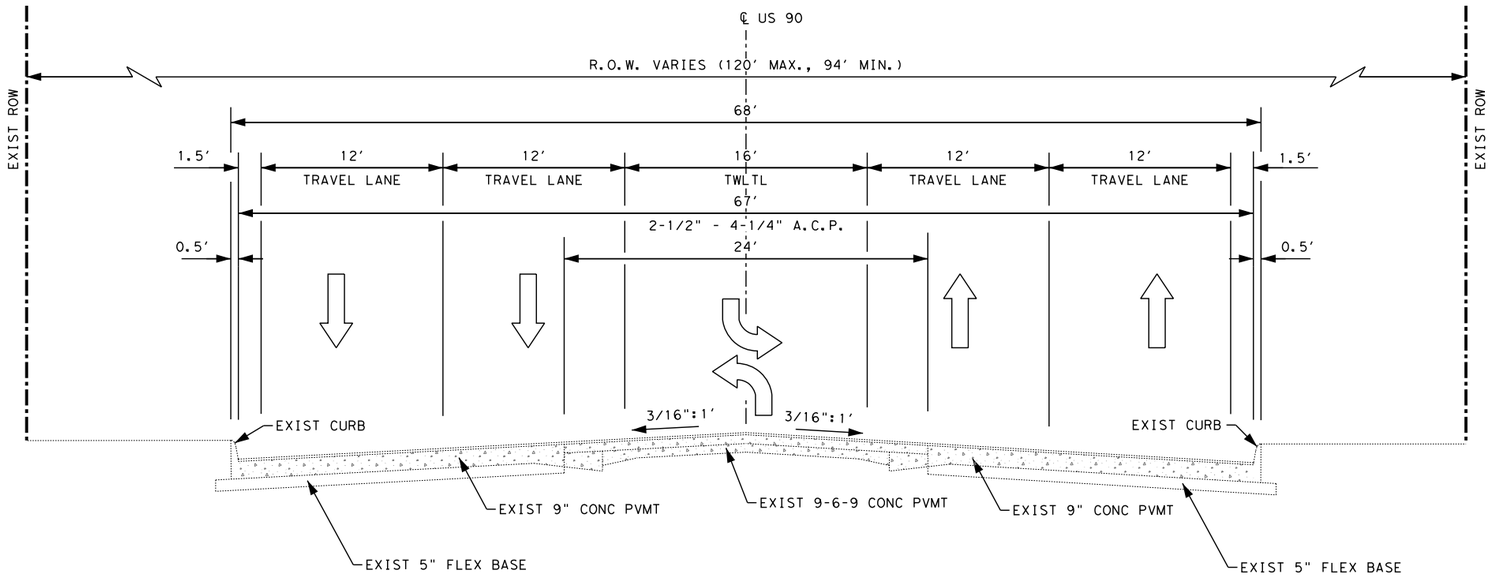
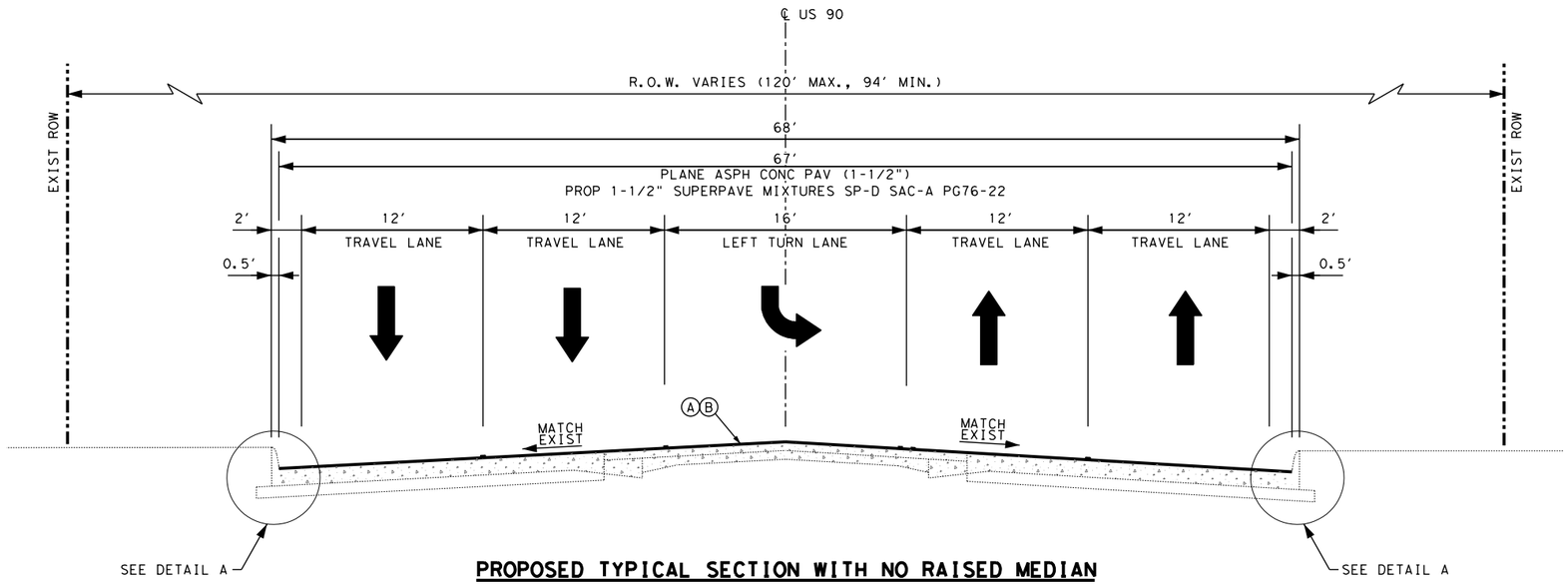


EXISTING TYPICAL SECTION

NOT TO SCALE

FROM STA 100+50.00 TO STA 138+75.93



PROPOSED TYPICAL SECTION WITH NO RAISED MEDIAN

NOT TO SCALE

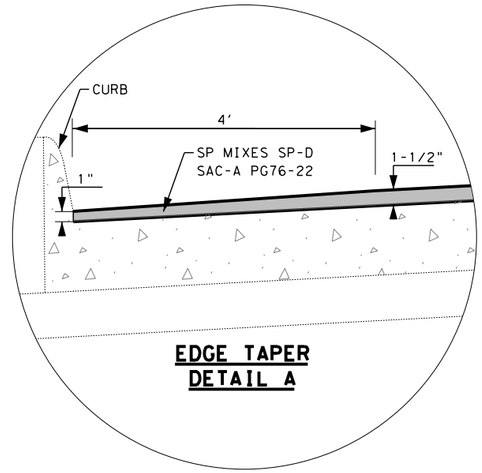
STA 100+60 TO STA 102+60.00
STA 113+54.99 TO STA 115+54.96
STA 121+08.08 TO STA 123+08.76
STA 128+57.06 TO STA 130+57.06

STA 100+50.00 TO STA 100+60.00 (SH 146)
STA 112+53.82 TO STA 113+54.99 (CLEVELAND ST)
STA 119+96.11 TO STA 121+08.08 (MAIN ST)
STA 127+41.51 TO STA 128+57.06 (WINFREE ST)
STA 138+08.45 TO STA 138+75.93 (COLBERT ST)

LEGEND

Ⓐ PLANE ASPH CONC PAV(1.5")

Ⓑ 1.5" - SUPERPAVE MIXTURES SP-D SAC-A PG76-22



EDGE TAPER DETAIL A

NOTE:

1. CONTRACTOR TO MATCH ALL EXISTING CROSS SLOPES, SUPERELEVATIONS, AND SUPERELEVATION TRANSITION POINTS.

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
LICENSED
PROFESSIONAL ENGINEER
P.E.
5/25/2022

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Texas Department of Transportation

US 90

TYPICAL SECTIONS

SHEET 02 OF 08

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	4

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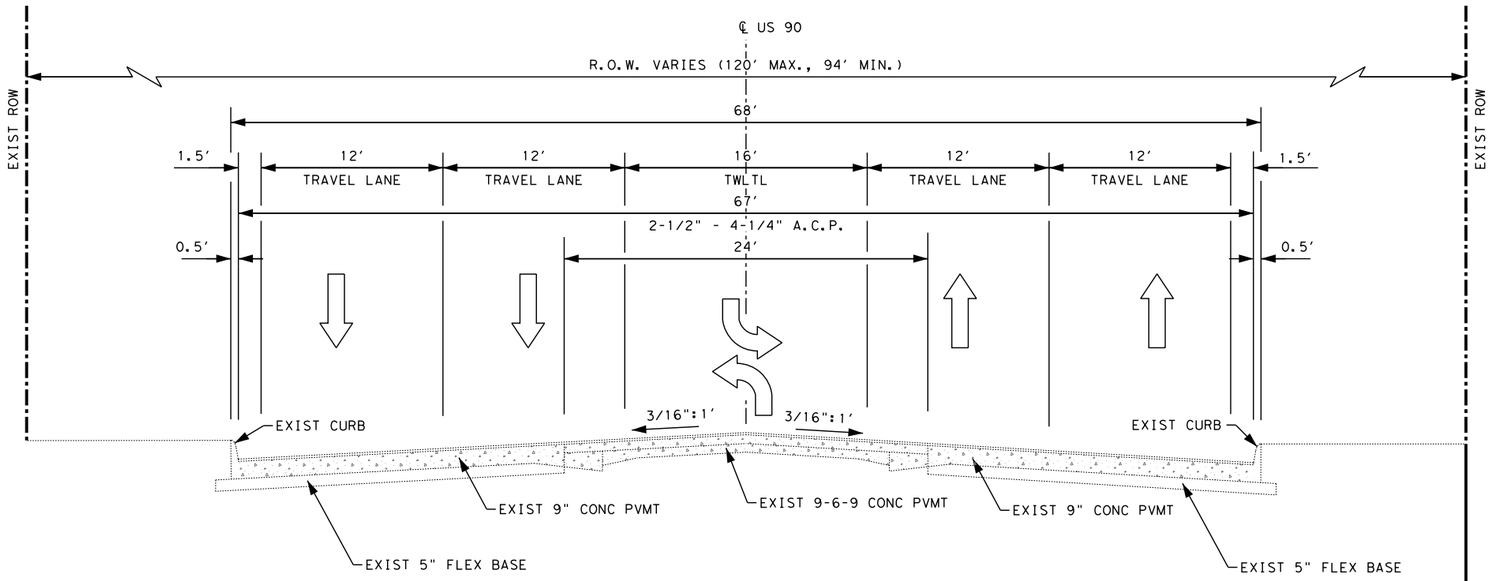
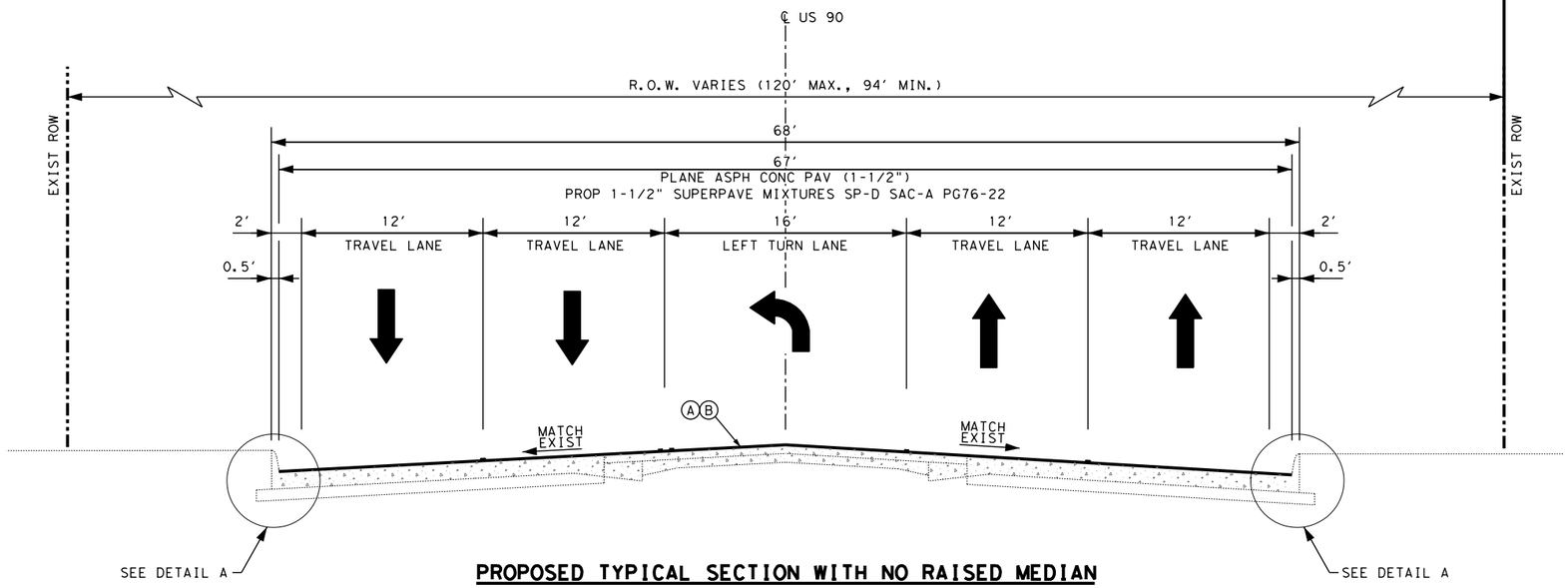


EXISTING TYPICAL SECTION

NOT TO SCALE

FROM STA 100+50.00 TO STA 138+75.93



PROPOSED TYPICAL SECTION WITH NO RAISED MEDIAN

NOT TO SCALE

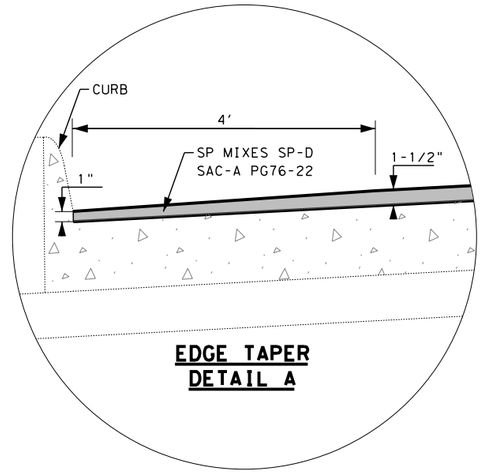
STA 110+42.13 TO STA 112+53.82
STA 118+05.02 TO STA 119+96.11
STA 125+41.51 TO STA 127+41.51
STA 136+08.49 TO STA 138+08.45

STA 100+50.00 TO STA 100+60.00 (SH 146)
STA 112+53.82 TO STA 113+54.99 (CLEVELAND ST)
STA 119+96.11 TO STA 121+08.08 (MAIN ST)
STA 127+41.51 TO STA 128+57.06 (WINFREE ST)
STA 138+08.45 TO STA 138+75.93 (COLBERT ST)

LEGEND

Ⓐ PLANE ASPH CONC PAV(1.5")

Ⓑ 1.5" - SUPERPAVE MIXTURES SP-D SAC-A PG76-22



EDGE TAPER DETAIL A

NOTE:

1. CONTRACTOR TO MATCH ALL EXISTING CROSS SLOPES, SUPERELEVATIONS, AND SUPERELEVATION TRANSITION POINTS.

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
LICENSED
PROFESSIONAL ENGINEER
P.E.
5/25/2022

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T.B.P.E.FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

US 90

TYPICAL SECTIONS

SHEET 03 OF 08

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	5

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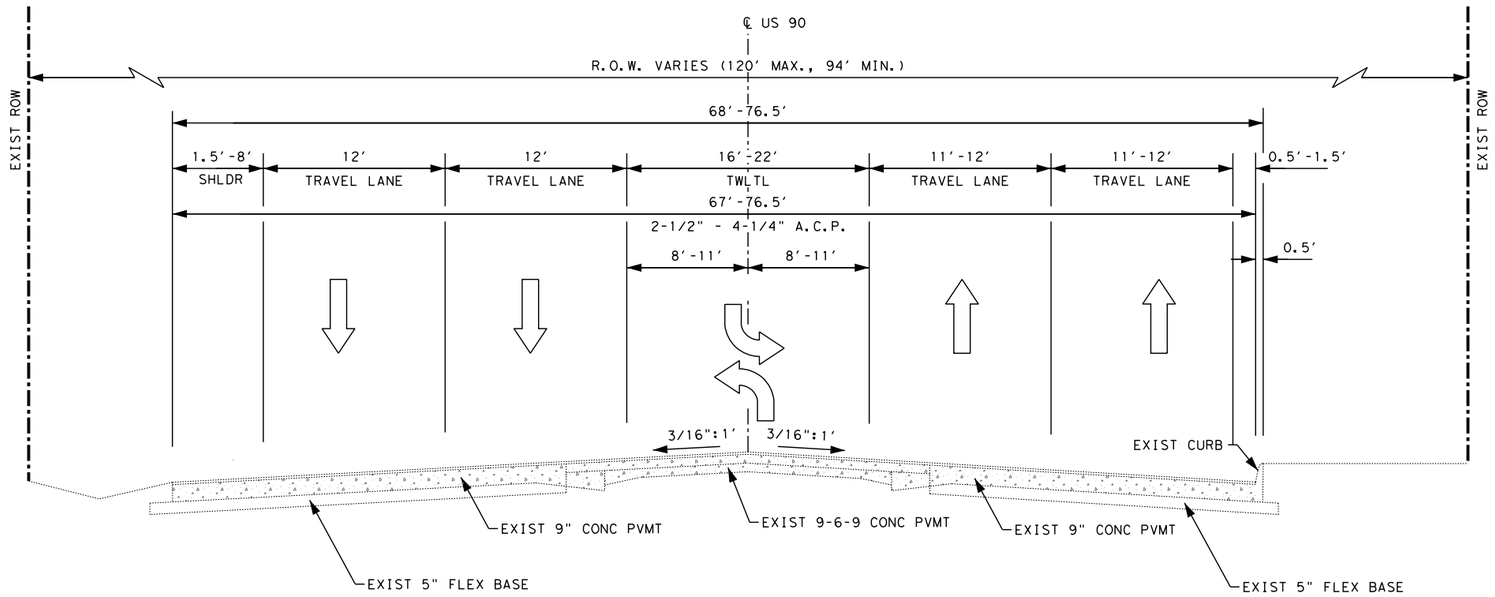
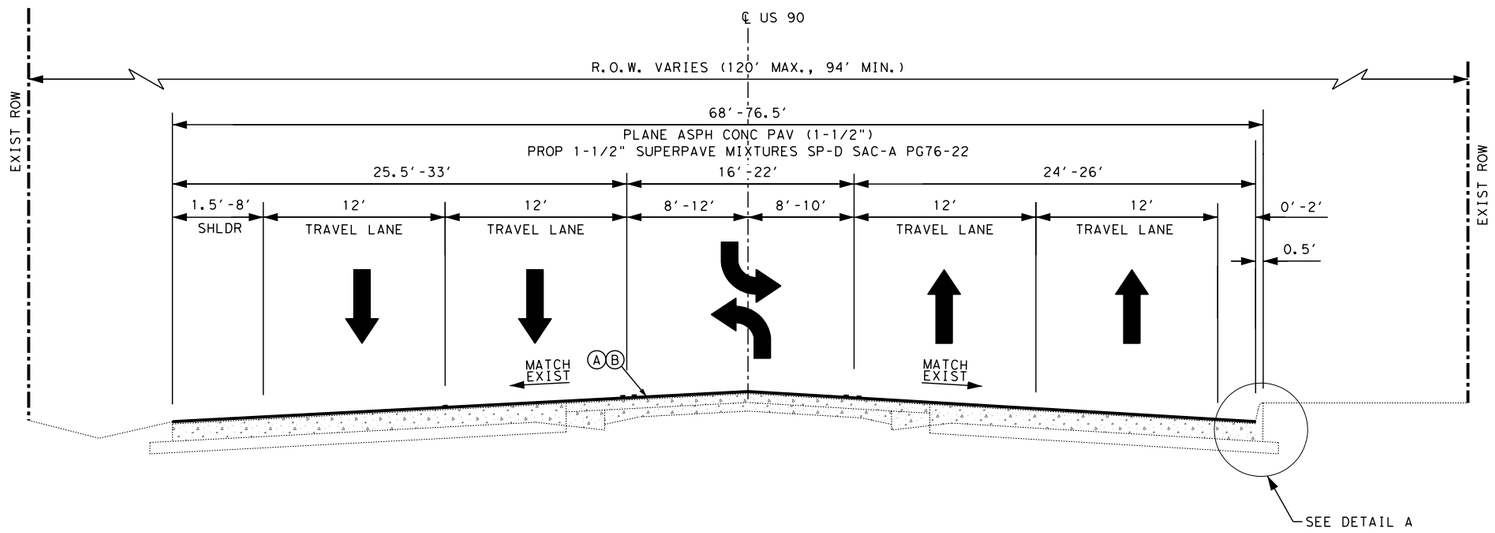


EXISTING TYPICAL SECTION

NOT TO SCALE

STA 138+75.93 TO STA 142+90.41



PROPOSED TYPICAL SECTION

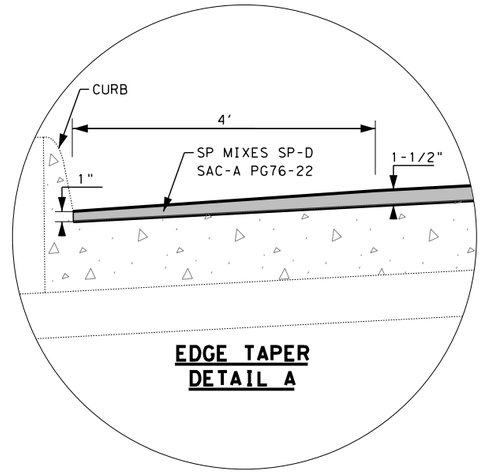
NOT TO SCALE

STA 138+75.93 TO STA 142+90.41

LEGEND

Ⓐ PLANE ASPH CONC PAV(1.5")

Ⓑ 1.5" - SUPERPAVE MIXTURES SP-D SAC-A PG76-22



EDGE TAPER DETAIL A

NOTE:

1. CONTRACTOR TO MATCH ALL EXISTING CROSS SLOPES, SUPERELEVATIONS, AND SUPERELEVATION TRANSITION POINTS.

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
LICENSED
PROFESSIONAL ENGINEER
P.E.
5/25/2022

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Texas Department of Transportation

US 90

TYPICAL SECTIONS

SHEET 04 OF 08

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
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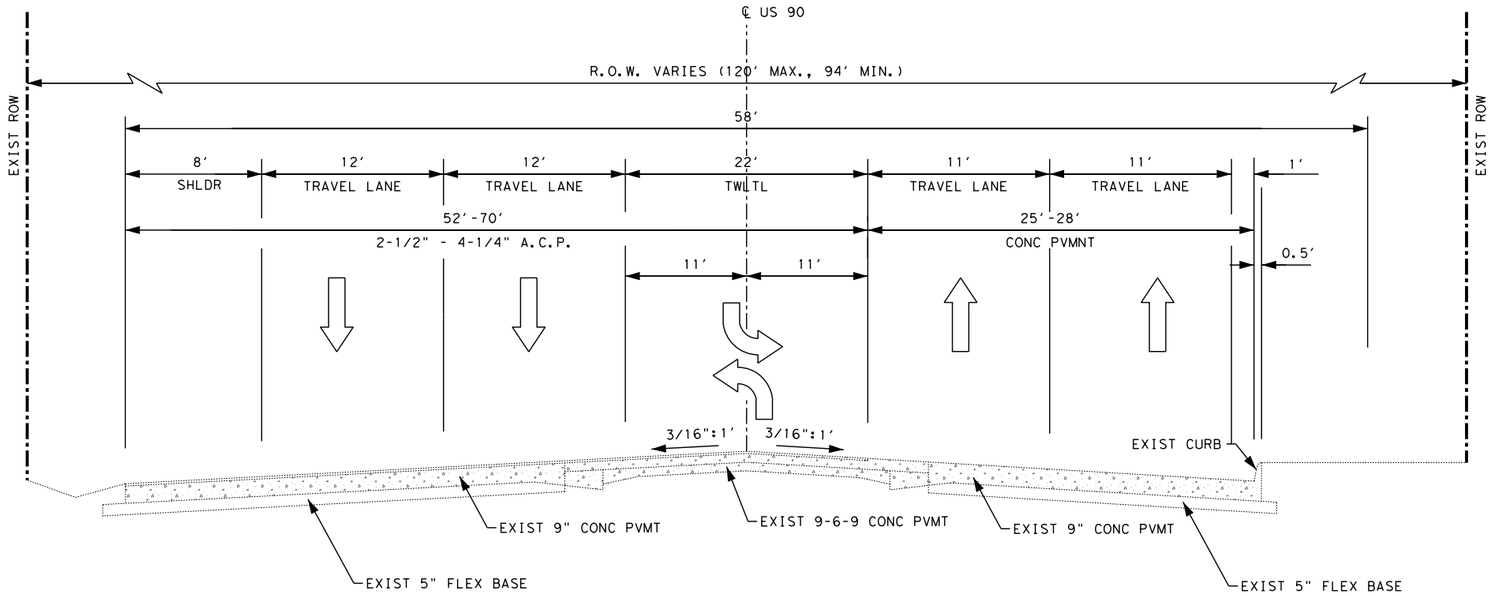
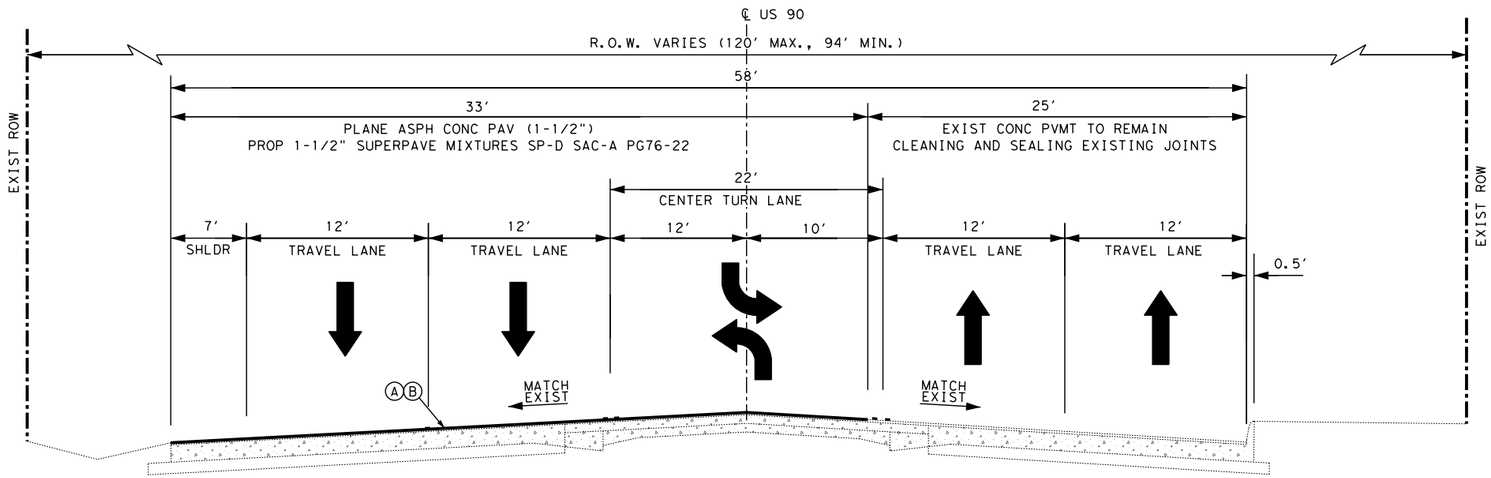


EXISTING TYPICAL SECTION

NOT TO SCALE

STA 142+90.41 TO STA 143+77.70



PROPOSED TYPICAL SECTION

NOT TO SCALE

STA 142+90.41 TO STA 143+00.00

STA 143+00.00 TO STA 143+77.70 (S COLBERT ST)

LEGEND

Ⓐ PLANE ASPH CONC PAV(1.5")

Ⓑ 1.5" - SUPERPAVE MIXTURES SP-D SAC-A PG76-22

NOTE:

1. CONTRACTOR TO MATCH ALL EXISTING CROSS SLOPES, SUPERELEVATIONS, AND SUPERELEVATION TRANSITION POINTS.

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
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PROFESSIONAL ENGINEER
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Texas Department of Transportation

US 90

TYPICAL SECTIONS

SHEET 05 OF 08

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	7

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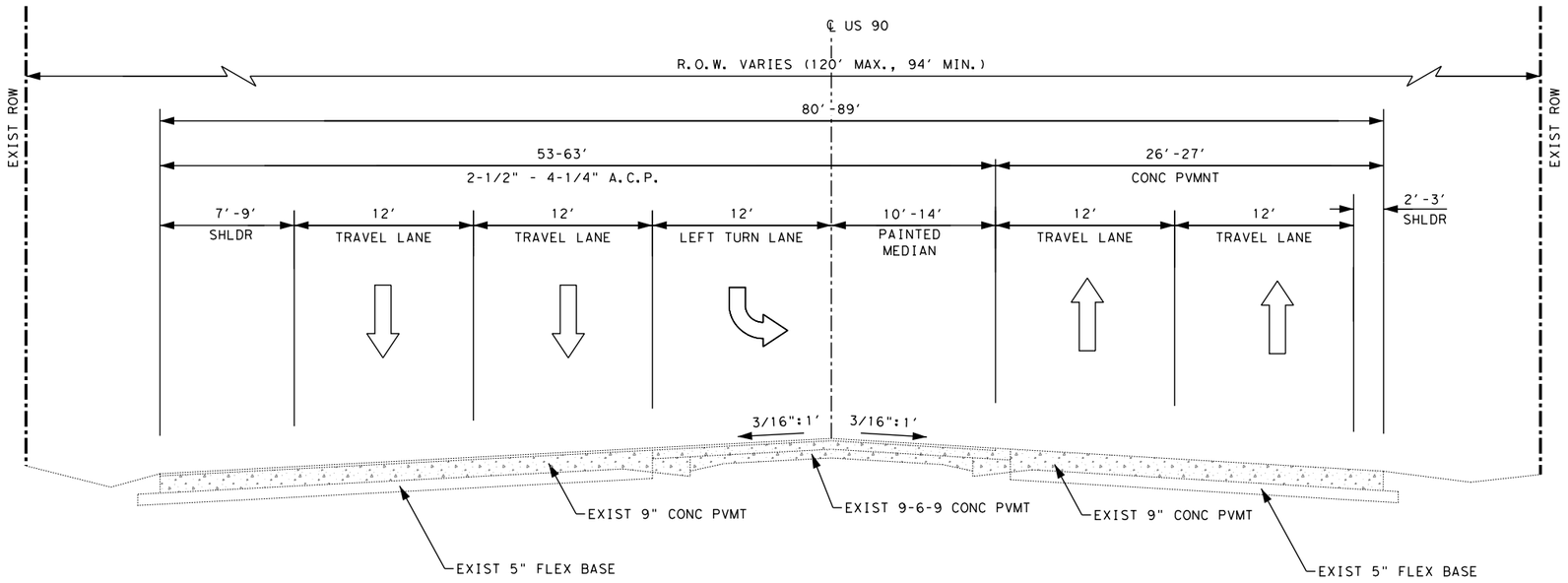
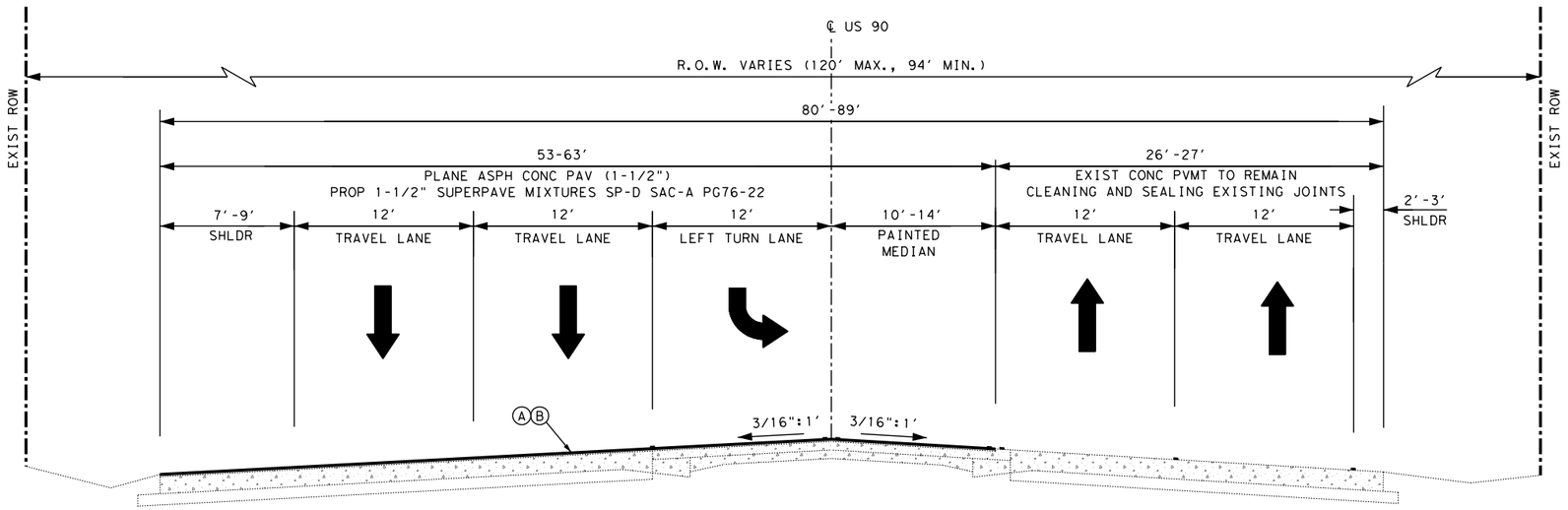


EXISTING TYPICAL SECTION

NOT TO SCALE

FROM STA 143+77.70 TO STA 146+00.00



PROPOSED TYPICAL SECTION

NOT TO SCALE

FROM STA 143+77.70 TO STA 146+00.00

LEGEND

Ⓐ PLANE ASPH CONC PAV(1.5")

Ⓑ 1.5" - SUPERPAVE MIXTURES SP-D SAC-A PG76-22

NOTE:

1. CONTRACTOR TO MATCH ALL EXISTING CROSS SLOPES, SUPERELEVATIONS, AND SUPERELEVATION TRANSITION POINTS.

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
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5/25/2022

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Texas Department of Transportation

US 90

TYPICAL SECTIONS

SHEET 06 OF 08

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	8

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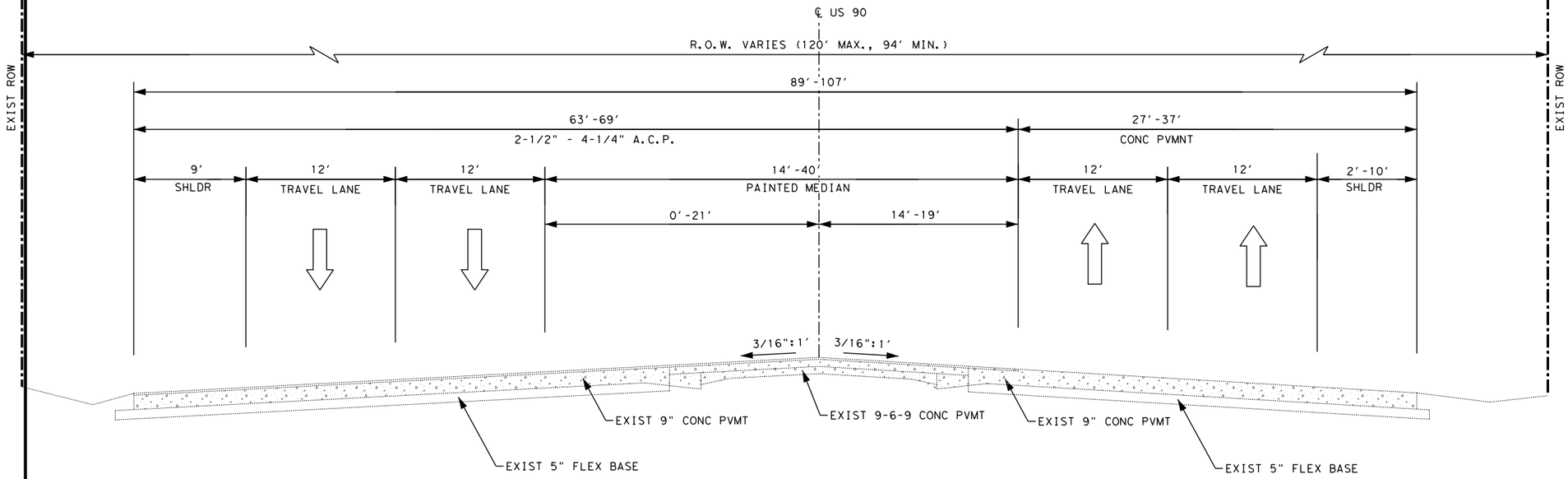
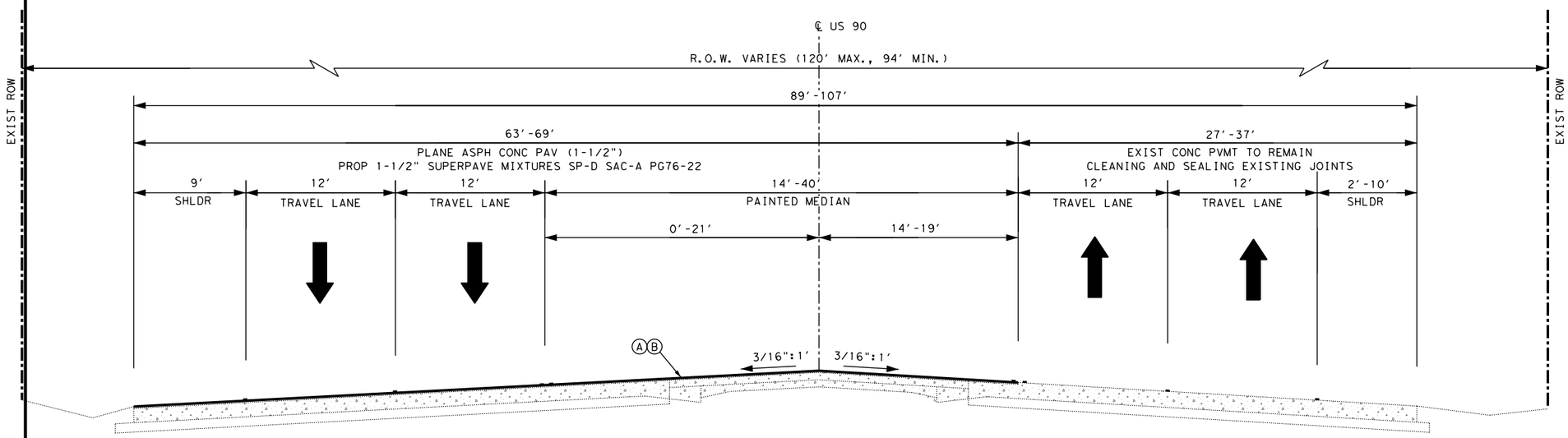


EXISTING TYPICAL SECTION

NOT TO SCALE

STA 146+00.00 TO STA 148+56.08



PROPOSED TYPICAL SECTION

NOT TO SCALE

STA 146+00.00 TO STA 148+56.08

LEGEND

- (A) PLANE ASPH CONC PAV(1.5")
- (B) 1.5" - SUPERPAVE MIXTURES SP-D SAC-A PG76-22

NOTE:

1. CONTRACTOR TO MATCH ALL EXISTING CROSS SLOPES, SUPERELEVATIONS, AND SUPERELEVATION TRANSITION POINTS.

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
LICENSED
PROFESSIONAL ENGINEER
P.E.
5/25/2022

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Texas Department of Transportation

US 90

TYPICAL SECTIONS

SHEET 07 OF 08

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	9

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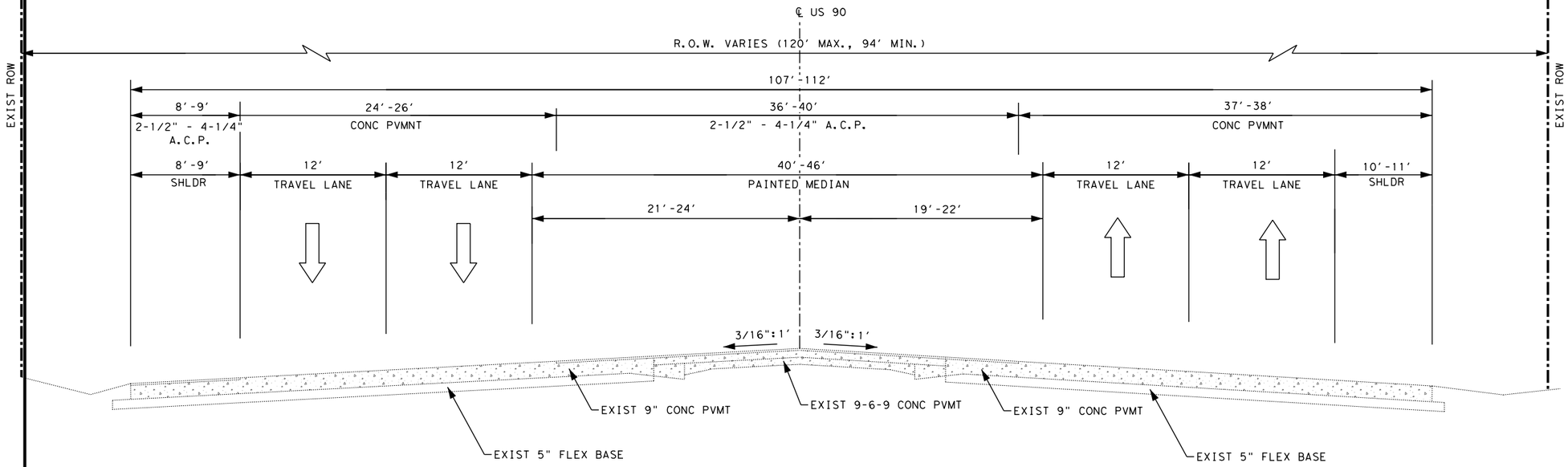
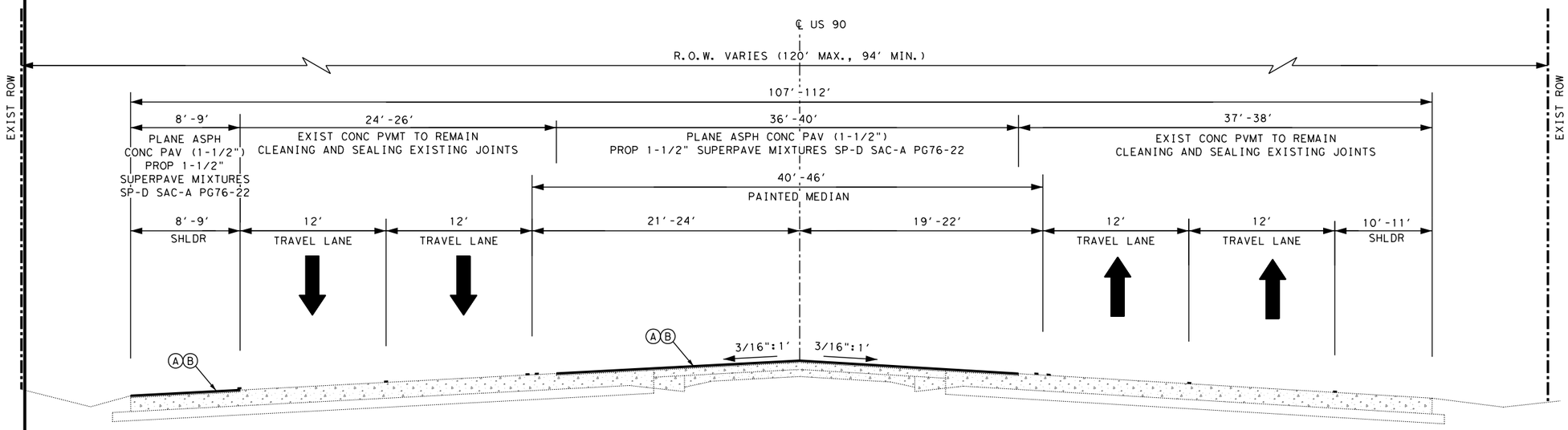


EXISTING TYPICAL SECTION

NOT TO SCALE

STA 148+56.08 STA 150+00.00



PROPOSED TYPICAL SECTION

NOT TO SCALE

STA 148+56.08 STA 150+00.00

LEGEND

Ⓐ PLANE ASPH CONC PAV(1.5")

Ⓑ 1.5" - SUPERPAVE MIXTURES SP-D SAC-A PG76-22

NOTE:

1. CONTRACTOR TO MATCH ALL EXISTING CROSS SLOPES, SUPERELEVATIONS, AND SUPERELEVATION TRANSITION POINTS.

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
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131479
LICENSED
PROFESSIONAL ENGINEER
P.E.
5/25/2022

IDCUS
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IDCUS, Inc.
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Houston, Texas 77094
(713) 541-5591 Fax: (713) 541-3501
T.B.P.E.FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

US 90

TYPICAL SECTIONS

SHEET 08 OF 08

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	10

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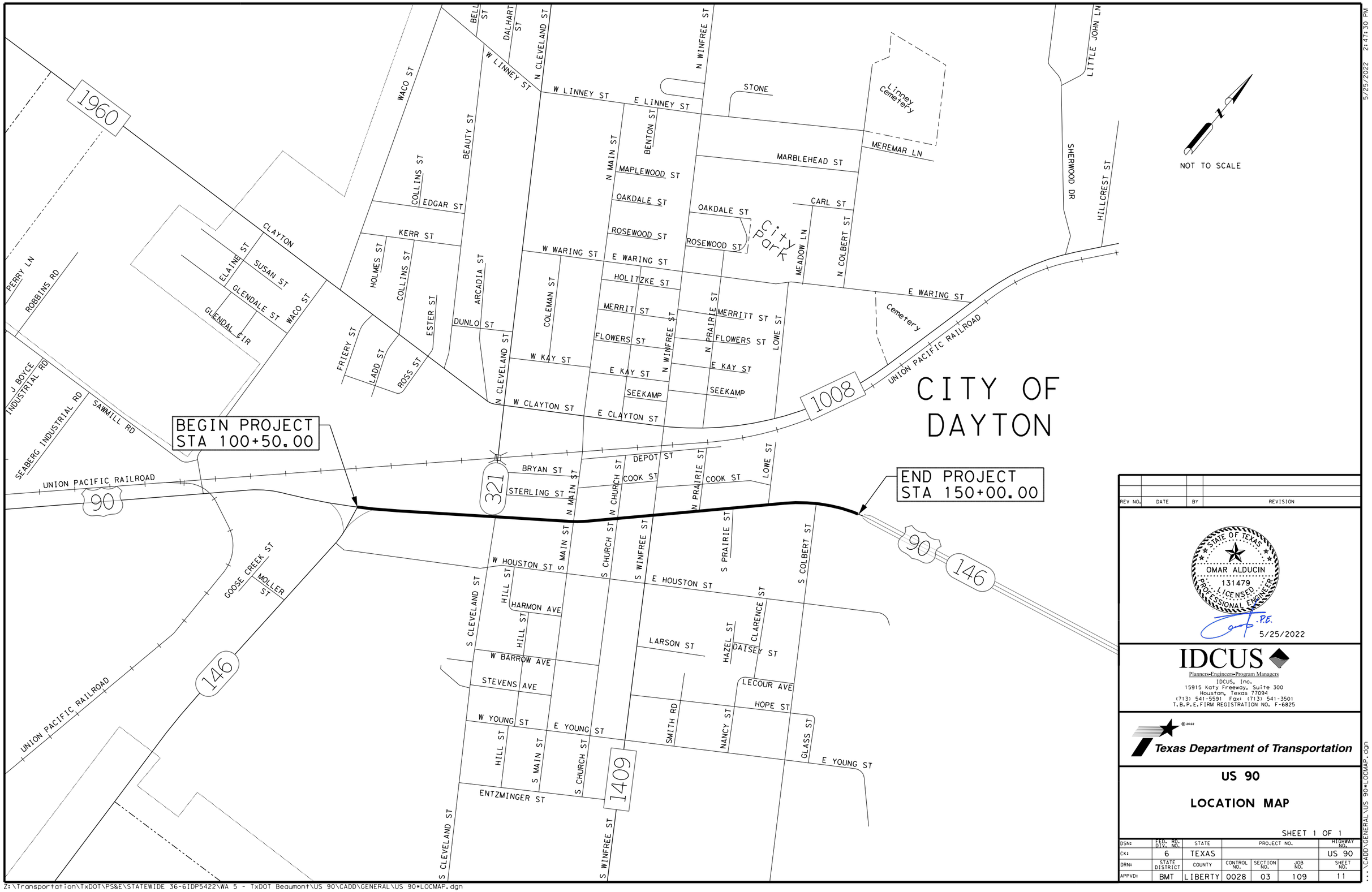

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LOCATION MAP

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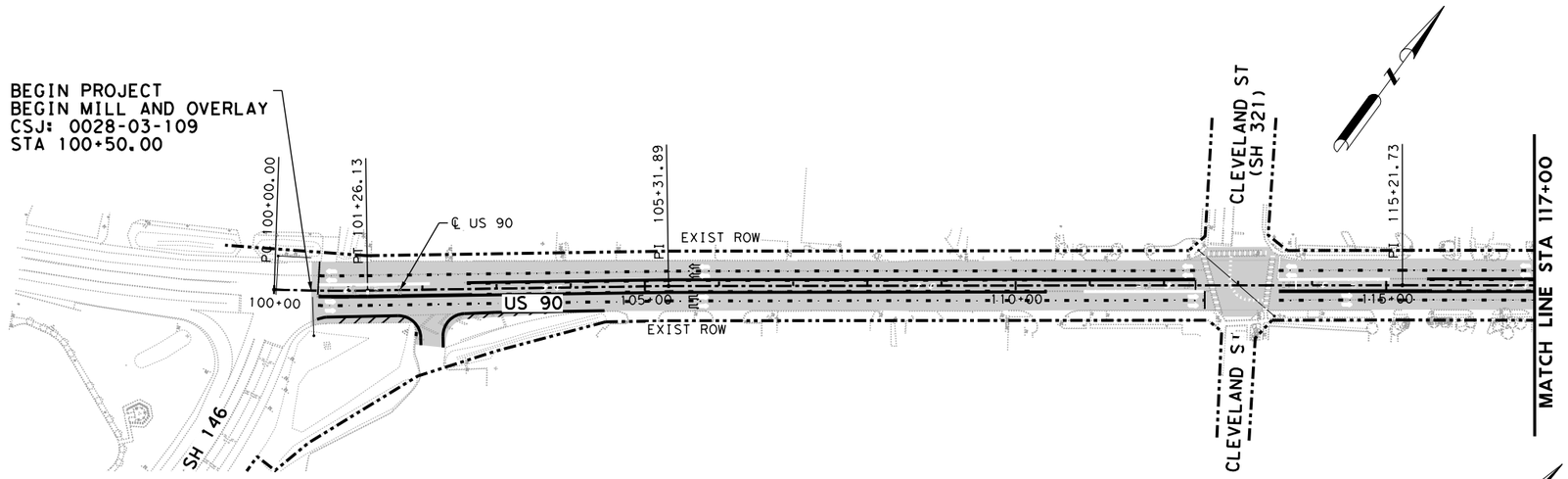

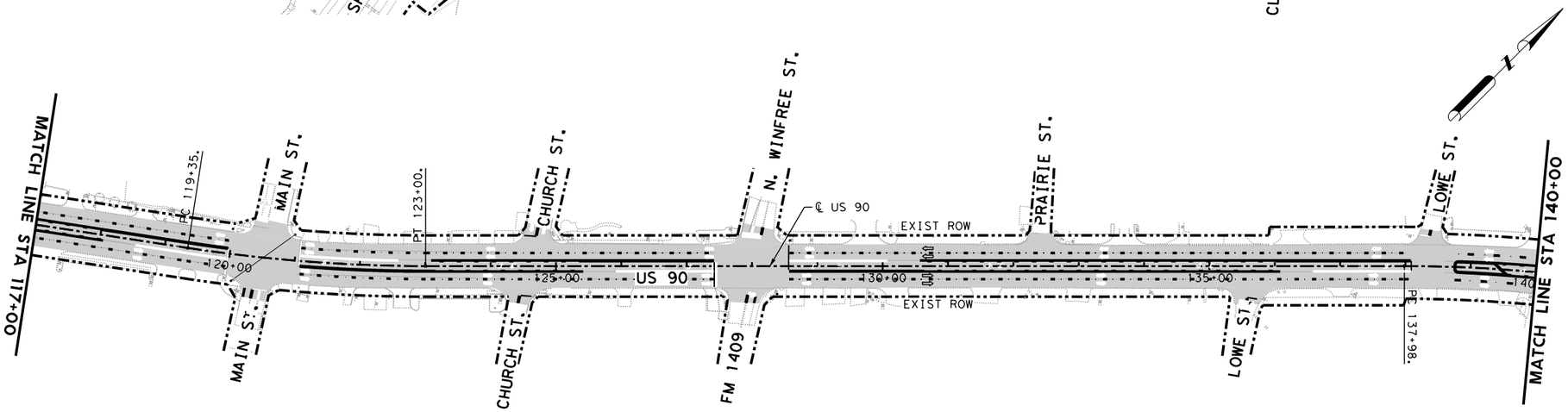

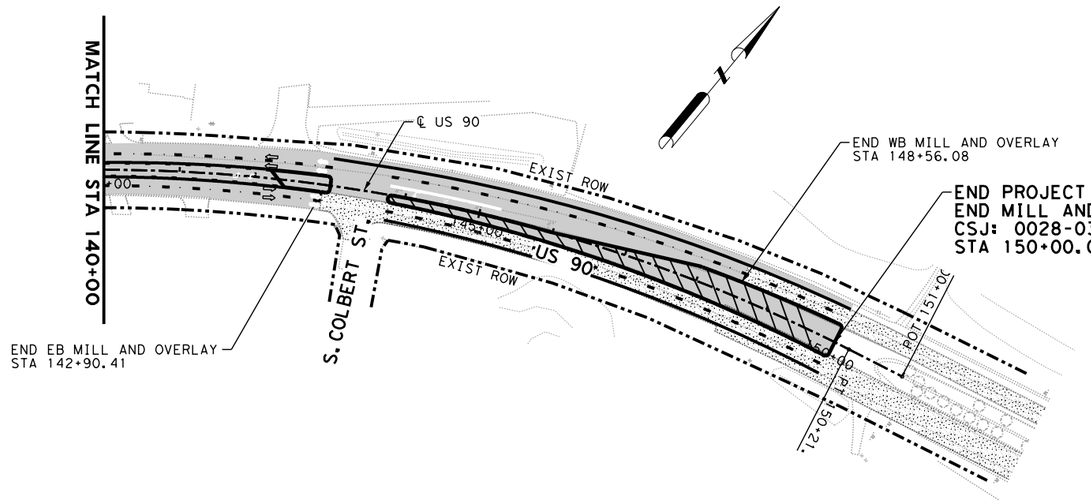

LEGEND

- PROP MILL AND OVERLAY
- EXIST CONC PAVEMENT TO REMAIN

0′ 100′ 200′
SCALE IN FEET

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PROJECT LAYOUT

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GENERAL NOTES:

Contractor questions on this project are to be addressed to the following individual(s):
Name Noel Salac
Email Noel.Salac@txdot.gov

Name Roberto Rodriguez
Email Roberto.M.Rodriguez@txdot.gov

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

All contractor questions will be reviewed by the Area Engineer or Assistant Area Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address: https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

General:

The contractor will verify material quantities and dimensions.

All designated waste material will become the property of the contractor and will be disposed of at a place off the right of way as approved.

The contractor will maintain adequate drainage throughout the limits of the project during all construction phases.

Assume full responsibility for the preservation of all sod, shrubbery, and trees at the site during construction. Carefully preserve and replace, in their original position, all sod and shrubbery removed. Replace all Contractor damaged sod or shrubbery at the Contractor's own expense.

Item 5 Control of the Work
Station the project before commencing work. Mark the stations every 100 feet. Maintain stationing throughout the duration of the project. Remove the station markings at the completion of the project. Consider this work to be subsidiary to the various bid items of the contract.

Sheet

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Item 6 Control of Materials

Flammable/combustible materials must be stored at a designated location as approved.

Do not store flammable/combustible materials under or adjacent to Bridge class structures.

Daily removal of these materials will be considered incidental work.

Mixing of materials, storing of materials, storing of equipment, or repairing of equipment on top of concrete pavement or bridge decks will not be permitted unless specifically authorized.

Item 7 Legal Relations and Responsibilities

Furnish all materials, labor and incidentals required to provide for traffic across the highway and for temporary ingress and egress to private property in accordance with article 7.2.4 of the standard specifications at no additional cost to the state. Maintain ingress and egress to the adjacent property at all times. Consider this work to be subsidiary to the various bid items of the contract.

The Contractor will be completely responsible for the immediate removal of any material that gets upon any vehicle as a result of their operation.

Personal vehicles of the contractor's employees will not be parked within the right of way at any time including any section closed to public traffic, unless the vehicle is being used for construction procedures. However, the Contractor's employees may park on the right of way at sites where the contractor has their office, equipment and materials storage yard.

No significant traffic generator events have been identified in the project limits.

Item 8 Prosecution and Progress

Working days will be charged during all observed curing times, even if no other work is being performed.

Compute and charge working days in accordance with Section 8.3.1.4 Standard Workweek. Nighttime work.

Adjoining projects may be in progress during the construction of a portion of this project. Plan and prosecute the sequence of construction and the traffic control plan with adjacent construction projects, if applicable. Manage construction of all phases to minimize disruption to traffic.

Notify the Engineer 72 hours in advance of any temporary or permanent lane, ramp or connector affected by closures, detours, or restrictions to lane widths, alterations to vertical clearances or modifications to alignment/radii. Any other modification to the roadway that may adversely affect the mobility of oversized/overweight trucks will require 5 business day advance written notice to the Engineer.

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GENERAL NOTES

SHEET 01 OF 06

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Work requiring temporary lane closures will only be allowed during non-peak hours. Non-peak hours will be nighttime, or weekends. Nighttime hours will be defined as 9:00 PM until 5:00 AM, Sunday night thru Thursday night. Weekend hours will be defined as 9:00 PM on Friday night until 5:00 AM on Monday morning. No lane closures will be allowed at any time during the following unless approved in writing: on Good Friday until midnight Easter Sunday, after 7 AM Tuesday before Thanksgiving Day through midnight Sunday after Thanksgiving, after 7 AM December 23 through January 2. One lane in each direction of each travel way is to remain open at all times. Placement of traffic control devices for night or weekend operations will not commence until after the start time and all devices will be removed from the roadway before the finish time. For all travel lanes, provide information regarding dates, times, typical work hours, type of closure, reason for closure, and expected project duration to the Liberty Area Office. This information will be provided 72 hours in advance of the closure to the Area Office. If approved, the Liberty Area Office will forward the information to the Public Information Officer for the Beaumont District.

Maintain one lane open to traffic during construction, unless otherwise approved.

Schedule work so that all travel lanes are open during non-working hours, nights and weekends, unless otherwise approved.

Night work will be required.

Supplemental lighting in addition to lighting on equipment and work vehicles will be required to insure adequate lighting for workers safety and inspection. All operations including planing and ACP placement must be adequately lighted using supplemental lighting. All supplemental lights are subject to the approval of the Engineer. Supplemental lighting will be added to the milling machine, asphalt distributor, aggregate spreader, rollers and laydown machine unless otherwise approved. This is considered subsidiary to the various bid Items of the contract.

The Engineer will suspend time charges after completion of all work and removal of the barricades. The Department will grant final acceptance when all performance periods are complete.

Accrue Contract time charges through the Contractor's completion of the final punch list. Time will not be suspended until all work is completed.

Submit a work schedule to the Engineer at the preconstruction meeting indicating completion dates for each location, and the number of crews required for the completion of the contract within the contract time period. If at any time during the contract the work progress is behind the initial schedule, submit documentation indicating how the project will be accelerated to ensure project completion in the remaining contract time.

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County: Liberty **Control:** 0028-03-109

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Provide a sequence of work with an estimated project schedule to the Engineer at the preconstruction meeting. By noon of each Wednesday, provide the Engineer a written outline of the proposed work schedule for the following week. This outline will also list the times and places for any proposed traffic control changes.

Monthly critical path method (CPM) updates are a very important aspect of managing the progress of this project. CPM planning schedule software will be required on this project as stipulated in the special provisions to the plans. An updated electronic schedule will be provided to the Engineer by the tenth day of each month. The Engineer may withhold the monthly estimate if the schedule update has not been received.

For this project, create and maintain the critical path method (CPM) schedule.

Work will not be permitted when impending bad weather or low temperatures may impair the quality of work.

The construction sequence may be modified as directed and approved.

Law enforcement will be considered for this contract under the following conditions unless otherwise directed:

- Night work operations that create substantial traffic safety risks for workers and/or road users,
- Traffic shifts at intersections where unexpected or sudden queuing is anticipated,
- Complex intersections where flaggers may not be able to maintain adequate traffic control.

Provide full-time, off-duty uniformed officer(s), with transportation jurisdiction and full police powers in the county or city in which the project is located, during construction as directed . The officer(s) must be able to show proof of certification by the Texas Commission on Law Enforcement Officers Standards. Officer(s) will be paid by force account, and must be approved. The vehicle used must be a marked law enforcement vehicle in the city or county where the project is located. Complete the daily tracking form provided by the Department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided.

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GENERAL NOTES

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HURRICANE

In the event of the declaration of a hurricane watch, warning, other severe weather warning or national or state emergency that requires the roadways in the vicinity be used as evacuation routes, cease all work that requires the Contractor's, sub-contractors' or material suppliers' vehicles to enter the stream of traffic on these primary or secondary evacuation routes. This work includes material hauling and delivery, and mobilization or demobilization of equipment.

This project is on a hurricane evacuation route. Furnish at the pre-construction meeting a written plan outlining procedures to suspend work, secure the jobsite and safely handle traffic through and across the project in the event of a hurricane evacuation.

In addition to lane closures, cease work 3 days before hurricane landfall on or near the roadway that adversely impacts the flow of traffic and reduces the capacity of the highway during an evacuation. Prohibit the Contractor's, sub-Contractors' or material suppliers' vehicles from entering or exiting the stream of traffic including material hauling and delivery, and mobilization or demobilization of equipment. When directed, this prohibition will include a reasonable time period for the evacuees to return to their point of origin.

Item 105 Removing Treated and Untreated Base and Asphalt Pavement

Haul and stockpile the unused material as directed by the Engineer. Stockpile material salvaged from this project at SH 321 ~ 3.2 miles N of FM 1960, before the RR overpass on the LHS; coordinates: 30°05'10.5"N 94°54'51.4"W; 30.086241, -94.914283. Stockpiled or reused material will be small enough to pass a 2" sieve.

Item 160 Topsoil

All slopes requiring topsoil will be tracked immediately upon final grading to prevent erosion. Tracking consists of operating a tracked vehicle or equipment up and down the slopes leaving track marks perpendicular to the direction of the slope. See EC(1) for Tracking details. Tracking slopes to prevent erosion will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Approximately 30 CY of existing topsoil may be windrowed or stockpiled (as approved) for later use under this Item. Place erosion control measures for the stockpile and/or windrow.

Item 162 Sodding for Erosion Control

Furnish and place Bermuda grass sod.

In drought conditions do not place sod as vegetation. Check with the area office in charge of the construction of the project.

Sheet

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Item 354 Planing and Texturing Pavement

Complete planing operations in adjacent lanes and shoulders to the same point at the end of each day.

Cut the existing shoulder pavement to allow for drainage of water away from travel lanes which have been planed. This work will be subsidiary to various bid items.

Schedule the work so that HMA is placed no more than two weeks after milling has been performed on any pavement surface, unless otherwise approved by the Engineer. The Engineer may require the HMA to be placed sooner than two weeks in cases when base materials are exposed or when the pavement structure is showing signs of distress.

Overlay across the ends of any curb ramps must not create a barrier to their use. Changes in level up to ¼" may be vertical; between ¼" and ½" must be beveled with a slope no greater than 1:2; greater than ½" shall require a "ramp".

Depth of overlays are expected to vary. No additional payment will be made for milling that exceeds specified depth up to twice the pay item depth (D). Compensation for milling greater than 2 x D will be in accordance with Article 9.7

Remove any and all asphalt materials that may remain on the concrete surface after milling due to irregularities in the underlying section (i.e. scabbing). Up to 1 in of adjacent shifted or faulted concrete slabs may be milled to remove scabs and improve ride.

If the Engineer determines an adjacent driveways needs to be tapered back to prevent a drop-off an additional pass will need to be made to taper the driveway as directed or for a distance of 24" into the driveway. This work will be measured and paid for under Item 354.

Item 361 Repair of Concrete Pavement

Complete repairs so that longitudinal joints fall on edge of travel lane or center of travel lane. No joints will be allowed in the wheel paths.

All material generated, including concrete slurry, as a result of saw cutting will be collected and kept from entering waterways, culverts, roadway inlets, and ditches.

Work will be conducted in such a manner so that all materials will be collected before the end of each day and especially before any rainfall event. Material from saw cutting will not be allowed to be tracked by traffic to other areas. Adequate sweeping, vacuuming, and hauling equipment will be maintained on the project to conduct material collection and recovery on a continuous

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US 90

GENERAL NOTES

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basis. Curb inlets will be blocked and protected during grinding and sweeping operations, but fully opened prior to before a rainfall event. Disposal of the material produced by the sawing operation will be to a solid waste facility authorized to handle such material. The Contractor will, prior to before beginning operations, provide a plan outlining the method of collection and disposal of this material for approval by the Engineer. The plan will also include the name and location of the facility receiving the solid waste. All work, equipment, materials and fees necessary to collect and dispose of this material shall will be considered subsidiary to this item and not paid for directly.

Material produced by the grinding operation may be recycled in accordance with all applicable rules and regulations as required. The Contractor will submit a plan for recycling to the Engineer for approval prior to before any grinding being performed.

Provide Class HES concrete. The coarse aggregate will be either Grade 2 or 3. A set accelerating admixture or high range water reducer may be necessary to meet the compressive strength requirements: this will require the written approval of the Engineer and will be subsidiary to the bid item. A satisfactory work plan for control must be submitted by the Contractor and approved before use. An evaluation of the concrete containing the admixture will be performed by the Engineer. Design the Class HES concrete to meet the requirements of Class P and a minimum average compressive strength of 1800 psi in 4 hours.

Where repairs in jointed pavement require the removal of a transverse joint, construct a new joint at the same location.

Where patches in jointed pavement require the removal of an existing dowel basket assembly, install a new basket in the same location.

Saw-cutting will not be paid for directly, but will be considered subsidiary to this Item. Schedule work, such that concrete placement follows full-depth saw-cutting by no more than three days. Saw-cutting of existing concrete pavement across existing cracks will not be allowed unless approved by the Engineer.

Placement of removed slabs onto concrete pavement which is to remain in place will not be allowed. All removed portions of concrete will be removed from the project the same day as removed from the roadway. Breaking removed portions of concrete on the top of the existing pavement will not be allowed.

Concrete removal will not be permitted when impending weather conditions may result in rainfall which will delay the concrete placement. In the event that if rainfall should occur after

concrete placement operations have commenced, the Contractor will have ample covering on hand to protect the work.

Station limits may be adjusted as directed by the Engineer to meet varying field conditions

Maturity Testing

Maturity testing, Tex-426-A, will be allowed for concrete pavement. Unless otherwise approved by the Engineer, use the maturity method in accordance with test method Tex-426-A to estimate concrete strength. The Maturity system will not be paid for directly, but is considered subsidiary to this item.

Provide to the Engineer, the Intellirock or Command Center maturity system (or approved equivalent) for testing concrete maturity. This system will include the logger/sensor, handheld reader, and software. The Intellirock system can be obtained from Nomadics Construction Labs (405-372-9535) and the Command Center system can be obtained from the Transtec Group (512-451-6233). Provide two (2) sensors per mix design and one (1) sensor to be placed in the last concrete pour per location site per day. Up to ten (10) additional sensors may be required and p laced as directed by the Engineer. Furnish the concrete necessary to establish the maturity curve for testing. This work is to be performed prior to before any concrete being placed and will not be paid for directly, but will be considered subsidiary to this Item.

Item 502 Barricades, Signs, and Traffic Handling

Construct all work zone signs, sign supports, and barricades from material other than wood unless approved otherwise. Metal posts, if used, are to be galvanized. Aluminum signs, if used, will meet the following minimum thickness requirements:

Square Feet	Minimum Thickness
Less than 7.5	0.080 inches
7.5 to 15	0.100 inches
Greater than 15	0.125 inches

The Contractor Force Account “Safety Contingency” that has been established for this project is intended to be used 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.

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GENERAL NOTES

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Use LCD's, drums, 42" cones, as channelizing devices.

Remove all traffic control devices from the right of way when they are not in use. Devices scheduled to be used within 3 days may be placed along the shoulder of the roadway or along the right of way when not in use, or stored in other approved areas on the project. Cover any construction signs that are not in effect and are installed in a fashion that will not allow them to be removed from the right of way easily.

Provide all flaggers as needed with two-way radio communication capability.

Provide flaggers at each side road intersection.

Item 506 Temporary Erosion, Sedimentation, and Environmental Controls

Construct all side slopes on rock filter dams with 6:1 slopes.

It is not anticipated that any additional erosion, sedimentation, or environmental control devices than those specified in the contract will be needed on this project. The Contractor Force Account "SW3P Contingency" that has been established for this project is intended to be utilized used in the event that such controls become necessary. The SW3P for this project will consist of the use of any temporary erosion control measures deemed necessary by the Engineer and as specified under this Item. This work will be paid for in accordance with Article 4.4., "Changes in the Work."

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

Concrete curb for the metal beam guard fence transition will have one No. 3 or No. 4 bar for longitudinal reinforcement. Dowel the curb into the pavement structure using 12 in. long No. 3 or No.4 bars at 18 in spacing. This work will not be paid for but will be considered subsidiary to the various bid items in the contract.

Item 585 Ride Quality for Pavement Surfaces

Measure and evaluate the ride quality of the pavement surface using Surface Test Type B, Schedule 3.

Item 666 Retroreflectorized Pavement Markings

Furnish Type II drop-on glass beads.

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Item 3077 Superpave Mixtures

Provide a separate Laboratory space, building or testing area, large enough to accommodate TxDOT equipment and testing on site at the Hot Mix Plant near or within the area of Contractor's testing equipment. The contractor will provide the SGC" Superpave Gyratory Compactor" and TGC "Texas Gyratory Compactor". All other equipment must be provided by TxDOT. TxDOT will be responsible for maintaining state provided equipment. The Contractor will provide TxDOT with the Calibration paperwork on the shared equipment that they provide.

Provide an all-weather parking area for the sole use of at least 2 State-owned vehicles. Situate the parking area near the Laboratory area at an acceptable location. Maintain the parking area until the project is completed and restore the area to a condition acceptable to the Engineer upon project completion.

Laboratory area shall have a roof, floor, doors, and screened windows. Ensure the floor is strong enough to support testing equipment and has an impervious floor covering. Ensure that the

Laboratory area is tied down, weatherproof, piped for water and fuel, and electrically wired by personnel meeting the requirements of Article 7.18., "Electrical Requirements."

Provide secured and controlled access to the Laboratory area through security measures such as bars, locks, alarms, or security fencing for the Laboratory area.

Furnish and install adequate equipment, outlets, lighting, air-conditioning, heating, and ventilation for the Laboratory area. Heating and Air Conditioning shall maintain the Laboratory working area temperature within a range of (68oF through 72oF).

Provide partitioned restroom furnished with restroom supplies, a lavatory, and a flush toilet connected to a sewer or septic tank within the Laboratory area.

Laboratory area will have the use of an internet service provider (ISP) that can provide more than one computer access to ISP account at one time. ISP provider must be able to supply a minimum 100 gigabyte download speed per account.

Required appurtenances within the Laboratory Area:

9.A 10lb ABC fire extinguisher with up-to-date inspection tag and a working smoke detector.

10.Additional workbench and tables at least 3 ft. wide, 6 ft. long, and 3 ft. high.

11.Minimum two chairs and one desk, filing cabinets, solar screen blinds or shades.

12.An operational telephone system.

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13.Water fountain or bottled water fountain able to provide cold water and have cup dispenser and cups.

14.Water (for testing purposes) from an approved source

15.Adequately power ventilate the room for the ignition oven. Provide a NEMA 6-50R (208/240 volt, 50 amp) outlet within 2.25 ft. of the ignition oven location and an independent exhaust outlet to the outside located a maximum of 8 ft. from the oven. Provide a level, sturdy and fireproof surface for the ignition oven with a minimum of 6 in. clearance between the furnace and other vertical surfaces. Vent the ignition oven to the outside.

16.A minimum of 20 ft. of total work counter length at least 3 ft. wide and 3 ft. above the floor and strong enough to support required testing equipment

17.A laboratory sink measuring 24 × 30 in. and 12 in. deep

18.Door openings for the Laboratory area must be 48-inches minimum width. If steps are required to gain access to the facility's then a landing dock will be provided with minimum dimensions of 60 inches wide by 60 inches deep. The strong floor and landing of the facility shall support the weight of all equipment and personnel providing a stable, essentially zero deflection during testing operations acceptable to the Engineer.

•Provide multifunction color printer/fax/scanner/copier capable of reproducing 11 X 17

For the Laboratory area the work performed, materials furnished, utilities, and utility services (including phone and internet), appurtenances including office equipment testing equipment, labor, tools, and incidentals will not be paid measured or paid for directly but will be subsidiary to pertinent items.

Use aggregate that meets the SAC requirement of class A for all surface mixes. RAP aggregate must meet the requirements of Table 1.

Aggregates used on shoulders and ramps are required to meet SAC requirements. Provide mix designs. Mix designs must be verified and approved.

Remove all vegetation from pavement edges, intersections, curbs and gutters and driveways before planning or ACP operations. This work will not be paid for directly but will be subsidiary to the various bid items.

Operate the spreading and finishing machine at a uniform forward speed consistent with the plant production rate, hauling capability, and roller train capacity to result in a continuous operation. The speed will be slow enough, so that stopping between trucks is not ordinarily required. If the

Sheet

County: Liberty **Control:** 0028-03-109

Highway: US 90

Engineer determines sporadic delivery of material is adversely affecting the HMA placement, the Engineer may require paving operations to cease until acceptable methods are employed to minimize starting and stopping of the paver.

A material transfer device (MTD) will be required for all surface courses of HMA on this project. An MTD is defined as a self-propelled, wheel-mounted vehicle capable of receiving HMA from the haul trucks separate from the paver. The MTD will have a minimum storage capacity of approximately 25 tons and will be equipped with a pivoting discharge conveyor and a means of completely remixing the HMA before placement. The Engineer may approve an alternative device on a trial basis for the surface course. This device will be capable of receiving HMA separate from the paver and must have remixing capabilities. For all other courses of HMA, other than the surface, an alternative device may be used as long as it is capable of receiving HMA separate from the paver.

Overlay across the ends of any curb ramps must not create a barrier to their use. Changes in level up to ¼" may be vertical; between ¼" and ½" must be beveled with a slope no greater than 1:2; greater than ½" will require a "ramp".

Station limits may be adjusted as

Item 6185

Shadow vehicles with TMA and high intensity rotating, flashing, oscillating or strobe lights are required. Use one TMA preceding and one TMA proceeding every stationary work zone and two TMA's for mobile operations.

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

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
LICENSED
PROFESSIONAL ENGINEER
P.E.
5/25/2022

IDCUS
Planners-Engineers-Program Managers
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Houston, Texas 77094
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T.B.P.E.FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

US 90

GENERAL NOTES

SHEET 06 OF 06

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	18

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0028-03-109 **DISTRICT** Beaumont **COUNTY** Liberty
HIGHWAY US 90

							TOTAL EST.	TOTAL FINAL
			CONTROL SECTION JOB		**0028-03-109**			
			PROJECT ID		**A00066602**			
			COUNTY		**Liberty**			
			HIGHWAY		**US 90**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL			
	104-6021	REMOVING CONC (CURB)	LF	1,900.000			1,900.000	
	105-6052	REMOVE STAB BASE & ASPH PAV (4"-5")	SY	270.000			270.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	270.000			270.000	
	162-6002	BLOCK SODDING	SY	270.000			270.000	
	354-6021	PLANE ASPH CONC PAV(0" TO 2")	SY	36,890.000			36,890.000	
	361-6034	FULL - DEPTH REPAIR CPCD (9")	SY	1,845.000			1,845.000	
	438-6001	CLEANING AND SEALING EXISTING JOINTS	LF	4,370.000			4,370.000	
	479-6002	ADJUSTING INLETS	EA	5.000			5.000	
	500-6001	MOBILIZATION	LS	1.000			1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	8.000			8.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	50.000			50.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	50.000			50.000	
	506-6035	SANDBAGS FOR EROSION CONTROL	EA	44.000			44.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	110.000			110.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	110.000			110.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	200.000			200.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	200.000			200.000	
	529-6005	CONC CURB (MONO) (TY II)	LF	1,900.000			1,900.000	
	530-6002	INTERSECTIONS (ACP)	SY	890.000			890.000	
	530-6005	DRIVEWAYS (ACP)	SY	834.000			834.000	
	662-6001	WK ZN PAV MRK NON-REMOV (W)4"(BRK)	LF	2,228.000			2,228.000	
	662-6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF	1,382.000			1,382.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	755.000			755.000	
	662-6017	WK ZN PAV MRK NON-REMOV (W)(ARROW)	EA	12.000			12.000	
	662-6029	WK ZN PAV MRK NON-REMOV(W)(WORD)	EA	9.000			9.000	
	662-6032	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	LF	1,360.000			1,360.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	20,468.000			20,468.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	876.000			876.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	3,478.000			3,478.000	
	666-6005	REFL PAV MRK TY I (W)4"(DOT)(090MIL)	LF	93.000			93.000	
	666-6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	1,382.000			1,382.000	
	666-6302	RE PM W/RET REQ TY I (W)4"(SLD)(090MIL)	LF	1,768.000			1,768.000	
	666-6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	2,181.000			2,181.000	
	666-6311	RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)	LF	1,051.000			1,051.000	
	666-6314	RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)	LF	10,373.000			10,373.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	749.000			749.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	21.000			21.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0028-03-109 **DISTRICT** Beaumont **COUNTY** Liberty
HIGHWAY US 90

			CONTROL SECTION JOB		**0028-03-109**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00066602**			
			COUNTY		**Liberty**			
			HIGHWAY		**US 90**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**		EST.	FINAL		
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA		9.000		9.000	
	668-6108	PREFAB PAV MRK TY C (Y) (24") (SLD)	LF		779.000		779.000	
	672-6007	REFL PAV MRKR TY I-C	EA		289.000		289.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA		262.000		262.000	
	678-6001	PAV SURF PREP FOR MRK (4")	LF		12,234.000		12,234.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF		2,181.000		2,181.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF		1,382.000		1,382.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF		749.000		749.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA		21.000		21.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA		9.000		9.000	
	720-6002	SPALLING REPAIR (POLYMERIC) (FLEXIBLE)	GAL		1,000.000		1,000.000	
	764-6001	DRAIN INLET CLEANING	EA		9.000		9.000	
	764-6025	STORM SEWER CLEANING (ALL SIZES)	LF		2,200.000		2,200.000	
	3077-6065	SP MIXESSP-DSAC-A PG76-22	TON		3,044.000		3,044.000	
	3077-6075	TACK COAT	GAL		2,213.000		2,213.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA		3.000		3.000	
	6185-6002	TMA (STATIONARY)	DAY		78.000		78.000	
	6185-6003	TMA (MOBILE OPERATION)	HR		264.000		264.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS		1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS		1.000		1.000	

SUMMARY OF ROADWAY QUANTITIES

ITEM	STATION						**			*			**	***	***	****		(*)	(**)	(**)
							104	105	354	361	438	479	529	530	530	720	764	764	3077	3077
							6021	6052	6021	6034	6001	6002	6005	6002	6005	6002	6001	6025	6065	6075
SHEET NO.	STATION					AREA (SF)	REMOVING CONC (CURB)	REMOVING STAB BASE AND ASPH PAV (4"-5")	PLANE ASPH CONC PAV (0" TO 2")	FULL - DEPTH REPAIR CPCD (9")	CLEANING AND SEALING EXISTING JOINTS	ADJUSTING INLETS	CONC CURB (MONO) (TY II)	INTERSECTIONS (ACP)	DRIVEWAYS (ACP)	SPALLING REPAIR (POLYMERIC) (FLEXIBLE)	DRAIN INLET CLEANING	STORM SEWER CLEANING (ALL SIZES)	SP MIXES SP-D SAC-A PG76-22	TACK COAT
							LF	SY	SY	SY	LF	EA	LF	SY	SY	GAL	EA	LF	SY	SY
CSJ: 0028-03-109																				
1 OF 3	BEGIN		TO	STA	117+00.00	116,585		270	12,954	648		3		578			4		12,954	12,954
2 OF 3	STA	117+00.00	TO	STA	137+00.00	133,377	1,900		14,820	741		2	1,900	312	602	1,000	5	2,200	14,820	14,820
3 OF 3	STA	137+00.00	TO	STA	END	82,047			9,116	456	4,370				232				9,116	9,116
PROJECT TOTALS:						332,009	1,900	270	36,890	1,845	4,370	5	1,900	890	834	1,000	9	2,200	36,890	36,890

* LOCATION TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
** ITEMS TO BE UTILIZED TO ADDRESS BROKEN CURBS TROUGHOUT THE PROJECT.
*** FOR DETAILS REFER TO "INTERSECTION DETAILS" SHEET
**** APPLICATION LOCATIONS TO BE APPROVED BY THE ENGINEER.
(*) QUANTITY IS ESTIMATED; TO BE FIELD VERIFIED AND ADJUSTED BY THE ENGINEER.
(**) REFER TO BASIS OF ESTIMATE FOR PAY ITEM

BASIS OF ESTIMATE:

DESCRIPTION	RATE	NO. OF UNITS	UNIT	QUANTITY	UNIT
SP MIXES SP-D SAC-A PG76-22	165 LBS/SY	36,890	SY	3,044	TON
TACK COAT	0.06 GAL/SY	36,890	SY	2,213	GAL

SUMMARY OF TCP QUANTITIES

ITEM	STATION			662	662	662	662	662	662	662	662	662	6001	6185	6185
				6001	6012	6016	6017	6029	6032	6034	6109	6111	6002	6002	6003
SHEET NO.	STATION			WK ZN PAV MRK NON-REMOV (W)4"(BRK)	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	WK ZN PAV MRK NON-REMOV (W)(ARROW)	WK ZN PAV MRK NON-REMOV(W) (WORD)	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	WK ZN PAV MRK SHT TERM (TAB)TY W	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
				LF	LF	LF	EA	EA	LF	LF	EA	EA	EA	DAY	HR
CSJ: 0028-03-109															
N/A	BEGIN	TO	END	2,228	1,382	755	12	9	1,360	20,468	876	3,478	3	78	264
PROJECT TOTALS:				2,228	1,382	755	12	9	1,360	20,468	876	3,478	3	78	264

REV NO.	DATE	BY	REVISION

IDCUS
Planners-Engineers-Program Managers
IDCUS, Inc.
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Houston, Texas 77094
(713) 541-5591 Fax: (713) 541-3501
T.B.P.E.FIRM REGISTRATION NO. F-6825

US 90

SUMMARY OF QUANTITIES

SHEET 01 OF 02

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	21

SUMMARY OF SIGNS AND PAVEMENT MARKINGS QUANTITIES

ITEM	STATION	666	666	666	666	666	666	668	668	668	668	672	672
		6005	6035	6302	6305	6311	6314	6076	6077	6085	6108	6007	6009
SHEET NO.	STATION	REFL PAV MRK TY I (W)4"(DOT) (090MIL)	REFL PAV MRK TY I (W)8"(SLD) (090MIL)	RE PM W/RET REQ TY I (W)4"(SLD) (090MIL)	RE PM W/RET REQ TY I (W)6"(BRK) (090MIL)	RE PM W/RET REQ TY I (Y)4"(BRK) (090MIL)	RE PM W/RET REQ TY I (Y)4"(SLD) (090MIL)	PREFAB PAV MRK TY C (W) (24") (SLD)	PREFAB PAV MRK TY C (W) (ARROW)	PREFAB PAV MRK TY C (W) (WORD)	PREFAB PAV MRK TY C (Y) (24") (SLD)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A
		LF	LF	LF	LF	LF	LF	LF	EA	EA	LF	EA	EA
CSJ: 0028-03-109													
1 OF 3	BEGIN TO STA 117+00.00	93	461	418	767	464	3,055	433	7	3		100	77
2 OF 3	STA 117+00.00 TO STA 137+00.00		662	25	838	445	3,657	286	10	4		117	93
3 OF 3	STA 137+00.00 TO STA END		259	1,325	576	142	3,661	30	4	2	779	72	92
PROJECT TOTALS:		93	1,382	1,768	2,181	1,051	10,373	749	21	9	779	289	262

ITEM	STATION	678	678	678	678	678	678
		6001	6002	6004	6008	6009	6016
SHEET NO.	STATION	PAV SURF PREP FOR MRK (4")	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (8")	PAV SURF PREP FOR MRK (24")	PAV SURF PREP FOR MRK (ARROW)	PAV SURF PREP FOR MRK (WORD)
		LF	LF	LF	LF	EA	EA
CSJ: 0028-03-109							
1 OF 3	BEGIN TO STA 117+00.00	3,566	767	461	433	7	3
2 OF 3	STA 117+00.00 TO STA 137+00.00	3,682	838	662	286	10	4
3 OF 3	STA 137+00.00 TO STA END	4,986	576	259	30	4	2
PROJECT TOTALS:		12,234	2,181	1,382	749	21	9

SUMMARY OF SWPPP QUANTITIES

ITEM	STATION	160	162	506	506	506	506	506	506	506
		6003	6002	6001	6011	6035	6038	6039	6042	6043
SHEET NO.	STATION	FURNISHING AND PLACING TOPSOIL (4")	BLOCK SODDING	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (REMOVE)	SANDBAGS FOR EROSION CONTROL	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
		SY	SY	LF	LF	EA	LF	LF	LF	LF
CSJ: 0028-03-109										
1 OF 3	BEGIN TO STA 117+00.00	270	270	50	50	16	40	40	40	40
2 OF 3	STA 117+00.00 TO STA 137+00.00					28	70	70	160	160
3 OF 3	STA 137+00.00 TO STA END									
PROJECT TOTALS:		270	270	50	50	44	110	110	200	200

REV NO.	DATE	BY	REVISION

IDCUS
Planners-Engineers-Program Managers
IDCUS, Inc.
15915 Katy Freeway, Suite 300
Houston, Texas 77094
(713) 541-5591 Fax: (713) 541-3501
T.B.P.E.FIRM REGISTRATION NO. F-6825

Texas Department of Transportation ® 2022

US 90

SUMMARY OF QUANTITIES

SHEET 02 OF 02

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	22

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TRAFFIC CONTROL AND SEQUENCE OF WORK

GENERAL

1. PRIOR TO BEGINNING CONSTRUCTION, ALL ADVANCED WARNING SIGNS MUST BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH SHEETS BC (1)-21 THROUGH BC (12)-21.

2. CONTRACTOR SHALL INSTALL ALL BARRICADES, SIGNS, AND CHANNELIZING DEVICES IN ACCORDANCE TO THE LATEST EDITION OF TEXAS MANUAL OF UNIFORM DEVICES (MUTCD) AND TXDOT STANDARDS TCP(2-4)-18, TCP (3-1)-13, TCP(3-3)-14 AND TCP (3-4)-13.

3. ALL WORK ON THIS PROJECT IS TO BE PERFORMED WITHIN THE EXISTING ROW.

4. ALL LANE CLOSURES SHALL BE PERFORMED AT NIGHT BETWEEN THE HOURS OF 8 PM TO 5 AM, SUNDAY NIGHT THROUGH THURSDAY NIGHT, OR AS DIRECTED BY THE ENGINEER. EXISTING LANES SHALL BE REOPENED TO TRAFFIC AT 5 AM DAILY.

5. THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER FOR APPROVAL OF NIGHTLY PLANNED LANE CLOSURE ACTIVITIES. CONTRACTOR SHALL ADJUST THE LENGTH OF THE NIGHTLY LANE CLOSURE (BARRICADES, SIGNS, CHANNELIZING DEVICES, AND TMA) TO ESTABLISH A SAFE WORKZONE OF THE SCHEDULED NIGHTLY WORK ACTIVITIES.

6. EACH MORNING BEFORE 5 AM THE NIGHT TIME LANE CLOSURE SHALL BE RESTORED TO A SAFE DRIVABLE PRE-EXISTING CONDITION.

7. ALL PAVEMENT EDGES EXCEEDING 2 INCHES MUST BE BACKFILLED WITH A 3:1 OR FLATTER SLOPE AT THE END OF EACH WORK NIGHT BEFORE OPENING BACK UP TO TRAFFIC.

8. THE CONTRACTOR SHALL PERFORM WORK IN A SAFE MANNER AND IMMEDIATELY CORRECT ANY SITUATION THAT PRESENTS A HAZARD TO THE TRAVELING PUBLIC AND/OR TO THE CONSTRUCTION WORKERS.

9. INSTALL SW3P DEVICES AS SHOWN IN THE PLANS.

10. AN ISD ELEMNTARY AND JUNIOR HIGH SCHOOL RESIDE WITHIN PROXIMITY OF THE PROJECT. SEE CONTACT INFORMATION BELOW.

    WOODROW WILSON JR HIGH SCHOOL
    SCHOOL STARTS AT 7:00 AM; ENDS AT 2:35 PM (GROUP #1) & 3:50 PM (GROUP #2)
    PH. (936) 258-2309

    STEPHEN F. AUSTIN ELEMTARY SCHOOL
    SCHOOL STARTS AT 7:45 AM; ENDS AT 4:30 PM
    PH. (936) 258-2535

PHASE 1 (REPAIR INLET/CURB/PAVEMENT AND ADJUST MANHOLE/VALVE)

1. INSTALL BARRICADES, SIGNS, AND CHANELIZING DEVICES ALONG US 90 FOR NIGHTLY LANE CLOSURE OF OUTSIDE LANE ACTIVITIES. CONTRACTOR SHALL ONLY CLOSE ONE LANE EACH DIRECTION OR AS APPROVED BY THE ENGINEER.

2. PERFORM REPAIRS ON DAMAGED INLETS, CURBS, AND PAVEMENT AS APPROVED BY THE ENGINEER. ADJUST MANHOLE AND VALVE COVERS AS APPROVED BY THE ENGINEER.

PHASE 2 (US 90 MILL AND INLAY ACTIVITIES)

1. MILL AND INLAY AREA SHOWN ON PLANS USING TCP (2-4)-18 STANDARD.

PHASE 3 FINAL PAVEMENT MARKINGS, SIGNS, AND FINAL CLEANUP

1. INSTALL PAVEMENT MARKINGS AND SIGNS.

2. REMOVE SWPPP DEVICES.

3. PERFORM FINAL CLEANUP.

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
ROLANDO ESCAMILLA
90128
LICENSED
PROFESSIONAL ENGINEER
5/25/2022

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Planners-Engineers-Program Managers
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T.B.P.E.FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

US 90

SEQUENCE OF WORK / TCP NARRATIVE

SHEET 01 OF 01

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	23

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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

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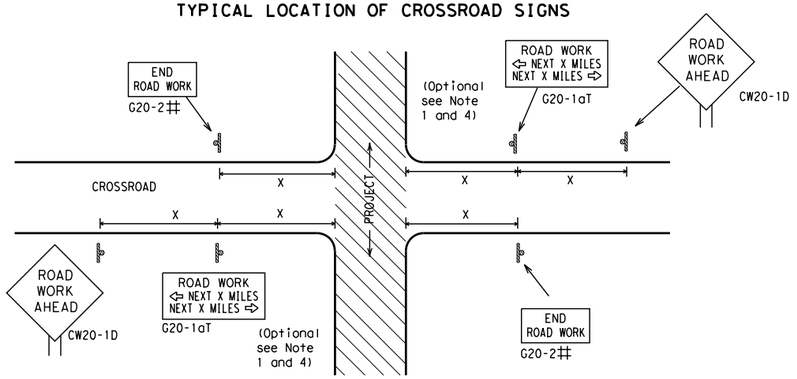
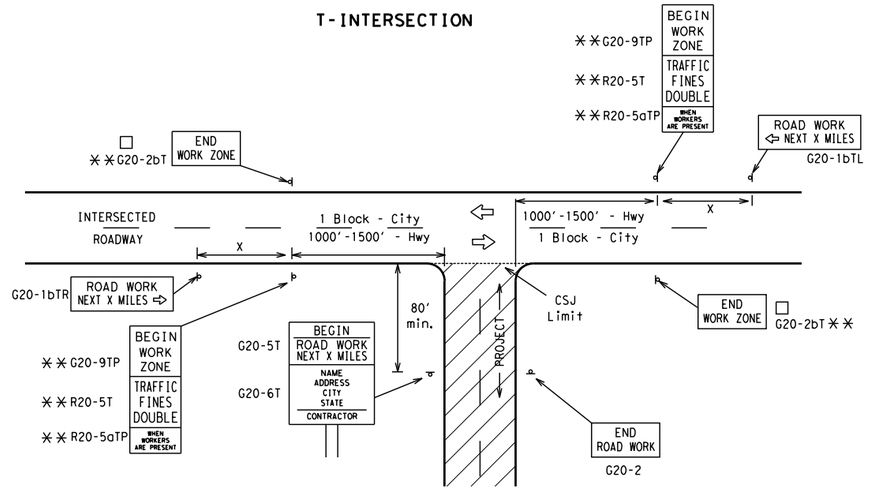
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

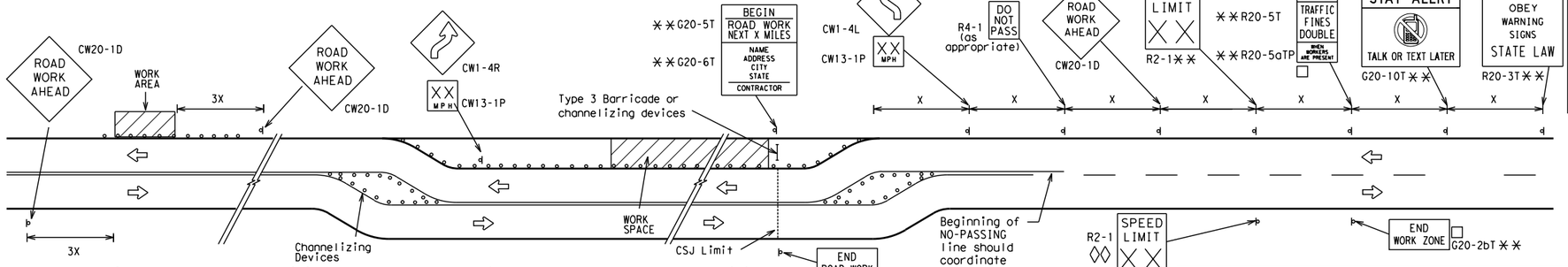
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

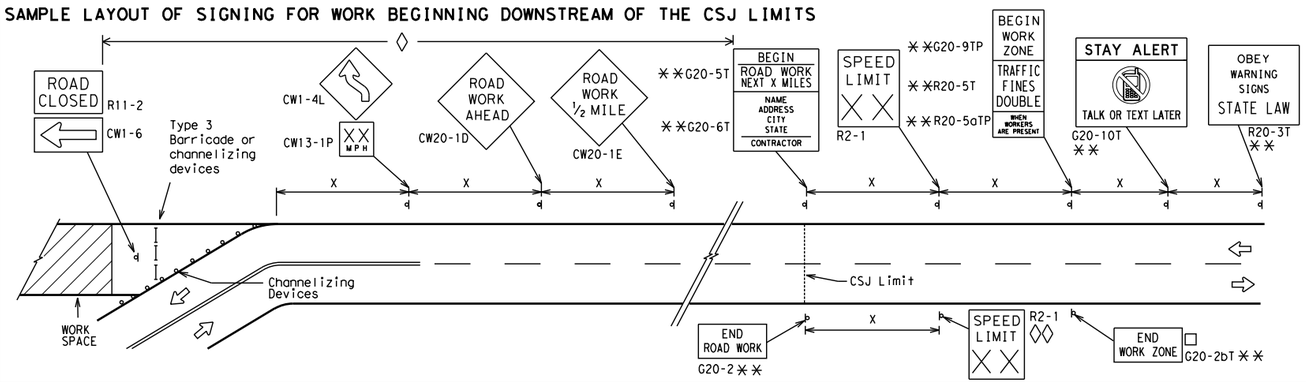
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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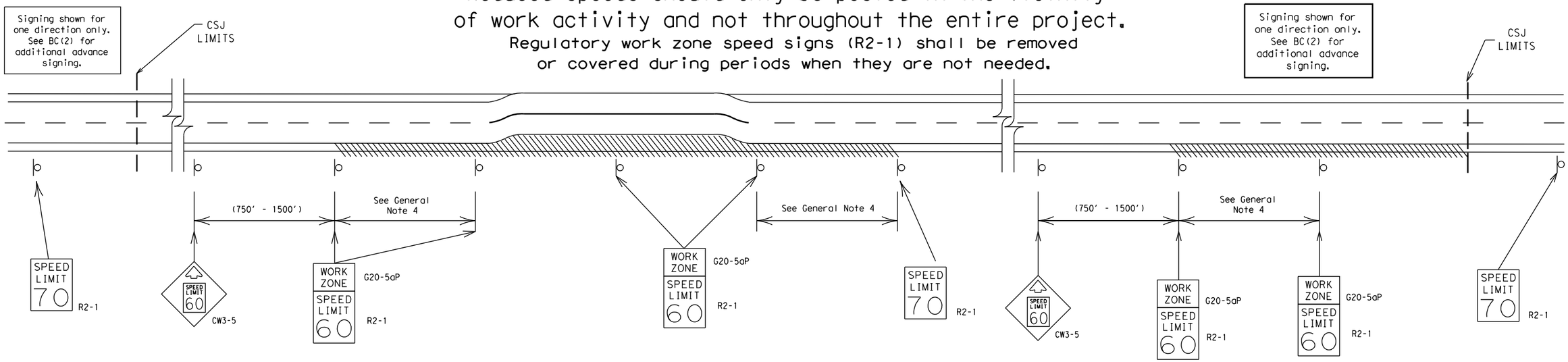
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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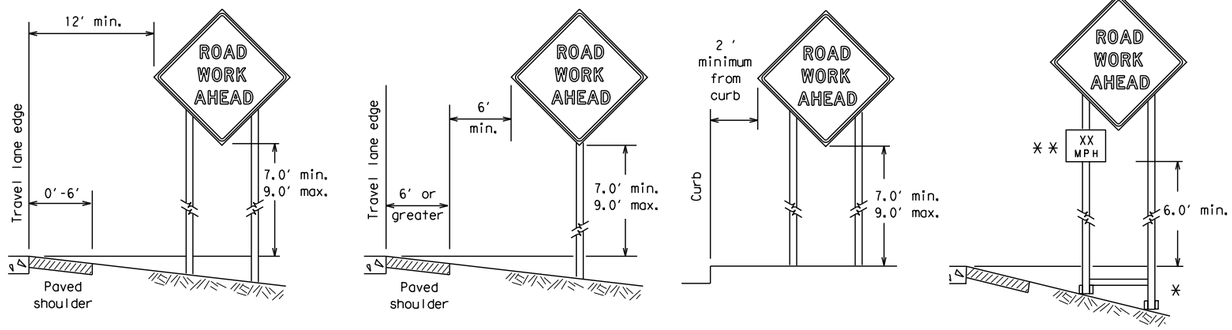
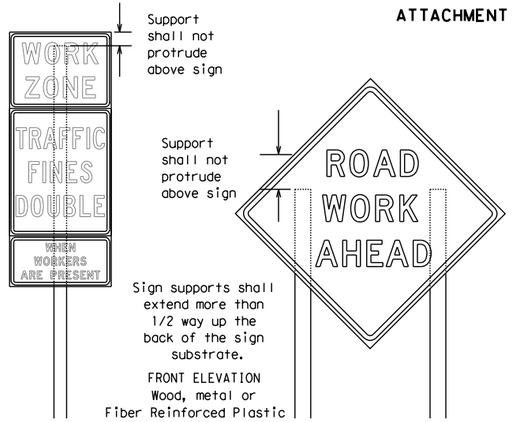
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

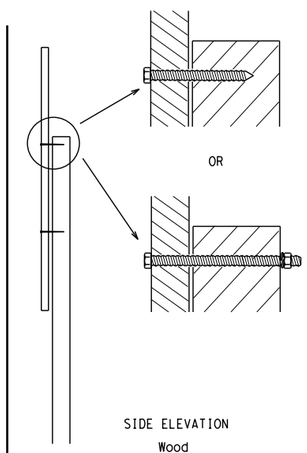


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





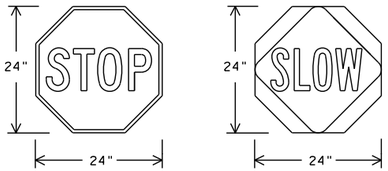
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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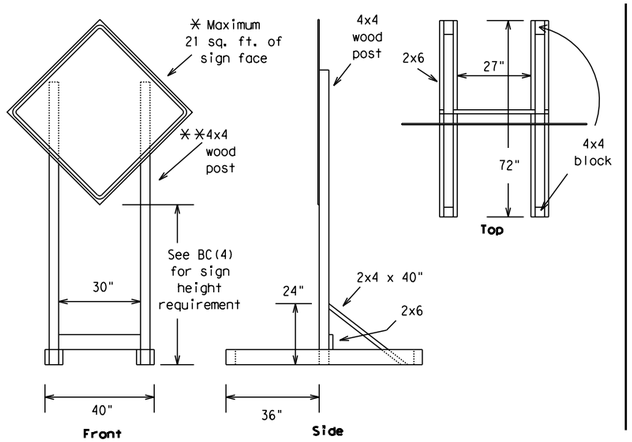
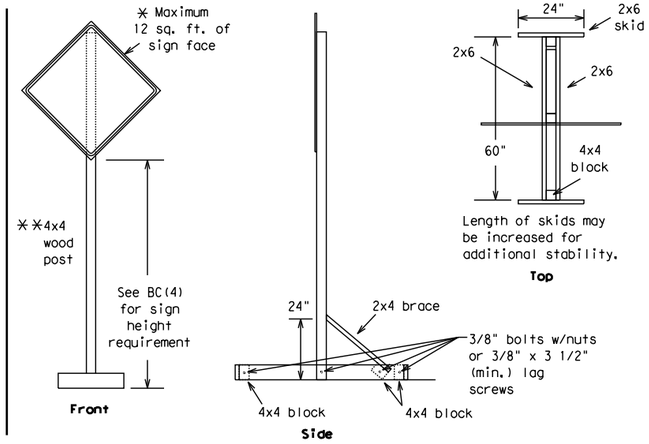
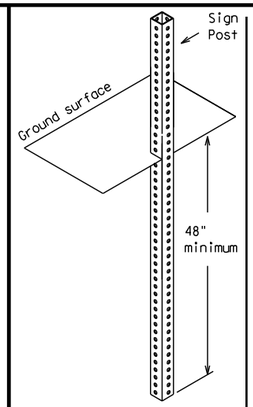
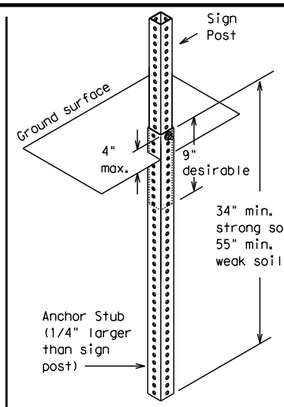


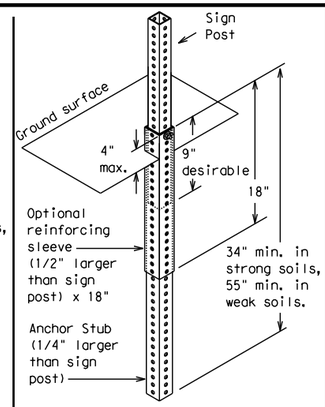


SKID MOUNTED WOOD SIGN SUPPORTS

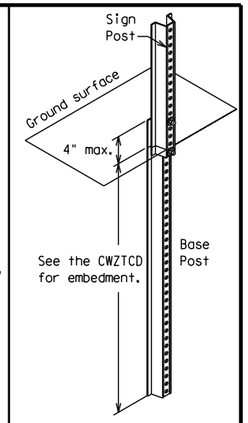
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







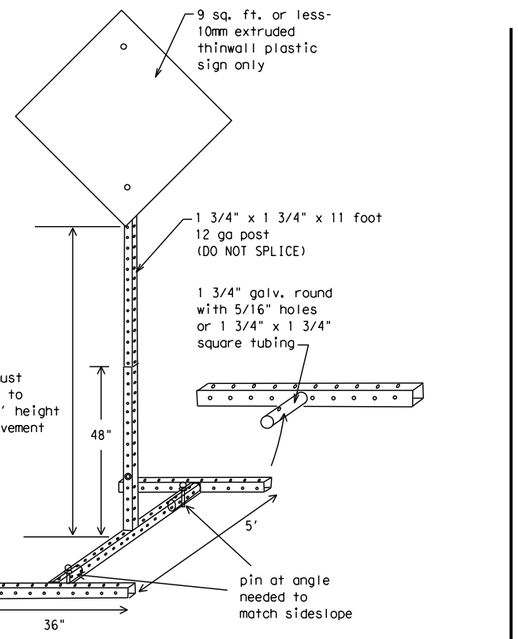
PERFORATED SQUARE METAL TUBING

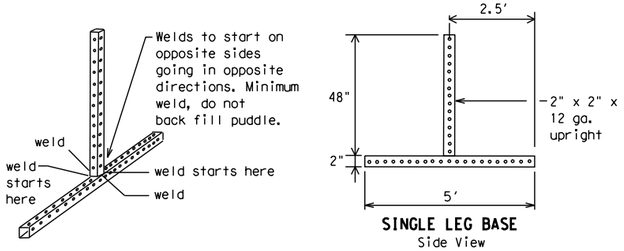


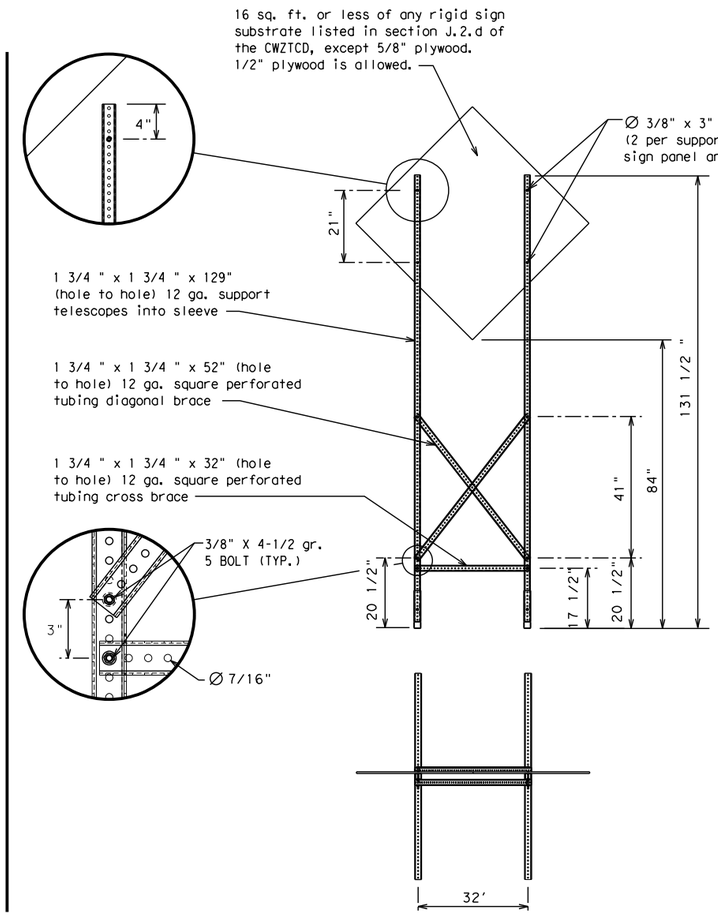
WING CHANNEL
Lap-splice/base bolted anchor

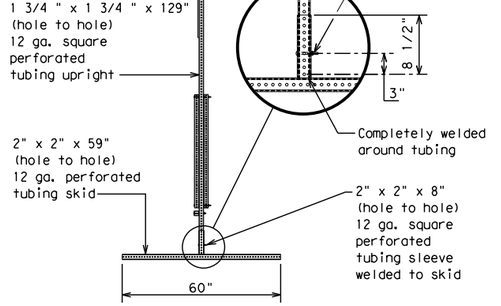
GROUND MOUNTED SIGN SUPPORTS

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









SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0028	03	109	US 90
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BMT	LIBERTY		28

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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

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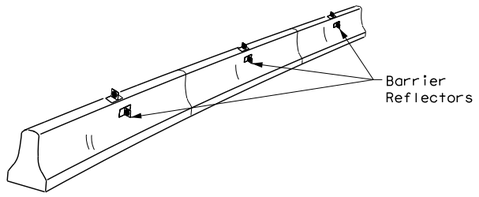
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0028	03	109	US 90
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BMT	LIBERTY		29

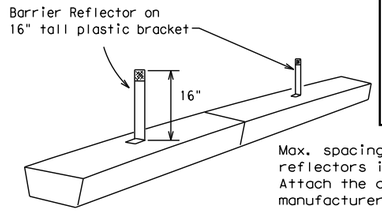
DATE: 5/25/2022 2:51:23 PM
FILE: Z:\Transportation\TxDOT\PS&E\STATEWIDE 36-6\DP5422\WA 5 - TxDOT Beaumont\US 90\CADD\STANDARDS\01 TCP\bc-21.dgn

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



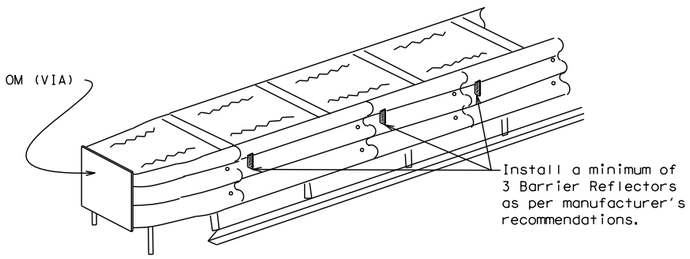
CONCRETE TRAFFIC BARRIER (CTB)

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



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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

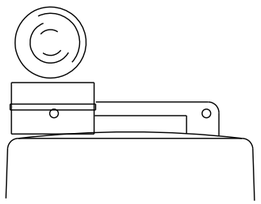
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

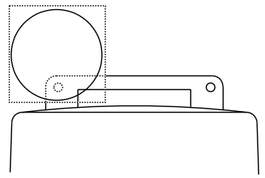
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

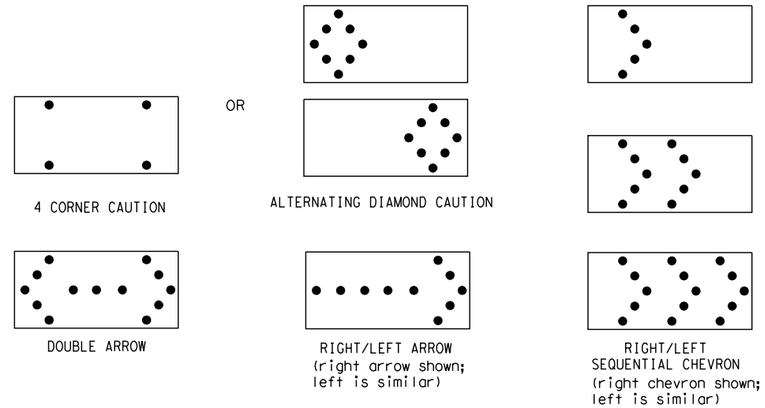
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

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

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

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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0028	03	109	US 90
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BMT	LIBERTY		30

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

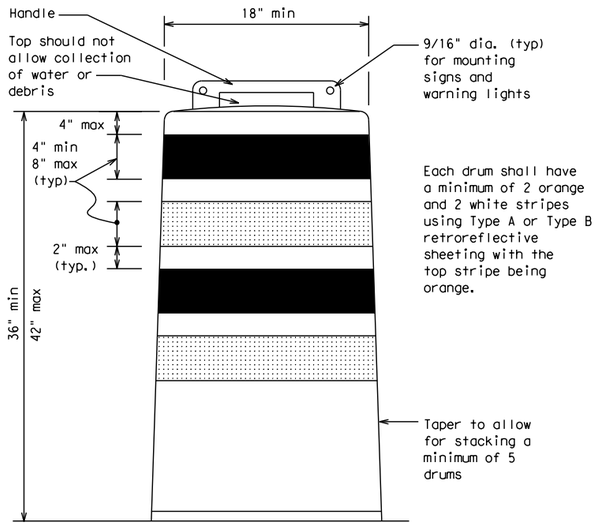
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

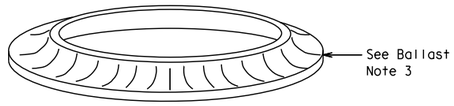
RETROREFLECTIVE SHEETING

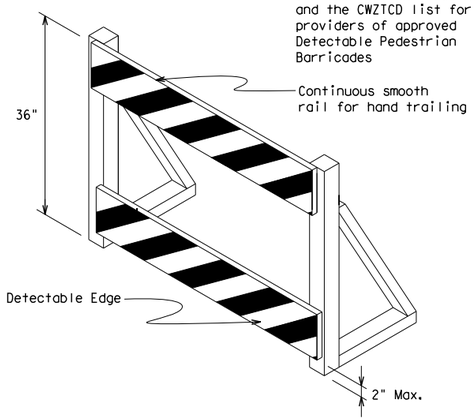
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

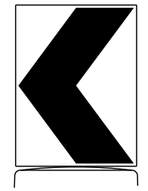




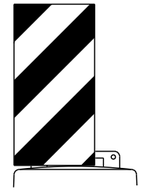


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0028	03	109	US 90
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	BMT	LIBERTY		31
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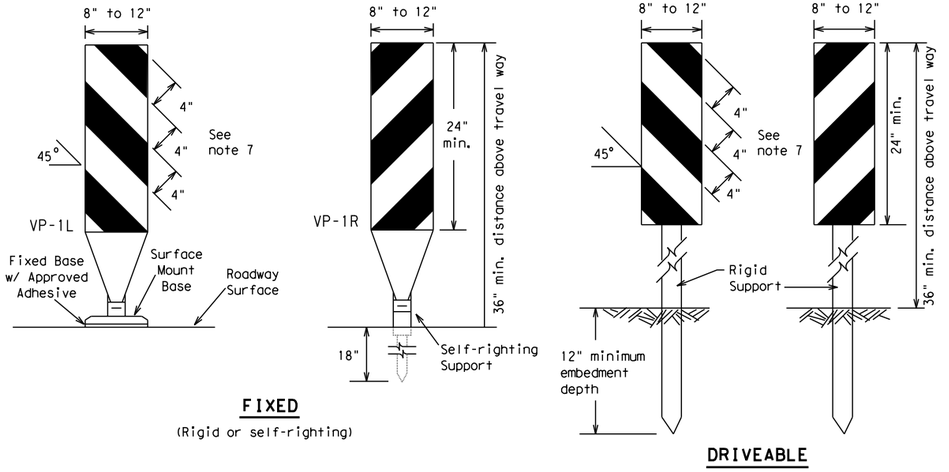
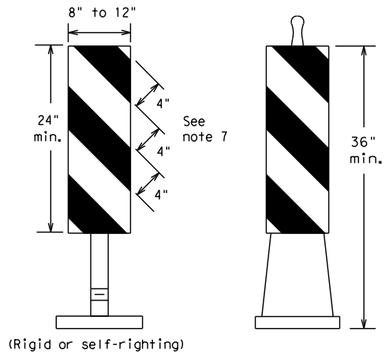


FIXED
(Rigid or self-righting)

DRIVEABLE

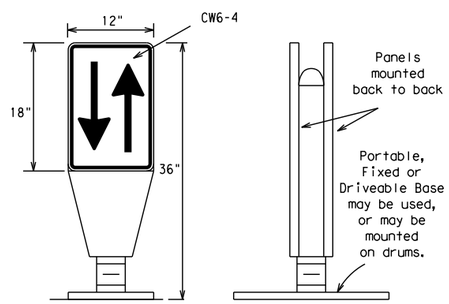


(Rigid or self-righting)

PORTABLE

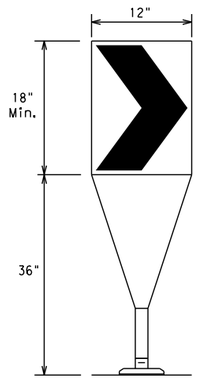
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is 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)



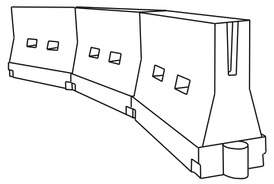
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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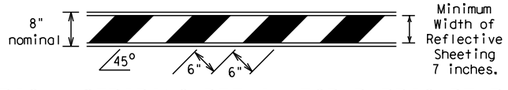
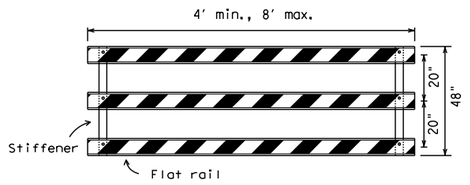
TYPE 3 BARRICADES

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.



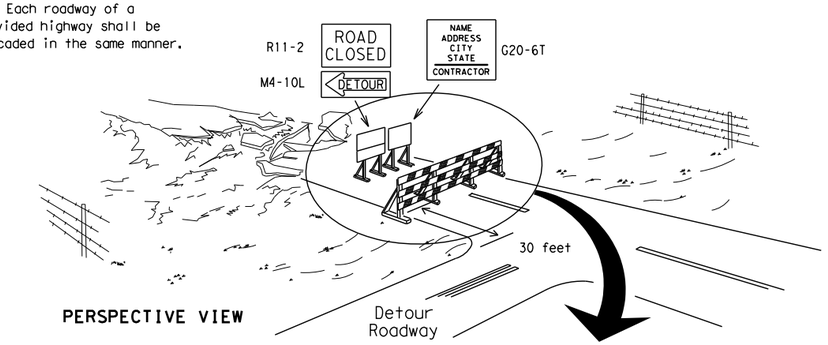
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

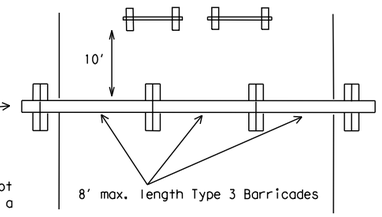
Each roadway of a divided highway shall be barricaded in the same manner.



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.

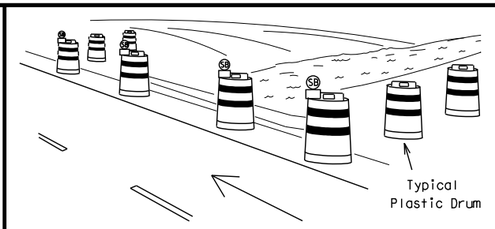
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

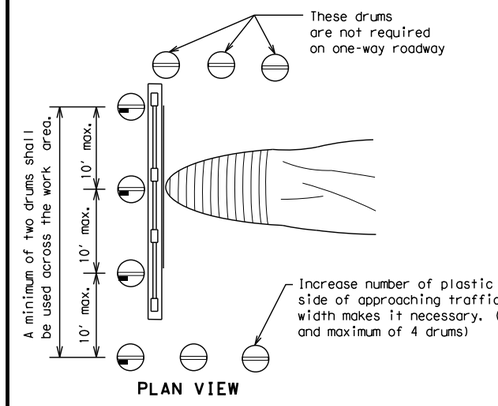
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

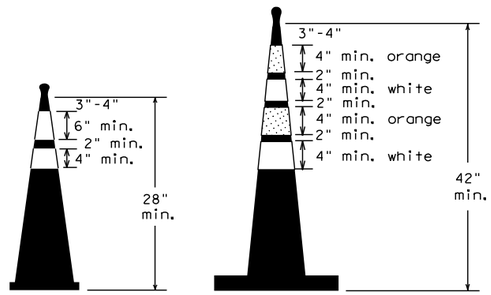
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



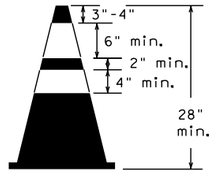
PLAN VIEW

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

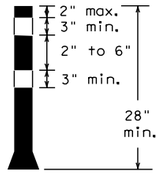
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

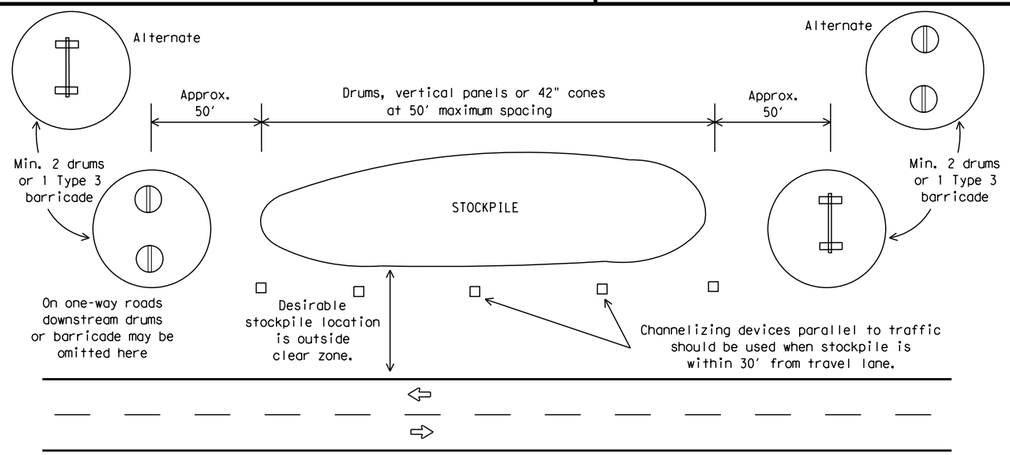


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0028	03	109	US 90
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BMT	LIBERTY		33

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

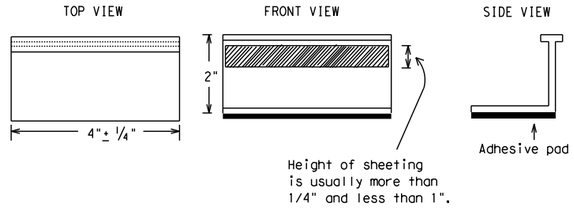
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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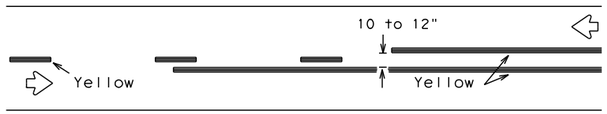
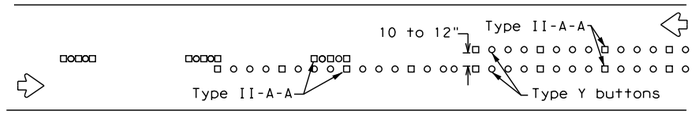
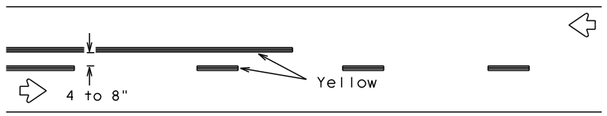
PAVEMENT MARKING PATTERNS



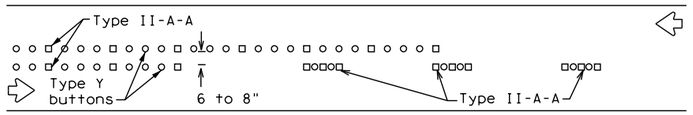
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



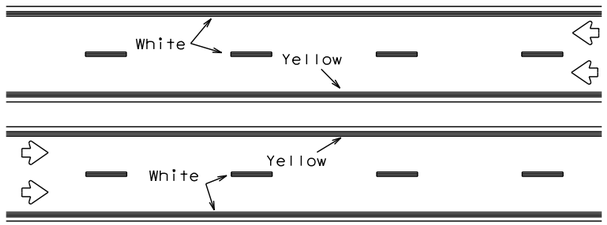
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



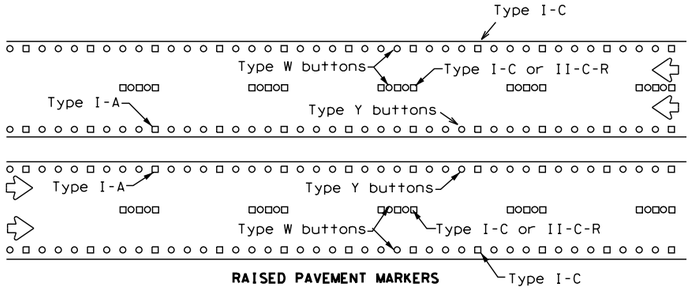
RAISED PAVEMENT MARKERS - PATTERN B

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

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



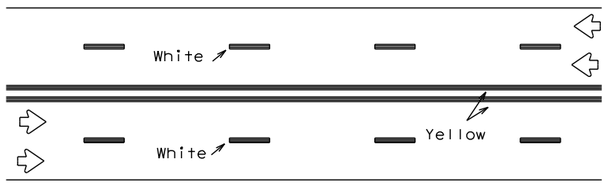
REFLECTORIZED PAVEMENT MARKINGS



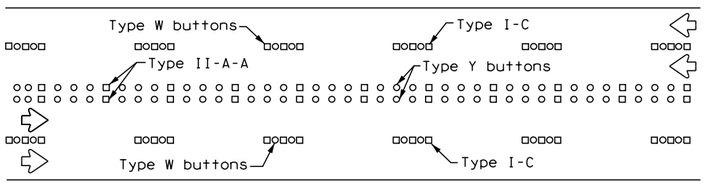
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



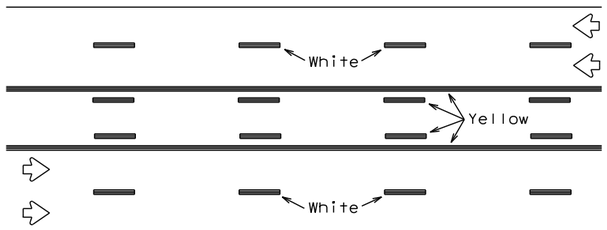
REFLECTORIZED PAVEMENT MARKINGS



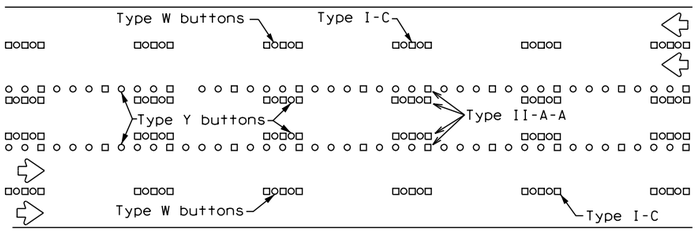
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

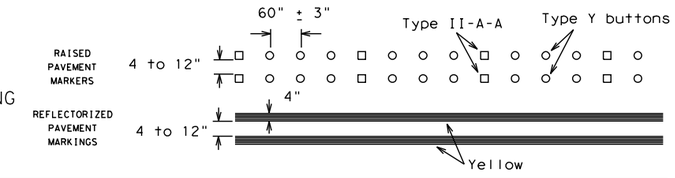
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

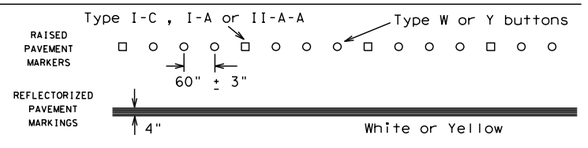
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

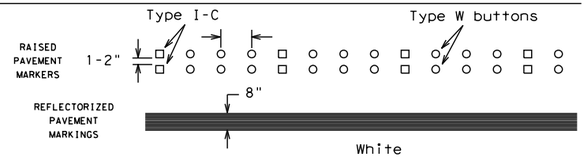


EDGE LINE OR SINGLE NO-PASSING LINE



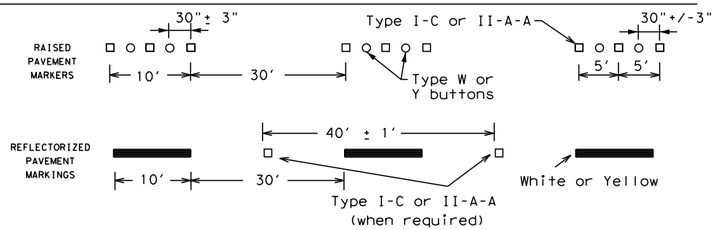
WIDE LINE

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

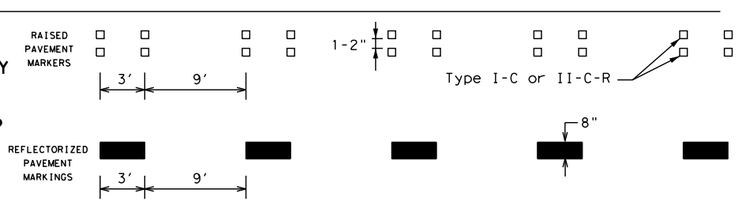


BROKEN LINES

CENTER LINE OR LANE LINE

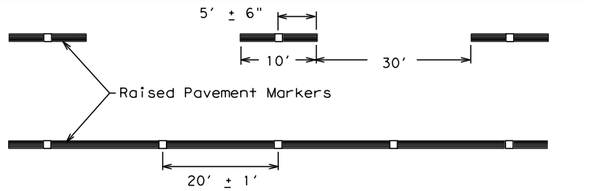


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

SHEET 12 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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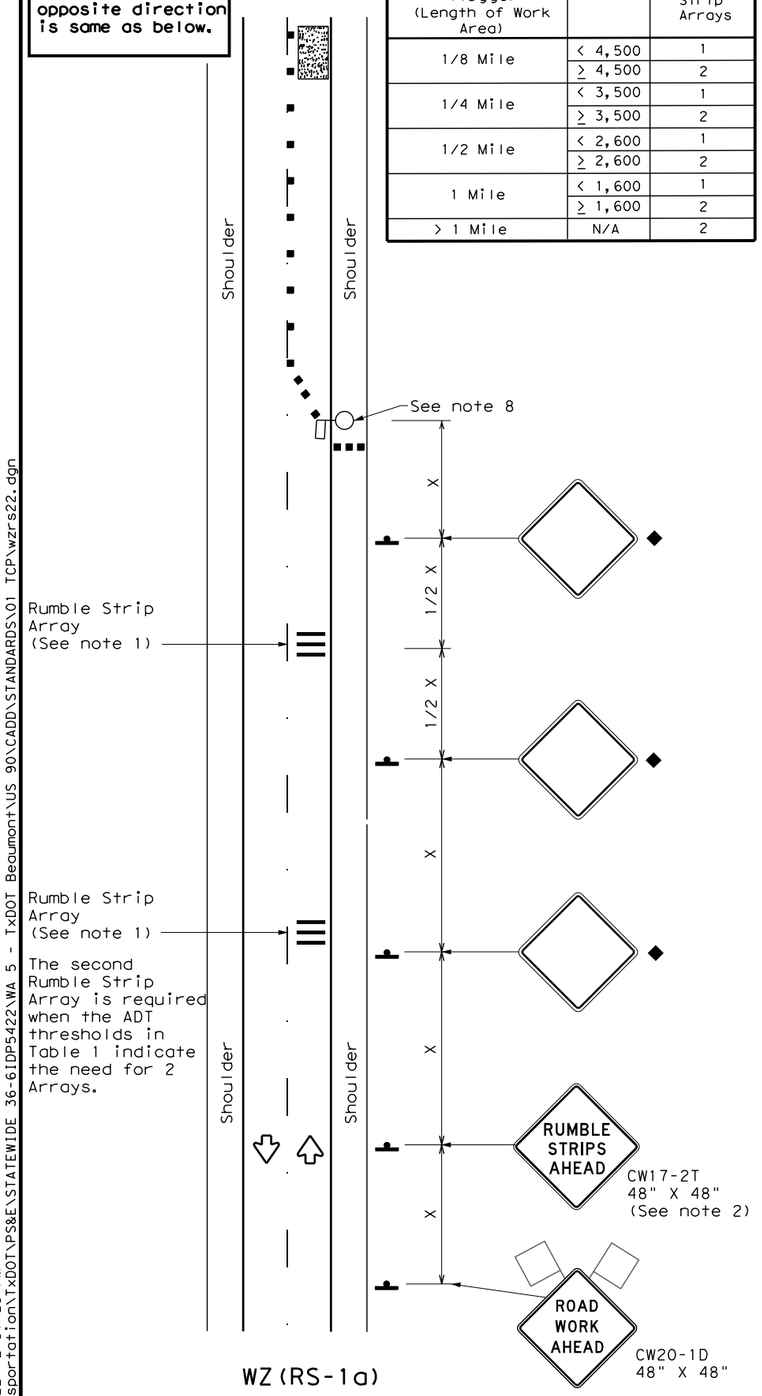
Warning sign and rumble strip sequence in opposite direction is same as below.

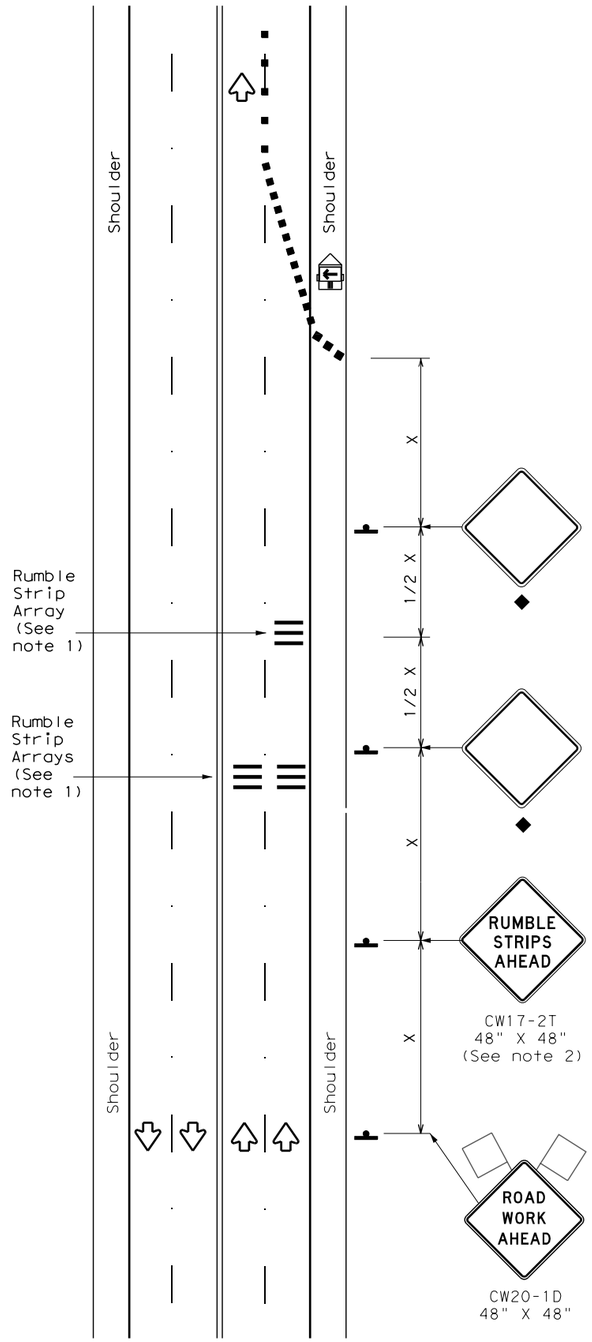


WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION

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-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

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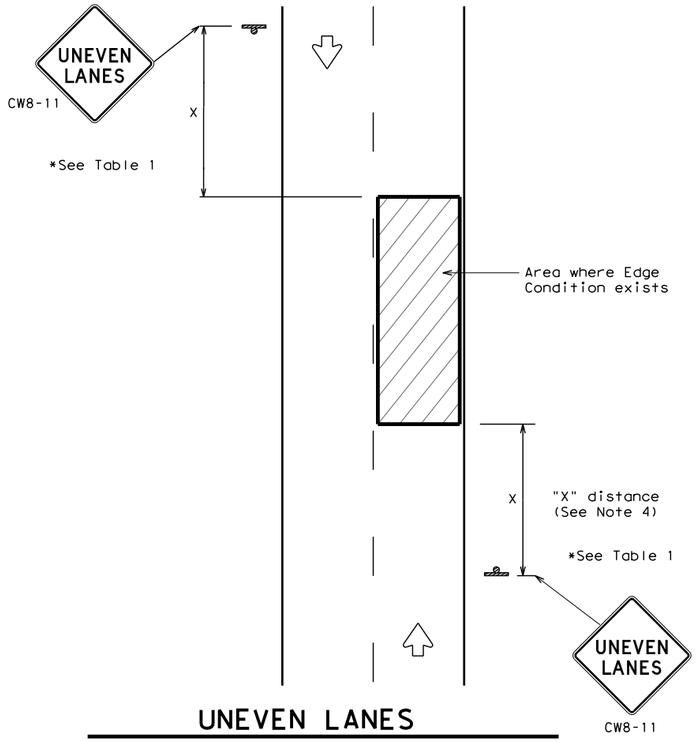
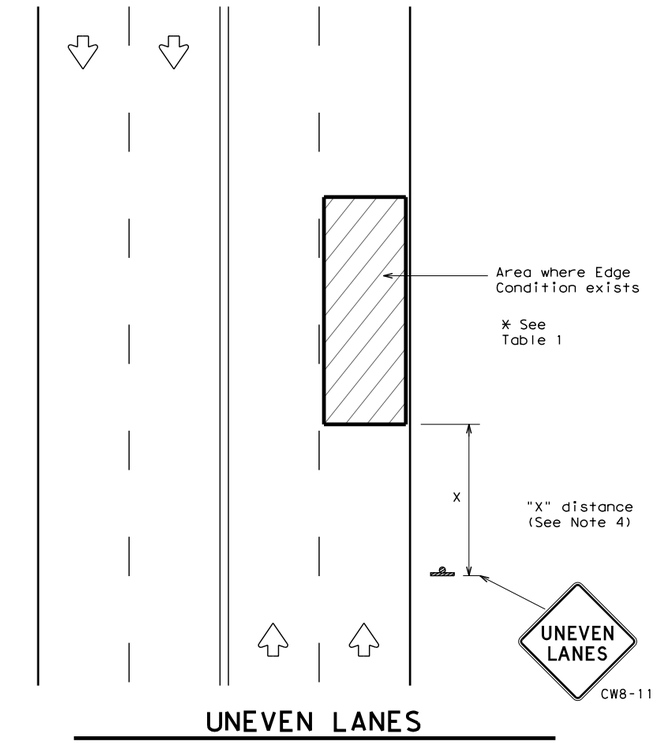
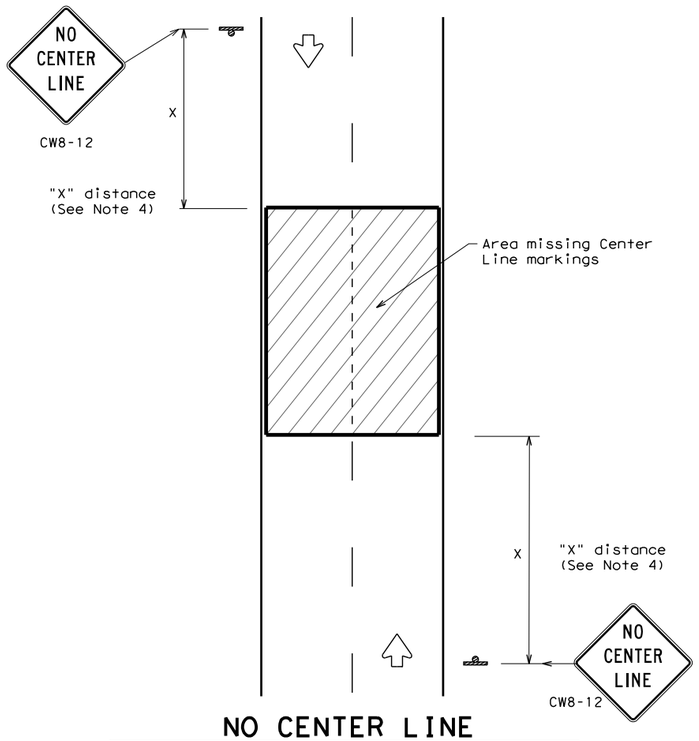


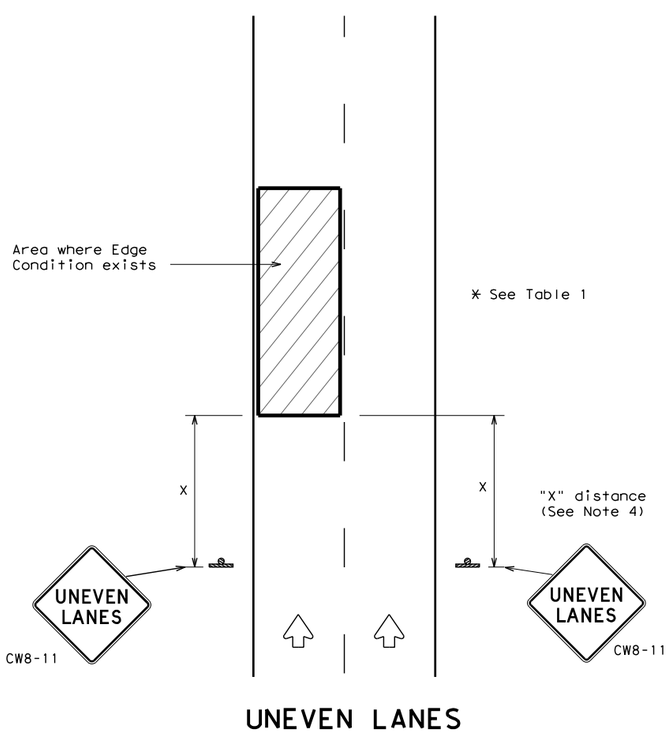
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

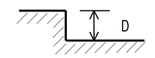
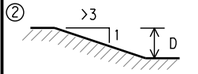
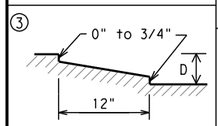
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

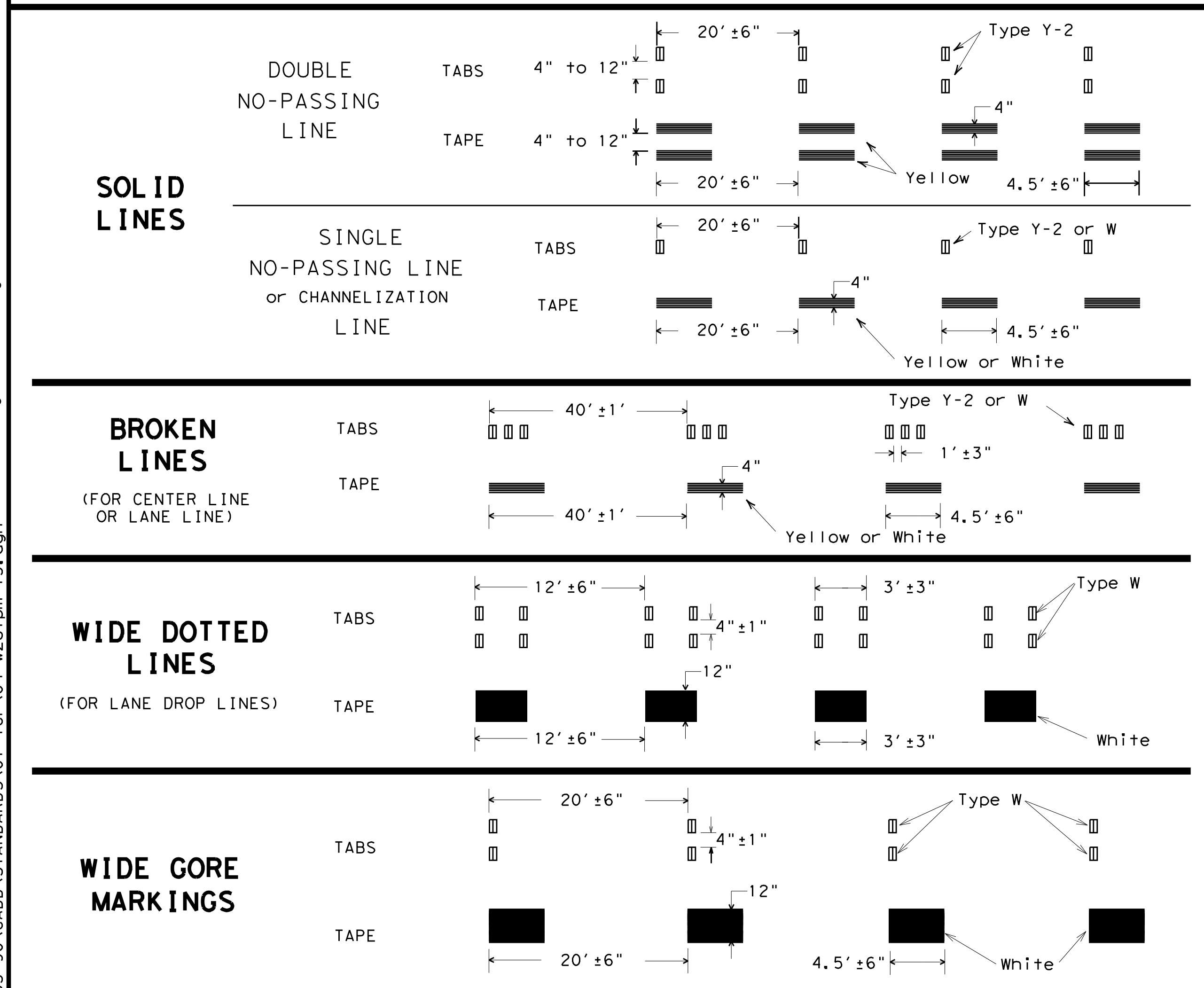
Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

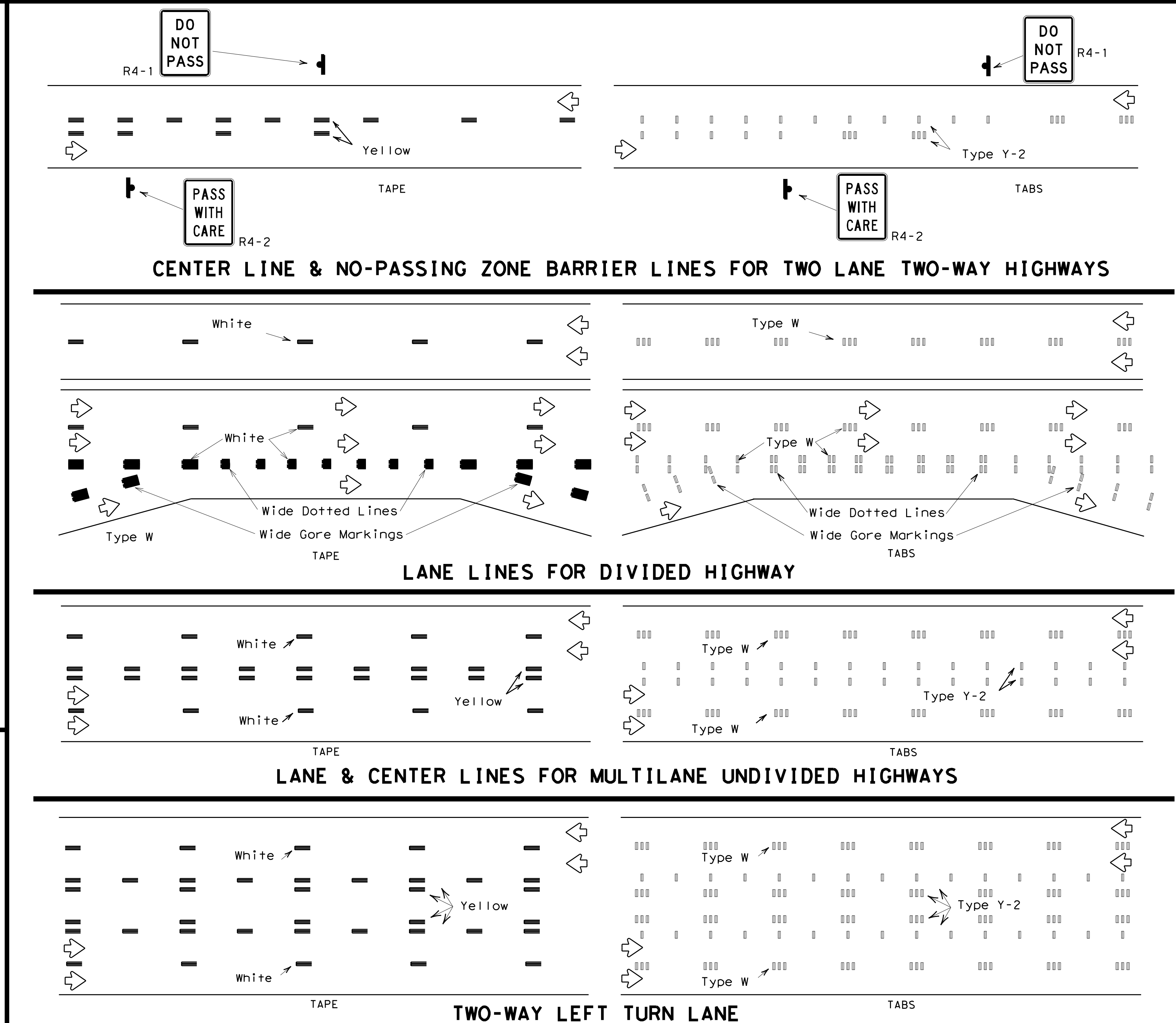
WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0028	03	109	US 90
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	BMT	LIBERTY		37

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS

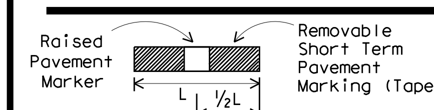


NOTES:

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.



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 Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE: wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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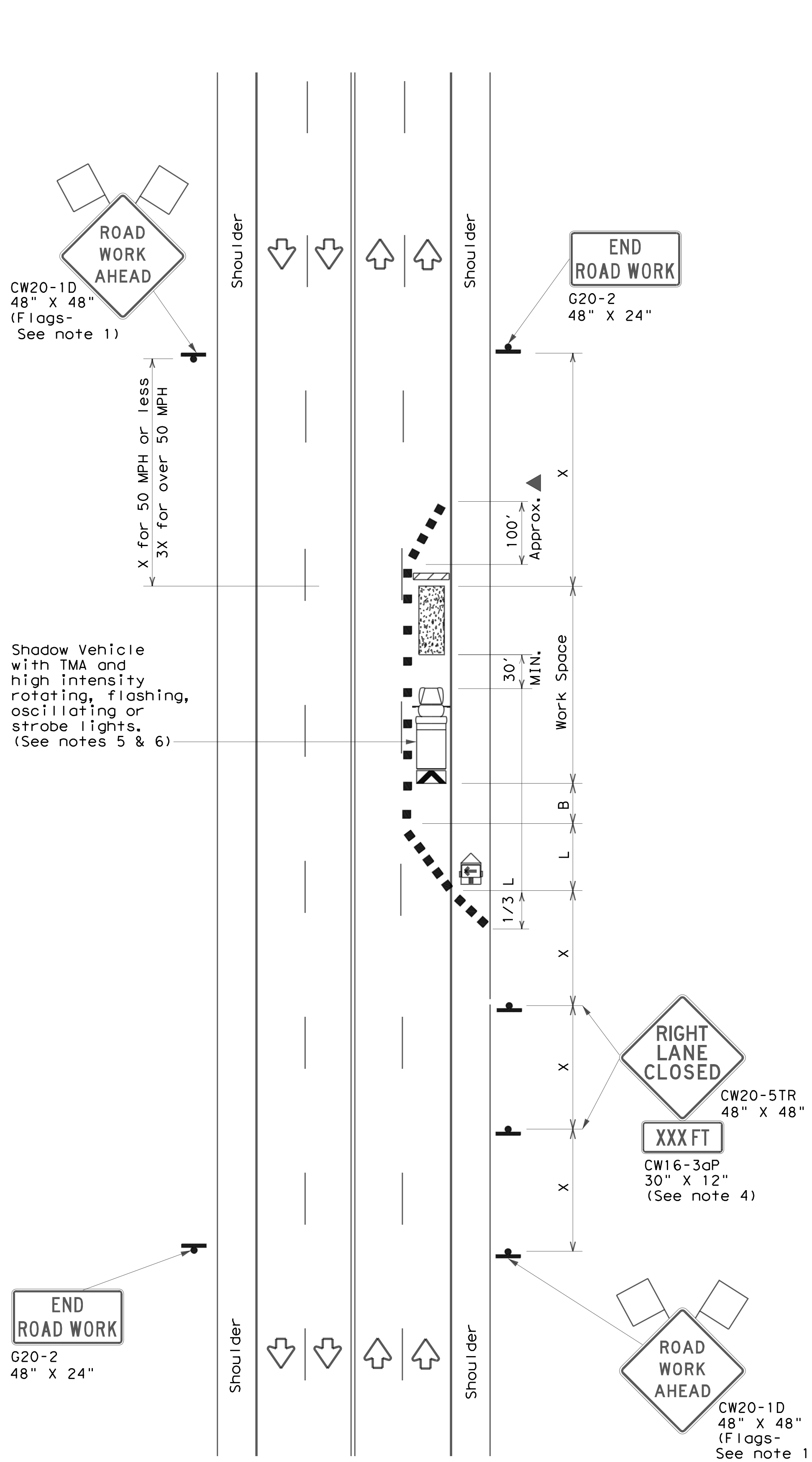
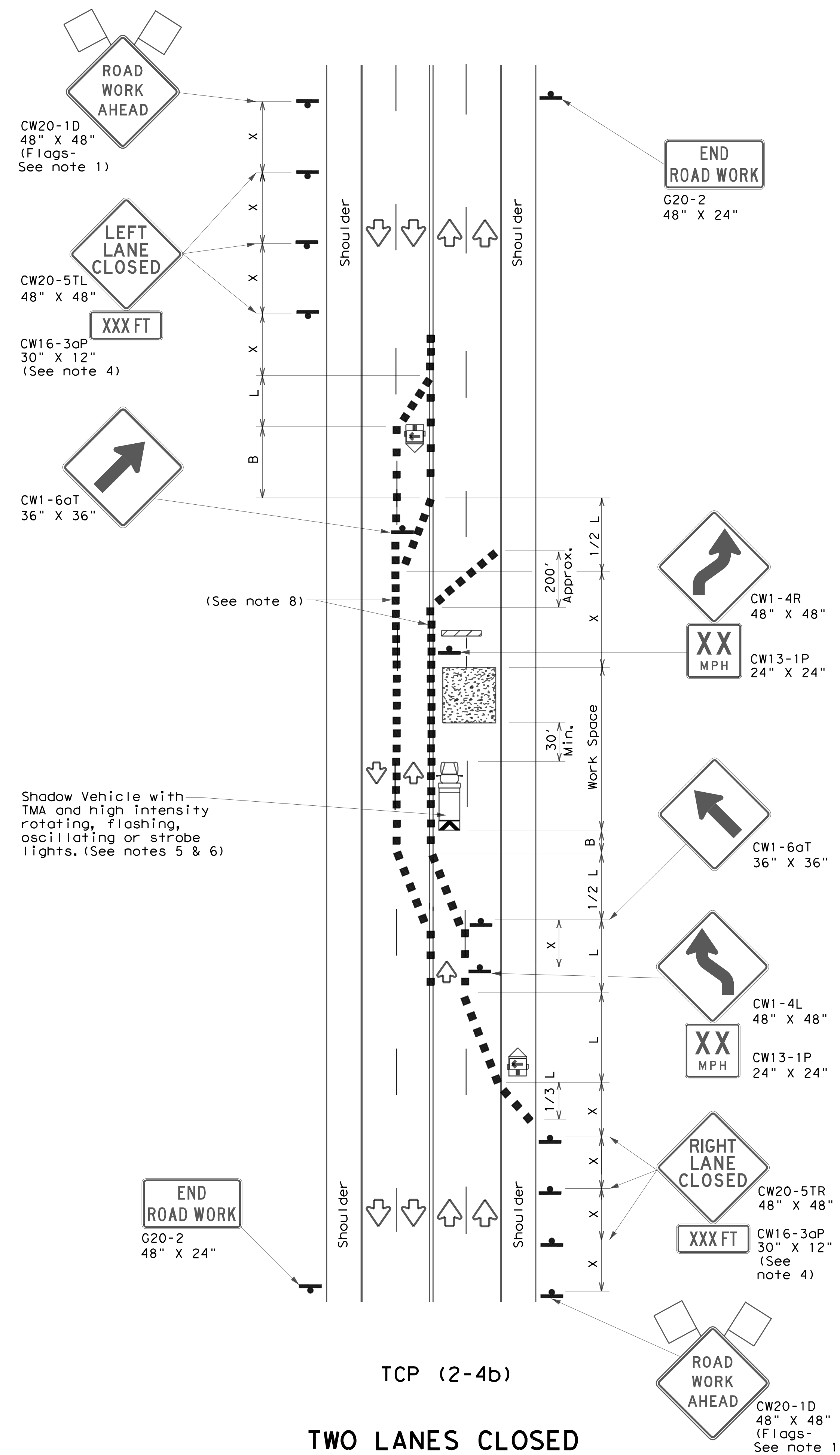
	BMT		LIBERTY	38



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		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

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

* Conventional Roads Only

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

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

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

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164

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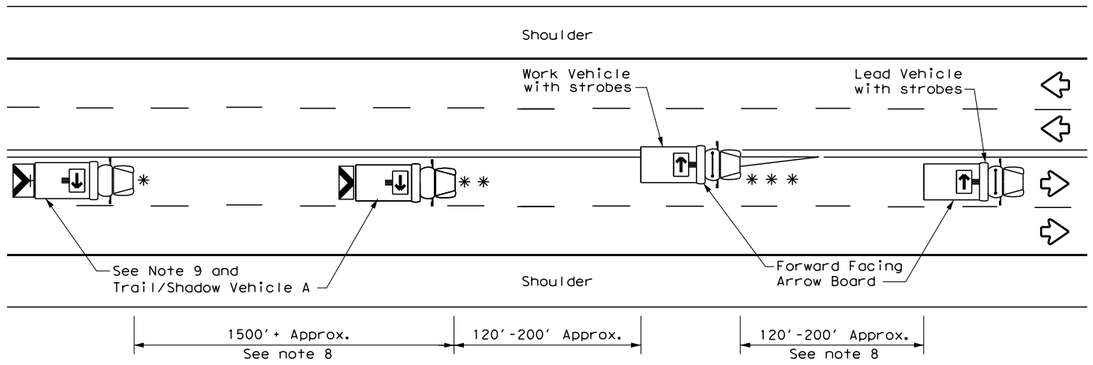
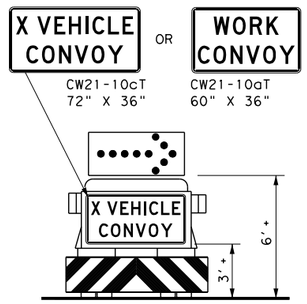


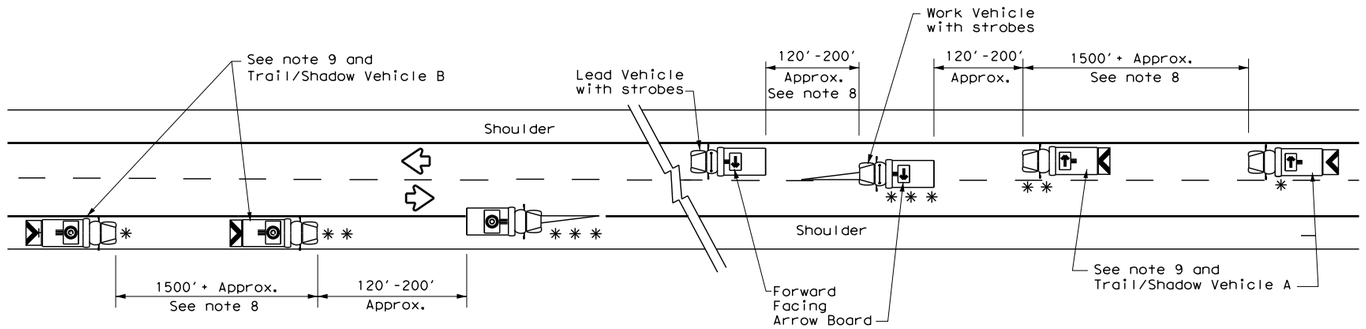
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

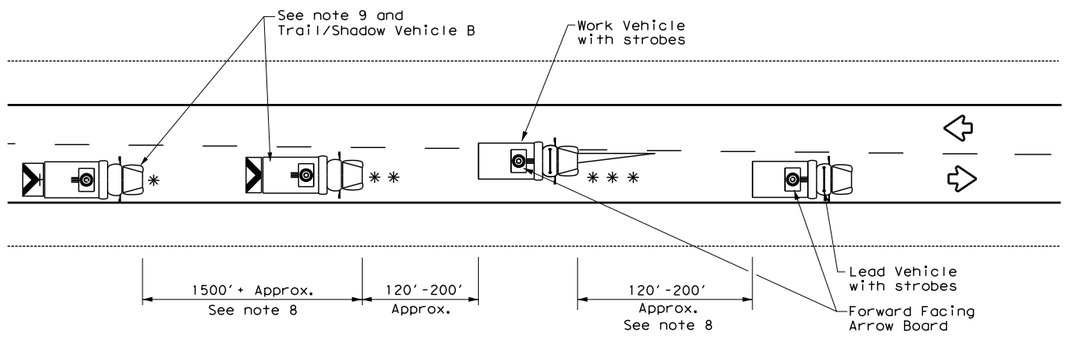


WORK ON SHOULDER

WORK ON TRAVEL LANE

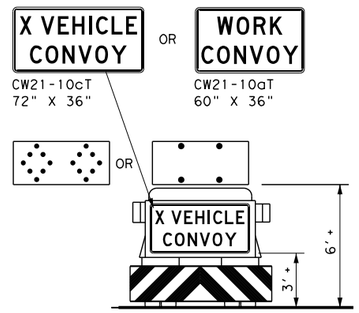
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

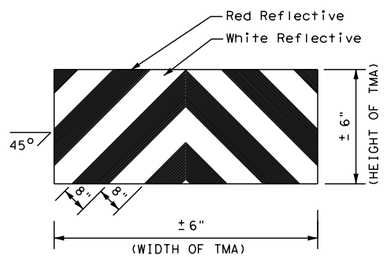
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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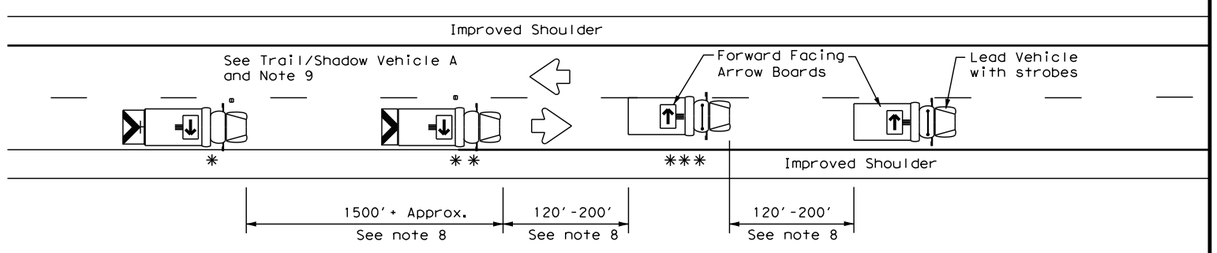
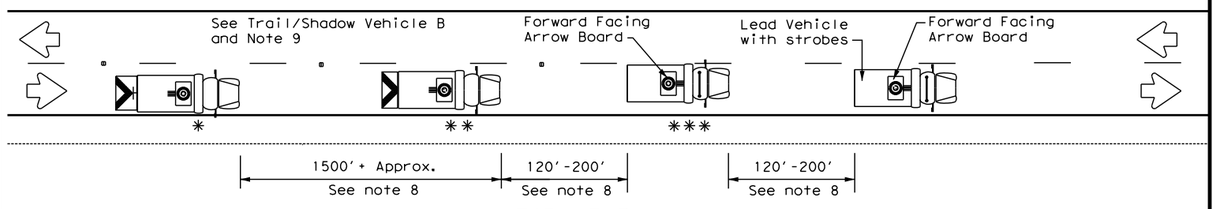


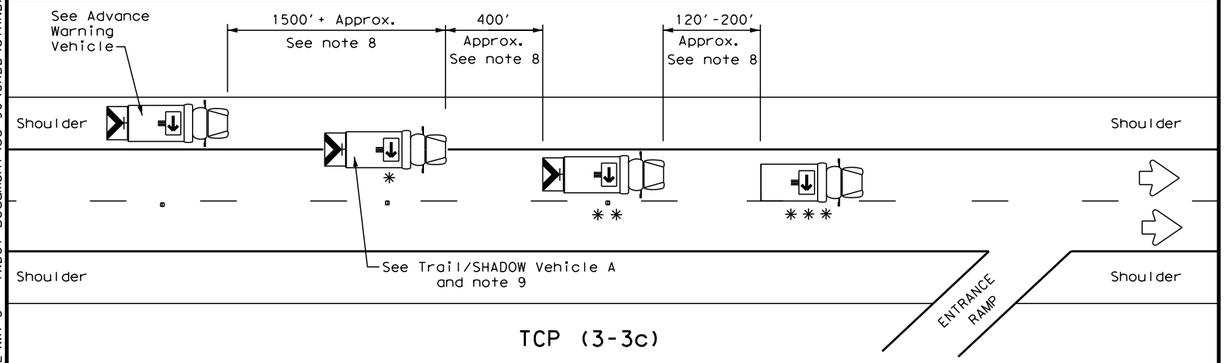
TCP (3-3a)

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



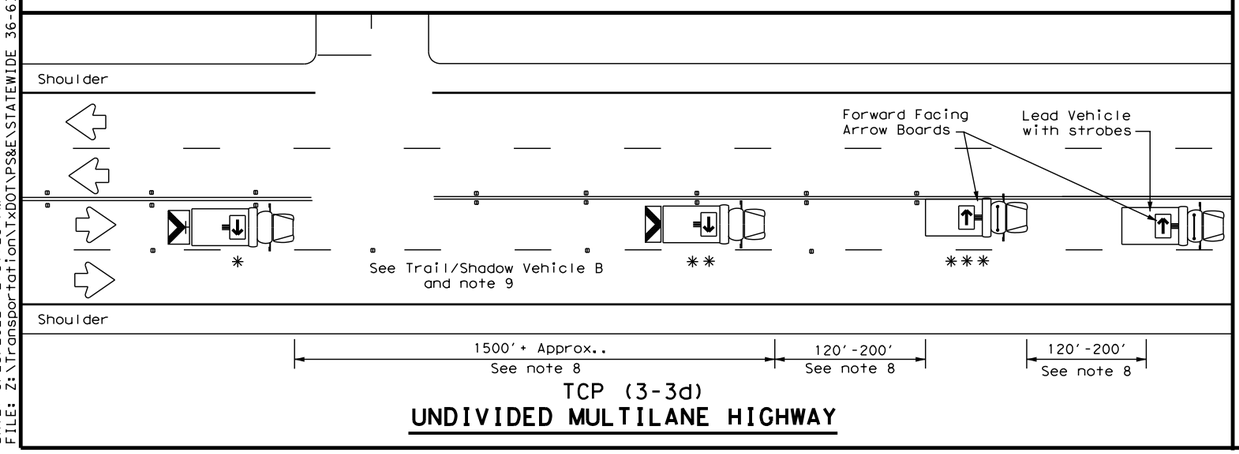
TCP (3-3b)

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



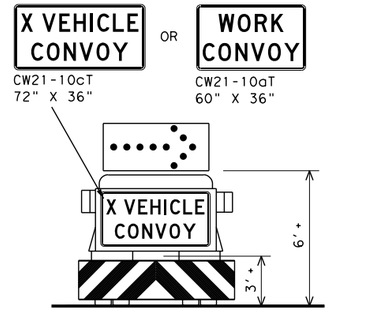
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



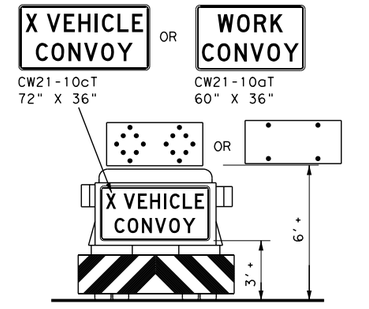
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



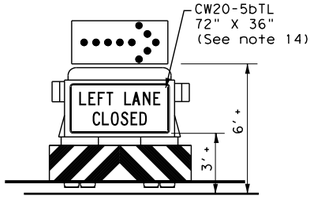
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

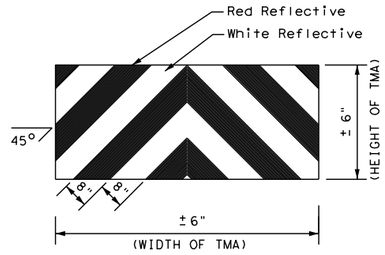


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

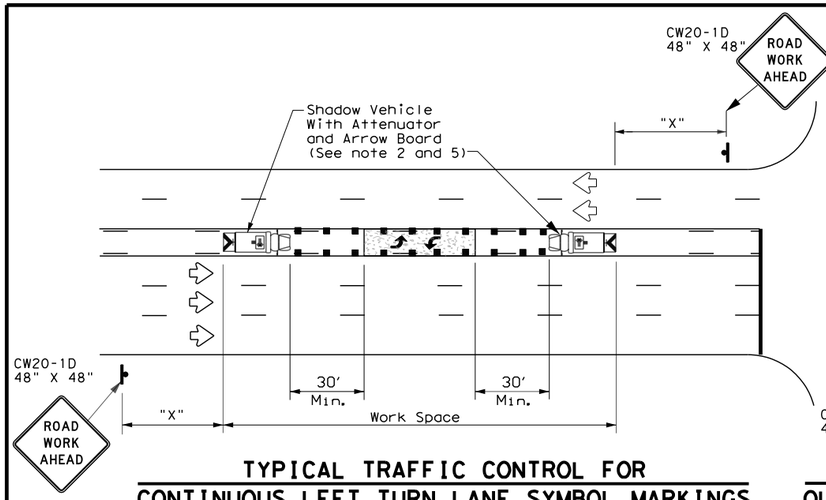
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

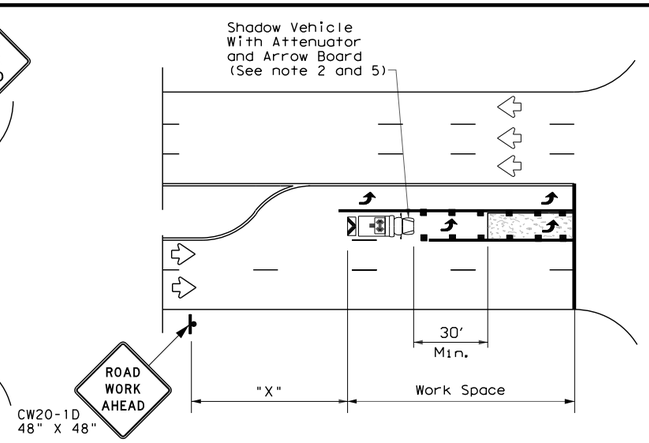
TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0028	03	109	US 90
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	BMT	LIBERTY		41
1-97 7-14				

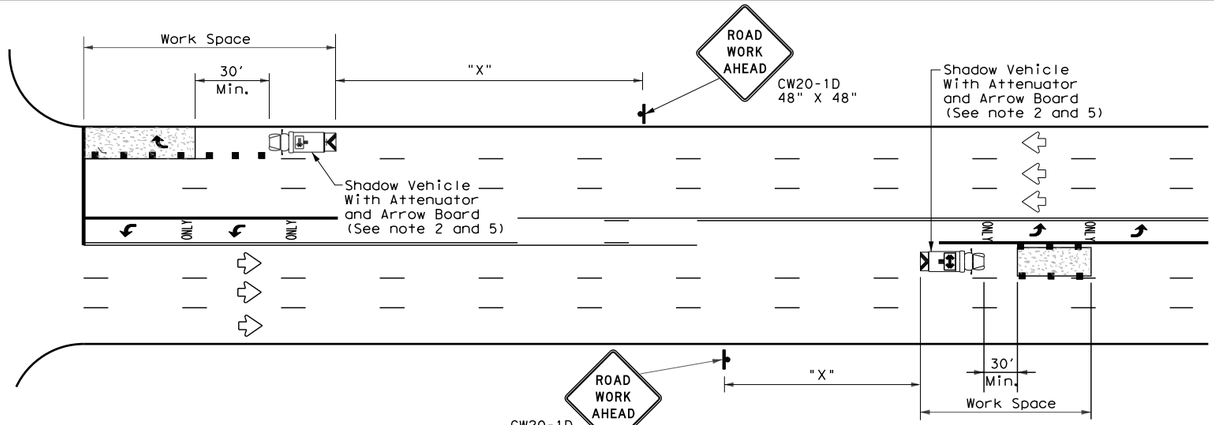
DATE: 5/25/2022 2:51:29 PM
FILE: Z:\Transportation\TxDOT\PS&E\STATEWIDE 36-6IDP5422\WA 5 - TxDOT Beaumont\US 90\CADD\STANDARDS\01 TCP\08 tcp3-4.dgn



TYPICAL TRAFFIC CONTROL FOR CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS

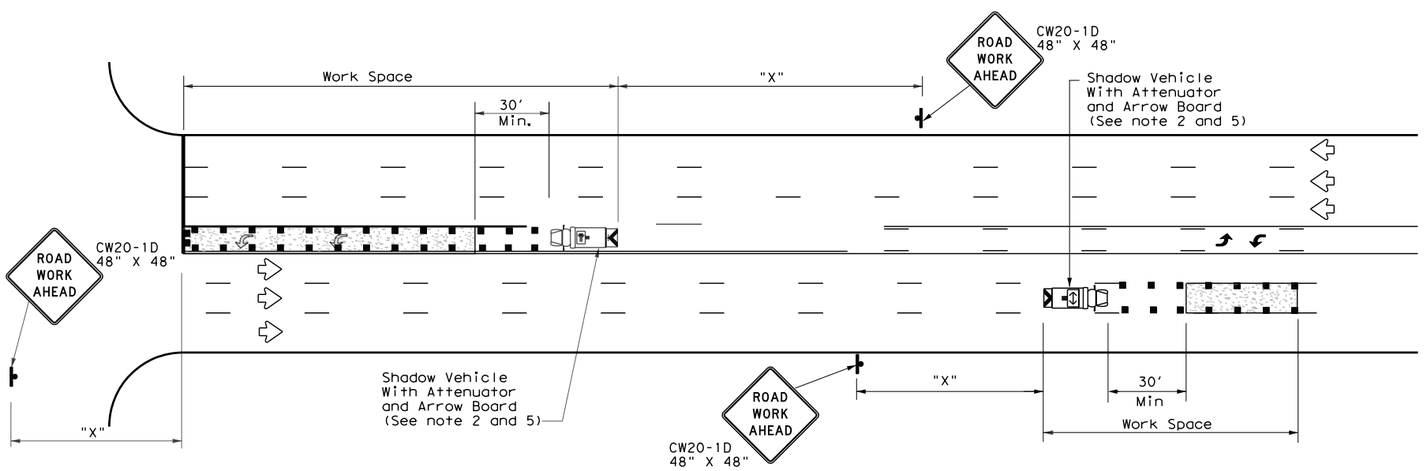


TYPICAL TRAFFIC CONTROL FOR OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS



TYPICAL TRAFFIC CONTROL FOR OUTSIDE LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR INSIDE LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR LEFT TURN LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR CENTER LANE MARKINGS

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	■ ■ ■	Channelizing Devices

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'

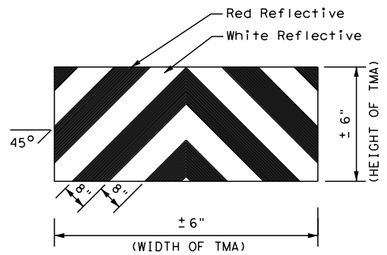
✳ Conventional Roads Only

✳✳ 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. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.
2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.
3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS

TCP(3-4)-13

FILE: tcp3-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July, 2013	CONT	SECT	JOB	HIGHWAY
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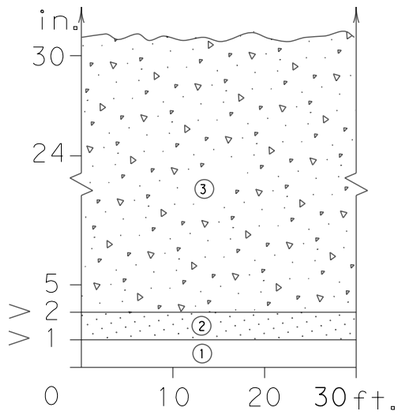
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		42

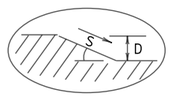
DATE: 5/25/2022 2:51:29 PM
FILE: Z:\Transportation\TxDOT\PS&E\STATEWIDE 36-6IDP5422\WA 5 - TxDOT Beaumont\US 90\CADD\STANDARDS\01 TCP\edgecon-21.dgn

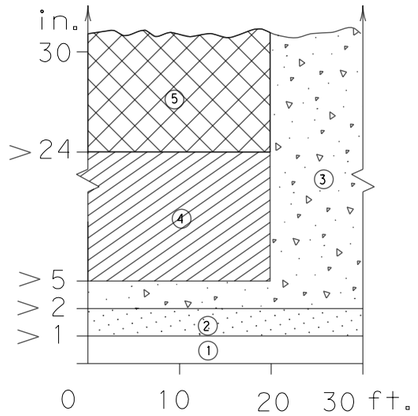
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

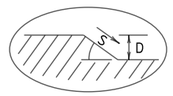


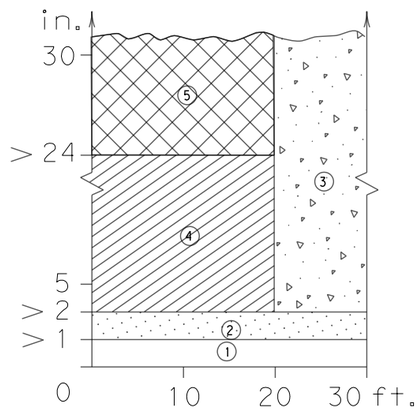
Edge Condition I
S = (3:1) (or flatter)



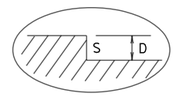


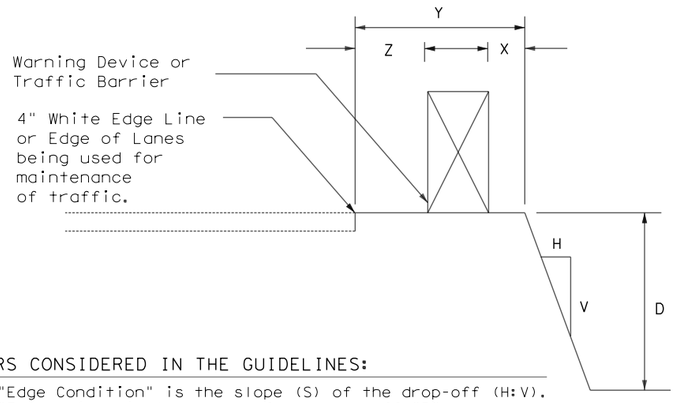
Edge Condition II
S = ((2.99):1) to (1:1)





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:

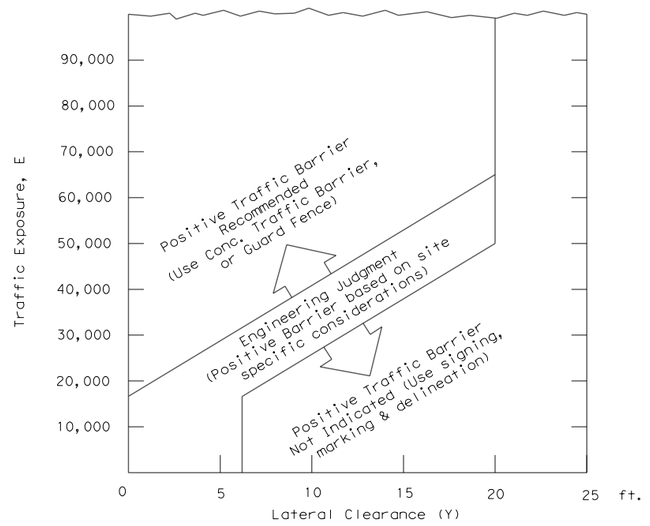
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

STATE OF TEXAS
ROLANDO ESCAMILLA
90128
LICENSED
PROFESSIONAL ENGINEER

Date 5/25/2022

Texas Department of Transportation

Traffic Safety Division Standard

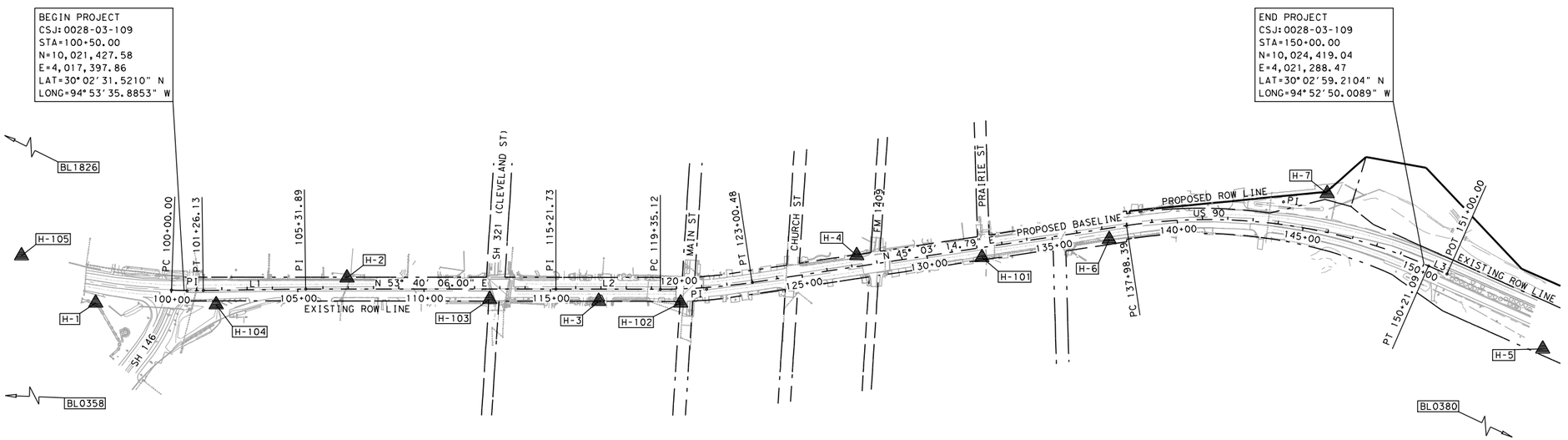
TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
© TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0028	03	109	US 90
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		43

0 250 500 750

SCALE 1"=500'

PI STATION	= 100+63.08	PI STATION	= 121+18.15	PI STATION	= 144+26.60
DELTA	= 2° 53' 26.32" (LT)	DELTA	= 8° 43' 20.16" (LT)	DELTA	= 32° 25' 59.37" (RT)
DEGREE OF CURVE	= 2° 17' 30.59"	DEGREE OF CURVE	= 2° 23' 14.37"	DEGREE OF CURVE	= 2° 39' 09.30"
TANGENT	= 63.08	TANGENT	= 183.03	TANGENT	= 628.22
LENGTH	= 126.13	LENGTH	= 365.36	LENGTH	= 1,222.70
RADIUS	= 2,500.00	RADIUS	= 2,400.00	RADIUS	= 2,160.00
PC STATION	= 100+00.00	PC STATION	= 119+35.12	PC STATION	= 137+98.39
PT STATION	= 101+26.13	PT STATION	= 123+00.48	PT STATION	= 150+21.09



Point	North	East	Elevation	Station	Offset	Description
H-104	10,021,458.19	4,017,533.81	78.17'	101+76.89	56.47' RT	SET 5/8" IR W/RODS
H-2	10,021,849.94	4,017,888.14	77.82'	106+95.24	44.35' LT	SET 5/8" IR W/TXDOT ALUM DISK
H-103	10,022,116.09	4,018,392.71	78.45'	112+59.40	40.17' RT	SET 5/8" IR W/RODS CAP
H-3	10,022,365.80	4,018,745.18	79.17'	116+91.39	47.51' RT	SET 5/8" IR W/TXDOT ALUM DISK
H-102	10,022,552.48	4,019,010.74	79.06'	120+14.13	55.17' RT	SET 5/8" IR W/RODS CAP
H-4	10,023,116.35	4,019,460.85	79.87'	127+25.16	43.40' LT	SET 5/8" IR W/TXDOT ALUM DISK
H-101	10,023,403.36	4,019,864.75	80.41'	132+13.79	38.80' RT	SET MAG NAIL IN EXP JNT
H-6	10,023,759.10	4,020,228.53	80.65'	137+22.57	44.00' RT	SET 5/8" IR W/TXDOT ALUM DISK
H-7	10,024,417.01	4,020,815.52	75.91'	145+66.15	151.47' LT	SET 5/8" IR W/TXDOT ALUM DISK
BL1826	10,022,198.36	4,001,441.40	78.89'	Off Chain	Off Chain	FND DISK IN CONC HWALL (U 1248 1978)
H-105	10,021,157.44	4,016,798.21	78.13'	Off Chain	Off Chain	SET 5/8" IR W/RODS CAP
H-5	10,024,427.50	4,021,866.12	22.39'	Off Chain	Off Chain	SET 5/8" IR W/TXDOT ALUM DISK IN CONC
H-1	10,021,180.40	4,017,145.57	76.73'	Off Chain	Off Chain	SET 5/8" IR W/TXDOT ALUM DISK IN CONC
BL0380	10,028,386.90	4,044,883.43	31.97'	Off Chain	Off Chain	FND DISK ON ROD IN SLV (C 1202 1972)
BL0358	10,017,772.61	4,013,358.73	71.88'	Off Chain	Off Chain	FND DISK IN CONC WWALL (B 1021 RESET 1970)
TXLI	10,028,351.20	4,055,793.62	57.65'	Off Chain	Off Chain	CORS TXLI

Line	Bearing
L1	N 52° 53' 03.76" E
L2	N 53° 46' 34.95" E
L3	N 77° 29' 14.16" E

From	To	Direction	Distance
H-105	H-1	N 86° 13' 05.99" E	348.12'
H-1	H-104	N 54° 24' 57.10" E	477.39'
H-104	H-2	N 42° 07' 43.35" E	528.22'
H-2	H-103	N 62° 11' 21.49" E	570.46'
H-103	H-3	N 54° 41' 02.58" E	431.96'
H-3	H-102	N 54° 53' 38.53" E	324.61'
H-102	H-4	N 38° 35' 55.19" E	721.49'
H-4	H-101	N 54° 36' 09.09" E	495.49'
H-101	H-6	N 45° 38' 24.73" E	508.81'
H-6	H-7	N 41° 44' 22.10" E	881.70'
H-7	H-5	N 89° 25' 40.56" E	1,050.65'

NGS Control Name	Published Value	Measured Value	Published minus Measured
	Elev.	Elev.	Elev.
BL0358	71.98	71.88	0.10
BL0380	31.97	31.88	0.09
BL1826	79.2	78.89	0.31

Notes:
1. All monuments are of First Vertical Order, Class II.
2. Published elevations are based on NAVD88.

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJ.).

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

3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES, AND MAY BE CONVERTED TO NAD83 (GRID) VALUES BY APPLYING THE COMBINED ADJUSTMENT FACTOR (CAF) FOR LIBERTY COUNTY. CAF = 1.00003, USING THE FORMULA: SURFACE / CAF = GRID

4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXLI DURING JANUARY 2020.

5. ELEVATIONS ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS, ADJUSTED WITH DIGITAL LEVELING, AND HOLDING FIXED THE GPS DERIVED ELEVATION FOR H-2 AND H-7.

6. VERTICAL MEASUREMENTS TO NGS BENCHMARKS ARE AS FOLLOWS:

BM#	PUB.	MEAS.
BL0358	71.98	71.88
BL0380	31.97	31.88
BL1826	79.2	78.89

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

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

5-26-2021

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

Sheet 1 of 1
Survey Date: January, 2020

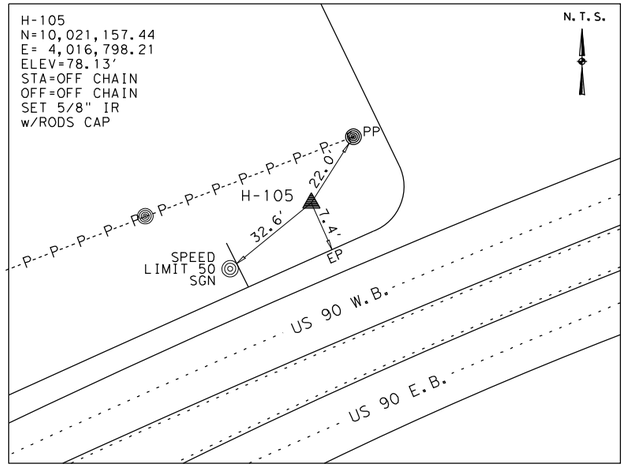
RODS
Surveying, Inc.
Central Infrastructure Transportation Land Development
6810 LEE ROAD, STE.100
SPRING, TEXAS 77379
TEL (281) 257-4020
FAX (281) 257-4021
TBPELS SURVEYING FIRM REG. No. 10030700

Texas Department of Transportation

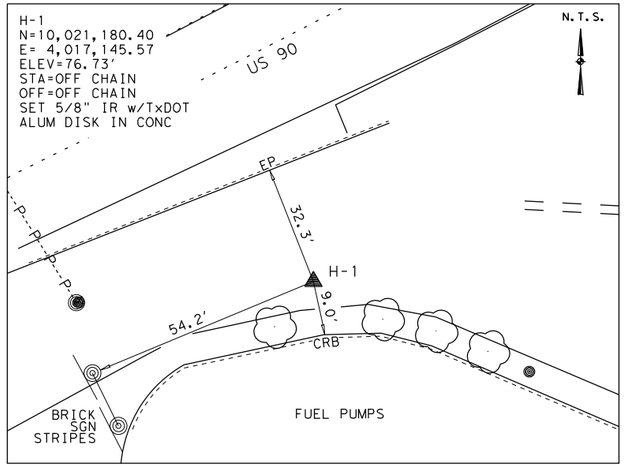
US 90
SURVEY CONTROL INDEX SHEET

FEDERAL AID PROJECT NO.				SHEET NO.
SEE COVER SHEET				44
FED. RD. DIV. NO.	STATE	DISTRICT		COUNTY
6	TEXAS	HOU		LIBERTY
STATE DIST. NO.	CONTROL	SECTION	JOB	HIGHWAY
12	0028	03	109	US 90

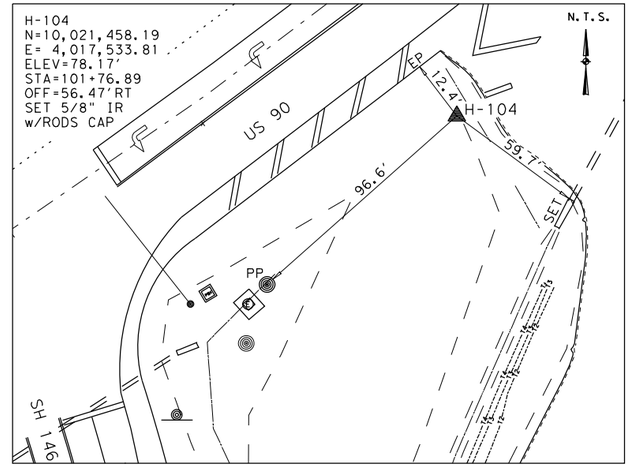
N:\IDC 382\21634005\B - US 90 (WA5)\CAD\H&V Control\H&V Index Sheet 01.dgn



STATION IS LOCATED ON THE NORTH SIDE OF US 90, AND LYING 0.12 MILE WEST OF SH 146.



STATION IS LOCATED ON THE SOUTH SIDE OF US 90, AND LYING 284 FEET WEST OF SH 146.



STATION IS LOCATED ON THE SOUTH SIDE OF US 90, AND LYING 186 FEET EAST OF SH 146.

NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJ.).

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

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4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXLI DURING JANUARY 2020.

5. ELEVATIONS ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS, ADJUSTED WITH DIGITAL LEVELING, AND HOLDING FIXED THE GPS DERIVED ELEVATION FOR H-2 AND H-7.

6. VERTICAL MEASUREMENTS TO NGS BENCHMARKS ARE AS FOLLOWS:

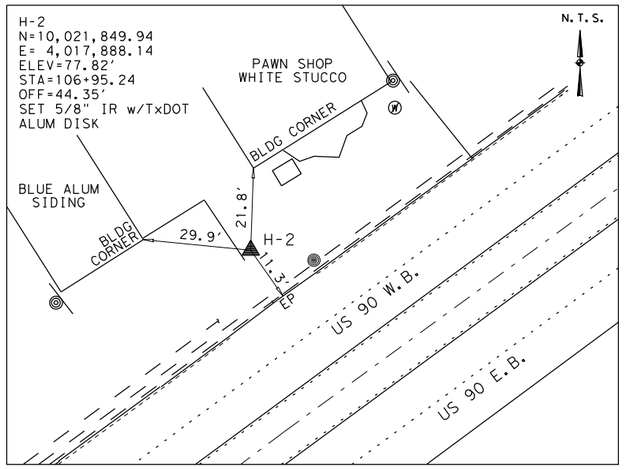
BM#	PUB.	MEAS.
BL0358	71.98	71.88
BL0380	31.97	31.88
BL1826	79.2	78.89

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

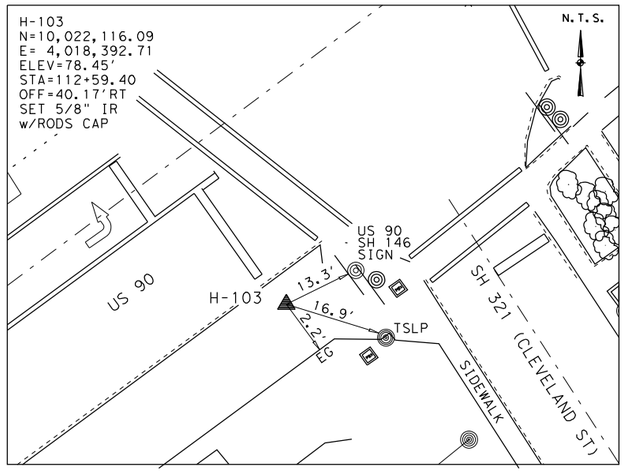
STATE OF TEXAS
REGISTERED
JIMMY D. WALTON
5889
PROFESSIONAL
LAND SURVEYOR

5-26-2021

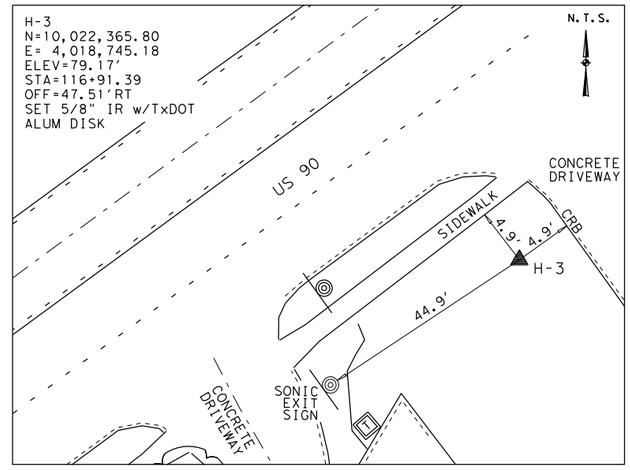
THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E



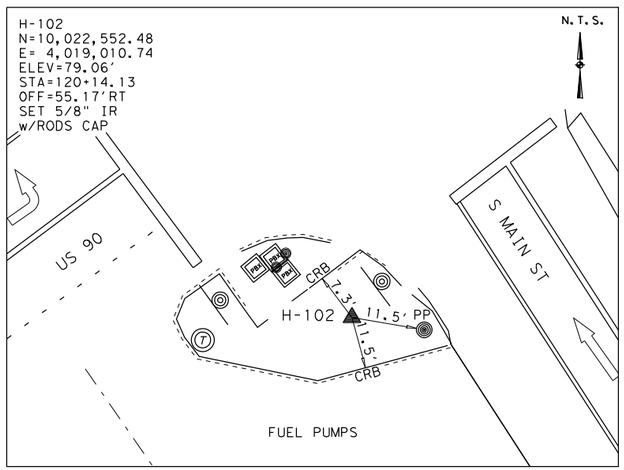
STATION IS LOCATED ON THE NORTH SIDE OF US 90, AND LYING 0.11 MILE WEST OF N CLEVELAND ST.



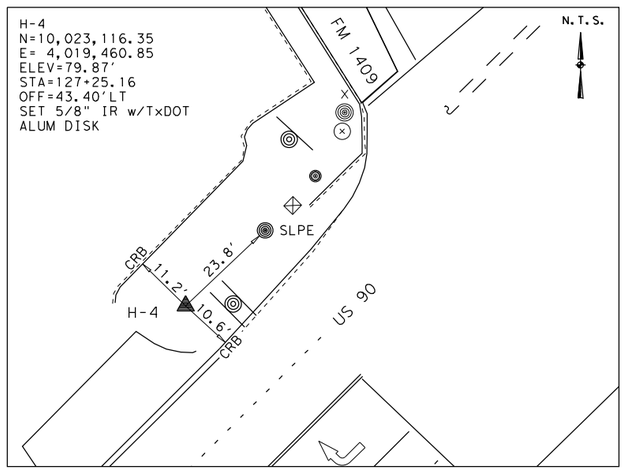
STATION IS LOCATED AT THE SOUTHWEST CORNER OF THE INTERSECTION OF US 90 AND SH 321 (CLEVELAND ST).



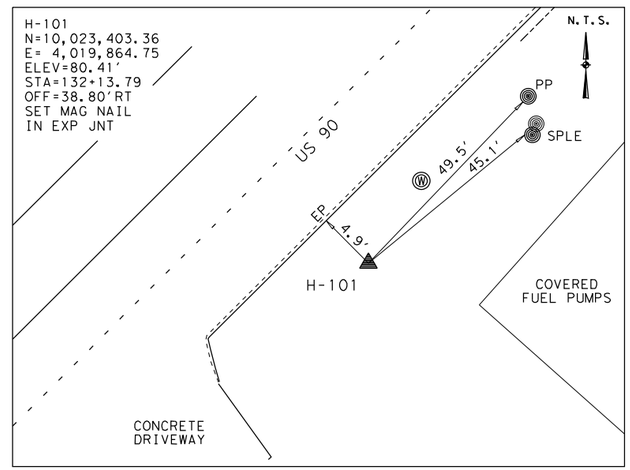
STATION IS LOCATED ON THE SOUTH SIDE OF US 90, AND LYING 387 FEET EAST OF S CLEVELAND ST.



STATION IS LOCATED AT THE SOUTHWEST CORNER OF THE INTERSECTION OF US 90 AND MAIN ST.



STATION IS LOCATED AT THE NORTHEAST CORNER OF THE INTERSECTION OF US 90 AND FM 1409.



STATION IS LOCATED ON THE SOUTH SIDE OF US 90, AND LYING 419 FEET EAST OF N WINFREE ST.

Sheet 1 of 2
Survey Date: January, 2020

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

Central Infrastructure Transportation Land Development

Texas Department of Transportation

US 90
HORIZONTAL & VERTICAL CONTROL SHEET

FEDERAL AID PROJECT NO.				SHEET NO.
SEE COVER SHEET				45
FED. RD. DIV. NO.	STATE	DISTRICT		COUNTY
6	TEXAS	HOU		LIBERTY
STATE DIST. NO.	CONTROL	SECTION	JOB	HIGHWAY
12	0028	03	109	US 90

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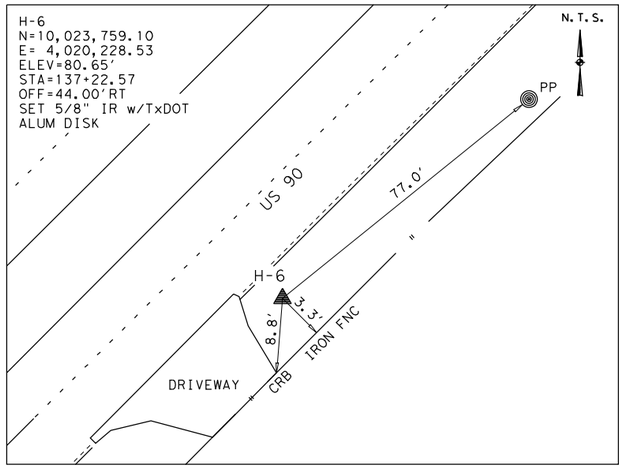
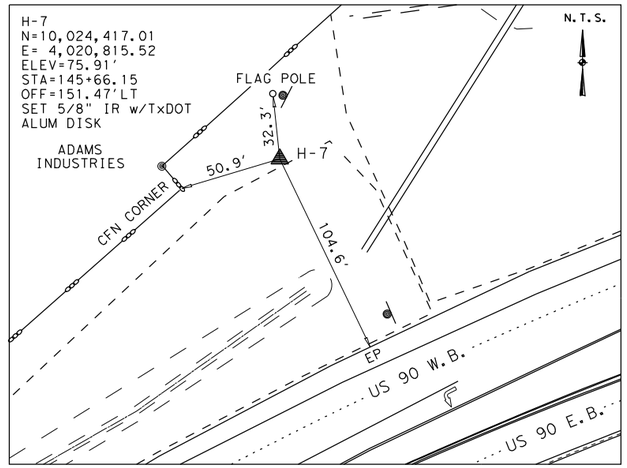
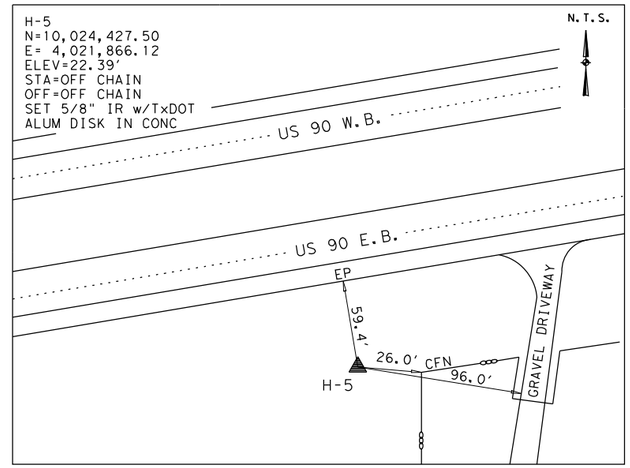


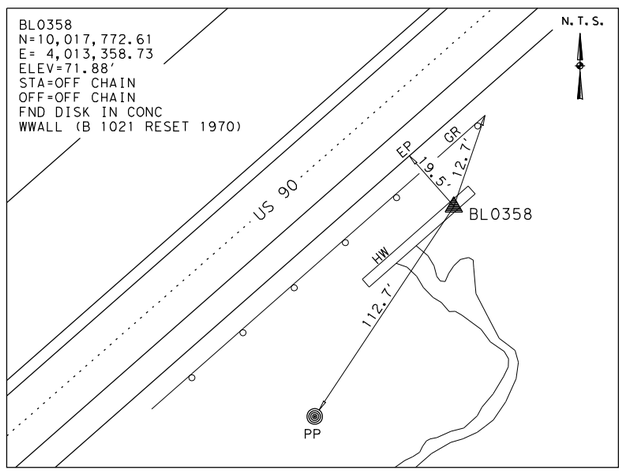
STATION IS LOCATED ON THE SOUTH SIDE OF US 90, AND LYING 0.11 MILE WEST OF S COLBERT ST.



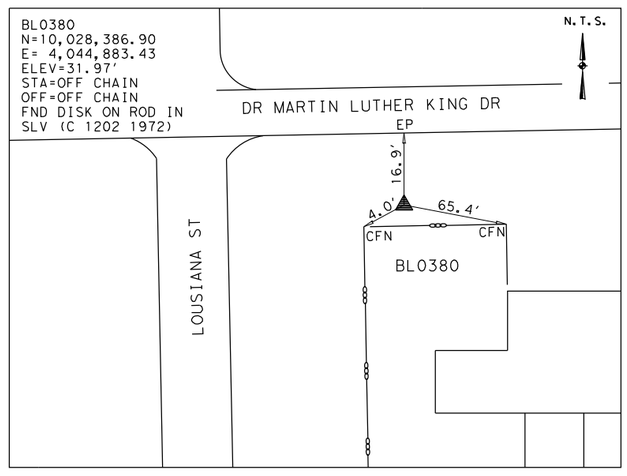
STATION IS LOCATED ON THE NORTH SIDE OF US 90, AND LYING 0.14 MILE EAST OF LOWE ST.



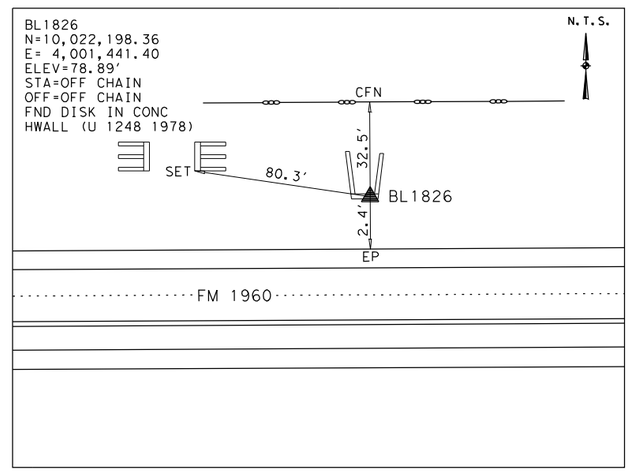
STATION IS LOCATED ON THE SOUTH SIDE OF US 90, AND LYING 0.22 MILE EAST OF S COLBERT ST.



STATION IS LOCATED ON THE SOUTH SIDE OF US 90, AND LYING 0.16 MILE WEST OF FM 493.



STATION IS LOCATED ON THE SOUTH SIDE OF DR MARTIN LUTHER KING JR DR, AND LYING 93 FEET EAST OF LOUISIANA ST.



STATION IS LOCATED ON THE NORTH SIDE OF FM 1960, AND LYING 0.18 MILE WEST OF FM 614.

NOTES:
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BM#	PUB.	MEAS.
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BL0380	31.97	31.88
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STATE OF TEXAS
REGISTERED
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5889
PROFESSIONAL
LAND SURVEYOR

5-26-2021

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Sheet 2 of 2
Survey Date: January, 2020

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

Texas Department of Transportation

US 90
HORIZONTAL & VERTICAL CONTROL SHEET

FEDERAL AID PROJECT NO.				SHEET NO.
SEE COVER SHEET				46
FED. RD. DIV. NO.	STATE	DISTRICT		COUNTY
6	TEXAS	HOU		LIBERTY
STATE DIST. NO.	CONTROL	SECTION	JOB	HIGHWAY
12	0028	03	109	US 90

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US 90

```
<*       1   DESCRIBE CHAIN US90_CL

Chain US90_CL contains:
 CUR US90_CL-1 US02 US03 CUR US90_CL-2 CUR US90_CL-3 US04

Beginning chain US90_CL description
================================================================================

                                  Curve Data
                                 *----------*
Curve US90_CL-1
P.I.  Station           100+63.08  N     10,021,434.5234  E      4,017,408.9603
Delta       =       2° 53′ 26.32" (LT)
Degree      =       2° 17′ 30.59"
Tangent     =             63.0775
Length      =            126.1282
Radius      =          2,500.0000
External    =              0.7956
Long Chord  =            126.1148
Mid. Ord.   =              0.7954
P.C.  Station           100+00.00  N     10,021,399.0459  E      4,017,356.8056
P.T.  Station           101+26.13  N     10,021,472.5860  E      4,017,459.2595
C.C.                               N     10,023,466.1346  E      4,015,950.6959
Back        = N  55° 46′ 30.09" E
Ahead       = N  52° 53′ 03.76" E
Chord Bear  = N  54° 19′ 46.92" E

Course from PT US90_CL-1 to US02 N 52° 53′ 03.76" E Dist 405.7614

Point US02            N  10,021,717.4327 E   4,017,782.8215 Sta     105+31.89

Course from US02 to US03 N 53° 40′ 06.00" E Dist 989.8419

Point US03            N  10,022,303.8730 E   4,018,580.2391 Sta     115+21.73

Course from US03 to PC US90_CL-2 N 53° 46′ 34.95" E Dist 413.3904

                                  Curve Data
                                 *----------*
Curve US90_CL-2
P.I.  Station           121+18.15  N     10,022,656.3221  E      4,019,061.3833
Delta       =       8° 43′ 20.16" (LT)
Degree      =       2° 23′ 14.37"
Tangent     =             183.0323
Length      =             365.3575
Radius      =           2,400.0000
External    =               6.9692
Long Chord  =             365.0048
Mid. Ord.   =               6.9490
P.C.  Station           119+35.12  N     10,022,548.1612  E      4,018,913.7280
P.T.  Station           123+00.48  N     10,022,785.6232  E      4,019,190.9289
C.C.                               N     10,024,484.2814  E      4,017,495.4760
Back        = N  53° 46′ 34.95" E
Ahead       = N  45° 03′ 14.79" E
Chord Bear  = N  49° 24′ 54.87" E

Course from PT US90_CL-2 to PC US90_CL-3 N 45° 03′ 14.79" E Dist 1,497.9083

                                  Curve Data
                                 *----------*
Curve US90_CL-3
P.I.  Station           144+26.60  N     10,024,287.5995  E      4,020,695.7448
Delta       =      32° 25′ 59.37" (RT)
Degree      =       2° 39′ 09.30"
Tangent     =             628.2158
Length      =           1,222.7012
Radius      =           2,160.0000
External    =              89.5011
Long Chord  =           1,206.4419
Mid. Ord.   =              85.9401
P.C.  Station           137+98.39  N     10,023,843.8036  E      4,020,251.1098
P.T.  Station           150+21.09  N     10,024,423.7066  E      4,021,309.0391
C.C.                               N     10,022,315.0112  E      4,021,777.0174
Back        = N  45° 03′ 14.79" E
Ahead       = N  77° 29′ 14.16" E
Chord Bear  = N  61° 16′ 14.48" E

Course from PT US90_CL-3 to US04 N 77° 29′ 14.16" E Dist 78.9112

Point US04            N  10,024,440.8032 E   4,021,386.0760 Sta     151+00.00

================================================================================
Ending chain US90_CL description
```

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
LICENSED
PROFESSIONAL ENGINEER
P.E.
5/25/2022

IDCUS
Planners-Engineers-Program Managers
IDCUS, Inc.
15915 Katy Freeway, Suite 300
Houston, Texas 77094
(713) 541-5591 Fax: (713) 541-3501
T.B.P.E.FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

US 90

HORIZONTAL ALIGNMENT DATA

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	47

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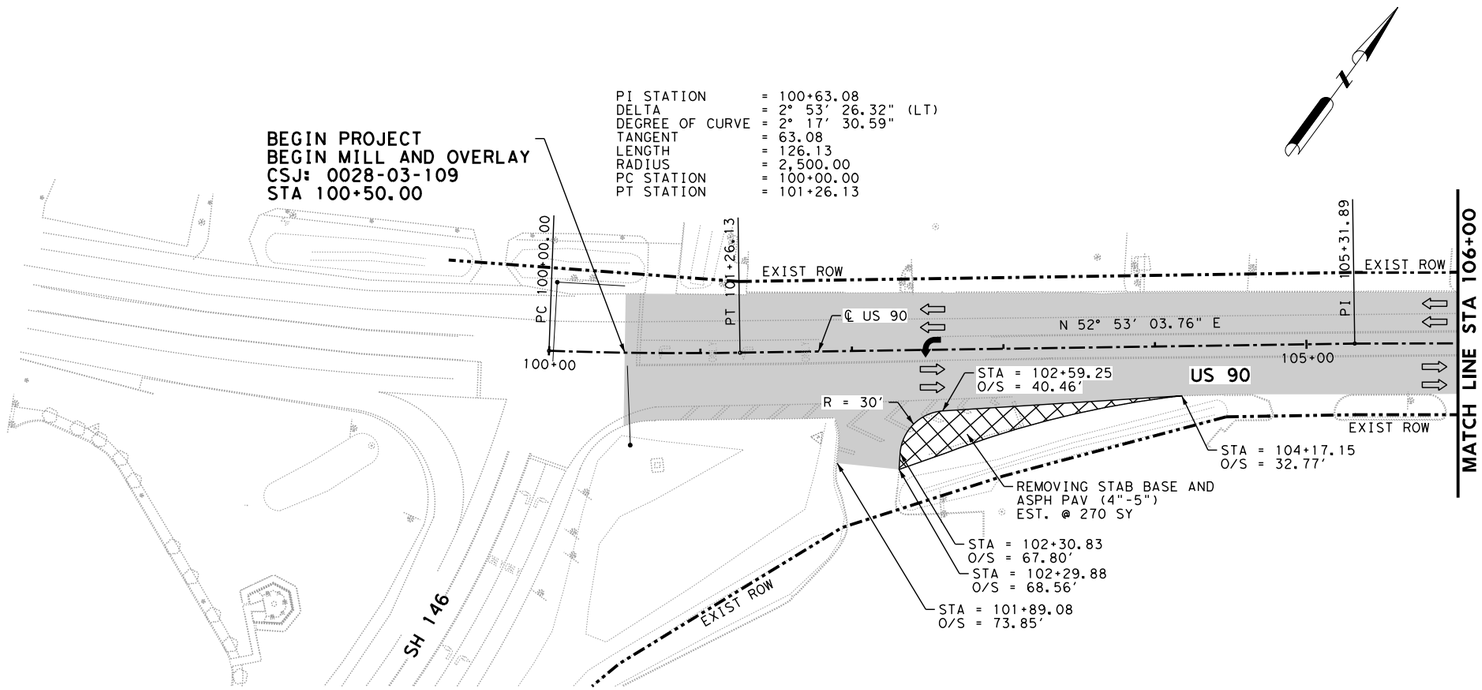

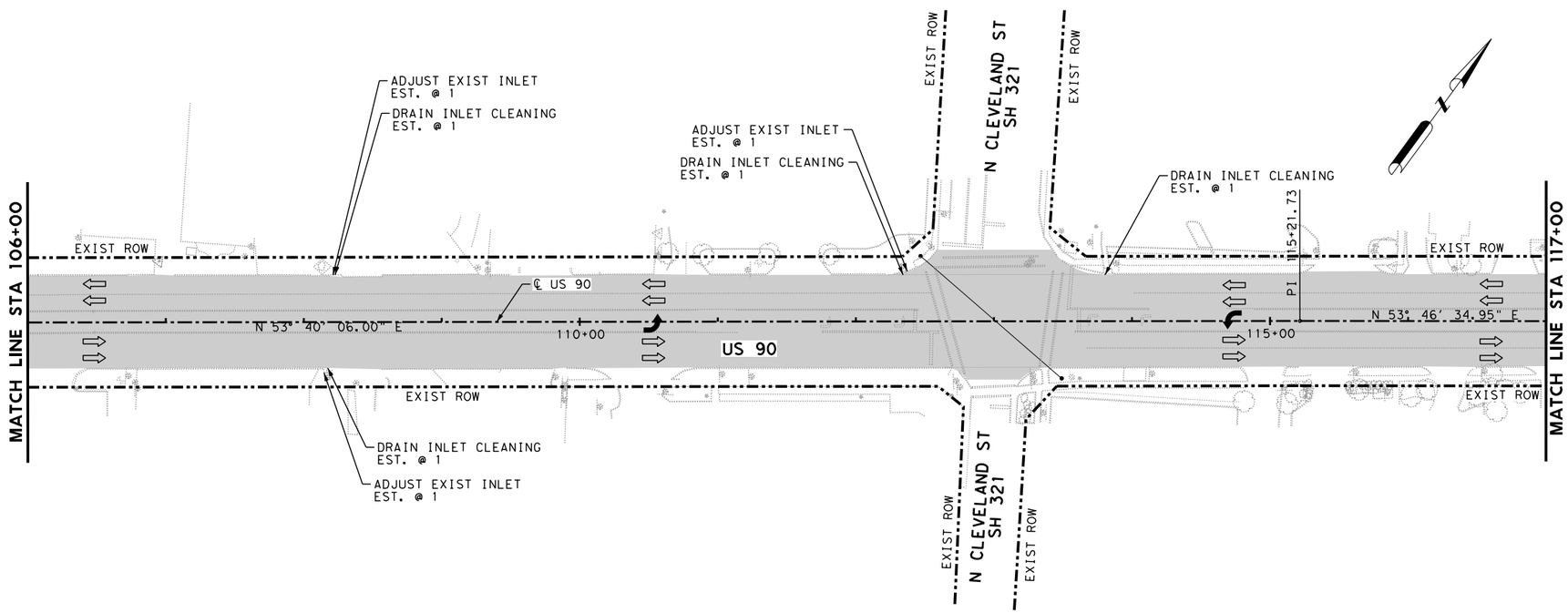

LEGEND

- PROP MILL AND INLAY
- EXIST CONC PAVEMENT
- EXIST TRAFFIC FLOW DIRECTION
- PROP TRAFFIC FLOW DIRECTION

NOTE:
1. FOR INTERSECTION LIMITS AND DIMENSIONS REFER TO "INTERSECTION DETAILS" SHEET.

0' 50' 100'
SCALE IN FEET

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
LICENSED
PROFESSIONAL ENGINEER
P.E.
5/25/2022

IDCUS
Planners-Engineers-Program Managers
IDCUS, Inc.
15915 Katy Freeway, Suite 300
Houston, Texas 77094
(713) 541-5591 Fax: (713) 541-3501
T.B.P.E. FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

US 90

ROADWAY PLAN LAYOUT
BEGIN PROJECT TO STA 117+00

SHEET 1 OF 3

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	48

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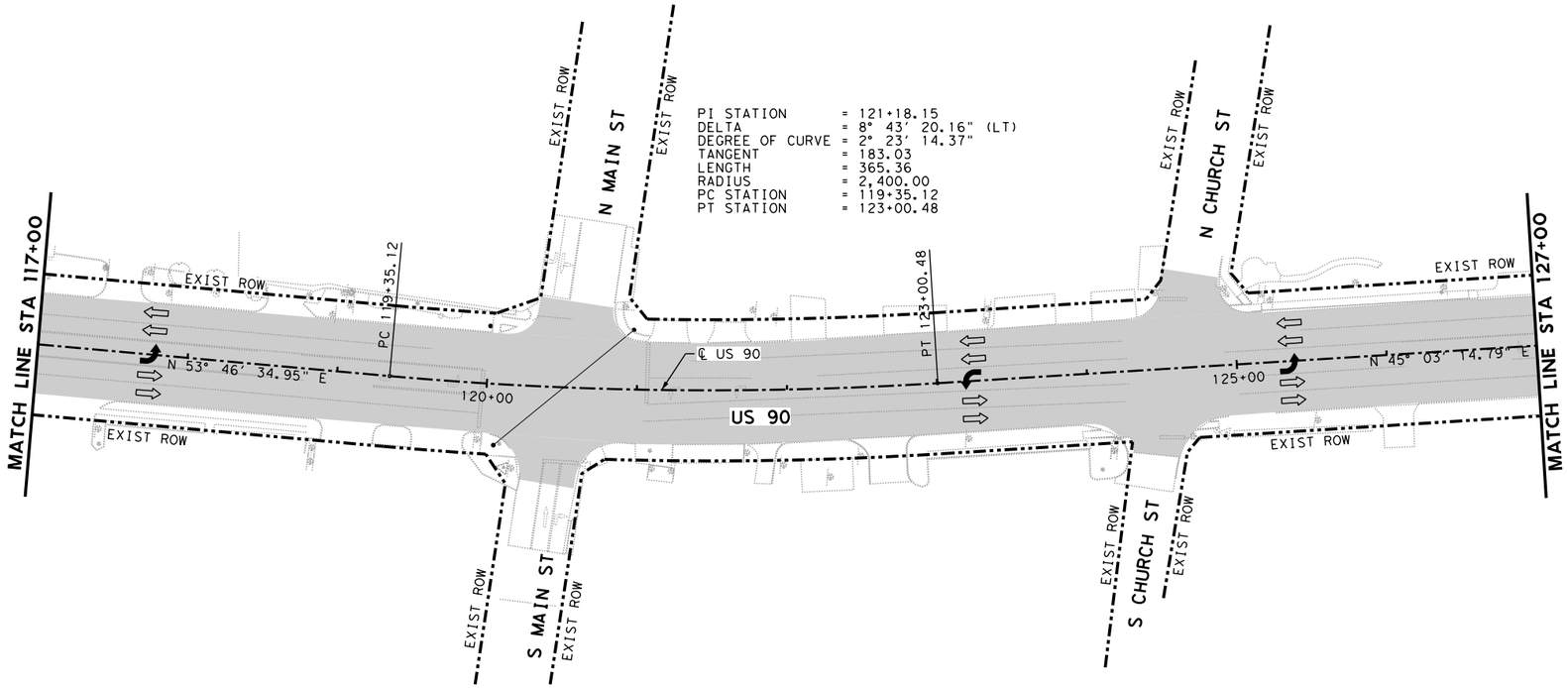

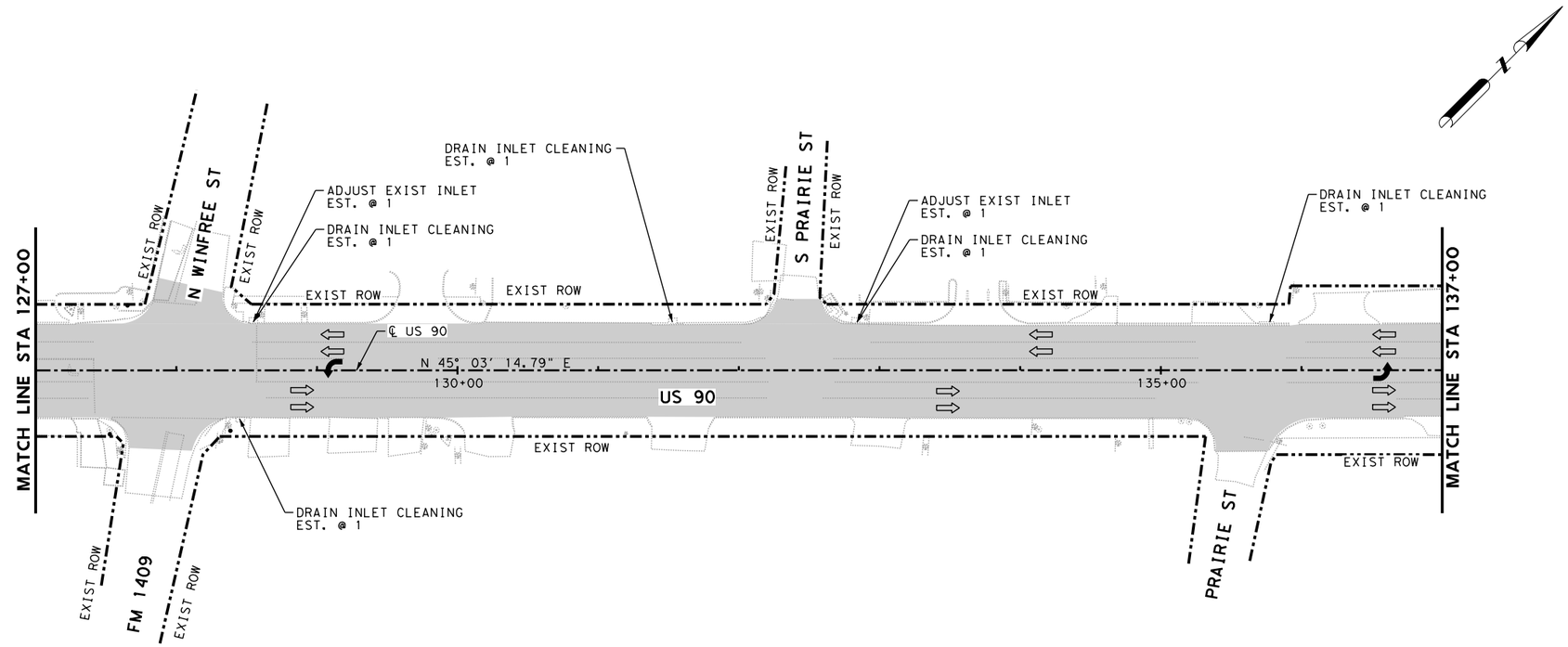

LEGEND

- PROP MILL AND INLAY
- EXIST CONC PAVEMENT
- EXIST TRAFFIC FLOW DIRECTION
- PROP TRAFFIC FLOW DIRECTION

NOTE:
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0′ 50′ 100′
SCALE IN FEET

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
LICENSED
PROFESSIONAL ENGINEER
P.E.
5/25/2022

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T.B.P.E. FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

US 90
ROADWAY PLAN LAYOUT STA 117+00 TO STA 137+00

SHEET 2 OF 3

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	49

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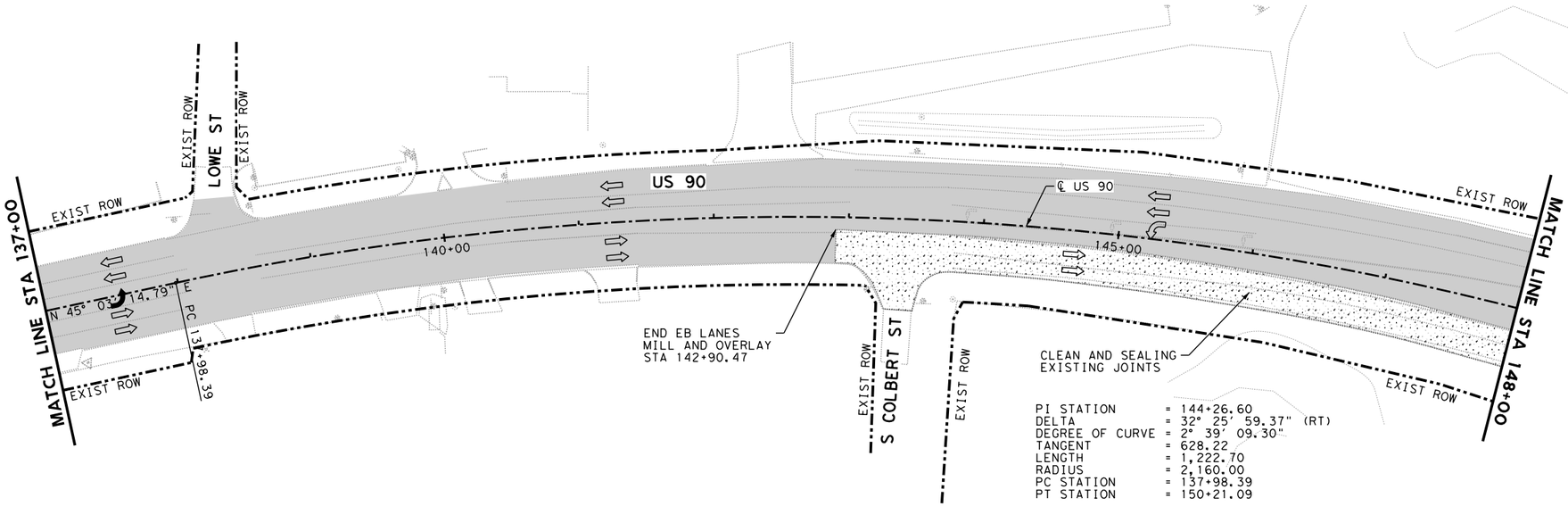

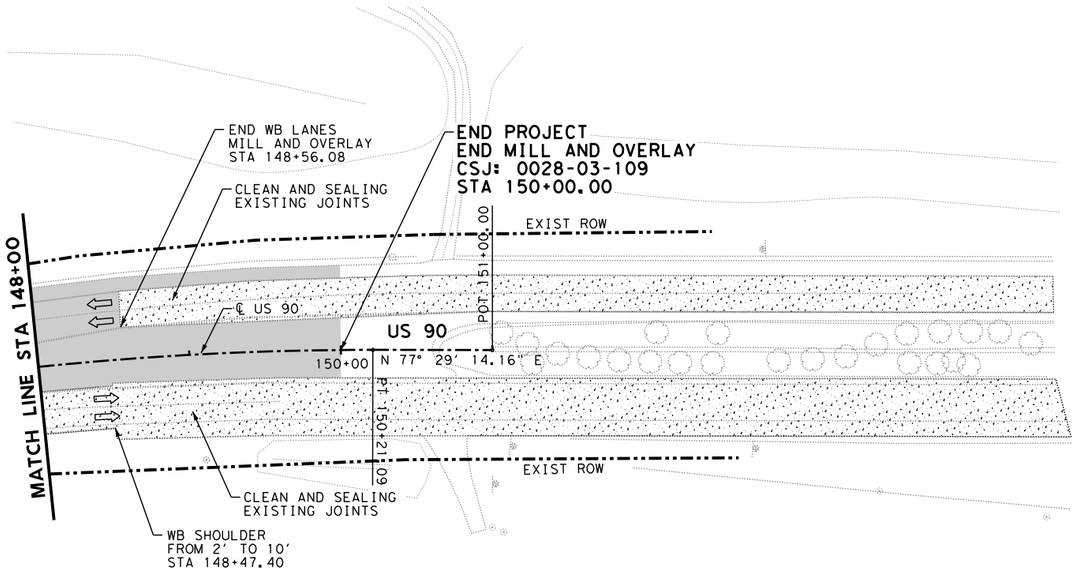

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0' 50' 100'
SCALE IN FEET

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
LICENSED
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Texas Department of Transportation

US 90

ROADWAY PLAN LAYOUT
STA 137+00 TO END PROJECT

SHEET 3 OF 3

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	50

5/25/2022 2:51:39 PM

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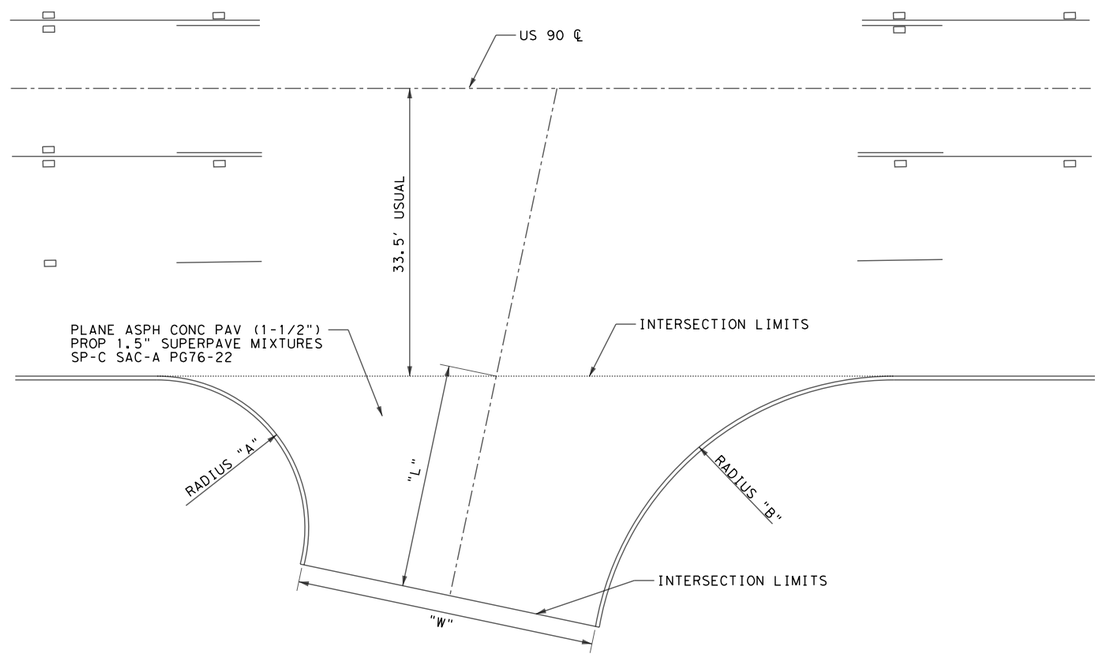

TYPICAL INTERSECTION STREET DETAILS

STATION	DESCRIPTION	INTERSECTION / DRIVEWAY	"W" STREET WIDTH	"L" STREET LENGTH	RADIUS "A"	RADIUS "B"	* 530 6002 INTERSECTIONS (ACP)	* 530 6005 DRIVEWAYS (ACP)	** 354 6021 PLANE ASPH CONC PAV(0" TO 2")	** 3077 6065 SP MIXES SP-D SAC-A PG76-22	** 3077 6075 TACK COAT
			FT.	FT.	FT.	FT.	S.Y.	S.Y.	S.Y.	S.Y.	GAL
112+94.22 L.T.	N. CLEVELAND STREET (SH 321)	INTERSECTION	64.0	52.0	46.0	46.0	470.1		470.1	470.1	28.2
113+00.80 R.T.	S. CLEVELAND STREET (SH 321)	INTERSECTION	28.2	25.7	20.0	28.0	107.9		107.9	107.9	6.5
120+49.94 R.T.	S. MAIN ST.	DRIVEWAY	37.0	9.0	27.0	28.0		49.9	49.9	49.9	3.0
120+51.82 L.T.	N. MAIN ST.	DRIVEWAY	48.4	18.0	20.0	20.0		209.7	209.7	209.7	12.6
124+55.81 R.T.	S. CHURCH ST.	DRIVEWAY	30.2	23.7	24.5	36.0		119.0	119.0	119.0	7.1
124+59.19 L.T.	N. CHURCH ST.	DRIVEWAY	37.0	29.0	22.0	20.0		141.6	141.6	141.6	8.5
128+00.07 L.T.	N. WINFREE ST.	INTERSECTION	46.7	27.8	26.0	20.0	141.5		141.5	141.5	8.5
128+03.10 R.T.	S. WINFREE ST. (FM 1409)	INTERSECTION	44.8	23.3	20.0	30.0	170.9		170.9	170.9	10.3
132+42.45 L.T.	S. PRAIRIE ST.	DRIVEWAY	30.8	17.7	24.0	20.0		82.0	82.0	82.0	4.9
135+69.94 R.T.	N. LOWE ST.	DRIVEWAY	36.4	24.3	21.0	36.0		131.8	131.8	131.8	7.9
138+25.92 L.T.	S. LOWE ST.	DRIVEWAY	29.8	22.9	20.0	20.0		100.6	100.6	100.6	6.0
						TOTAL =	890.4	834.6	1725.0	1725.0	103.5

* QUANTITY INCLUDED ON THE SUMMARY OF ROADWAY QUANTITIES.
** FOR CONTRACTORS INFORMATION ONLY.

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
LICENSED
PROFESSIONAL ENGINEER
P.E.
5/25/2022

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Texas Department of Transportation

US 90

INTERSECTION DETAILS

SHEET 1 OF 1

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	51

5/25/2022 2:51:41 PM

..\US 90*INTERSECTION DETAILS.dgn

Z:\Transportation\TxDOT\PS&E\STATEWIDE 36-6IDP5422\WA 5 - TxDOT Beaumont\US 90\CADD\ROADWAY\US 90*INTERSECTION DETAILS.dgn

DATE: 5/25/2022
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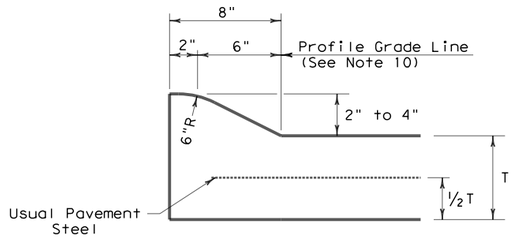
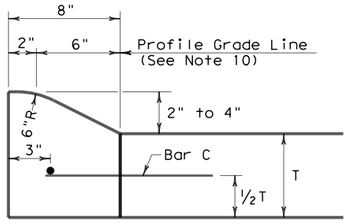


TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



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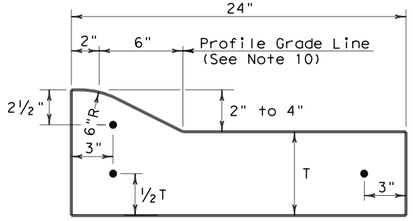

TYPE I CURB AND GUTTER
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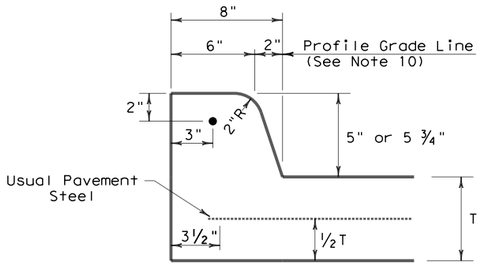

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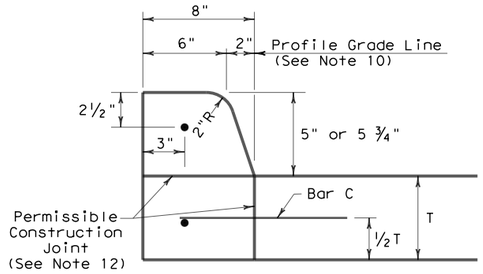
5" - 5 ¾" HEIGHT



TYPE II CURB
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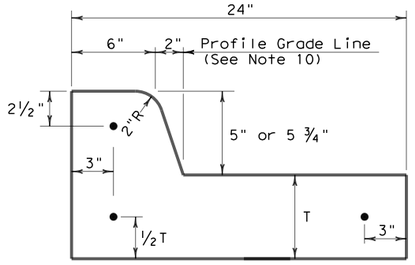

TYPE II CURB AND GUTTER
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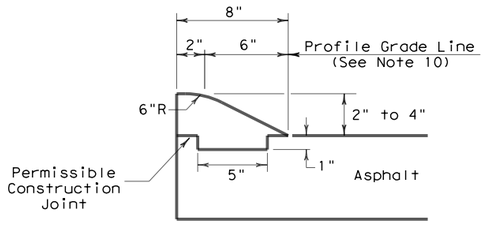
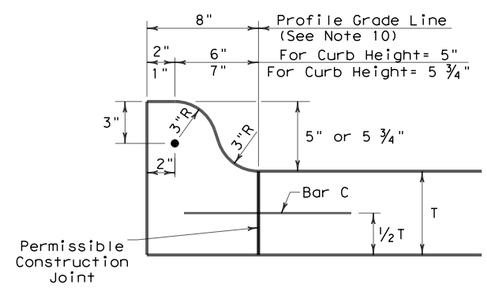
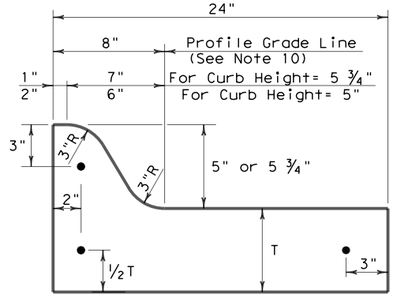


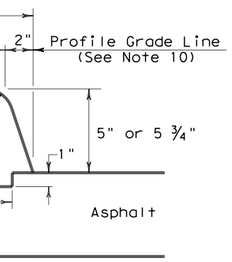
TYPE III CURB (KEYED)
2" - 4" HEIGHT



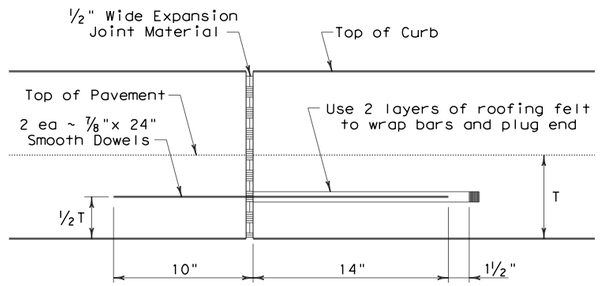
TYPE IIa CURB
5" - 5 ¾" HEIGHT



TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT

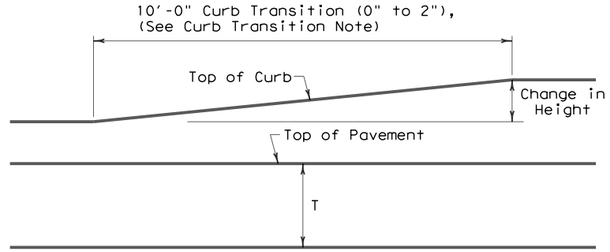


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

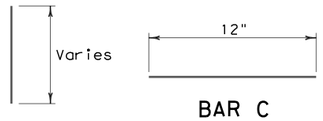
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and the grouted in place, or may be inserted into fresh concrete.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
13. Bar B used as needed to support curb reinforcing steel during concrete placement.



BAR B

BAR C

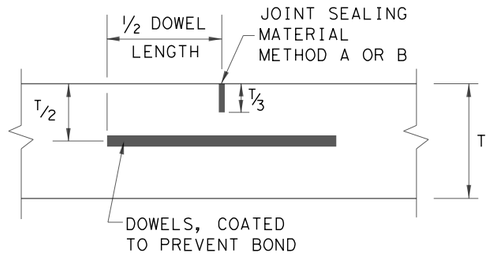
Texas Department of Transportation

Design Division Standard

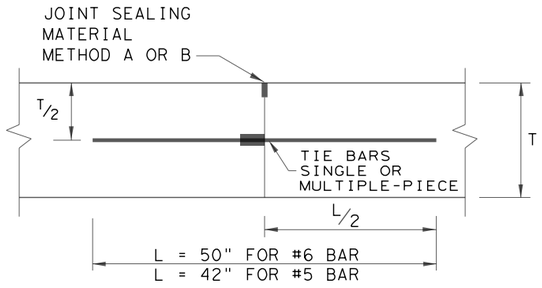
CONCRETE CURB AND CURB AND GUTTER

CCCG-21

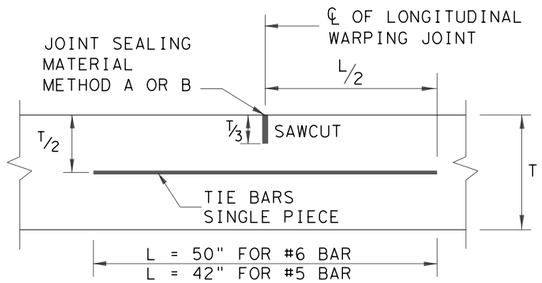
FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: SS	CK: KM
©TxDOT: FEBRUARY 2021 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0028	03	109	US 90
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		52



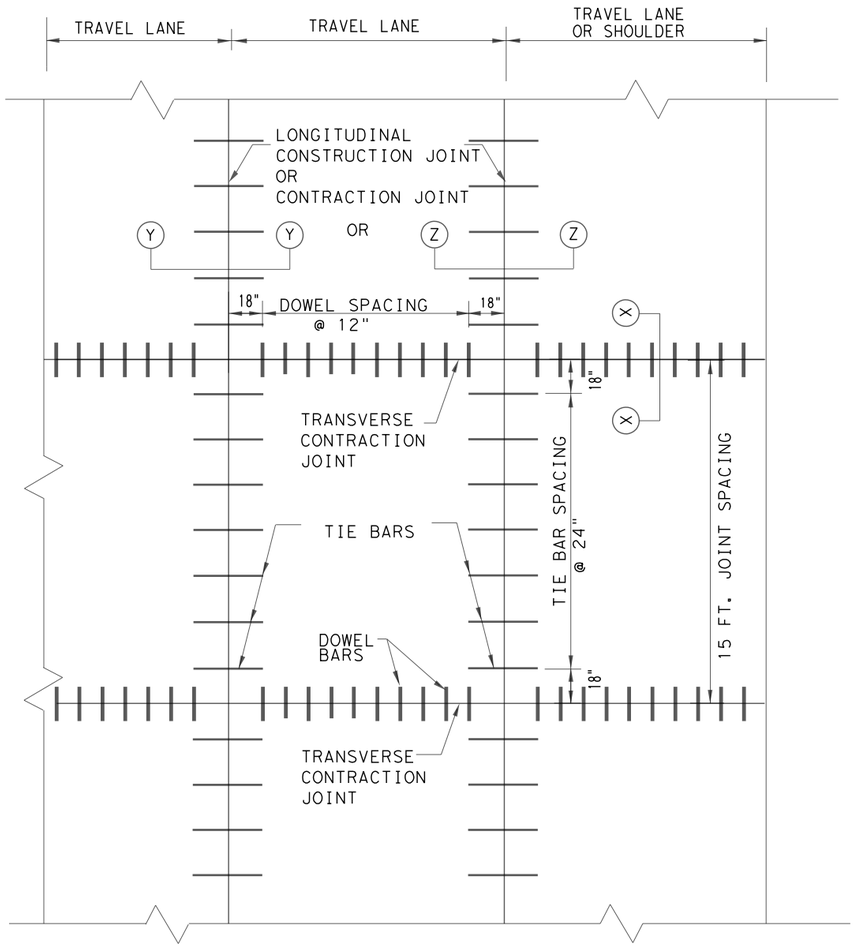
TRANSVERSE CONTRACTION JOINT
SECTION X-X



LONGITUDINAL CONSTRUCTION JOINT
SECTION Y-Y



LONGITUDINAL CONTRACTION JOINT
SECTION Z-Z



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. PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT ARE NOT COVERED BY THIS STANDARD.
2. FOR FURTHER INFORMATION REGARDING THE PLACEMENT OF CONCRETE AND LOAD TRANSFER DEVICES REFER TO THE GOVERNING SPECIFICATION FOR "CONCRETE PAVEMENT".
3. THE SPACING BETWEEN TRANSVERSE CONTRACTION JOINTS SHALL BE 15 FT. UNLESS OTHERWISE SHOWN IN THE PLANS.
4. TRANSVERSE CONSTRUCTION JOINTS MAY BE FORMED BY USE OF METAL OR WOOD FORMS EQUAL IN DEPTH TO THE DEPTH OF PAVEMENT, OR BY METHODS APPROVED BY THE ENGINEER.
5. USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL THE FORMED JOINTS.
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 JOINT BETWEEN OUTSIDE LANE AND SHOULDER SHALL BE A LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z) UNLESS OTHERWISE SHOWN IN THE PLANS. THE SAW CUT DEPTH FOR THE LONGITUDIANL CONTRACTION JOINT (SECTION Z-Z) SHALL BE ONE THIRD OF THE SLABTHICKNESS (T/3).
8. WHEN TYING CONCRETE GUTTER AT A LONGITUDINAL JOINT, THE TIE BAR LENGTH OR POSITION MAY BE ADJUSTED. PROVIDE 3 IN. OF CONCRETE COVER FROM THE BACK OF GUTTER TO THE END OF TIE BAR.
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. WHEN AN MONOLITHIIC CURB IS SPECIFIED, THE JOINT IN THE CURB SHALL COINCIDE WITH PAVEMENT JOINTS AND MAY BE FORMED BY ANY MEANS APPROVED BY THE ENGINEER.
11. DOWEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1/4 IN. HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED. WHERE DOWEL BAR BASKETS ARE USED, REMOVE THE SHIPPING WIRES.
12. THE DETAIL FOR JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."

TABLE NO. 1 DOWELS (SMOOTH BARS)		
SLAB THICKNESS T (IN.)	BAR DIA. AND LENGTH	AVERAGE SPACING (IN.)
6 to 7.5	1" X 18"	12
8 to 10	1 1/4" X 18"	12
>= 10.5	1 1/2" X 18"	12

TABLE NO. 2 TIE BARS (DEFORMED BARS)		
SLAB THICKNESS T (IN.)	BAR SIZE	AVERAGE SPACING (IN.)
6 to 7.5	#5	24
>= 8	#6	24

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

CONCRETE PAVEMENT DETAILS
CONTRACTION DESIGN
T-6 to 12 INCHES

CPCD-14

FILE: cpcd14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
©TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0028	03	109	US 90
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		53

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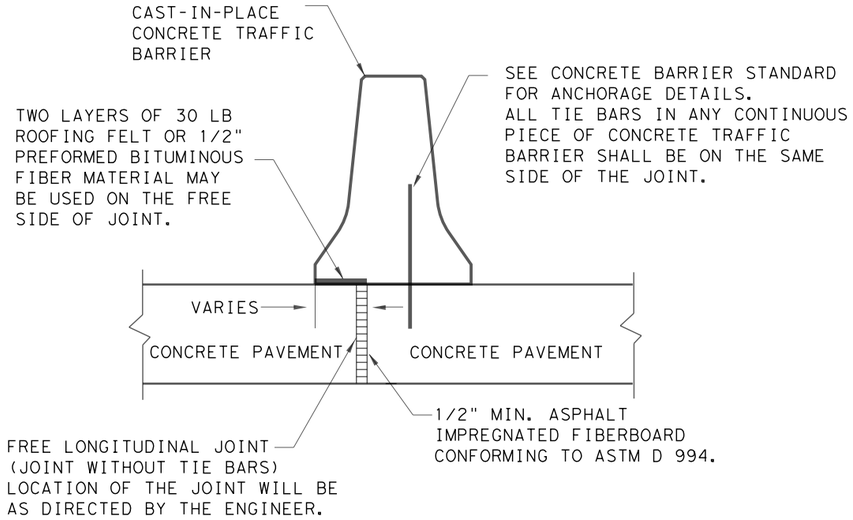
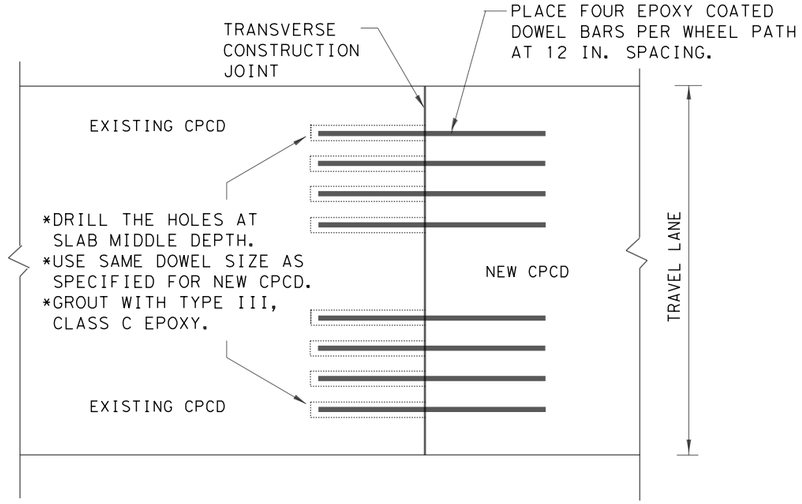
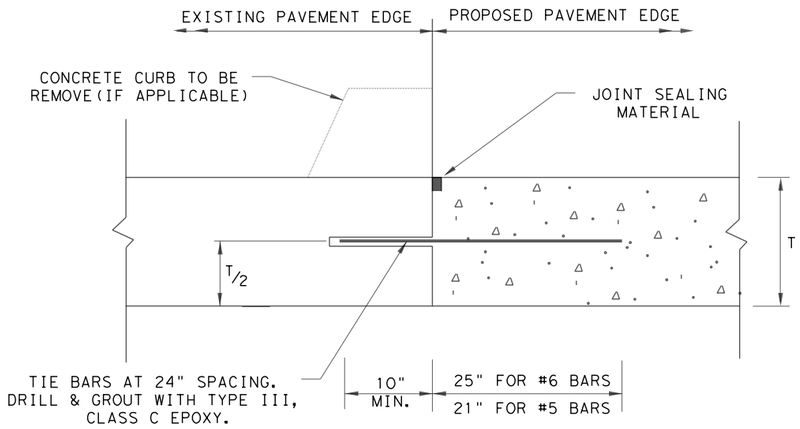


FREE LONGITUDINAL JOINT DETAIL



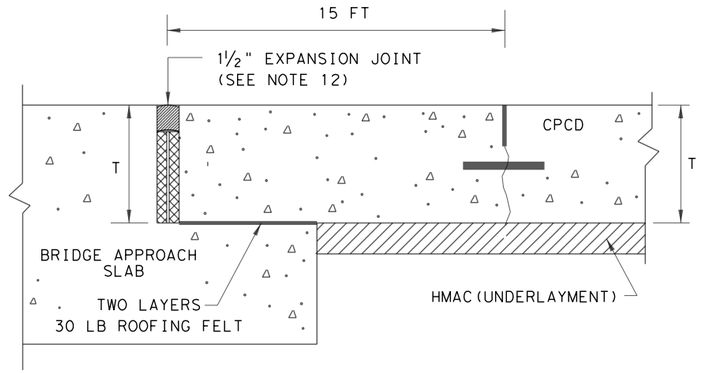
TRANSVERSE JOINT DETAIL
EXISTING CPCD TO NEW CPCD

PLAN VIEW (NOT TO SCALE)



1. BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQUIREMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
2. SPACE TIE BARS AT 24" SPACING. USE #6 BARS FOR 8" AND THICKER SLABS, USE #5 BARS FOR LESS THAN 8" THICK SLABS.
3. THE TRANSVERSE JOINTS OF PROPOSED PAVEMENT SHALL COINCIDE WITH EXISTING PAVEMENT JOINTS UNLESS OTHERWISE SHOWN ON THE PLANS.

LONGITUDINAL WIDENING JOINT DETAIL



TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH

Texas Department of Transportation

Design Division Standard

CONCRETE PAVEMENT DETAILS
CONTRACTION DESIGN
T-6 to 12 INCHES

CPCD-14

FILE: cpcd14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
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REVISIONS	0028	03	109	US 90
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		54

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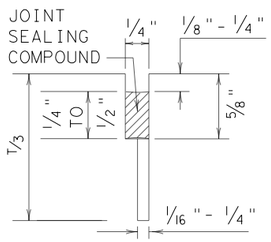
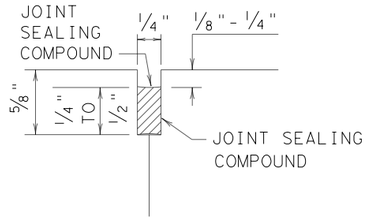
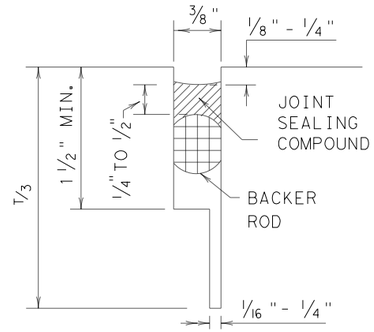
METHOD B: JOINT SEALING COMPOUND



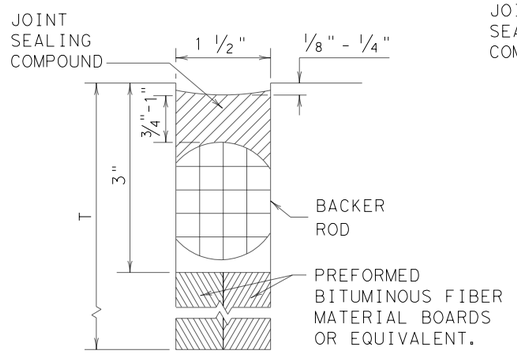
LONGITUDINAL SAWED
CONTRACTION JOINT



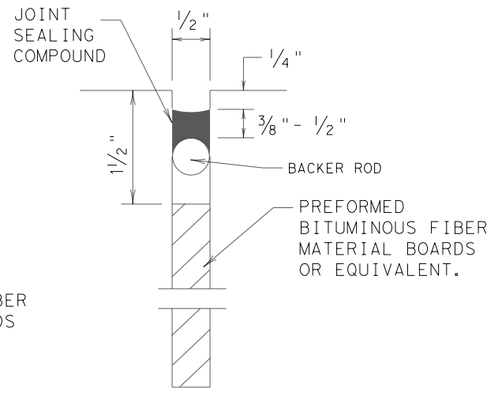
LONGITUDINAL OR TRANSVERSE
CONSTRUCTION JOINT



TRANSVERSE SAWED
CONTRACTION JOINT

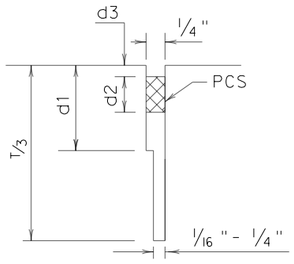


TRANSVERSE FORMED
EXPANSION JOINT



FORMED
ISOLATION JOINT

METHOD A: PREFORMED COMPRESSION SEALS (PCS)(DMS-6310 CLASS 6)



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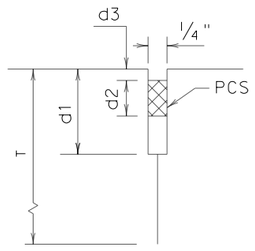
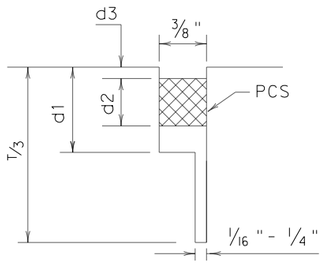
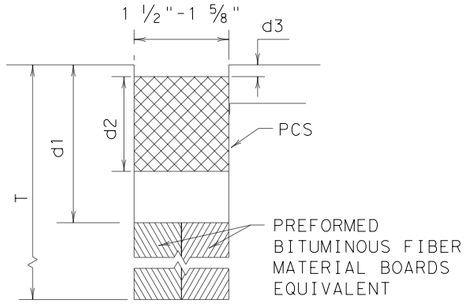


LONGITUDINAL
CONSTRUCTION JOINT



TRANSVERSE SAWED
CONTRACTION JOINT



TRANSVERSE FORMED
EXPANSION JOINT

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, EITHER METHOD "A" OR METHOD "B" MAY BE USED.
2. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
3. THE JOINT RESERVOIR FOR SEALANT OR PCS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND THE SAWED JOINTS.
4. DIMENSIONS d1, d2, AND d3 SHOWN IN METHOD A SHALL BE IN ACCORDANCE WITH THE PREFORMED COMPRESSION SEAL MANUFACTURER'S RECOMMENDATION.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
6. FOR SAWED LONGITUDINAL JOINT, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED.
7. FOR TRANSVERSE SAWED CONTRACTION, TRANSVERSE FORMED EXPANSION JOINT, AND ISOLATION JOINT USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4,5,7,OR 8 FOR MAINTAINING EXISTING JOINTS.
8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
9. ISOLATION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.

Texas Department of Transportation | Design Division Standard

CONCRETE PAVING DETAILS

JOINT SEALS

JS-14

FILE: js14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
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REVISIONS	0028	03	109	US 90
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		55

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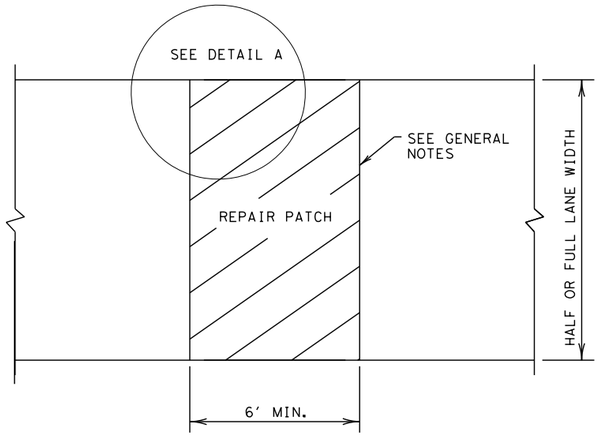
TABLE NO.1 STEEL BAR SIZE AND SPACING						
TYPE PAVEMENT	SLAB THICKNESS AND BAR SIZE		LONGITUDINAL*		TRANSVERSE*	
			REGULAR BARS	TIEBARS	BARS	TIEBARS
	T (IN.)	BAR SIZE	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)
CRCP	6.0	#5	7.5	7.5	24	24
	6.5		7.0	7.0		
	7.0		6.5	6.5		
	7.5		6.0	6.0		
	8.0	#6	9.0	9.0	24	24
	8.5		8.5	8.5		
	9.0		8.0	8.0		
	9.5		7.5	7.5		
	10.0		7.0	7.0		
	10.5		6.75	6.75		
	11.0		6.5	6.5		
	11.5		6.25	6.25		
	≥12.0		6.0	6.0		
JRCP	<8.0	#5	24.0	12.0	24	24
	≥8.0	#6	24.0	12.0	24	24
CPCD	<8.0	#5	NONE	12.0	NONE	24
	≥8.0	#6	NONE	12.0	NONE	24

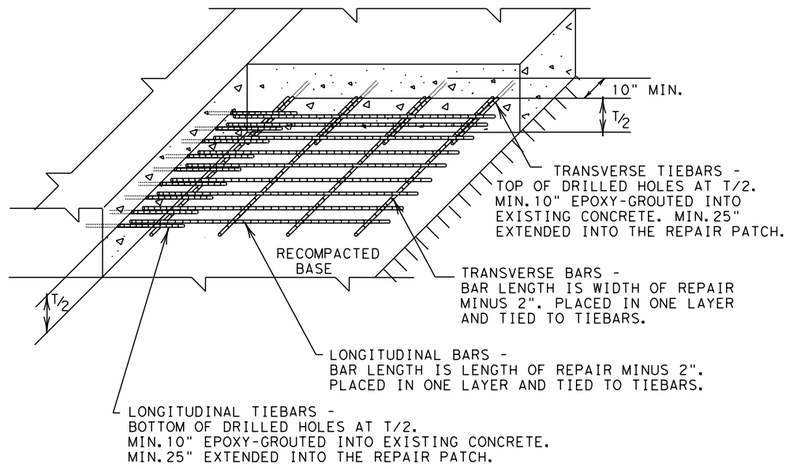
* USE 12" SPACING AS FIRST AND LAST SPACING AT END OR SIDE FOR ALL BARS.

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



PLAN VIEW

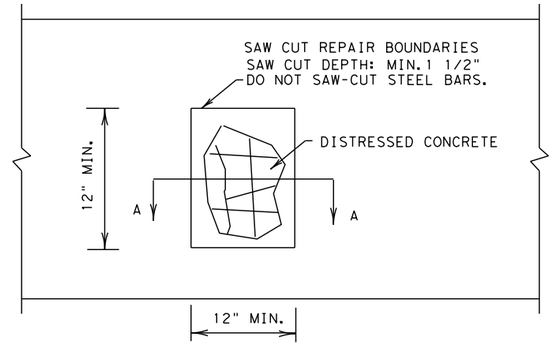


DETAIL A
GROUTED TIEBARS & REINFORCEMENT

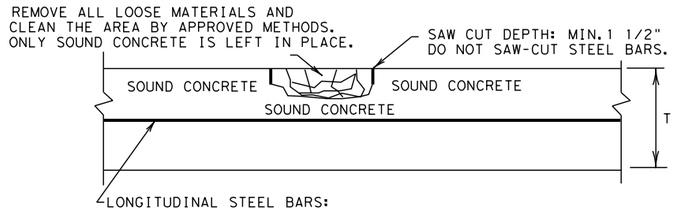
FULL-DEPTH REPAIR OF CRCP, JRCP, AND CPCD

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
3. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



PLAN VIEW



LONGITUDINAL STEEL BARS:

*REPAIR AREAS MAY BE ADJUSTED AFTER REMOVING DISTRESSED CONCRETE. SWITCH THE HALF-DEPTH REPAIR TO FULL-DEPTH REPAIR IF EXPOSED EXISTING LONGITUDINAL BARS ARE DEFICIENT, AS APPROVED. COMPENSATION WILL BE MADE FOR UNEXPECTED VOLUMES OF REPAIR AREAS OR CHANGES IN SCOPE OF WORK.

*INCREASE THE REPAIR AREA AND PERFORM A FULL-DEPTH REPAIR AS DIRECTED IF LONGITUDINAL STEEL BARS WERE DAMAGED BY THE REMOVAL OPERATIONS. NO ADDITIONAL COMPENSATION WILL BE MADE.

SECTION A-A

HALF-DEPTH REPAIR

Texas Department of Transportation

Design Division Standard

REPAIR OF CONCRETE PAVEMENT

REPCP-14

FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0028	03	109	US 90
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		56

DATE: 5/25/2022
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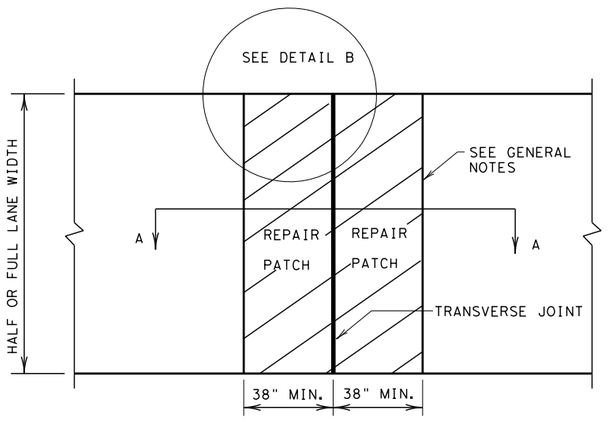
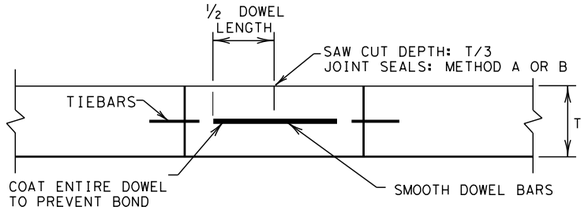
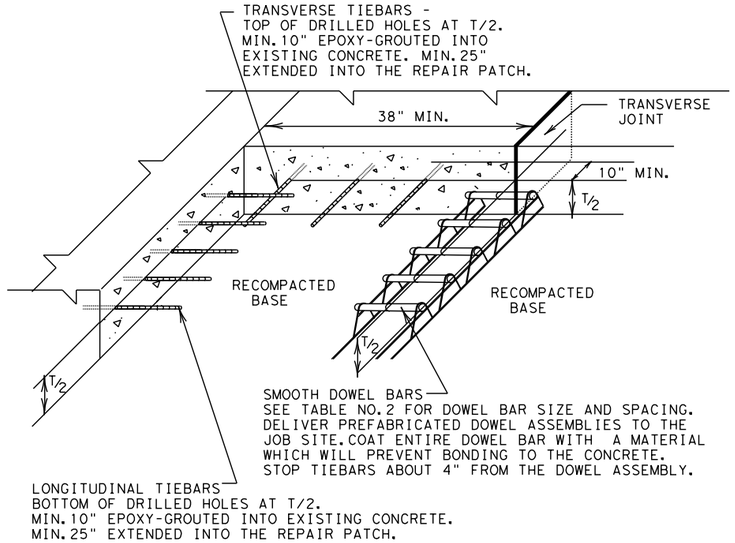


PLAN VIEW



SECTION A-A



DETAIL B
GROUTED TIEBARS & DOWELS

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."
8. DOWEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1/4 IN. HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED. WHERE DOWEL BAR BASKETS ARE USED, REMOVE THE SHIPPING WIRES.

TABLE NO. 2 DOWELS (SMOOTH BARS)			
PAVEMENT THICKNESS (INCHES)	SIZE AND DIA.	LENGTH (IN.)	SPACING (IN.)
<10	#8 (1 IN.)	18.0	12.0
≥10	#10 (1 1/4 IN.)		

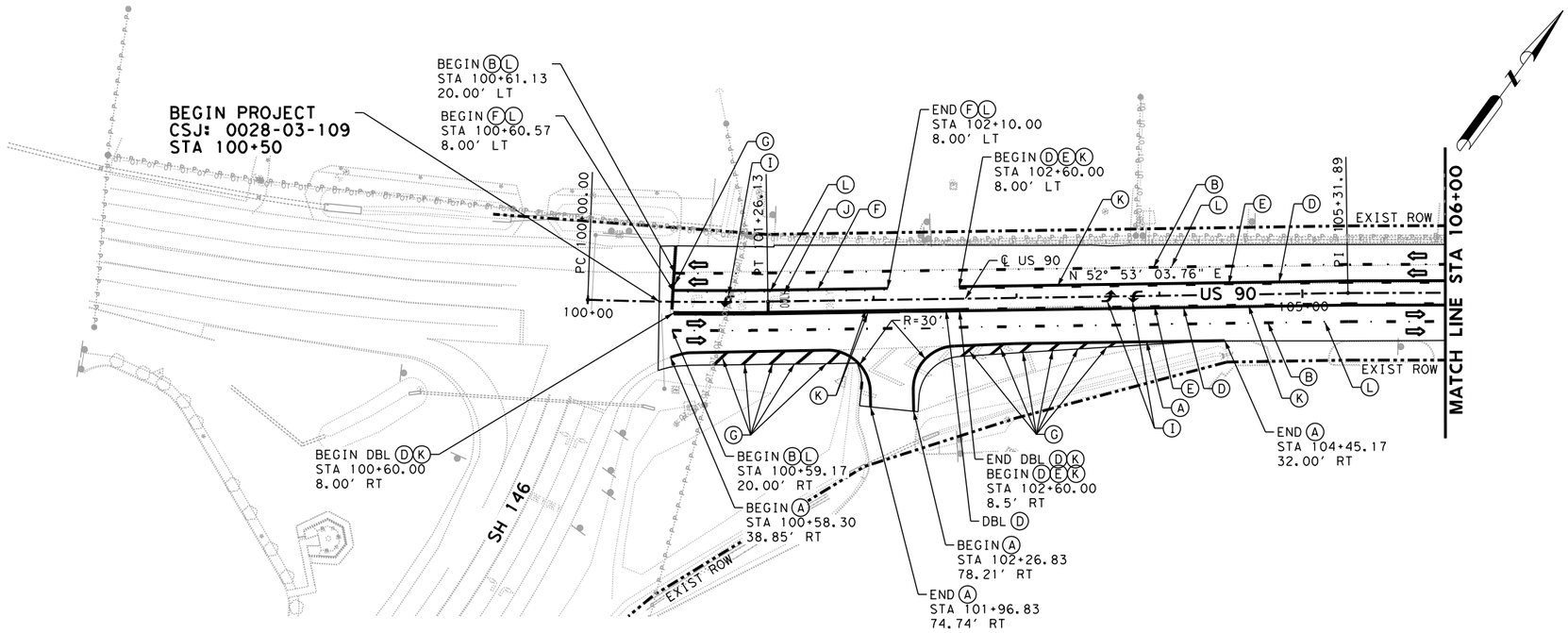
REPAIR OF TRANSVERSE JOINT OF CPCD

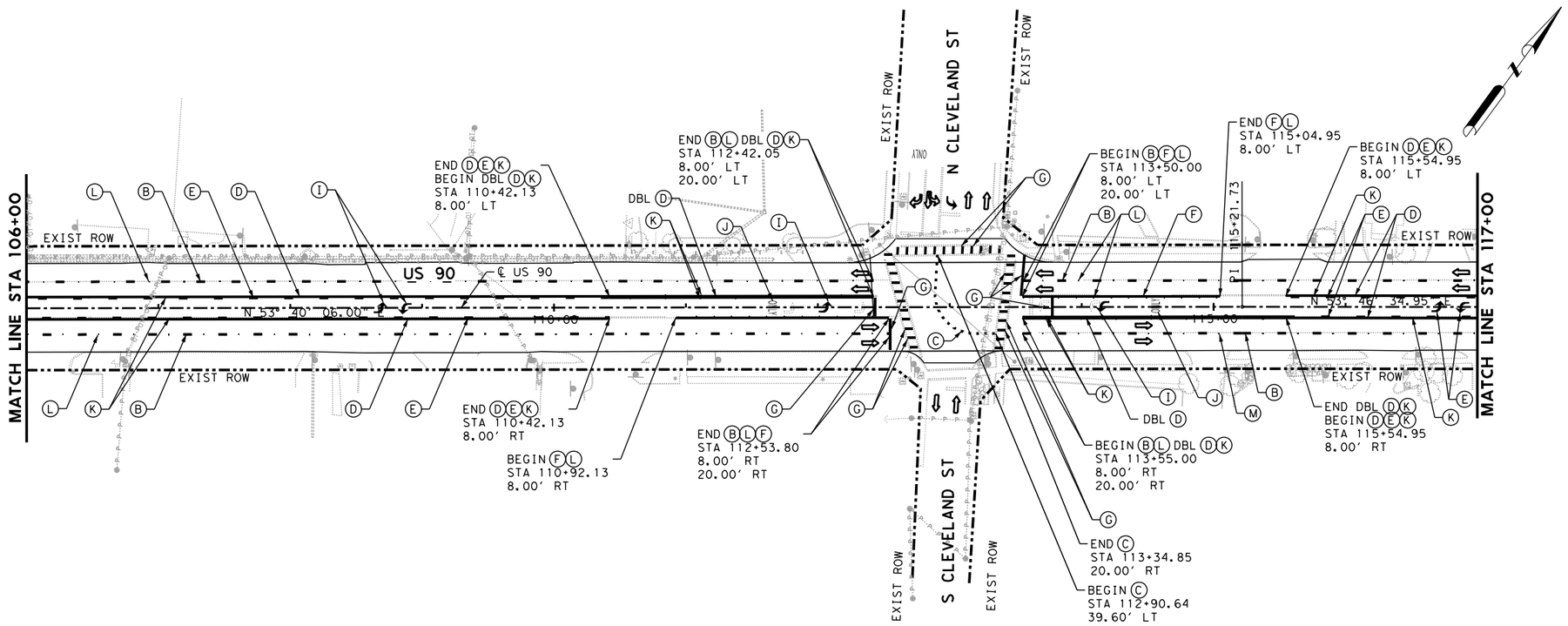
Texas Department of Transportation | Design Division Standard

REPAIR OF CONCRETE PAVEMENT

REPCP-14

FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0028	03	109	US 90
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		57





LEGEND

- (A) REFL PAV MRK TYPE I (W) 4" (SLD) (90MIL)
- (B) REFL PAV MRK TYPE I (W) 6" (BRK) (90MIL)
- (C) REFL PAV MRK TYPE I (W) 4" (DOT) (90MIL)
- (D) REFL PAV MRK TYPE I (Y) 4" (SLD) (90MIL)
- (E) REFL PAV MRK TYPE I (Y) 4" (BRK) (90MIL)
- (F) REFL PAV MRK TYPE I (W) 8" (SLD) (90MIL)
- (G) PREFAB PAV MRK TY C (W) (24") (SLD)
- (H) PREFAB PAV MRK TY C (Y) (24") (SLD)
- (I) PREFAB PAV MRK TY C (W) (ARROW)
- (J) PREFAB PAV MRK TY C (W) (WORD)
- (K) REFL PAV MRKR TY II-A-A
- (L) REFL PAV MRKR TY I-C
- PROP DIRECTION OF TRAFFIC FLOW
- EXIST DIRECTION OF TRAFFIC FLOW

0' 50' 100'
SCALE IN FEET

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
131479
LICENSED
PROFESSIONAL ENGINEER
P.E.
5/25/2022

IDCUS
Planners-Engineers-Program Managers
IDCUS, Inc.
15915 Katy Freeway, Suite 300
Houston, Texas 77094
(713) 541-5591 Fax: (713) 541-3501
T.B.P.E.FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

US 90
SIGNING AND PAVEMENT MARKING LAYOUT
STA 100+00 TO STA 117+00

SHEET 1 OF 3

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	58

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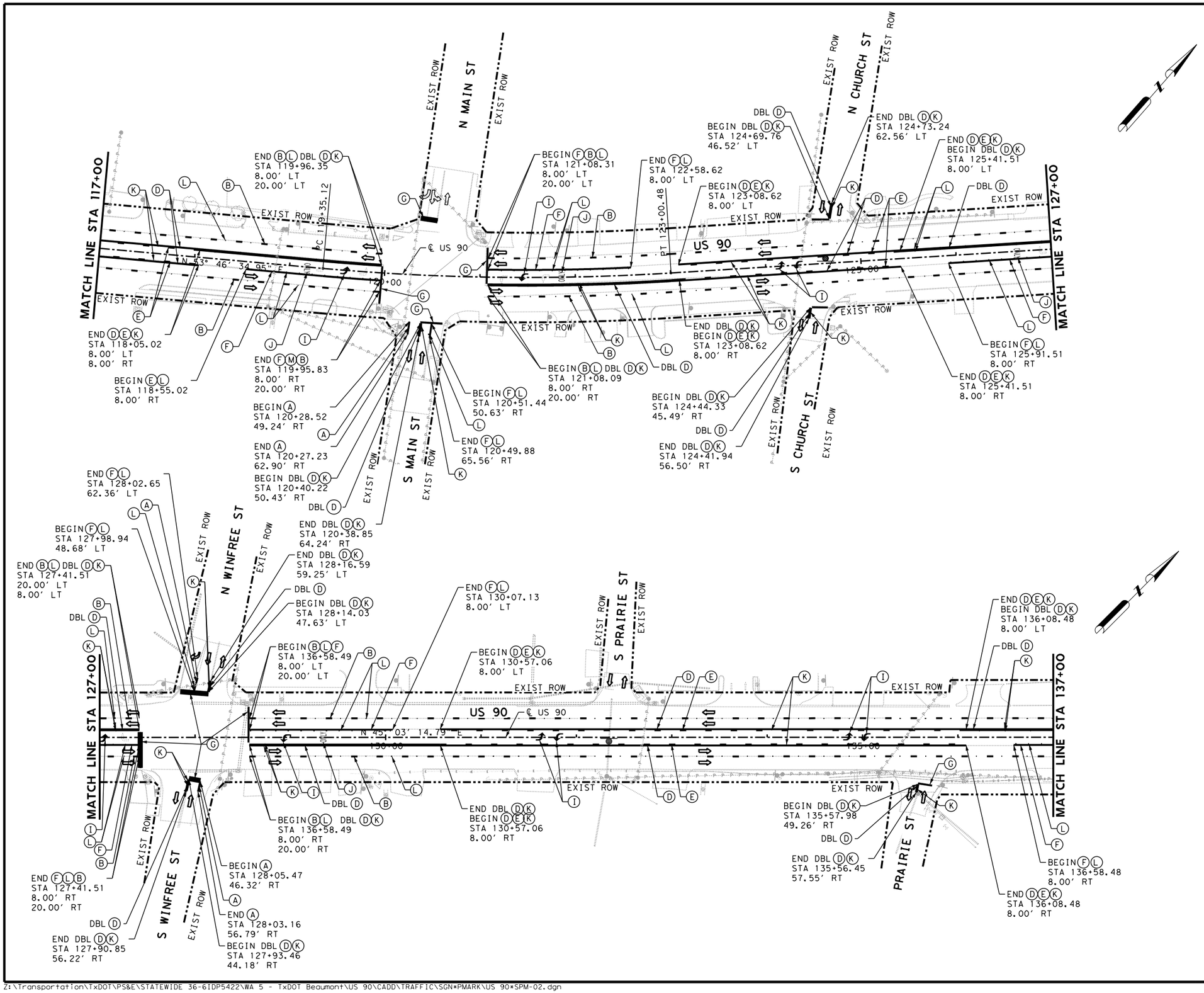

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- EXIST DIRECTION OF TRAFFIC FLOW

0′ 50′ 100′
SCALE IN FEET

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
OMAR ALDUCIN
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(713) 541-5591 Fax: (713) 541-3501
T.B.P.E. FIRM REGISTRATION NO. F-6825

US 90
SIGNING AND PAVEMENT MARKING LAYOUT
STA 117+00 TO STA 137+00

SHEET 2 OF 3

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
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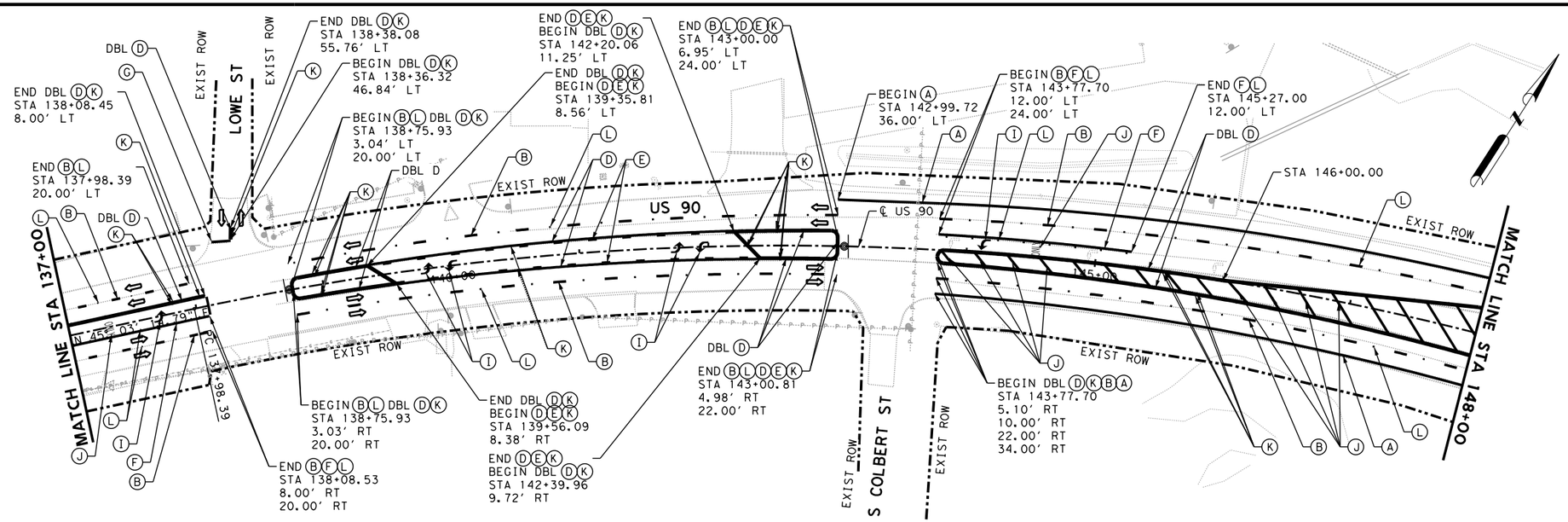

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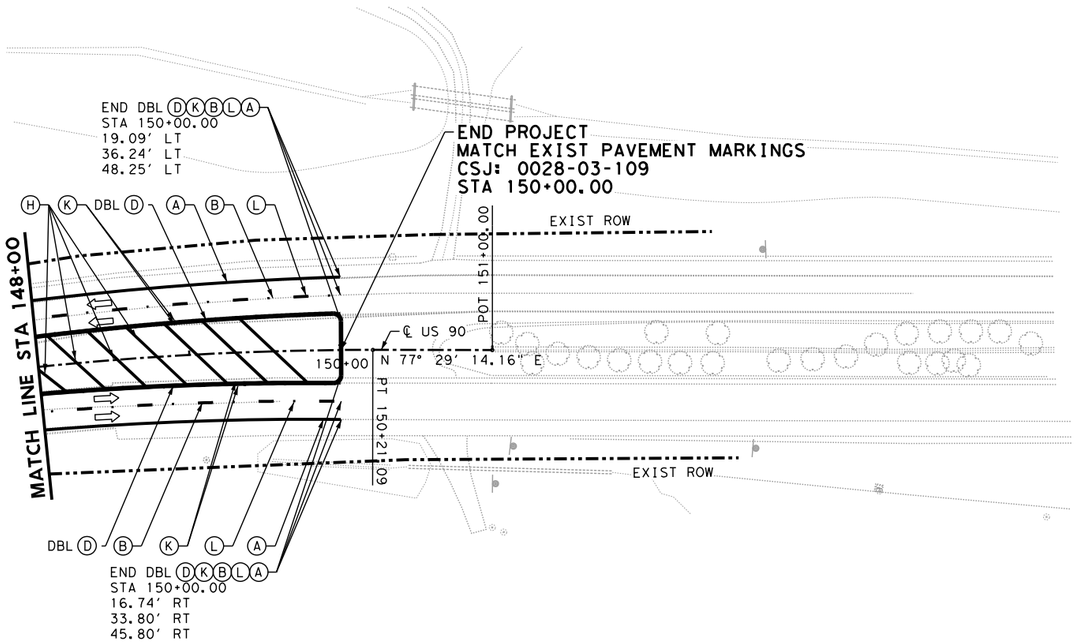
- PROP DIRECTION OF TRAFFIC FLOW
- EXIST DIRECTION OF TRAFFIC FLOW

0' 50' 100'
SCALE IN FEET



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Texas Department of Transportation

US 90
SIGNING AND PAVEMENT MARKING LAYOUT
STA 137+00 TO STA 154+00

SHEET 3 OF 3

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
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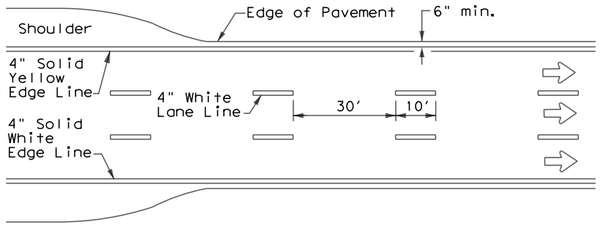
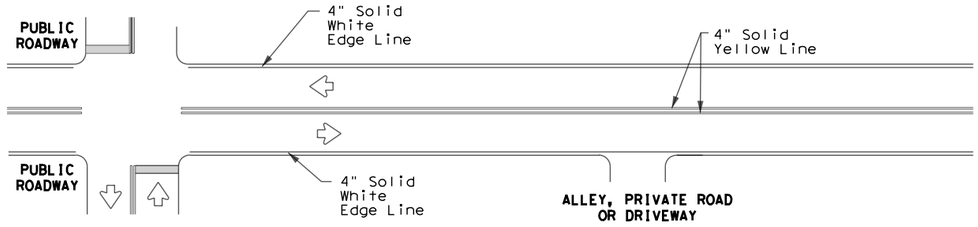
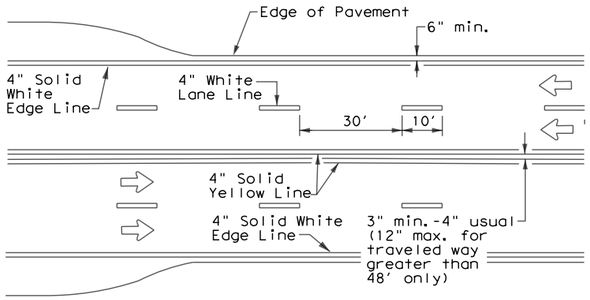


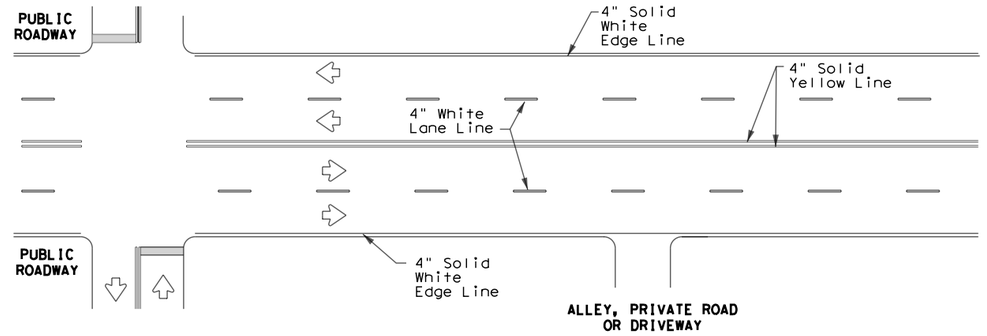
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



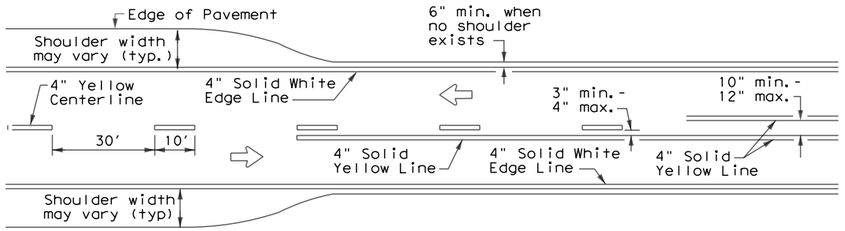
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



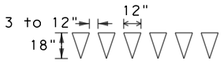
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



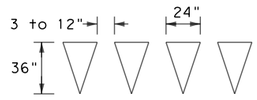
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

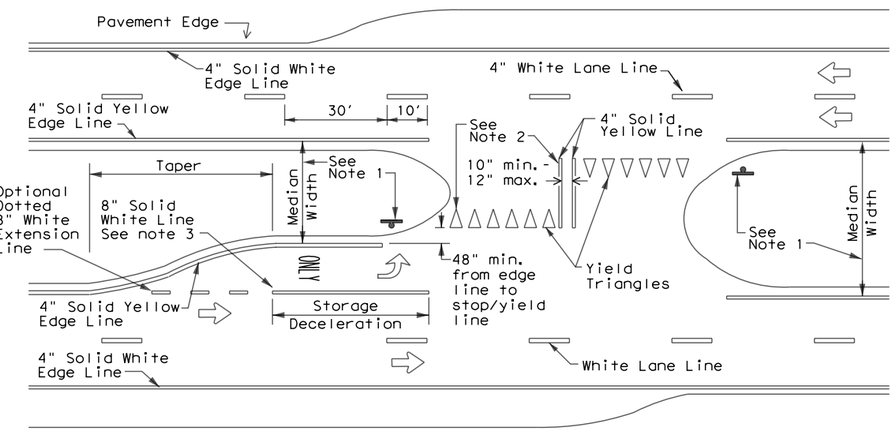


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



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 are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles 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.

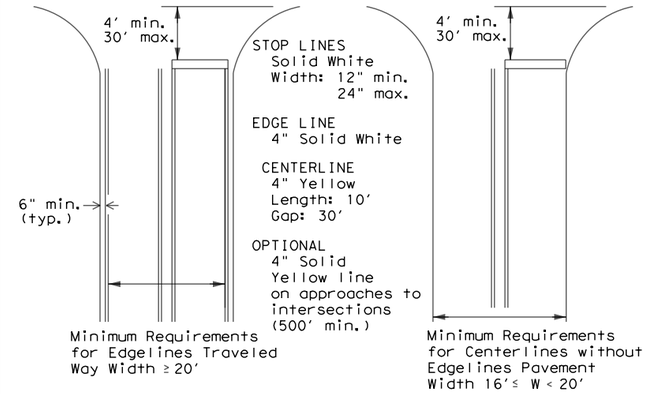
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines 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 inside of edgeline to the inside of edgeline 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.



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

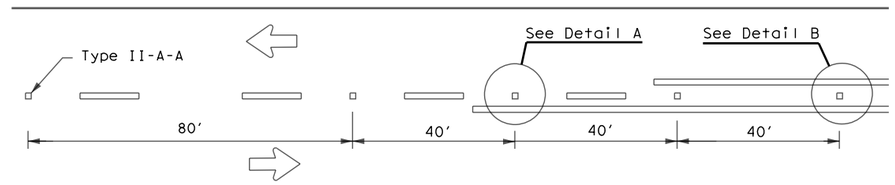
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

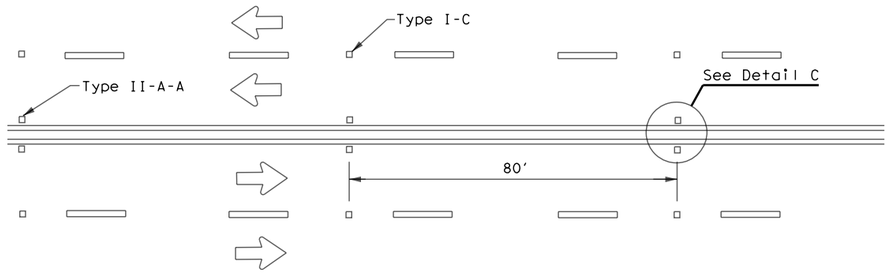
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0028	03	109	US 90
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	BMT	LIBERTY		61

22B

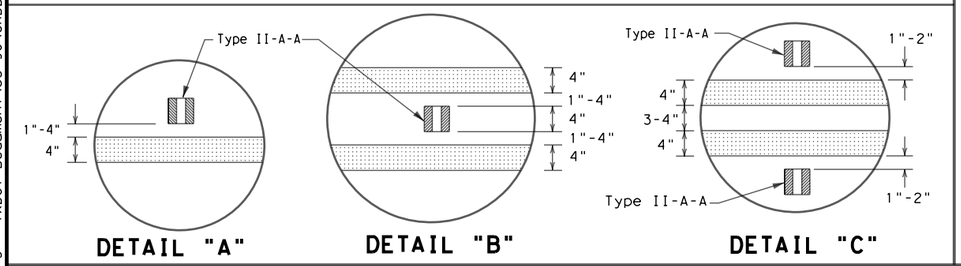
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



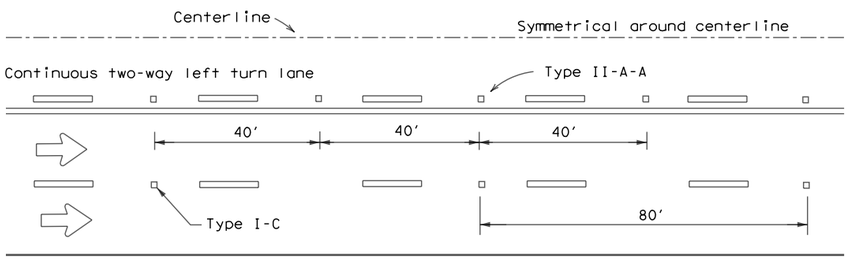
CENTERLINE FOR ALL TWO LANE ROADWAYS



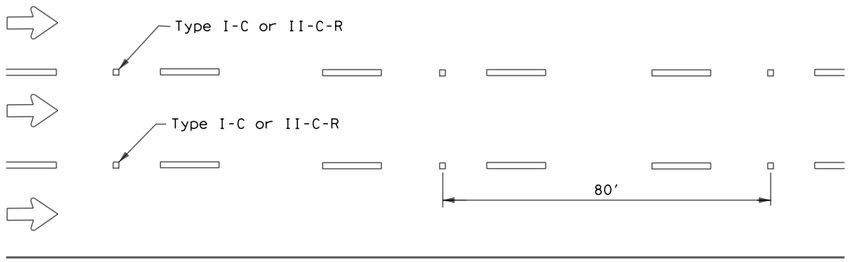
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**

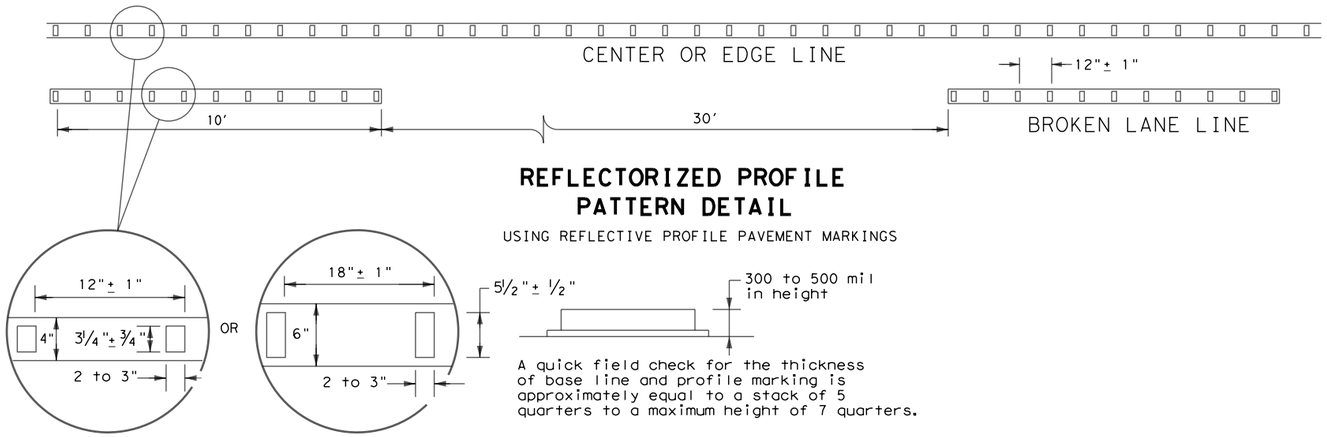


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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

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



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

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

NOTE

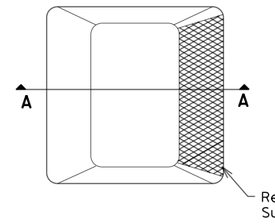
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

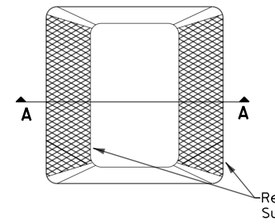
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

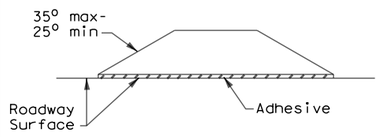
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



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)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	0028	03	109	US 90
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		62

22B

DATE: 5/25/2022 2:51:55 PM
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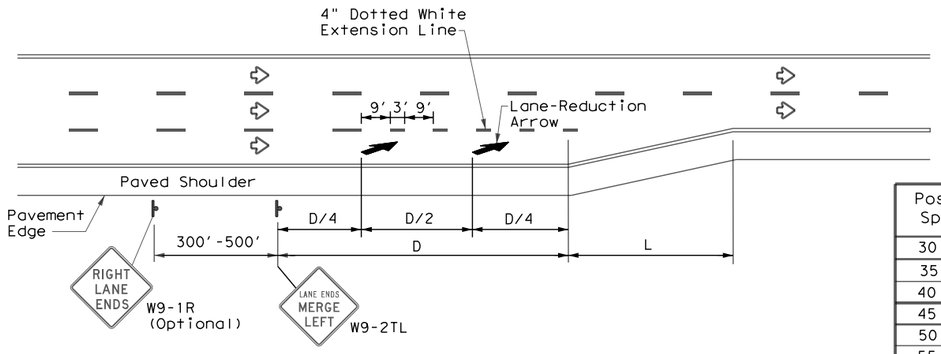


LANE REDUCTION

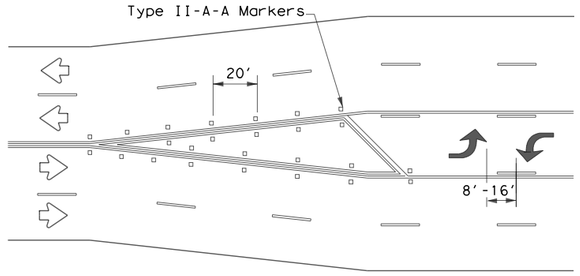
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

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 W9-1R "RIGHT LANE ENDS" 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.

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.

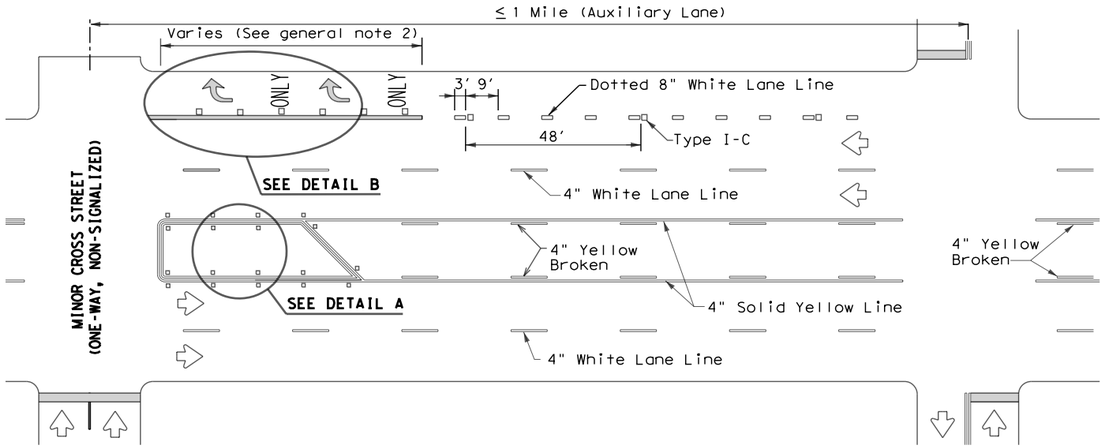


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

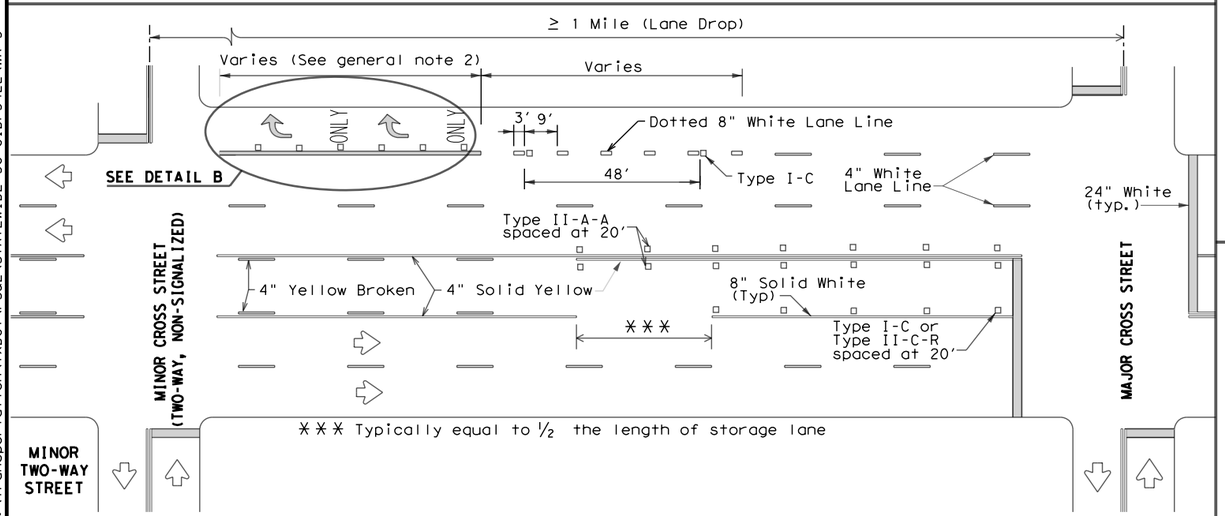
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

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

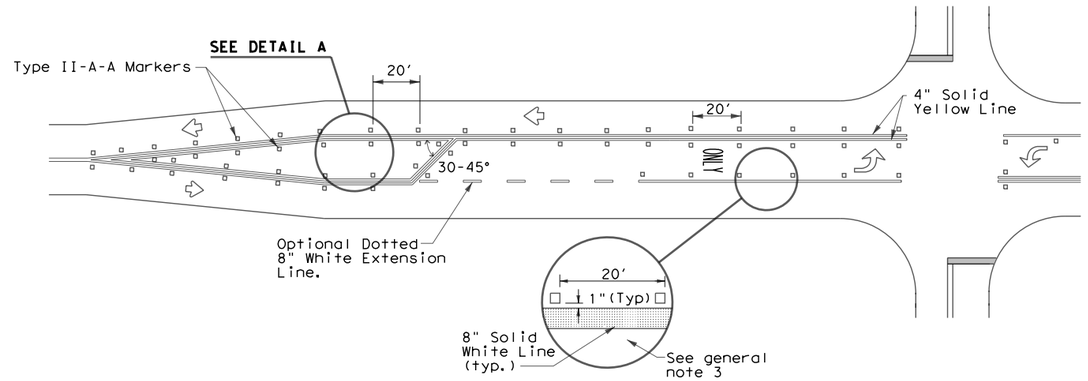
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



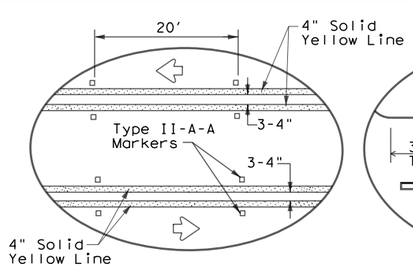
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



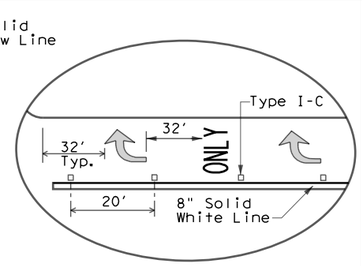
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A



DETAIL B

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

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© TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0028	03	109	US 90
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	BMT	LIBERTY		63
3-03 6-20				

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DATE: 5/25/2022 2:51:56 PM
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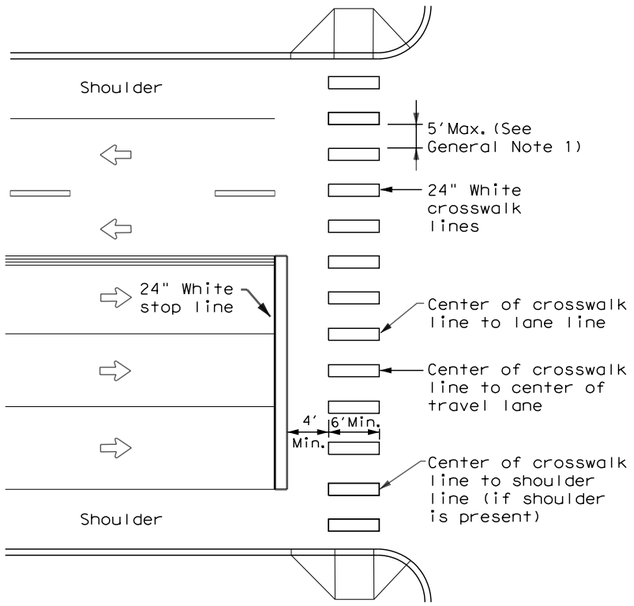


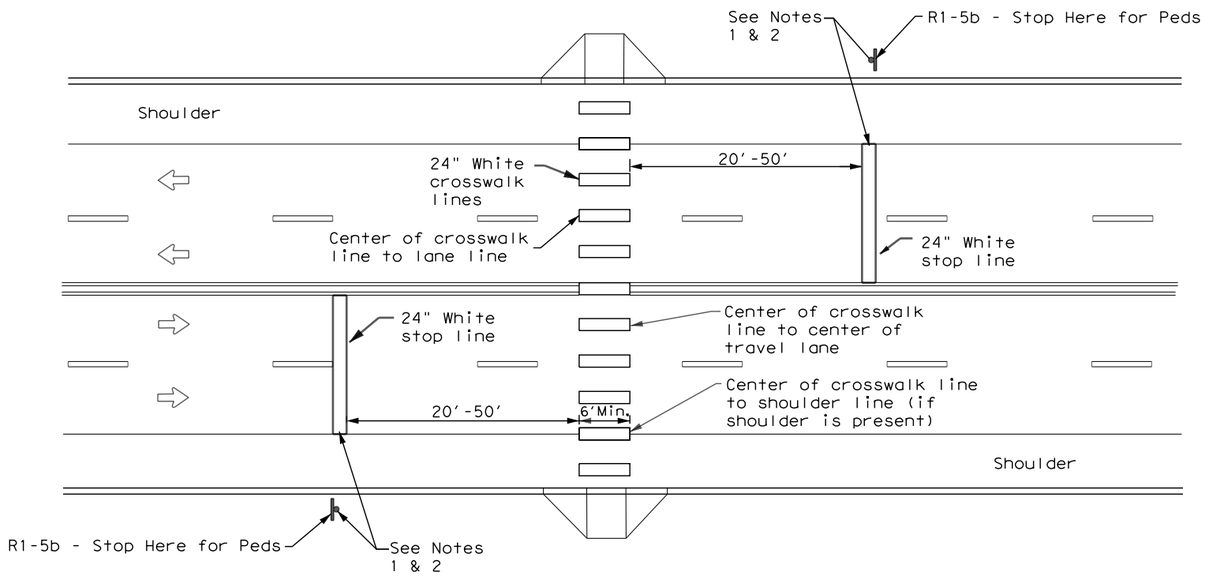
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6′ wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

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.



UNSIGNALIZED MID BLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with "Stop Here for Pedestrians" signs at unsignalized mid block cross walks.
2. Use stop bars with "Stop Here on Red" signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22

FILE: pm4-22.dgn	DN:	CK:	DW:	CK:
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 3-22	0028	03	109	US 90
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		64

22D

SITE DESCRIPTION

Notes:

(1) The Site Description is accomplished using various sheets, each revealing separate details. This Index Sheet's purpose is to point the user to the appropriate location where the information required by the TPDES CGP can be found.

(2) The project limits shown on the Title Sheet and limits of TxDOT Right Of Way shall also be the limits of coverage of the SW3P.

NATURE OF ACTIVITY: MILL AND OVERLAY EXISTING PAVEMENT SURFACE, ADJUST INLETS, AND PAVEMENT MARKINGS.

INTENDED SEQUENCE OF MAJOR SOIL DISTURBING ACTIVITIES: N/A

TOTAL AREA OF SITE: 8.25 AC AREA TO BE DISTURBED: 0.01 AC

If area of disturbance can be expected to exceed 1.0 acres, Beaumont District Standard SW3P-B should be included in the plans.

PRE-CONSTRUCTION RUNOFF CO-EFFICIENT: 0.70

POST-CONSTRUCTION RUNOFF CO-EFFICIENT: 0.70

EXISTING SOIL DESCRIPTION: The area's predominate soil type is Morey-Urban Land Compl. Pre-construction soils are covered 80-90% with various grass, brush, and weeds. The local climate is humid subtropical (49.77" average annual rain.)

GENERAL LOCATION MAP: See Title Sheet

RECEIVING WATERS: SEGMENT NUMBER 0801

SEGMENT NAME TRINITY RIVER

LOCATION OF WETLAND OR SPECIAL AQUATIC SITES: See EPIC Sheet

DRAINAGE PATTERNS: RUNOFF FLOWS THROUGH THE EXISTING DITCHES TOWARDS LINNEY CREEK AT THE NORTH END OF THE PROJECT, AND A SYSTEM OF DITCHES AT THE SOUTH END.

TYPICAL AREAS OF SOIL DISTURBANCE: N/A

TYPICAL AREAS WHICH WILL NOT BE DISTURBED: EXISTING PERVIOUS AREAS.

LOCATION OF OFF-SITE SURFACE RECEIVING WATERS: LINNEY CREEK AT THE NORTH END OF THE PROJECT. A SYSTEM OF DITCHES AT THE SOUTH END.

LOCATIONS WHERE STABILIZATION PRACTICES WILL OCCUR: ALL DISTURBED AREAS

LOCATIONS OF OFF-SITE STORAGE OF MATERIALS AND EQUIPMENT, WASTE, BORROW; OR DEDICATED MATERIAL PROCESSING PLANTS: To be determined during construction by Contractor and Engineer.

LOCATIONS WHERE STORM WATER DISCHARGES TO SURFACE WATERS: N/A

LOCATION OF POLLUTION CONTROL MEASURES: See SW3P Layout Sheet(s) or As need/as directed by the Engineer

CONTROLS

SOIL STABILIZATION PRACTICES

INTERIM:

____	TEMPORARY SEEDING	X	PRESERVATION OF NATURAL RESOURCES
____	MULCHING (Hay or Straw)	____	FLEXIBLE CHANNEL LINER
____	BUFFER ZONES	____	OTHER

PERMANENT:

____	SEEDING	____	RETENTION BLANKET
X	BLOCK SOD	____	CHANNEL LINER
____	OTHER		

STRUCTURAL PRACTICES (T/P)*

T	SILT FENCE	____	PAVED FLUMES
____	HAY BALES	____	ROCK BEDDING AT CONSTRUCTION EXIT
T	ROCK BERMS	____	TIMBER MATTING AT CONSTRUCTION EXIT
____	PIPE SLOPE DRAINS	____	SEDIMENT TRAPS
____	CHANNEL LINERS	____	SEDIMENT BASINS
____	STORM SEWERS	____	CURB and GUTTER
T	STORM INLET SEDIMENT TRAP	____	VELOCITY CONTROL DEVICES
____	STONE OUTLET STRUCTURES	T	EROSION CONTROL LOGS
____	DIVERSION, INTERCEPTOR, or PERIMETER SWALES		
____	DIVERSION, INTERCEPTOR, or PERIMETER DIKES		

* T means Temporary - P means Permanent

PERMANENT POST CONSTRUCTION TSS CONTROLS

____ RETENTION / IRRIGATION

____ EXTENDED DETENTION BASINS

____ VEGETATIVE FILTER STRIPS / VEGETATIVE SWALES

____ CONSTRUCTED WETLANDS

____ WET BASINS

OTHER CONTROLS

____ WATERING FOR DUST CONTROLS

____ SEDIMENT REMOVAL FROM ROADWAY (SWEEPING)

____ LOADED TRUCKS WILL BE COVERED WITH TARP

The above indicated practices are proposed to control pollutants in storm water discharges. These practices are based on information contained in TxDOT Storm Water Management Guidelines. The Schedule of implementation of these practices will be based on the intended Sequence of Major Soil Disturbing Activities. Stabilization measures shall be initiated no later than 14 days after construction activity of that portion of the site has temporarily or permanently ceased.

Describe construction and waste materials expected to be stored on site and proposed controls to reduce pollutants from these materials (include storage practices spill prevention and response. MILL AND OVERLAY EXIST PAVEMENT SURFACE AND INSTALLATION OF PAVEMENT MARKINGS. MATERIAL SUCH AS REBAR AND CONCRETE TO BE USED. USE OF EROSION LOGS AT GRATE INLETS, SANDBAGS AND SILT FENCES AT CURB INLETS.

Describe pollutant sources from areas other than construction and measures implemented at those sites to minimize pollutant discharges. ____

Describe pollutant sources from areas from the construction site and measures implemented at those sites to minimize pollutant discharges. All waste material will be disposed of in accordance with all State Laws and Regulations. No construction waste will be buried on sites.

Describe measures necessary to protect listed endangered or threatened species, or critical habitat. See EPIC

INFORMATION

MAINTENANCE:

All erosion and sediment control and other protective measures identified in the SW3P must be maintained in effective operating conditions. If site inspections required by this permit identify BMP's that are not operating effectively, maintenance shall be performed before the next anticipated storm event, or as necessary to maintain the continued effectiveness of storm water controls. If maintenance prior to the next anticipated storm event is unpracticable, maintenance must be scheduled and accomplished as soon as practical.

INSPECTION:

Qualified personnel shall inspect disturbed areas of the construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, structural control measures, and locations where vehicles enter or exit the site.

Inspection Cycle Option:

- ☐ 1. At least every 14 calendar days or within 24 hrs after 0.5 inches or more of rainfall.
- ☒ 2. At least every 7 calendar days.
- ☐ 3. At least monthly (Engineer & DEQC approved revision to SW3P required).

a). Disturbed areas that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Sediment and erosion control measures identified on the SW3P shall be observed to ensure that they are operating correctly. Locations where vehicles enter or exit the site shall be inspected for evidence of offsite sediment tracking. Sediments must be removed from sediment control structures no later than the time that the design capacity has been reduced by 50%.

b). Based on the result of the inspection, the SW3P shall be revised to include (show on Site Map) additional or modified BMP's designed to correct the observed deficiency. Revisions to the SW3P must be completed within seven (7) calendar days following the inspection.

c). A report summarizing the scope, date, name and qualifications of inspector, and major observations relating to the implementation of the SW3P shall be produced and retained as part of the SW3P for 3 years from date of final stabilization.

d). The following records must be maintained and either attached to or referenced in the SW3P, and made readily available upon request to the parties in Part III.D.1 of the CGP: 1). The dates when major grading activities occur; 2). The dates when construction activities temporarily or permanently cease on a portion of the site and; 3). The dates when stabilization measures are initiated.

INSPECTOR PAPERWORK CHECKLIST:

- ☒ Contact Form (1)
- ☒ Notice of Intent (1)(2)
- ☐ SW3P Certification Statement (signed by AE) (2)
- ☐ Delegation of Signature Authority (all Inspectors signing reports) (2)(3)
- ☐ TPDES General Permit (2)(3)
- ☐ Environmental Document (2)
- ☐ Inspection and Maintenance Report (2)(3)
- ☐ Notice of Termination (2)
- ☒ SW3P Plan (2)(3)
- ☐ Inspector Qualification Form (2)(3)
- ☐ Project Diary (2)(3)

(1) The information should be displayed on the Project Bulletin Board.
(2) The information should be a part of the permanent SW3P file maintained at the Area Office.
(3) The information should be maintained at the Field Office.

STORM WATER POLLUTION PREVENTION PLAN is consistent with requirements specified in applicable sediment and erosion site plans or site permits, or storm water management site plans or site permits approved by State, Tribal or local officials (i.e. MS4 Permits).

Any reportable quantity of Hazardous Material release must be reported to the National Response Center at 1-800-424-8802. In addition the Beaumont District "Hazardous Material Spill Information Form" must be completed and mailed to the EPA Regional Office in Dallas, Tx.

A copy of the Construction General Permit is part of the SW3P.

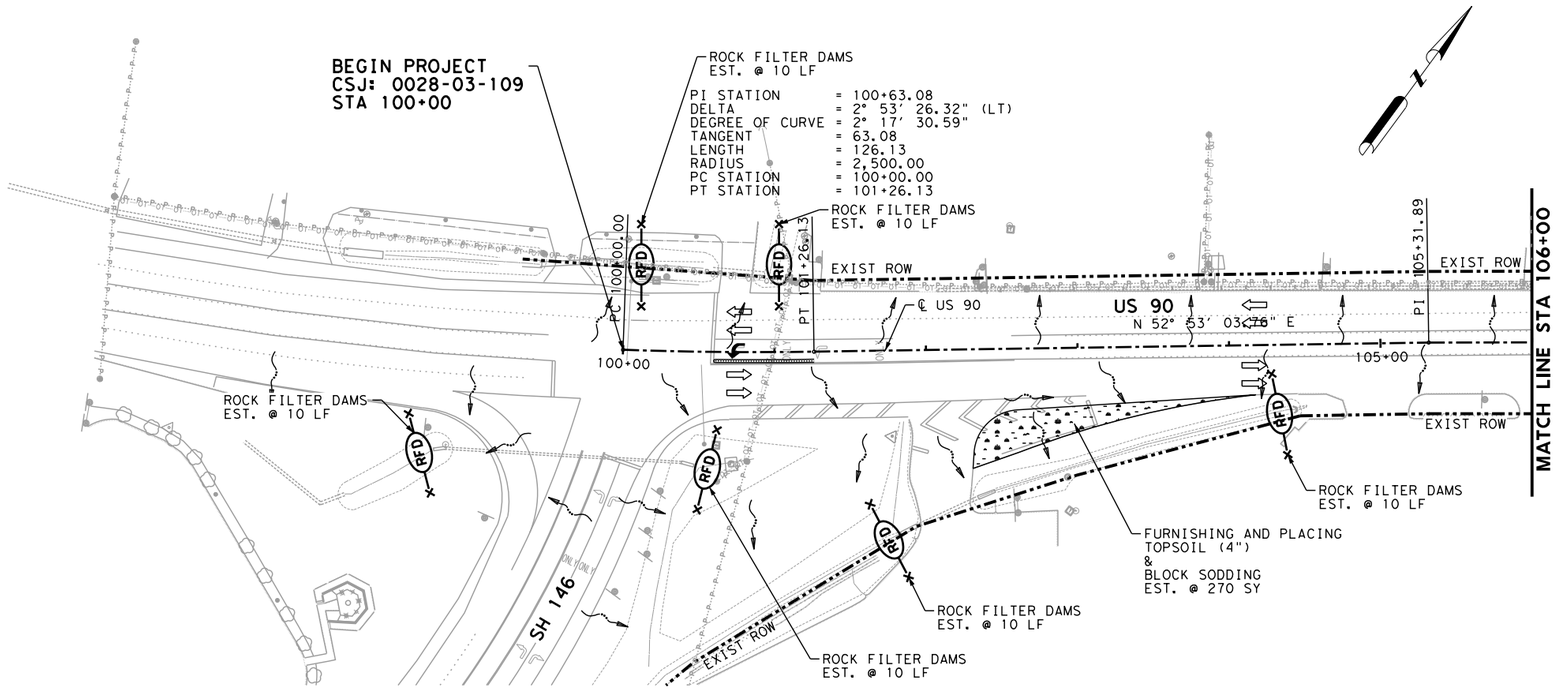
STATE OF TEXAS
CHARLES M. SHINE
62999
LICENSED
PROFESSIONAL ENGINEER

5/25/2022

BEAUMONT DISTRICT
Texas Department of Transportation

SW3P INDEX
SW3PI-07 (BMT)

REVISIONS	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
	6			65
	STATE	STATE DIST.NO.	COUNTY	
	TEXAS	BMT	LIBERTY	
	CONT.	SECT.	JOB	HIGHWAY NO.
	0028	03	109	US 90



LEGEND

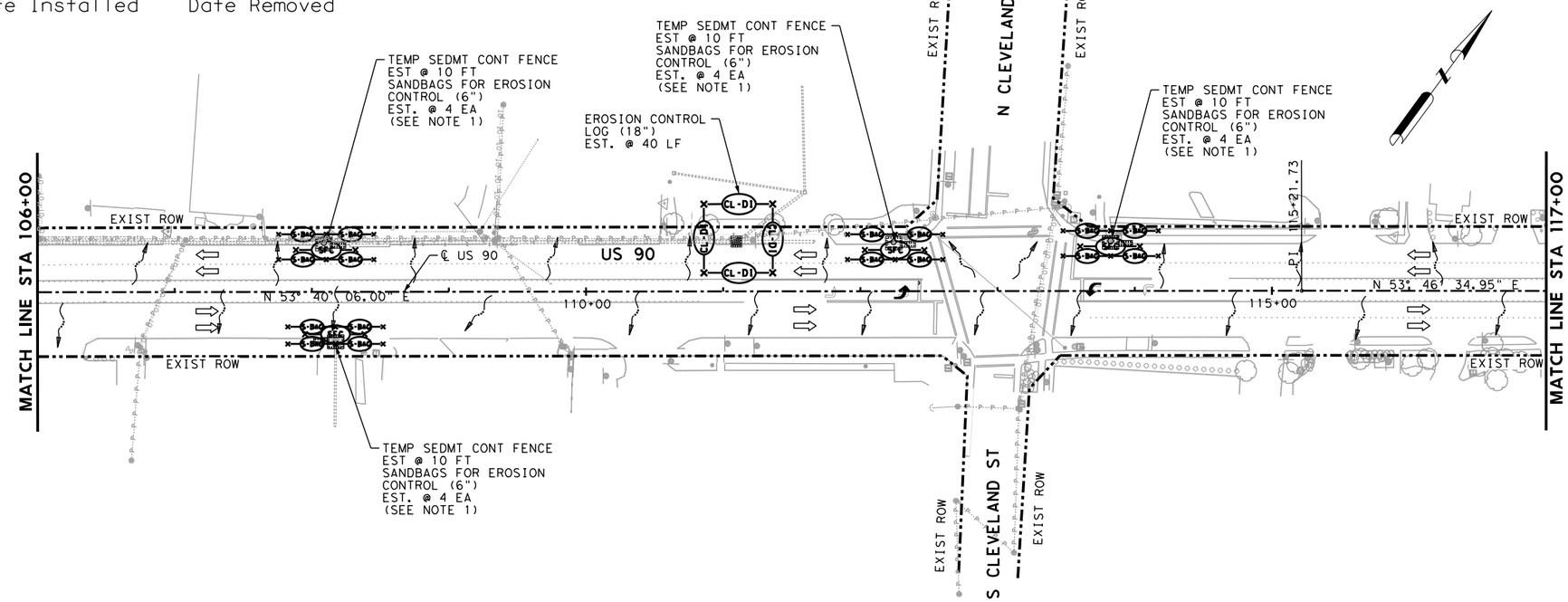
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- S-BAG — SANDBAG FOR EROSION CONTROL AT CURB INLET
- SCF — TEMP SEDMT CONT FENCE
- RFD — ROCK FILTER DAM
- TOP SOIL AND BLOCK SODDING
- FLOW ARROW
- EXIST STORM SEWER
- EXIST INLET
- EXIST TRAFFIC LANE
- PROP TRAFFIC LANE

NOTE:

1. FOR DETAILS ON INLET EROSION CONTROL PLACEMENT REFER TO "INLET PROTECTION SILT FENCE" SHEET.

Inspector

Date Installed Date Removed



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SCALE IN FEET

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
CHARLES M. SHINE
62999
LICENSED
PROFESSIONAL ENGINEER

Charles M. Shine P.E. 5/25/2022

IDCUS
Planners-Engineers-Program Managers
IDCUS, Inc.
15915 Katy Freeway, Suite 300
Houston, Texas 77094
(713) 541-5591 Fax: (713) 541-3501
T.B.P.E.FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

US 90

SW3P LAYOUT
STA 100+00 TO STA 117+00

SHEET 1 OF 3

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	66

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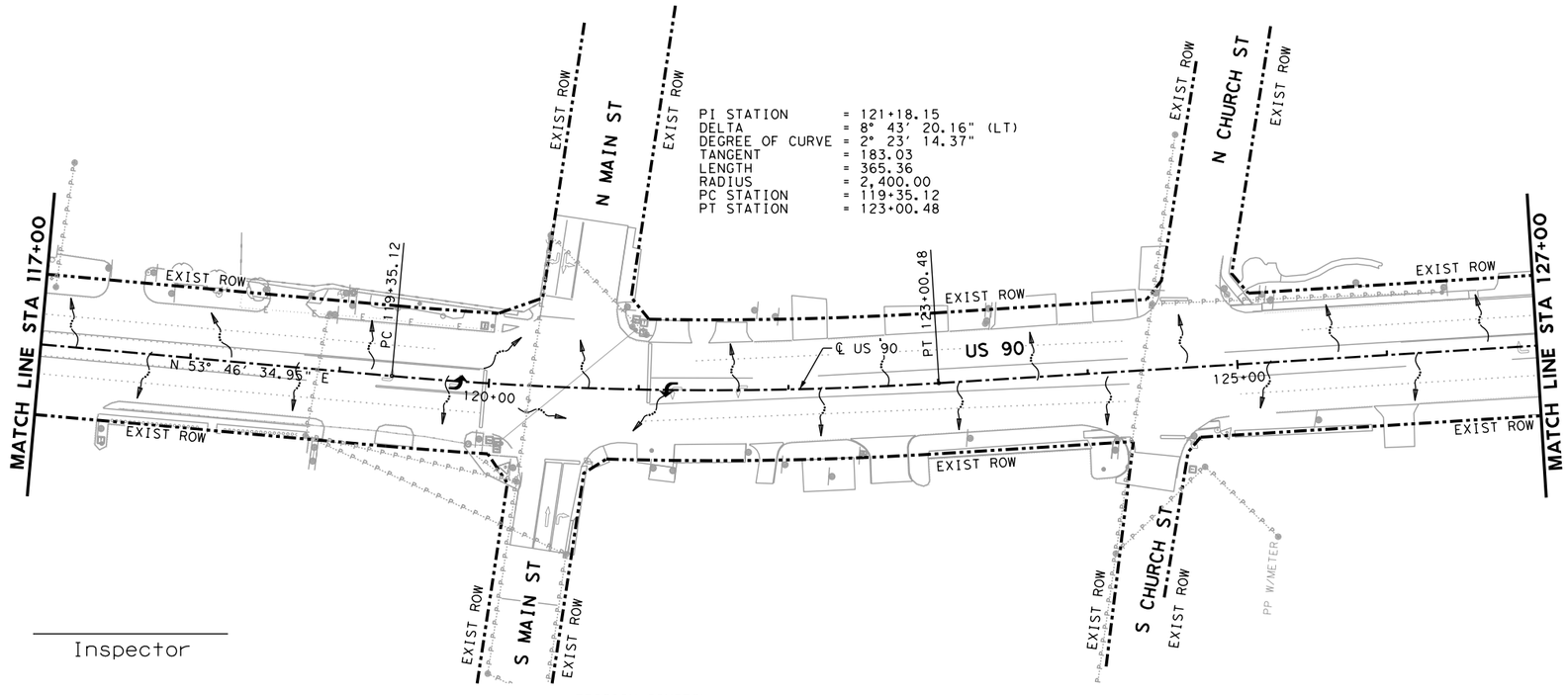
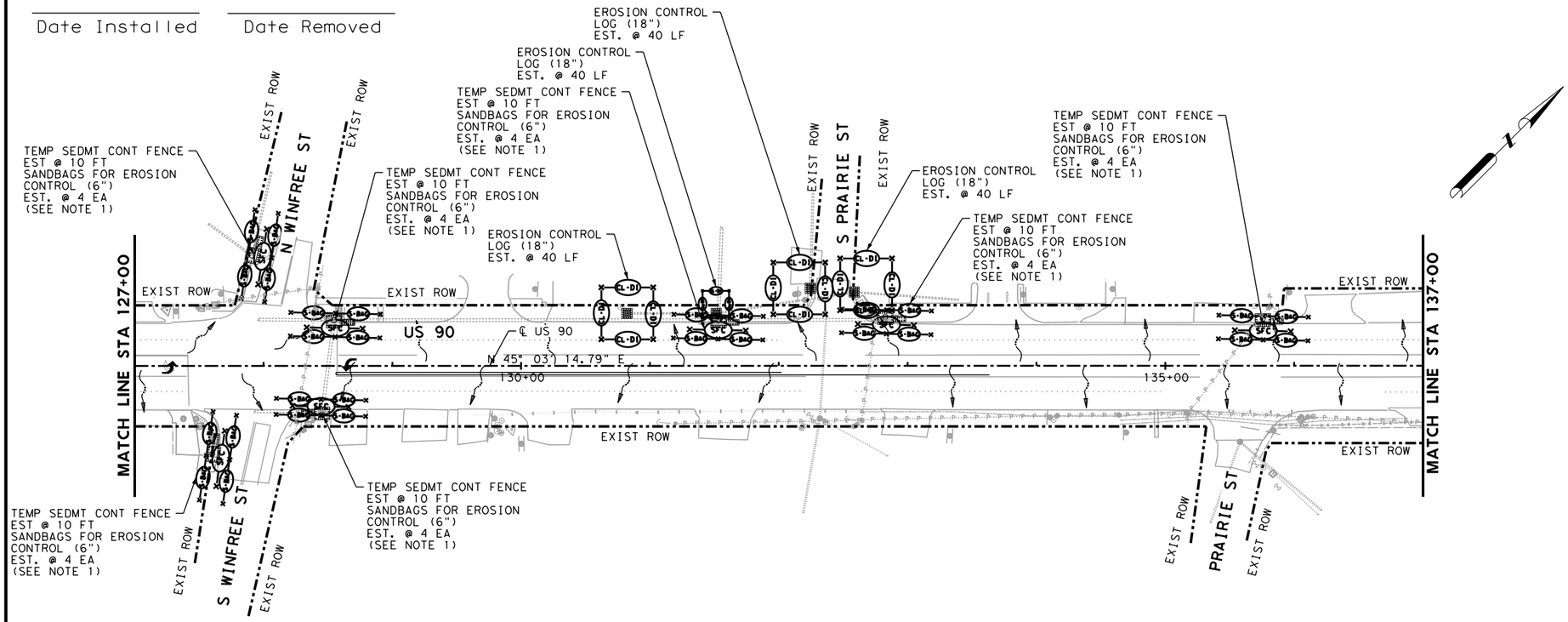


Inspector

Date Installed Date Removed



LEGEND

- CL-DI — EROSION CONTROL LOG AT DROP INLET
- S-BAG — SANDBAG FOR EROSION CONTROL AT CURB INLET
- SCF — TEMP SEDMT CONT FENCE
- RFD — ROCK FILTER DAM
- TOP SOIL AND BLOCK SODDING
- FLOW ARROW
- EXIST STORM SEWER
- EXIST INLET
- EXIST TRAFFIC LANE
- PROP TRAFFIC LANE

NOTE:

1. FOR DETAILS ON INLET EROSION CONTROL PLACEMENT REFER TO "INLET PROTECTION SILT FENCE" SHEET.

0' 50' 100'
SCALE IN FEET

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
CHARLES M. SHINE
62999
LICENSED PROFESSIONAL ENGINEER
5/25/2022

IDCUS
Planners-Engineers-Program Managers
IDCUS, Inc.
15915 Katy Freeway, Suite 300
Houston, Texas 77094
(713) 541-5591 Fax (713) 541-3501
T.B.P.E. FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

US 90

SW3P LAYOUT
STA 117+00 TO STA 137+00

SHEET 2 OF 3

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	67

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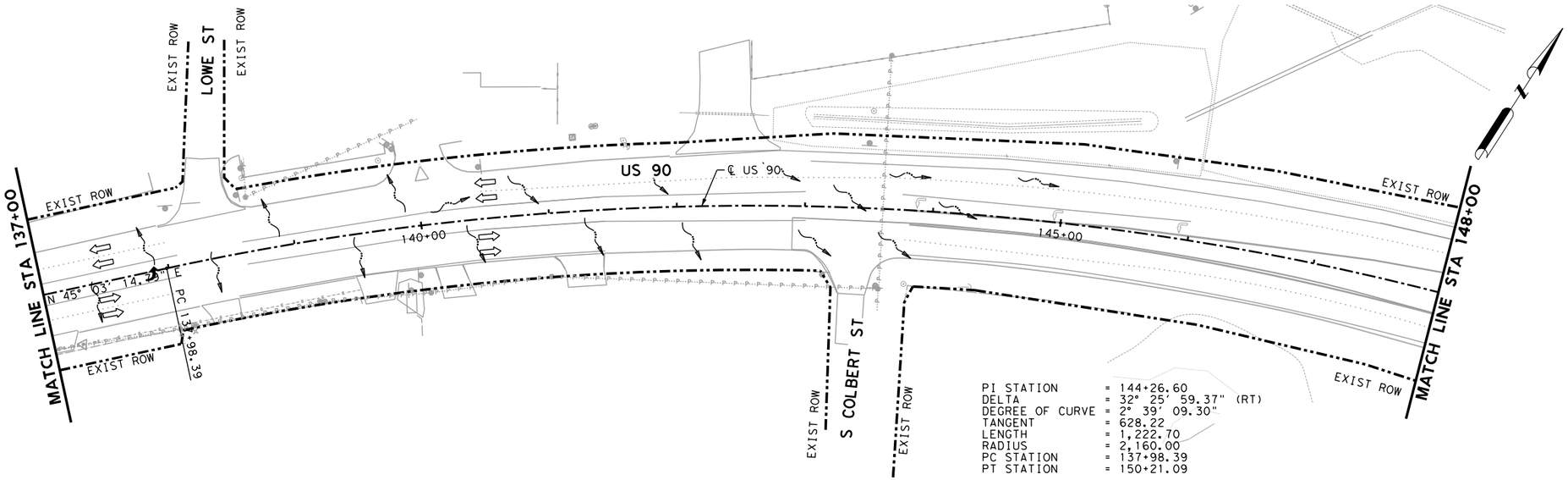


PI STATION	= 144+26.60
DELTA	= 32° 25' 59.37" (RT)
DEGREE OF CURVE	= 2° 39' 09.30"
TANGENT	= 628.22
LENGTH	= 1,222.70
RADIUS	= 2,160.00
PC STATION	= 137+98.39
PT STATION	= 150+21.09

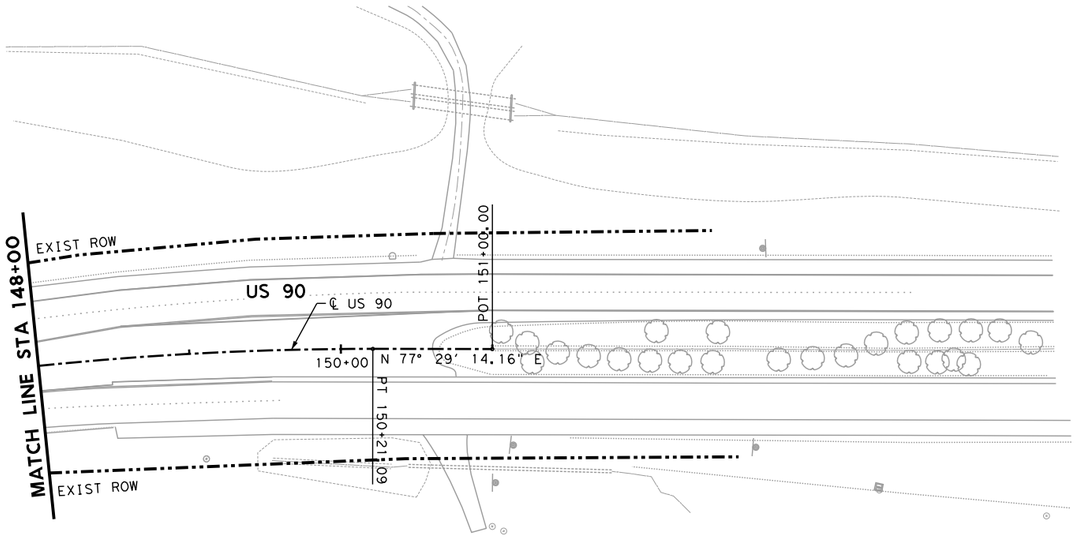
LEGEND

- CL-DI — EROSION CONTROL LOG AT DROP INLET
- S-BAG — SANDBAG FOR EROSION CONTROL AT CURB INLET
- SCF — TEMP SEDMT CONT FENCE
- RFD — ROCK FILTER DAM
- TOP SOIL AND BLOCK SODDING
- FLOW ARROW
- EXIST STORM SEWER
- EXIST INLET
- EXIST TRAFFIC LANE
- PROP TRAFFIC LANE

NOTE:

1. FOR DETAILS ON INLET EROSION CONTROL PLACEMENT REFER TO "INLET PROTECTION SILT FENCE" SHEET.

0′ 50′ 100′
SCALE IN FEET



Inspector

Date Installed _____ Date Removed _____

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
CHARLES M. SHINE
62999
LICENSED PROFESSIONAL ENGINEER
5/25/2022

IDCUS
Planners-Engineers-Program Managers
IDCUS, Inc.
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T.B.P.E.FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

US 90

SW3P LAYOUT
STA 137+00 TO STA 154+00

SHEET 3 OF 3

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	68

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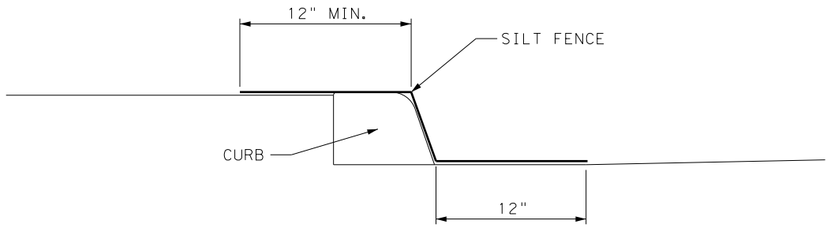
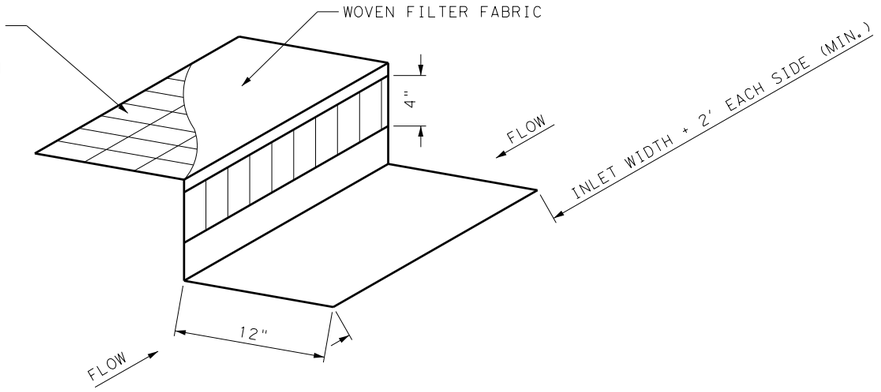
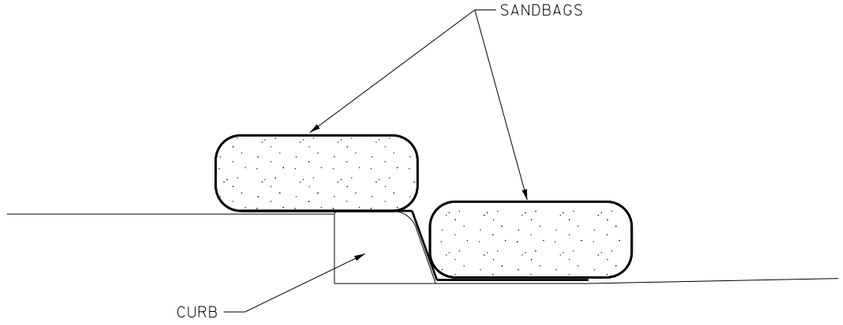


SILT FENCE DETAIL

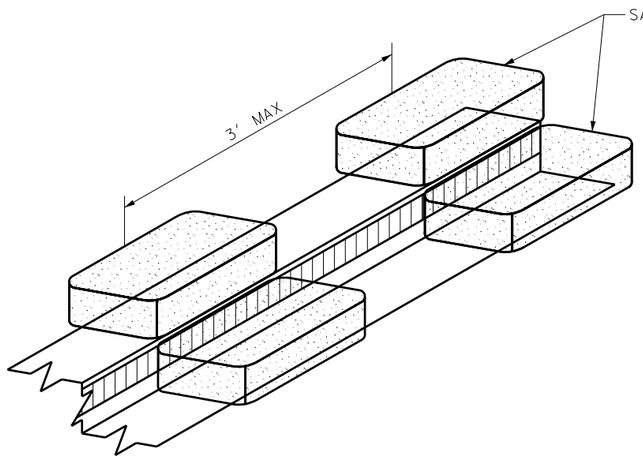
GALVANIZED WELDED WIRE MESH (W.W.M.) (12.5 GA. SWG MIN.) WITH A MAXIMUM OPENING SIZE OF 2" X 4" OR WOVEN MESH (W.M.)



SILT FENCE PLAN

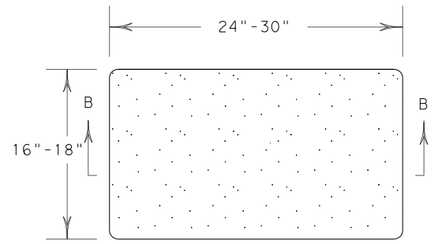


ANCHORAGE DETAIL

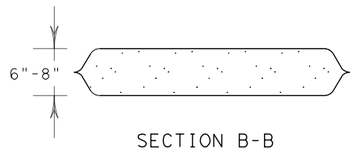


ANCHORAGE PLAN

NOTES:
1. REMOVE SECTION OF FILTER FABRIC AS SHOWN OR AS DIRECTED. FASTEN FABRIC TO EXPOSED WIRE WITH HOG RINGS OR CORD AT A MAXIMUM SPACING OF 15".
2. PLACE SANDBAGS AS SHOWN AT A MAXIMUM OF 3' ON CENTER BOTH IN THE GUTTER AND ON THE INLET. SUBMIT ALTERNATIVE ANCHORING METHODS FOR APPROVAL PRIOR TO INSTALLATION.
3. INSPECT INLETS DAILY. REMOVE ACCUMULATED SEDIMENT 2" OR MORE DEEP. REPAIR OR REPLACE DAMAGED INLET PROTECTION AS NECESSARY.



SANDBAG DETAIL



SECTION B-B

REV NO.	DATE	BY	REVISION

STATE OF TEXAS
CHARLES M. SHINE
62999
LICENSED PROFESSIONAL ENGINEER

5/25/2022

IDCUS
Planners-Engineers-Program Managers
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T.B.P.E. FIRM REGISTRATION NO. F-6825

Texas Department of Transportation

US 90

INLET PROTECTION SILT FENCE

DSN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:	6	TEXAS				US 90
DRN:	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
APPVD:	BMT	LIBERTY	0028	03	109	69

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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. TxDOT - Beaumont District
2. City of Dayton

☐ 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 as required by the Engineer.
3. The project is estimated to involve less than one acre of soil disturbance. In the event the project disturbance acreage becomes equal to or greater than one acre, the CGP is applicable. Contact TxDOT project inspector for coordination with DEQC for necessary action.
4. Take measures to prevent construction materials and debris including, but not limited to wastewater (i.e., cooling liquid, etc.) associated with concrete removal from entering any inlets, ditches, or waterways.

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, including Regional conditions for the State of Texas, 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: Permit # ______
☐ Other Nationwide Permit Required: NWP# ______

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

1. Maintain a neat and clean worksite next to the water and do not allow any debris to fall into the water.
2. Comply with "Work In or Near Waters/Wetlands Regulatory Requirements and Best Management Practices" section found in the Beaumont District Environmental Field Guide.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

☐ No Action Required ☒ Required Action

Action No.

1. 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.

IV. VEGETATION RESOURCES

☐ No Action Required ☒ Required Action

Action No.

1. No tree or vegetation removal/trimming of any kind is allowed. Exceptions are allowed for mowed and maintained grass.

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

☐ No Action Required ☒ Required Action

Action No.

1. If any animal enters the work area, do not harm, harass, or attempt to handle; let the animal leave on its own.
2. If caves or sinkholes are discovered on site, cease work in the area and contact the TxDOT Inspector or DEQC for guidance.
3. Comply with "Wildlife: Regulatory Requirements and Best Management Practices" section found in the Beaumont District Environmental Field Guide.
4. Contractor shall maintain compliance with the Migratory Bird Treaty Act (MBTA) and Texas Parks and Wildlife (TPW) Code section 64.002. The full MBTA guidance may be found here:

   https://ftp.txdot.gov/pub/txdot-info/env/toolkit/350-01-gui.pdf
5. Resource specific BMPs (Section I) and Pavement BMPs (Section II, F) from the 'Updated Best Management Practices (BMPs) for TxDOT Maintenance Activities' guidance under the TxDOT Maintenance Program EA shall be reviewed and implemented where appropriate.

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

☐ No Action Required ☒ Required Action

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
* Any other evidence indicating possible hazardous materials or contamination discovered on site.

List below any bridge class structure(s), not including box culverts, being replaced, rehabilitated, removed, extended or modified as part of this project, or state "None", if applicable.
If "None", then no further action is required. Otherwise TxDOT is responsible for completing asbestos assessment/inspection and evaluation for presence of lead.

Provide results below:

Structure Location	PSN	Element	Lead	Asbestos
None				

If Asbestos is present, then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary.

If Asbestos is not present, then TxDOT is still required to notify DSHS 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.

Hazardous Materials or Contamination Issues Specific to this Project:

Action No.

1. Comply with TxDOT Standard Specification 7.12 and Special Provision 006-012 if evidence of hazardous materials or contamination is noted during construction.
2. Notify TxDOT Inspector or DEQC of any hazardous materials spills including fuel, hydraulic fluid, etc.

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

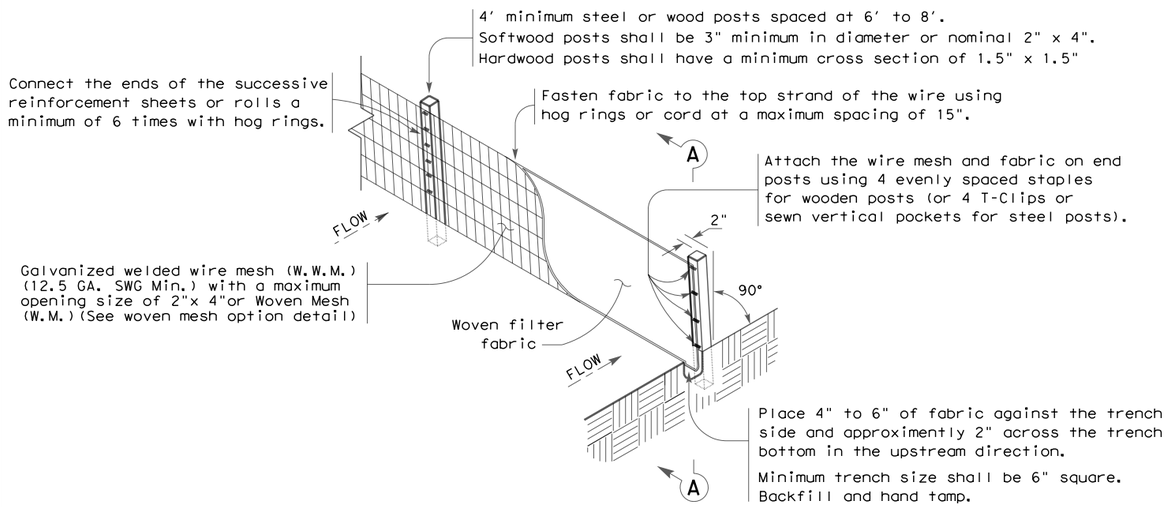
1. Comply with "General Construction" section found in the Beaumont District Environmental Field Guide.

APPROVED BY ______ DATE ______
DISTRICT ENVIRONMENTAL DEPARTMENT

Texas Department of Transportation — Beaumont District Standard

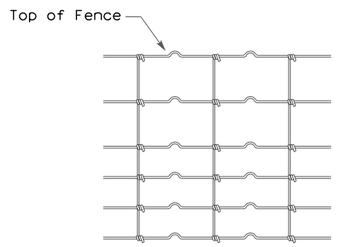
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS
EPIC

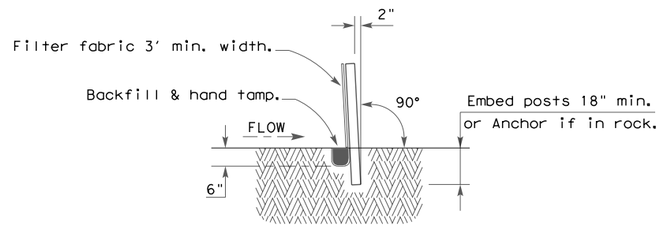
FILE: epic.dgn	DN: TxDOT	CK: AM	DW: VP	CK: AR
©TxDOT February 2019	CONT	SECT	JOB	HIGHWAY
	0028	03	109	US 90
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		70



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

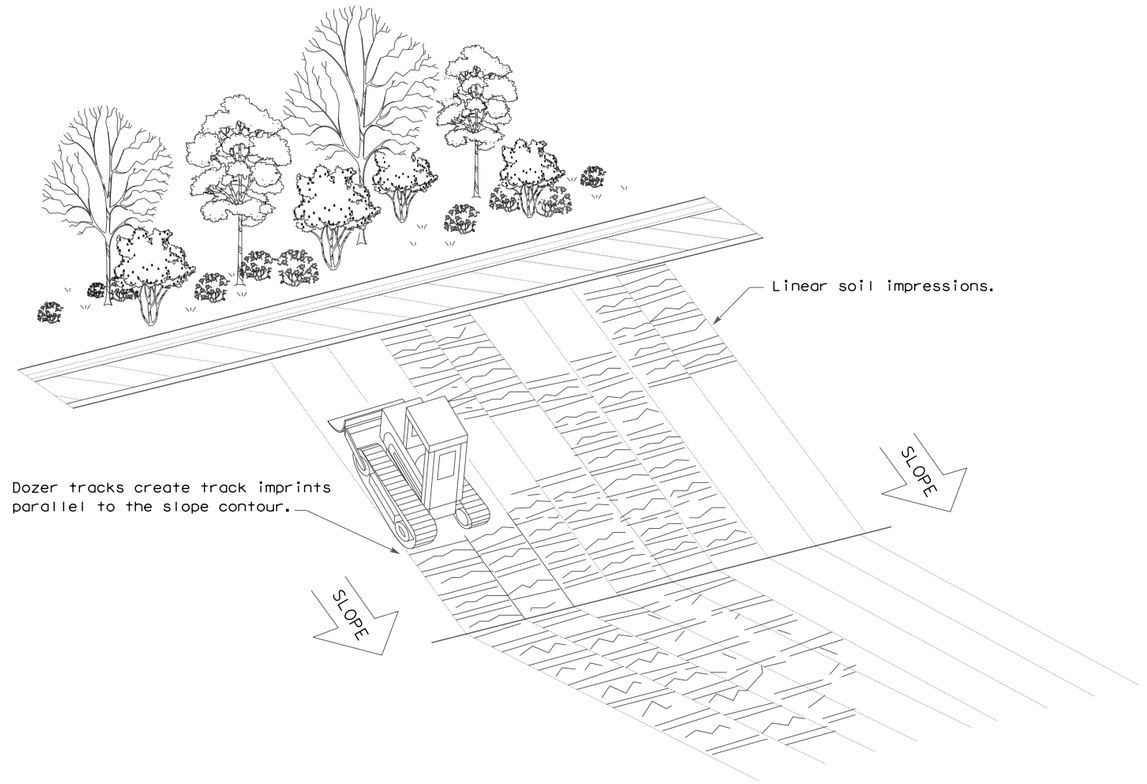
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

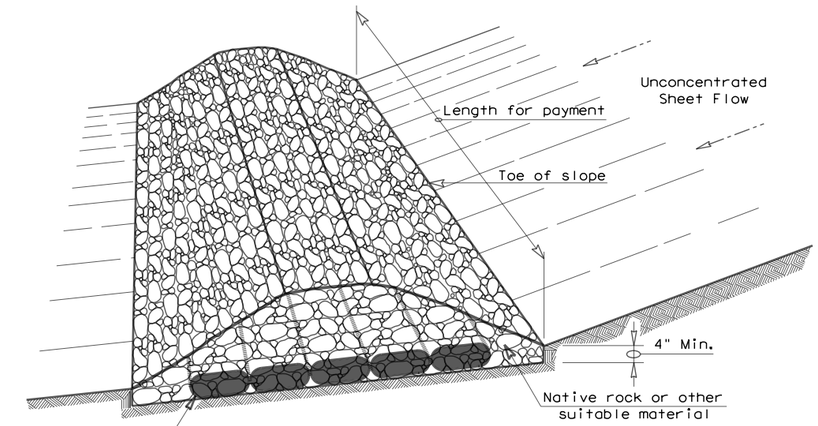
FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0389	02	052	SH 146	
	DIST	COUNTY		SHEET NO.	
	BTM	CHAMBERS		71	

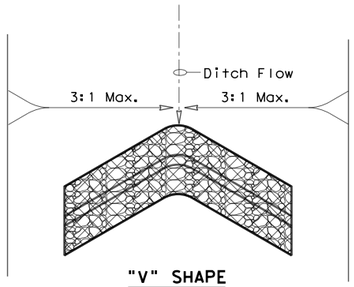
DATE
FILE

DATE:
FILE:

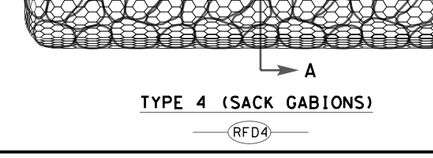


FILTER DAM AT TOE OF SLOPE

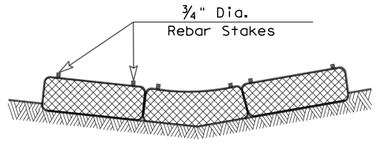
RFD1



"V" SHAPE PLAN VIEW



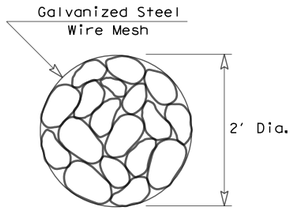
PLAN VIEW



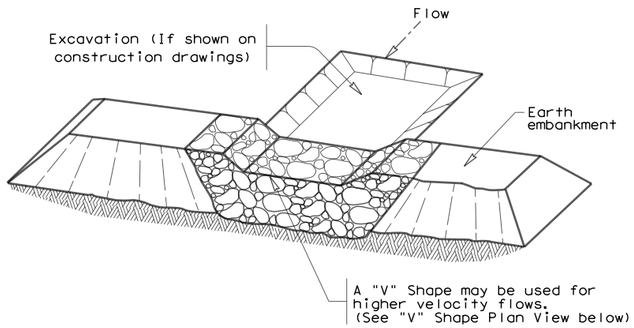
SECTION B-B

TYPE 4 (SACK GABIONS)

RFD4

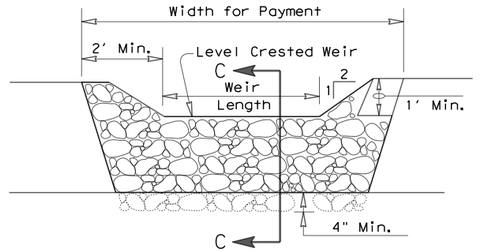


SECTION A-A

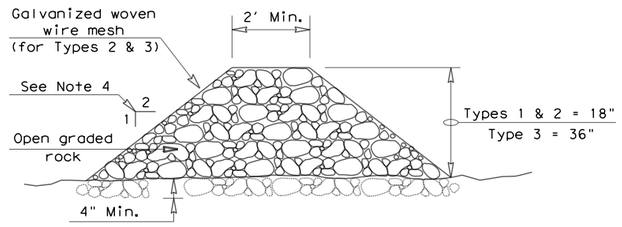


FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

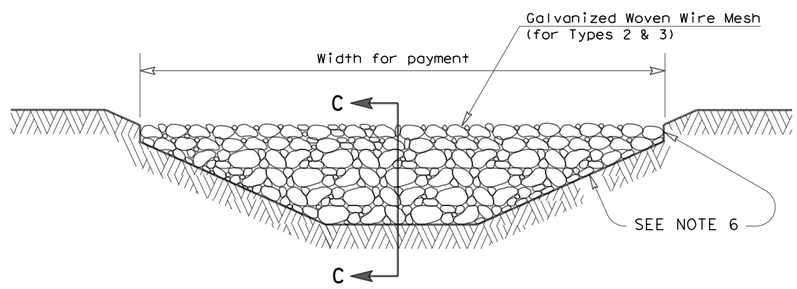
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation

Design Division Standard

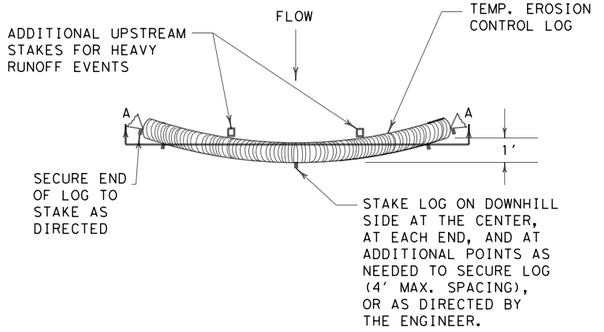
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

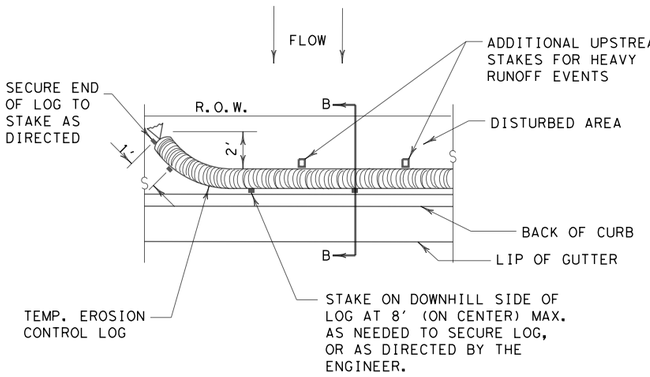
EC(2)-16

FILE: ec216	DN: TxDOT		CK: KM	DW: VP		DN/CK: LS
	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0389	02	052		SH 146	
	DIST	COUNTY			SHEET NO.	
	BTM	CHAMBERS			72	

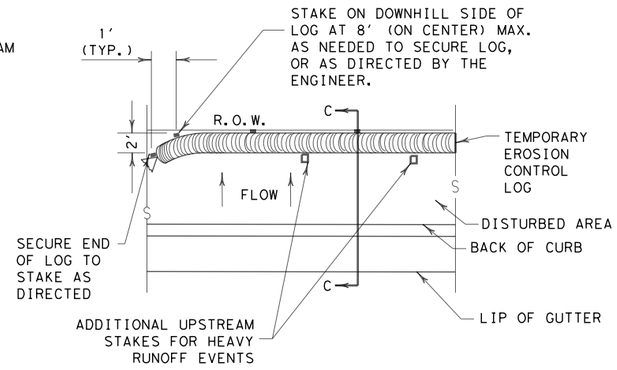
DATE:
FILE:



PLAN VIEW



PLAN VIEW



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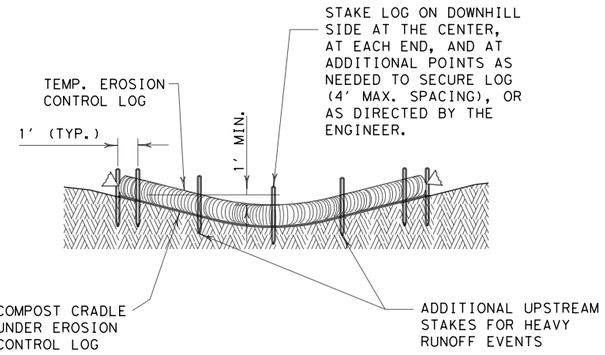
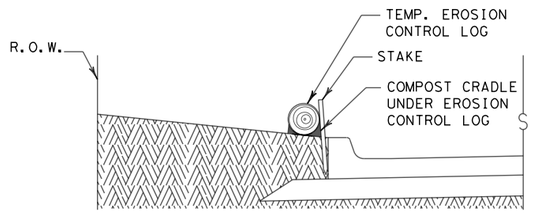


SECTION A-A

EROSION CONTROL LOG DAM

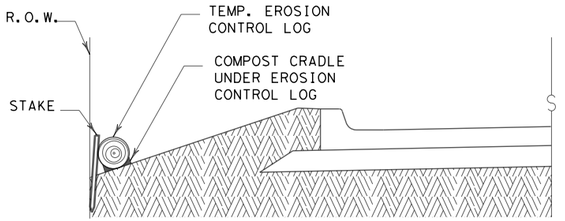
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

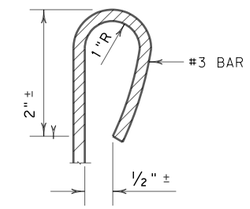
CL-BOC



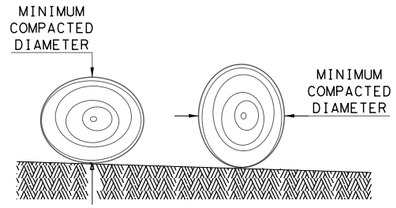
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL



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

GENERAL NOTES:

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

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

Control logs should be placed in the following locations:

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

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

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Design Division Standard

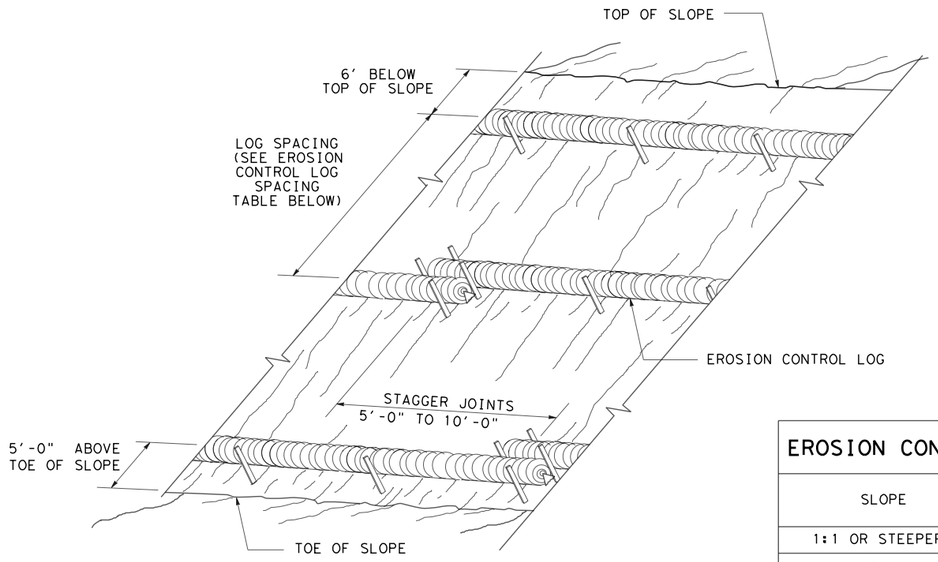
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

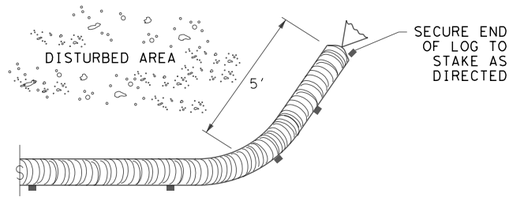
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0389	02	052	SH 146	
	DIST	COUNTY		SHEET NO.	
	BTM	CHAMBERS		73	

DATE:
FILE:



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

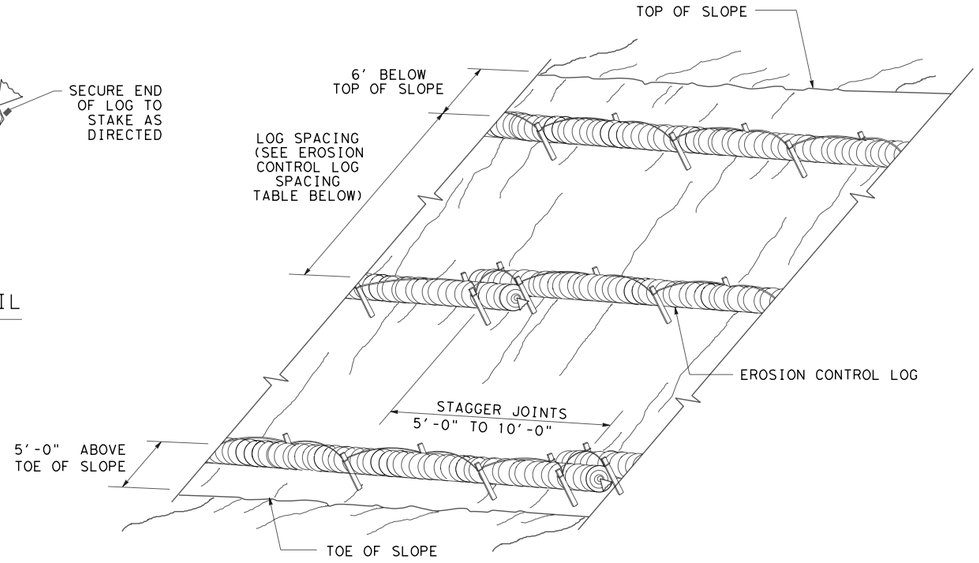
CL-SST



END SECTION RAP DETAIL

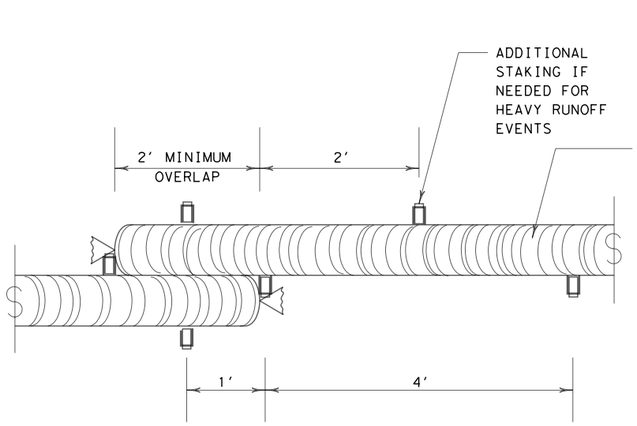
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

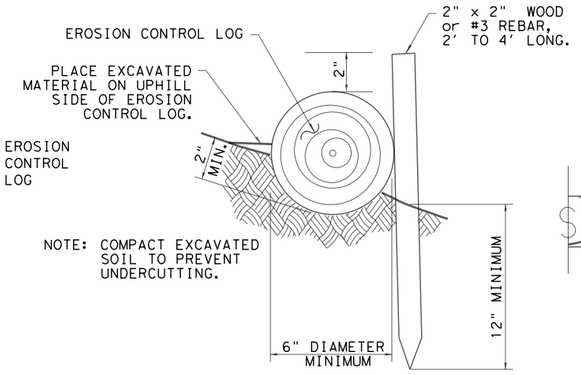
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

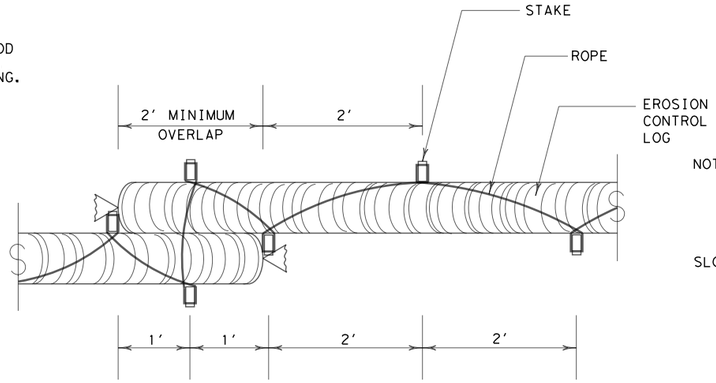


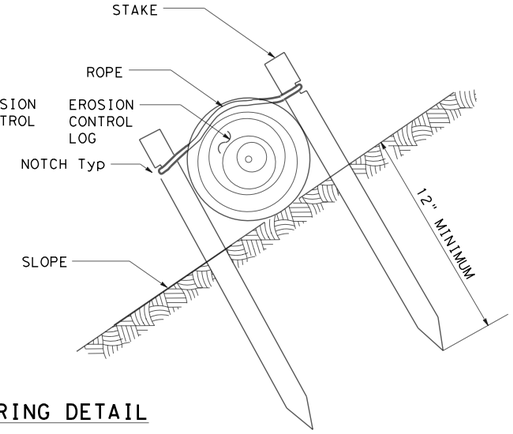


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

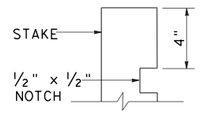
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

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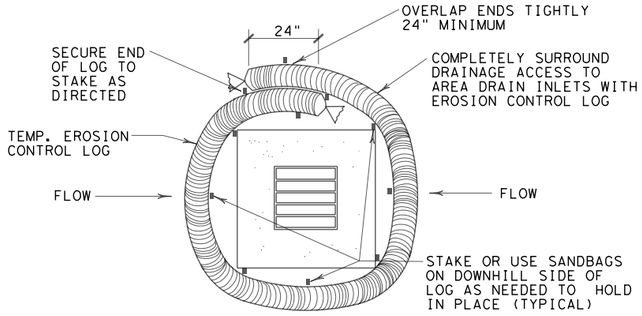
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

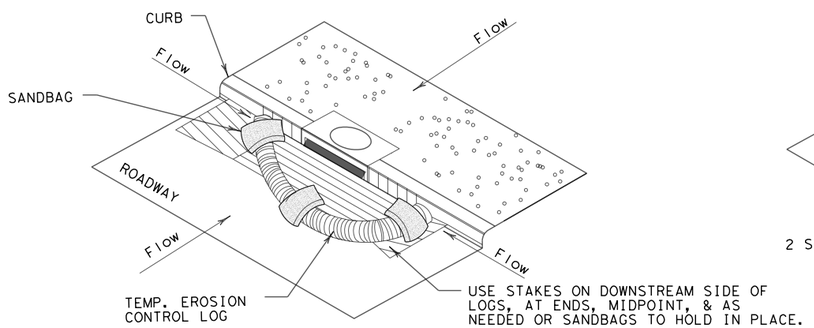
FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0389	02	052		SH 146	
	DIST	COUNTY			SHEET NO.	
	BTM	CHAMBERS			74	

DATE:
FILE:



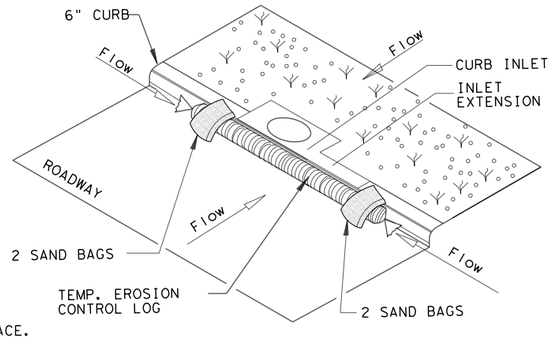
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

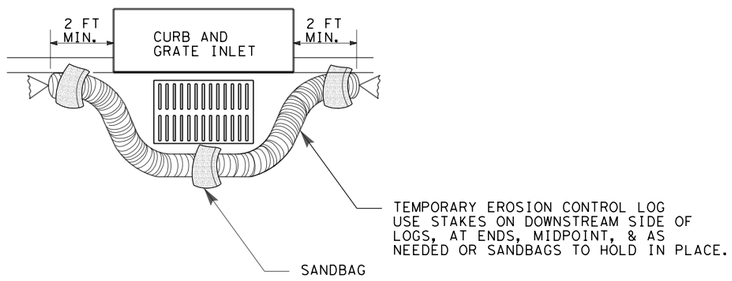
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

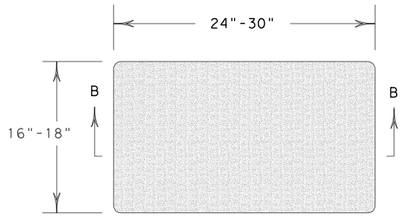
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



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	0389	02	052		SH 146	
	DIST	COUNTY			SHEET NO.	
	BTM	CHAMBERS			75	